Planning Perspectives 1Q 2019

Integrity in Investing

Optimize Winning by Losing Uncertainty

Paul Byron Hill, MBA, MFP, MSFS, ChFC®, CFP®
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PROFESSIONAL FINANCIAL
Integrative Wealth Management

"Once you accept [Dimensional's] view of the markets, the benefits go way beyond just investing money."
– **David Booth**, *Founder and Executive Chairman of Dimensional Fund Advisors*

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

Key takeaways:

- The goal of wealth planning is to optimize personal utility, not to maximize returns
- Investment strategies need to be stress-tested periodically to confirm their viability
- Investors need to avoid making strong inferences from too little evidence
- Investing is always risky, but diversified dimensional allocation strategies increase certainty

People planning for their future rationally prefer certainty over uncertainty. The known always seems safer than the unknown. People prefer to maintain the quality of their lifestyles throughout what they hope will be a long retirement. They prefer to avoid going broke or depending on charity or government. Optimizing a client's utility through skilled wealth planning means effectively coordinating the many factors that impact a quality lifestyle in retirement–social security, pensions, taxes, inflation, healthcare, asset protection, insurance, legacy–as well as managing investments to most reliably capture expected returns.

Blindly allocating too much to stocks chasing higher returns increases uncertainty, possibly jeopardizing the dependability of future income flows. And yet, without enough risk exposure for expected returns, money could run out if you live too long. Wealth planning must manage multiple sources of uncertainty consistent with client needs, values and goals in ways that tradeoff the certainty of competing desires. Life is not certain, but the probability of success may be improved by smarter wealth planning.

Exhibit 1 below illustrates how a retirement experience could be optimized. The client's personal utility function is the imaginary curved concave line. The investment function of risk/return tradeoffs is shown as a straight line that intersects the utility curve at two points, A and D. A series of allocations strategies with increasing expected return are a function of line A-D. The highest possible return is D; the average is B. C, however, is the optimum utility point for client certainty. Allocation E may yield a higher expected total wealth, but it's suboptimal. B can intersect with C, but client's utility is less if only considered in terms of financial wealth from investing—"wealth" being broadly defined not just as assets but also people.

HOW DIVERSIFICATION INCREASES UTILITY OF WEALTH

Diversification directly impacts potential utility by marginally increasing certainty. People often think of volatility reduction as the only benefit of diversification. In fact, there are many more benefits, including the important

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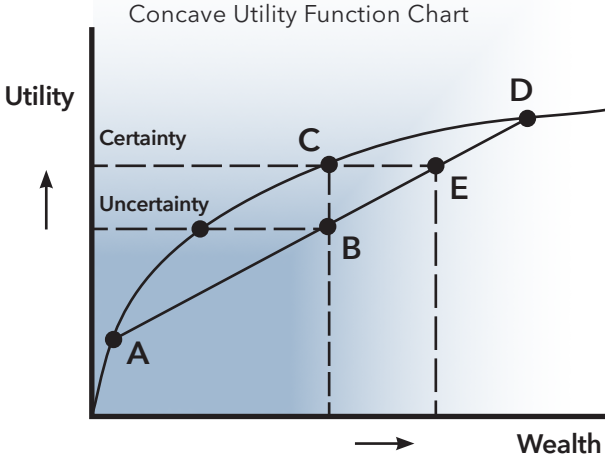
Exhibit 1: OPTIMAL WEALTH STRATEGY IN UTILITY THEORY
Concave Utility Function Chart

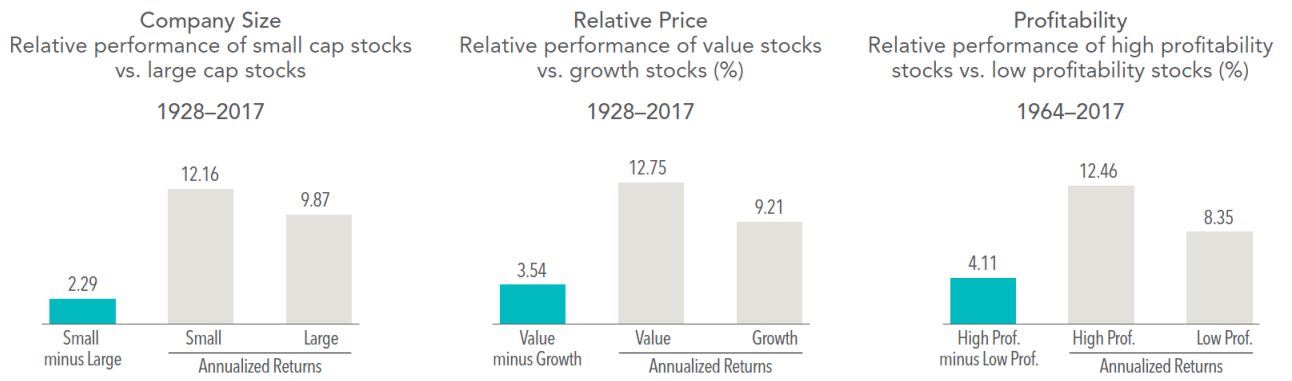


role broad diversification plays within a dimensional-style portfolio structure for delivering more reliable planning outcomes, reducing investor uncertainty and so increasing their utility. Our firm structures well-diversified multi-factor strategies along the dimensions of expected returns learned from decades of scientific research to systematically pursue more client utility.

How may diversification improve client certainty and wealth utility? As we know, not all securities have the same expected return. The valuation equation[1] implies that it is possible to use market prices and fundamental data to systematically identify differences in expected returns among securities. Consistent with standard valuation theory, variables like company size, relative price, and profitability have been shown to explain differences in average returns with empirical back testing.[2] Unlike many factor variables that fail to hold up to closer scrutiny, academic research that Dimensional Fund Advisors relies on has shown that premiums associated with company size, relative price, and profitability are sensible, persistent across time periods, pervasive across markets, robust, and cost-effective in real-world portfolios.[3]

When a realized premium has been positive, not all securities in that group will contribute equally to its return. Some securities performed extremely well and contributed greatly, while others may have had average or poor returns.[4] It is not possible to consistently predict which of the relatively small number of securities will do well and drive a positive realized premium for that group of securities because in many cases, news about why they will do well has not yet arrived. For that reason, Dimensional believes the most reliable way to capture the higher expected returns associated with premiums is with a diversification methodology with a continuous focus on all stocks in a group of higher expected return stocks. A methodology that is not sufficiently well-diversified may inadvertently exclude from its holdings those companies that would have generated the group's premiums. As a result, this diversification methodology captures the reliable drivers—called "dimensions"—of expected returns.

Exhibit 2: EMPIRICAL EVIDENCE OF THE DIMENSIONS OF EXPECTED RETURNS IN US STOCKS



Annualized compound returns (%) in US dollars. Company size premium: Dimensional US Small Cap Index minus the S&P 500 Index (Large). Relative price premium: Fama/French US Value Index minus the Fama/French US Growth Index. Profitability premium: Dimensional US High Profitability Index minus the Dimensional US Low Profitability Index. Please refer to the Appendix for descriptions of the Dimensional and Fama/French indices. *S&P data © 2018 S&P Dow Jones Indices LLC, a division of S&P Global. All rights reserved.*

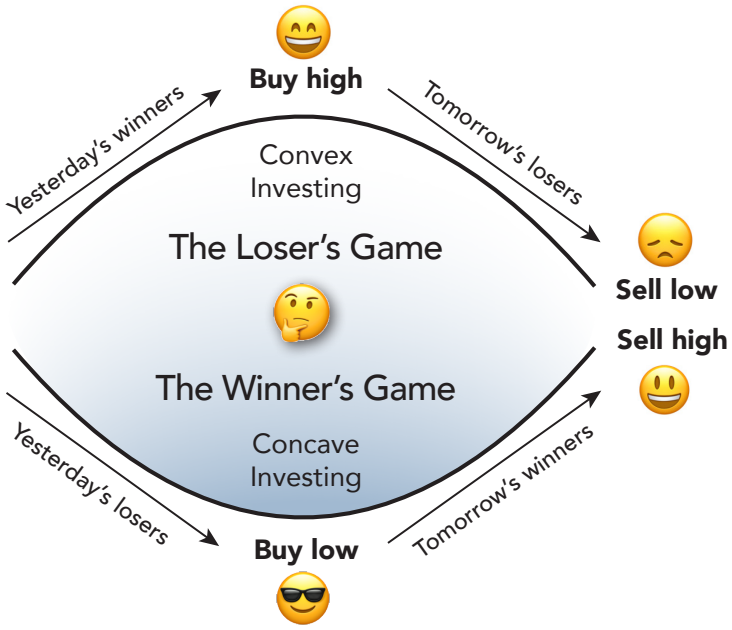
A REVIEW OF MARKET RETURNS

After strongly performing in 2017, equity markets globally delivered broadly negative returns in 2018. This was covered in our annual *Global Market Review* for 2018. News stories impacting the views of market participants last year typically included reports on global economic growth, rising U.S. corporate earnings, low U.S. unemployment, the implementation of Brexit, U.S. trade wars with China and other countries, and rising interest rates in the U.S. as the Federal Reserve's excessively easy monetary policy finally ended and interest rates dictated by Fed policy progressively increased each quarter last year.

Investors without the conviction of an investing philosophy informed by financial science invariably start with forecasting presuppositions from recent market results: thinking begins with the end in mind (picking winners, since that appears more certain, providing greater emotional utility). Investors selectively find evidence to justify their conclusions rather than being open to what the evidence reveals (which should include painfully evaluating previous decisions year-by-year). In a highly competitive market for investor capital, recent high fund performance and fashionable hedge fund-like schemes with attention-grabbing returns are easiest to sell.

A well-documented common investor mistake known from behavioral economics is "recency bias." Recency bias causes more recent returns to drive investor decisions. In economic theory, more is better than less. So investors attempting to maximize utility observe recent high returns (good or bad), and project those results into the future. For example, as of year-end, the 10-year return for the U.S. S&P 500 Index was 13.1% with a 243% total return, while the MSCI Emerging Markets Index returned just 8.4% yearly with a 124% total return (with greater uncertainty). Volatility of the S&P 500 index was about 14% a year, and the MSCI Emerging Market index about 19%. To be sure, investors prefer certainty—lower return with nearly 40% greater volatility. Given that developed non-U.S. securities performed even worse than emerging markets, it is no surprise in an environment with very low interest rates that in reviewing portfolios of prospective clients planning for retirement, most had extremely high allocations to large U. S. growth stocks. Unusually low volatility for the last two years made this more attractive.

Exhibit 3: **INVESTING BEHAVIOR: LOSING "CONVEX" & WINNING "CONCAVE"**



While there are many reasons why a U.S.-based investor may have home bias in preferring a U.S. equity allocation, using return differences over comparatively short time periods (we believe even 10 years is "short") as a major factor in decision making may miss future major opportunities in the larger global market. While international and emerging markets stocks have delivered relatively disappointing returns recently, that has not always been the case, and not the average case. Longer-term, there is very strong evidence of valuable diversification benefits in non-U.S. stocks because in equilibrium, the cost of capital should be the same throughout the world. This is a planning topic to be explored another time.

Investors engagement in sub-optimal economic behaviors is well-documented. *Exhibit 3* diagrams "Convex" and "Concave" investing methods. Intuitively investors know buying high and selling low isn't a profitable strategy, yet investors as a group keep buying after recent strong performance (when higher valuations means expected returns are lower) and sell after poor performance periods (when the reverse is true). I recall about a decade ago when investors were piling into emerging markets due to several years of very strong performance: For five years ending

in 2007, the S&P index gained a 26% total return, while the emerging markets index returned 350%. Yet without a well-informed investing philosophy, like someone lost in the Adirondack woods without a compass or a map, investors reflexively play The Loser's Game as they wander in circles gathering information about recent hot funds. Most of the new money for emerging markets came in 2007, driving prices to new highs just before a collapse due to the start of the Financial Panic late that year.

FACTORING VALUE INTO PREMIUMS

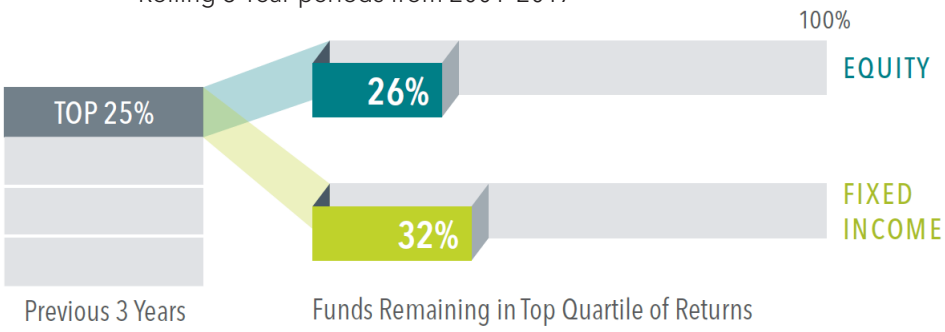
The strong outcomes from value strategies that many clients realized years ago seem increasingly distant and faded in memory. The serial out-performance of U.S. "growth" stocks relative to "value" stocks has been noticed widely. *Exhibit 2* shows strong evidence that dimensional premiums of value, size and profitability existed historically, but concerns are voiced that this information is widely available, including industry research services, that it must be fully incorporated into security prices. Did "value" become so over-exposed and over-rewarded that future benefits from "value" allocations are gone?

For 2018 the Russell 1000 Growth Index of U. S. stocks returned -1.5%, while the Russell 1000 Value Index returned -8.3%. Over the last decade Russell shows U.S. large growth stocks had a 15.3% annualized return versus 11.2% for U.S. large value stocks. In about half those ten years the value premium was positive, and in about half it was negative. While the Dimensional U.S. Large Value portfolio returned about 1.5% a year more than comparable Russell value index—yet investors speculate what might have been gained "if only" they had allocated into growth. The cumulative difference over a decade can seem insurmountable if an investor had abandoned their asset allocation strategy and made a big growth bet.

Now that stock volatility has begun normalizing to historical levels and markets declined dramatically due to increased uncertainty, investors have already adopted a timing mentality and begun to reduce their growth allocations and are transferring to cash which is beginning to pay interest.[5] Prospective clients nearing retirement often had substantial allocations to U.S. large growth stocks simply because they earned so little interest from fixed income securities and bank accounts. This same thinking seems to affect value stocks. Since the short-term outcome of no investing strategy can be certain and investors lack much knowledge of financial history, it's not surprising investors are seeking more utility.

As index-style investing gains broader acceptance and as active fund management is increasingly rejected—as more companies each year offer 401k plans with only low-cost index funds alternatives for their employees as retail investing becomes increasingly commoditized—is whether some of our clients lack the conviction to stick with a philosophy that we are convinced has the most wealth planning utility. Therefore, it's smart to stress-test the way Dimensional has redesigned value and size strategies for their portfolios with the enhancement and diversification

Exhibit 4: PERCENTAGE OF TOP-RANKED FUNDS THAT STAYED TOP-RANKED
Rolling 3-Year periods from 2001–2017



This study evaluated fund performance persistence over rolling periods from 2001 through 2017. Each year, funds are sorted within their category based on their previous three-year total return. Those ranked in the top quartile (25%) of returns are evaluated over the following three-year period. The chart shows the average percentage of top-ranked equity and fixed income funds that kept their top ranking in the subsequent period.

Source: *US-domiciled open-end mutual fund data is from Morningstar and Center for Research in Security Prices (CRSP) from the University of Chicago. Index funds and fund-of-funds are excluded from the sample.*

Exhibit 5: U.S. EQUITY RETURNS FROM DIMENSIONAL MULTI-FACTOR INDEXES
2016-2018 Trump Presidential Period
Annualized and Total Returns for All Periods (USD)

	U.S. Large Growth	U.S. Large Market	U.S. Large Value	U.S. Small Growth	U.S. Small Market	U.S. Small Value	3-Month U.S. Treasury Bill
Trump Normalization Period 1/2016-11/2018							
Annualized	**14.6%**	13.6%	12.5%	12.8%	13.0%	**13.8%**	1.0%
Total Return	**48.9%**	44.9%	41.0%	42.1%	42.9%	**45.6%**	2.9%
Std Deviation	*10.2%*	*9.6%*	*12.5%*	*13.4%*	*14.2%*	*16.1%*	*0.2%*

Source: *Dimensional Fund Advisors LP and The Dimensional Matrix Book 2017. Dimensional indexes are compiled from Center for Research in Security Prices and Compustat data. Growth strategies are securities whose lower relative price is in the top 50% of the corresponding Dimensional large or small market index. Value strategies are securities whose higher relative price is in the bottom 35% of the corresponding Dimensional large or small market index. Companies with higher relative profitability are emphasized, and utilities, REITs and investment companies are excluded. Indexes have been retroactively calculated by Dimensional and did not exist prior to December 2012. US Treasury Bill index provided by ICE Data Series/Bank of America/Merrill Lynch from Bloomberg LP.*

Past performance is not a guarantee of future results, and there is always a risk that an investor may lose money regardless how long they may be invested. Indices are not available for direct investment, therefore their performance does not reflect the expenses associated with the management of an actual portfolio. Performance does not represent the impact that economic and market factors may have had on client or advisor decision-making if money was actually invested during that period. Periods begin with the year of the presidential election since markets are forward looking and anticipate potential changes by 12 months or more.

benefits of the profitability dimension. We need to be as certain as we can be of the expected retirement outcomes we plan for our clients (and ourselves). After all, many times what looks good in theory often looks less good when results are realized.

STRESS-TESTING INVESTING STRATEGIES

Professional Financial clients have individualized investment policies and procedures to guide their evaluation of dimensional portfolio strategies. Because most clients are retired or approaching retirement, evaluating strategies planning for 30-years or longer requires a different approach than portfolio performance, whether short-term or long-term. Conventional industry story lines and popular media focuses on developing lists of "top ranking" managers or funds of the past 3 or 5 years without distinguishing the factors that separate skill from luck, are not likely to confidently provide the outcomes you need in your retirement years. *Exhibit 4* grimly reminds us of how poor conventional methods promoted by Morningstar or published by popular financial magazines that rank funds or managers by return over the past three year or five year to predict the best funds for the next three or five years.

Financial economic theory says that in highly competitive capital markets, riskier "value" or "small" companies must pay more when competing with safer large "growth" firms to attract capital. As a compensation for their increased risk, those firms must offer higher expected returns. While *expected* returns are always positive, *realized* returns are not. Decades of academic research supports the presence of "factors" with premiums for market, value, size and profitability. Perversely for the years after the Financial Panic of 2007-2009, less risky U.S. growth companies have realized much greater returns than riskier value or small firms. The results of some Dimensional funds are not what we hoped for. So let's stress test newly developed Dimensional U.S. equity indexes incorporating the new "profitability" dimension, to evaluate relative performance looking at both growth and value tiltings.

In 2012 Dimensional first introduced its own proprietary multifactor indexes to allow simulations over long time periods going back decades, and to allow advisor to see how reformulated designs of existing portfolio would have performed had the profitability dimension been present from inception. *Exhibits 5* and *6* provide an index matrix of large/small and growth/value multifactor simulations. Rather than use typical but arbitrary five- or ten-year periods, for a clearer illustration, three successive eight-year periods corresponding to three presidential administrations were selected. The most recent administration with three years is separate. This framework permits us to consider the impact of crisis events most feared by certainty-preferring investors: the Tech Crash of 2000-2002 and the Financial Panic of 2007-2009.

Our reason for using U.S. presidential administrations as a framework is two-fold: While no administration in power really controls the economy and financial markets, it still wields enormous influence over economic, business, regulatory, tax and monetary matters plus a lot more. Cold wars stop and hot wars start. Global trading treaties change. Investor risk perceptions are impacted differently by different people and policies in place. These Dimensional proprietary indexes are a much more practical way to evaluate the future impact of live Dimensional portfolios than the older Fama/French research indexes that were developed for a very different purpose.

Beginning with *Exhibit 5* associated with the Trump administration (treating the presidential election year as part of that president's term of office) we immediately see the outperformance of large growth stocks. For conventional comparison, the Russell large growth index had a total return of 37.3% and the large value index had 22.4%, and the Russell small growth and value indexes at 23.3% and 23.8% were virtually identical. The Dimensional U.S. Large Growth index (which also includes the profitability dimension) had a 48.9% total return compared to the U.S. Large Value with 41.0%. U.S. Small Value in the Dimensional indexes out-performed Small Growth 45.6% to 42.1%. Within a typical structured portfolio allocation, the higher performance of a small value allocation would offset some of the lower large value performance. What is also important to note is that Dimensionally structured portfolios enhanced with a profitability not only significantly improve upon value index returns, but also are likely to significantly improve upon growth index returns as well without an index's shortcomings.

Exhibit 6: U.S. EQUITY RETURNS FROM DIMENSIONAL MULTI-FACTOR INDEXES

1992-2015 Clinton, Bush & Obama 2-Term Presidential Periods
Annualized and Total Returns for All Periods (USD)

	U.S. Large Growth	U.S. Large Market	U.S. Large Value	U.S. Small Growth	U.S. Small Market	U.S. Small Value	3-Month U.S. Treasury Bill
Clinton Tech Growth Period 1/1992-12/1999							
Annualized	19.2%	19.5%	**19.9%**	14.8%	17.3%	**19.2%**	4.8%
Total Return	308.1%	316.3%	**326.7%**	200.9%	258.9%	**308.1%**	45.1%
Bush Tech Recovery Period 1/2000-12/2007							7.8
Annualized	0.8%	1.9%	**9.4%**	9.0%	12.8%	**16.4%**	3.5%
Total Return	6.7%	16.3%	**104.6%**	99.5%	162.2%	**236.0%**	31.3%
Obama Great Recession Period 1/2008-12/2015							
Annualized	**9.1%**	6.8%	5.1%	**8.4%**	7.9%	7.9%	0.3%
Total Return	**101.0%**	68.6%	48.3%	**90.7%**	83.5%	83.2%	2.8%
Combined Presidential Periods 1/1992-12/2015							
Annualized	9.5%	9.1%	**11.3%**	10.7%	12.6%	**14.4%**	2.8%
Total Return	775.0%	716.1%	**1195.1%**	1045.2%	1626.7%	**2411.5%**	95.8%
Std Deviation	*14.2%*	*14.4%*	*16.7%*	*18.9%*	*18.1%*	*19.0%*	*0.7%*

Source: *Dimensional Fund Advisors LP and The Dimensional Matrix Book 2017. Dimensional indexes are compiled from Center for Research in Security Prices and Compustat data. Growth strategies are securities whose lower relative price is in the top 50% of the corresponding Dimensional large or small market index. Value strategies are securities whose higher relative price is in the bottom 35% of the corresponding Dimensional large or small market index. Companies with higher relative profitability are emphasized, and utilities, REITs and investment companies are excluded. Indexes have been retroactively calculated by Dimensional and did not exist prior to December 2012. US Treasury Bill index provided by ICE Data Series/Bank of America/Merrill Lynch from Bloomberg LP.*

Past performance is not a guarantee of future results, and there is always a risk that an investor may lose money regardless how long they may be invested. Indices are not available for direct investment, therefore their performance does not reflect the expenses associated with the management of an actual portfolio. Performance does not represent the impact that economic and market factors may have had on client or advisor decision-making if money was actually invested during that period. Periods begin with the year of the presidential election since markets are forward looking and anticipate potential changes by 12 months or more.

Exhibit 6, shows our complete presidential period study over 24 years. The Dimensional value/size tilted portfolio strategy out-performed a Dimensional growth/size tilted portfolio strategy in two out of three periods. A conventional Russell U.S. large growth index during the eight "Tech Growth" Clinton years cumulatively outperformed its large value index 362% to 272%. Comparable returns with the Dimensional index strategies was 308.1% to 326.7% but interesting in favor of their large value strategy. More telling is the succeeding Bush period with a tech bust and a long recovery: large growth gained a meager 6.7% and a strong 104.6% for large value. Small value did especially well. Growth only dominates with Dimensional during Obama's Great Recession years, 101.0% to 48.3% for large value.

Over the combined 24-year period, a Dimensional large growth strategy actually underperforms a large value strategy 775.0% to 1,195.1%. Value is 54% higher. Likewise, small growth significantly underperforms small value 1,045.2 to 2,411.5%! Notably Russell conventional indexes for those same years were 562% for large growth and 836% for large value, or a 41% improvement with value, but the Dimensional returns dwarf those of the conventional index by a huge margin. Dimensional international and emerging market proprietary indexes not shown here likewise showed similar growth-value differences for both large and small stock categories, and likewise improve on conventional indexes.

LONG NEGATIVES ARE UNKNOWN KNOWNS

As we've noted, investors prefer certainty to uncertainly, all things being equal. Moreover, behavioral economists find investors feel pain from loss twice as much as happiness of the same amount of gain. So compounded by recency bias, a casually observed "losing trend" in any part of the market over an number of years can become a source of anxiety for some investors when they believe they are losing and not "winning" relative to other investors or other alternatives. Over time, without a clearly informed investing philosophy, they give up and seek more certainty in another investment. Such investors don't know what they don't know, and get in a cycle thinking they know more than they do.

Commentators and competitors frequently observe that Dimensional portfolios with value (relative price) tilts as well as their international funds have done less "than if" U.S. large growth index funds had been owned during the past few years. Occasionally a prospective client may share a story about the "disappointment" of a "friend" who bought a Dimensional portfolio from some "advisor" in the recent past. With more questioning we find it was sold based on past performance and price without planning and a process. The true problem, we submit lies in failing to properly educate and plan for clients.

Most investors think it's smart decision-making to select stocks, bonds, mutual funds or ETFs from an advisor showing great past results. Advisors know that selectively presented numbers are easy to compare and make it easy to sell. They have tools to selectively manipulate information perfectly legally. *Exhibit 4* clearly shows that recent past performance of mutual funds (and by implication, any active separate account investing) offers little useful insight into the future returns of specific funds. The vast performance advertising marketing industry is designed to promote products to sell, not to be owned. Salespersons quickly learn that recent past performance is the easiest way to make a sale—or to lose a customer to a competitor. Salespersons have their own preferences for certainty of a quick sale today. And if last year's recommendation didn't work out, there is always a cycle of new winning funds to sell.

Professional Financial requires participation in our professional wealth management process. Essential to creating successful client outcomes is educating clients about planning for unknown knowns of investing. We expect returns for any Dimensional fund or strategy to be positive every day. But in any Dimensionally focused portfolio strategy one of the allocations or premiums could be—and will be—negative for months or years. Investors with short memories forget that the currently hot U.S. market equity premium and the S&P 500 index were about zero from 2000 to 1999. Indeed, risk-free Treasury bills out-performed the U.S. stock market equivalent of the S&P 500 index for 17 years from 1966 to 1982 (6.8% to 7.1% annualized)! So the potential long negativity of a equity or fixed income premium and its duration is an unknown known. But how long must we wait to be sure that an

Exhibit 7: SUMMARY STATISTICS FOR DIMENSIONAL PREMIUMS OF U.S. STOCK RETURNS

From Bootstrapping Simulation to Estimate Probability of Negative Outcomes
Data Period: July 1963 to December 2016 (642 months, 60 month samplings with replacement)

U. S. STOCK PREMIUMS	Equity Market	Market Value Over Market	Big Value Over Market	Market Small Over Market	Small Value Over Market
Expected Premium (annualized)	6.12%	3.48%	2.40%	3.24%	6.24%
Expected Premium (monthly)	0.51%	0.29%	0.20%	0.27%	0.52%
Standard Deviation (monthly)	*4.42%*	*2.19%*	*2.32%*	*2.83%*	*3.20%*
Std Dev/Exp Premium (monthly)	**8.7**	**7.6**	**11.6**	**10.5**	**6.2**
Probability Negative Outcomes					
1 Year	36.0%	46.3%	47.7%	47.2%	42.7%
10 Years	15.6%	9.0%	20.5%	22.5%	4.5%
20 Years	7.9%	2.9%	12.2%	14.4%	0.8%
30 Years	4.1%	1.0%	7.8%	9.6%	0.2%

Source: *Eugene F. Fama and Kenneth F. French, "Volatility Lessons" (May 2018 Draft), www.FamaFrench.com. See paper for methodology details.*

equity, value or size premium doesn't exist when it disappears? Professor Kenneth R. French studied this question.[6]

Informed investors need to be as certain as they can be—if they are expected to be disciplined for years regarding disappointing or even negative "losing" premiums and asset classes—that their investment policy commitment has strong supporting empirical evidence when "everyone" may be following recent hot "winning" trend. These are essential lessons that every investor should know

Exhibits 7 summarizes French's study using an advanced statistical technique called "bootstrapping." While bootstrapping has its own limitations for making estimations, it provides important insights into unknowns. What see from the exhibit is that just the *equity* premium component of market returns:

- Can be negative 36.0% of one-year periods;
- Can be negative 15.6% of 10-year periods;
- And can be negative 4.1% of 30-year periods—what is for many, a retirement lifetime!

We gain three important insights about what is normal for investing. First, the value premium and others in the exhibit has as a significant probability of being negative for long periods, and we should expect it. The broad market value premium may be negative 2.9% of the time for ten years and 1.0% of the time for 30 years. The large value premium may be negative 20.5% of the time for ten years and 7.8% of the time for 30 years! Investing is risky, and to participate in expected returns requires commitment.

The second insight from *Exhibits 8* and *9* is that premium return distributions are NOT normally distributed—they are highly skewed to the right of the distribution range, and well separated from the negative left side! Extreme right tail kurtosis extends far beyond the right tail of what is a normal distribution. This is "the winner's game" for disciplined investors. A big portion of potential returns are concentrated within a few short periods. That means, if you don't stay in place, you can easily miss those few periods of outsized returns. This implies an investor **must be** committed to an informed strategy. The study tells us nothing about *when* outsized returns will occur, but you certainly will not capture those dimensional premiums when they occur if you decide to start playing "the loser's game."

The third insight is that concentrating your portfolio based on recent past performance to maximize winning—even with a diversified index fund—is a serious mistake. *Investors often make strong inferences and major decisions based on deceptively little information.* Ten good years, such as U.S. large growth stocks have provided, have induced

Exhibit 8: 10-YEAR SIMULATED EQUITY PREMIUMS WITH FITTED NORMAL DISTRIBUTION

Period: July 1973 to December 2016 (642 month)

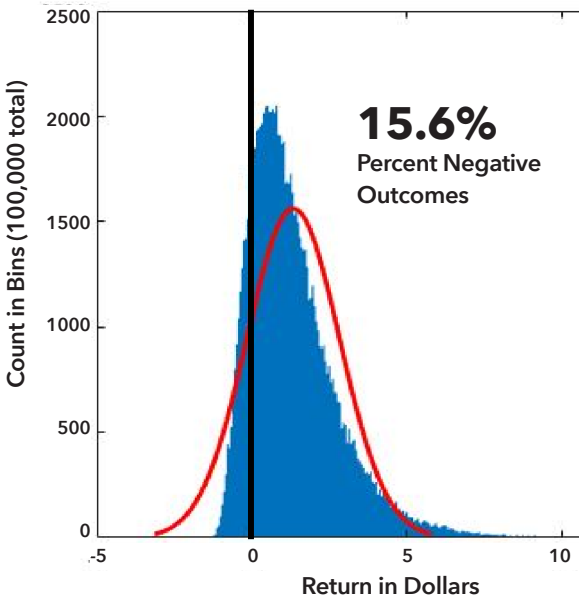
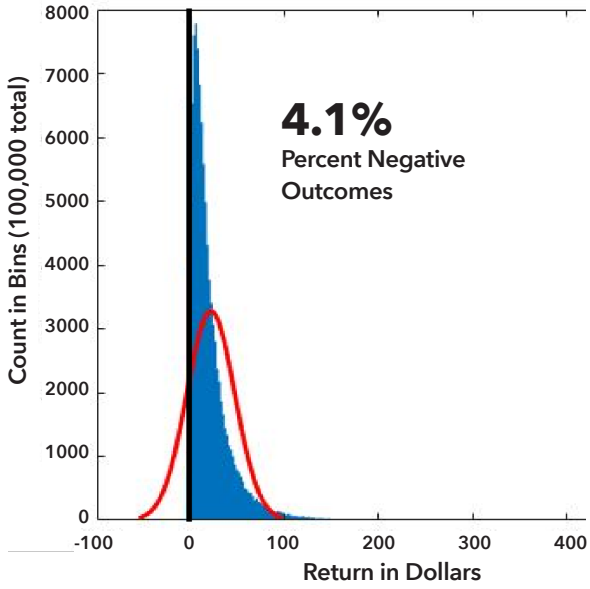


Exhibit 9: 30-YEAR SIMULATED EQUITY PREMIUMS WITH FITTED NORMAL DISTRIBUTION

Period: July 1973 to December 2016 (642 month)



Source: *Kenneth F. French, "Volatility Lessons" (May 2018 draft), www.FamaFrench.com. See paper for complete methodology details. The Monthly equity premium is the difference between the monthly return on the value-weight portfolio of NYSE-AMEX-NASDAQ stocks (Market) and the 1-month Treasury bill rate. The results summarize 100,000 bootstrapped premiums. The premiums that are negative are to the left of zero. The simulations in allow for uncertainty about expected premiums. Averages, standard deviations, and percentiles are dollar payoffs (not percent returns) from borrowing one dollar at the Treasury bill rate and investing it in Market. Past performance is no assurance of future outcomes. Hypothetical studies are for conceptual purposes only.*

far too many investors to pour too much of their wealth into well-performing Vanguard, Blackrock, Fidelity and similar index and EFT funds. Following the herd is a costly mistake. Stocks are always risky. Poor returns on bonds or a bank account is not an excuse. People can choose to save more, work longer or spend less in retirement. There is no money magic or magicians. Your investment policy must integrate all dimensions of return so that when one or two dimensions are negative, others are likely to be positive, dramatically improving likely shorter-term planning outcomes during retirement—and increasing the certainty of your utility.

French comments: "The high volatility of stock returns is common knowledge, but many professional investors seem unaware of its implications. Negative equity premiums and negative premiums of value and small stock returns relative to the market are commonplace for three- to five-year periods, and are far from rare for ten-year periods… We find similar results for a value-weight portfolio of developed market stocks outside the U.S. Our general message is universal: because of the high volatility of stock returns, investors cannot draw strong inferences about expected returns from three, five or even ten years of realized returns." Using three-, five- and even ten-year periods to make confident conclusions from Dimensional strategy evaluations to justify pursuing alternative investment strategies that have the appearance of greater success is very likely hazardous to your wealth and peace of mind.

Even if we are sure an expected equity premium is large and positive, the likelihood of a negative realized premium over the next three, five or ten years can be substantial, is French's conclusion. As we see from the middle of *Exhibit 7*, the ratio of very large standard deviation to very small expected premiums overwhelms the premiums with statistical noise. *Exhibits 7* and *8* illustrate how loud that "noise" can be. The histograms depict the very high heteroskedasity of those few returns driving the premium outward to the positive right of the chart—and away from the negative left side. But there are still negative outcomes to the left of "zero" for 15.6% of ten year periods, and 4.1% of 30 year periods. French also calculates that out of 4 or 5 premium factors, at least one will be negative for a 10 year period 46.4% of the time.[7]

French finally concludes that empirical evidence insufficient to abandon Fama-French multifactor model predictions. Fundamentally, the firm's cost of capital is the investor's return, as late Nobel laureate Merton Miller and director of Dimensional was so fond of repeating to us. The discount rate on relative cash flows means that when price is low in relation to fundamentals, then a high expected return is signaled. But in order to participate in those few unpredictable periods of big winnings, your money must maintain a broadly consistent allocation strategy—or you will lose out.

If your money regularly shifts from value to growth strategies or to different asset allocations domestically and internationally chasing momentum trends (EFT index funds make it easy) based on performance timing signals, beware: you could easily experience the worst of all possible outcomes—ending up missing those few big return days by being in another allocation or simply holding cash for a sense of safety. If you ever want proof of a devil who temps mortals with their fear and greed, this must be investor hell.

HIGH RISK FROM LOW COST OF CAPITAL IN EQUITIES

Stocks markets worldwide may resume falling in 2019. U.S. large stocks have raced ahead far ahead of other markets, driven by the Federal Reserve's excessively easy monetary policy, permitting the U.S. government to borrow trillions of dollars—more than doubling its official debt over the past decade to about 100 percent of its gross domestic product—mostly for spending of doubtful long-term benefit. The result is a fragile financial situation and steep drop in stock, bond and real estate markets worldwide. Likely to be hurt the most will be investors in highly appreciated U.S. large growth stock positions.

To deal with the Great Recession, the Fed cut interest rates to historic lows and kept them there until the end of 2015. The Fed also bought long-term government bonds and mortgage-back securities, more than quintupling its balance sheets. Mr. Bernanke explained this "unconventional" monetary policy was designed to encourage an asset-substitution effect. Investors would shift out of bonds and into equities and real estate. The resulting rise in household wealth would push up consumer spending and strengthen the economic recovery. The strategy eventually worked as Mr. Bernanke had predicted.

The problem is that stock prices rose over the past decade much faster than corporate profits did. The price/earnings ratio for the S&P 500 is higher than at any time in the 100 years before 1998 and 70% above its historical average. The high price of stock reflected the very low returns on fixed-income securities and bank deposits. The real return as been negative until recently for years. As interest rates rise back to normal levels, overpriced stock markets are also likely to revert to previous norms.

Growth premiums have been approaching record high 1999 levels as investors and traders pursued the upward momentum of large growth stocks, further bidding prices up. A disciplined client with a committed dimensional strategy should see coming market decline as an enormous opportunity for aggressive rebalancing. Highly leveraged hedged funds and traders will demand liquidity. So you will help them sell, and provide the liquidity they will so desperately need—at your time, at your price.

MANAGING UNCERTAINTY WITH CONFIDENCE

The importance of having a sound investment philosophy—one founded on financial science and one that you can stick with—cannot be overstated. Just like a personal philosophy can act as a moral compass, an investment philosophy can guide informed decisions on effectively planning, evaluating your plan, and staying invested. While this sounds simple, the implications for taking and staying in control of your wealth planning during good times and bad are profound.

Our enduring investment philosophy from our model of the world from years of proven experience, is based on a belief in the power of markets. That belief is grounded in economic theory backed by decades of empirical research of renown academics. It includes Dimensional Funds Advisors internal research team who works closely with leading financial economists like Professor French.

Dimensional pursues higher expected returns using a dynamic process that integrates research, portfolio design, and portfolio management and trading. Through

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Dimensional's deep working relation¬ships with leading financial economists like Nobel laureates Eugene Fama and Robert Merton, academic insights are smartly applied to practical strategies to help clients confidently access global capital markets.

Rather than vainly forecasting future market movements or outguessing a multitude of managers, Dimensional's research team draws information about expected returns from the market itself—leveraging the collective knowledge of millions of buyers and sellers who set unbiased security prices every trading day. Trusting markets to do what they do best—drive accessible information into prices—frees Dimensional to spend its resources where they have a distinct advantage over traditional stock managers, market timers or the algorithms of quantitative traders: namely in how they interpret advanced research, how they design and manage portfolio strategies, and how they service our clients.

For a client to place trust in Dimensional as well as in Professional Financial and our wealth management process, is ultimately to place trust in market prices and in the collective wisdom of the markets. Dimensional earns our trust and yours as our client through rigorous execution of a transparent process based on structured strategies, trusted research and disciplined implementation empowering decisions.

There are things you can control and things you can't. That's true in life. It's true in business. And that's true in wealth management strategy. Managing uncertainty is what we do. To optimize your utility in retirement planning, an investment management strategy must be part of an integrative process to be successful. By planning personalized for your family, we can help position you for greater peace of mind and confidence even in the worst of times to have an abundant retirement.

Endnotes

1 Derived from the classic Gordon Dividend Discount Model. At the most basic level, the value of a company is the sum of all its future profits discounted back to today. But estimating the variables is educated guesswork. Dimensional lets aggregate market prices as the most reliable estimate of value tell us what they should be.

2 See, for example Eugene F. Fama and Kenneth R. French, "The Cross-Section of Expected Stock Returns" (1992); "Common Risk Factors in the Returns of Stocks and Bonds" (1993); "Profitability, Investment and Average Returns" (2006), Robert Novy-Marx, "The Other Side of Value: The Gross Profitability Premium" (2013); Gerald O'Reilly and Savina Riszova, "Expected Profitability: A New Dimension of Expected Returns" (Dimensional research, 2013); and Wei Dai, "How Diversification Impacts the Reliability of Outcomes" (Dimensional research, 2016).

3 See Paul Byron Hill, "Seeing and Believing in Investment Planning," *Planning Perspectives* (4Q 2014).

4 For example, Fama and French, "Migration" (2007) documented how different transition groups have contributed to the size and value premiums as stocks transitioned across different size and value portfolios.

5 "Investors' Cash Dash Adds to Stock Market Volatility," *Wall Street Journal* (January 22, 2019)

6 Kenneth R. French, "Volatility Lessons" (May 2018 draft), accessed www.FamaFrench.com.

7 Ibid. Calculated for 4 or 5 factors, June 1973 to June 2018 for monthly bootstrapping data for draws.

APPENDIX: Index Descriptions

Dimensional US Adjusted Market 1 Index January 1975–present is compiled by Dimensional from CRSP and Compustat data. Targets all securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with an emphasis on companies with smaller capitalization, lower relative price, and higher profitability. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to March 2007. The calculation methodology was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index. Prior to January 1975 Targets all securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with an emphasis on companies with smaller capitalization and lower relative price.

Dimensional US Large Cap Value Index is compiled by Dimensional from CRSP and Compustat data. Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations above the 1,000th largest company whose relative price is in the bottom 30% of the Dimensional US Large Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes securities with higher profitability, lower relative price, and lower market capitalization. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to March 2007. The calculation methodology for the Dimensional US Large Cap Value Index was amended in January 2014 to include direct profitability as a factor in selecting securities for inclusion in the index. Prior to January 1975: Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations above the 1,000th largest company whose relative price is in the bottom 20% of the Dimensional US Large Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price.

Dimensional US Large Cap Growth Index is compiled by Dimensional from CRSP and Compustat data. Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations above the 1,000th largest company whose

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relative price is in the top 50% of all large cap companies after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes companies with higher profitability, lower relative price, and lower market capitalization. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to December 2012.

Dimensional US Small Cap Index was created by Dimensional in March 2007 and is compiled by Dimensional. It represents a market capitalization weighted index of securities of the smallest US companies whose market capitalization falls in the lowest 8% of the total market capitalization of the Eligible Market. The Eligible Market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: Non-US companies, REITs, UITs, and investment companies. From January 1975 to the present, the index also excludes companies with the lowest profitability and highest relative price within the small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: CRSP and Compustat. The index monthly returns are computed as the simple average of the monthly returns of 12 sub-indices, each one reconstituted once a year at the end of a different month of the year. The calculation methodology for the Dimensional US Small Cap Index was amended on January 1, 2014, to include profitability as a factor in selecting securities for inclusion in the index.

Dimensional US Small Cap Value Index is compiled by Dimensional from CRSP and Compustat data. Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market whose relative price is in the bottom 35% of the Dimensional US Small Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes securities with higher profitability, lower relative price, and lower market capitalization. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to March 2007. The calculation methodology for the Dimensional US Small Cap Value Index was amended in January 2014 to include direct profitability as a factor in selecting securities for inclusion in the index. Prior to January 1975: Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market whose relative price is in the bottom 25% of the Dimensional US Small Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price.

Dimensional US Small Cap Growth Index is compiled by Dimensional from CRSP and Compustat data. Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations in the lowest 8% of the total market capitalization whose relative price is in the top 50% of all small cap companies after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index excludes companies with the lowest profitability. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to December 2012.

Dimensional US High Profitability Index: Created by Dimensional in January 2014 and represents an index consisting of US companies. It is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three high-profitability subgroups. It is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: CRSP and Compustat.

Dimensional US Low Profitability Index: Created by Dimensional in January 2014 and represents an index consisting of US companies. It is compiled by Dimensional. Dimensional sorts stocks into three profitability groups from high to low. Each group represents one-third of the market capitalization. Similarly, stocks are sorted into three relative price groups. The intersections of the three profitability groups and the three relative price groups yield nine subgroups formed on profitability and relative price. The index represents the average return of the three low-profitability subgroups. It is rebalanced twice per year. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Source: CRSP and Compustat.

Fama/French US Value Research Index: Provided by Fama/French from CRSP securities data. Includes the lower 30% in price-to-book of NYSE securities (plus NYSE Amex equivalents since July 1962 and Nasdaq equivalents since 1973).

Fama/French US Growth Research Index: Provided by Fama/French from CRSP securities data. Includes the higher 30% in price-to-book of NYSE securities (plus NYSE Amex equivalents since July 1962 and Nasdaq equivalents since 1973).

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