ASSET ALLOCATION OPTIMIZATION USING DOWNSIDE RISK ANALYSIS

ABSTRACT

We used Sortino downside risk analysis to examine which mixes of various asset classes produced higher return and lower risk. We examined more than 10,000 different portfolio allocation mixes over the 1926-2004 time period, with particular emphasis placed on the most recent twenty years (1984-2004). In addition we describe how this downside risk analysis can be used to evaluate individual mutual fund risk.

We found Sortino downside risk analysis provided more accurate portfolio asset allocation construction than traditional mean variance optimization software. The optimal mixes of various asset class portfolios are described in this paper. Optimal long term equity asset allocation mixes should contain higher proportions of small cap and mid cap stocks, and greater weighting of value style than growth styles.

Asset allocation software has typically used mean variance optimization algorithms to determine security allocations within a portfolio in order to obtain the best tradeoff between risk and return. These techniques, by using the variance as a measure of risk, are flawed because variance measures uncertainty, not risk as a typical investor thinks of risk. Under this approach, a portfolio that exceeded the investor's goals by 5% would be seen as more risky than a portfolio that lagged by 2%. Sortino downside risk analysis defines risk in relation to an investor's goal, or Minimal Acceptable Return ("MAR"). A portfolio with a greater probability of lagging the MAR is seen as more risky than one with a smaller probability of failing to meet the MAR.

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ASSET ALLOCATION

Designing an optimal portfolio for an individual investor, total retirement plan, or plan participant has undergone dramatic changes over the last few decades. Not yet an exact science, portfolio construction has moved past the "art" phase of its development. Another term for portfolio construction is "asset allocation." Without proper asset allocation, there is little chance of a successful financial plan because the real rate of investment return will likely be insufficient.

Numerous studies, along with basic intuition, have revealed that asset allocation is a key determinant of investment performance over time. In addition asset allocation is an important tool for reducing risk. Over time, asset allocation can explain most of the investor's long-term investment return, so it should not be left to chance. Asset allocation is part of the general financial plan success triad, along with asset quality and adequate savings.
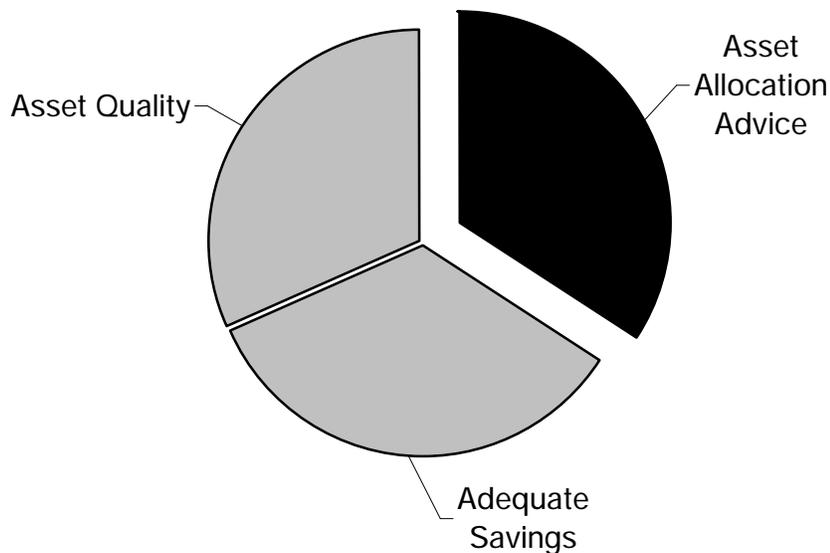
Anyone who has had even the slightest exposure to the teachings of investing has heard that determining one's asset allocation is a most important decision. Generally, the main asset classes under consideration are equities (stocks or stock mutual funds), fixed income (bonds or bond funds), and cash (money market securities). According to the most often quoted study in this area, the allocation of one's investment dollars between stock, bond and cash asset classes determines 90% of the portfolio's performance over time. More recent studies report that asset allocation may only explain 40% of total return. But whether the figure is 90% or 40%, there is no doubt that asset allocation explains a substantial portion of return over time.

Asset allocation can protect wealth from the dangers of a volatile market. From the Great Depression of the 1930s to the technology stock bust of the late 1990s, fluctuations in the stock market have plagued investors. Asset allocation allows investors to obtain growth while limiting the chances of huge loss. However, many individual investors and defined contribution plan participants do not understand or apply any type of effective asset-allocation policy. This is a stark contrast to professionally managed defined benefit plans. Virtually every defined benefit plan has a detailed written asset-allocation investment policy managed by specialists.

MODERN PORTFOLIO THEORY

In defining asset allocation, the terms "risk" and "volatility" are often used, and most investors and assume that there should be less of it. Today the risk of a single asset class or entire portfolio can be measured. What is risk, how do we define it, and what does it have to do with returns? In 1952, Dr. Harry Markowitz published an article in the Journal of Finance that showed the tradeoff between risk and return. The higher the portfolio's return, the higher the risk—he used standard deviation as a measure of risk. This relationship is called Modern Portfolio Theory.

Markowitz demonstrated the risk-reward relationship on a graph called the "Efficient Frontier," which plots "return" on the y-axis against "risk" (standard deviation) on the x-axis. Practically speaking, standard deviation measures uncertainty—either good or bad. Markowitz further concluded that the most efficient portfolio was the one that gave the highest return for each level of portfolio risk. An inefficient portfolio exposed the investor to a higher level of risk without a corresponding higher level of return.
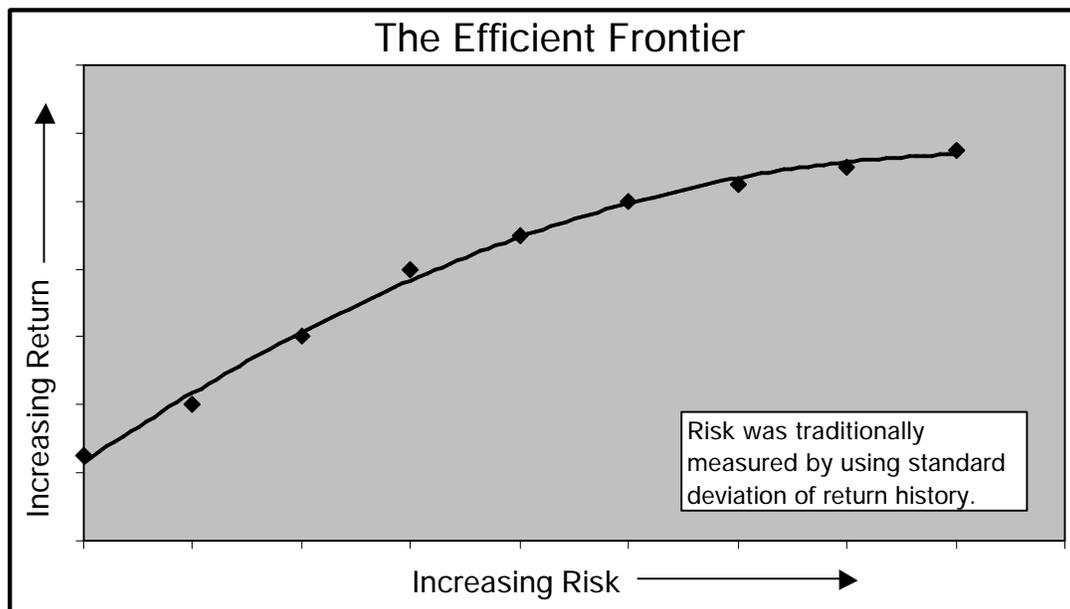
Historically, using modern portfolio theory, the easiest way to define risk was using standard deviation of the asset's return over many time periods. What does this standard deviation calculation actually mean? Standard deviation is a statistical measure of the scatter between groups of return figures. Two thirds of the time the annual return of the asset lies between one standard deviation above and one below the mean value. In addition 95% of the time the return will lie between two standard deviations above and two standard deviations below the mean.

As we will discuss in more detail later in this paper, the problem with this analysis is that standard deviation does not correspond to how an investor views risk. Few investors would be upset if their return was above their expected value, but most would be disappointed if their return was below their expected value. Thus standard deviation is flawed as a measure of risk because it cannot distinguish bad volatility from good volatility.

HOW DOES ASSET ALLOCATION REDUCE RISK OVER TIME?

No doubt, some investors have heard the recommendation many times that in order to reduce risk you should diversify across asset classes—stocks, bonds, and cash investments—in proportions appropriate for your goals, time horizon, and risk tolerance.

The chart below looks at five-year returns for six different asset allocations that were rebalanced annually for forty-three years. Depicted are the best and worst five-year annualized returns for each portfolio from 1960 to 2003. Not surprisingly, an all-stock portfolio had the highest highs and the lowest lows. But an all-bond portfolio also had five-year periods of negative returns. However, a portfolio roughly evenly balanced between stocks and bonds (60% stocks and 40% bonds, or 40% stocks and 60% bonds) had no negative returns for any five-year period. The future may be different, but it is comforting to know how various asset classes interacted with each other over the past forty-three years.
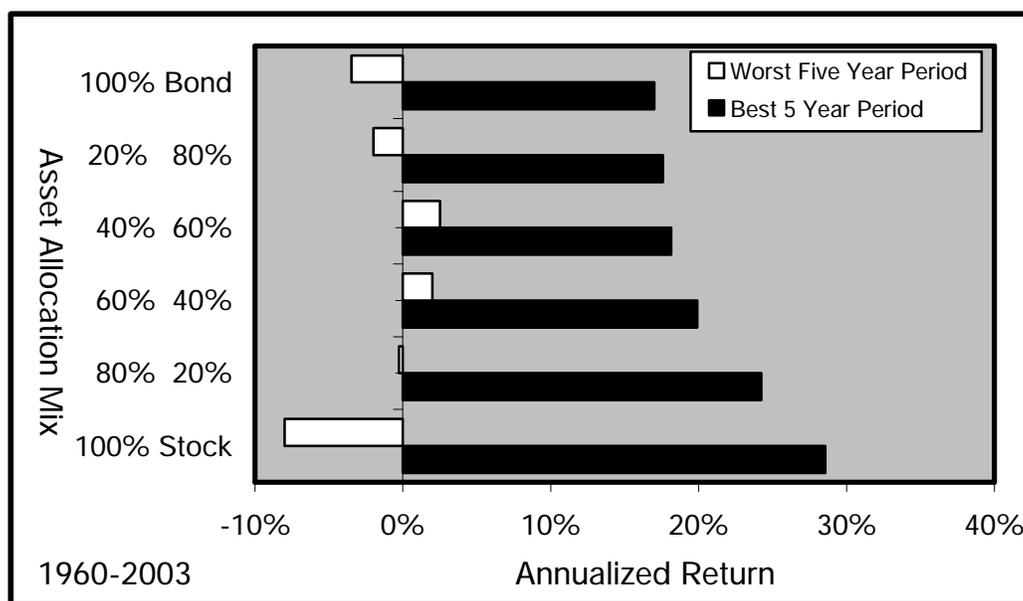
While the theoretical aspects of the importance of asset allocation in portfolio performance can be sound, the quantitative aspect can be very difficult for many investors to implement. In theory, the perfect asset allocation mix would combine various high returning assets in such a way that the return is maintained but the risk is substantially reduced.

Our research has shown that it is difficult to significantly reduce risk by simply blending various mixes of high returning assets. As we will demonstrate later, there is some advantage in mixing small and mid cap stocks with large stocks, especially value style stocks, to modestly reduce risk. However, the majority of risk reduction is gained by blending fixed income with the equity portfolio. We will also demonstrate later that certain asset classes, such as international stocks or high yield bonds do not help the portfolio's risk/return features but instead are actually detrimental!

DIVERSIFICATION BY ASSET CLASS AND STYLE

Stock and bond funds can be segregated in many different ways. Useful subcategories include the size of the companies the funds invest in, such as large cap stocks (usually companies over $7 billion in market capitalization), mid cap stocks (between $1 billion and $7 billion) and small cap stocks (under $1 billion). Other useful subcategories include geographical location of the companies either inside the United States or outside, such as an international stock fund.

Other subcategories include funds that hold real-estate trusts and funds that hold both stocks and bonds, namely balanced funds. Each of these subcategories has its own special features and risks. The goal is to combine a number of the different funds in a portfolio so that each fund moves somewhat differently from the others. The idea is that some of the risk of each individual fund is offset by the other funds. The risk cannot be eliminated this way, but it can be substantially reduced.
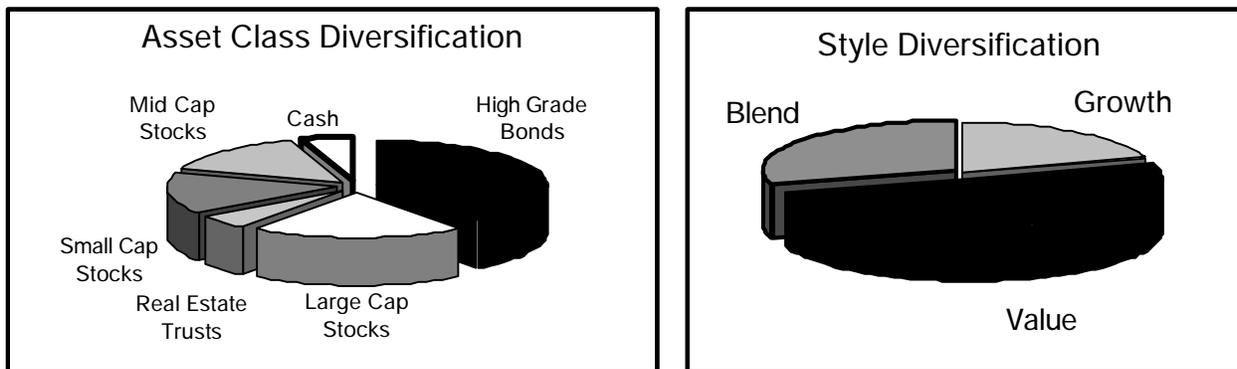
There are also many types of bond fund subcategories, including those issued by the U.S. government, state or local governments, corporations and foreign bonds. Bonds are issued for periods ranging from short-term bonds (such as U.S. Treasury bills) to long-term government or corporate bonds. The interest rate risk and credit risk vary, depending on the issuer, the bond, and the length of the term.

It is useful to further divide equities into investment style subcategories such as growth, value, or a blend of the two. Investors have traditionally considered growth stocks to be more aggressive, and value stocks to be slightly more conservative. Thus, a fund could hold stocks in subgroups, such as large cap growth, large cap value, mid cap growth, small cap value, and so on. Optimal asset allocation does not require that the portfolio be evenly divided between growth and value. Indeed, as we will se later, Sortino downside risk analysis clearly shows selectively allocating more of the portfolio towards a value style make sense over long time periods

Evaluating and selecting the funds in each of these subgroups can be challenging. Unified Trust has established a fiduciary "Best Practices" compendium to help guide this process. We define "asset quality" as selecting and maintaining better funds in each asset class. We use the Unified Fiduciary Monitoring Index$^{®}$ to measure and continually monitor asset quality. For more information on this process please visit our website at www.unifiedtrust.com.

THE IMPORTANCE OF ANNUAL REBALANCING

Annual rebalancing to restore the original asset allocation mix is a simple and effective tool that can help investors and plan participants improve their success rates. It is most effective if applied to accounts by way of a default pathway so that the desired action does not depend upon the investor overcoming their inertia and procrastination behaviors.

The stock-bond mix in their accounts will naturally vary as the two asset classes perform differently from one another. The portfolio can be kept on track by rebalancing—periodically making adjustments to the investments to bring the mix of stocks, bonds, and cash back in line with the original asset allocation.

During bull markets for stocks, the proportion of an investor's account in stocks will grow and can make the accounts more risky than intended. For example, an account that was 50% stocks and 50% bonds in 1995 would have grown to 71% stocks and just 29% bonds in 1999—just before the three-year bear market in stocks in 2000-2002.

1999 Asset Allocation of a 50:50 Portfolio in 1995

Annual Performance
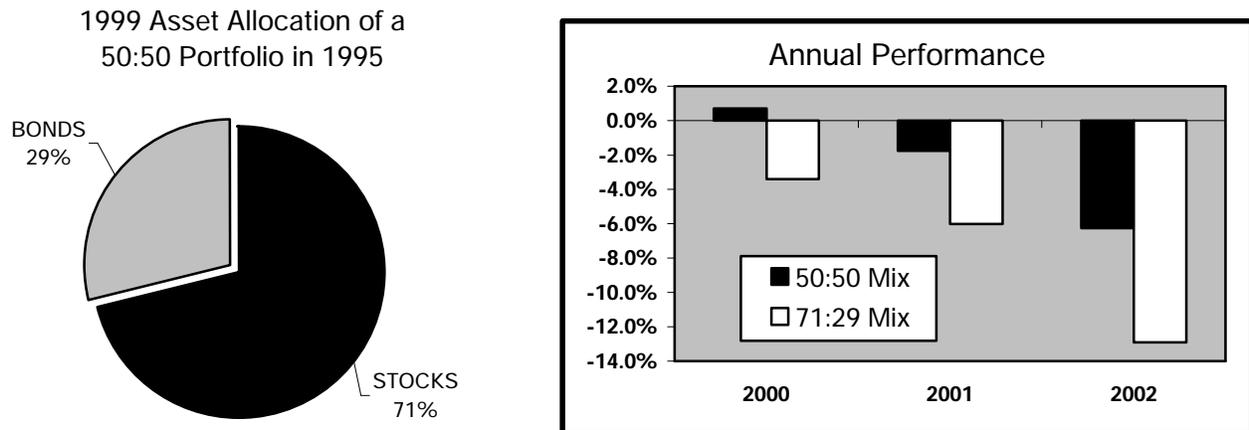
Allowing the account that was supposed to be 50% stocks and 50% bonds in 1999 to remain at 71% stocks and just 29% bonds would make a total performance difference over the next three years of -15.04% as compared to the rebalanced mix. Likewise, during bear markets for stocks, the proportion of an account in stocks will decline and can make the account more conservative than was intended. Having a lower proportion of stocks than intended may limit returns when the stock market rebounds. For example, an account that was 50% stocks and 50% bonds in 1999 would have declined to 32% stocks and 68% bonds in late 2002.

In 2003, the stock market rebounded, and the bond market was flat. A portfolio made up of 50% stocks and 50% bonds outperformed a 32:68 portfolio by 3.47%. Over the full four years of 1999–2003, annual portfolio rebalancing added a significant amount (+18.51%) to net return.

Our research has shown similar advantages of maintaining value versus growth allocations over time. Portfolio performance is improved and risk reduced when the proportion of the equity allocation in value styles is maintained over time.

WHAT IS THE MOST APPROPRIATE WAY TO DEFINE "RISK"?

In order to create the most optimal asset allocation mixes we must plot return versus risk. Many investors and plan participants think they understand risk; however, risk can be a deceiving concept that varies from case to case. Differing risk-measurement techniques have confused even the most savvy investor. To begin this discussion, we need to review some basic definitions.

Standard Deviation

The most widely accepted measure of investment risk is standard deviation. When used to gauge performance risk, it measures the degree to which returns have been spread out around their historical average. Most mutual fund reports carry some information about standard deviation, although most people reading it, and many writing about it, don't understand what it means.

Standard deviation is a statistical measurement of dispersion around an average, which, for an investment, depicts how widely the returns varied over a certain period. Investors use the standard deviation of historical performance to try to predict the range of returns that is most likely for a given fund. When a fund has a high standard deviation, the predicted range of performance is wide, implying greater volatility.

For example, a portfolio return of 15% annually over ten years is generally good. But an investment style that returns 15% every year is more valuable than one that is up 100% one year and then down 75% another, even if it also averages 15% over a long period.

Most investors prefer a return that meets their financial goals and expectations with the least possible risk. They seek investments with the least variability of return, or annual difference from the expected return. Investors look at returns to gauge the likelihood of future excess performance. Standard deviation measures how consistently that return was delivered. The more consistently a return occurred in the past, the more likely the investor will receive that return in the future.

The main problem with standard deviation is that it is not a measure of risk. Rather, it is a measure of uncertainty. As we will see a bit later in this paper, investors think of risk and uncertainty differently. Any risk measure based upon standard deviation is flawed. Investors worry about not meeting their goals, not about higher-than-expected returns (uncertainty).

Beta

This is another commonly misunderstood risk measurement. Beta does not measure risk. Beta is a measure of a fund's sensitivity to market movements. The beta of the market is 1.00 by definition. Generally, a stock fund is correlated to the S&P 500. If a fund has a beta of 1.50, it tends to move 1.5 times as much in either direction as the S&P 500. For example, if the S&P 500 were up 10%, the fund would be expected to be up 15%. It is a correlation indicator, not a risk indicator.

It is important to note that a low beta for a fund does not necessarily imply that the fund has a low level of volatility. A low beta signifies only that the fund's market-related correlation is low. A specialty fund that invests primarily in gold, for example, will usually have a low beta, as its performance is tied more closely to the price of gold and gold-mining stocks than to the overall stock market. Thus, the specialty fund might fluctuate wildly because of rapid changes in gold prices, but its beta will remain low. The "R squared" general correlation to the overall stock market would be lower than most funds, but the volatility would still be high.

Alpha

Alpha is a measure of the difference between a fund's actual returns and its expected performance, given its level of risk as measured by beta. A positive alpha figure indicates that the fund has performed better than its beta would predict. In contrast, a negative alpha indicates the fund's underperformance, given the expectations established by the fund's beta. Alpha is a measure of excess return, not risk.

> **Alpha = Excess Return - [Beta x (Benchmark - Treasury)]**
>
> **Where:**
>
> **Benchmark = the total return of the benchmark index**
>
> **Treasury = the return on risk-free treasuries**
> **Beta= the fund's beta**

Sharpe Ratio

The Sharpe Ratio is risk-adjusted measure developed by Nobel laureate William Sharpe. It is calculated by using standard deviation and Alpha to determine reward per unit of risk. This idea is that the higher the Sharpe Ratio, the better the fund's historical risk-adjusted performance. Various studies have offered mixed reviews as to whether or not the Sharpe Ratio has any future predictive power on fund performance.

$$\textbf{Sharpe Ratio} = \frac{\textbf{Alpha}}{\textbf{Standard Deviation}}$$

Any measurement that uses the standard deviation in the equation, such as the Sharpe Ratio, is a flawed measure of risk. The standard deviation measures uncertainty, not risk the way an investor thinks of risk. Thus any measure that incorporates standard deviation somewhere in the calculation is measuring uncertainty. Investors do not care about good volatility they are only concerned about bad volatility.

DESCRIBING RISK IN A WAY THAT CORRESPONDS TO INVESTORS' THINKING

As mentioned above, there are drawbacks to using standard deviation as a measure of risk: it interprets any difference from the average, above or below, as bad, not how most investors feel about returns. Few investors fret about their portfolios doubling; most only worry about the downside—their returns being below average. Investors think of risk as downside risk only.

Downside risk, as the name implies, measures risk below a certain point. For example, if an investor is worried only about losing money, that point would be zero, and the possibility of negative returns would be viewed as risky. If an investor needs to earn a 7% annual return in order to meet goals, any return under 7% would be considered risky. If an investor is evaluating a mutual fund against its per group, any return below the performance of the peer group would be unacceptable. This investment return floor, which serves as the dividing line between good and bad outcomes, is called the minimum acceptable return (MAR).

Unlike standard deviation, downside risk accommodates different views of risk. Institutional investors often view investment risk as the possibility of underperforming the benchmark, whereas retail investors tend to regard risk in absolute terms as the possibility of loss.

Investors can customize the downside risk calculation using their own MAR. The institutional investor typically uses the benchmark rate as the minimum acceptable return, while the retail investor often uses the risk-free rate. Because standard deviation can only measure how tightly distributed returns are situated around a mean, it cannot be customized for individual investors.

The amount of risk in a set of returns changes considerably depending upon where the MAR is set. For example, if one investor needs an investment that returns no less than 4% annually, any amount less than this will result in the underfunding of her pension plan. Another investor wants a good return but doesn't want to incur losses. By raising the MAR from

zero to 4%, a larger amount of the return distribution violates the MAR. This additional area—the amount between zero and 4%—is considered risk for the first investor, but not for the second.
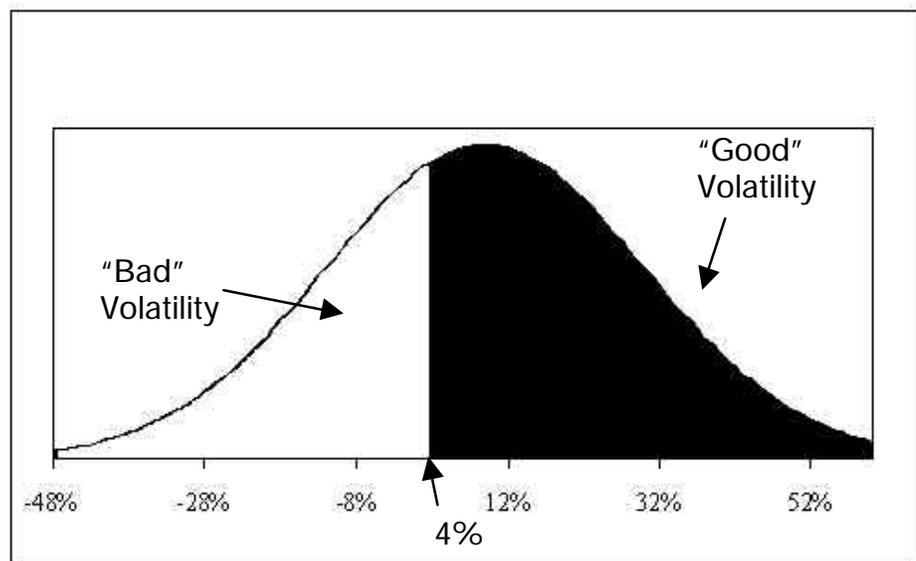
Risk is one of those subjects where there is widespread agreement on the surface but little agreement on the details. Many plan sponsors and investors agree that they do not like risk, but they often disagree on just how much risk is involved in a particular investment. Downside risk can accommodate this diversity in risk perception. Downside risk measures risk below some point. If an investor is worried only about losing money, the possibility of negative returns would be viewed as risky. If an investor needs to earn x% return to meet goal, any return under x% would be unacceptable (risky). This represents the MAR floor that is tolerable for this investor.

The key difference between standard deviation and MAR is as follows: Standard deviation interprets any difference from the average return, above or below, as bad. Most investors' views of risk are toward the downside only. That is, investors only worry about their returns being below some point. In addition to being a more intuitive definition of risk, the major advantage to downside risk over standard deviation is that it accommodates different views of risk.

Institutional investors often view investment risk as the possibility of underperforming the benchmark. Pension plan participants usually view risk in absolute terms, as the risk of not accomplishing their goal. By using downside risk, each investor can customize the risk calculation using an individualized MAR. In the above examples the institutional investor would use the benchmark rate as the minimum acceptable return, while the plan participant would want to know the risk of falling below 7%. Standard deviation can only measure how tightly distributed returns are situated around a mean, so it cannot be customized for the individual investor.

Another limitation to standard deviation as a measurement of investment risk lies with the underlying data. Most investors will recall the "normal distribution" from their Introduction to Statistics course. This nicely proportioned bell-shaped curve is what underlies all the assumptions about standard deviation. If the underlying data is not normally distributed, the standard deviation is likely to give misleading results. A number of studies have demonstrated that investment returns are not normally distributed. If the returns are not normally distributed, investors using standard deviation are likely to reach the wrong conclusions.

A further enhancement to the downside risk calculation is available in Unified Trust systems that use bootstrapping routines. Bootstrapping is a technique that tries to increase the explanatory power of a limited amount of data. Bootstrapping in this case selects twelve months at random and links them together to form a one-year return. This process is repeated thousands of times, resulting in a distribution with many observations instead of just a few. An underlying assumption to bootstrapping is that the data is independent. That is, one period's return has no connection to another period's return. Most investors believe that the return from one period has something to do with that from another period, but the two values have little correlation. Studies suggest that sequential returns are not entirely independent, but the correlation between a return and that of a return two periods later is approximately zero. One must weigh the additional explanatory power gained by the increased number of observations against the error introduced because returns are not entirely independent. In spite of its possible drawbacks, we prefer to bootstrap data, because we believe that it is able to capture returns that could have happened but never did happen, therefore providing a more complete picture of the nature of uncertainty.

DOWNSIDE RISK STATISTICS

Downside risk calculations provide the user with more information than just a downside deviation number. The additional statistics provide insight into the causes of the risk.

Downside Probability tells the user how often the returns violated the MAR. This is important, because in order to assess the likelihood of a bad outcome, it is necessary to know how often one occurred. Downside probability answers the question: "Is an investment below the MAR 5% of the time or 50% of the time?" The opposite of downside probability is **Upside Probability**. Upside probability is how often the investment exceeded the MAR.

Average Under Performance indicates the average size of the unacceptable returns. This statistic helps an investor judge the severity of the average "bad" return. An investment that lost money twice as often as a second investment may still be preferable if it tended to lose far less than the second investment. Average Under Performance answers the question: "When an investment is below the MAR, is it 2% below or 20% on average?"

Downside Magnitude 99th Percentile is the return at the ninety-ninth percentile on the downside. This is a worst-case scenario. An investment may lose money only occasionally, may average small losses when they do occur, and yet may prove unacceptable if the potential exists for huge losses. Downside Magnitude 99th Percentile answers the question: "When an investment is below the MAR, what is the worst case scenario?"

All of these statistics are combined into the **Sortino Downside Risk Statistic,** named after Dr. Frank Sortino at San Francisco's Pension Research Institute. In the table on page 18 we refer to this as **"Downside Risk".** It includes the size and the frequency of unacceptable returns. Downside risk can be thought of as the equivalent to the standard deviation of just bad results. Generally speaking our research has consistently demonstrated the downside risk will be greater when the MAR is an absolute number, such as 5% annual return, as compared to a relative number such as peer group performance.

The accepted risk-adjusted return measurement is the **Active Sortino Ratio**, which is the annualized return of the manager minus the MAR, divided by the downside risk. Similar to the Sharpe Ratio (which uses standard deviation), the Active Sortino Ratio measures how many units of active excess return were received per unit of downside risk experienced. However, it defines risk in a way more like the average investor thinks of risk. A positive (> 0) Active Sortino Ratio is good and a negative value (< 0) is undesirable.

When discussing Sortino Downside Risk, some may question why it was not adopted earlier. Part of the reason may be the more complex calculation required. Today, computing power and memory are relatively cheap commodities. Desktop software that will calculate downside risk is readily available. We have found this methodology very useful in building asset allocation model portfolios with better risk/return characteristics. For most investors, downside risk is a new concept. However, it is gaining acceptance among some in the financial community. We like the concept of defining risk as a return below some point, as this is consistent with most investors' views of risk.

CONDUCTING ASSET ALLOCATION RESEARCH
USING DOWNSIDE RISK STATISTICS

In preparation of this paper we examined more than 10,000 portfolio combinations to find the best combinations of various asset classes. Our research produced several different conclusions than prior publications. Earlier work and most commercial asset allocation software rely upon standard deviation as a measure of risk. As explained above, standard deviation cannot distinguish good volatility from bad volatility. Standard deviation assumes all volatility is risk. By using downside risk analysis we were able to construct portfolios optimized for return and risk based upon an investor's view of risk.

Most asset allocation software programs rely upon traditional "gold standard" asset class information published by Ibbotson Associates[1] in their annual yearbook; *Stocks, Bonds, Bills and Inflation.* Their data extend back to 1926, but only cover fewer assets classes, and do not cover growth versus value as Fama and French have done. Fama and French[2] studied small cap and large cap stocks, and growth and value subgroups from 1926-2004. In conducting our data analysis we wanted to cover additional important asset class groups, such as REITs, stable value funds, international stocks and high yield bonds. In second section of our analysis, we relied primarily upon the Wilshire database to conduct more meaningful research. This database contains much greater asset class information. We were able to intensively examine quarterly growth and value style performance differences in various market capitalization groups for the twenty-year period (80 quarters) beginning in 1984. The various asset classes examined are shown on page 20.

Using downside risk analysis, we attempted to answer the following questions:

1. Which asset classes are most useful to reduce overall risk in a portfolio?

2. Which fixed income asset classes are most useful to diversify fixed income portfolio?

3. Which equity asset classes are most useful to diversify the equity portion of a portfolio?

4. Which equity styles, such as growth or value, are best?

5. Which equity capitalization size categories, such as large, mid or small cap are best?

6. Which alternative asset classes are most useful to diversify an overall portfolio?

7. How many equity asset classes are needed to diversify the equity portfolio?

8. How should employee benefit model portfolios be optimally constructed?

9. How do the optimal asset allocation portfolios, selected with asset class data, perform with specific mutual funds selected by using funds with top 25% Unified Fiduciary Monitoring Index® scores?

10. Which downside risk factors are useful in selecting mutual funds from a finalist pool of funds, all with top 25% Unified Fiduciary Monitoring Index® scores?

EQUITY ASSET CLASS
1926-2004 HISTORICAL RETURNS

In our research we sought out factors that explained both differences among the returns of individual stocks in any given time period and the variation of stock returns through time. If a factor is related to non-diversifiable risk and possesses explanatory power independent of other factors, the factor is considered a "dimension" of stock returns.

Fama and French[2] tested many variables in their search for traits that explained differences in returns. These variables included company size, leverage, price/earnings, price/cash flow and price/book value. They sorted the stock market on each of these variables to see if it created a pattern in returns—to see if stocks ranked by a fundamental variable also fell into rank by historical performance. They concluded that almost all the variables they tested relate to returns. Two of the factors, however, seemed to do the job of all the factors together. Specifically, portfolios consisting of small companies or those with relatively high book-to-market (BtM) ratios have superior rates of return.

Fama and French found that two dimensions related to company size and book-to-market ratio ("BtM") together explain much of the common variation of stock returns and that these factors are related to risk. Small cap stocks have higher average returns than large cap stocks, and high BtM (or "value") stocks have higher average returns than low BtM (or "growth") stocks. Based on Fama and French's findings, size and BtM are the most important long term explanatory dimensions of stock returns.

The Fama/French results have important implications for domestic equity portfolio design. Large capitalization growth stocks constitute large portions of traditional "market-like portfolios" based on indexes such as the S&P 500 or the Wilshire 5000. Domestic equity portfolios with greater commitments to small cap stocks and value stocks offer higher average returns than conventional market-like portfolios. Later in this paper we will further analyze these two dimensions of stock returns in relation to Sortino downside risk.

Controlling for BtM differences by comparing large cap value to small cap value and comparing large cap growth to small cap growth, Fama and French found small cap stocks had higher average returns than large cap stocks over the 1926-2004 time period. Controlling for differences in size by comparing large cap growth to large cap value and comparing small cap growth to small cap value, they also found value stocks had higher average returns than growth stocks.

Seeking a risk-based explanation for the relations of size and BtM to average returns, Fama and French[3] investigated the behavior of the earnings of stocks grouped by size and BtM. By measuring profitability by the ratio of annual earnings to book value of equity, BtM is associated with persistent differences in profitability. On average, low BtM stocks are more profitable than high BtM stocks of similar size for at least five years before and after portfolio formation. Low BtM indicates sustained high earnings that are characteristic of "growth" firms that are growing and financially robust. High BtM indicates protracted low earnings that are typical of "value" firms experiencing financial distress.

CUMULATIVE ADDITIONAL RETURN EFFECT 1926-2004
VALUE MINUS GROWTH STOCKS
SMALL CAP MINUS LARGE CAP STOCKS
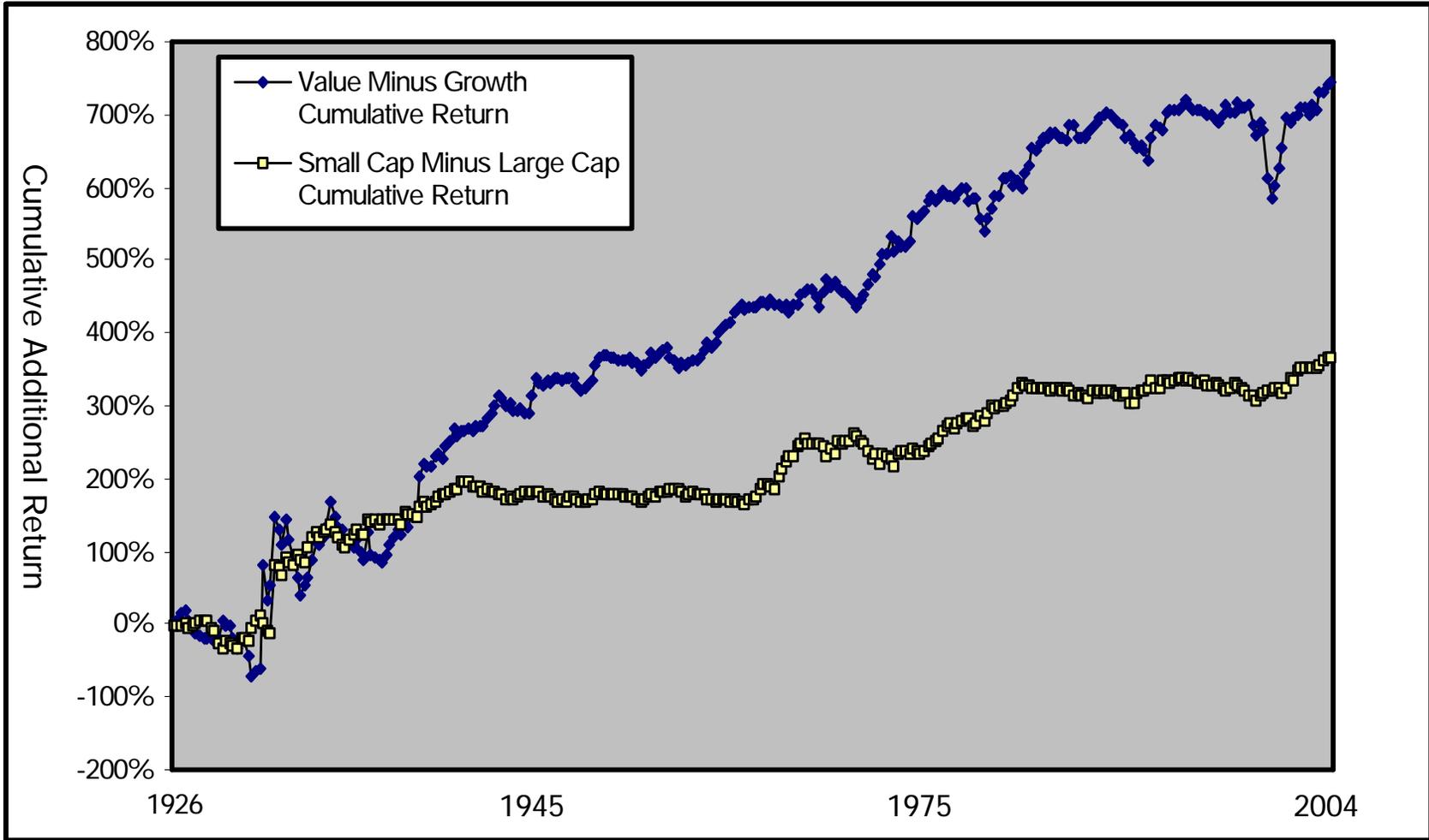
The most certain of financial concepts is that risk and return are generally related. Systematic differences in returns must relate to differences in risk. After all, who would invest in stocks if they expect the same return as Treasury bills? Investors expect markets to compensate them for increased uncertainty and an increased chance of loss—and prices reflect this expectation.

Most asset allocation software programs use standard deviation as a measure of risk. On pages 8-12 we discussed a better way to define investment risk using the Sortino downside risk analysis. Standard deviation measures uncertainty, not true risk. If standard deviation were a complete measure of risk, average returns would increase as standard deviations increase. Controlling for differences in BtM, a direct relation between average returns and standard deviations is found when large cap stocks are compared to small cap stocks. But, controlling for differences in size, a discrepancy appears.

Fama and French found that small growth stocks had a lower average return and a higher standard deviation than small value stocks. Since greater standard deviations are not consistently associated with higher average returns, standard deviation is not a reliable measure of risk.

In terms of asset allocation, most investors commit high proportions of their domestic equity holdings to portfolios resembling the S&P 500, Russell 3000 or other market-like proxies. Large cap growth stocks are the dominant holdings (60.9%) of the S&P 500 as illustrated below. As a result, market-like proxies are poor portfolio structures for investors seeking exposure to the size and/or value factors. Investors can get such exposure by increasing their relative holdings of small cap, mid cap and value stocks.

S&P 500 ASSET CLASS COMPOSITION
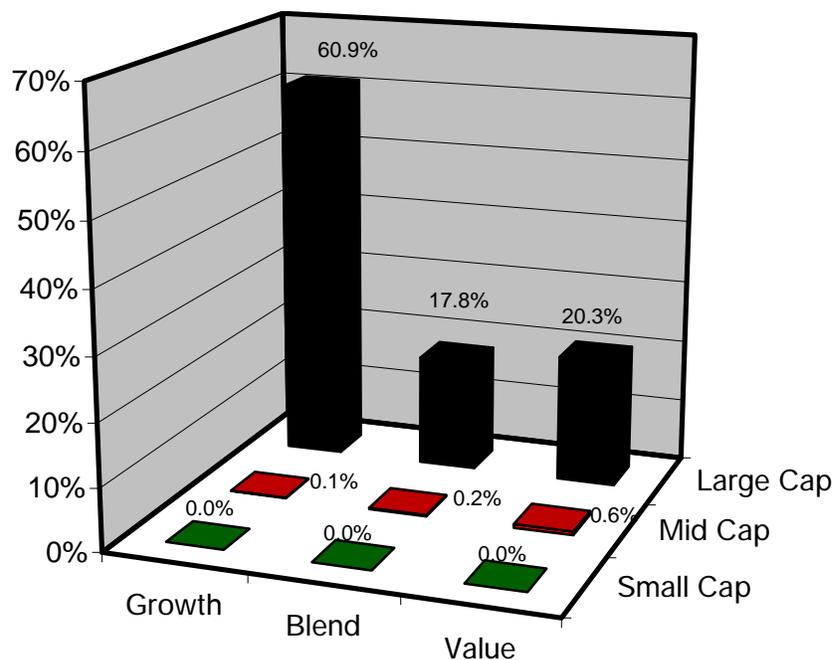
Structured portfolios contained higher proportions of small cap, mid cap and value stocks offer the prospect of higher long-term returns than market-like portfolios, but the higher expected returns as shown in the figure below are not sure things over short time periods. Size and value premiums vary widely and randomly. Structured portfolios are not appropriate for all investors.

Over periods of less than five years, structured portfolios often will have lower returns than market-like portfolios. It is only over longer time periods that it becomes more probable that structured portfolios will outperform market-like portfolios. Investors with short horizons or aversion to risk should stick with market-like portfolios. Structured portfolios only make sense for investors with long time horizons and sufficient tolerance for increased risk.

Unified Trust has found that mutual funds tend to migrate towards the market. We can speculate why. The market is still the general benchmark fund managers are compared to and they don't want to be too different. Also, as funds get more and more popular, they often increase the size of their holdings to accommodate new investment dollars. Whatever the reason, the market seems to have a "center of gravity" dragging managers towards it over time. When they move enough, it constitutes nothing less than a change of asset class.

Equity Subgroup Returns 1926-2004

Large Cap Growth	S&P 500	Large Cap Value	Small Cap Growth	Small Cap Blend	Small Cap Value
9.70%	10.44%	12.06%	9.79%	13.41%	15.03%
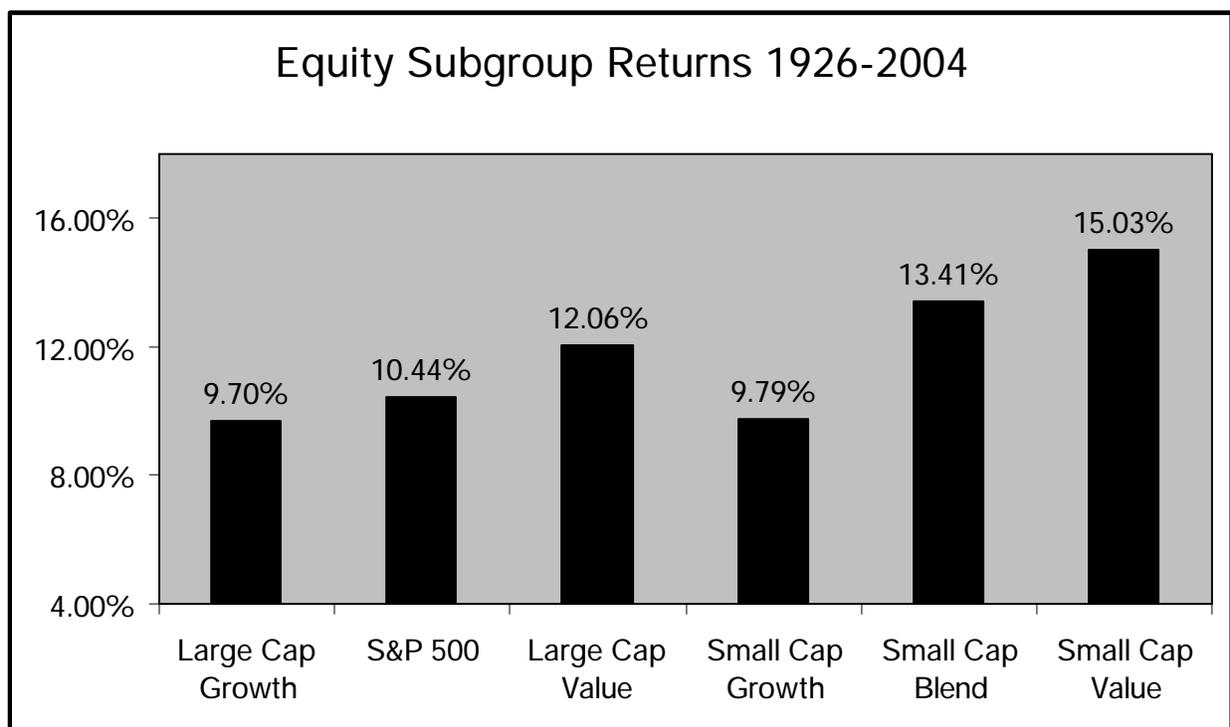
The best performing asset classes over the 1926-2004 (and 1984-2004) time period was small cap value. As illustrated by the graph on the next page, over time, the difference in equity asset class compounding rates is truly staggering. For example, $1 invested in the S&P 500 during 1926-2004 grew to $2,256, while $1 invested in small cap value grew to $53,441. In contrast, $1 invested in the small cap growth during 1926-2004 grew to $1,422, and $1 invested in large cap growth value grew to $1,337.

GROWTH OF $1 FROM 1926-2004
LONG TERM ASSET CLASS PERFORMANCE

Legend:
- Small Cap Value $53,441
- Small Cap Blend $17,767
- Large Cap Value $6,989
- S&P 500 (Large Cap Blend) $2,256
- Small Cap Growth $1,422
- Large Cap Growth $1,337
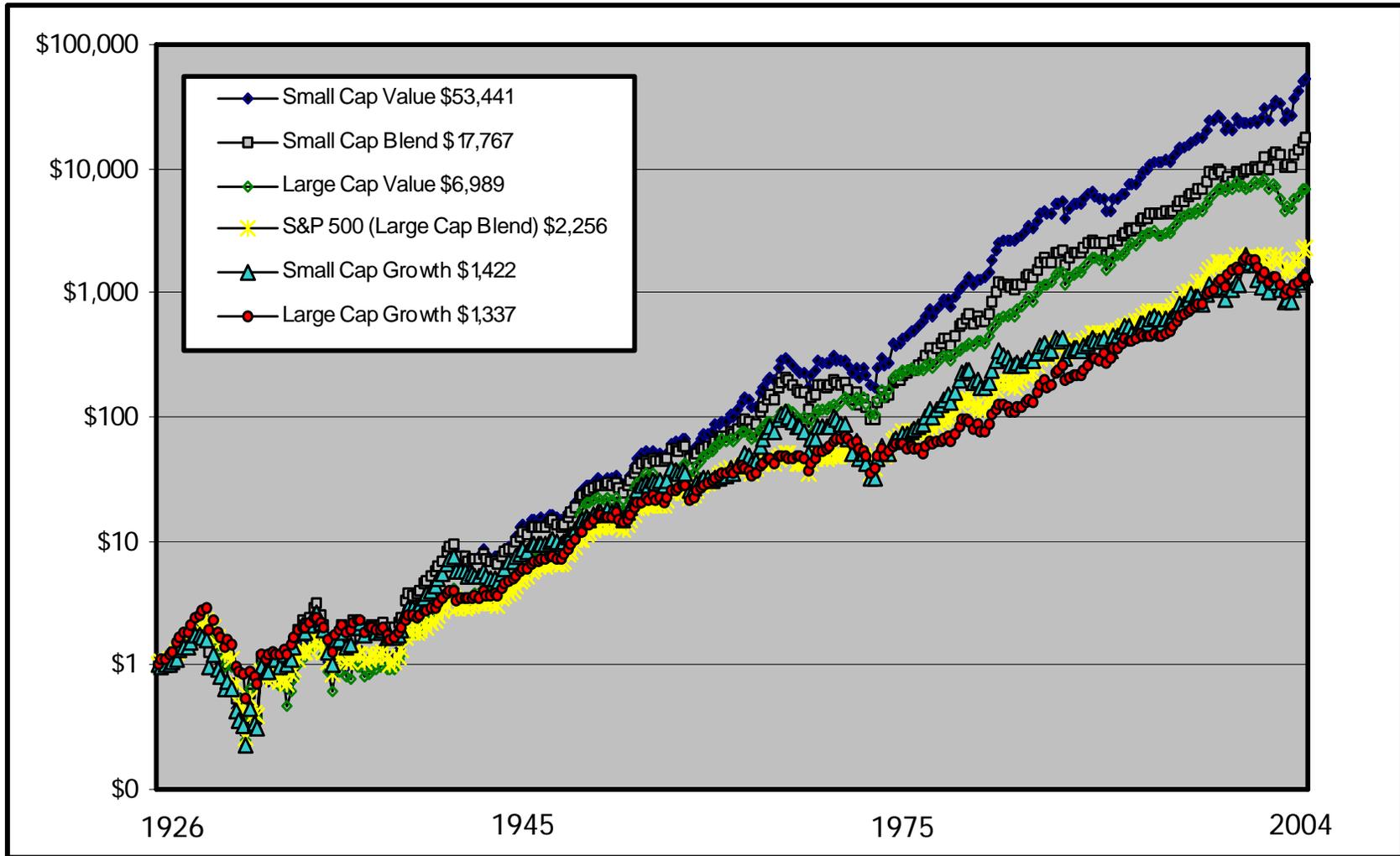
Long Term 1926-2004 Equity Asset Class Downside Risk Analysis

We have analyzed the long term equity asset data to understand the risk-reward relationship between the various equity asset classes. We analyzed 311 quarters (> 77 years) for downside risk using a quarterly MAR of 2.00%, or 8.24% annualized. We found that several asset classes gave a higher longer term return than the S&P 500 ("Large Cap Blend"), and also give more units of return for each unit of risk taken. These asset classes can then be combined into an improved equity portfolio asset class mix ("Portfolio 14" as described in detail later).

	Large Cap Growth	Large Cap Blend	Large Cap Value	Small Cap Growth	Small Cap Blend	Small Cap Value	Portfolio 14
Portfolio Return	9.70%	10.44%	12.06%	9.79%	13.41%	15.03%	12.83%
Downside Risk:	23.56%	20.75%	22.30%	27.15%	22.96%	24.84%	21.43%
Average Underperformance:	-16.85%	-16.55%	-17.06%	-22.28%	-18.62%	-20.09%	-17.18%
Downside Probability:	45.00%	42.40%	41.80%	47.90%	42.80%	39.60%	39.99%
99th Percentile	-46.76%	-43.67%	-50.69%	-54.77%	-50.54%	-52.22%	-47.88%
Return/Downside Probability	0.216	0.246	0.288	0.204	0.313	0.380	0.321
Return/Downside Risk	0.412	0.503	0.541	0.361	0.584	0.605	0.599

Return per Unit of Downside Risk 1926-2004
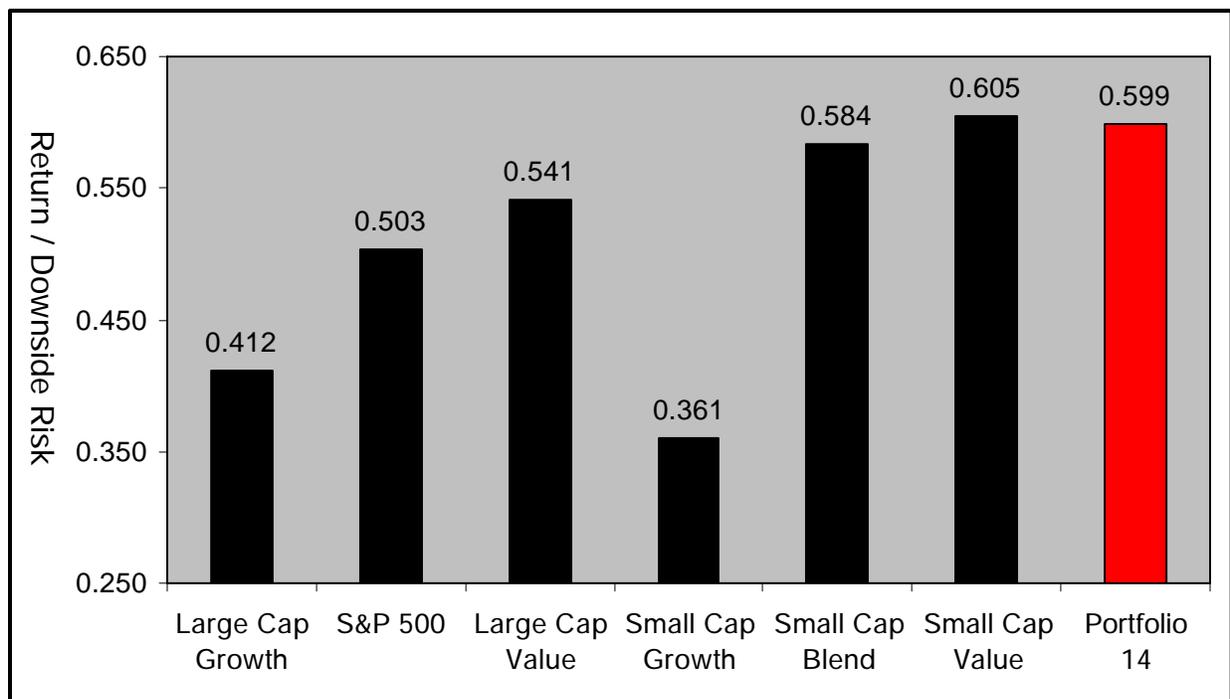
Growth of $1 from 1926-2004 from Various Equity Asset Classes and Portfolio 14

Legend:
- Optimal Portfolio 14 $11,917
- S&P 500 $2,256
- Small Cap Growth $1,422
- Large Cap Growth $1,337
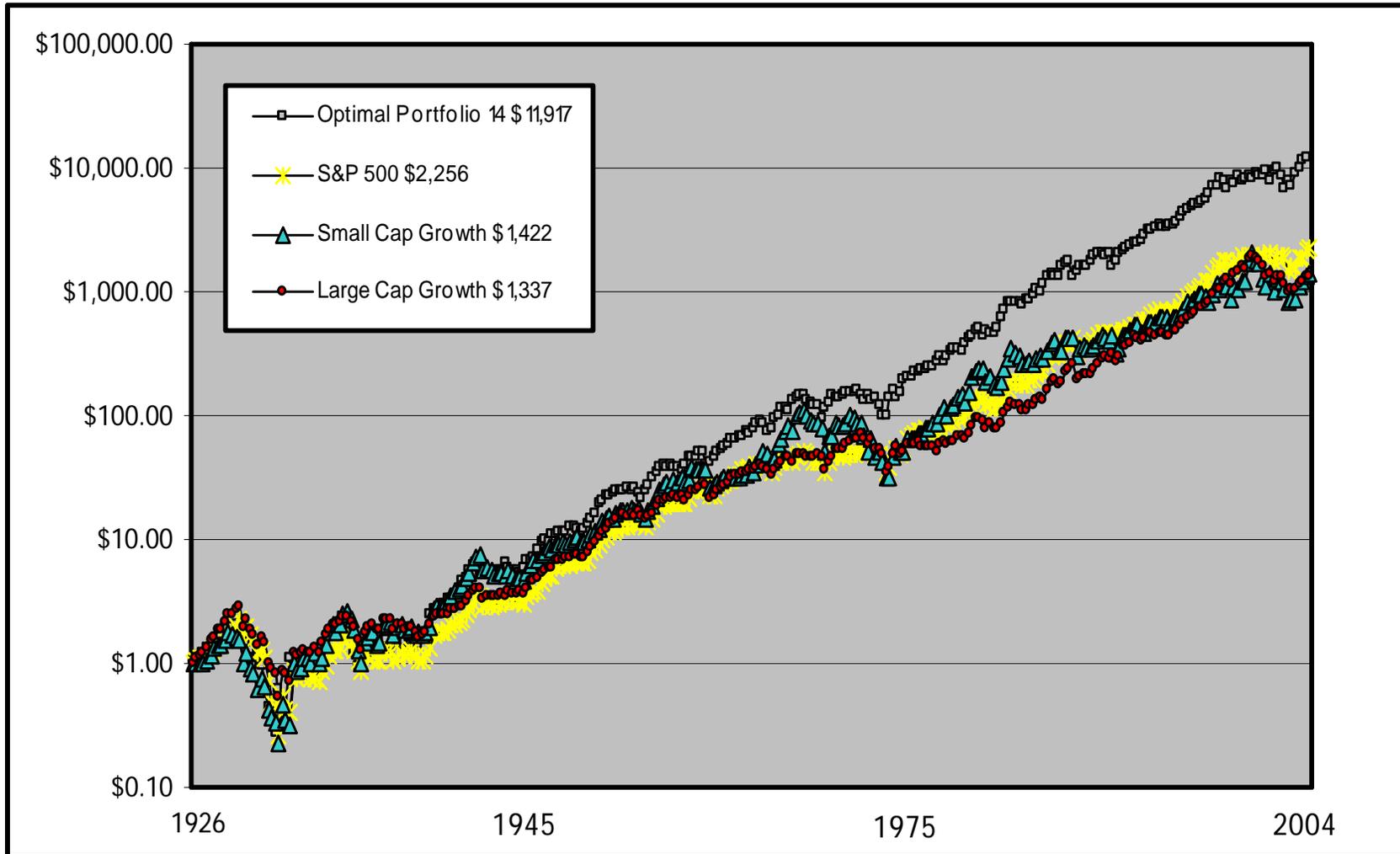
ASSET CLASS PERFORMANCE FROM 1984-2004
BASED UPON DOWNSIDE RISK STATISTICS

Portfolio Name	Portfolio Return	Quarterly MAR Benchmark	Annual MAR Benchmark Return	Active Excess Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
US Equity Indexes													
S&P 500	13.02%	2.50%	10.38%	2.64%	0.16	1.00	16.24%	59.10%	16.24%	-13.14%	40.90%	-33.95%	1000
Dow Jones Industrial Average	12.44%	2.50%	10.38%	2.06%	0.13	0.95	15.63%	57.00%	15.33%	-12.08%	43.00%	-34.50%	1000
Wilshire 5000	12.87%	2.50%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000
Wilshire All Growth	11.88%	2.50%	10.38%	1.50%	0.08	0.95	18.77%	57.10%	19.75%	-15.47%	42.90%	-43.24%	1000
Wilshire All Value	13.16%	2.50%	10.38%	2.78%	0.16	0.86	14.54%	59.00%	16.95%	-13.48%	41.00%	-36.67%	1000
Wilshire Large Cap 750	12.99%	2.50%	10.38%	2.61%	0.16	0.93	15.44%	62.00%	16.69%	-13.22%	38.00%	-37.37%	1000
Wilshire Mid Cap 500	14.39%	2.50%	10.38%	4.01%	0.22	1.06	19.49%	59.60%	18.47%	-14.94%	40.40%	-38.74%	1000
Wilshire Small Cap 750	12.60%	2.50%	10.38%	2.22%	0.11	1.00	20.53%	57.80%	20.53%	-16.51%	42.20%	-45.63%	1000
Wilshire Large Growth	12.22%	2.50%	10.38%	1.84%	0.10	0.94	17.94%	57.80%	18.99%	-15.25%	42.20%	-42.18%	1000
Wilshire Large Value	13.05%	2.50%	10.38%	2.67%	0.17	0.94	14.94%	60.90%	15.88%	-12.53%	39.10%	-35.80%	1000
Wilshire Mid Cap Growth	12.72%	2.50%	10.38%	2.34%	0.11	1.07	22.49%	58.60%	21.04%	-16.83%	41.40%	-46.41%	1000
Wilshire Mid Cap Value	15.02%	2.50%	10.38%	4.64%	0.27	1.03	17.88%	62.40%	17.31%	-13.56%	37.60%	-40.24%	1000
Wilshire Small Growth	10.52%	2.50%	10.38%	0.14%	0.01	0.92	23.41%	52.30%	25.34%	-20.72%	47.70%	-54.60%	1000
Wilshire Small Value	14.06%	2.50%	10.38%	3.68%	0.19	1.02	19.74%	62.50%	19.36%	-15.30%	37.50%	-40.52%	1000
Wilshire REIT	10.14%	2.00%	8.24%	1.90%	0.16	1.00	12.29%	57.20%	12.24%	-9.56%	42.80%	-28.23%	1000
Foreign Stocks													
MSCI EAFE	9.52%	2.50%	10.38%	-0.86%	-0.04	0.88	17.50%	49.20%	19.90%	-16.25%	50.80%	-43.25%	1000
US Fixed Income Indexes													
US. Treasury Bills	4.98%	1.25%	5.12%	-0.14%	-0.13	0.64	0.70%	47.90%	1.09%	-0.86%	52.10%	-2.66%	1000
Stable Value Fund Index	6.72%	1.50%	6.14%	0.58%	1.97	5.56	1.63%	95.00%	0.29%	-0.22%	5.00%	-0.27%	1000
US Intermed Govt Bond	7.50%	1.50%	6.14%	1.36%	0.27	1.23	6.27%	55.30%	5.09%	-4.00%	44.70%	-12.54%	1000
US Long Govt Bond	7.91%	1.50%	6.14%	1.77%	0.18	1.06	10.10%	55.50%	9.56%	-7.50%	44.50%	-21.97%	1000
High Yield Bond Index	7.08%	1.50%	6.14%	0.94%	0.10	0.83	8.04%	52.70%	9.68%	-7.68%	47.30%	-21.99%	1000

WHICH ASSET CLASSES ARE MOST USEFUL TO REDUCE DOWNSIDE RISK IN A PORTFOLIO 1984-2004?

The first question we answered was which asset classes can reduce downside risk in portfolio in our more detailed study from 1984-2004. Many investors hope that it is possible to assemble a variety of high returning asset classes with low correlation coefficients. (the correlation coefficient quantifies the tendency of all financial assets to move in the same direction) If one could assemble a portfolio of high yielding asset classes with low correlation to one another, it would be possible to have a portfolio deliver a high rate of return with minimal risk.

Our downside risk analysis found that it is possible to reduce risk somewhat with certain high yielding asset classes, but the only substantial way to reduce downside risk in the portfolio was to add various amounts of low volatility fixed income assets to the equity portfolio. We examined many thousands of possible portfolio mixes. The chart below shows the results of ten asset allocation mixes. The quarterly MAR was 1.25%, or 5.09% on an annual basis. Only the value style weighted equity mixes combined with stable value funds or intermediate Treasury bonds significantly reduced downside risk (portfolios 7, 8, 9 and 10).
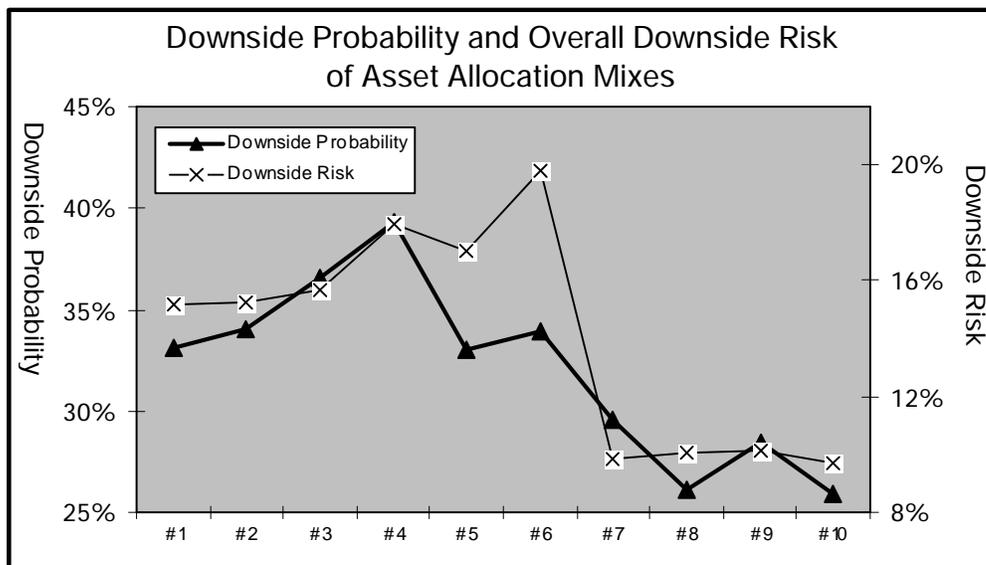
1. 100% Wilshire 5000 (entire U.S. stock market)
2. 50% Wilshire 5000 and 50% Foreign Stocks
3. 50% Wilshire Large Cap Growth and 50% Foreign Stocks
4. 50% Wilshire Small Cap Growth and 50% Foreign Stocks
5. 100% Wilshire Large Cap Growth
6. 50% Wilshire Large Cap Growth and 50% Wilshire Small Cap Growth
7. 70% Wilshire 5000 and 30% Intermediate Treasury Bonds
8. 30% Wilshire Large Cap Value, 10% Wilshire Large Cap Blend, 15% Wilshire Mid Cap Blend, 15% Wilshire Small Cap Value, 30% Intermediate Treasury Bonds
9. 30% Wilshire Large Cap Value, 10% Wilshire Large Cap Blend, 15% Wilshire Mid Cap Blend, 15% Wilshire Small Cap Value, 30% Stable Value Fund
10. 20% Wilshire Large Cap Value, 10% Wilshire Mid Cap Value, 15% Wilshire Mid Cap Blend, 15% Wilshire Small Cap Value, 10% Wilshire REIT, 30% Stable Value Fund

WHICH ASSET CLASSES ARE MOST USEFUL TO REDUCE DOWNSIDE RISK IN THE FIXED INCOME PORTFOLIO 1984-2004?

We examined which types of fixed income classes can reduce downside risk in fixed income portion of the overall portfolio. Our downside risk analysis found that it is possible to reduce risk significantly with the addition of stable value funds to an intermediate Treasury bond portfolio without significantly reducing historical return. We also examined the impact of adding high yield fixed income ("junk bonds"). We found that adding high yield bonds to the fixed income portfolio in any proportion significantly increased downside risk and did not improve return. The first chart shows an intermediate Treasury bond portfolio beginning with 100% Treasury bonds and adding 10% increments of stable value funds until the portfolio is 100% stable value. The second chart shows an intermediate Treasury bond portfolio beginning with 100% Treasury bonds and adding 10% increments of high yield bonds until the portfolio is 100% high yield.
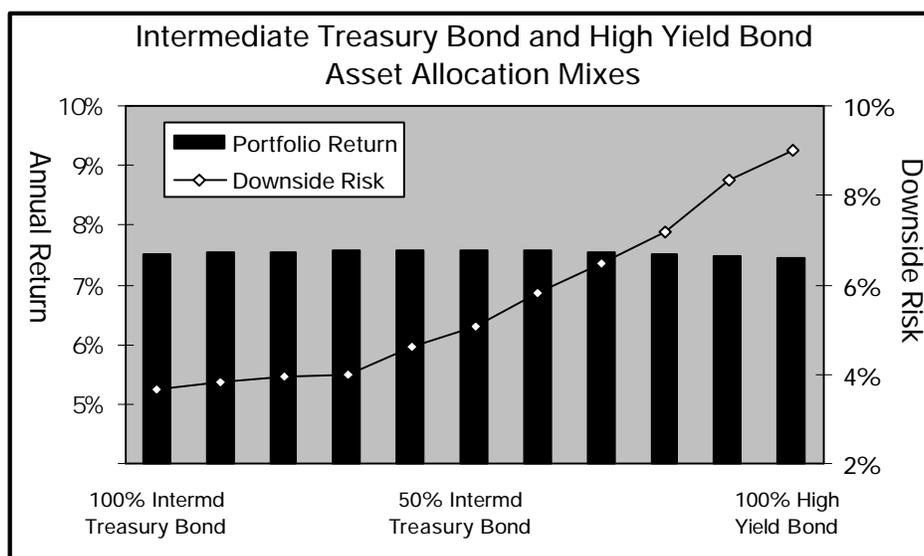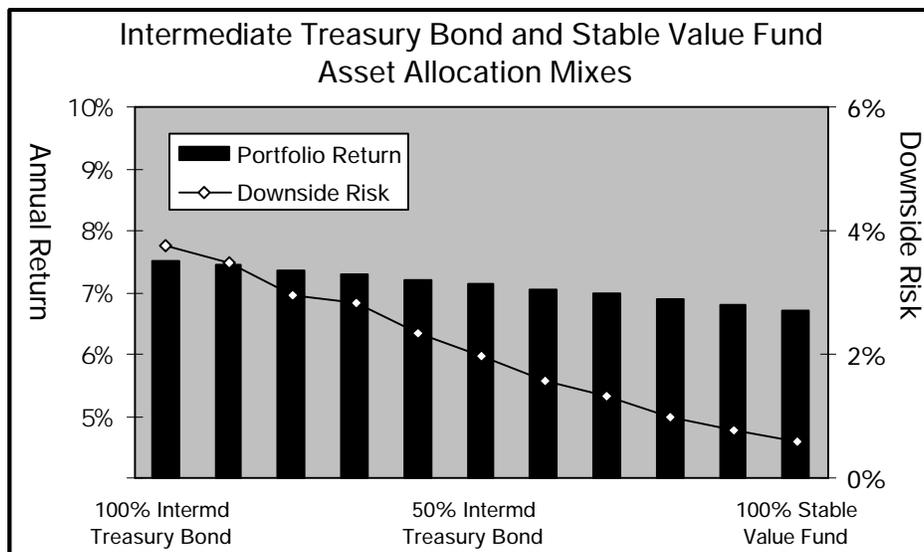
WHICH EQUITY ASSET CLASSES IN TERMS OF MARKET CAPITALIZATION ARE MOST USEFUL TO REDUCE DOWNSIDE RISK IN THE EQUITY PORTFOLIO 1984-2004?

We examined which types of equity asset classes can reduce downside risk in the equity portion of the overall portfolio. The quarterly MAR was 2.50%, or 10.38% on an annual basis. Our downside risk analysis found that it is possible to reduce risk and improve return by adding a substantial portion, at least 50%, of equally divided small cap and mid cap equity classes.

We examined many thousands of possible portfolio mixes. The chart below shows the results of eleven asset allocation mixes. The most efficient point of return and reduced downside risk was with portfolios six and seven. These portfolios held 40%-50% large-cap, and the remaining 50%-60% was equally divided between mid cap and small cap size equity asset classes. Portfolios that were comprised of a mostly mid cap and small cap experienced slightly higher rates of return, but also had much higher downside risk (portfolios 9, 10 and 11).
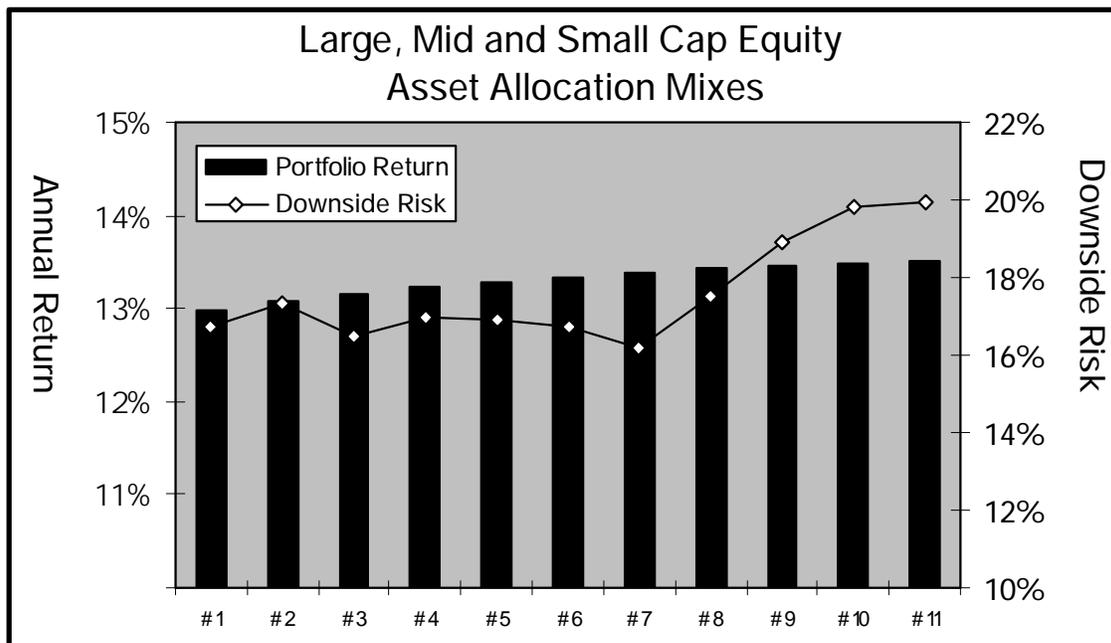
1. 100% Wilshire Large Cap
2. 90% Wilshire Large Cap, 5% Wilshire Mid Cap, 5% Wilshire Small Cap
3. 80% Wilshire Large Cap, 10% Wilshire Mid Cap, 10% Wilshire Small Cap
4. 70% Wilshire Large Cap, 15% Wilshire Mid Cap, 15% Wilshire Small Cap
5. 60% Wilshire Large Cap, 20% Wilshire Mid Cap, 20% Wilshire Small Cap
6. 50% Wilshire Large Cap, 25% Wilshire Mid Cap, 25% Wilshire Small Cap
7. 40% Wilshire Large Cap, 30% Wilshire Mid Cap, 30% Wilshire Small Cap
8. 30% Wilshire Large Cap, 35% Wilshire Mid Cap, 35% Wilshire Small Cap
9. 20% Wilshire Large Cap, 40% Wilshire Mid Cap, 40% Wilshire Small Cap
10. 10% Wilshire Large Cap, 45% Wilshire Mid Cap, 45% Wilshire Small Cap
11. 0% Wilshire Large Cap, 50% Wilshire Mid Cap, 50% Wilshire Small Cap

SHOULD THE EQUITY PORTFOLIO BE WEIGHTED TOWARDS GROWTH OR VALUE STYLES 1984-2004?

We examined equity asset class mixes based upon growth or value investment styles. The quarterly MAR was 2.50%, or 10.38% on an annual basis. Our downside risk analysis found that it is possible to reduce risk and improve return by weighting the portfolio towards value.

We examined many hundreds of possible portfolio mixes. The chart below shows the results of eleven asset allocation mixes. They begin with 100% growth and end with 100% value. The most efficient point of return and reduced downside risk was with portfolios nine and ten. These portfolios held 80%-90% value and 10%-20% growth styles. This chart does not illustrate the results of various mixes containing some blend style, which is a mid point mixture of growth and value. In accounts holding some blend equities, holding a majority of the remaining non-blend style equity allocation weighted towards value provided better diversification.

Growth vs. Value U.S. Equity Asset Allocation Mixes
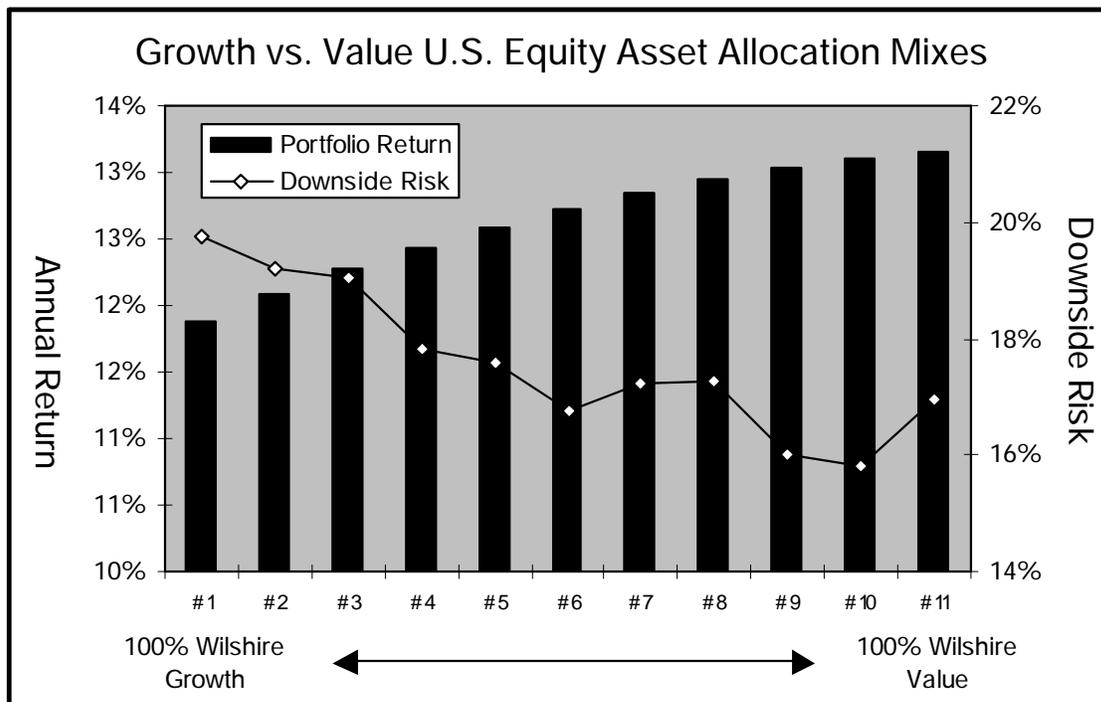
1. 100% Wilshire Growth
2. 90% Wilshire Growth and 10% Wilshire Value
3. 80% Wilshire Growth and 20% Wilshire Value
4. 70% Wilshire Growth and 30% Wilshire Value
5. 60% Wilshire Growth and 40% Wilshire Value
6. 50% Wilshire Growth and 50% Wilshire Value
7. 40% Wilshire Growth and 60% Wilshire Value
8. 30% Wilshire Growth and 70% Wilshire Value
9. 20% Wilshire Growth and 80% Wilshire Value
10. 10% Wilshire Growth and 90% Wilshire Value
11. 100% Wilshire Value

ARE ALTERNATIVE ASSET CLASSES USEFUL 1984-2004?

We examined REITs, high yield bonds, international bonds, emerging market stocks and international stocks. Our downside risk analysis found that it is possible to reduce risk significantly, at the "cost" of slightly reduced return, with the addition of 10%-20% allocations of REITs to the U.S. equity portfolio. We could find no such relationship with international investments. We found that adding international investments (EAFE) to the U.S. equity portfolio in any proportion significantly increased downside risk and did not improve return. The first chart shows the U.S. equity portfolio (Wilshire 5000) beginning with 100% U.S. stocks and adding 10% increments of REITs until the portfolio is 100% REITs. The second chart shows the U.S. equity portfolio (Wilshire 5000) beginning with 100% U.S. stocks adding 10% increments of international stocks (EAFE index) until the portfolio is 100% foreign stocks. Our conclusion of the minimal diversification from EAFE (foreign-large cap growth) is consistent with data presented by Clark[4].
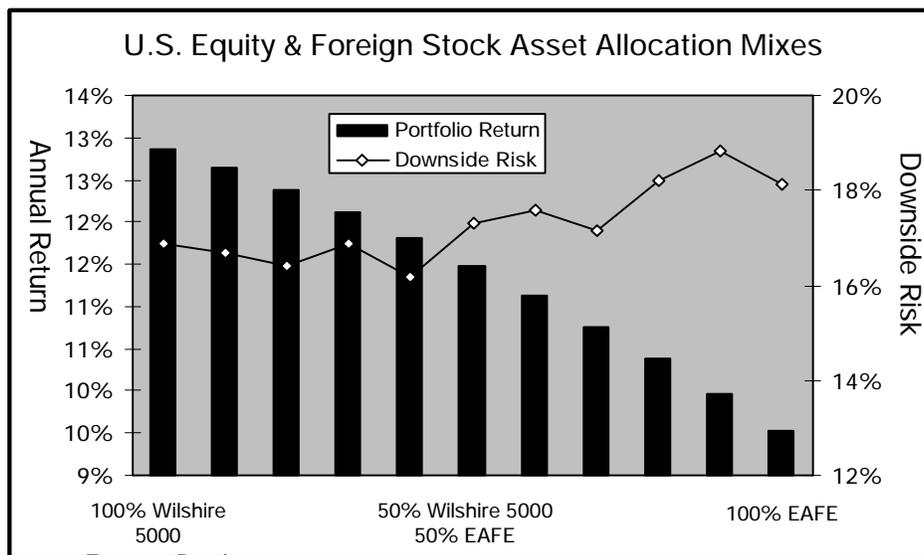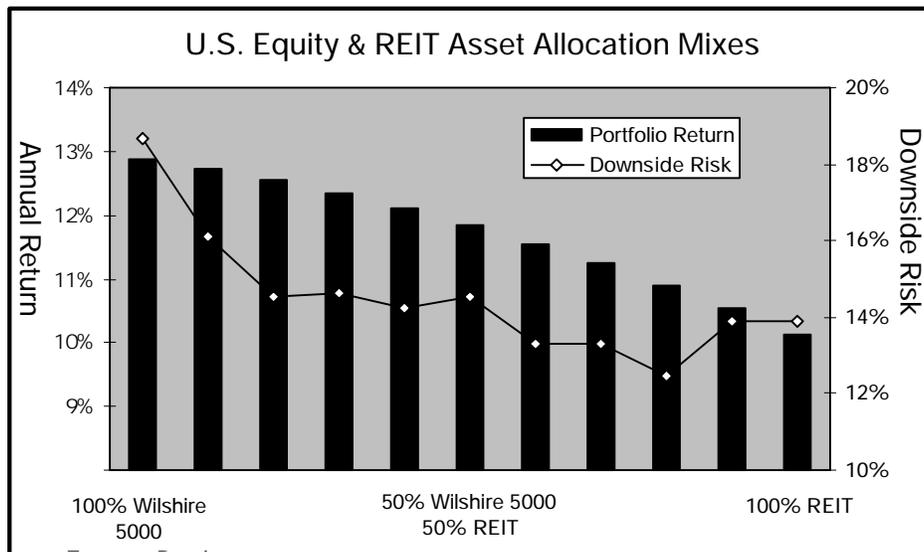
U.S. Equity & REIT Asset Allocation Mixes

U.S. Equity & Foreign Stock Asset Allocation Mixes

HOW MANY EQUITY ASSET CLASSES ARE NEEDED TO DIVERSIFY THE EQUITY PORTFOLIO 1984-2004?

We examined how many of the nine traditional U.S. equity asset classes are needed to properly diversify the equity portion of the portfolio. The traditional nine style boxes are shown below.

Wilshire Large Growth	Wilshire Large Cap 750	Wilshire Large Value
Wilshire Mid Cap Growth	Wilshire Mid Cap 500	Wilshire Mid Cap Value
Wilshire Small Cap Growth	Wilshire Small Cap 750	Wilshire Small Cap Value

It should be noted that in some cases the division between these style boxes for mutual funds can be somewhat arbitrary. We avoided this problem by only studying broad asset classes. In our analysis we used the following Wilshire indexes for each style box. We examined many hundreds of possible portfolio mixes. The portfolio holdings are described on page 26. Each equity portfolio was compared to a benchmark using a quarterly MAR of 2.50%, or 10.38% on an annual basis. For comparison, the broad U.S. stock market as measured by the Wilshire 5000, had a return of 12.87%, a downside risk of 17.10%, and a downside probability of 37.00%. Listed below are the results of the various portfolios ranked by return to downside risk and return to downside probability.

Portfolio Name	Portfolio Return	Downside Risk	Return/ Downside Risk	Portfolio Name	Portfolio Return	Downside Probability	Return/ Downside Probability
Portfolio 20	14.06%	16.24%	0.87	Portfolio 14	14.12%	37.69%	0.38
Portfolio 14	14.12%	16.99%	0.83	Portfolio 24	13.94%	36.70%	0.38
Portfolio 17	13.71%	16.63%	0.82	Portfolio 18	13.77%	36.60%	0.38
Portfolio 18	13.77%	16.92%	0.81	Portfolio 20	14.06%	38.00%	0.37
Portfolio 10	13.96%	17.16%	0.81	Portfolio 7	13.30%	37.00%	0.36
Portfolio 24	13.94%	17.18%	0.81	Portfolio 15	13.94%	39.10%	0.36
Portfolio 16	13.72%	17.24%	0.80	Portfolio 21	13.64%	38.30%	0.36
Portfolio 8	14.05%	17.72%	0.79	Portfolio 19	13.56%	38.60%	0.35
Portfolio 15	13.94%	17.65%	0.79	Portfolio 16	13.72%	39.10%	0.35
Portfolio 13	13.15%	16.76%	0.78	Portfolio 10	13.96%	39.90%	0.35
Portfolio 7	13.30%	17.01%	0.78	Portfolio 8	14.05%	40.30%	0.35
Portfolio 23	13.43%	17.25%	0.78	Wilshire 5000	12.87%	37.00%	0.35
Portfolio 2	13.67%	17.80%	0.77	Portfolio 22	13.05%	37.70%	0.35
Wilshire 5000	12.87%	17.10%	0.75	Portfolio 2	13.67%	40.00%	0.34
Portfolio 19	13.56%	18.09%	0.75	Portfolio 1	13.34%	39.80%	0.34
Portfolio 25	13.90%	18.60%	0.75	Portfolio 23	13.43%	41.20%	0.33
Portfolio 1	13.34%	17.93%	0.74	Portfolio 17	13.71%	42.10%	0.33
Portfolio 22	13.05%	17.67%	0.74	Portfolio 25	13.90%	42.80%	0.32
Portfolio 21	13.64%	18.58%	0.73	Portfolio 11	13.27%	41.10%	0.32
Portfolio 11	13.27%	18.14%	0.73	Portfolio 13	13.15%	41.90%	0.31
Portfolio 5	13.29%	18.29%	0.73	Portfolio 5	13.29%	42.70%	0.31
Portfolio 12	13.16%	19.09%	0.69	Portfolio 12	13.16%	43.30%	0.30
Portfolio 3	12.80%	19.20%	0.67	Portfolio 3	12.80%	42.90%	0.30
Portfolio 6	12.69%	19.75%	0.64	Portfolio 9	12.46%	43.50%	0.29
Portfolio 4	12.16%	19.25%	0.63	Portfolio 6	12.69%	45.40%	0.28
Portfolio 9	12.46%	20.25%	0.62	Portfolio 4	12.16%	44.80%	0.27

There were a number of equity asset class mixtures that were found to produce returns greater than the Wilshire 5000 with less downside risk. A common underlying characteristic of the successful portfolios was that they contained higher proportions of mid cap and small cap equities than the Wilshire 5000. In addition, they contained less growth style and a higher proportion of value style than the Wilshire 5000.

Portfolio Name	Portfolio Return	Downside Risk	Return/ Downside Risk	Large Cap Growth	Large Cap Blend	Large Cap Value	Mid Cap Growth	Mid Cap Blend	Mid Cap Value	Small Cap Blend	Small Cap Value
Portfolio 20	14.06%	16.24%	0.87		40%			20%	20%		20%
Portfolio 14	14.12%	16.99%	0.83	8%	10%	12%	5%	25%	20%		20%
Portfolio 17	13.71%	16.63%	0.82		10%	50%		10%	15%		15%
Portfolio 18	13.77%	16.92%	0.81		40%			15%	15%	15%	15%
Portfolio 10	13.96%	17.16%	0.81		30%	15%		25%	15%		15%
Portfolio 24	13.94%	17.18%	0.81		50%				25%		25%
Portfolio 16	13.72%	17.24%	0.80		50%			10%	15%	10%	15%
Portfolio 8	14.05%	17.72%	0.79		25%			13%	25%	13%	25%
Wilshire 5000	12.87%	17.10%	0.75								

It was not necessary to hold all nine major equity classification style boxes in the equity allocation for an improved result. In fact, a successful portfolio (example: portfolio 24) could hold as few as three asset classes. A successful portfolio could be constructed from holding 25%-60% large cap blend and value, 25% to 40% mid cap blend and value, and 15% to 40% small cap blend and value.

Some aggressive investors may be concerned that the value tilt may cause them to miss a strong growth cycle. Generally speaking, during growth cycle the blend portion of the equity portfolio will produce sufficient return to meet the investor's MAR. However, if any growth style is required for complete "diversification", the highest return growth asset class were large cap and mid cap, although all growth classes were inferior to the Wilshire 5000 in terms of both return and downside risk as plotted against a 2.50% quarterly MAR (10.38% annualized MAR).

Portfolio Name	Portfolio Return	Annual MAR Benchmark Return	Active Excess Return	Downside Risk	Retun / Downside Risk	Average Under Performance	Downside Probability
Wilshire 5000	12.87%	10.38%	2.49%	17.10%	0.75	-13.70%	37.00%
Wilshire Large Growth	12.22%	10.38%	1.84%	18.99%	0.64	-15.25%	42.20%
Wilshire Mid Cap Growth	12.72%	10.38%	2.34%	21.04%	0.60	-16.83%	41.40%
Wilshire Small Growth	10.52%	10.38%	0.14%	25.34%	0.42	-20.72%	47.70%

It should be noted all successful portfolios that outperformed the Wilshire 5000 with less downside risk *did not outperform every quarter*. On the contrary, the most successful portfolios were found to underperform the Wilshire 5000 during **30%-40%** of all quarters over the entire 1984-2004 time period. Such periodic underperformance would be generally most likely when the value style was out of favor and growth style was in favor.

Thus during the "market bubble" of the late 1990's when large cap growth stocks predominated, the successful equity portfolio did not look to be superior. But over the subsequent 2000-2002 stock market correction time period, and over the entire 1984-2004 time period examined, the value oriented portfolio was generally superior.

EQUITY ASSET CLASS PORTFOLIO MIXTURES

Portfolio	Large Cap Growth	Large Cap Blend	Large Cap Value	Mid Cap Growth	Mid Cap Blend	Mid Cap Value	Small Cap Growth	Small Cap Blend	Small Cap Value	Comments
Portfolio #1		50.0%			25.0%			25.0%		
Portfolio #2		25.0%	25.0%		12.5%	12.5%		12.5%	12.5%	
Portfolio #3	25.0%	25.0%		12.5%	12.5%		12.5%	12.5%		Low Return High Risk
Portfolio #4	25.0%	25.0%		25.0%	25.0%					Low Return High Risk
Portfolio #5	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	
Portfolio #6	50.0%	25.0%			12.5%			12.5%		Low Return High Risk
Portfolio #7		25.0%	50.0%		12.5%			12.5%		
Portfolio #8		25.0%			12.5%	25.0%		12.5%	25.0%	
Portfolio #9		25.0%		25.0%	12.5%		25.0%	12.5%		Lowest Return High Risk
Portfolio #10		30.0%	15.0%		25.0%	15.0%			15.0%	High Return Low Risk
Portfolio #11	6.5%	25.0%	6.5%	6.5%	18.5%	6.5%	6.5%	17.5%	6.5%	
Portfolio #12	19.0%	25.0%		19.0%	19.0%			18.0%		
Portfolio #13		80.0%			10.0%			10.0%		
Portfolio #14	8.0%	10.0%	12.0%	5.0%	25.0%	20.0%			20.0%	Highest Return
Portfolio #15		50.0%				25.0%			25.0%	
Portfolio #16		50.0%			10.0%	15.0%		10.0%	15.0%	
Portfolio #17		10.0%	50.0%		10.0%	15.0%			15.0%	High Return Low Risk
Portfolio #18		40.0%			15.0%	15.0%		15.0%	15.0%	High Return Low Risk
Portfolio #19		50.0%				25.0%	25.0%			
Portfolio #20		40.0%			20.0%	20.0%			20.0%	Highest Return / Risk
Portfolio #21		40.0%				30.0%	30.0%			
Portfolio #22		25.0%	50.0%					25.0%		
Portfolio #23			40.0%		30.0%			30.0%		
Portfolio #24		50.0%				25.0%			25.0%	High Return Low Risk
Portfolio #25		40.0%			30.0%				30.0%	

Long Term Equity Asset Class Performance 1984-2004

Legend:
- Optimized Mix Portfolio 14 $115,155
- S&P 500 $95,625
- Large Cap Growth $83,372
- Small Cap Growth $54,034
- Foreign Stocks $52,799
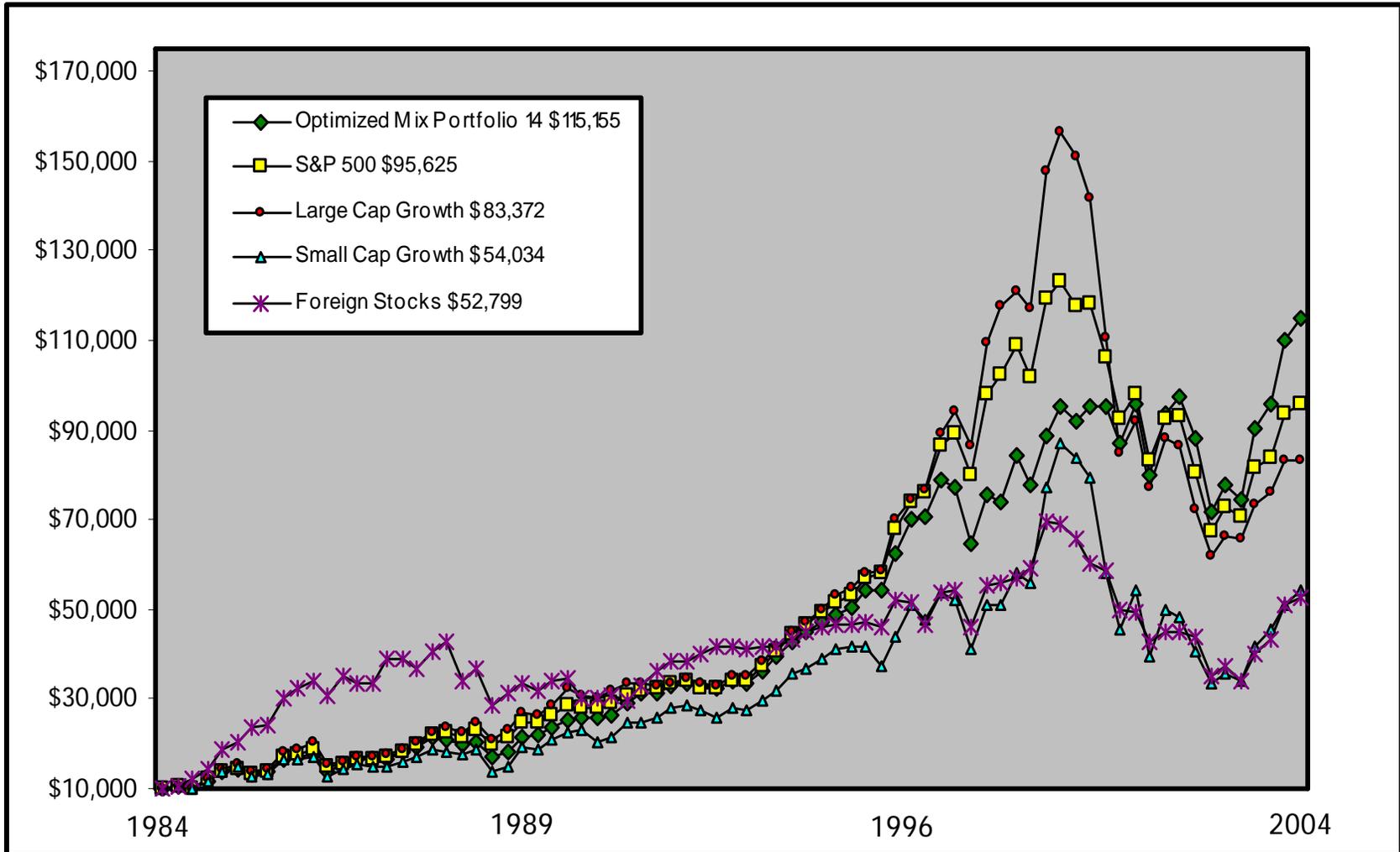
EQUITY ASSET CLASS PORTFOLIO MIXTURES (QUARTERLY MAR = 2.50%)
GENERAL CHARACTERISTICS 1984-2004

Portfolio Name	Portfolio Return	MAR Benchmark Return	Active Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
Wilshire 5000	12.87%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000
Portfolio 1	13.34%	10.38%	2.96%	0.17	0.91	16.36%	60.20%	17.93%	-14.36%	39.80%	-40.75%	1000
Portfolio 2	13.67%	10.38%	3.29%	0.18	0.90	15.98%	60.00%	17.80%	-14.16%	40.00%	-38.98%	1000
Portfolio 3	12.80%	10.38%	2.42%	0.13	0.96	18.45%	57.10%	19.20%	-15.43%	42.90%	-42.26%	1000
Portfolio 4	12.16%	10.38%	1.77%	0.09	0.99	18.97%	55.20%	19.25%	-15.31%	44.80%	-44.78%	1000
Portfolio 5	13.29%	10.38%	2.91%	0.16	0.96	17.57%	57.30%	18.29%	-14.49%	42.70%	-39.81%	1000
Portfolio 6	12.69%	10.38%	2.31%	0.12	0.94	18.47%	54.60%	19.75%	-15.88%	45.40%	-41.84%	1000
Portfolio 7	13.30%	10.38%	2.92%	0.17	0.94	15.96%	63.00%	17.01%	-13.68%	37.00%	-38.11%	1000
Portfolio 8	14.05%	10.38%	3.67%	0.21	0.98	17.41%	59.70%	17.72%	-14.15%	40.30%	-38.18%	1000
Portfolio 9	12.46%	10.38%	2.08%	0.10	0.96	19.41%	56.50%	20.25%	-16.40%	43.50%	-42.38%	1000
Portfolio 10	13.96%	10.38%	3.58%	0.21	0.94	16.07%	60.10%	17.16%	-13.86%	39.90%	-35.22%	1000
Portfolio 11	13.27%	10.38%	2.89%	0.16	0.98	17.84%	58.90%	18.14%	-14.60%	41.10%	-38.59%	1000
Portfolio 12	13.16%	10.38%	2.78%	0.15	1.00	19.06%	56.70%	19.09%	-15.36%	43.30%	-42.04%	1000
Portfolio 13	13.15%	10.38%	2.77%	0.17	0.98	16.45%	58.10%	16.76%	-13.66%	41.90%	-36.56%	1000
Portfolio 14	14.12%	10.38%	3.74%	0.22	1.00	16.92%	61.72%	16.99%	-13.46%	37.69%	-37.78%	1000
Portfolio 15	13.94%	10.38%	3.56%	0.20	0.96	16.92%	60.90%	17.65%	-14.29%	39.10%	-37.12%	1000
Portfolio 16	13.72%	10.38%	3.34%	0.19	0.97	16.71%	60.90%	17.24%	-13.55%	39.10%	-37.48%	1000
Portfolio 17	13.71%	10.38%	3.32%	0.20	1.02	16.90%	57.90%	16.63%	-13.15%	42.10%	-38.44%	1000
Portfolio 18	13.77%	10.38%	3.39%	0.20	1.04	17.52%	63.40%	16.92%	-13.43%	36.60%	-38.18%	1000
Portfolio 19	13.56%	10.38%	3.17%	0.18	0.90	16.22%	61.40%	18.09%	-14.26%	38.60%	-40.39%	1000
Portfolio 20	14.06%	10.38%	3.67%	0.23	1.05	17.05%	62.00%	16.24%	-12.76%	38.00%	-38.69%	1000
Portfolio 21	13.64%	10.38%	3.26%	0.18	0.92	17.16%	61.70%	18.58%	-14.77%	38.30%	-41.90%	1000
Portfolio 22	13.05%	10.38%	2.66%	0.15	0.88	15.55%	62.30%	17.67%	-14.28%	37.70%	-38.40%	1000
Portfolio 23	13.43%	10.38%	3.05%	0.18	1.04	18.00%	58.80%	17.25%	-13.61%	41.20%	-37.91%	1000
Portfolio 24	13.94%	10.38%	3.56%	0.21	0.93	15.93%	63.30%	17.18%	-13.83%	36.70%	-39.41%	1000
Portfolio 25	13.90%	10.38%	3.52%	0.19	0.93	17.35%	57.20%	18.60%	-14.82%	42.80%	-40.37%	1000

COMPARISON OF VARIOUS EQUITY ASSET CLASS MIXTURE PORTFOLIOS
SORTED BY RETURN 1984-2004 (QUARTERLY MAR = 2.50%)

Portfolio Name	Portfolio Return	MAR Benchmark Return	Active Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
Portfolio 14	14.12%	10.38%	3.74%	0.22	1.00	16.92%	61.72%	16.99%	-13.46%	37.69%	-37.78%	1000
Portfolio 20	14.06%	10.38%	3.67%	0.23	1.05	17.05%	62.00%	16.24%	-12.76%	38.00%	-38.69%	1000
Portfolio 8	14.05%	10.38%	3.67%	0.21	0.98	17.41%	59.70%	17.72%	-14.15%	40.30%	-38.18%	1000
Portfolio 10	13.96%	10.38%	3.58%	0.21	0.94	16.07%	60.10%	17.16%	-13.86%	39.90%	-35.22%	1000
Portfolio 15	13.94%	10.38%	3.56%	0.20	0.96	16.92%	60.90%	17.65%	-14.29%	39.10%	-37.12%	1000
Portfolio 24	13.94%	10.38%	3.56%	0.21	0.93	15.93%	63.30%	17.18%	-13.83%	36.70%	-39.41%	1000
Portfolio 25	13.90%	10.38%	3.52%	0.19	0.93	17.35%	57.20%	18.60%	-14.82%	42.80%	-40.37%	1000
Portfolio 18	13.77%	10.38%	3.39%	0.20	1.04	17.52%	63.40%	16.92%	-13.43%	36.60%	-38.18%	1000
Portfolio 16	13.72%	10.38%	3.34%	0.19	0.97	16.71%	60.90%	17.24%	-13.55%	39.10%	-37.48%	1000
Portfolio 17	13.71%	10.38%	3.32%	0.20	1.02	16.90%	57.90%	16.63%	-13.15%	42.10%	-38.44%	1000
Portfolio 2	13.67%	10.38%	3.29%	0.18	0.90	15.98%	60.00%	17.80%	-14.16%	40.00%	-38.98%	1000
Portfolio 21	13.64%	10.38%	3.26%	0.18	0.92	17.16%	61.70%	18.58%	-14.77%	38.30%	-41.90%	1000
Portfolio 19	13.56%	10.38%	3.17%	0.18	0.90	16.22%	61.40%	18.09%	-14.26%	38.60%	-40.39%	1000
Portfolio 23	13.43%	10.38%	3.05%	0.18	1.04	18.00%	58.80%	17.25%	-13.61%	41.20%	-37.91%	1000
Portfolio 1	13.34%	10.38%	2.96%	0.17	0.91	16.36%	60.20%	17.93%	-14.36%	39.80%	-40.75%	1000
Portfolio 7	13.30%	10.38%	2.92%	0.17	0.94	15.96%	63.00%	17.01%	-13.68%	37.00%	-38.11%	1000
Portfolio 5	13.29%	10.38%	2.91%	0.16	0.96	17.57%	57.30%	18.29%	-14.49%	42.70%	-39.81%	1000
Portfolio 11	13.27%	10.38%	2.89%	0.16	0.98	17.84%	58.90%	18.14%	-14.60%	41.10%	-38.59%	1000
Portfolio 12	13.16%	10.38%	2.78%	0.15	1.00	19.06%	56.70%	19.09%	-15.36%	43.30%	-42.04%	1000
Portfolio 13	13.15%	10.38%	2.77%	0.17	0.98	16.45%	58.10%	16.76%	-13.66%	41.90%	-36.56%	1000
Portfolio 22	13.05%	10.38%	2.66%	0.15	0.88	15.55%	62.30%	17.67%	-14.28%	37.70%	-38.40%	1000
Wilshire 5000	12.87%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000
Portfolio 3	12.80%	10.38%	2.42%	0.13	0.96	18.45%	57.10%	19.20%	-15.43%	42.90%	-42.26%	1000
Portfolio 6	12.69%	10.38%	2.31%	0.12	0.94	18.47%	54.60%	19.75%	-15.88%	45.40%	-41.84%	1000
Portfolio 9	12.46%	10.38%	2.08%	0.10	0.96	19.41%	56.50%	20.25%	-16.40%	43.50%	-42.38%	1000
Portfolio 4	12.16%	10.38%	1.77%	0.09	0.99	18.97%	55.20%	19.25%	-15.31%	44.80%	-44.78%	1000

COMPARISON OF VARIOUS EQUITY ASSET CLASS MIXTURE PORTFOLIOS
SORTED BY ACTIVE SORTINO RATIO 1984-2004 (QUARTERLY MAR = 2.50%)

Portfolio Name	Portfolio Return	MAR Benchmark Return	Active Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
Portfolio 20	14.06%	10.38%	3.67%	0.23	1.05	17.05%	62.00%	16.24%	-12.76%	38.00%	-38.69%	1000
Portfolio 14	14.12%	10.38%	3.74%	0.22	1.00	16.92%	61.72%	16.99%	-13.46%	37.69%	-37.78%	1000
Portfolio 10	13.96%	10.38%	3.58%	0.21	0.94	16.07%	60.10%	17.16%	-13.86%	39.90%	-35.22%	1000
Portfolio 8	14.05%	10.38%	3.67%	0.21	0.98	17.41%	59.70%	17.72%	-14.15%	40.30%	-38.18%	1000
Portfolio 24	13.94%	10.38%	3.56%	0.21	0.93	15.93%	63.30%	17.18%	-13.83%	36.70%	-39.41%	1000
Portfolio 15	13.94%	10.38%	3.56%	0.20	0.96	16.92%	60.90%	17.65%	-14.29%	39.10%	-37.12%	1000
Portfolio 18	13.77%	10.38%	3.39%	0.20	1.04	17.52%	63.40%	16.92%	-13.43%	36.60%	-38.18%	1000
Portfolio 17	13.71%	10.38%	3.32%	0.20	1.02	16.90%	57.90%	16.63%	-13.15%	42.10%	-38.44%	1000
Portfolio 16	13.72%	10.38%	3.34%	0.19	0.97	16.71%	60.90%	17.24%	-13.55%	39.10%	-37.48%	1000
Portfolio 25	13.90%	10.38%	3.52%	0.19	0.93	17.35%	57.20%	18.60%	-14.82%	42.80%	-40.37%	1000
Portfolio 2	13.67%	10.38%	3.29%	0.18	0.90	15.98%	60.00%	17.80%	-14.16%	40.00%	-38.98%	1000
Portfolio 23	13.43%	10.38%	3.05%	0.18	1.04	18.00%	58.80%	17.25%	-13.61%	41.20%	-37.91%	1000
Portfolio 21	13.64%	10.38%	3.26%	0.18	0.92	17.16%	61.70%	18.58%	-14.77%	38.30%	-41.90%	1000
Portfolio 19	13.56%	10.38%	3.17%	0.18	0.90	16.22%	61.40%	18.09%	-14.26%	38.60%	-40.39%	1000
Portfolio 7	13.30%	10.38%	2.92%	0.17	0.94	15.96%	63.00%	17.01%	-13.68%	37.00%	-38.11%	1000
Portfolio 13	13.15%	10.38%	2.77%	0.17	0.98	16.45%	58.10%	16.76%	-13.66%	41.90%	-36.56%	1000
Portfolio 1	13.34%	10.38%	2.96%	0.17	0.91	16.36%	60.20%	17.93%	-14.36%	39.80%	-40.75%	1000
Portfolio 11	13.27%	10.38%	2.89%	0.16	0.98	17.84%	58.90%	18.14%	-14.60%	41.10%	-38.59%	1000
Portfolio 5	13.29%	10.38%	2.91%	0.16	0.96	17.57%	57.30%	18.29%	-14.49%	42.70%	-39.81%	1000
Portfolio 22	13.05%	10.38%	2.66%	0.15	0.88	15.55%	62.30%	17.67%	-14.28%	37.70%	-38.40%	1000
Portfolio 12	13.16%	10.38%	2.78%	0.15	1.00	19.06%	56.70%	19.09%	-15.36%	43.30%	-42.04%	1000
Wilshire 5000	12.87%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000
Portfolio 3	12.80%	10.38%	2.42%	0.13	0.96	18.45%	57.10%	19.20%	-15.43%	42.90%	-42.26%	1000
Portfolio 6	12.69%	10.38%	2.31%	0.12	0.94	18.47%	54.60%	19.75%	-15.88%	45.40%	-41.84%	1000
Portfolio 9	12.46%	10.38%	2.08%	0.10	0.96	19.41%	56.50%	20.25%	-16.40%	43.50%	-42.38%	1000
Portfolio 4	12.16%	10.38%	1.77%	0.09	0.99	18.97%	55.20%	19.25%	-15.31%	44.80%	-44.78%	1000

COMPARISON OF VARIOUS EQUITY ASSET CLASS MIXTURE PORTFOLIOS
SORTED BY DOWNSIDE RISK 1984-2004 (QUARTERLY MAR = 2.50%)

| Portfolio Name	Portfolio Return	MAR Benchmark Return	Active Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
Portfolio 20	14.06%	10.38%	3.67%	0.23	1.05	17.05%	62.00%	16.24%	-12.76%	38.00%	-38.69%	1000
Portfolio 17	13.71%	10.38%	3.32%	0.20	1.02	16.90%	57.90%	16.63%	-13.15%	42.10%	-38.44%	1000
Portfolio 13	13.15%	10.38%	2.77%	0.17	0.98	16.45%	58.10%	16.76%	-13.66%	41.90%	-36.56%	1000
Portfolio 18	13.77%	10.38%	3.39%	0.20	1.04	17.52%	63.40%	16.92%	-13.43%	36.60%	-38.18%	1000
Portfolio 14	14.12%	10.38%	3.74%	0.22	1.00	16.92%	61.72%	16.99%	-13.46%	37.69%	-37.78%	1000
Portfolio 7	13.30%	10.38%	2.92%	0.17	0.94	15.96%	63.00%	17.01%	-13.68%	37.00%	-38.11%	1000
Wilshire 5000	12.87%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000
Portfolio 10	13.96%	10.38%	3.58%	0.21	0.94	16.07%	60.10%	17.16%	-13.86%	39.90%	-35.22%	1000
Portfolio 24	13.94%	10.38%	3.56%	0.21	0.93	15.93%	63.30%	17.18%	-13.83%	36.70%	-39.41%	1000
Portfolio 16	13.72%	10.38%	3.34%	0.19	0.97	16.71%	60.90%	17.24%	-13.55%	39.10%	-37.48%	1000
Portfolio 23	13.43%	10.38%	3.05%	0.18	1.04	18.00%	58.80%	17.25%	-13.61%	41.20%	-37.91%	1000
Portfolio 15	13.94%	10.38%	3.56%	0.20	0.96	16.92%	60.90%	17.65%	-14.29%	39.10%	-37.12%	1000
Portfolio 22	13.05%	10.38%	2.66%	0.15	0.88	15.55%	62.30%	17.67%	-14.28%	37.70%	-38.40%	1000
Portfolio 8	14.05%	10.38%	3.67%	0.21	0.98	17.41%	59.70%	17.72%	-14.15%	40.30%	-38.18%	1000
Portfolio 2	13.67%	10.38%	3.29%	0.18	0.90	15.98%	60.00%	17.80%	-14.16%	40.00%	-38.98%	1000
Portfolio 1	13.34%	10.38%	2.96%	0.17	0.91	16.36%	60.20%	17.93%	-14.36%	39.80%	-40.75%	1000
Portfolio 19	13.56%	10.38%	3.17%	0.18	0.90	16.22%	61.40%	18.09%	-14.26%	38.60%	-40.39%	1000
Portfolio 11	13.27%	10.38%	2.89%	0.16	0.98	17.84%	58.90%	18.14%	-14.60%	41.10%	-38.59%	1000
Portfolio 5	13.29%	10.38%	2.91%	0.16	0.96	17.57%	57.30%	18.29%	-14.49%	42.70%	-39.81%	1000
Portfolio 21	13.64%	10.38%	3.26%	0.18	0.92	17.16%	61.70%	18.58%	-14.77%	38.30%	-41.90%	1000
Portfolio 25	13.90%	10.38%	3.52%	0.19	0.93	17.35%	57.20%	18.60%	-14.82%	42.80%	-40.37%	1000
Portfolio 12	13.16%	10.38%	2.78%	0.15	1.00	19.06%	56.70%	19.09%	-15.36%	43.30%	-42.04%	1000
Portfolio 3	12.80%	10.38%	2.42%	0.13	0.96	18.45%	57.10%	19.20%	-15.43%	42.90%	-42.26%	1000
Portfolio 4	12.16%	10.38%	1.77%	0.09	0.99	18.97%	55.20%	19.25%	-15.31%	44.80%	-44.78%	1000
Portfolio 6	12.69%	10.38%	2.31%	0.12	0.94	18.47%	54.60%	19.75%	-15.88%	45.40%	-41.84%	1000
Portfolio 9	12.46%	10.38%	2.08%	0.10	0.96	19.41%	56.50%	20.25%	-16.40%	43.50%	-42.38%	1000

COMPARISON OF VARIOUS EQUITY ASSET CLASS MIXTURE PORTFOLIOS
SORTED BY DOWNSIDE PROBABILITY 1984-2004 (QUARTERLY MAR = 2.50%)

Portfolio Name	Portfolio Return	MAR Benchmark Return	Active Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
Portfolio 18	13.77%	10.38%	3.39%	0.20	1.04	17.52%	63.40%	16.92%	-13.43%	36.60%	-38.18%	1000
Portfolio 24	13.94%	10.38%	3.56%	0.21	0.93	15.93%	63.30%	17.18%	-13.83%	36.70%	-39.41%	1000
Portfolio 7	13.30%	10.38%	2.92%	0.17	0.94	15.96%	63.00%	17.01%	-13.68%	37.00%	-38.11%	1000
Wilshire 5000	12.87%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000
Portfolio 14	14.12%	10.38%	3.74%	0.22	1.00	16.92%	61.72%	16.99%	-13.46%	37.69%	-37.78%	1000
Portfolio 22	13.05%	10.38%	2.66%	0.15	0.88	15.55%	62.30%	17.67%	-14.28%	37.70%	-38.40%	1000
Portfolio 20	14.06%	10.38%	3.67%	0.23	1.05	17.05%	62.00%	16.24%	-12.76%	38.00%	-38.69%	1000
Portfolio 21	13.64%	10.38%	3.26%	0.18	0.92	17.16%	61.70%	18.58%	-14.77%	38.30%	-41.90%	1000
Portfolio 19	13.56%	10.38%	3.17%	0.18	0.90	16.22%	61.40%	18.09%	-14.26%	38.60%	-40.39%	1000
Portfolio 16	13.72%	10.38%	3.34%	0.19	0.97	16.71%	60.90%	17.24%	-13.55%	39.10%	-37.48%	1000
Portfolio 15	13.94%	10.38%	3.56%	0.20	0.96	16.92%	60.90%	17.65%	-14.29%	39.10%	-37.12%	1000
Portfolio 1	13.34%	10.38%	2.96%	0.17	0.91	16.36%	60.20%	17.93%	-14.36%	39.80%	-40.75%	1000
Portfolio 10	13.96%	10.38%	3.58%	0.21	0.94	16.07%	60.10%	17.16%	-13.86%	39.90%	-35.22%	1000
Portfolio 2	13.67%	10.38%	3.29%	0.18	0.90	15.98%	60.00%	17.80%	-14.16%	40.00%	-38.98%	1000
Portfolio 8	14.05%	10.38%	3.67%	0.21	0.98	17.41%	59.70%	17.72%	-14.15%	40.30%	-38.18%	1000
Portfolio 11	13.27%	10.38%	2.89%	0.16	0.98	17.84%	58.90%	18.14%	-14.60%	41.10%	-38.59%	1000
Portfolio 23	13.43%	10.38%	3.05%	0.18	1.04	18.00%	58.80%	17.25%	-13.61%	41.20%	-37.91%	1000
Portfolio 13	13.15%	10.38%	2.77%	0.17	0.98	16.45%	58.10%	16.76%	-13.66%	41.90%	-36.56%	1000
Portfolio 17	13.71%	10.38%	3.32%	0.20	1.02	16.90%	57.90%	16.63%	-13.15%	42.10%	-38.44%	1000
Portfolio 5	13.29%	10.38%	2.91%	0.16	0.96	17.57%	57.30%	18.29%	-14.49%	42.70%	-39.81%	1000
Portfolio 25	13.90%	10.38%	3.52%	0.19	0.93	17.35%	57.20%	18.60%	-14.82%	42.80%	-40.37%	1000
Portfolio 3	12.80%	10.38%	2.42%	0.13	0.96	18.45%	57.10%	19.20%	-15.43%	42.90%	-42.26%	1000
Portfolio 12	13.16%	10.38%	2.78%	0.15	1.00	19.06%	56.70%	19.09%	-15.36%	43.30%	-42.04%	1000
Portfolio 9	12.46%	10.38%	2.08%	0.10	0.96	19.41%	56.50%	20.25%	-16.40%	43.50%	-42.38%	1000
Portfolio 4	12.16%	10.38%	1.77%	0.09	0.99	18.97%	55.20%	19.25%	-15.31%	44.80%	-44.78%	1000
Portfolio 6	12.69%	10.38%	2.31%	0.12	0.94	18.47%	54.60%	19.75%	-15.88%	45.40%	-41.84%	1000

EQUITY PORTFOLIO TO WILSHIRE 5000 TRACKING ERROR

Although it was mentioned earlier, it is worth noting again that all successful portfolios that outperformed the Wilshire 5000 with less downside risk *did not outperform every quarter or year*. On the contrary, the most successful long term equity portfolios were found to underperform the Wilshire 5000 during **30%-40%** of all quarters over the entire 1984-2004 time period. These data are also true for the 1926-2004 time period.

Since the more successful long-term portfolios were weighted more towards value and less towards growth, such periodic underperformance would be generally most likely when the value style was out of favor and growth style was in favor. If an investor is seeking to always exactly track the Wilshire 5000, they will be unable to outperform over long time periods. They will also be subject to potentially greater losses during periods of corrections in the general equity market.
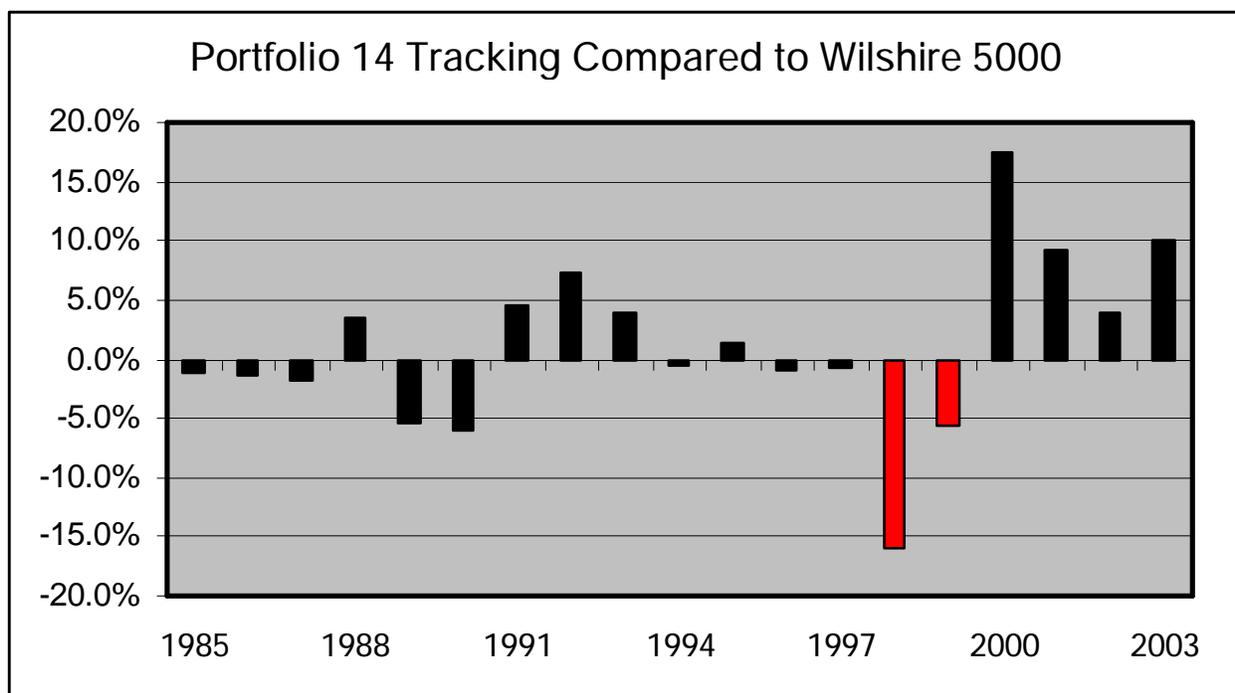
The chart above shows the annual tracking error (performance difference) of equity portfolio 14 (8% large cap growth, 10% large cap blend, 12% large cap value, 5% mid cap growth, 25% mid blend, 20% mid cap value and 20% small cap value) as compared to the Wilshire 5000. Over the entire 80 quarter time period (1984-2004) portfolio 14 outperformed the Wilshire 5000 +14.12% versus +12.87%. Any value greater than zero meant that portfolio 14 outperformed the Wilshire 5000, and any negative value meant the portfolio underperformed the Wilshire 5000.

During the "market mania" of 1998-1999, large cap growth stocks contributed most of the performance to the Wilshire 5000. The negative tracking error of the successful portfolio 14 was substantial during the 1998-1999. The "price" to be paid by the investor seeking to outperform the Wilshire 5000 on a downside risk adjusted basis is that some periods of underperformance tracking error will occur from time to time.

HOW SHOULD EMPLOYEE BENEFIT MODEL PORTFOLIOS BE OPTIMALLY CONSTRUCTED FROM AN ASSET ALLOCATION PERSPECTIVE?

Proper asset allocation explains 40% to 90% of the plan participant's long-term return. Because of inertia and procrastination, large-scale data show most plan participants make few changes to their accounts over time. Some plan sponsors have attempted to offer participants asset allocation choices with lifestyle funds. So far, lifestyle funds have produced little improvement in outcome success and haven't proved popular with employees, but that may be because they were not well explained. Data indicate that only one in three plan participants choose lifestyle funds when they are offered.

A professionally managed model portfolio can overcome many of these problems, especially when presented as part of an automatic, or default pathway. Some may assume that model portfolios and lifestyle funds are basically the same, but there are significant differences between the two. A properly constructed and managed model portfolio is superior to a lifestyle fund. Most participants that use lifestyle funds try to combine the lifestyle fund with other funds and defeat its purpose. In contrast, plan participants can invest in only one model in order to ensure they have proper asset allocation. The plan trustee can automatically rebalance model portfolios without any actions by plan participants.

Another advantage over lifestyle funds holding other funds is that with model portfolios, a potential second layer of mutual fund fees is avoided. More importantly, most lifestyle funds use mutual funds from the same mutual fund company—giving a proprietary taint to the objectivity of fund selection and replacement. A model portfolio is made up of mutual funds selected and monitored on a totally objective basis. Asset quality can be maintained within the model. In a lifestyle fund, the participant is stuck with the underlying proprietary holdings.

Traditional asset allocation software creates an efficient frontier of various asset allocation mixes by plotting portfolio return against risk, and relies upon standard deviation as risk. As we pointed out earlier on pages 8-11, standard deviation measures uncertainty, but does not really measure risk the way an investor thinks of risk. A far better way to build model portfolio asset allocation mixes is with the Sortino Downside Risk statistics as the risk measurement. Downside risk, as the name implies, measures risk below a certain point. If an investor needs to earn a 5% annual return in order to meet goals, any return under 5% would be considered risky.

In addition to offering several model portfolios, the plan should provide at least two default model portfolios for participants who make no investment selections. For example, the plan could offer a 40:60 stock:fixed-income asset-allocation model portfolio for participants over the age of fifty and a 60:40 stock:fixed-income asset allocation for participants under the age of fifty. The plan sponsor should be aware that it is possible that the plan may not be able to rely upon ERISA Section 404(c) protection under such an approach. However, the discretionary trustee would be prudent in the selection, monitoring, and replacement of investments as well as diversification of plan assets under ERISA Section 404(a).

Unified Trust Company offers six model portfolios. The six are: Ultra Conservative 100, Conservative 20 80, Balanced 40 60, Balanced 60 40, Aggressive 80 20 and Ultra Aggressive 100. The asset quality of each portfolio is maintained through fiduciary monitoring. Each portfolio is comprised of funds with acceptable Unified Fiduciary Monitoring Index® scores, usually in the top 25% of their peer group.

The asset allocations are listed below. The equity allocations for the two most conservative allocations containing equities (Conservative 20 80 and Balanced 40 60) are based upon portfolio number 20, which had the highest return/downside risk. Portfolio 20, described in detail on pages 20-24, contains 40% large cap blend, 20% mid cap blend, 20% mid cap value, and 20% small cap value.

ULTRA CONSERVATIVE 100 ASSET ALLOCATION

Asset Class	% Allocation	Primary Choice Asset Class	Secondary Choice Asset Class	Tertiary Choice Asset Class
Cash (Stable Value)	60%	Stable Value Fund	Money Market	Money Market
Intermediate Bond	20%	Intermediate-term Bond	Intermediate Government	Short-term Bond
Intermediate Government	20%	Intermediate Government	Short Government	Intermediate-term Bond

CONSERVATIVE 20 80 ASSET ALLOCATION

Asset Class	% Allocation	Primary Choice Asset Class	Secondary Choice Asset Class	Tertiary Choice Asset Class
Cash (Stable Value)	40%	Stable Value	Money Market	Money Market
Intermediate Bond	20%	Intermediate-term Bond	Intermediate Government	Short-term Bond
Intermediate Government	20%	Intermediate Government	Short Government	Intermediate-term Bond
Large Cap Blend	8%	Large Cap Blend	Large Cap Value	Large Cap Growth
Mid Cap Blend	4%	Mid Cap Blend	Large Cap Blend	Mid Cap Value
Mid Cap Value	4%	Mid Cap Value	Mid Cap Blend	Large Blend
Small Cap Value	4%	Small Cap Value	Small Cap Blend	Mid Cap Blend

BALANCED 40:60 ASSET ALLOCATION

Asset Class	% Allocation	Primary Choice Asset Class	Secondary Choice Asset Class	Tertiary Choice Asset Class
Cash (Stable Value)	30%	Stable Value	Money Market	Money Market
Intermediate Bond	15%	Intermediate-term Bond	Intermediate Government	Short-term Bond
Intermediate Government	15%	Intermediate Government	Short Government	Intermediate-term Bond
Large Cap Blend	16%	Large Cap Blend	Large Cap Value	Large Cap Growth
Mid Cap Blend	8%	Mid Cap Blend	Large Cap Blend	Mid Cap Value
Mid Cap Value	8%	Mid Cap Value	Mid Cap Blend	Large Blend
Small Cap Value	8%	Small Cap Value	Small Cap Blend	Mid Cap Blend

The equity allocations for the three most aggressive allocations containing equities (Balanced 60 40, Aggressive 80 20, and Ultra Aggressive 100) are based upon portfolio number 14, which had the overall highest return and reasonable downside risk. Portfolio 14, described in detail on pages 20-21, contains 8% large cap growth, 10% large cap blend, 12% large cap value, 5% mid cap growth, 25% mid cap blend, 20% mid cap value, and 20% small cap value.

BALANCED 60:40 ASSET ALLOCATION

Asset Class	% Allocation	Primary Choice Asset Class	Secondary Choice Asset Class	Tertiary Choice Asset Class
Cash (Stable Value)	20%	Stable Value	Money Market	Money Market
Intermediate Bond	20%	Intermediate-term Bond	Intermediate Government	Short-term Bond
Large Cap Growth	5%	Large Cap Growth	Large Cap Blend	Mid Cap Growth
Large Cap Blend	6%	Large Cap Blend	Large Cap Value	Large Cap Growth
Large Cap Value	7%	Large Cap Value	Large Cap Blend	Large Cap Growth
Mid Cap Growth	3%	Mid Cap Growth	Mid Cap Blend	Large Cap Blend
Mid Cap Blend	15%	Mid Cap Blend	Large Cap Blend	Mid Cap Value
Mid Cap Value	12%	Mid Cap Value	Mid Cap Blend	Large Cap Value
Small Cap Value	12%	Small Cap Value	Small Cap Blend	Mid Cap Value

AGGRESSIVE 80 20 ASSET ALLOCATION

Asset Class	% Allocation	Primary Choice Asset Class	Secondary Choice Asset Class	Tertiary Choice Asset Class
Cash (Stable Value)	10%	Stable Value	Money Market	Money Market
Intermediate Bond	10%	Intermediate-term Bond	Intermediate Government	Short-term Bond
Large Cap Growth	6%	Large Cap Growth	Large Cap Blend	Mid Cap Growth
Large Cap Blend	8%	Large Cap Blend	Large Cap Value	Large Cap Growth
Large Cap Value	10%	Large Cap Value	Large Cap Blend	Large Cap Growth
Mid Cap Growth	4%	Mid Cap Growth	Mid Cap Blend	Large Cap Blend
Mid Cap Blend	20%	Mid Cap Blend	Large Cap Blend	Mid Cap Value
Mid Cap Value	16%	Mid Cap Value	Mid Cap Blend	Large Cap Value
Small Cap Value	16%	Small Cap Value	Small Cap Blend	Mid Cap Value

ULTRA AGGRESSIVE 100 ASSET ALLOCATION

Asset Class	% Allocation	Primary Choice Asset Class	Secondary Choice Asset Class	Tertiary Choice Asset Class
Large Cap Growth	8%	Large Cap Growth	Large Cap Blend	Mid Cap Growth
Large Cap Blend	10%	Large Cap Blend	Large Cap Value	Large Cap Growth
Large Cap Value	12%	Large Cap Value	Large Cap Blend	Large Cap Growth
Mid Cap Growth	5%	Mid Cap Growth	Mid Cap Blend	Large Cap Blend
Mid Cap Blend	25%	Mid Cap Blend	Large Cap Blend	Mid Cap Value
Mid Cap Value	20%	Mid Cap Value	Mid Cap Blend	Large Cap Value
Small Cap Value	20%	Small Cap Value	Small Cap Blend	Mid Cap Value

For the six model portfolios we use the following MAR values:

Ultra Conservative 100: Quarterly MAR = 1.25% (5.09% annualized)
Conservative 20 80: Quarterly MAR = 1.50% (6.14% annualized)
Balanced 40 60: Quarterly MAR = 1.75% (7.19% annualized)
Balanced 60 40: Quarterly MAR = 2.00% (8.24% annualized)
Aggressive 80 20: Quarterly MAR = 2.25% (9.31% annualized)
Ultra Aggressive 100: Quarterly MAR = 2.50% (10.38% annualized)

The results of the six model portfolios are shown below. Based upon underlying asset class allocation as described above, each model has historically outperformed its matched benchmark. In addition, trailing performance of funds relative to the underlying peer group selected by the Unified Fiduciary Monitoring Index® in each asset classes are also illustrated. This methodology produces an optimal risk/return outcome.

Portfolio Name	Annual MAR	Portfolio Return	Active Return	Downside Risk	Return/ Downside Risk	Downside Probability	Return/ Downside Probability
Ultra Conservative 100 Asset Classes	5.09%	7.40%	2.31%	1.31%	5.66	16.50%	0.45
Ultra Conservative 100 Funds	5.09%	8.46%	3.37%	0.90%	9.36	8.00%	1.06
Matched Benchmark (1)	5.09%	6.69%	1.60%	1.90%	3.52	30.60%	0.22
Conservative 20 80 Asset Classes	6.14%	9.12%	2.98%	3.10%	2.94	24.30%	0.38
Conservative 20 80 Funds	6.14%	10.19%	4.05%	2.79%	3.65	17.70%	0.58
Matched Benchmark (2)	6.14%	8.17%	2.03%	3.31%	2.47	32.60%	0.25
Balanced 40 60 Asset Classes	7.19%	10.55%	3.36%	6.63%	1.59	31.30%	0.34
Balanced 40 60 Funds	7.19%	11.63%	4.44%	6.39%	1.82	27.10%	0.43
Matched Benchmark (3)	7.19%	9.54%	2.35%	6.53%	1.46	39.20%	0.24
Balanced 60 40 Asset Classes	8.24%	11.92%	3.68%	10.04%	1.19	35.20%	0.34
Balanced 60 40 Funds	8.24%	13.01%	4.77%	10.43%	1.25	32.30%	0.40
Matched Benchmark (4)	8.24%	10.78%	2.54%	9.92%	1.09	38.90%	0.28
Aggressive 80 20 Asset Classes	9.31%	13.11%	3.80%	13.46%	0.97	37.40%	0.35
Aggressive 80 20 Funds	9.31%	14.21%	4.90%	13.94%	1.02	35.20%	0.40
Matched Benchmark (5)	9.31%	11.90%	2.59%	12.89%	0.92	38.70%	0.31
Ultra Aggressive 100 Asset Classes	10.38%	14.14%	3.76%	17.50%	0.81	37.20%	0.38
Ultra Aggressive 100 Funds	10.38%	15.25%	4.87%	16.63%	0.92	36.70%	0.42
Matched Benchmark (6)	10.38%	12.87%	2.49%	17.10%	0.75	37.00%	0.35

(1) Ultra Conservative 100 benchmark mix is 60% Treasury Bills and 40% Lehman intermediate Treasury Bonds

(2) Conservative 20 80 benchmark mix is 20% Wilshire 5000, 40% Treasury Bills, 40% Lehman intermediate Treasury Bonds

(3) Balanced 40 60 benchmark mix is 40% Wilshire 5000, 30% Treasury Bills, 30% Lehman intermediate Treasury Bonds

(4) Balanced 60 40 benchmark mix is 60% Wilshire 5000, 20% Treasury Bills, 20% Lehman intermediate Treasury Bonds

(5) Aggressive 80 20 benchmark mix is 80% Wilshire 5000, 10% Treasury Bills, 10% Lehman intermediate Treasury Bonds

(6) Ultra Aggressive 100 benchmark mix is 100% Wilshire 5000

EB MODEL PORTFOLIO GENERAL CHARACTERISTICS
BASED UPON UNDERLYING ASSET CLASSES 1984-2004

Portfolio Name	Portfolio Return	MAR Benchmark Return	Active Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
Ultra Conservative 100	7.40%	5.09%	2.31%	1.76	2.17	2.84%	83.50%	1.31%	-1.07%	16.50%	-2.44%	1000
Matched Benchmark (1)	6.69%	5.09%	1.59%	0.84	1.60	3.05%	69.40%	1.90%	-1.46%	30.60%	-4.21%	1000
Conservative 20 80	9.12%	6.14%	2.98%	0.96	1.57	4.86%	75.70%	3.10%	-2.36%	24.30%	-6.64%	1000
Matched Benchmark (2)	8.17%	6.14%	2.04%	0.62	1.29	4.27%	67.40%	3.31%	-2.61%	32.60%	-7.01%	1000
Balanced 40 60	10.55%	7.19%	3.36%	0.50	1.10	7.37%	68.70%	6.63%	-5.31%	31.30%	-13.89%	1000
Matched Benchmark (3)	9.54%	7.19%	2.36%	0.37	1.06	6.69%	60.80%	6.53%	-4.93%	39.20%	-15.24%	1000
Balanced 60 40	11.92%	8.24%	3.68%	0.37	1.09	10.95%	64.80%	10.04%	-7.84%	35.20%	-22.50%	1000
Matched Benchmark (4)	10.78%	8.24%	2.54%	0.26	0.98	9.69%	61.10%	9.92%	-7.81%	38.90%	-21.73%	1000
Aggressive 80 20	13.11%	9.31%	3.80%	0.28	1.09	14.65%	62.60%	13.46%	-10.77%	37.40%	-29.97%	1000
Matched Benchmark (5)	11.90%	9.31%	2.59%	0.20	1.06	13.61%	61.30%	12.89%	-10.47%	38.70%	-27.85%	1000
Ultra Aggressive 100	14.14%	10.38%	3.76%	0.21	0.99	17.34%	62.80%	17.50%	-14.17%	37.20%	-37.32%	1000
Matched Benchmark (6)	12.87%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000

(1) Ultra Conservative 100 benchmark mix is 60% Treasury Bills and 40% Lehman intermediate Treasury Bonds

(2) Conservative 20 80 benchmark mix is 20% Wilshire 5000, 40% Treasury Bills, 40% Lehman intermediate Treasury Bonds

(3) Balanced 40 60 benchmark mix is 40% Wilshire 5000, 30% Treasury Bills, 30% Lehman intermediate Treasury Bonds

(4) Balanced 60 40 benchmark mix is 60% Wilshire 5000, 20% Treasury Bills, 20% Lehman intermediate Treasury Bonds

(5) Aggressive 80 20 benchmark mix is 80% Wilshire 5000, 10% Treasury Bills, 10% Lehman intermediate Treasury Bonds

(6) Ultra Aggressive 100 benchmark mix is 100% Wilshire 5000

EB MODEL PORTFOLIO GENERAL CHARACTERISTICS BASED UPON MUTUAL FUNDS SELECTED WITH THE UNIFIED FIDUCIARY MONITORING INDEX®

Portfolio Name	Portfolio Return	MAR Benchmark Return	Active Return	Active Sortino Ratio	U-P Ratio	Upside Potential	Upside Probability	Downside Risk	Average Under Performance	Downside Probability	99th Percentile	Number of Bootstrapped Years
Ultra Conservative 100 Funds	8.46%	5.09%	3.36%	3.72	4.01	3.62%	92.00%	0.90%	-0.69%	8.00%	-1.31%	1000
Matched Benchmark (1)	6.69%	5.09%	1.59%	0.84	1.60	3.05%	69.40%	1.90%	-1.46%	30.60%	-4.21%	1000
Conservative 20 80 Funds	10.19%	6.14%	4.05%	1.45	1.87	5.21%	82.30%	2.79%	-2.12%	17.70%	-5.46%	1000
Matched Benchmark (2)	8.17%	6.14%	2.04%	0.62	1.29	4.27%	67.40%	3.31%	-2.61%	32.60%	-7.01%	1000
Balanced 40 60 Funds	11.63%	7.19%	4.45%	0.70	1.27	8.15%	72.90%	6.39%	-5.00%	27.10%	-14.00%	1000
Matched Benchmark (3)	9.54%	7.19%	2.36%	0.37	1.06	6.69%	60.80%	6.53%	-4.93%	39.20%	-15.24%	1000
Balanced 60 40 Funds	13.01%	8.24%	4.77%	0.46	1.03	10.76%	67.70%	10.43%	-8.20%	32.30%	-22.72%	1000
Matched Benchmark (4)	10.78%	8.24%	2.54%	0.26	0.98	9.69%	61.10%	9.92%	-7.81%	38.90%	-21.73%	1000
Aggressive 80 20 Funds	14.21%	9.31%	4.91%	0.35	1.02	14.28%	64.80%	13.94%	-10.90%	35.20%	-29.68%	1000
Matched Benchmark (5)	11.90%	9.31%	2.59%	0.20	1.06	13.61%	61.30%	12.89%	-10.47%	38.70%	-27.85%	1000
Ultra Aggressive 100 Funds	15.25%	10.38%	4.87%	0.29	1.05	17.43%	63.30%	16.63%	-13.28%	36.70%	-33.49%	1000
Matched Benchmark (6)	12.87%	10.38%	2.49%	0.15	0.95	16.25%	63.00%	17.10%	-13.70%	37.00%	-38.26%	1000

(1) Ultra Conservative 100 benchmark mix is 60% Treasury Bills and 40% Lehman intermediate Treasury Bonds

(2) Conservative 20 80 benchmark mix is 20% Wilshire 5000, 40% Treasury Bills, 40% Lehman intermediate Treasury Bonds

(3) Balanced 40 60 benchmark mix is 40% Wilshire 5000, 30% Treasury Bills, 30% Lehman intermediate Treasury Bonds

(4) Balanced 60 40 benchmark mix is 60% Wilshire 5000, 20% Treasury Bills, 20% Lehman intermediate Treasury Bonds

(5) Aggressive 80 20 benchmark mix is 80% Wilshire 5000, 10% Treasury Bills, 10% Lehman intermediate Treasury Bonds

(6) Ultra Aggressive 100 benchmark mix is 100% Wilshire 5000

WHICH DOWNSIDE RISK FACTORS ARE USEFUL IN SELECTING MUTUAL FUNDS FROM A FINALIST POOL OF FUNDS, ALL WITH TOP 25% UNIFIED FIDUCIARY MONITORING INDEX® SCORES?

The downside risk analysis lends itself to help select mutual funds with good UFMI® scores. We have found that 85% of funds with a UFMI® score in the selection group (UFMI® 1-25) have a positive Active Sortino Ratio. Although the two calculations are based upon entirely different methodologies, there is a correlation between the UFMI® score and the Active Sortino Ratio as illustrated below.
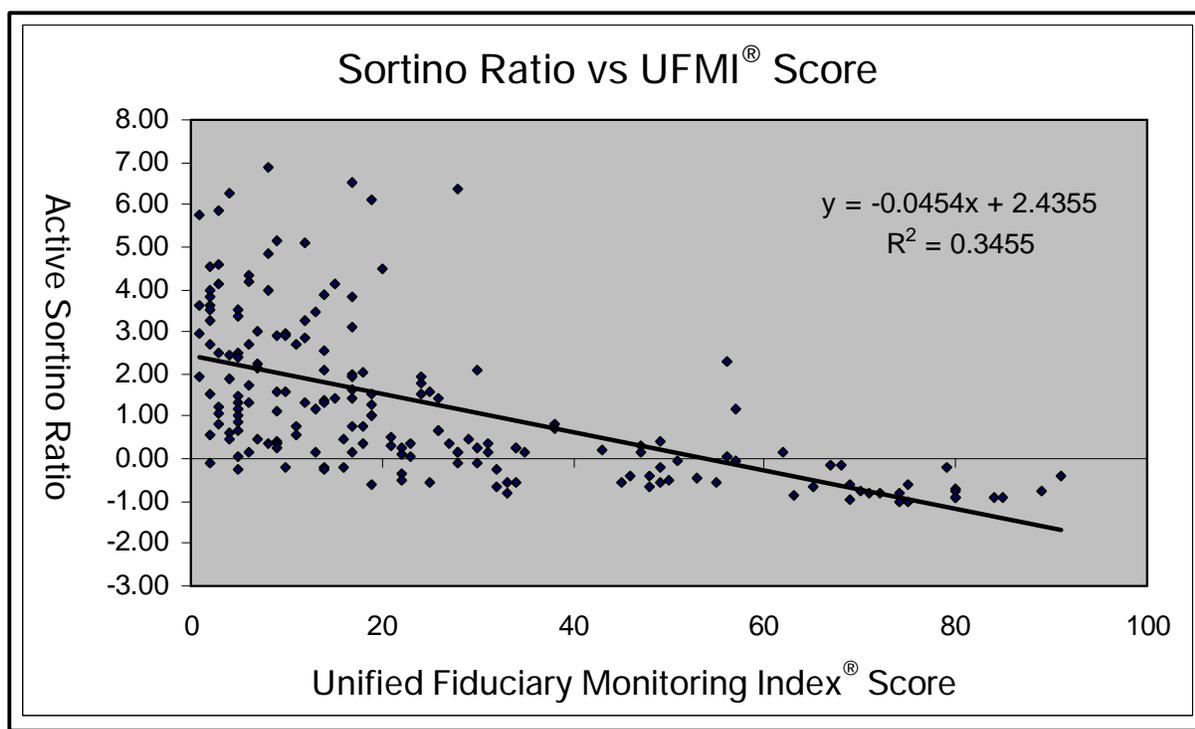
The comparison MAR can be an absolute number, such as 2.50% per quarter, or a relative MAR, such as the peer group performance each quarter. The downside risk and downside probability values will be smaller when the fund is compared to a relative MAR, such as peer group, than to an absolute MAR. We have found the following downside risk attributes to be extremely helpful in further segregating and examining low risk funds with good UFMI® scores.

MAR = Peer Group

Downside Risk < 3.00%

Downside Probability < 30%

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