

Integrity in Investing Distinguishing Chance from Skill for Informed Planning



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**PROFESSIONAL
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Purposeful Wealth Management

“Investing is not a game where the guy with the 160 IQ beats the guy with the 130 IQ. Once you have ordinary intelligence, what you need is the temperament to control the urges that get other people into investing troubles.”

– **Warren Buffett**, CEO of Berkshire Hathaway, America’s famous investor

This is part of a series exploring integrity in professional wealth planning

Key takeaways:

- Confusing chance with skill is commonly confused by investment fund managers
- A recent pattern of strong returns that conveys skill, may just as likely to be due to chance
- In the short run chance dominates returns, making many average managers appear talented
- Dimensional multifactor strategies reliably demonstrate long-run investing skill

We once observed that “Most bad investing choices are not due to the ‘opportunity,’ but due to investor temperament...” Most so-called investors begin with money, seeking quick gains; they up end with an experience they regret.”¹ Aided and abetted by Covid-related government lockdowns and free money, and accelerated by iPhones and social media chat sites, legions of Americans at home got hooked on trading stocks, options, and cryptocurrencies to get wealthy. Share prices along with space vehicles got shot into low orbit around the earth during an extended bull market. Last year the game ended as once-hot shares and financial vehicles, finally subjected to the cruel force of economic gravity, burned up those wealth illusions on re-entry.

A recent *Wall Street Journal* lead article tells about a well-dressed but evidently glum young man pictured in a shop’s storage area: “Amateur trader Omar Ghias [aged 25] says he amassed roughly \$1.5 million as stocks surged during the early part of the pandemic, gripped by a speculative fervor that cascaded across all markets. As his gains swelled, so did his spending... He says he also borrowed heavily to amplify his positions. When the party ended, his fortune evaporated thanks to some wrong-way bets and his excessive spending... He now works at a deli in Las Vegas that pays him roughly \$14 an hour plus tips and sells area timeshares. He says he no longer has any money invested. “I’m starting from zero.””²

Humans are ludicrously overconfident. For example, about 90% of drivers think they are above average—which is mathematically impossible. In investing realms, overconfidence is manifested in a delusional belief that anyone “smart enough” can time market cycles or pick securities that will allow them to out-perform “The Market” and make big money even if they only rely on social media feeds or cheap subscriptions. Industry players including professionals believe they can select from past performances to see patterns to buy and sell. Buying high usually leads to selling low, since buying in bulls feels great and selling in bears brings relief.



Industry Myths Confuse Chance with Skill

Among Wall Street's favorite narratives is that professional investors like pension funds, hedge funds, and mutual funds have the resources, expertise, and brainpower to "beat the market." Individual retail investors are the "dumb money" who supply them with gains. Both views have an element of truth, but neither is true. After all, 90 percent of all money nowadays is managed by *professionals*. So-called professionals are challenged because they charge fees for the supposed expertise the claim to possess, and so their results are measured against every other professional trading in some way—every year, every quarter, every month, and for a few, every day or hour. Individual investors have no such pressure. Their illusions stem from lack of true accountability: rarely do they subject their complete holdings to sensible tracking against risk-adjusted benchmarks. A few early big wins cause an illusion of special trading talent—but their thinking omits proper accounting for forgotten losers or potential winners not owned.

An enormous body of academic evidence suggests that professionals who actively trade even with all their formidable advantages are themselves the primary contributors to "market efficiency." They are the primary victims of their internal research, trading and management methods that systematically undermine returns they could have had by simply matching a value-weighted market portfolio. That reality undermines their stories of expertise. A recent study by Bessembinder-Cooper-Zhang titled "Mutual Fund Performance at Long Horizons" evaluated the value that actively management of mutual funds added.³

BCZ notes the primary problem of doing fund management evaluations: "The majority of the existing empirical literature focuses on observed monthly returns and constructs performance measures, e.g. Sharpe ratios, alphas, etc. that rely on the conditional or unconditional arithmetic mean of those monthly returns." But since serious investors as opposed to traders are primarily concerned with accumulation or distribution of wealth over a long horizon, geometric returns at long-term intervals are the appropriate performance measure. Those returns incorporate nasty negative monthly volatility over periods included a crisis or two—which greatly impacts long-term fund calculations, as well as the very survival of many funds.

Arithmetic benchmarks show most mutual funds outperforming over short evaluation horizons. But BCZ found

that performance measured geometrically over the 20- or 30-year horizons shows not only underperformance but much failure over time. Goals planned for retirement-driven clients encompass decades, not just one- or five-year periods. This leads to merry-go-rounds of fund selections which keep industry advisors employed.

Mutual fund marketing perversely concentrates on relatively short periods of performance. Morningstar's retail reports primary focus is limited to ten years. Brokerage statements concentrate primarily on rolling 12-month periods. Fund comparisons over time horizon limits of less than ten years limits the extent that statistical analysis that may distinguish chance versus skill for reliably evaluating comparable actively managed fund returns.

- Returns of more than 7,800 U.S. stock mutual funds from 1991 through 2020 were studied (no non-US or global stock funds). The BCZ study looked at monthly, annual, and 10-year periods as well as each fund's history from inception.
- Returns were measured against a total U.S. stock market index and an exchange traded fund (SPY) matching the S&P 500 index of US large companies (only considering beta of the market and not multiple Fama-French market factors).
- The average fund had a return history of only 11 years. The experience of closed funds included in the averages negatively impacted group returns. The percentage of surviving funds that out-performed market benchmarks generally decreased over time.
- The typical fund returned an average of 7.7% annually over the three decades; returns realized by investors was 6.9% due to periodic transfers between various funds and cash. Over that period funds typically averaged close to 1% in advisory expenses. The cost of "being human" from actively chasing returns from buying and selling funds, as BCZ observed, was a drag almost as high as the average fund advisory fee.⁴
- Relative to the SPY's S&P 500 index, the sample of buy-and-held with returns in excess of the SPY:
 - Decreased to 41.1% at annual horizons;
 - Decreased to 38.3% at decade horizons;
 - And settled at 30.3% at full sample horizon (29.6% for compounded returns).
 - The chances of success was less than a coin flip!



The market index of the respected Center for Research in Security Prices (CRSP) database with over 4,000 U.S. stocks shows a 11.1% return during the period of the BCZ study. A hypothetical mutual fund of the U.S. total market index corresponding to the Russell 3000 index (which excludes the smallest cap stocks), were someone to be fully invested the entire thirty years, would show a return of about 10.7% following a Vanguard pricing structure.⁵ There appears to be at least a 3.0% annual gap between benchmarks and average realized returns of managed funds.

Self-inflicted Returns Sabotage

One explanation of lower investor-realized returns may be in pursuit of higher returns the funds that they purchased had poor performance before they exited: Over 20% of funds underperformed low-risk one-month U.S. Treasury bill *during their entire existence*. More than 40% of funds that survived five years or less underperformed Treasury bills over their entire but pitiful, existence—highlighting the extreme cost of adverse fund selection.

Notably a small number of funds performed very well: 442 or 5.6% of the sample delivered a compounded return twice that over the corresponding SPY returns, and 160 or 2.0% delivered a compounded return three times that of the SPY. We cannot know how many investors actually held any such funds for thirty years.⁶ But without an informed multifactor investing approach and the courage to stick with it for decades through markets ups and downs the chance is extremely small—not enough to give a client much peace of mind.

BCZ concludes that there is “a fundamental shortcoming of [fund] alpha [generated by manager skill] as estimated from short-term returns as a performance measure for a long-term investor.” That means, the average manager did not add enough value to justify their fees. They further added: “The results reported here imply that the evaluation of fund performance is intrinsically linked to return horizon: a given fund’s performance relative to [conventional market] benchmarks can be positive over short horizons and negative over long horizons, even when results are measured from a single dataset.” That is, BCZ findings show that popular short-term arithmetic measures of return and risk so popular with Morningstar users and 401k plans using that data do not reliably identify funds offer better outcomes for planning important long-term goals like retirement.

Seeing Patterns That Don’t Exist

How can we explain how both professional and amateur investors, as a group even with expenses, miss total market returns by about 3% each year on average—and only a tiny proportion of funds obtaining more than the full market return equivalent? Media advertisements make investing in funds or stocks or hiring a smart advisor seem easy. The BCZ study shows that cannot be true. While advisors and managers always benefit regardless of their fund performance, the game of investing that investors play should have a new set of rules.

The first rule would be that “you don’t know what you don’t know.” Repeat again. The illusion of knowledge is rooted in human overconfidence, mentioned earlier. Connected with this is the human tendency to see patterns where they do not

exist.⁷ Do a Google image search for “#iseefaces” and you will understand. We are hard-wired to identify patterns, real or not. Who hasn’t seen a figure in the clouds? Those of us from northern New England still remember the Old Man of the Mountain, a rock formation, now gone, that appeared to silhouette an old man. Likely the evolutionary cost of failing to see patterns of lethal predators in a primeval forest was high.



The Old Man of the Mountain, NH (1916)

Professionals and amateurs see number patterns everywhere in market returns. They predict ways to make money on stock or fund price movements using popular schemes or novel notions or old ideas with no basis in academic research. Popular financial media and industry research services encourage this illusion by providing all manner of clever charts, graphs, and tables of numbers. Moreover, brokerage firms frequently advertise tools for “technical trading” that enable you to manipulate data yourself! It’s really fun—until it’s not.

It is one thing to interpret a startled expression in a bowling ball or a light switch, and another to think that patterns found in historical stock market data—especially provided by brokers firms incentivizing trading—is somehow a worthwhile activity for profitable predictions. If anyone has access to the same information, where is the competitive advantage? Human over-confidence in believing that we can see or find some return pattern in the numbers that no one else sees in order to trigger making a profitable trade is being exploited.

Exhibit 1: Proportion of US Stock Market Returns Explained by the Preceding Period's Return

1 Month	Rolling Period Returns					
	Overlapping			Non-Overlapping		
	12 Month	36 Month	60 Month	12 Month	36 Month	60 Month
0.2%	82.7%	93.4%	96.0%	0.6%	3.9%	0.6%

Source: Dimensional Fund Advisors. Past performance is not a guarantee of future results. Indices are not available for direct investment; therefore, their performance does not reflect the expenses associated with the management of an actual portfolio.

Russell 3000 Index data from Frank Russell Company for the period January 1979 to December 2021. Rolling, overlapping periods formed each month. Rolling, non-overlapping periods formed at the end of each period of length specified. Percentages refer to the R-squared from a statistical regression where the dependent variable is the Russell 3000 index's return in one period and the independent variable is the index's return in the preceding period.

Some Statistical Observations

Investors, both professionals and amateurs, encouraged in that myth by research services like Morningstar or Motley Fool,⁸ popularly believe markets to be cyclical and move in waves. They intensively seek out signs of cycles and movements to hopefully futilely predict stocks, sectors or styles showing the right “momentum.” Rolling returns, whether stock or crypto, are a bear trap, luring investors with the illusion of a profitable pattern where none exists. It is not surprising that even academic researchers who know better keep finding patterns in asset prices and returns. A non-trivial fraction of patterns found in professional publications, when intensively examined, turn out to be false positives.

For example, rolling month-to-month performance obscures highly volatile stock returns that otherwise would make return patterns appear far less predictable. Expressed as overlapping, rolling periods multi-year return patterns can appear cyclical because consecutive observations share many data points. For example, a five-year rolling U.S. stock market return computed December 2021 happened to have 59 out of 60 data points in common with the end-of-July five-year return.

Autocorrelation can be measured through the proportion of monthly Russell 3000 US stock index returns statistically “explained” by past return observations. As shown in *Exhibit 1*, a regression of the index's monthly returns on the return in the preceding month finds that consecutive monthly returns have almost no correlation. In technical terms, the so-called autoregressive model produces an R-squared of just 0.2%, meaning just a small fraction of each month's returns could be “explained” by the month preceding.

However, rolling returns measured each month are highly correlated with the rolling return observed the following month—the percentage of variation explained, the statistical R-squared, ranged from 82.7% using 12-month returns to 96% for five-year returns. These values stand in

stark contrast to the regressions of non-overlapping, rolling returns, for which consecutive observations are essentially totally independent in a statistical analysis.

Market cyclicity frequently occurs in economic data series. Measures such as GDP growth, inflation, and employment are relatively slow-moving. Their values actually autocorrelate—values in any one period are strongly related to those in the preceding and following periods. Those patterns can be somewhat meaningful. The mistake of investors is to think that stock patterns have similar cyclicity.

A truly cyclical stock market, where one period provides useful information about the next period, would present frequent opportunities for market timing. However, changes in stock market prices are fast-moving so that autocorrelation of returns is negligible. Burton Malkiel's famous 1973 book, *A Random Walk Down Wall Street* popularized the idea that one period tells you nothing about the next. The paucity of the average active fund outperforming a market index in the BCZ studies and the large short fall confirms Malkiel's assertion of a random walking market.

The evidence presented demonstrates why active investing through traditional mutual funds or separate accounts or hedge funds⁹ is a loser's game. While it is possible to win, the odds of doing so are so small that it isn't prudent to try.

Beware of any investment salesman promoting XYZ mutual fund or ETF based only on a five or ten year “good” return pattern. Since few salesmen ever promote funds with a “bad” return pattern, most likely there is survivorship bias present. The best way to show whether that salesman is likely a pretender, simply ask: were you buying XYZ for you and clients five/ten years ago?

Hidden Cost of Selecting “Best Ideas”

A significant activity of active managers to justify their fees perversely decreases chances for success. According to Morningstar, the average actively managed U.S. fund holds



160 stocks out of potentially 4,000 stocks. Managers keep this low to concentrate on their “best ideas.” However, studies suggest that the fewer number of stocks held, the lower are returns. Why should this be? *The opportunity cost of unselected big winners.* Making bets on potential big winners is not enough; competitors identify them too, bidding up the price, reducing the expected return. Index funds with lower management costs outperform by capturing all the needles in all the haystacks. Dimensional Fund Advisors enjoys higher returns than index funds partly due to its globally diversified approach encompassing all major markets among its wide portfolio of funds.

Warren Buffett, the famed super-investor CEO of Berkshire of 58 years, admitted as much once to shareholders:

Most of my capital-allocation decisions have been no better than so-so. In some cases, also, my bad moves have been rescued by very large doses of luck... Our satisfactory [long-term] results have been the product of about a dozen truly good decisions—that would be about one every five years [!].

One of the world’s greatest investors attributes nearly all his superior performance to approximately 12 decisions. That means Mr. Buffett gets his “best ideas” roughly twice a decade. How likely are solicitations arriving in your

email box daily to outperform an index fund? Recommendation: turn up the intensity of your spam blocker or permanently “junk” them as they come in.¹⁰

The return distribution for most long-horizon investors (and there should not be any other kind) is positively skewed with far more losers than winners (the median return therefore is below the mean return). What makes things worse, are drags from high fees and other costs active managers incur. William Sharpe’s classic *Arithmetic of Active Management* theorized that “after costs, the return on the average actively managed dollar will be less than the return on the average passively managed dollar.”¹¹ Fama and French tested this in *Luck versus Skill in the Cross-Section of Mutual Fund Returns* and found Sharpe’s hypothesis to be true.¹² Other foreign markets around the world show the same returns. Yes, some managers will catch the right stock at just the right time, but how do you catch the right manager at the right time? BCZ show how very few there are and how conventional methods focused on short-term measures cannot reliably identify the long-term performers necessary to realizing critical long-term goals.

Separating Return Patterns from Chance

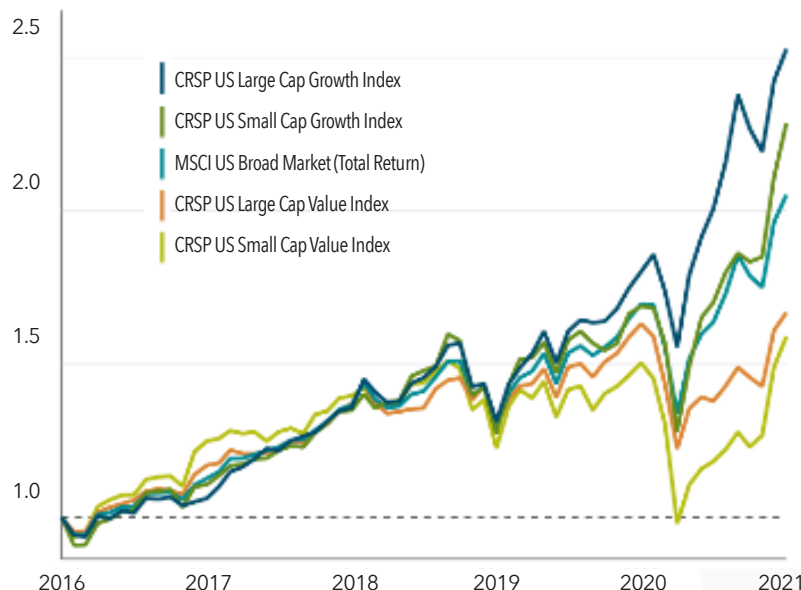
Exhibit 2 illustrates how misleading chance patterns can confuse informed investing. The 5-year cumulative return

of the US large cap growth index charted dominates the five different market indexes selected for a period ending in 2021. In fact, for ten years ending in 2021, the MSCI US Large Growth Index had an average return of 14.2 % annualized and 329% cumulative. Yet someone expecting such returns to continue for the next ten years almost surely would be disappointed. Disappointment would have begun the very next year: that same growth index declined 33.8% in 2022, reducing a decade of cumulative returns by over a third in one year.

In contrast, the seemingly laggard CRSP US Large Value index back in *Exhibit 2* had only a -2.0% loss in 2022, bringing their outcomes more closely together. See the change in *Exhibit 3*. *Exhibit 4* provides a larger historical data context. True value stocks as an asset class long-term have outperformed growth stocks as

Exhibit 2: Return Patterns of Select US Asset Classes

Monthly Returns, January 2016 to 2021

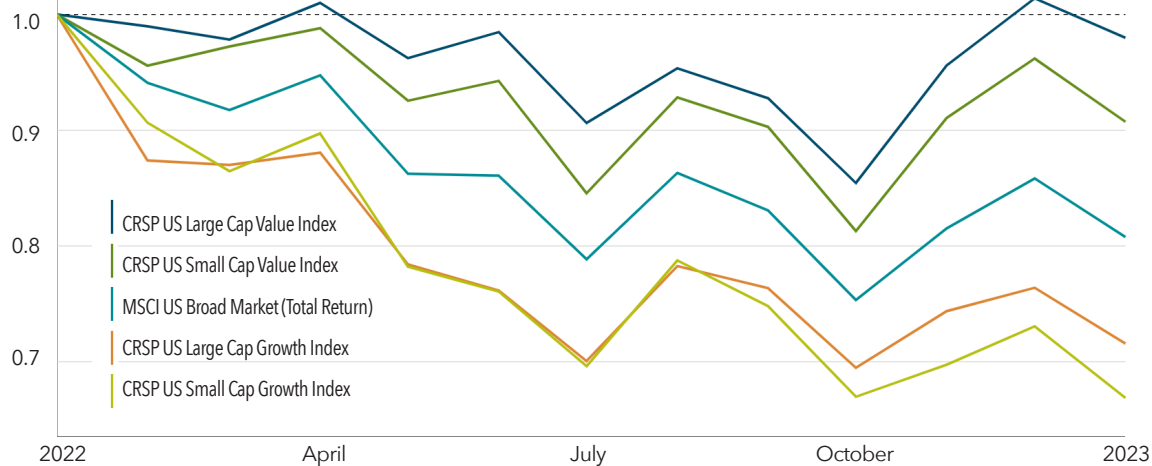


Source: Dimensional Fund Advisors. Performance data shown represents past performance. Past performance is no guarantee of future results and current performance may be higher or lower than the performance shown. The investment return and principal value of an investment will fluctuate so that an investor’s shares, when redeemed, may be worth more or less than their original cost. Average annual total returns included reinvestment of dividends and capital gains. Index returns are not representative of actual portfolios and do not reflect costs and fees associated with an actual investment. Returns provided by CRSP, the Center for Research in Security Prices and MSCI, Inc.



Exhibit 3: Return Patterns of Select US Asset Classes

Monthly Returns, January 2022 to December 2022



Source: Dimensional Fund Advisors. Performance data shown represents past performance. Past performance is no guarantee of future results and current performance may be higher or low than the performance shown. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Average annual total returns included reinvestment of dividends and capital gains. Index returns are not representative of actual portfolios and do not reflect costs and fees associated with an actual investment. Returns provided by CRSP, the Center for Research in Security Prices and MSCI, Inc.

academic studies have shown, although the path can be bumpy. Without knowing expected returns chance patterns of realized returns can seriously confuse undisciplined investors.

When I studied for my CFP back in 1981, the investing section was dominated by the Capital Asset Pricing Model (CAPM) of so-called "Modern Portfolio Theory." That earned Bill Sharpe (1964) and John Lintner (1965) Nobel prizes. The CAPM theorizes that the ideal market portfolio for an investor is some value-weighted combination of all investible stocks, bonds, and alternative assets. Further every portfolio's expected return is a linear function of its beta, the sensitivity of the market return's price volatility.

The academic understanding today is much more complex. The empirical data studied on new computers in the 1980s did not support the theory and was eventually superseded by the Fama-French multifactor model, leading to a Nobel prize for Eugene Fama (2013). The CAPM still dominates the theory and practice of the financial industry, however. It is simple to learn and easy to explain and carries an academic gloss. Yet due to my MBA (1989) from the Simon Business School, what were then termed CAPM "anomalies" gave me enough insight from my studies in advanced finance to decide to pursue that new Fama-French multifactor approach for my client's professional investment planning.

Planning for Components of Return

In a multifactor approach, an asset's return can be split into its expected return, which is our best guess of what will happen based on all information currently available, and its unexpected return, which is the element of surprise—the difference between the return that actually happens relative to the return expected:

$$R = E(R) + U \quad (1)$$

The goal of those who study stock returns is primarily to predict the future, not describe the past. In the context of equation (1), researchers try to identify persistent differences in expected return across assets or asset classes. Differences in the cross-section of expected returns, however, are usually small relative to the high volatility of unexpected returns. Thus realized returns are understood mostly to be the result of chance.

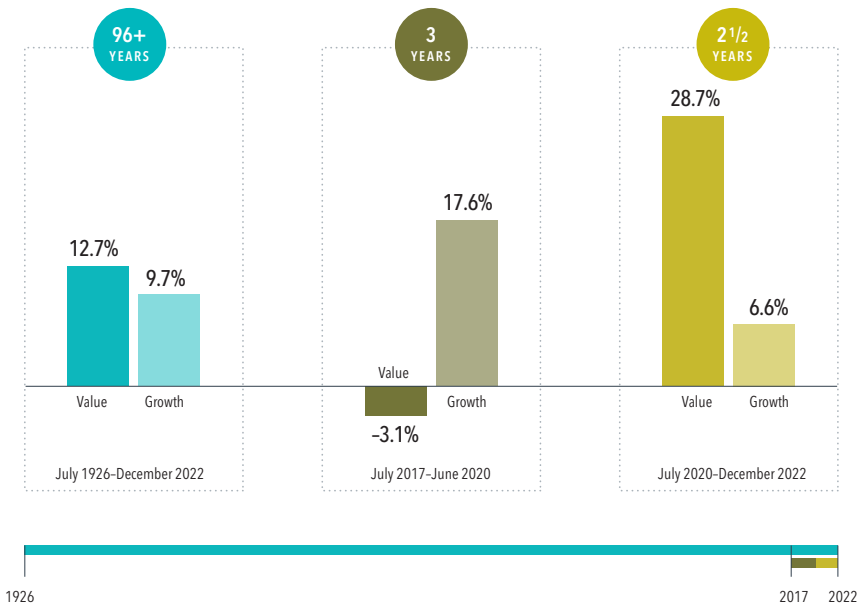
Over shorter investment horizons—three, five, ten, even twenty years—realized returns typically dominate the unexpected component. Inferences made by investors from a pattern of realized returns are most often what are termed in financial jargon, "false positives." What is that? A medical test may indicate that you could have cancer, but your surgeon finds none. Barring the possibility of a miracle, the medical test was a "false positive."

We need to make predictive estimations for return [R] for various long-term planning models, such as for retirement purposes. But first for modeling expected returns, we must have identified persistent differences in expected returns



Exhibit 4: Growth Versus Value Performance in Historical Context

Annualized Returns, July 1926 – December 2022



Source: Dimensional Fund Advisors. Performance data shown represents past performance and is no guarantee of future results. Value and growth stocks represented by the Fama/French US Value Research Index and the Fama/French US Growth Research Index, respectively. The Fama/French Indices represent academic concepts that may be used in portfolio construction and are not available for direct investment or for use as a benchmark. Index returns are not representative of actual portfolios and do not reflect costs and fees associated with an actual investment. Returns provided by Ken French, available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[E(R)] of the asset classes that will be allocated for model portfolio composites even though differences in E(R) may be small relative to the volatility of stocks or unexpected returns [U]. Informed planning allows us to see through a confusing pattern of unexpected returns [U] that an actively managed fund might provide. Some managers would have you believe from their results that another 329% return for US large growth stocks for the ten years going forward is reasonable, as in *Exhibit 2*, and they can do it again. That is unlikely.

Short-term fund performance, however impressive, provides little insight into manager skill due to the prevalence of unexpected returns. The empirical evidence of *Exhibit 4* provides valuable insight into the expected return of the two asset classes we may use for modeling. For informed planning, we assume E(U) is equal to 0% and ignore patterns of unexpected returns. For our models, we construct a market-weighted model empirically with estimated market, size and value premiums in proportion to the structured allocations. That concept underlies our firm's approach for structuring multi-factor strategies.

More Reliable Retirement Returns

Modern finance has developed far beyond the old “modern portfolio theory” of the 1980s. Insights from valuation theory

from modern finance has organized research more meaningfully and usefully for portfolio strategies to capture full market returns. One insight, confirmed by the BCZ study, is that evaluations of managed funds, like those of Dimensional Fund Advisors, must be based on long time horizons, not the short-term practice derived from CAPM related notions. Planning based on long horizons is critical for achieving financially secure retirement planning outcomes as well as legacy goals. Many actively managed funds today can never do that because most will close before they can become “long-term” for any evaluation.

It's important to evaluate just how well a wealth manager has performed not just in a couple handpicked strategies but across a broad series of strategies and over

the longest time periods available. Did they deliver what they said they'd deliver? Did their approach remain consistent? Have their solutions survived the test of time? Are you confident they can repeat that success over your lifetime?

Conclusion

The revolution in modern finance of the past forty years has provided breakthrough insights that make conventional active management outmoded. For example, it is known that a small company trading at a relatively low price with high profitability has a higher expected return than a large company trading at a higher price with low profitability.¹³ Research has led to categorizing differences in company size, relative price, and profitability as long-term return drivers—or dimensions. The expected returns derived from academic research for those dimensions have tended to persist over many decades and are pervasive around the world. Most important, a highly respected firm with dozens of “long-term” strategies that may be evaluated as BCZ suggests has them available in fund form.

Dimensional Fund Advisors has a proven systematic process for selecting stocks for well-diversified market portfolios. Dimensional funds have a track record of out-performing most index market portfolios in ways that active managers

cannot do, as BCZ shows, despite noisy realized returns and long periods when a particular driver doesn't deliver its primary dimensional premium for a fund.

Professional Financial has applied one philosophy behind our strategies for close to thirty years. Through that time from our modest beginnings, despite a wide range of

troubled markets, clients have been attracted and stayed with us. The track record of the Dimensional investment strategies we've used for clients and for ourselves is revealing. Our experience confirms the importance of having a philosophy for investing that you can stick with, grounded in science, and showing clients the rewards of working with a professional firm you can trust.

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ENDNOTES

1. Paul Byron Hill, "Protecting Planning from Financial Propaganda," *Planning Perspectives* (2Q 2022), page 1.
2. Gunjan Banerji, "The Retreat of the Amateur Investors," *Wall Street Journal* (February 4-5, 2023), B1.
3. Hendrik Bessembinder, Michael Cooper and Feng Zhang, "Mutual Fund Performance at Long Horizons," *Journal of Financial Economics* (January 2023). Dimensional Fund Advisors annually publishes *The Fund Landscape* that studies US-domiciled mutual funds and ETF performance over the prior twenty years, but much less rigorously.
4. BCA suggest that investors sacrificed \$1.02 trillion in wealth during the period due to such behavior.
5. One month U.S. Treasury bills for the 30-year period were 2.5%. The consumer price index was officially 2.25%.
6. For those interested, anyone crazy enough to put all their money into the Dimensional U.S. Small Cap Value portfolio and stayed there through thick and lots of thin would have experienced about three times SPY's return.
7. Michael Shermer, "Patternicity: Finding Meaningful Patterns in Meaningless Noise," *Scientific American* (December 1, 2008).
8. From a Google search, see this site with a serious young man at his computer thoughtfully looking into space: <https://youngandtheinvested.com/best-stock-investment-research-websites-software/>
9. See Nicolas Bollen, Juha Joenvaara and Mikko Kauppila, "Hedge Fund Performance: End of an Era?" *Financial Analysts Journal* (2021) and Rodney Sullivan, "Hedge Fund Alpha: Cycle or Sunset?" *The Journal of Alternative Investments* (Winter 2021).
10. Hendrik Bessembinder in previous research showed that less than half of all stocks generate positive returns over their publicly traded lifetimes, and that only 4% of a stock created all the net gains in the U.S. market between 1926 and 2015. *Journal of Financial Economics* (September 2018). The problem of professional investors is that of omission: they can't search every field in an immense world of haystacks where chance is at work.
11. William F. Sharpe, "The Arithmetic of Active Management," *Financial Analysts Journal* (January-February 1991).
12. Eugene F. Fama and Kenneth F. French, "Luck Versus Skill in the Cross Section of Mutual Fund Returns," *Journal of Finance* (December 2009). Ssrn.com/abstract=1356021
13. See Paul Byron Hill, "Informed Strategy: Models and the Art of Science," *Planning Perspectives* (3Q 2017).

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