Improving Risk-Adjusted Returns Using Market-Valuation-Based Tactical Asset Allocation Strategies

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Executive Summary

- Studies examining the value of active management strategies tend to analyze performance within asset classes against narrowly defined benchmarks; there is little research analyzing tactical asset allocation strategies that change allocations *among* asset classes, rather than *within* them.
- The distribution of expected returns and volatility are statistically significantly different at valuation extremes than they are from the general distribution of returns. As a result, the efficient frontier itself can shift because of varying capital market assumptions across different valuation environments, which in turn implies that asset allocations should change as market valuations change.
- A basic market-valuation-based tactical asset allocation strategy that underweights equities (relative to bonds) in overvalued environments, and overweights equities in favorably valued environments, can lead to higher returns and improved risk-adjusted returns.
- The results for improvements in return and risk-adjusted returns hold up on an ex ante analysis and a historical analysis.
- The improved results—comparable to the value of rebalancing—are sustained even when accounting for reasonable tax assumptions, in large part because of the relatively low turnover necessary to achieve improvements through basic tactical asset allocation strategies.

In order to evaluate the effectiveness of active management, its performance must be measured relative to the returns that would have been earned had the active manager not played a role—in other words, a buy-and-hold benchmark. Thus, the ability of the average U.S. large-cap growth fund manager to outperform a large-cap growth index, or the average U.S. small-cap growth fund manager to outperform an appropriate small-cap index, is the center of the discussion. The asset allocation of the portfolio is usually not discussed at all in the context of this performance evaluation; an active manager is evaluated against a relevant single-asset-class benchmark, and a multi-asset-class portfolio is evaluated by its component parts against associated single-asset-class benchmarks. Accordingly, virtually all evaluations of active management are done by measuring a manager who has a narrowly defined scope of available investments against a similarly narrow benchmark.

Defining Value with Tactical Asset Allocation

Tactical asset allocation contends that value may be created not only by trying to generate outperformance within a particular asset class but also by trading across those asset classes. Unlike mutual fund managers, who are often constrained to only invest in a narrow "style box" of potential securities related to a specific asset-class benchmark, active tactical asset allocators often have a wide range of options in choosing the asset classes in their portfolio. The changes to the asset allocation of the portfolio are usually based on opportunistically buying asset classes active managers believe represent good return potential, or selling asset classes with weak return expectations or elevated risk.

As tactical investors incrementally identify opportunities for profit and/or risks to avoid, the asset allocation of the portfolio may incrementally change over time. Skeptics point out that there is little academic evidence that tactical asset allocation actually does earn excess (risk-adjusted) returns for investors. However, many buy-and-hold investors wrongly conclude that prior tracking-error-based studies (for example, Carhart 1997, Bollen and Busse 2004) comparing style-constrained mutual fund manager performance to passive indices to evaluate the persistence of fund manager outperformance are applicable to the debate about buy-and-hold versus tactical investing. In truth, because of the differences in investment strategies and especially in determining an appropriate benchmark, one discussion actually has little to do with the other. As the research currently stands, tactical asset allocation may lack evidence to support its effectiveness (with a few notable exceptions, such as Nawrocki and Evensky 2003), but it has not been clearly proven ineffective, either.

This is complicated by the fact that there seems to be a dearth of tactical asset allocation managers to study in the first place. In a recent paper in response to Roger Ibbotson et al.'s paper "The Equal Importance of Asset Allocation and Active Management," Solow and Kitces (2010) pointed out that as a practical matter the only large universe of tactical managers available for study is found in the hedge fund community. However, even hedge fund managers are often style-constrained as market-neutral, long-short, event-driven, convertible arbitrage, and so on, making it difficult to isolate a portfolio style similar to what would truly be described as tactical asset allocation.

As research by Cremers and Petajisto (2006) has shown, an astonishing number of managers closely hug their underlying benchmark with little "active share" deviations from the benchmark's underlying holdings. And given the way managers are punished for "style drift" away from a specified benchmark in the traditional investment management world, even fewer managers likely contribute any active share by deviating from their multi-asset-class benchmark with changes *among* the asset classes in the portfolio.

From a theoretical basis, a recent study to challenge the effectiveness of tactical asset allocation was David Blanchett's article "Is Buy and Hold Dead? Exploring the Costs of Tactical Reallocation" in the February 2011 *Journal of Financial Planning*, which attempted to advance the discussion about tactical asset allocation versus buy-and-hold investing by posing an interesting question. Blanchett asked how often a tactical asset allocator must correctly select the outperforming asset class (either bond or equity) in order to achieve a similar risk-adjusted return as a static buy-and-hold investor. His study concluded that a tactical investor must guess the winning asset class correctly 66 percent of the time ignoring taxes, and 70 percent of the time considering the impact of taxes, to equal the risk-adjusted return of a buy-and-hold portfolio allocated 50 percent to stocks and 50 percent to bonds. For investors considering active portfolio management, the prospect of having to guess the winning asset class 70 percent of the time must seem daunting. After all, guessing implies a success rate of 50 percent.

The difficulty, though, is that the Blanchett study evaluates active portfolio management in the context of a blind guessing game, which assumes that over every time interval, the investor has absolutely no information about expected returns and volatility beyond an assumption that they will be consistent with their long-term historical average. When future expectations of returns and volatility change from an assumption that the best predictor of the future is to use a *singular* ultra-long-term average of the past, different results begin to emerge.

Moving Beyond a Single Historical Average Return

Active tactical managers cringe at the implication that asset allocation decisions are the result of a blind guessing game. Instead, tactical asset allocators generally believe there are many strategies to actively manage asset allocation based on fundamentally sound approaches to how market prices behave in the real world. Accordingly, though, tactical managers usually reject the idea that asset class returns can be properly forecast using a single group of long-term historical averages of return, standard deviation, and correlation. The past decade is an example in which actual market returns, volatility, and correlations significantly deviated from historical averages for an extended period. Notably, the recent "lost decade" for most equity indices is not an isolated event. There have been four such long-term or secular bear markets since the early 1900s, with unique return, volatility, and correlation characteristics (Solow and Kitces 2006).

Tactical managers believe that many factors affect the future performance of financial markets. Three of the most well-known factors are the economic/market cycle, the behavior of investors, and the valuation of securities or asset classes. Perhaps the most well documented of the three is market valuation. Graham and Dodd were writing about buying securities with a "margin of safety" in their well-known book *Security Analysis* as early as 1934. Yet the notion that there is a cause-and-effect relationship between market value and portfolio performance is completely lost in the traditional approach to buy-and-hold portfolio construction. Using ultra-long-term historical average data for model inputs obliterates the changes in market value that affect portfolio returns over 5-year to 20-year time frames—notwithstanding the fact that those are common time horizons for investors to achieve their goals (or at least to evaluate whether a strategy is helping them achieve their goals).

> "Incorporating a simple factor such as market valuation into a tactical asset allocation process can improve the risk-adjusted returns of client portfolios."

Study Overview

Our study attempts to illustrate how incorporating a simple factor such as market valuation into a tactical asset allocation process can improve the risk-adjusted returns of client portfolios. Instead of presenting active management as a "guessing game" with a 50/50 chance of being right or wrong, we illustrate the benefit of incorporating a simple valuation-rules-based approach to tactical asset allocation, in which the investor increases the portfolio's exposure to equities when markets in the aggregate are inexpensive and reduces it when markets are overpriced relative to historical standards.

This simplified portfolio strategy is not a market-timing exercise that requires investors to make large asset allocation bets based on their analysis of market value. Instead, the portfolio is allocated 80 percent to a core consisting of 40 percent equities and 40 percent bonds (the benchmark), and the remaining 20 percent is tactically and actively reallocated to either stocks or bonds at valuation extremes. This will result in a portfolio that in total is 60 percent stocks and 40 percent bonds when markets are considered inexpensive, 40 percent stocks and 60 percent bonds when markets are considered expensive, and equally weighted (50 percent/50 percent) in all other cases; in essence, the portfolio becomes a 50/50 allocation, +/– 10 percent. Results for more significant asset allocation shifts (+/– 20 percent, +/– 30 percent, etc.) are also shown for context.

The analysis also considers the effect of taxation because of the implied higher turnover of the portfolio with tactical asset allocation shifts. We present this simplified approach as a first step for advisers to further understand some basic tenets of tactical investing:

- Valuation is a useful tool to forecast long-term asset-class returns with a probability of success high enough to aid the risk/return results of the portfolio over relevant long time horizons.
- Tactical asset allocation can be implemented in the context of diversified portfolios.
- Changing the asset allocation of a portfolio to opportunistically take advantage of extreme valuations constitutes "market timing" only in the best sense of the term. Such modest market-timing shifts in this context allow investors to obtain higher returns with lower risk than a buy-and-hold portfolio strategy.
- Tactical asset allocation advantages persist after considering tax costs, especially relative to a portfolio being rebalanced anyway.
- Tactical asset allocation changes at valuation extremes offer investors a high probability of success and do not constitute a "guessing game," but instead simply represent a different way to further break down the same historical data already being used for portfolio construction.

Methodology

Our study is based on a sample of monthly data for U.S. large-cap stocks and U.S government bonds from 1926 to 2010. For stocks we use the S&P Composite time series provided by Robert J. Shiller, professor of economics at Yale University. For bond returns we use the Ibbotson Intermediate Government Bond Total Return Index. At each month-end starting in January 1926 we calculate the five-year normalized price-to-earnings (P/E) ratio for the overall S&P Composite. This is obtained dividing the S&P Composite average price over the most recent month by the average of the preceding 20 quarters (five years) of trailing-four-quarters earnings per share of the S&P Composite itself. No forward earnings estimates are involved. In addition, we use a three-month lag to calculate the P/E ratio (current month-end price divided by five-year normalized earnings for the period ending three months ago). This ensures that only already-reported data are used at each point in time, therefore eliminating any look-ahead bias. This form of five-year normalized P/E ratio is one of the simplest and most commonly used statistics to gauge the cheapness or expensiveness of stocks at a given time; the rationale for using normalized earnings is that annual (and especially quarterly) trailing earnings can experience a significant degree of volatility throughout economic cycles, and taking a longer-term average of earnings should smooth out the cyclical peaks and troughs. (Ten-year normalized P/E ratios were also tested, but five-year normalized is used here because it appeared to

provide more useful predictive power for tactical asset allocation changes and responded slightly more readily to changing economic environments.)

In addition, at each month-end, we calculate the annualized total return for the *subsequent* five-year period for the S&P Composite and the Ibbotson Bond Index (simply referred to as "stocks" and "bonds" hereafter). Five-year returns are used instead of one-year returns because valuation is usually more predictive over intermediate-term time horizons rather than short-term ones, and the goal is to develop an investment strategy appropriate for intermediate- to long-term goals (such as for retirement). Using this valuation data, we break returns into three historical valuation environments: high P/E, middle P/E, and low P/E. We still assume for the time being that the historical average returns, standard deviations, and correlations can be a reasonable estimate of future returns; however, we now evaluate those metrics separately within each unique valuation environment.

Accordingly, the first step of the analysis sorts the monthly data in the sample based on the five-year normalized P/E ratio (simply referred to as "P/E ratio" or "P/E" from this point forward). The sample is then divided into three subsamples, with thresholds at the 10th and 90th P/E ratio percentiles. Thus, the bottom 10 percent of P/E valuations create the "low P/E environment," the top 10 percent are the "high P/E environment," and the remaining 80 percent are the "middle P/E environment." The objective is to obtain estimates of average returns, standard deviations, and correlations for stocks and bonds, determined separately for each of these three P/E environments, to determine whether they are significantly different from each other and from the sample as a whole. The statistical significance will be assessed using a combination of t-tests (for averages), F-tests (for standard deviations), and z-tests (for correlations).

Where results are statistically significantly different, the means, standard deviations, and correlations specific to the P/E environment will be used; where not statistically significant, the environment-specific estimates are discarded and the overall sample results are used. The estimates of average returns, standard deviations, and correlations for the three different P/E environments, obtained as explained above, are used to analyze the performance of a buy-and-hold portfolio as well as various tactical portfolio strategies.

We define the buy-and-hold portfolios as invested 50 percent in stocks and 50 percent in bonds in all P/E environments. The tactical portfolios are defined based on the amount by which they are allowed to deviate from the allocation of the buy-and-hold benchmark portfolio. For instance a +/– 10 percent tactical portfolio is allowed to overweight or underweight stocks/bonds by as much as 10 percent relative to the buy-and-hold benchmark in extreme P/E environments, while still holding the neutral 50/50 portfolio in the 80 percent of scenarios that fall within the middle P/E environment. As a result, such a portfolio would be invested 60 percent in stocks and 40 percent in bonds when overweighting stocks, and 40 percent in stocks and 60 percent in bonds when underweighting stocks. Likewise, a +/– 50 percent tactical portfolio would be invested 100 percent in stocks when overweighting stocks and 100 percent in bonds when underweighting stocks, while remaining at 50/50 in middle P/E environments. The tactical portfolios implemented here are purely rules-based, meaning they will automatically change allocations to the appropriate extent, overweighting stocks and underweighting bonds in every low P/E environment, underweighting stocks and overweighting bonds in every high P/E environment, and holding the equally weighted buy-and-hold benchmark in the remaining middle P/E environments.

The historical returns, standard deviations, and correlations specific to the three different P/E environments are used to analyze the expected performance of the tactical portfolios relative to the buy-and-hold portfolio benchmark. Initially we will calculate the expected return and volatility of a two-asset portfolio to determine the ex ante expected performance of the tactical portfolios; this initial analysis will ignore the impact of transaction costs and taxes. Subsequently, we perform a historical analysis of the performance of each of the tactical portfolio strategies relative to the buy-and-hold portfolio. The historical performance is measured over 660 30-year periods starting at each month-end from January 1926 to December 1980 (therefore ending in November 2010). The 30-year length of the investment period was chosen to replicate the typical holding period of a retirement account. The buy-and-hold portfolio as well as all the tactical portfolios are rebalanced annually, starting 12 months after inception; therefore, the impact of transaction costs on tactical portfolios relative to the buy-and-hold portfolio is assumed negligible (as even the buy-and-hold portfolio will have annual rebalancing transactions). In this version of the analysis, we calculate the results of the tactical and buy-and-hold strategic portfolios using a series of tax-sensitive assumptions as well, to incorporate the impact of taxes on performance and tactical strategies.

P/E Environment Tests and Initial Results

The first step is to test whether a valuation tool such as the P/E ratio can be relied on when forecasting future stock and bond returns different than the long-term average of the overall sample. Table 1 shows the average five-year annualized return, standard deviation, and correlation of stocks and bonds over the entire sample as well as in each P/E environment. Over the entire sample, from 1926 to 2010, stocks and bonds earned average annual returns equal to 11.16 percent and 5.62 percent, respectively, with standard deviations equal to 27.53 percent and 10.24 percent, respectively. The implied Sharpe ratios, assuming a risk-free rate equal to 3 percent, are 0.30 for stocks and 0.26 for bonds. Moreover, the correlation between stocks and bonds was 0.15.

After the overall sample is split into three subsamples based on P/E ratio levels, as described in the previous section, we can see in Table 1 that the historical statistics of the "normal" middle P/E environment most closely resemble the overall sample. We cannot say the same about the two extreme P/E environments.

Table 1: Historical Performance of Different P/E Groups

Entire Sample	Stocks	Bonds
Average Return	11.16%	5.62%
Standard Deviation	27.53%	10.24%
Sharpe Ratio*	0.30	0.26
Correlation	0.15	
Top 10% P/E	**Stocks**	**Bonds**
Average Return	**1.03%**	6.04%
Standard Deviation	**13.22%**	**3.90%**
Sharpe Ratio*	–0.15	0.78
Correlation	0.37	
Middle 80% P/E	**Stocks**	**Bonds**
Average Return	11.14%	5.26%
Standard Deviation	25.50%	**9.25%**
Sharpe Ratio*	0.32	0.24
Correlation	0.09	
Bottom 10% P/E	**Stocks**	**Bonds**
Average Return	**18.69%**	8.00%
Standard Deviation	22.61%	**17.16%**
Sharpe Ratio*	0.69	0.29
Correlation	0.20	

* Assuming a 3% risk-free rate

Historically, in high P/E environments, the subsequent five-year annualized returns for stocks and bonds were 1.03 percent and 6.04 percent, with standard deviations of 13.22 percent and 3.90 percent, respectively. The implied Sharpe ratios are –0.15 for stocks and 0.78 for bonds. It is striking how significantly these numbers differ from the ones in middle P/E environments and the ones in the overall sample. In high P/E environments, stocks appear to significantly underperform bonds on both an absolute (lower average return) and risk-adjusted (lower Sharpe ratio) basis. Moreover, the correlation between stocks and bonds in high P/E environments, measured at 0.37, appears noticeably higher than average, indicating that in high P/E environments diversification may not be as effective at reducing portfolio risk.

On the other hand, in low P/E environments, subsequent five-year annualized returns for stocks and bonds were 18.69 percent and 8.0 percent, with standard deviations of 22.61 percent and 17.16 percent, respectively. The implied Sharpe ratios are 0.69 for stocks and 0.29 for bonds. Therefore, when P/E ratios imply stocks are undervalued, stocks seem to largely outperform bonds on both an absolute (higher returns) and risk-adjusted basis (return relative to standard deviation), and they do so by a larger amount than they do on average. The correlation in this subsample was measured at 0.20.

After estimating average returns, standard deviations, and correlations for stocks and bonds in each P/E environment, we ran a series of tests to determine their statistical significance. Each number coming out of the P/E environment subsamples was tested for being statistically different than its counterparts for other P/E environments and relative to the entire sample. Our tests included a combination of t-tests (for averages), F-tests (for standard deviations), and z-tests (for correlations). A 99 percent confidence level was used for all tests. For obvious reasons we do not report the full-scale test results here for every possible permutation. The highlighted cells in Table 1 indicate which results were statistically significant.

As the highlighted cells reveal, the subsequent five-year annualized stock returns of the high and low P/E environments were statistically distinguishable from each other and from the average stock return on the entire sample with a 99 percent confidence level. Moreover, the lower volatility of stocks in high P/E environments was also statistically significant (ostensibly lower total volatility because there's so little upside!). In the case of bonds, none of the average returns was statistically distinguishable from the average return across all environments, but their respective standard deviations were, which also implies that the differences in Sharpe ratios across environments are meaningful. Overall, these results constitute strong evidence supporting the idea that investors should not expect to earn "average" stock returns (or even risk-adjusted bond returns) at all valuation levels and points in time. In fact, the average stock return an investor can expect to earn over an intermediate time frame (five years) is highly influenced by the valuation environment prevailing at the start of the investment time horizon.

Table 2: Expected Performance

Buy-and-Hold Benchmark				
Stocks (Weight)		**Expected Return**	**Standard Deviation**	**Sharpe Ratio**
50%		8.21%	14.81%	0.352
Tactical Portfolios				
Stocks (Max Weight)	**Stocks (Min Weight)**	**Expected Return**	**Standard Deviation**	**Sharpe Ratio**
60%	40%	8.40%	14.63%	0.369
70%	30%	8.58%	14.72%	0.379
80%	20%	8.77%	14.86%	0.388
90%	10%	8.96%	15.04%	0.396
100%	0%	9.14%	15.28%	0.402

Ex Ante Performance

In this section we use the five-year annualized returns, standard deviations, and correlations for the three different P/E environments to analyze the expected or ex ante performance of the buy-and-hold portfolio as well as the different tactical portfolios defined in the Methodology section. Expected return and variance of a portfolio of two assets, stocks and bonds in our case, can be calculated as follows:

$$E(R_p) = \omega_S E(R_S) + \omega_B E(R_B)$$

$$\sigma_p^2 = \omega_S^2 \sigma_S^2 + \omega_B^2 \sigma_B^2 + 2\omega_S \omega_B \sigma_S \sigma_B \rho_{SB}$$

where E() = expected value operator

R_S, R_B, R_p = stocks, bonds, and portfolio return

ω_S, ω_B = stocks and bonds weight

$\sigma_S^2, \sigma_B^2, \sigma_p^2$ = stocks, bonds, and portfolio variance

ρ_{SB} = correlation of stocks, bonds

In our case, because we have divided the historical sample into three groups based on P/E ratios, we are faced with three separate sets of returns, variances, and correlations of stocks and bonds, one for each P/E environment. In addition, the portfolio weights of the tactical portfolios will differ across P/E environments. Therefore we have to first compute the expected performance of each portfolio in each P/E environment.[1] After we have calculated the expected return and variance of each portfolio in each P/E environment, we calculate overall expected performance (across all P/E environments) of each portfolio as follows:

$$E(R_p) = E(R_{p,LOW})\rho_{LOW} + E(R_{p,MID})\rho_{MID} + E(R_{p,HI})\rho_{HI}$$

$$\sigma_p^2 = \sigma_{p,LOW}^2 \rho_{LOW} + \sigma_{p,MID}^2 \rho_{MID} + \sigma_{p,HI}^2 \rho_{HI}$$

where $\rho_{LOW}, \rho_{MID}, \rho_{HI}$ = probability of occurrence of low, middle, and high P/E environments.

These are weighted averages of the performance in each P/E environment, with the weights being the probability of occurrence of each P/E environment. Because the low and high P/E environments were previously defined as the bottom and top deciles of the overall sample, the probability of occurrence of each of them is 10 percent by construction. This implies a probability of occurrence of middle P/E environments equal to 80 percent.

After we replace the variables in the equations above with the estimated inputs from Table 1, we obtain the results reported in Table 2. The tactical portfolios seem to have an edge over the buy-and-hold portfolio. In fact, all tactical portfolios outperform the buy-and-hold portfolio both in absolute terms (higher expected return) and relative terms (higher Sharpe ratio) when evaluated on this basis. Notably, modest tactical shifts (+/– 10 percent) result in higher returns and reduced standard deviations; only the +/– 30 percent and more extreme tactical portfolios even have a comparable amount of volatility to the buy-and-hold portfolio, but are generating more than 50 basis points of additional return to more than compensate for the higher risk (resulting in superior Sharpe ratios). Please note that these results ignore the impact of taxes (and transaction costs), which are explored further in the next section.

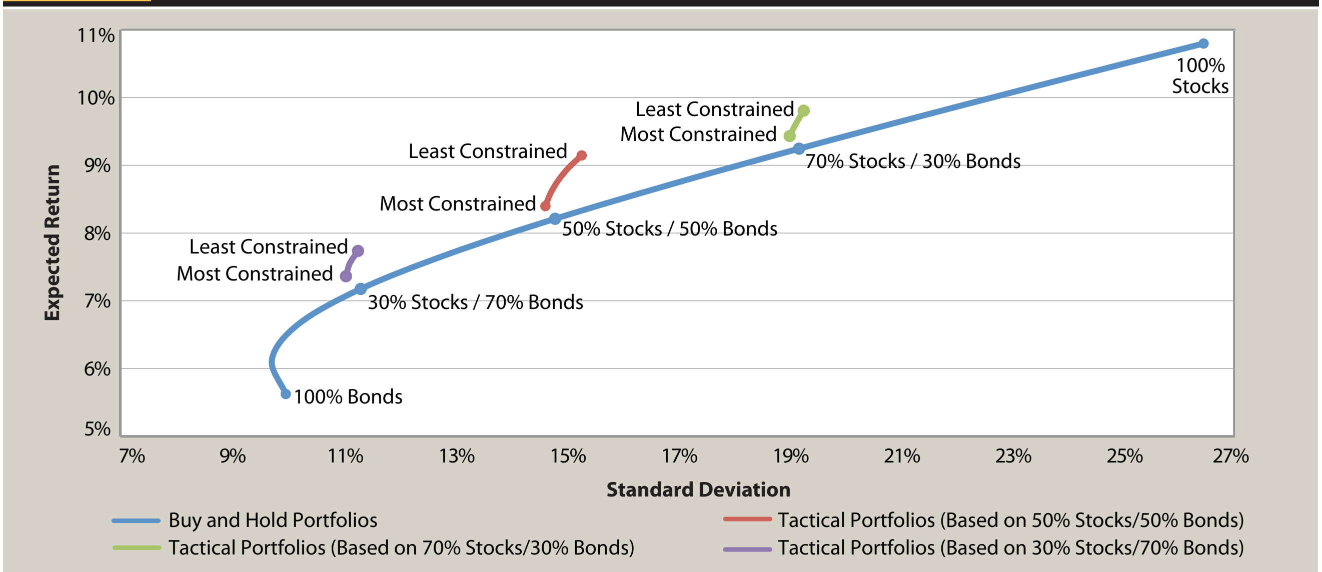
Figure 1 gives a graphical representation of the results by plotting the full range of buy-and-hold portfolios in an efficient frontier chart, and then graphing the tactical portfolios built around a 50/50 benchmark. Notably, the choice of a 50/50 benchmark is arbitrary (albeit one intended to represent a "typical" balanced portfolio), and tactical portfolios can be built around any benchmark. To illustrate this point, Figure 1 also graphs tactical portfolios built around a 30/70 benchmark and a 70/30 benchmark. From Figure 1 it is easily noticeable that all tactical portfolios lie above the buy-and-hold "efficient" frontier, indicating that they offer better risk-return trade-offs over the subsequent five years.

Historical Analysis and Tax Impact Evaluation

We conclude this study with a historical analysis of the performance of the buy-and-hold portfolio and the tactical portfolios defined in previous sections, including an evaluation of the impact of taxation on tactical shifts.

Starting at month-end January 1926, we calculate one-year portfolio returns, using a fixed 50/50 allocation for the buy-and-hold portfolio and purely mechanical rules-based tactical allocation changes, based on the five-year normalized P/E ratio and using different sets of constraints for the tactical portfolios. All portfolios are rebalanced annually, starting 12 months after the inception date. Because the tactical

Figure 1: Expected Efficient Frontier



portfolios have at least some trade with virtually identical frequency as the buy-and-hold portfolio (the buy-and-hold portfolio has an annual rebalancing transaction and the tactical portfolios only change allocations at most once per year), the relative impact of transaction costs are assumed negligible. To evaluate the affect of taxation on transactions, the following assumptions are made:

- Bond returns are taxed as ordinary income annually when earned, assuming a 28 percent tax rate.
- Stock returns are taxed as long-term capital gains, assuming a 15 percent tax rate. Stock returns are only taxed when sold, either because of rebalancing or a tactical portfolio shift.
- Gains on stocks are taxed assuming any sale has a pro-rata portion of the overall cost basis and gains in the portfolio (for example, if the stock portion of the portfolio is up 10 percent, any sale is treated as though it has a pro-rata share of the 10 percent gains and remaining cost basis); cost basis is tracked throughout; any unrecognized gains at the end of the time horizon are assumed liquidated with taxes paid at that time.
- Taxes on fixed-income gains are debited directly against the return for the year; taxes on stock gains are extracted from the stock portfolio (which in turn results in a small incremental amount of additional gain). Losses are assumed to generate a credit for the appropriate tax amount (and based on the tax rates applicable to the investment that generated the loss).
- Rebalancing occurs annually, after all taxes are paid.

Annual returns are ultimately compounded over rolling 30-year periods. The first 30-year period starts January 1926 and finishes December 1955, and the last 30-year period goes from December 1980 to November 2010 (the final full year of our sample data). The same process is repeated using month-end February through December as inception dates for all the portfolios, to eliminate any seasonality bias or sensitivity to the month in which rebalancing and tactical shifts occur. In all cases, rebalancing occurs every 12 months.

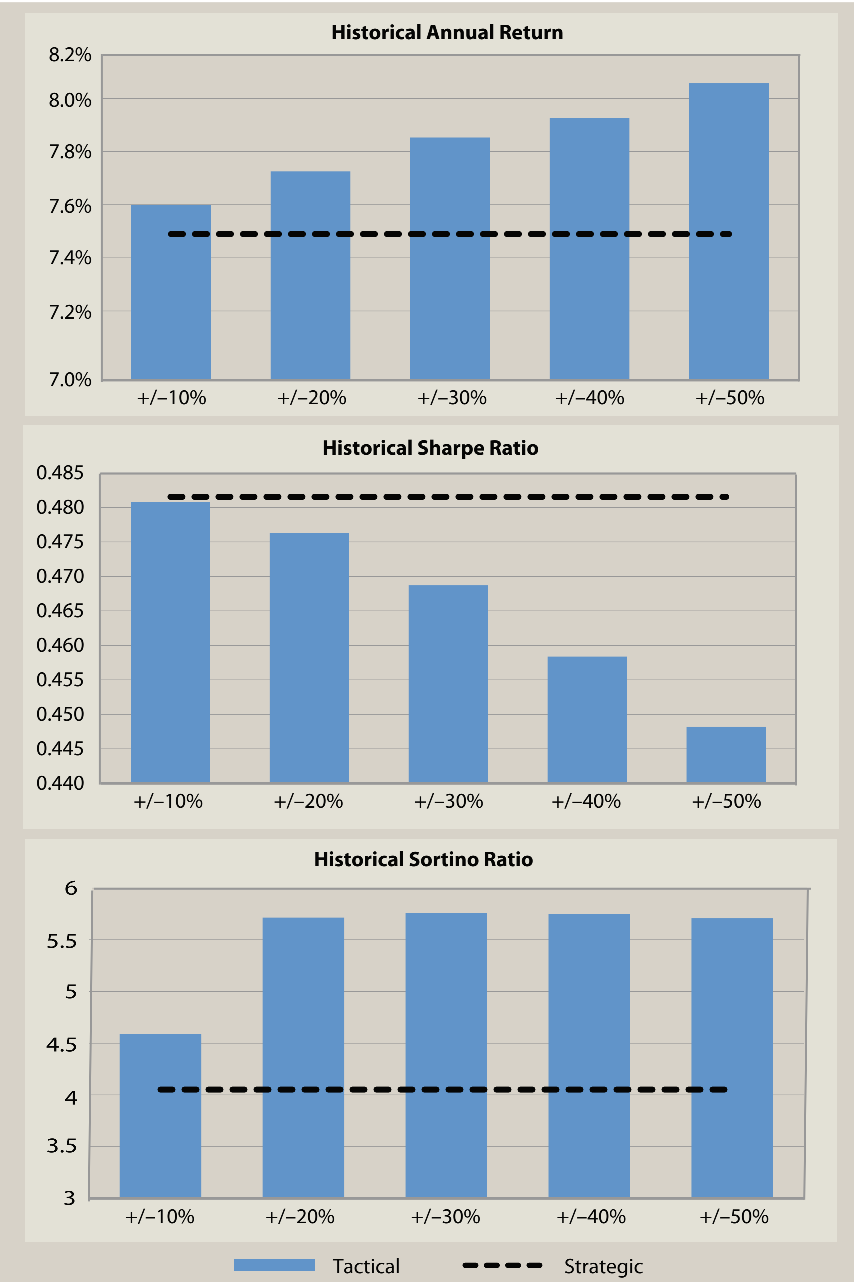
The results we present are average *after-tax* results of all 30-year periods with inception dates from January 1926 through December 1980 (ending November 2010). Please note that we do expect these results to differ from the ones obtained through the ex ante calculations in the previous sections. The reason is twofold: the impact of taxes and the effects of compounding returns over 30-year periods, instead of merely projecting over five-year periods.

Table 3 and Figure 2 report average 30-year annualized return, standard deviation, Sharpe ratio, and Sortino ratio for the 50/50 buy-and-hold portfolio and the differently constrained tactical portfolios. Although a 50/50 buy-and-hold portfolio historically yielded an average 30-year annualized return of 7.48 percent, the tactical portfolios yielded average 30-year annualized returns ranging from 7.59 percent for the most conservative tactical portfolio (+/– 10 percent) to 8.06 percent for the most aggressive tactical portfolio (+/– 50 percent). The average return increases monotonically as the tactical constraints are relaxed. However, such higher returns are not achieved without

Table 3: Average Historical Results

Strategic	Annual Return	Standard Deviation	Sharpe Ratio	Sortino Ratio
50% / 50%	7.48%	9.55%	0.482	4.052
Full Tactical				
+/– 10%	7.59%	9.86%	0.481	4.589
+/– 20%	7.71%	10.24%	0.476	5.714
+/– 30%	7.82%	10.70%	0.469	5.757
+/– 40%	7.93%	11.24%	0.458	5.749
+/– 50%	8.06%	11.83%	0.448	5.708

Figure 2: Comparison of Returns/Ratios for 50/50 Strategic and Tactical Portfolios

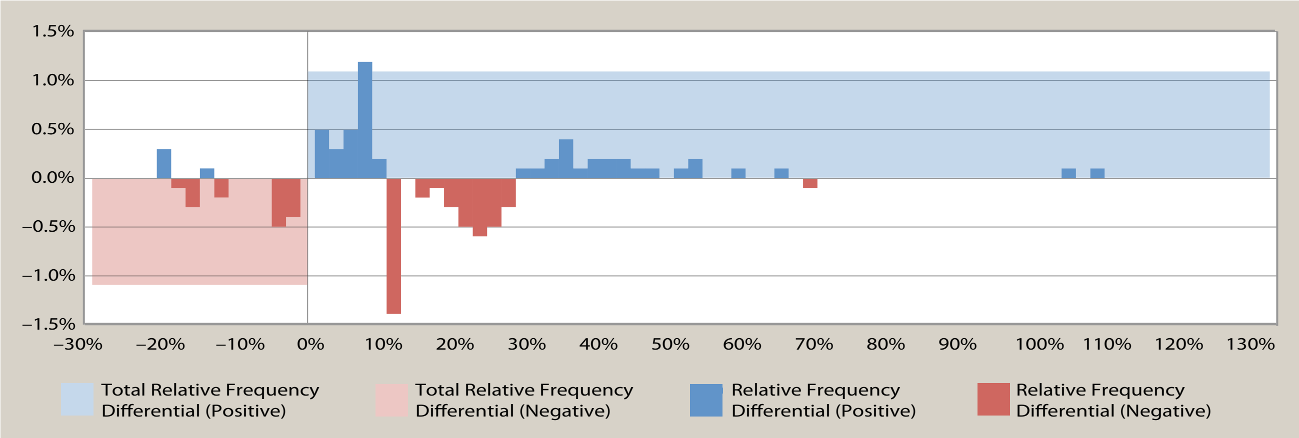


increasing the standard deviation of the portfolios, which was 9.55 percent for the buy-and-hold portfolio and ranged from 9.86 percent to 11.83 percent for the tactical portfolios. Once again, the standard deviation increased monotonically as the portfolios were less tactically constrained. The resulting Sharpe ratio, assuming a risk-free rate of 3 percent, was 0.482 for the buy-and-hold portfolio, but decreased steadily from 0.481 to 0.448 for the more aggressive tactical portfolios, implying that the increased returns were associated with an ever-greater increase in volatility. However, the Sharpe ratio, which is deservedly the most widely used measure of risk-adjusted performance, can produce misleading results when confronted with non-symmetrical distributions of returns. The denominator of the Sharpe ratio, the standard deviation of returns, can be decomposed into downside and upside deviation. For the purposes of this evaluation, the standard deviation of returns may not be the best measure of portfolio risk, as higher returns can cause "increased" volatility, but investors are not necessarily concerned with volatility if it is only to the upside!

In cases in which the definition of risk can be limited to downside deviation, the Sortino ratio may be a better measure of risk-adjusted performance. The Sortino ratio is based on the same concept as the Sharpe ratio (excess return per unit of risk), but uses downside deviation alone as a measure of risk. More precisely, the Sortino measure is calculated as the ratio of return in excess of a user-defined minimum acceptable return (MAR) to downside deviation relative to the same minimum acceptable return. The MAR is typically set to zero, which allows the resulting downside deviation to be interpreted as the risk of incurring losses.

As reported in Table 3, our historical analysis indicates that the Sortino ratios of the tactical portfolios were

Figure 3: Relative Frequency Differential, Tactical (+/–30%) Minus Strategic (50%/50%)



significantly higher than that of the buy-and-hold portfolio. More precisely, although the buy-and-hold portfolio had a Sortino ratio of 4.052, the same measure ranged between 4.589 and 5.708 for the tactical portfolios. In addition, the Sortino ratio of the tactical portfolios did not continue to increase with the aggressiveness of the portfolios. Contrarily, it increased from 4.589 for the +/– 10 percent portfolio up to 5.714 with the +/– 20 percent portfolio; from there, it peaked just slightly higher at 5.757 with the +/– 30 percent portfolio, and then declined very slightly as the tactical portfolios allowed for further deviations. The nearly opposite behavior of Sharpe and Sortino ratios across the different portfolios (rising Sortino ratios with relaxing tactical constraints, while the Sharpe ratio declines) seems to confirm the hypothesis that more tactical portfolios increase volatility by enhancing upside returns even while mitigating downside volatility; the net result may be a total increase in standard deviation (lower Sharpe ratio), but nonetheless a dramatic improvement in managing downside risk while retaining upside growth.

In order to verify whether this is indeed the case with our tactical portfolios, we look for evidence of asymmetry in the historical probability distribution of returns of the buy-and-hold portfolio and the +/– 30 percent tactical portfolio (which had the highest Sortino ratio).

Figure 3 plots the relative frequency differential between the +/– 30 percent tactical portfolio and the 50/50 strategic portfolio for different annual returns, grouped into intervals of 2 percent size. Positive readings (above the zero line on the vertical axis) indicate that the tactical portfolio experienced returns in that specific range more frequently than the buy-and-hold portfolio; vice versa, negative readings (below the line) indicate that the buy-and-hold strategic portfolio experienced returns in that specific range more frequently. For example, the positive reading of 0.40 percent for returns in the 34 percent to 36 percent interval indicates that returns within this interval were 0.40 percent more frequent in the tactical portfolio than in the strategic portfolio. To facilitate the reader, frequencies favoring tactical were colored blue, and returns that were more frequent for strategic portfolios were colored red. The dominance of blue to the right of the 0 percent return line indicates that positive returns (especially those in the 0 percent to 10 percent range and the 30 percent-plus range) occurred more frequently with tactical portfolios; the dominance of red to the left of the zero line indicates that losses occurred far more frequently with strategic portfolios. In addition, the blue-shaded area represents the sum of all readings (both positive and negative) for positive returns (and leans toward tactical portfolios), and the red-shaded area does the same for negative returns (and leans toward strategic portfolios).

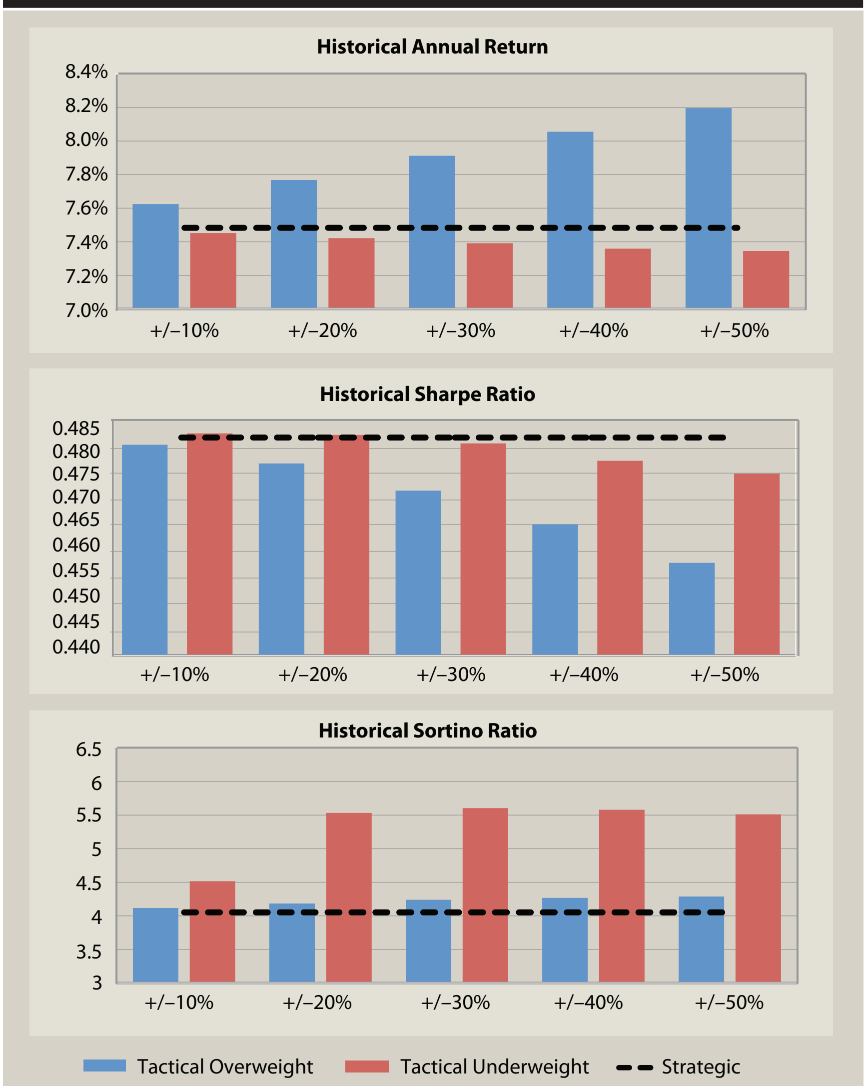
Figure 3 leaves little to interpretation; although the differences are modest (because of the infrequency of trading), overall the positive returns were nearly 1.1 percent more likely to occur in the tactical portfolio (and returns greater than 30 percent were 2.2 percent more likely), but negative returns were nearly 1.1 percent more likely to occur in the strategic portfolio.

Finally, we look at the *skewness*, a measure of asymmetry of probability distributions. Qualitatively, a positive skew indicates that the tail of the right side of the probability density function is longer than the left side, which implies more upside deviations (big returns) than downside deviations (losses). The inverse is true for negative skewness. A skewness of zero is typical of normal distributions and indicates that the distribution is symmetrical around the mean. The skewness of the historical distribution of annual returns of the 50/50 strategic portfolio was 0.15,

Table 4: Average Historical Results

Strategic	Annual Return	Standard Deviation	Sharpe Ratio	Sortino Ratio
50% / 50%	7.48%	9.55%	0.482	4.052
Tactical Overweight				
10%	7.62%	9.93%	0.480	4.118
20%	7.77%	10.36%	0.477	4.184
30%	7.91%	10.85%	0.471	4.239
40%	8.06%	11.38%	0.465	4.268
50%	8.20%	11.95%	0.458	4.288
Tactical Underweight				
–10%	7.45%	9.48%	0.482	4.516
–20%	7.42%	9.42%	0.482	5.533
–30%	7.39%	9.39%	0.480	5.605
–40%	7.36%	9.38%	0.477	5.579
–50%	7.35%	9.39%	0.475	5.512

Figure 4: Effect of Being Overweight/Underweight in Equities in Low/High P/E Environments



indicating a small positive asymmetry. This result is not surprising, as some degree of non-normality in stock returns has been well documented in financial literature. However, the same calculation applied to the tactical portfolios returned values of 1.27 for the +/– 30 percent portfolio and 1.98 for the +/– 50 percent portfolio. Therefore the tactical portfolios historically appear to have a much larger positive skewness of returns than the strategic portfolio, indicating that a large portion of their standard deviation of returns was in fact upside deviation. A larger upside deviation, other things being equal, gives the tactical portfolios a better chance of achieving higher returns; therefore, it should not be considered a risk, but rather a desirable feature of the portfolio, given that the same increased volatility is not seen on the downside.

In order to further investigate the performance of the tactical portfolios, we decided to separately analyze the effect of being overweight equities in low P/E environments from being underweight equities in high P/E environments. By doing this, we wish to find out whether either one contributes disproportionately to the better risk-adjusted performance of the original tactical portfolios, let alone whether either one actually outperforms the original tactical portfolios. Table 4 and Figure 4 report the results for what we call tactical overweight and tactical underweight portfolios and compare them to the results of the usual 50/50 strategic portfolio. Tactical overweight portfolios overweight equities in low P/E environments and stay at benchmark allocation (50/50) in all other cases; they do not underweight high P/E environments. Conversely, tactical underweight portfolios underweight equities in high P/E environments and stay at benchmark allocation the rest of the time. As the results show, using a tactical overweight alone seems to boost average annual returns well above the buy-and-hold portfolio and also above full tactical portfolios (the one using both overweights and underweights). However, the corresponding Sortino ratios constitute only a small improvement from the strategic portfolio, peaking at 4.288 with the 50 percent tactical overweight portfolio. Conversely, using a tactical underweight alone leads to a small decrease in average annual returns, which is more pronounced the more extreme the underweight, but a significant reduction in downside deviations. The corresponding Sortino ratios of tactical underweight portfolios are significantly higher than those of the buy-and-hold portfolio as well as the tactical overweight portfolios, peaking at 5.605 with the –30 percent tactical underweight portfolio. Therefore, underweighting in high P/E environments is the driving enhancement for Sortino ratios (downside risk management), and overweighting in low P/E environments is the driver for increased returns. Nonetheless, the full tactical portfolios that both underweight and overweight appropriately still constitute a superior choice than either case separately and also beat the strategic 50/50 portfolio, which historically had inferior performance to all the tactical portfolios on a risk-adjusted basis.

Results Summary

As the results reveal, tactical strategies are capable of outperforming passive, strategic investment approaches—as long as the tactical decisions are constrained to valuation environments that favor them. Although the tactical shifts do not universally show superior results, they are not intended to be a 100 percent success-rate strategy (nor is rebalancing); the point is simply that, as with rebalancing strategies, by systematically implementing such processes, average results are expected to be improved, including higher returns and reduced downside volatility. In fact, the magnitude of results—50–100 basis points of outperformance for the +/– 10 percent up to +/– 30 percent tactical strategies over and above the rebalanced buy-and-hold portfolio—is itself comparable to the value of ongoing rebalancing versus no rebalancing at all, estimated by Daryanani (2008) (although Daryanani's research did not evaluate risk-adjusted returns).

The tactical approach in this context represents a significant departure from research studies such as Blanchett (2011) that implicitly assume tactical investors simply make "random" decisions about when to overweight or underweight stocks and therefore must rely on chance and luck. Instead, as the research here shows, measures like valuation (for example, five-year normalized P/E ratio) provide a statistically significant and meaningful framework to parse the same long-term historical results into a series of subsets that each have their own unique characteristics. Given that different P/E environments have different prospective returns, investors can better understand when the risk/return characteristics of stocks are appealing relative to bonds and make shifts accordingly.

Although more active trading via tactical asset allocation also increases turnover and therefore current taxation, such impact is relatively minimal in the tactical allocation scenarios illustrated here because of the relatively few trades actually involved—as trades only occur annually and at the 10th and 90th percentiles, the strategies on average only produce two (fairly modest-sized) overweighting or underweighting shifts every decade—and the fairly modest size of a typical trade. To say the least, the results shown here—all net of taxes—still reflect superior outcomes despite any increase in frequency of tax liabilities and turnover associated with tactical shifts. On the other hand, even tactical portfolios that make large shifts—for example, +/– 50 percent—still generate superior performance, even on a tax-adjusted basis. However, as the earlier results showed, the relative value of increasingly large tactical shifts begins to diminish; most of the increase in value for the strategy (as measured by Sharpe and Sortino ratios) comes by the time tactical shifts reach approximately +/– 20 percent.

"The results shown here—all net of taxes—still reflect superior outcomes despite any increase in frequency of tax liabilities and turnover associated with tactical shifts."

Future Research

The results of this study introduce numerous potential lines of additional research. Varying thresholds of P/E environments for making tactical shifts may be explored. Relative adjustments among more asset classes than just the two-asset-class model examined here can be tested. Valuation measures specific to various asset classes, such as yield levels for fixed income, capitalization rates for real estate, etc., could be explored. Overall, the framework in this paper for triggering overweight and underweight shifts is intended to demonstrate that such tactical adjustments can be done

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on a reliable basis over time to generate value; it is not meant to imply that further fine-tuning could not advance risk-adjusted returns even further.

Another line of inquiry would extend this tactical asset allocation research into its impact on the sustainability of retirement income withdrawals. To the extent tactical asset allocation provides not just higher returns but better risk-adjusted returns, there is potential that tactical strategies may not only enhance portfolio results but sustainable safe withdrawal rates as well (Kitces 2009).

Lastly, the authors wish to emphasize that market valuation is but one methodology that can be considered to tactically change the asset allocation of the portfolio. Changes in the market cycle and in the behavior of market participants and their impact on subsequent market movements are fruitful areas of future study.

JFP

Endnote

1. For instance, the formulas below are used to calculate expected return and variance of a given portfolio in a low P/E environment:

$$E(R_{P,LOW}) = \omega_{S,LOW} E(R_{S,LOW}) + \omega_{B,LOW} E(R_{B,LOW})$$

$$\sigma^2_{P,LOW} = \omega^2_{S,LOW}\sigma^2_{S,LOW} + \omega^2_{B,LOW}\sigma^2_{B,LOW} + 2\omega_{S,LOW}\omega_{B,LOW}\sigma_{S,LOW}\sigma_{B,LOW}\rho_{SB,LOW}$$

where $R_{S,LOW}, R_{B,LOW}, R_{P,LOW}$ = stocks, bonds, and portfolio return in low P/E environments

$\omega_{S,LOW}, \omega_{B,LOW}$ = stocks and bonds weight in low P/E environments

$\sigma^2_{S,LOW}, \sigma^2_{B,LOW}, \sigma^2_{P,LOW}$ = stocks, bonds, and portfolio variance in low P/E environments

$\rho_{SB,LOW}$ = correlation of stocks, bonds in low P/E environments

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