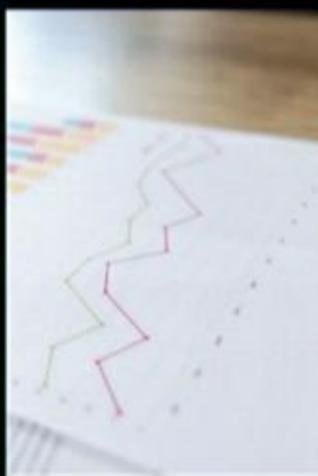ASSET ALLOCATION
FOR ALL
MARKETS

Research, approach, and an investing strategy for up and down market cycles

30 YEAR INVESTING PRO
TERRY GRENNON

Introduction

Suppose you are like many investors, then you have lived through at least one financial crisis. I lived through the 2000-2002 stock market downturn as Director of Asset Allocation, responsible for the asset allocation advice of 6,000 registered representatives.

In the 2008-2009 downturn, I was a co-portfolio manager managing $30 billion in asset allocation fund assets. As a professional investor, the lessons I learned were that I owed it to my clients to do a better job protecting assets from loss. It wasn't acceptable as a fiduciary to lose 15-45%, while stocks lost 60-75%.

When I started creating an alternative approach to asset allocation, I learned that it's imperative to protect against 15% losses or more. I knew that hedging against large loss has a more significant upside in the long run. I also learned that a strategy for identifying a period of potential loss could be identified, and an approach to mitigate loss could easily be implemented. In the end, I developed an approach that results in significantly more asset growth than a buy and hold strategy. It was the two market downturns that got me interested in active asset allocation.

We know asset allocation theory, and reality is much different in a market meltdown.

This book highlights the most critical research tied to investing in up and down market cycles, asset allocation, and investment management over the last 50 years. We start with a critical look at diversification and asset allocation; we provide an in-depth analysis of investing in stocks, we then provide details

on two active asset allocation approaches, make a case for index funds, and then introduce you to a management tool which we'll use to manage the asset allocation strategy going forward.

Diversification

To understand the central meaning of diversification, you have to start with The Uniform Prudent Investor Act (UPIA), a piece of the Restatement (Third) of Trusts. UPIA sets up principles for the investment of trust assets. It expresses that "The role of proper asset allocation when diversifying the investment portfolio of a trust: Asset allocation decisions are a fundamental aspect of an investment strategy, and are a starting point in formulating a plan of diversification (as well as an expression of judgments concerning suitable risk-return objectives)."

While UPIA isn't law, most states have embraced it. At the heart of it is the wording:

"exercise prudence in diversifying the investments to minimize the risk of large losses." The practical solution for trustees

has been all along to utilize "diversified" models and strategies.

This is also the case in 401(k) plans; a plan sponsor fiduciary is required to provide participants an investment menu that offers the participant a means to build a

"diversified" portfolio. The Department of Labor states the fiduciary "must act prudently and must diversify the plan's investments to minimize the risk of large losses."

This requirement defines diversification in which "gains in one investment will cancel out the losses in another." The solution has been for the financial services industry to utilize Modern Portfolio Theory (MPT) to develop and make available diversified asset allocation strategies for participants to use to manage their plan assets.
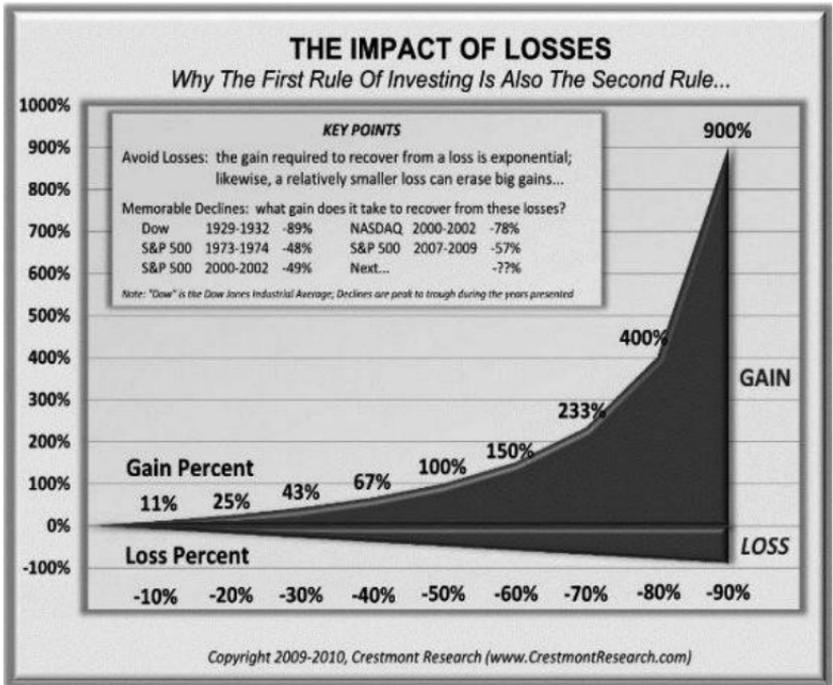
The all in one MPT solution has been the target-date fund for the retirement plan industry.

MPT, which earned the author, Harry Markowitz, a Nobel prize in 1990, is based on his paper, Portfolio Selection, which he wrote in 1952. The MPT approach is an optimization model in which each asset class's returns, risks, and correlation coefficients are used to develop diversified strategies designed to optimize the portfolio's unit of return for each unit of risk.

The MPT model has being used prevalently used across the financial services industry since the mid-1990s and is still used today in financial planning services.

The Impact of Large Losses

At the heart of the issue of avoiding loss is the math behind significant losses and how detrimental they can be to a portfolio's capital. The following table makes it evident that a long-term investment strategy must mitigate substantial drawdowns.

THE IMPACT OF LOSSES
Why The First Rule Of Investing Is Also The Second Rule...

KEY POINTS

Avoid Losses: the gain required to recover from a loss is exponential; likewise, a relatively smaller loss can erase big gains...

Memorable Declines: what gain does it take to recover from these losses?

Dow	1929-1932	-89%	NASDAQ	2000-2002	-78%
S&P 500	1973-1974	-48%	S&P 500	2007-2009	-57%
S&P 500	2000-2002	-49%	Next...		-??%

Note: "Dow" is the Dow Jones Industrial Average; Declines are peak to trough during the years presented

Gain Percent: 11%   25%   43%   67%   100%   150%   233%   400%   900%

GAIN / LOSS

Loss Percent: -10%   -20%   -30%   -40%   -50%   -60%   -70%   -80%   -90%

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Source: Crestmont Research

Reality

The reality is that when you move beyond the application of MPT into the testing of the diversification benefits of mixing 7-10 asset classes, the instability of the model, especially when it comes to the correlations and correlation coefficient relationships among asset classes, becomes apparent. Specifically, the less positive to negative correlations among asset classes do not hold up. They increase in value. This is readily apparent during recessions and bear market periods in stocks in which there is a 15% or more loss.

The reality is the following figures reflect the bear market in stocks during the 2008 – 2009 Global Financial Crisis and

the impact on the Vanguard Target Date Series, the most prominent set of target-date funds in the industry which are based on Modern Portfolio Theory.

Loss	Target Retirement Income Fund	Target Retirement 2015 Fund	Target Retirement 2025 Fund	Target Retirement 2035 Fund	Target Retirement 2045 Fund
Worst Year	-10.93%	-24.06%	-30.05%	-34.66%	-34.56%
Max. Drawdown	-17.00%	-35.00%	-42.49%	-48.05%	-47.97%

Tail Risk

In 1963, IBM researcher Benoit Mandelbrot released a definitive study of cotton futures in which he discovered that cotton prices did not follow a normal distribution, and changes were not independent. A quality that did not fit with traditional probability theory, the central limit theorem (CLT), and MPT.

In 1966 he developed a model clarifying how rational market mechanisms can create "bubbles." In 1972, he distributed a multifractal model that consolidates and expands long tails and long dependence.

In 2006, Mandelbrot's book The Misbehavior of Markets found that "stocks and currencies are riskier than normally assumed. It means that stock portfolios are being put together incorrectly; far from managing Risk, they may be magnifying it. It means that some trading strategies are misguided and options mid-priced. Anywhere the bell curve assumption enters the financial calculations, an error can come out."

He cited the example of Long-Term Capital Management, which used classic models and three years of historical correlations until its ruin. Mandelbrot's principal discovery was that security prices trend in the form of fractals. To test a

simple trend following strategy, he ran a backtest for a colleague in which; "if a stock rises 5 percent, it is more likely to keep rising than it is to fall. Such a simple rule like he could profit from this tendency.

And profit hugely: He calculated that an investor who had blindly followed such a rule from 1929 to 1959 would have gained an average 36.8 percent a year before the commission. That was twelve times the average 3 percent increase that the market achieved during that period." His overall message is that "You cannot beat the market, says the standard market doctrine. Granted. But you can sidestep its worst punches."

The Myth of Diversification

Research has shown that correlations increase, and the diversification benefits of a multi-asset class portfolio even with alternative asset classes fail during periods of market declines. This failure is explored in the paper When Diversification Fails. In their report, authors and T. Rowe Price portfolio managers,
Sébastien Page, CFA, and

Robert A. Panariello, CFA state, "One of the most vexing problems in investment management is that diversification seems to disappear when investors need it the most.

We surmise that many investors still do not fully appreciate the impact of extreme correlations on portfolio efficiency—in particular, on exposure to loss."

They recommend, "Prudent investors should not use them (correlations) in risk models, at least not without adding other tools, such as downside risk measures and scenario analyses. To enhance risk management beyond naive diversification,

investors should re-optimize portfolios with a focus on downside risk, consider dynamic strategies, and, depending on an aversion to losses, evaluate the value of downside protection as an alternative to asset class diversification."

This table illustrates their findings.
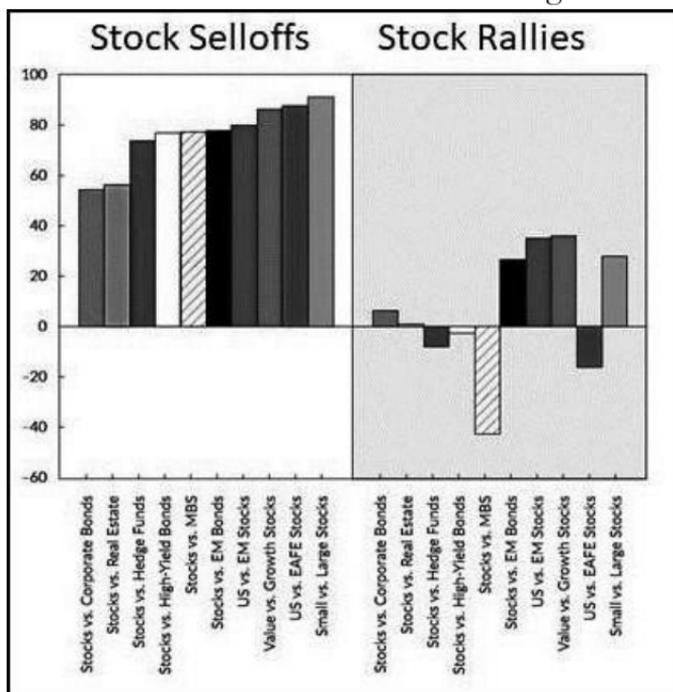
The general shakiness of the asset class correlations' relationship suggests that asset allocation recommendations and products ought to respond to changes in the economy and the market.

2 Asset Classes

In his paper, Portfolio Selection, Markowitz explicitly said, "It is necessary to avoid investing in securities with high covariances among themselves." He also said to invest in an asset class; one must have "beliefs about the future performances of available securities."

Therefore the question becomes, how many asset classes are truly required to develop a fully diversified strategy. In the paper, When Diversification Fails, the authors,

Page and Panariello, recommend during downturns: "government bonds almost always rally because of the flight-to-safety effect (Gulko 2002). In a sense, duration risk may be the only true source of diversification in multi-asset portfolios. Therefore, the expected stock bond correlation is one of the most impor-

tant inputs to the asset allocation decision."

So the answer is stocks and bonds are the two asset classes required to create a diversified portfolio precisely because of their correlation coefficients.

Returns

The one primary assumption that MPT strategists have traditionally used for largecap stock returns is 10%. This is the 100-year average return for the S&P 500. As you can see the average is 10% but that's over the entire period. If you break it out into 10 year chunks you can see the returns vary considerably.

8

Source: Crestmont Research

When looking closely at stock market returns, there are only three components (excluding transaction costs and expenses): dividend yield, earnings growth, and change in the level of valuation (P/E ratio).

Profit growth and P/E change decide capital gains or losses. Dividend yield gives a return, notwithstanding any capital gains or losses. These segments determine the stock exchange's total return.

Every one of the parts has drivers established in economics or finance. Stock returns are not irregular over longer-term periods and frequently unsurprising overtime periods of 5-10 years or more.

10-YEAR STOCK MARKET RETURN (COMPONENTS)
Total Return Before Transaction Costs (1900-2019)

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Profit growth is firmly grounded in economic development. Over complete business cycles, the S&P 500 Index earnings growth will be somewhat slower than the general economy.

The dividend yield is generally influenced by the degree of valuation at the start of the investment. Dividends are dependent on earnings. High valuation periods fundamentally result in moderately low-dividend yields and vice versa.

The inflation rate drives the level and pattern of P/E. This single factor clarifies secular stock market cycles in terms of math. This rule recognizes the considerable impact that securities exchange revaluation has on acknowledged market returns. It likewise features the need to concentrate on decade-long stretches and not century long average returns. P/E is the present cost of the market partitioned by the current profit of the market. Market prices long-term conform to the market's

estimation of the present estimate of expected future profit at a given discount rate.

The inflation rate drives the discount rate. When the inflation rate increases, the current valuation for a future stream income decreases with P/E. Conversely, during deflationary times, the degree of future earnings decreases along with P/E.

Subsequently, P/E tops at low and stable inflation levels and decreases as it moves from stability. The top for P/E for periods with an average of 3% GDP is in the mid-20s. P/E's trough with high inflation and deflation has commonly been somewhere in the range of 5 and 10.

Even an all-inclusive time horizon of 20 years doesn't guarantee a 10% average total returns in stocks.

	TOTAL RETURNS BY DECILE RANGE		S&P500 DECILE	AVG BEGIN	AVG END
DECILE	FROM	TO	AVG	P/E	P/E
1	3.1%	6.4%	5.1%	20.7	11.4
2	6.6%	7.1%	6.9%	17.7	11.7
3	7.2%	7.3%	7.3%	14.9	13.5
4	7.3%	7.9%	7.6%	15.8	13.3
5	8.0%	8.9%	8.5%	17.3	17.7
6	9.3%	10.8%	9.9%	17.5	19.3
7	10.9%	11.4%	11.2%	14.8	18.5
8	11.5%	12.8%	12.1%	11.9	19.1
9	13.0%	14.0%	13.7%	11.9	21.6
10	14.0%	17.1%	15.4%	10.1	28.6

20 Year Periods Ending 1919 - 2019 (101 periods)

Note: P/E ratio based upon average 10-year real EPS (P/E10)

Source: Crestmont Research

Secular Cycles

The reality is returns are dependent upon the degree of valuation (P/E) toward the beginning of the period. When stocks, P/E are moderately high and above average, subsequent returns over the ensuing 20 years have been below average. When P/E is relatively low, and below average, the following stock returns are above average.

The long-term view of the stock market reflects extended periods of surge and stall. These periods, known as secular bull markets and secular bear markets, are not optical illusions; instead, they are extended periods when market valuations (i.e., price/ earnings ratios: P/Es) are multiplying the effect of rising earnings or mitigating them.

The following chart presents the stock market levels every year since 1900. Rising P/Es representing bull markets are seen in green, bearish markets are in red. For those that purchased stocks when prices were lower, the adjustment in valuation alone has a multiplying effect on your stock investment.

However, for those that buy stocks at high valuations, the decrease in prices during a declining market counterbalances a significant part of the advantage of earnings growth. What do I mean by secular? I mean an all-inclusive timeframe or a period. A secular stock market cycle means a broadened period and falls into two categories.

Bull market cycles are periods when stock returns are positive, and bear market cycles reflect times of zero or negative returns. You will see that bull and bearish markets are numerically driven concentrated in decade long stretches and not century long average returns. Within secular cycles, there

can be shorter bull and bear cyclical periods. Essential economic and financial matters cause these periods through the expansion and decline of the rate of inflation. In turn, inflation drives the price to earnings rate (P/E) of the stock market over the secular period.
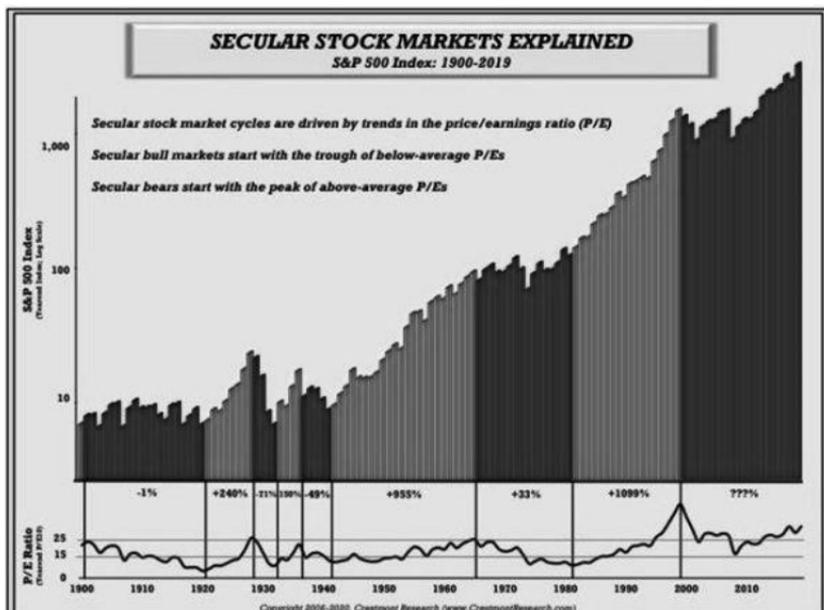
Source: Crestmont Research

The Implications

Expanded times of low inflation and high P/E that doesn't have a considerable P/E change depend upon earnings growth and dividend yield for return. Low inflation brings about generally low dividends. High P/E brings about a low dividend yield.

These periods with high P/Es have low stock market returns. From a degree of moderately high P/E, a bull market can't begin until P/E finishes its trek descending to levels

where it can significantly increase. Hence, modest returns from earnings growth and dividend yield result from periods with high P/E.

High P/E stocks in a muted inflation environment result in below-average returns for investors. The net outcome is close to zero return, usually experienced from a declining market. Many bears are periods with generally low or negative returns due to a negative impact from P/E diminishing.

To understanding better than expected returns, stock investors should likewise get the advantage of P/E expanding—a secular bull. As P/E grows due to reestablishing a low and stable inflation rate. Secular stock market cycles are not driven by time. They don't begin and stop at new highs or lows (or identify with a specific increase or breakeven). Secular cycles can only be seen distinctly through an assessment of the hidden rules that drive them. Secular cycles are joined at the hip of the P/E cycle, caused by the impact of inflation on the valuation of stocks.

Stocks, Inflation, and P/Es

There has been no more prominent factor in the variation of stock returns over decade stretches than the effect of the direction in P/Es. History shows that the adjustment in stocks P/E ratio over; for example, ten-year periods regularly can double or cut in half stock returns.

A closer look is valuable since it's such an essential factor in asset allocation and stock investing through bullishness and bearishness. The stock price divided by earnings per share is P/E. P/E represents the number of years of the present profit investors are eager to pay for the stock for investors.

For instance, if a company earns a $1 per share of profit now and then investors are willing to pay $10 for the stock (a P/E of 10) and on different occasions, they may pay $20 (a P/E of 20). Similarly, when we analyze the P/E of the S&P 500 index, there are times when the valuation has been moderately high and other occasions when valuations were in the single digits.

While singular companies will have their conditions that affect earnings, P/E, and their stock price in large measures. For the market as a whole, growth overall is consistent, predictable, and changes according to distinct cycles. The key is to focus on the primary factors driving price direction.

When we look over the previous century, we see a rollercoaster pattern of the market P/E— wavering from tops over 20 to troughs beneath 10. Even though the cycles are not balanced, they are repeating. There has been no more prominent factor in the variability of stock asset class returns over ten-year periods than the effect of the pattern in P/Es.

15

P/E can be thought of as the value that we will pay today for the option to get future income from the investment. With securities, we interpret this into a yield. Stocks provide yield either through profits or retained earnings. P/E speaks to a valuation measure dependent on an investor's' desire or interest for future returns.

At the point when earnings yields are lower, P/Es will be numerically higher. Moreover, when earnings yields are higher, P/ Es are lower. However, future earnings start to mirror a declining deflationary direction when inflation drops much further into deflation. When that happens, prices that we are happy to pay today become lower, and P/E decreases.

Along these lines, there is a limit to P/Es. Higher inflation causes lower P/Es, and deflation causes lower P/Es— P/Es top at more significant levels when inflation is low and stable. In some cases, P/Es can also expand to extremes that distort expectations and a bubble in stock prices. During these periods, positive price expectations outweigh valuations (P/E). When you chart the connection between P/Es and inflation over the previous century, a Y pattern appears.

SCATTER PLOT: P/E RATIO AND INFLATION (1900 - 2019)
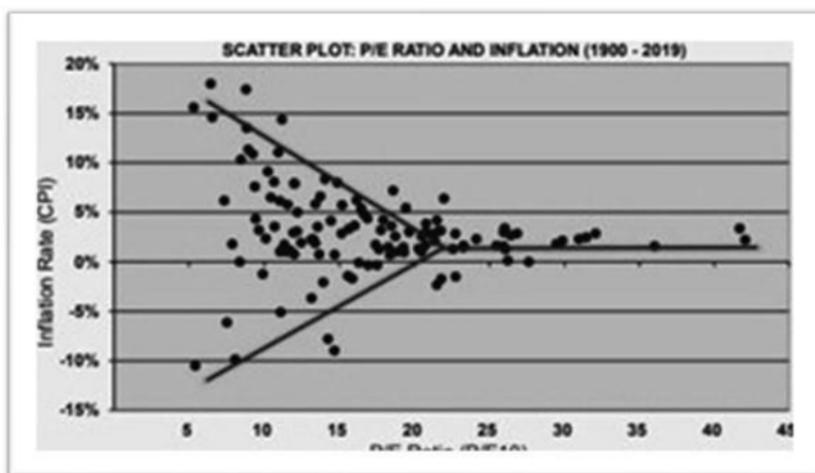
This perspective confirms that both deflation and high inflation result in lower P/Es and stock prices. The sweet spot for higher P/Es and stock prices is stable 1% inflation.

The common understanding of the connection between P/Es and interest rates assumes that inflation is always positive.

As reflected in the diagram, P/Es and stock prices increase when inflation is stable and decrease when inflation is hot or cold. The outcome is the "Y Curve" impact, where P/E falls into deflation during times of low loan rates. This impact is persistent, with an expected decline in corporate earnings and lower stock valuations.

The Current Secular Market

The last secular bull finished with the market valuation (P/E) at levels twice as high as all past bulls. That implied that the current secular bear had twice as much ground to cover. However, despite everything, the market has stayed at or above levels persistent with where typical bears begin.

Since bears start where bulls end, the beginning level for P/E in secular bearish markets is, for the most part, in the red zone on the following graph. The present secular declining market has endured quite a while. The degree of market valuation is too high to give the lift to restore a bullish market.

In actuality, P/E is considerably above the beginning level for a mainstream secular bear. An abrupt decrease in 2000 to bear lows would have been a brutal bear plunge.

Many forget how high the P/E was in 2000.

The following chart shows precisely how far we needed to go in the current secular bear market. P/E is on the left; time is on the lower axis. The graph presents the entirety of secular bears from the previous century. Before our present, each secular bear followed a secular bull that finished with P/E in or approaching the red zone.
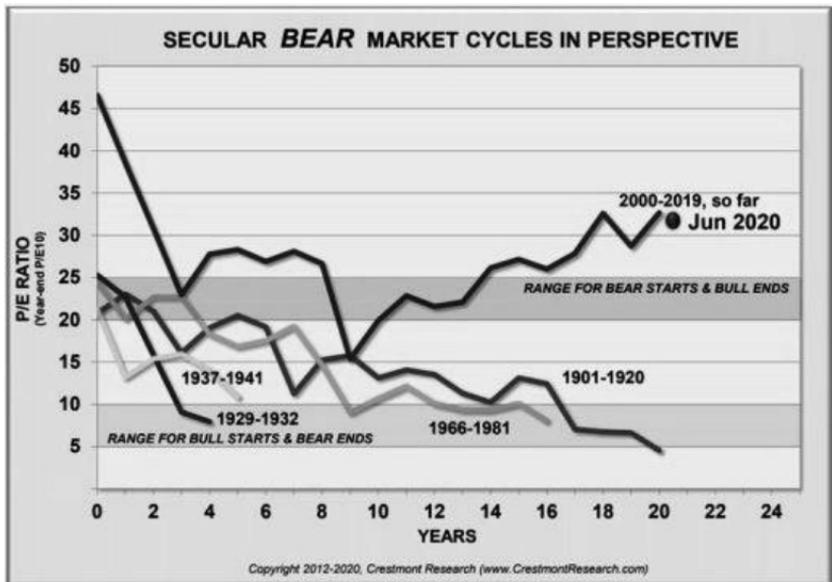
That set the beginning stage for each secular bear. However, this time, the secular bull of the late 1990s finished about twice as high—it was a significant bubble. In this manner, it is reasonable to expect that our present secular bear may last much more time or be twice as intense as past secular bears.

Since the Fed and different components have kept the economy in a condition of moderately low expansion, the present secular bear has ground its way back to (and now marginally over) the ceiling of the red zone. On the off chance that inflation stays low and stable, this secular bear will remain in hibernation until inflation runs hot or cold.

Hibernation maintains a strategic distance from the declining P/E of a secular bear.

It is the decrease in P/E that makes secular bears yield zero returns. Hibernation likewise implies zero chance of better returns unless there is a bubble in P/Es.

What is the expectation for future returns?

SECULAR **BEAR** MARKET CYCLES IN PERSPECTIVE

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Forecasted Returns

Now that we illuminated the risks of standard MPT with assumed static 10% returns, we can offer a solution based on a new approach to MPT to develop diversified strategies that factor in a considerable loss risk. The answer is combined with an investment menu design that compliments the new MPT approach.

Yale Professor Robert Shiller developed the cyclically adjusted price-to-earnings ratio (CAPE) and detailed it in his paper, Valuation Ratios and the Long-Run Stock Market Outlook. This valuation measure of stocks using the real

(inflation-adjusted) per share earnings over ten years of the S&P 500. CAPE, or what is also called the P/E 10 ratio, uses smoothed real earnings.

The Shiller P/E 10 is based on Graham and Dodd's work Security Analysis in which the smoothing process of using multiyear average earnings per share was recommended. We can see the inverse relationship of valuation and subsequent 10year returns.
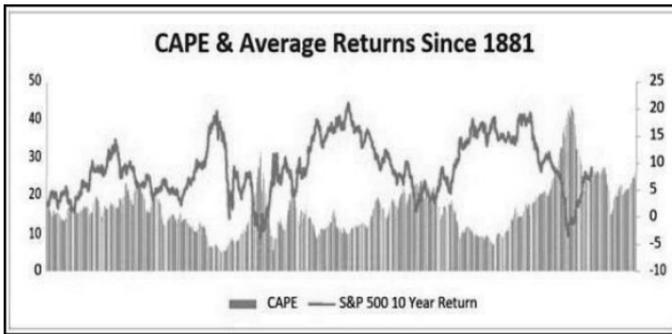
Given the instability of the capital markets, prudent investing in all market types is a suitable theme when making asset allocation decisions, especially in the face of a bear market. The dilemma facing investors who rely on a standard MPT approach is that it does not consider both bull and bear market cycles.

Markowitz led with: "The process of selecting a portfolio may be divided into two stages. The first stage starts with observation and experience and ends with beliefs about the future performances of available securities. The second stage starts with the relevant beliefs about future performances and ends with the choice of the portfolio.

This paper is concerned with the second stage."

It's been many decades since the paper was first distributed. Many investors have repeated their "buy and- hold" mantra working together with Dr. Markowitz. But it isn't what he proposed.

Nor did he recommend Strategic Asset Allocation (SAA) as the solution. Consider the possibility that your holding period is not 80 to 100 years, which is what "buy and hold," and SAA inputs are based on.

> This practical approach to the "first stage" of MPT has been overlooked. As Markowitz's paper underscores, we must use "observation and experience" to create "beliefs about future performances." Although the future performance of the stock market can't be anticipated with assurance or accuracy, through observation and experience, we have the option to, at any rate, refine the presumptions into better than expected or beneath average return expectations by using P/E.

A Forward-Looking MPT Solution

Utilizing CAPE, forecasts based on the following historical range of CAPE valuations and 10-year returns can be used as a return input for stocks. This table details the scope of CAPE numbers and associated 10-year average returns over 100 years.

CAPE Rank	% Return
0 to 5	15
6 to 10	14
11 to 15	13
16 to 20	12
21 to 25	11
26 to 30	10
31 to 35	10
36 to 40	9
41 to 45	9
46 to 50	9
51 to 55	9
56 to 60	8
61 to 65	7
66 to 70	6
71 to 75	6
76 to 80	5
81 to 85	4
86 to 90	3
91 to 95	2
96 to 100	1

The Shiller CAPE as of May 1, 2020, was 27.55, placing it in the 93d percent rank, and it translates into a 2% return expectation on stocks over the next ten years.

To build out our asset class return (and risk) assumptions to include bonds, the 20 Treasury yield as of May 1, 2020, was

1.04%. Therefore our asset class return assumptions are Stocks: 2.00%, Bonds: 1.04%.

If we use these return expectations with the long-term standard deviations of the S&P 500, 20 Year Treasury, our overall asset class assumptions are ...

Asset Class	Return	Risk
Stocks	2.00%	15.00%
Bonds	1.04%	7.00%

Next, we develop the Sharpe ratio for each asset allocation mix in our strategy set.

Sharpe = (Strategy Return – Risk-Free Rate)/ Strategy Risk

Across our long-term allocations, we can see in the following table, position #1 has the highest Sharpe, 13%, and therefore it becomes our strategy allocation on May 1.

Position	Stocks	Bonds	Return	Risk	Sharpe
1	30%	70%	1.34%	9.40%	13%
2	40%	60%	1.43%	10.20%	13%
3	60%	40%	1.62%	11.80%	12%
4	70%	30%	1.72%	12.60%	12%
5	80%	20%	1.81%	13.40%	12%

We are currently at extreme valuations in stocks; what about a period in which valuations were lower to illustrate the dynamic asset class assumptions.

In March 2009 (bottom of the market), the CAPE was

13.32, a 36th percent rank historically. This rank translates into an expected return on stocks of 9%.

In March 2009, the yield on a 10 Year Treasury Bond was 2.8%. Therefore, our assumptions were...

Asset Class	Return	Risk
Stocks	9.00%	15.00%
Bonds	2.80%	7.00%

Across our allocations, we can then see position #5 has the greatest Sharpe.

Position	Stocks	Bonds	Return	Risk	Sharpe
1	30%	70%	4.66%	9.40%	48%
2	40%	60%	5.28%	10.20%	50%
3	60%	40%	6.52%	11.80%	54%
4	70%	30%	7.14%	12.60%	55%
5	80%	20%	7.76%	13.40%	57%

So the strategy allocation at the time would be 80% stocks, 20% bonds.

Performance

Using this dynamic active approach, we find higher risk-adjusted returns (Sharpe) than most of the static strategic asset allocation mixes. Cumulative growth is on par with an 80/20 mix. So the active approach captures 97% and 84% of the incremental growth of the 80/20 and 100% mixes with 62$ and 50% of the Risk, respectively.

TERRY GRENNON

1994-2020

Measure	Dynamic	30/70	40/60	60/40	70/30	80/20	100
Return	8.6%	6.9%	7.3%	8.1%	8.4%	8.7%	9.3%
Risk	7.5%	5.2%	6.4%	9.2%	10.6%	12.1%	15.0%
Sharpe	0.75	0.75	0.67	0.56	0.51	0.48	0.42
Gro $100k	$ 1,010,954	$ 650,825	$ 725,313	$ 882,692	$ 963,823	$ 1,045,181	$ 1,203,676

Performance – Drawdown 2000 – 2002 Bear Market

Date	Dynamic	30/70	40/60	60/40	70/30	80/20	100
8/1/2000	$230,886	$230,886	$251,390	$296,764	$321,748	$348,336	$406,518
9/1/2002	$224,480	$224,480	$226,446	$228,713	$228,986	$228,674	$226,286
Drawdown	-2.8%	-2.8%	-9.9%	-22.9%	-28.8%	-34.4%	-44.3%

Performance – Drawdown 2008 – 2009 Bear Market

Date	Dynamic	30/70	40/60	60/40	70/30	80/20	100
10/1/2007	$330,689	$330,689	$353,719	$400,874	$424,718	$448,533	$495,385
3/1/2009	$290,827	$290,827	$290,193	$285,407	$281,293	$276,079	$262,570
Drawdown	-12.1%	-12.1%	-18.0%	-28.8%	-33.8%	-38.4%	-47.0%

During the two bear markets, the dynamic approach had losses equivalent to a 30/70 mix.

Mood and the stock market

The Theory: The theory of mood and markets is a hypothesis of human social conduct depicting the causal connection between the social state of mind and social activity. In human complex systems, such as the stock market, herding behavior results in uncertainty settings reflected in social mood patterns that fit with various fractal designs or wave patterns. These patterns are repetitive, probabilistic, and predictable.

These social mindset patterns determine the character of activities, both in financial markets and other social settings. The scientific name of the system is socionomics.

Shiller: Shiller's (1990) study of the stock market crash of 1987 is a genuine case of the disparity between what institutional investors state is the explanation behind an enormous market swing and what they did as they sold their stock positions by the droves. The study found that the most prominent reason for selling was that the market was "overvalued."

However, an astonishing 43% of these institutional investors experienced "unusual symptoms of anxiety (difficulty concentrating, sweaty palms... or rapid pulse) regarding the stock market." Rather than the quiet thinking procedure of selling they revealed, they were seen as "...people reacting to each other with heightened attention and emotion, trying to fathom what other investors were likely to do, and falling back on intuitive models...."

Post hoc defense of the following action finishes this mindboggling sort of social activity. Socionomics: Socionomics finds financial valuations by different homogeneous participants fill in as the setting for non-rational behavior.

This follows variances endogenously in a social mood that drives asset value fluctuations. The socionomics hypothesis sets that social disposition might be an extension among intuition and habit, between emotional inclination and setting clear discernment and action. Socionomics considers intuition to be an extension among science and social sciences that explains human social conduct.

Part of this hypothesis reverberates in Pareto's little-known sociological premise of buildups and determinations. Pareto's

proposition of a natural human spirit toward "sociability" is identified with the socionomics conceptualization of herding (Pareto called such impulses "residues"). In contrast, his idea of mental "derivations," the methods by which individuals legitimize their conduct, is identified with the hypothesis regarding the role of rationalization in financial decision making.

The socionomics model of endogenous causality in a homogeneous system varies from the neoclassical theory of finance that assumes system participation is heterogeneous and causality is exogenous. Pareto was famous for making and refining parts of equilibrium theory in economics and his economic concept of the "Pareto optimum."

One may say that Pareto was the first to do for sociological behavior what Freud did for intimate and emotional behavior: he lay bare its roots in unconscious motivations.

The neoclassical monetary hypothesis takes its model of causality from nineteenth century physics (Mirowski, 1989). Socionomics addresses the unpredictable truth of money related conduct from the viewpoint of a comprehensive combination of the causal connections among people and aggregates in society (Prechter and Parker, 2004).

According to socionomics, when people don't have the foggiest idea, they are affected to go about as though others do. To herd, it is thought to expand the general possibility of survival. Herding depends on the respective state of mind of investors and how they feel. This is the territory of the cerebrum's prerational regions, which mediates emotions, not

rational ones (Prechter, 2001). This reason for the herding impulse can be found in neurophysiology.

The territories of the brain mediating rational ideas assume a job in the herding process. They produce reasoning for the investor's irrational behavior. Data from socionomics studies (Prechter, 1999a, 2003) finds that markets are not driven by causes outside the market itself, such as financial reports, wars, terrorism, elections, corporate earnings, scandals, Fed actions, or the movements of other markets.

The hypothesis expresses that the social state of mind goes before and decides social activity, not the other way around. Additionally, market prices are simply an

"epiphenomenon" of an unconscious, subjective valuation process. Waxing hopefulness produces rising prices, and waxing cynicism creates falling prices.

Prices are merely a gauge of investor psychology, which comes from the social state of mind. Socionomics is consistent with modern systems theory, where a working connection at the individual level and the aggregate level exists. Likewise, it shows no

"cause and effect" relationships that are linear; instead, social activities "proceed relentlessly according to form" (Prechter, 1999) at the aggregate level.

Socionomics can clarify why investment fund managers, in total, neglect to beat the market (Olsen, 1996). It isn't because the market is random; it is because of the managers' herd, much like individual investors. See Sias (2004), Welch (2000), Graham (1999), Trueman (1994), and Scharfstein and Stein (1990) for proof of herding by institutional managers, foundations, financial journalists, brokers, and money managers.

There are no critical contrasts in real-life trading between the conventional classes of "smart money" and "dumb money."

The hypothesis perceives the requirement where both reasonability is the standard and digestion of man's dynamic, endogenous causal procedures in social settings of uncertainty, where herding is the rule.

Examples of the difference between logical and non logical thinking exist with other social models. Freud's "primary process" (nonlogical) and "secondary process" (logical) or Kahneman's (2003) "system 1" vs. "system 2" thinking. The Elliott Wave:

Socionomics proposes that the positive social state of mind is the wellspring of mental imaginativeness and good faith that prompts innovative achievements and bullish monetary markets and the economy. In contrast, a negative social disposition is the wellspring of stagnation and financial downturns.

The social framework shapes the crisis; it doesn't influence its substance, which relies on the person's ideas and financial issues when all is said in done. It is the premise that social temperament, which thus instigates social activities (one of which is purchasing and selling stocks), appears as a hierarchical fractal. The shapes can be traced out according to the "Wave Principle" (Elliott, 1938, 1946; Frost and Prechter, 1978/2005).
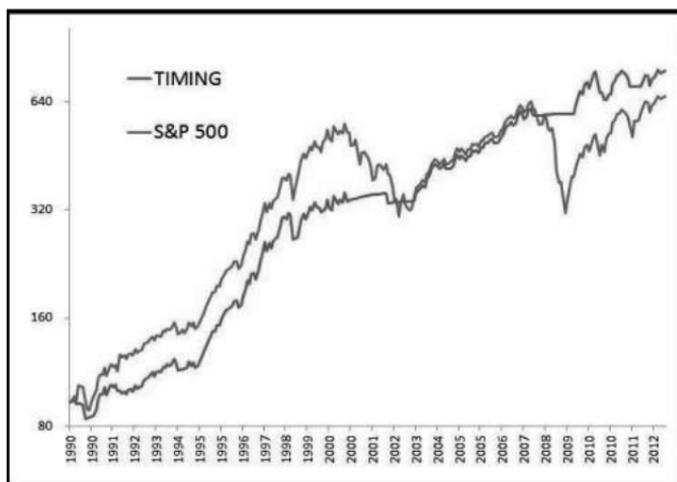
The Elliott Wave
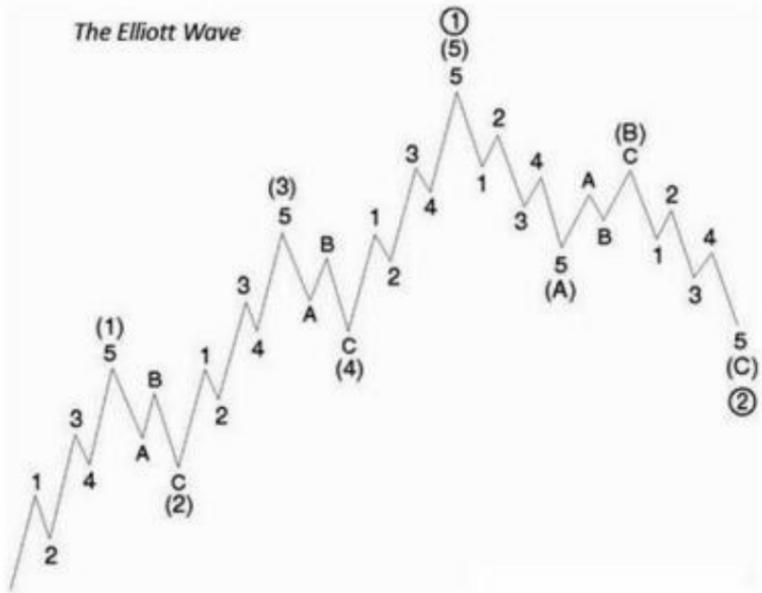
By understanding the Wave Principle, you can anticipate large and small shifts in psychology, driving any investment market and help yourself minimize the emotions that drive your own investment decisions.

Tactical Asset Allocation (TAA)

Since 2006, Meban Faber has been updating his research on a simple trend following approach in his paper, A Quantitative Approach to Tactical Asset Allocation. The simple asset protection approach uses a 200-day moving average price to go long when the current price moves above the moving average and a move to cash when it falls below it. This chart and table illustrate the protective qualities of the approach.

S&P 500 Total Returns vs. Timing Total Returns (1901-2012)

	S&P 500	TIMING
Returns	9.32%	10.18%
Volatility	17.87%	11.97%
Sharpe	0.32	0.55
MaxDD	-83.46%	-50.29%
% Positive Months	61.58%	75.80%
$100 becomes	$2,163,361	$5,205,587
Inflation CAGR	3.11%	3.11%

Technical Factors

Utilizing the Elliott Wave Oscillator, the Golden Cross, and volume, this asset allocation approach may be used to allocate in and out of stocks when dynamically:

• Wave & Volume properties indicate a primary wave trend down (or up) in stocks is occurring.

Elliott Wave Oscillator (EWO) is simply the difference between a five-period and thirty-five-period simple moving average.

The EWO indicator is used to determine where an Elliott wave ends, and another begins. When the oscillator begins to put in a series of lower highs while price puts in higher highs, a trend change occurs.

The basis of the Elliott principle, which quantifies market crowd behavior, works best in equities that (1) have lots of volume (liquidity) and (2) move according to fundamental forces of fear and greed on the part of many participants. The Golden Cross

The Golden Cross is a longer-term trend measure that utilizes the 200-day moving average. It sometimes is coupled with a shorter 50 day moving average. In Meb Faber's paper, A Quantitative Approach to Tactical Asset Allocation, a 1% move of the one-day change in the price above or below the 200-day moving average.

Faber, in his paper, cites Jeremy Siegel with the 1% specification:

"The most often cited long-term measure of trend in the technical analysis community is the

200-day simple moving average. In his 2008 book Stocks for the Long Run: The Definitive Guide to Financial Market Returns & Long-Term Investment Strategies,

Jeremy Siegel investigates the use of the 200-day SMA in timing the Dow Jones

Industrial Average (DJIA) from 1886 to 2006. His test bought the DJIA when it closed at least 1 percent above the 200-day moving average, and sold the DJIA and invested in Treasury bills when it closed at least 1 percent below the 200-day moving average.

He concludes that market timing improves the absolute and risk-adjusted returns over buying and holding the DJIA. Likewise, when all transaction costs are included (taxes, bid-ask spreads, commissions), the risk-adjusted returns are still higher when employing market timing, though timing falls short on an absolute return measure."

Performance

We find a cumulative asset growth advantage of 58% vs. a 100% stock allocation and 70% vs. a strategic asset allocation approach (60% stocks, 40% bonds) from October 1992 through September 2020 with the new Strategy that combines fundamental and technical inputs. Here is the difference between the dynamic asset allocation strategy and the 60/40 and 100% stock strategies.

Difference

	60/40	100
	$2,323,509	$1,915,101

Efficient Capital Markets

In 1970 Eugene F. Fama wrote a review of the work related to the efficient market hypothesis (EMH), including the work of Benoit Mandelbrot and Paul Samuelson. EMH suggested that stock prices were impossible to predict because "all information" was already built into the prices.

Fama states, "the assumption that market equilibrium conditions can be stated in terms of expected returns elevates the purely mathematical concept of expected value to a status not necessarily implied by the general notion of market efficiency. The expected value is just one of many possible summary measures of a distribution of returns, and market

efficiency per se (i.e., the general notion that prices "fully reflect" available information) does

not imbue it with any special importance."

The implication for the asset management industry was obvious, and eventually, it became evident in the returns data when researchers started to look for evidence of EMH. The message: professional money managers can't outperform the market.

The Performance Of Mutual Funds – In The Period 1945-1964 In this 1967 study using Jensen's Alpha, the researcher Michael C. Jensen looked at fund managers' net and gross fund performance. This was his conclusion on the ability of fund managers to predict stock prices: "The evidence on mutual fund performance indicates not only that these 115 mutual funds were on average not able to predict security prices well enough to outperform a buy-the market-and-hold policy, but also that there is very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance.

It is also important to note that these conclusions hold even when we measure the fund returns gross of management expenses (assuming their bookkeeping, research, and other expenses except brokerage commissions were obtained free). Thus on average, the funds were not quite successful enough in their trading activities to recoup even their brokerage expenses."

The Loser's Game

Before Roger Ibbotson started Ibbotson Associates to give the financial services industry all the tools necessary to run an advice business, Yale Professor Charles D.

Ellis wrote a landmark advocacy paper for individual investors and indexation.

"The Loser's Game" contended: "Disagreeable data are streaming out of the computers of Becker Securities and Merrill Lynch and all the other performance measurement firms. Over and over again, these facts and figures inform us that investment managers fail to perform.

Not only are the nation's leading portfolio managers failing to produce positive absolute rates of return (after all, it's been a long, long bear market), but they are also failing to produce positive relative rates of return. Contrary to their oft articulated goal of outperforming the market averages, investment managers are not beating the market:

The market is beating them." Ellis pointed out that "Professionals win points, amateurs lose points." He used tennis as an analogy to get across his point in the paper.

> "In expert tennis, about 80 percent of the points are won; in amateur tennis, about 80 percent of the points are lost. In other words, professional tennis is a Winner's Game

– the activities of the winner determine the outcome – and amateur tennis is a Loser's Game – the outcome is determined by the activities of the loser. The two games are, in their

fundamental characteristic, not at all the same. They are opposites."

On performance, Ellis points out: "The disagreeable numbers from the performance measurement firms say there are no managers whose past performance promises that they will outperform the market in the future. Looking backward, the evidence is alarming: 85 percent of professionally managed funds underperformed the S&P 500 during the past ten years.

And the median fund's rate of return was only 5.4 percent – about 10 percent below the S&P 500." Ellis found Greenwich Associates, became part of Yale's investment committee and joined the board of his friend's John Bogle's, The Vanguard Group.

Graham's Later View of Active Management Benjamin Graham, the dean of active value investing and security selection, was also well aware that the superior rewards he had reaped using his valuation principles would be difficult to achieve in the future.

In a 1976 interview, he made this remarkable concession, "I am no longer an advocate of elaborate techniques of security analysis to find superior value opportunities. This was a rewarding activity, say, 40 years ago, but the situation has changed a great deal since then. In the old days, any well-trained security analyst could do a good professional job of selecting undervalued issues through detailed studies.

Still, in the light of the enormous amount of research now being carried on, I doubt whether in most cases such extensive efforts will generate sufficiently superior selections to justify their cost."

Over time, more academics started to look at portfolio management models and performance. As Sanford Grossman and

Joseph Stiglitz point out in their 1980 paper,

On the Impossibility of Informationally Efficient Markets, there must be "sufficient profit opportunities, i.e., inefficiencies, to compensate investors for the cost of trading and informationgathering." While they argue that there are some returns for investors, they suggest that the rewards investors gather are commensurate with the costs they bear.

Investors seek and exploit obvious profit opportunities (which is why they are so rare).

On Persistence in Mutual Fund Performance In 1997, Mark M. Carhart released his paper "On Persistence in Mutual Fund Performance" in the Journal of Finance. The research "finds that "performance does not reflect superior stock-picking skill. Rather, common factors in stock returns and persistent differences in mutual fund expenses and transaction costs explain almost all of the predict-ability in mutual fund returns. The results do not support the existence of skilled or informed mutual fund portfolio managers."

Active Management

To justify hiring active managers, the investor must believe 1. Some portfolio managers have the skill to deliver superior performance. 2. The investor has the talent to identify superior managers. In his paper, "Manager Selection," Scott D. Stewart from the CFA Institute found concerning evidence that

managers can outperform their benchmarks: "evidence suggests that it is difficult to generate positive alpha."

Furthermore, "If positive alphas persist over time, investors should be able to collect historical returns, compute alphas, and select a set of managers with the highest performance. Regrettably, although evidence suggests this approach works in the short term, the alpha appears to decay over time."

He also finds that institutional consultants "seem to follow short-term performance trends and make value-destroying decisions when hiring and firing. In terms of the performance of their investment decisions." He points out that indexing benefits from the reduced time needed to conduct new manager due diligence and monitor current managers.

In their paper, "Is Manager Selection Worth the Effort for Financial Advisors?," authors John West, CFA, and Trevor Schuesler, CFA, conclude "manager selection fails to produce positive excess returns, on average" and "trend-chasing behavior leads to poor buy and sell decisions."

They find "many advisors put their clients on the "hamster wheel" of manager selection, continuously replacing poor performers with good performers. The evidence makes it pretty clear we shouldn't use historical performance as our primary manager selection criteria."

They conclude, "Nonetheless, the literature suggests that financial advisors shouldn't expect, nor communicate to clients an expectation of, market-beating results via manager selection, at least not with the current (sometimes overwhelming) investor bias of making buy and sell decisions based on

performance metrics." They state, "If the expectation is to produce positive alpha, financial advisors and their clients are likely to be disappointed."

Bogle

"I would add that I am not persuaded that international funds are a necessary component of an investor's portfolio. Foreign funds may reduce a portfolio's volatility, but their economic and currency risks may reduce returns by a still larger amount.

The idea that a theoretically optimal portfolio must hold each geographical component at its market weight simply pushes me further than I would dream of being pushed. My best judgment is that international holdings should comprise 20 percent of equities at a maximum and that a zero weight is fully acceptable in most portfolios."

"Large additional exposure to foreign stocks to invest in foreign nations is not essential. In terms of Risk and return, the record of the past — whether prologue to the future or not — does not provide compelling reasons to abandon the acres of diamonds that can be unearthed at home to seek unknown diamond lodes abroad."

"I want to reemphasize my reluctance to embrace the idea of holding a truly global portfolio, in which a U.S. investor's market weighting would be based on the weights of the markets of each major nation, resulting, in mid-2009, in 44 percent U.S. stocks and 56 percent international stocks.

But I have no reluctance whatsoever to emphasize a truly global strategy, focused largely on U.S. stocks. After all, the

major U.S. corporations include some of the world's largest firms, doing business all over the globe. In 2008 foreign sales represented 48 percent of all sales for the Standard & Poor's 500 Index, up from 42 percent in 2003. So I continue to believe it is not necessary to stray too far from home."

Bogle saw that three funds were better. He thought, "The beauty of owning the market is that you eliminate individual stock risk, you eliminate market sector risk, and you eliminate manager risk; There may be better investment strategies than owning just three broad-based index funds, but the number of strategies that are worse is infinite."

"A recent study by Morningstar Mutual Funds—to its credit, one of the few publications that systematically tackles issues like this one— concluded essentially that owning more than four randomly chosen equity funds didn't reduce Risk appreciably. Around that number, the Risk remains fairly constant, all the way out to 30 funds (an unbelievable number!), at which point Morningstar stopped counting. Figure 4.6 shows the extent to which the standard deviation of the various fund portfolios declined as more funds were added."

Why Index Funds Are Better

The bottom line, utilizing index funds is a prudent decision regarding fees, investments, and asset allocation. It's a sensible decision both at the individual and aggregate fund family level.

1. If an investor took index funds in aggregate to compare fees for reasonableness. They would find

which index fund providers were ripping them off
based on their methodology and execution costs.
They would just drop them without hesitation.

2. But where prudence plays a role, evaluation and due
diligence with index funds are different from active
funds since fees represent more than getting what
you pay for. Index fund performance closely matches
the realized and expected performance of the
underlying index it represents.

The same underlying index, which in many cases is tied
directly to an asset class that is used in the asset allocation
approach and process. Therefore investors will experience
fewer periods in which their asset allocation strategy
expectations have a mismatch with their investment funds and
their asset allocation strategy performance.

1. It eliminates the whole controversial debate about
active vs. passive, which researchers say favors index
funds, and asset management professionals
sometimes say they have an excellent fund that
outperforms the respective index. The reality is there
is no definitive process among fiduciaries that
enables them to pick good active, persistent
managers that can prudently support the asset
allocation approach.

I've practiced investment manager research and selection
on and off for 30+ years. I've seen empirical white paper
research that says you need 15 years of cumulative aggregate

performance measurements to justify active management fees yet fiduciaries and advisors only use standardized measuring periods that usually end at ten years utilizing compound annual growth rates. Both approaches may be acceptable on the surface to a plan sponsor, but it's very debatable across the investment community.

1. The bottom line, the whole idea of active management is very subjective on many different levels and extremely debatable, making any selection process fraught with Risk (s) and, therefore, imprudent.
2. AND the focus should be on the asset allocation process anyway. Isn't that what's been said all along.

A Case for Index Fund Portfolios

In their paper, A Case for Index Fund Portfolios, authors Richard A. Ferri and Alex C.

Benke state that "investors holding only index funds have a better chance for success." To avoid the survivorship bias that exists in commercially available mutual fund databases, in their research, Ferri and Benke used the "CRSP Survivor-Bias-Free US Mutual Fund Database," which includes funds that have failed or merged over time.

They "looked at the performance of the Vanguard Total Stock Market Index Fund Investor Shares relative to actively managed large-cap fund portfolios, the performance of the Vanguard Total International Stock Index Fund Investor Shares relative to foreign stock funds, etc. We then combined these probabilities to estimate the probability that a portfolio

of index funds will outperform and compare this to the scenario's actual results.

Table 2 lists individual category results for the index fund portfolio funds used in Scenario 1. The "Index Portfolio Win %" column is the probability of the fund to outperform a randomly selected actively managed fund in its category over the 16 years. "Median Performance Loss" is the relative median performance of the active funds that Line 4 in Table 2 shows the weighted average of the three individual index funds based on 40% U.S. equity, 20% international equity, and 40% U.S. investment grade bond fund portfolio.

Weighting the three index funds using 40%/20%/40% suggests an expected index portfolio win rate for the portfolio by 79.9%. In reality, the actual win rate was 82.9% from Scenario 1. Our estimate was 3.0% below. This was an unexpected outcome.

The "Median Performance Win" of 0.74% based on the 40%/20%/40% asset allocation method was higher than the actual result. In the real 5,000 simulated trials, the median outperforming actively managed portfolio won by only 0.52% annually, one third less than the expected outperformance.

TABLE 2: Estimated winning percentage of an all index fund portfolio over 16 years (1997-2012)

FUND OR PORTFOLIO	INDEX PORTFOLIO WIN %	MEDIAN PERFORMANCE LOSS	MEDIAN PERFORMANCE WIN
VTSMX (US equity: 40%)	77.1%	-2.01%	0.97%
VGTSX (Int'l equity: 20%)	62.5%	-1.75%	1.34%
VBMFX (US bonds: 40%)	91.5%	-0.99%	0.23%
Weighted 40%/20%/40%	79.9%	-1.56%	0.74%
Scenario 1 Results	82.9%	-1.25%	0.52%

Sources: CRSP Survivor Bias-Free US Mutual Fund Database, author calculations

The paper concludes: Mutual fund portfolios holding only index funds have performance advantages over comparable portfolios that only actively manage funds. These advantages were quantified by running several scenarios that measured and compared strategy performance over time, both nominally and riskadjusted.

How many index funds are optimal?

To get to the heart of this question, The Vanguard Group of funds' admiral share classes were analyzed because of their representation at the major and then the sub asset class level. The following breaks out two sets of asset class types Set A without international and Set B with international.

SET A						
Asset Class	Name	Ticker	%	Asset Class	Name	Ticker
60% Stocks	Total Stock Market Index Fund Admiral Shares	VTSAX	35%	US Large Cap	Vanguard 500 Index Fund Admiral Shares	VFIAX
			15%	US Mid Cap	Vanguard Mid-cap Index Fund Admiral Shares	VIMAX
			10%	US Small Cap	Vanguard Small-cap Index Fund Admiral Shares	VSMAX
40% Bonds	Total Bond Market Index Fund Admiral Shares	VBTLX	5%	High Yield	High-Yield Corporate Fund Admiral Shares	VWEAX
			5%	Long	Long-Term Investment-Grade Fund Admiral Shares	VWETX
			20%	Intermediate	Intermediate-Term Investment-Grade Fund Admiral Shares	VFIDX
			10%	Short	Short-Term Investment-Grade Fund Admiral Shares	VFSUX

SET B						
Asset Class	Name	Ticker	%	Asset Class	Name	Ticker
40% Stocks	Total Stock Market Index Fund Admiral Shares	VTSAX	25%	US Large Cap	Vanguard 500 Index Fund Admiral Shares	VFIAX
			10%	US Mid Cap	Vanguard Mid-cap Index Fund Admiral Shares	VIMAX
			5%	US Small Cap	Vanguard Small-cap Index Fund Admiral Shares	VSMAX
20% Stocks	Vanguard Total International Stock Index Fund Admiral Shares	VTIAX	15%	Int'l Developed	Vanguard Developed Markets Index Fund Admiral Shares	VTMGX
			5%	Int'l Emerging	Emerging Markets Stock Index Fund Admiral Shares	VEMAX
40% Bonds	Total Bond Market Index Fund Admiral Shares	VBTLX	5%	High Yield	High-Yield Corporate Fund Admiral Shares	VWEAX
			5%	Long	Long-Term Investment-Grade Fund Admiral Shares	VWETX
			20%	Intermediate	Intermediate-Term Investment-Grade Fund Admiral Shares	VFIDX
			10%	Short	Short-Term Investment-Grade Fund Admiral Shares	VFSUX

Correlations – Set A

The following correlations table clearly shows that for Set A, the two sets of funds with the lowest correlation and diversification benefits are the Total Stock & Total Bond funds and Small

Cap & Total

 Bond funds. Total Bond has a clear advantage over the bond sub-asset classes.

Total stock is not a clear winner over the other stock sub-asset classes.

12 Month Correlations 12/1/2001 - 4/30/2020										
Name	Ticker	VTSAX	VBTLX	VFIAX	VIMAX	VSMAX	VWEAX	VWETX	VFIDX	VFSUX
Vanguard Total Stock Mkt Idx Adm	VTSAX	-	-0.07	1.00	0.97	0.95	0.70	0.10	0.22	0.33
Vanguard Total Bond Market Index Adm	VBTLX	-0.07	-	-0.07	-0.04	-0.09	0.27	0.90	0.87	0.64
Vanguard 500 Index Admiral	VFIAX	1.00	-0.07	-	0.95	0.92	0.69	0.10	0.22	0.32
Vanguard Mid Cap Index Admiral	VIMAX	0.97	-0.04	0.95	-	0.97	0.73	0.13	0.26	0.38
Vanguard Small Cap Index Adm	VSMAX	0.95	-0.09	0.92	0.97	-	0.70	0.08	0.20	0.31
Vanguard High-Yield Corporate Adm	VWEAX	0.70	0.27	0.69	0.73	0.70	-	0.42	0.60	0.69
Vanguard Long-Term Investment-Grade Adm	VWETX	0.10	0.90	0.10	0.13	0.08	0.42	-	0.87	0.64
Vanguard Interm-Term Investment-Grde Adm	VFIDX	0.22	0.87	0.22	0.26	0.20	0.60	0.87	-	0.90
Vanguard Short-Term Investment-Grade Adm	VFSUX	0.33	0.64	0.32	0.38	0.31	0.69	0.64	0.90	-

Correlations – Set B

The following correlation table clearly shows that for Set B, the two sets of funds with the lowest correlation and diversification benefits are the Total Stock & Total Bond fund and Small Cap & Total Bond fund. The international funds had negligible correlations and diversification benefits.

12 Month Correlations 12/31/2011 - 4/30/2020													
Name	Ticker	VTSAX	VTIAX	VBTLX	VFIAX	VIMAX	VSMAX	VTMG	VEMA	VWEA	VWET	VFIDX	VFSUX
Vanguard Total Stock Mkt Idx Adm	VTSAX	-	0.867	-0.121	0.997	0.983	0.959	0.87	0.753	0.77	0.071	0.222	0.412
Vanguard Total Intl Stock Index Admiral	VTIAX	0.867	-	-0.038	0.864	0.871	0.827	0.988	0.918	0.792	0.118	0.311	0.476
Vanguard Total Bond Market Index Adm	VBTLX	-0.121	-0.038	-	-0.121	-0.092	-0.134	-0.062	0.054	0.242	0.908	0.875	0.665
Vanguard 500 Index Admiral	VFIAX	0.997	0.864	-0.121	-	0.969	0.935	0.868	0.75	0.759	0.071	0.217	0.399
Vanguard Mid Cap Index Admiral	VIMAX	0.983	0.871	-0.092	0.969	-	0.977	0.868	0.765	0.792	0.097	0.259	0.457
Vanguard Small Cap Index Adm	VSMAX	0.959	0.827	-0.134	0.935	0.977	-	0.823	0.721	0.769	0.055	0.215	0.425
Vanguard Developed Markets Index Admiral	VTMG	0.87	0.988	-0.062	0.868	0.868	0.823	-	0.852	0.78	0.103	0.282	0.451
Vanguard Emerging Mkts Stock Idx Adm	VEMA	0.753	0.918	0.054	0.75	0.765	0.721	0.852	-	0.733	0.166	0.369	0.498
Vanguard High-Yield Corporate Adm	VWEA	0.77	0.792	0.242	0.759	0.792	0.769	0.78	0.733	-	0.435	0.607	0.719
Vanguard Long-Term Investment-Grade Adm	VWET	0.071	0.118	0.908	0.071	0.097	0.055	0.103	0.166	0.435	-	0.883	0.703
Vanguard Interm-Term Investment-Grde Adm	VFIDX	0.222	0.311	0.875	0.217	0.259	0.215	0.282	0.369	0.607	0.883	-	0.904
Vanguard Short-Term Investment-Grade Adm	VFSUX	0.412	0.476	0.665	0.399	0.457	0.425	0.451	0.498	0.719	0.703	0.904	-

Summary Statistics – Set A

The following summary statistics for the broader asset class strategy set show no benefits advantage across any measurement.

Metric	Portfolio B1	Portfolio B2	Difference	
Start Balance	$10,000	$10,000		
End Balance	$18,310	$18,595	($285)	-2.9%
End Balance (inflation adjusted)	$15,653	$15,897	($244)	-2.4%
CAGR	6.70%	6.87%	-0.17%	-2.5%
CAGR (inflation adjusted)	4.92%	5.09%	-0.17%	-3.5%
Stdev	8.06%	8.95%	-0.89%	-11.0%
Best Year	20.11%	21.16%	-1.05%	-5.2%
Worst Year	-5.78%	-7.74%	-1.96%	33.9%
Max. Drawdown	-12.04%	-14.49%	2.45%	-20.3%
Sharpe Ratio	0.77	0.72	0.05	6.5%
Sortino Ratio	1.16	1.06	0.10	8.6%

Summary Statistics – Set B. The following summary statistics show higher risk-adjusted return measurements for the three-asset fund class strategy.

Metric	Portfolio A1	Portfolio A2	Difference	
Start Balance	$10,000	$10,000		
End Balance	$34,017	$33,628	$389	3.9%
End Balance (inflation adjusted)	$23,444	$23,176	$268	2.7%
CAGR	6.91%	6.84%	0.07%	1.0%
CAGR (inflation adjusted)	4.76%	4.69%	0.07%	1.5%
Stdev	8.82%	9.67%	-0.85%	-9.6%
Best Year	21.97%	25.18%	-3.21%	-14.6%
Worst Year	-20.13%	-25.33%	-5.20%	25.8%
Max. Drawdown	-30.65%	-35.23%	4.58%	-14.9%
Sharpe Ratio	0.65	0.6	0.05	7.7%

Drawdowns

The performance during drawdown periods reflects an advantage for a 2-3 asset class strategy.

Metric	Portfolio A1	Portfolio A2	Difference
Worst Year	-30.65%	-35.23%	4.58%
Historical Value-at-Risk (5%)	-3.71%	-4.08%	0.37%
Analytical Value-at-Risk (5%)	-5.86%	-6.56%	0.70%

Metric	Portfolio B1	Portfolio B2	Difference
Worst Year	-5.78%	-7.74%	1.96%
Historical Value-at-Risk (5%)	-4.06%	-4.35%	0.29%
Analytical Value-at-Risk (5%)	-3.30%	-3.70%	0.40%

Safe Relative Withdrawal Rates

The granddaddy industry-standard 4% systematic withdrawal rate may have originated with CREF's (College Retirement Equities Fund) variable annuity assumed investment return (AIR).

It may have been supported over the years by the individual investor financial planning community since it is widely recognized that a 10% assumed return on largecap U.S. stocks was (and still is) being used not just in optimization for asset allocation but also for Monte Carlo simulation in determining appropriate systematic withdrawal rates in retirement.

We also know from Easterling's research that Monte Carlo simulation is simply the other side of the MPT coin. Based on the dynamic asset allocation approach to investing in stocks, bonds, and cash, why would investors not consider a more pragmatic approach and prudent, safe relative withdrawal rate (SRWR) based on CAPE and yields?

For example, if the CAPE is in the 95-100% historical valuation, which translates into a 1% assumed return on stocks and yields on bonds is 2% (assumed return on bonds), then

would it not be more safe and prudent then to withdraw 40% of the assumed investment return based on your mix. So a 60/40 mix has a 1.4% (60% of 1% + 40% of 2%) assumed investment return then the traditional 4% systematic withdrawal rate/10% return on investments rule of thumb translates into 0.56% SRWR.

Management

To receive the full backtest of the Strategy and to start receiving updates to manage the Strategy, please visit the following password protected page:

Password: AAFAM

https://terrygrennon.com/2020/11/02/asset[1]-[2]allocation[3]-[4]for[5]-[6]all[7]-[8]markets/[9]

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