Adaptive Asset Allocation Policies

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Abstract

Many institutional and individual investors have an asset allocation policy that calls for investing a specified percentage of the total value of a portfolio in each of several asset classes. To conform with such a policy as market values change requires selling assets that performed relatively well and buying those that performed relatively poorly. Such a strategy is clearly contrarian and can only be followed by a minority of investors. In practice, many investors seldom rebalance completely to conform with their policy. On the other hand, many multi-asset mutual funds, increasingly used in defined contribution plans, do so frequently, resulting in contrarian behavior. This paper presents an alternative approach, in which an asset allocation policy adapts as markets move, taking into account changes in the outstanding market values of major asset classes. Such policies can take important information into account, reduce or avoid contrarian behavior and could be followed by a majority of investors.

Overview

The Third Edition of the CFA Institute's book on Managing Investment Portfolios states that:

> "… strategic asset allocation can be viewed as a process with certain well-defined steps. Performing those steps produces a set of portfolio weights for asset classes; we call this set of weights the strategic asset allocation (or the *policy portfolio*)." [2]

This is a paper about such *asset allocation policies*.

I begin by describing traditional policies and provide three examples of mutual funds that have such policies and appear to conform closely to them. I then show that these actions are inherently contrarian in nature and that it is impossible for a majority of investors to follow such policies. This may seem surprising, given the ubiquity of such asset

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[2] Maginn, Tuttle, Pinto and McLeavey, 2007, p. 231

allocation policies. The apparent paradox is resolved by noting that many organizations and individuals fail to adhere to their policies when markets change.

Next, I argue that for many investors, it may be undesirable to follow a traditional asset allocation policy by frequently rebalancing portfolio holdings to regain the specified asset weights. While this may comfort those who rarely rebalance their portfolios, it raises concerns about those who make frequent trades to maintain an allocation that conforms with stated policy, as do many multi-asset retail mutual funds.

To show the likely magnitude of the problems with traditional asset allocation policies, I analyze the relative market values of bonds and stocks in the United States over the last thirty years. The variation has been substantial. This implies, for example, that a purportedly medium-risk asset allocation policy would have varied from having the same risk as the portfolio of the average investor to being more aggressive than such a portfolio at some times and more conservative at others.

Next, I consider two non-traditional ways to set asset allocation policy. Key to both methods is the use of the current market values of the outstanding securities in each asset class -- information which I argue should be incorporated whenever an asset allocation is chosen. The first method relies on both optimization and reverse optimization procedures. It is more sophisticated but requires significant analyses from period to period. The second approach, which I term an *Adaptive Asset Allocation Policy*, is simple, easy to execute and can be readily adopted by organizations with pre-existing traditional asset allocation policies.

To illustrate, I show how institutional investors, investment advisors, balanced mutual funds and target-date funds can adopt and follow adaptive asset allocation policies. In most cases this will provide guidelines that are more consistent with their stated goals and objectives. For simplicity I employ examples involving only two asset classes but the procedures can be utilized with as many asset classes as desired.

Finally, I briefly describe several desirable products and services not currently offered by index providers and investment companies – products that would explicitly take current asset market values into account. If the arguments in this paper have merit, investors would be well served if the industry responded by providing such services and investment products.

Traditional Asset Allocation Policies

The March 2009 California Public Employee's Retirement System Asset Allocation Report[3] provides the example of a traditional asset allocation policy shown in Table 1.

[3] CalPERS, 2009

Table 1
CalPERS Asset Allocation Policy, March 2009

Asset Class	***Policy Target***
Global Equity	66 %
Global Fixed Income	19 %
Inflation-linked Assets	5%
Real Estate	10 %
Cash	0 %

A key feature is that the policy target for each asset class is stated as a *percent of the total value* of the fund with each of the asset targets between 0% and 100%. This is virtually always the manner in which an asset allocation policy is stated. I use the term "traditional" for such a policy, to differentiate it from the adaptive policies described later.

A typical large institutional investor sets an asset allocation policy after considerable analysis, changing it only episodically. In this case:

> "CalPERS follows a strategic asset allocation policy that identifies the percentage of funds to be invested in each asset class. Policy targets are typically implemented over a period of several years …"

To accommodate disparities between policy proportions and actual portfolio holdings, most traditional asset allocation policies include acceptable ranges around each target weight within which the magnitude of the asset class in question is allowed to vary. For some investors the deviations can become substantial. At the end of March, 2009 the proportions actually held by CalPERS differed substantially from its policy target (adopted in the latter part of 2007 but still in effect at the time), as shown in Table 2[4]:

Table 2
CalPERS Target and Actual Asset Allocations, March 2009

Asset Class	***Policy Target***	***Current***	***Current - Target***
Global Equity	66 %	53.5 %	- 12.5 %
Global Fixed Income	19 %	25.2 %	+ 6.2 %
Inflation-Linked Assets	5 %	2.5 %	- 2.5 %
Real Estate	10 %	11.4 %	+ 1.4 %
Cash	0 %	7.3 %	+ 7.3 %

To restore the portfolio to conform with the asset allocation policy, CalPERS would have had to sell some of the current holdings in three asset classes (Global Fixed Income, Real Estate and Cash) and purchase additional amounts of two others (Global Equity and Inflation-Linked Assets). This was not done immediately, however, since a new asset allocation policy was being considered by the board at the time.

[4] CalPERS 2009

While statistics are lacking, it appears that most large pension funds, endowments and foundations have traditional asset allocation policies. In many cases considerable discrepancies may be allowed to develop between policy and actual asset proportions. While some funds may actively rebalance holdings to avoid substantial discrepancies, others allow the proportions to change with market moves, then revisit their asset allocation policies when differences between actual and policy weights become large. It appears that relatively few institutional investors engage in what some would term "slavish" adherence to a set of policy asset weights by engaging in frequent rebalancing transactions.

The majority of multi-asset mutual funds also have traditional asset allocation policies. However, unlike many institutional investors, many such mutual funds allow only relatively small deviations of the actual asset proportions from those specified in their policy.

Many individual investors invest some or all of their retirement savings in multi-asset mutual funds, either directly or through a 401(k) or other type of retirement plan. Under the Pension Protection Act of 2006, the U.S. Department of Labor[5] has included only two types of mutual or collective funds as "Qualified Default Investment Alternatives": *Balanced* (sometimes termed *life-stage*) and *Target-date* (sometimes termed *life-cycle*) funds.[6] At the end of December 2008, 9.1% of the 1.084 trillion dollars invested in mutual funds offered by the top 25 providers of such funds to 401(k) plans was invested in Balanced or Asset Allocation Funds and 8.9% in Target-date funds[7].

To illustrate, I provide an example of each type of fund.

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[5] United States Department of Labor, 2009

[6] More specifically, the regulation provides for four types of QDIAs:

"A product with a mix of investments that takes into account the individual's age or retirement date (an example of such a product could be a life-cycle or targeted-retirement-date fund);

An investment service that allocates contributions among existing plan options to provide an asset mix that takes into account the individual's age or retirement date (an example of such a service could be a professionally-managed account);

A product with a mix of investments that takes into account the characteristics of the group of employees as a whole, rather than each individual (an example of such a product could be a balanced fund); and

A capital preservation product for only the first 120 days of participation (an option for plan sponsors wishing to simplify administration if workers opt-out of participation before incurring an additional tax)."

In addition, investments in stable value funds made prior to the date of the final regulation may be retained but there is no relief for future contributions to such account.

[7] Pensions and Investments, 2009, pp. 11,14.

Vanguard Balanced Index

The Vanguard Balanced Index Fund, with $7.5 billion under management in April 2009, "… seeks—with 60% of its assets— to track the investment performance of a benchmark index that measures the investment return of the overall U.S. stock market. With 40% of its assets, the fund seeks to track the investment performance of a broad, market-weighted bond index." It compares its returns with those of a benchmark with 60% invested in the MSCI US Broad Market Index and 40% in Barclay's Capital U.S. Aggregate Bond Index. Over the 36 months ending in March 2009, the R-squared value for a comparison of the fund's returns with that of the benchmark was 1.00 (to two decimal places), indicating close conformance of the asset proportions with the 60/40 policy[8].

Fidelity Freedom 2020 Fund

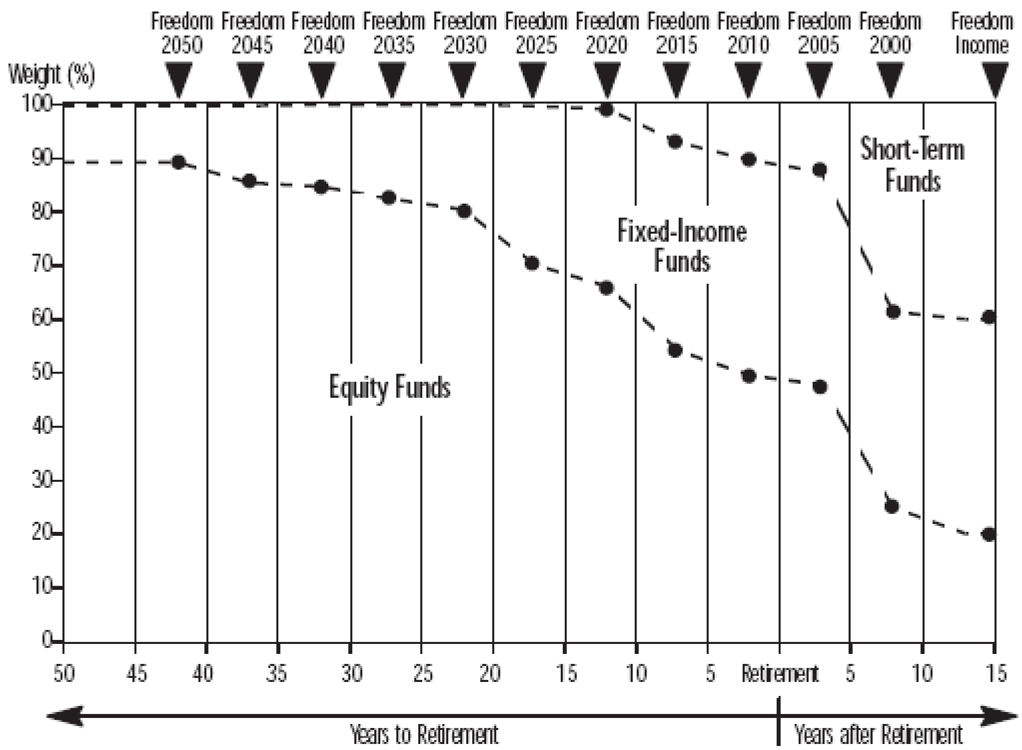
Fidelity offers a series of Target-date funds. Of these, the Fidelity Freedom 2020 was the one most used by Defined Contribution Plans, with assets from such plans of over $12 billion at the end of December, 2008[9]. The next six funds in order of total assets in Defined Contributions plans were Fidelity Freedom funds with other target dates.

[8] Vanguard Balanced Index, 2009
[9] Pensions and Investments, 2009, p. 12

An excerpt from the 2008 prospectus[10] for the family of funds is instructive:

> "The following chart [Figure 1, below] illustrates each Freedom Fund's approximate asset allocation among equity, fixed-income, and short-term funds as of March 31, 2008. The chart also illustrates how these allocations may change over time. The Freedom Funds' target asset allocations may differ from this illustration."

Figure 1
Fidelity Freedom Funds Asset Allocation



Moreover, the fund's adviser "…intends to manage each Freedom Fund according to its target asset allocation strategy, and does not intend to trade actively among underlying Fidelity funds or intend to attempt to capture short-term market opportunities. However, [it] … may modify the target asset allocation strategy for any Freedom Fund and modify the selection of underlying Fidelity funds for any Freedom Fund from time to time[11]."

[10] Supplement to the Fidelity Freedom Funds Prospectus, 2008, p. 40

[11] Supplement to the Fidelity Freedom Funds Prospectus, 2008, p. 41

A comparison of the allocation for the 2020 fund at the end of March 2008[12] with that at the end of March, 2009[13] is shown in Table 3.

Table 3
Fidelity Freedom 2020 Asset Allocations, 2008 and 2009

Asset	***Actual March 31, 2008***	***Actual March 31, 2009***
U.S. Equity	52.6 %	52.1 %
Non-U.S. Equity	13.7 %	12.9 %
Investment Grade Fixed Income	25.5 %	26.1 %
High-Yield Fixed Income	7.6 %	7.6 %
Short-term Funds	0.6 %	1.3 %

As intended, over the course of the year, the percentage of value invested in equity had fallen, providing overall asset allocations extremely close to those called for by the "glide path" shown in Figure 1.

While these funds provide only examples, their activities suggest that many active and passive multi-asset mutual funds choose to significantly rebalance their holdings after major market moves in order to minimize differences between actual and policy asset allocations. Funds that do so follow traditional asset allocation policies, with balanced funds rebalancing to conform with a constant asset allocation through time, and target-date funds rebalancing to conform with an asset allocation that varies slowly over time as called for by a pre-specified glide path.

The Contrarian Nature of Traditional Asset Allocation Strategies

The term *contrarian* is used in many contexts. Closest to the meaning I shall give it is that provided by Investopedia:

> "An investment style that goes against prevailing market trends by buying assets that are performing poorly and [then] selling when they perform well"[14]

For the purposes of this paper, I consider an investor to be a contrarian if he or she (or it) buys assets that perform poorly relative to the other assets in the portfolio and sells assets that perform well relative to the others.

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[12] Supplement to Fidelity Freedom Funds Prospectus, 2008 p. 11

[13] Fidelity Freedom 2020 Fund Composition, 2009

[14] Investopedia, 2009.

Consider an investor who attempts to keep the actual asset percentages of a portfolio consistent with a stated asset allocation policy. I will define such a strategy as one that *follows an asset allocation policy,* rebalancing a portfolio frequently to conform with a pre-specified set of asset proportional values.

More specifically, assume that an investor rebalances a portfolio to a stated set of asset proportions at the end of every review period (for example, each month or quarter). There are *n* asset classes. Let the dollar amounts invested initially in the assets be $X_{1,..}X_n$. The initial value of the portfolio is:

$$(1) \qquad V_0 = \sum_i X_i$$

and the initial asset proportions are:

$$(2) \qquad X_1/V_0,...,X_n/V_0$$

I assume that these are equal to the investor's asset allocation policy proportions.

Now imagine that a period has passed and that the *value-relative* for asset *i* (the ratio of the ending value to beginning value) is k_i. The new dollar values of the assets will be:

$$(3) \qquad k_1X_1,....,k_nX_n$$

The ending value of the portfolio will be:

$$(4) \qquad V_1 = \sum_i k_iX_i$$

and the new asset proportions will be:

$$(5) \qquad k_1X_1/V_1,...,k_nX_n/V_1$$

Denote the value-relative for the portfolio K_p:

$$(6) \qquad K_P \equiv V_1/V_0$$

Now assume that the investor wishes to purchase and sell securities in amounts that will make the new asset proportions equal the initial policy proportions. Let $D_{1,,,}D_n$ represent the dollar amounts of the assets purchased (if positive) or sold (if negative). The goal is to select a set of positive, negative and possibly zero values for $D_{1,,,}D_n$ such that:

$$(7) \qquad \frac{k_iX_i + D_i}{V_1} = \frac{X_i}{V_0} \quad \text{for every asset i.}$$

This requires that:

(8) $D_i = (K_p - k_i)X_i$

Also of interest is the amount of an asset purchased as a proportion of the value before the transaction. Denoting this as Y_i:

(9) $Y_i \equiv \frac{D_i}{k_i X_i} = \frac{K_p}{k_i} - 1$

If an asset underperformed the portfolio as a whole, $(K_p - k_i)$ will be positive. As the formula shows, the investor will purchase the asset, since D_i will be positive. Such assets are *relative losers*. Moreover, the poorer such an asset's performance (that is, the smaller its value-relative k_i), the greater will be Y_i, the amount purchased, as a percentage of the current holding.

Conversely, if an asset outperformed the portfolio as a whole, $(K_p - k_i)$ will be negative. The investor will sell the asset, since D_i will be negative. Such assets are *relative winners*. Moreover, the better such an asset's performance (the larger its value-relative k_i) the greater will be Y_i, the amount sold as a percentage of the current holding.

In this setting there is no doubt that an investor who follows an asset allocation policy is a contrarian. To repeat the obvious:

> *Rebalancing a portfolio to a previously-set asset allocation policy involves selling relative winners and buying relative losers*[15].

Contrarians All?

If I wish to buy a security, someone must sell it to me. If I wish to sell a security, someone must buy it. Anyone who rebalances a portfolio to conform with an asset allocation policy must trade. With whom can he or she transact?

From time to time, firms and other entities issue new securities and purchase or redeem existing ones. But most security transactions involve trades of existing securities between

[15] This is true under the assumption made throughout the paper that no asset proportions are negative. Funds with policies involving negative proportions (for example, leverage) may buy relative winners and sell relative losers. For example, consider a fund with a policy of investing 150% in stocks and -50% in short-term bonds (loans). Assume that the initial position is $150 in stocks and -$50 in bonds, giving a net worth of $100. If the value of the stock portfolio doubles, the new position will equal $300 in stocks and -$50 in bonds, giving a net worth of $250. The new proportions will be 120% in stocks and -20% in bonds. To restore the fund to its policy proportions will require purchasing more stocks and selling more bonds (that is, borrowing more money). Such a fund will thus purchase relative winners and sell relative losers.

two investors. This raises the obvious question: Can all investors be contrarians? The answer is no.

I illustrate with a simple example. There are four investors, each of whom follows an asset allocation policy with positive proportions of four asset classes, although the proportions differ. A period has passed, and the assets have performed differently. In the table below the assets are numbered in terms of their performance (thus $k_1>k_2>k_3>k_4$). The investors differ in their initial allocations and hence have different overall portfolio returns (K_p values). Each investor wishes to make transactions to rebalance to his or her asset allocation policy. In Table 4, a minus sign indicates an asset to be sold and a plus sign one to be purchased. The final columns show the number of investors wishing to sell an asset, the number wishing to buy and the difference between the two.

Table 4
Asset Allocation Trades for Four Investors

Assets in decreasing order of return	***Investor A***	***Investor B***	***Investor C***	***Investor D***	***Number of Sellers***	***Number of Buyers***	***Net Number of Sellers***
1	-	-	-	-	4	0	4
2	-	-	-	+	3	1	2
3	+	+	-	+	1	3	-2
4	+	+	+	+	0	4	-4

Since every investor holds the best-performing asset, every portfolio return will be below its return. Hence, every investor will wish to sell shares of asset 1. Conversely, every portfolio return will be greater than the return of the worst-performing asset, so every investor will wish to buy shares of asset 4. With regard to the best and worst-performing assets, every investor is indeed a contrarian and the group as a whole must find some investors who do not follow asset allocation policies with whom to trade.

Note that in each investor's column, minus (sell) signs come first, followed by plus (purchase) signs. This must be the case, since each investor will wish to sell all assets with performance (k_i) greater than that of his or her portfolio (Kp). However, investor asset allocations differ, as will portfolio returns, so the points at which minus signs stop and plus signs begin will vary. This leads to a key characteristic of the final column. The net number of sellers (number of sellers – number of buyers) will be smaller, the poorer an asset's performance.

To keep the example simple, I have assumed that each investor's portfolio performance differs from that of each asset. However, this need not be the case. If an asset's performance equals that of an investor's portfolio, he or she will not wish to buy or sell shares in it – a situation that could be represented with a zero in the table.

Another modification could be made to increase the realism of the example. Some investors may have an asset allocation policy that calls for zero exposure to one or more assets. This could also be represented with a zero in the table, since no trades will be required.

Taking such possibilities into account would modify the characteristics of the table only slightly. The net number of sellers will either decrease or stay the same, the lower an asset's performance.

It is important to not read too much into this result. While the net *number* of sellers will not increase the lower an asset's return, the difference between the *dollar value* of shares offered for sale and the dollar value of shares desired to be purchased by the group of investors following asset allocation policies may not have this characteristic, due to differences in the values of an asset's holding across portfolios. Put somewhat differently, the relationship between (1) the net number of shares offered and (2) asset return may be not be completely monotonic, especially for assets with returns close to that of the overall market.

Despite this caveat, it remains true that those attempting to rebalance to asset allocation policies will, as a group wish to sell shares of the best-performing asset and purchase shares of the worst-performing asset. This alone leads to two conclusions that should seem obvious at this point:

It is impossible for all investors to be contrarians

Thus:

It is impossible for all investors to follow traditional asset allocation policies[16]

More pragmatically, for a large number of investors to be able to follow traditional asset allocation policies, it is necessary that a large number of other investors be willing to take the other sides of the requisite trades. Investors in the latter group will have to purchase assets that have performed well (relative winners) and sell assets that have performed poorly (relative losers). As I will discuss below, such a strategy will prove superior if security price trends persist; therefore investors who do this are often termed *trend-followers*. To oversimplify, for every contrarian there must be a trend-follower. Not only is it impossible for all investors to follow contrarian strategies, it is impossible for those with a majority of capital assets to do so.

It is easy to identify investors with traditional asset allocation policies. As indicated earlier, there are many. But it is harder to identify investors with trend-following policies. This raises the more practical question: how many investors can in fact follow an asset allocation policy? The answer might well be relatively few. While many investors have asset allocation policies, it may be that relatively few actually follow them by rebalancing their portfolios frequently. As suggested earlier, multi-asset mutual funds appear to represent major exceptions, rebalancing their portfolios frequently by buying relative losers and selling relative winners.

Why a Contrarian Strategy?

Why might an investor wish to adopt a contrarian strategy? There are two major possibilities. The investor might believe that markets are *efficient* and that the preferences and/or positions of the ultimate beneficiary or beneficiaries of a fund differ sufficiently from those of the average investor to warrant such a strategy. Alternatively, the investor might believe that markets are *inefficient* and that the majority of investors do not realize that a contrarian strategy can provide a better combination of risk and return than available using conventional or trend-following strategies.

[16] With non-negative asset proportions.

Efficient Market Views

A key relationship between market returns and the performance of different asset allocation policies was shown by Perold and Sharpe.[17] They compared the payoffs provided by following a traditional asset allocation policy with those obtained by following a buy-and-hold strategy. Assuming investment in two asset classes (bills and stocks), they defined define *constant-mix strategies* as those that "maintain an exposure to stocks that is a constant proportion of wealth." and noted that "In general, rebalancing to a constant mix requires the purchase of stocks as they fall in value … and the sale of stocks as they rise in value … where, strictly speaking, changes in value are measured in relative terms."

Perold and Sharpe showed that the desirability of rebalancing to constant proportions of wealth depends on the movements of market prices:

> "In general, a strategy that buys stocks as they fall and sells as they rise will capitalize on reversals. The marginal purchase decisions will turn out to be good ones, as will the marginal sell decisions. A constant-mix strategy will thus outperform a comparable buy-and-hold strategy in a flat (but oscillating) market precisely because it trades in a way that exploits reversals." On the other hand, ".. a constant-mix approach will underperform a comparable buy-and-hold strategy when there are no reversals. This will also be the case in strong bull or bear markets when reversals are small and relatively infrequent, because most of the marginal purchase and sell decisions will turn out to have been poorly timed…
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> Cases in which the market ends up near its starting point are likely to favor constant-mix strategies, while those in which the market ends up far from its starting point are likely to favor buy-and-hold strategies…Neither strategy dominates the other. A constant-mix policy tends to be superior if markets are characterized more by reversals than trends. A buy-and-hold policy tends to be superior if there is a major move in one direction.[18]"
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> "Ultimately, the issue concerns the preferences of the various parties that will bear the risk and/or enjoy the reward from investment. There is no reason to believe that any particular type of dynamic strategy is best for everyone (and, in fact, only buy-and-hold strategies could be followed by everyone.)[19]"

[17] Perold and Sharpe, p. 151
[18] Perold and Sharpe, p. 154
[19] Perold and Sharpe, p. 158

Roughly speaking, an efficient market view holds that an investor is best served by adopting the average opinion of investors about the probabilities of possible future combinations of returns. Among investors who accept this premise, the return distribution associated with a rebalancing strategy will appeal to only a minority, with another group of investors taking the other sides of the rebalancing trades of the first group. Absent superior knowledge about the return-generating process, an investor should follow a traditional asset allocation policy only if he or she is less concerned than the average investor about inferior returns in very bad or very good markets. It seems unlikely that this describes the typical small investor, for whom most balanced and target-date funds are designed.

From late 2007 through early 2009, returns on stock markets around the world were dismal, with many markets posting losses of 50% or more in real terms. Sobered by these results, some analysts changed their assumptions about stock returns. In some cases, positive serial correlations of returns were assumed. This increased the probabilities of trends and hence extreme long-term returns. In other cases, some other process was included to provide a distribution with a "fat left tail", increasing the probabilities of large negative returns. Some analysts included both features in their models. In models with such assumptions, extreme markets are more likely, making traditional asset allocation policies even less appropriate for funds designed for small investors.

Inefficient Market Views

Many advocates of rebalancing rationalize their position with an assumption that markets are not efficient and that other investors with whom they can trade do not fully understand the nature of asset returns.

An example is provided by the view taken by Arnott and Lovell in the second edition of the CFA Institute book on Managing Investment Portfolios:

> "How many investors permit their asset mix to drift with the whims of the markets (assuring overweighting at market highs and underweighting at the lows). … Simple rebalancing can provide the necessary measure of control over a drifting mix. It is worthwhile if properly managed."[20]

Note the references to "market highs … and lows". The statement suggests that one can tell when an asset is at its market high or low before the fact – hardly an efficient market concept.

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[20] Arnott and Lovell, 1990

In the third edition of this book, the authors of the section on Monitoring and Rebalancing (Arnott, Burns, Plaxo and Moore) take a more nuanced approach. However, there is still a suggestion that rebalancing can take advantage of market inefficiency:

> " .. not rebalancing may mean holding assets that have become overpriced, offering inferior future rewards, A commitment to rebalance to the strategic asset allocation offers an effective way to dissuade clients from abandoning policy at inauspicious moments."

To buttress this view, the authors report the results of an empirical test using monthly rebalancing from 1973 to 2003, showing that a rebalanced portfolio would have provided a greater average return with a smaller standard deviation than a "drifting mix". [21] As discussed earlier, rebalancing to a constant mix typically outperforms a buy-and-hold strategy when reversals are more common than trends. In periods with more trends than reversals, the comparison is likely to yield the opposite conclusion. As is frequently the case, the outcomes of empirical tests with past data can be highly period-dependent.

When adopting an investment strategy it is ultimately necessary to make an assumption about the nature of security markets in the future. If one believes that markets are inefficient, it makes sense to take advantage of investors who do not realize that this is so. Nonetheless, the task can be daunting, as Arnott argued in 2009:

> "At its heart, rebalancing is a simple contrarian strategy. In ebullient times, this means taking money away from our biggest winners. In the worst of times, the process forces us to buy more of the assets that have caused us the greatest pain. Most investors acknowledge it as a critical part of the successful investor's toolkit. But recognition and action are two different things. Surrounded by bad news, pulling the trigger to buy securities down 50%, 75%, or even 90% is exceedingly difficult for even the staunchest of rebalancers. Many lose their nerve and blink, letting a healthy portion of the excess returns slip from their grasp."[22]

This paragraph reflects some of the points I have made thus far. It recognizes that rebalancing is in fact a contrarian strategy. It acknowledges that such action involves buying losers and selling winners. It suggests that most investors believe it is desirable, but that many "lose their nerve and blink." And it reflects its author's view that markets are sufficiently inefficient that by failing to rebalance, investors let "a healthy portion of the excess returns slip from their grasp."

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[21] Arnott, Burns. Plaxco, and Moore, 2007.

[22] Arnott, 2009, p. 1

Asset Allocation Policy and Market Efficiency

It is important to note that the vast majority of those who adopt an asset allocation policy heed the recommendations in the Third edition of the CFA Institute's book on Managing Investment Portfolios:

> "We have emphasized that the expectations involved in strategic asset allocation are long term. 'Long term' has different interpretations for different investors, but five years is a reasonable minimum reference point."[23]

Are markets efficient in the long run? It depends on what is meant by the term "efficient". In the current context, it suffices to ask whether an investor wishes to assume that significant numbers of investors are foolish enough to take the other side of contrarian trades when it is undesirable for them to do so. An investor who adopts a traditional asset allocation policy and rebalances frequently to conform with it must either (1) have an unusual set of preferences for return in different markets (as described earlier) or (2) believe that markets will be inefficient in this sense more often than not over a period of several years.

I believe that the majority of institutional investors who adopt traditional asset allocation policies do not intend to do so for either of these reasons. Rather, they adopt a policy designed to reflect their preferences for risk vis-à-vis return and their special circumstances when the policy is adopted. As time passes and markets change, the policy no longer serves its original purpose. But neither a traditional rebalancing approach nor a "drifting mix" is appropriate. Below I will suggest two possible alternatives. First, however, it is useful to see how far a traditional policy can diverge from its original position.

Bond and Stock Values in the United States

Consider a simple asset allocation policy that involves only U.S. bonds and U.S. stocks. Assume that the former are represented by the Barclays Capital (formerly Lehman) Aggregate U.S. Bond Index and the latter by the Wilshire 5000 U.S. Stock Index[24].

Now, consider a balanced mutual fund that has chosen an asset allocation policy with 60% invested in U.S. stocks and 40% in U.S. bonds, using these two indices as benchmarks. Its goal is to provide its investors with a portfolio representative of the

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[23] Maggin, Tuttle, Pinto and McLeavey, 2007, pp. 233-4.

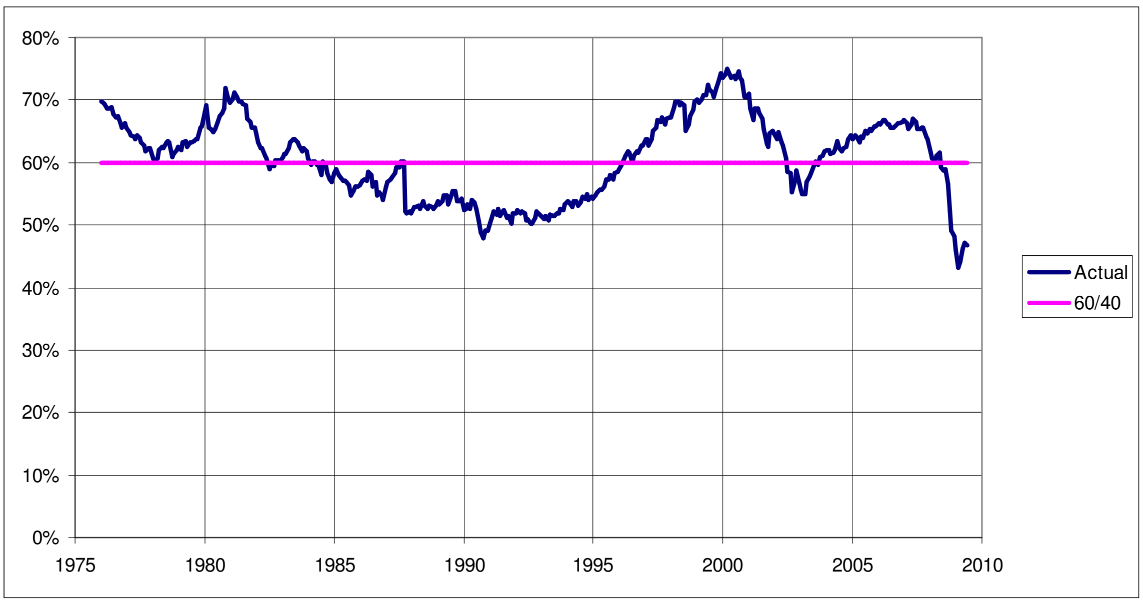
[24] Throughout the paper I use the "Full Cap" version of the index rather than the "float adjusted" alternative that uses weights for the securities based on estimates of the number of shares more likely to be available for trading.

broad U.S. market of stocks and bonds. Investments in each of the asset classes are made via index funds in order to closely track the underlying returns.

The similarity of this fund to the Vanguard Balanced Index Fund is not coincidental. The two differ only with respect to the indices used for U.S. stock returns, but the two alternatives are highly correlated.

Figure 2 shows the ratio of (1) the total market capitalization of the stock index to (2) the sum of the total market capitalizations of the bond and stock indices over the period from January 1976 through June 2009. More succinctly, it shows the percentage of value in stocks in the U.S. vis-à-vis the value of stocks and bonds over 33.5 years.

Figure 2
The Ratio of the Value of U.S. Stocks to U.S. Stocks plus Bonds,
Jan. 1976 through June 2009



As Figure 2 shows, there has been substantial variation in the relative values of stocks and bonds in the U.S. This is not an exception – in other countries, security values have also varied substantially.

Over the entire period shown, the proportion of value in stocks averaged 60.7% -- close to that of a traditional 60/40 strategy with monthly rebalancing, shown by the line in the figure. The average increase in the value of bonds was larger than that of stocks. On the other hand, the total return on stock investments averaged more than that on bond investments, as one would expect over the long run, due to their greater risk.

Table 5 shows the annualized monthly averages[25] of the total returns, percentage changes in market value and the differences between the two. Overall, investors neither extracted large amounts of cash from the bond and stock markets nor invested substantial amounts of new cash. They did, however, invest in new bonds in amounts that were close to the sum of coupon payments received from bonds and the dividends paid by their stocks.

Table 5
Returns and Changes in Market Value, U.S. Bonds and Stocks, Jan. 1976 through June 2009

	Return	% Change in Market Value	Difference
Bonds	8.20%	10.82%	2.62%
Stocks	11.27%	8.96%	-2.31%

Assume that our balanced fund opened its doors in February 1984, when the value of U.S. stocks was 59.62%of the total of stock and bond values. At the time, the fund with 60% in stocks, represented an investment in the U.S. bond and stock markets quite well and should have had a similar risk and expected return.

Now, fast forward to October, 1990. The market value of stocks is now 47.99% of the total but the fund has rebalanced to maintain its policy target of 60%. It is no longer representative of the market's risk and return; instead, the fund is riskier, presumably with a higher expected return.

Figure 2 shows that over this period our fund varied from being significantly riskier than the U.S. bond+stock market to being considerably less risky. At the end of March 2000, the proportion of market value in stocks was 75.06%, leading to the lowest relative risk for the fund in the entire period. At the end of February 2009, the situation was just the opposite. The proportion of market value in stocks fell to its nadir of 43.18%; making the fund, at 60%, much riskier than the overall U.S. bond plus stock market.

In sum, our fund failed in its goal to provide a strategy representative of the overall market of bonds and stocks in the United States except in the very long run. And, as Keynes taught us, "in the long run we are dead."[26]

[25] Each figure is equal to 12 times the corresponding monthly average value.

[26] Keynes, 1923

To accomplish its goal, our fund needs to *adapt* its allocation policy. I turn now to two ways in which an investor can do this: (1) Optimization based on Reverse Optimization and (2) an approach that I will term an Adaptive Asset Allocation Policy. I assume that the investor is concerned with only the return on assets (ruling out cases in which liabilities are taken into account) and that the fund being managed constitutes the entire portfolio (ruling out the use of balanced or target date funds as components of a larger portfolio).

Optimization based on Reverse Optimization

Many asset allocation policies are chosen after extensive analyses designed to determine a set of optimal strategies with different combinations of risk and return. In some cases, the analysis uses a standard Markowitz mean/variance approach. In others, the goal is to maximize an investor's expected utility. In many cases these optimization analyses are conducted with constraints on asset holdings designed to reflect liquidity requirements or other factors. Moreover, the policy actually chosen may differ to an extent from any of the analytically "optimal' asset mixes.

Whatever the process, asset allocation policies are set after considering estimates of risks and returns of major asset classes and the correlations among their returns. More generally, the relationship can be characterized as follows:

$$(10) \quad Asset\ Allocation_t = f\,(Investor\ Characteristics_t, Market\ Forecasts_t)$$

The subscripts indicate that the appropriate asset allocation at a time t depends on the investor's characteristics and the forecasts for asset returns and risks at the time. The notation *f( )* should be read as "is a function of" the items in the parentheses.

Consultants and others who make market forecasts typically take into account historic returns and some aspects of economic theory. Some forecasters, but by no means all, take into account the current market values of major asset classes. The following rather crude equation represents the preferred approach:

$$(11) \quad Market\ Forecasts_{>t} = f\,(History_{<=t}, Economic Theory_t,\ Market Values_t)$$

The subscripts emphasize that market forecasts for outcomes occurring after time t are based on historic information for periods up to and including time t, and economic theory and market values at time t[27].

[27] For an early discussion of the need to account for changes in market values when making forecasts, see Rosenberg and Ohlson, 1976.

Why should market values inform forecasts? Because an asset's current market value reflects the collective view of the probabilities of possible future prospects. This is valuable information and should be taken into account when managing a portfolio.

Analytic approaches for making market forecasts in this manner are generally termed *reverse optimization*[28]. Mean/Variance approaches can assume that capital markets provide unbiased estimates of future prospects[29]or incorporate views about deviations from such estimates[30]. A comparable approach has been suggested for making forecasts to be used in expected utility analyses[31].

Combining equations (10) and (11) gives the following important relationship.

$$(12)\ Asset\ Allocation_t = f(Investor\ Characteristics_t, History_{<=t}, Economic\ Theory_t, Market\ Values_t)$$

The inevitable conclusion is that an investor's asset allocation, expressed in the traditional manner as percentages of total value in each asset class, should change over time to reflect changing market values, even if the investor's characteristics are unchanged. This is the key tenet of this paper.

Importantly, such an approach may not require substantial transactions over and above those associated with reinvesting dividends, interest payments and other cash received from security issuers. Moreover, there is no reason to expect that it will involve selling relative winners and buying relative losers, as must be done to conform with a traditional asset allocation policy.

The equation also shows that a formal system could be set up to frequently revise an investor's asset allocation policy by conducting a reverse optimization analysis followed by optimization. However, the process requires complex models in order to accommodate real-world aspects[32] and is apparently used by relatively few organizations.[33]

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[28] An excellent example is described in EnnisKnupp 2009.

[29] Sharpe, 1974 and Sharpe 1985

[30] Black and Litterman 1991

[31] Sharpe, 2007.

[32] A mean/variance approach could be designed in which the asset allocation policy was characterized by a given ratio of the investor's risk tolerance to that of the market as a whole. I explored this possibility in an earlier paper (Sharpe, 1990). To be practical, the reverse optimization procedure needs to be consistent with an equilibrium in which there are restrictions and/or costs associated with negative holdings – an issue that I discussed in another paper (Sharpe, 1991).

[33] Full disclosure: I co-founded an investment management and advisory company (Financial Engines, Inc.) that uses asset market values and reverse optimization at least once a month to adjust forecasts of risks, returns and correlations for investment vehicles such as mutual funds, followed by optimization analyses to make any appropriate changes in investor portfolios. While no asset allocation policy *per se* is involved, the underlying philosophy is similar.

To provide an alternative, I offer a procedure that can periodically adapt an organization's asset allocation policy to take asset market values into account and do so in a manner that does not require actions that are clearly contrarian in nature. It is simple and can be implemented easily. No claim is made that it is the best possible approach. But it should be better than either strict conformance with a traditional asset allocation policy or the adoption of such a policy followed by subsequent actions (or lack thereof) that treat the policy as irrelevant.

Adaptive Asset Allocation Policies

Dictionary.com defines *adapt* as follows:

> Adjust oneself to different conditions, environment, etc..[34]

In this case, the "different conditions, environment, etc." are new asset market values.

Imagine that a fund investing in U.S. stocks and bonds established an asset allocation policy of 80% stocks and 20% bonds at the end of February, 1984, with the Wilshire 5000 index representing stocks and the Barclays Capital U.S. Aggregate Bond index representing bonds. As shown in Figure 2, at the time the market proportions were 59.62% and 40.38%, respectively. Assume this information had been taken into account in the study that led to the 80/20 policy.

A traditional approach would hold that the policy called for adjustments in holdings to achieve an 80/20 allocation no matter what the subsequent market proportions might be. But as I have argued, this not likely to be a wise course. Instead, the policy proportions should be adjusted as market values change. I propose instead a procedure that I will term an *Adaptive Asset Allocation (AAA) Policy.*

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[34] *Dictionary.com, 2009*

Tables 6a and 6b show the required calculations for the appropriate allocation at the end of October, 1990 when stocks were a substantially smaller portion of overall market value.

Table 6a
Market Values ($Billions), U.S. Bonds and Stocks, Feb 1984 and Oct. 1990

	Stocks	Bonds	% Stocks
$V_{im,o}$ (Feb. 1984)	1,648.19	1,116.49	59.62%
$V_{im,t}$ (Oct. 1990)	2,652.92	2,875.69	47.99%
$k_i = V_{im,t}/V_{im,0}$	1.6096	2.5757	

Table 6b
Adaptive Policy Allocations, Feb. 1984 and October 1990

	Stocks	Bonds	Sum
$AA_{if,0}$	80.00%	20.00%	
$AA_{if,0} * k_i$	128.77%	51.51%	180.28%
$(AA_{if,0}*k_i)/Sum(AA_{if,0}*k_i)$	71.43%	28.57%	

Table 6a shows the total outstanding market capitalizations for each of the two indices at the two dates (time 0 and time t, respectively) and the ratios of the ending values to the beginning values, denoted k_i as before. Table 6b shows the calculations for the new asset allocation. For each asset, the initial proportion in the fund is multiplied by the ratio of the new total market value of the asset class as a whole to the old value. In this case the outstanding values of both assets increased substantially. Hence the sum of the adjusted proportions for the fund is much greater than 100%, as shown in the third column. To compute the new asset value proportions for the fund, the figures in the second row are divided by their sum. This gives the new asset allocation shown in the final row.

In this case, stocks fell from representing close to 60% of total market value to slightly less than 48%. Given this, the fund's asset allocation policy changed from one with 80% invested in stocks to one with 71.43% so invested.

Why is this procedure likely to be preferred over a traditional approach? Because it need not require that investors who have such policies make transactions with other investors whenever market prices change, as do traditional asset allocation policies.

Consider a world in which changes in asset market values result only from changes in security prices and reinvestment of cash flows from each asset in the same class. An investor who makes no withdrawals or additional investments and chooses to reinvest all cash flows from each asset class in the same class will be in compliance with his or her adaptive policy at all times and will not need to make transactions with other investors. This follows from the fact that the value of the investor's holdings of each class will change by precisely the same percentage as does that of the market (k_i). In such a setting AAA policies are *macro-consistent* in the sense that it is possible for all investors to follow such strategies.

Of course the investment world is far more complex. There are new issues of securities, buy-backs and redemptions. Moreover, the total values of these transactions for an asset class rarely net to zero. Public firms go private and vice-versa. Some investors have positive net cash flows that require purchases of new assets while others must sell assets to raise cash. Despite these complications, a group of investors following AAA policies is not likely to need to make large purchases or sales of assets with investors not following such policies. This contrasts starkly with the situation facing investors attempting to comply with traditional asset allocation policies, who must frequently purchase assets that are relative losers and sell those that are relative winners.

Tables 6a and 6b utilized the following formula to compute the proportion invested in asset *i* in the fund (*f*) at time *t*.

$$(13) \qquad X_{if,t} = \frac{X_{if,0}\left(V_{im,t} / V_{im,0}\right)}{\sum_i X_{if,0}\left(V_{im,t} / V_{im,0}\right)}$$

Here $V_{im,t}$ and $V_{im,0}$ are the total outstanding market values of asset *i* at times *t* and *0*, respectively. The proportion invested in asset *i i*n the fund at time *0* is $X_{if,0}$ and the proportion to be invested at time *t* is $X_{i,ft}$.

Note that the total market value of asset *i* at time *0* will equal its proportion of total value ($X_{im,0}$) times the total value of all assets at the time ($V_{m,0}$). A similar relationship will hold for time *t*. Thus:

$$(14) \qquad \begin{aligned} V_{im,0} &= X_{im,0} V_{m,0} \\ V_{im,t} &= X_{im,t} V_{m,t} \end{aligned}$$

Substituting these relationships in equation (13) and cancelling terms gives a formula for calculating the new proportion for the fund to invest in asset *i* as a function solely of the proportions at time *0* and the ratios of the proportions for the market portfolio at the two time periods:

$$(15) \quad X_{if,t} = \frac{X_{if,0}\left(X_{im,t} / X_{im,0} \right)}{\sum_i X_{if,0}\left(X_{im,t} / X_{im,0} \right)}$$

Table 7 shows the computations for February 1984 and October 1990.

Table 7
Adaptive Policy Allocations, Feb. 1984 and October 1990
Using Asset Proportions

	Stocks	Bonds	Sum
$X_{im,0}$	59.62%	40.38%	
$X_{if,0}$	80.00%	20.00%	
$X_{im,t}$	47.99%	52.01%	
$X_{if,o}*X_{im,t}/X_{im,o}$	64.39%	25.76%	90.15%
$X_{if,t}$	71.43%	28.57%	

In this example, the initial asset allocation set at time *0* is assumed to have been appropriate, given the market values of the asset classes at the time. This is typically the case when an institutional investor selects an asset allocation policy. However, the adaptive formula (15) can be applied in other contexts. Key is the statement of an asset allocation policy in terms of base values for (1) the policy and (2) the market. For example:

> "The fund's Asset Allocation Policy is to have 80% invested in stocks and the remainder in bonds when the market value of stocks is 60% of the total value of stocks and bonds, with the proportions to be determined each period using the adaptive asset allocation formula."

Table 8 shows this asset allocation policy using the terms in formula (15).

Table 8
An Asset Allocation Policy

	Stocks	Bonds
$X_{im,0}$	60 %	40 %
$X_{if,0}$	80 %	20 %

More generally, denote the mixes of market and fund assets respectively as:

(16a) $X_{m,0} = (X_{1m,0}, X_{2m,0,} \ldots, X_{nm,0})$

(16b) $X_{f,0} = (X_{1f,0}, X_{2f,0,} \ldots, X_{nf,0})$

where there are *n* assets and $X_{m,0}$ and $X_{f,o}$ are vectors representing the *base* market and fund asset allocations, respectively.

With this interpretation, it is straightforward to apply the adaptive approach to a wide range of investments. I illustrate with three prototypical types of funds.

Institutional Funds

As indicated earlier, most pension funds, endowments and foundations conduct asset allocation studies that lead to the selection of a policy asset mix. This can be considered the base policy ($X_{f,o}$). Presumably this asset allocation was considered appropriate given the market conditions ($X_{m,0}$) at the time, whether or not these market values were used explicitly when determining asset prospects. Given this assumption, the asset allocation policy can be converted to an adaptive policy by simply applying the adaptive formula (15) in subsequent periods.

As with the traditional approach, allowable deviations from the policy targets may be selected. For example, these could be set to equal the currently allowed deviations of the holdings in each asset class. If the fund makes few if any trades, it is less likely that the resulting ranges will be violated with an adaptive policy than would be the case with a traditional approach.

Undoubtedly many institutional funds will consider the conversion from a traditional to an adaptive asset allocation policy too dramatic to accept overnight. But at the very least I suggest that the required computations for an adaptive asset allocation policy be performed periodically, so key decision-makers can evaluate the fund's actual holdings in terms of both the traditional and this alternative approach. In time, such an exercise might lead to a greater acceptance of the latter.

Balanced Funds

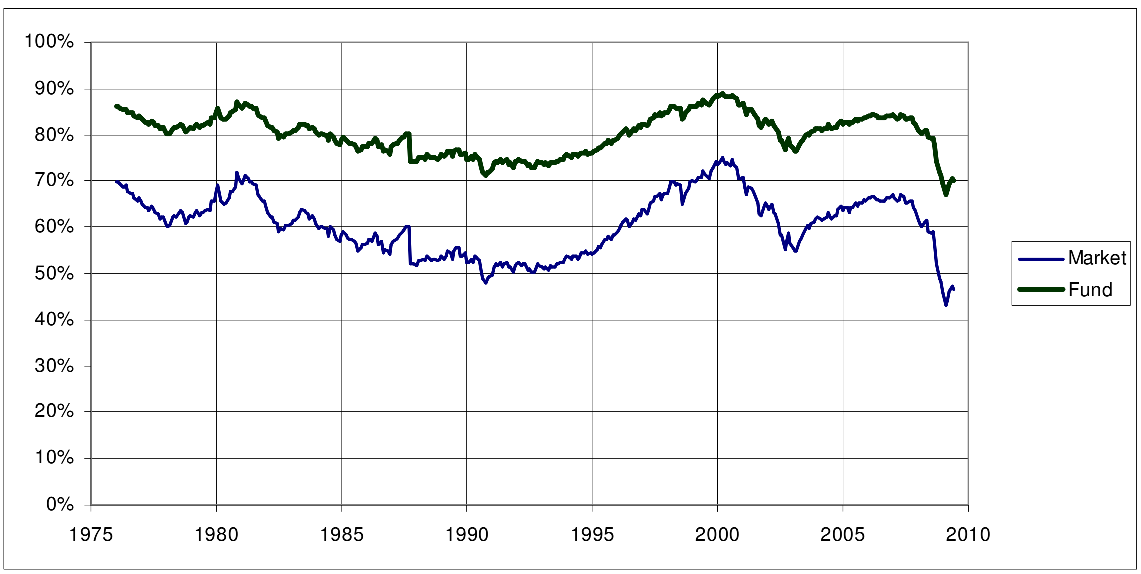
As the earlier discussion suggests, multi-asset mutual funds are likely to make transactions required to conform closely with their traditional asset allocation policies. To a considerable extent, the fund's asset allocation policy will drive its investments. This makes the choice of the type of policy especially important. In this section I consider the use of adaptive policies by balanced funds; the next covers target-date funds.

Typically, a balanced fund is designed to provide a mix of two or more asset classes with a constant level of "conservatism" or "aggressiveness". While some may think of these terms as absolute, a more pragmatic approach interprets them as relative. In this view, an "aggressive" fund should provide more risk than the market as a whole, while a "conservative" one should provide less. A "representative" fund could be designed to provide the same risk as the market as a whole.

It is easy to construct an adaptive representative fund. It will have the market proportions of the asset classes in every time period. At the time of formation, the actual proportions ($X_{f,0}$) will be set to equal the market proportions ($X_{m,0}$). The adaptive formula (15) will subsequently lead the fund manager to hold assets in market proportions at each time period. For example, a balanced fund designed to represent the U.S. stock and bond markets would follow the curve in Figure 2 rather than the horizontal line.

An aggressive fund would begin with an asset mix with greater risk than that of the market at the time, then adjust its holdings using formula (15). Figure 3 shows the actual proportions for a fund that wishes to hold an 80/20 mix of U.S. stocks and bonds when the market proportions are 60/40.

Figure 3
Asset Allocations, Market and an Aggressive Balanced Fund



As intended, the fund remained more aggressive than the market throughout the period. However the ratio of the fund's proportion in stocks to that of the market varied, beginning at 1.333 (80%/60%) and ranging between 1.18 and 1.55.

Not surprisingly, at the four times when the total market value of stocks was close to 60% of the total value of stocks and bonds, the fund's asset allocation policy dictated a value close to the intended 80/20 mix.

In this example, the fund started when the market mix was in fact 60/40. But this need not have been the case. The fund could have been started at any time with a stated policy specified in terms a “normal mix” ($X_{f,o}$) when markets are “normal” ($X_{m,0}$).

This suggests a simple way to convert an existing balanced fund to an adaptive one. The stated policy ($X_{f,o}$) need only be augmented by the “normal” market conditions ($X_{m,0}$) for which it is appropriate. The asset allocation policy for any period can then be determined using formula (15).

Target-date Funds

As indicated earlier, a target-date fund is one with a policy “glide path” indicating the appropriate asset allocation at each time in the future until the date at which money in the fund is to be transferred to another vehicle. In effect, the fund has a base allocation for every time period. It is straightforward to accommodate this in the adaptive asset allocation formula. Let $X_{ib,t}$ represent the “base” allocation for time t specified in the current policy. This replaces the constant allocation given by $X_{if,0}$ in the formula, giving:

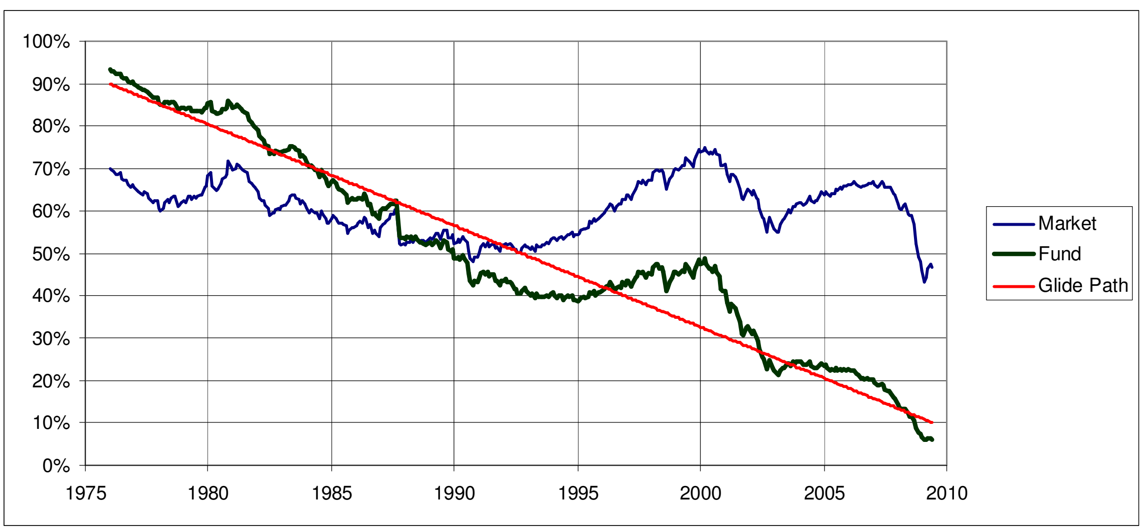
$$(17) \quad X_{if,t} = \frac{X_{ib,t}\left(X_{im,t} / X_{im,0} \right)}{\sum_i X_{ib,t}\left(X_{im,t} / X_{im,0} \right)}$$

This is more general than formula (15), which can be considered a special case in which $X_{ib,t} = X_{if,0}$ for every time period t.

Figure 4 provides an illustration of an adaptive target-date fund. It assumes that the fund was started in January 1976 with a glide path calling for 90% in stocks initially with the percentage decreasing by a constant percentage each month, reaching 10% in June 2009. The red line in the figure shows the base allocations that would be implemented by a traditional target-date fund. The blue curve shows the market proportions.

To convert this to an adaptive target-date fund we make the assumption that the original glide path was chosen to be appropriate when the market proportions in stocks and bonds are 60% and 40%, respectively. Using these proportions for the $X_{im,,0}$ values in formula (17), the green curve indicates the allocations for the adaptive target-date fund. Since the glide path is assumed to be optimal when the market proportions are 60%/40%, the adaptive proportions and the policy glide path coincide when the stocks are in fact 60% of the total value of bonds and stocks. Whenever the market proportion of stocks (shown by the blue curve) is below 60%, the fund's allocation to stocks (shown by the green curve) is below that specified by the glide path (shown by the red curve). Conversely, when stocks represent more than 60% of the value of the market, the fund's allocation to stocks is greater than that called for by the glide path.

Figure 4
Asset Allocations, Market and an Adaptive Target Date Fund



Implications for the Investment Industry

If my arguments have merit, a number of changes should be made by the investment industry.

First and foremost, more data will need to be made available about the market values of the securities in each of the benchmarks designed to represent major asset classes. Most such indices are computed by third parties such as Barclays Capital and Wilshire Associates, who compute the two indices used in this paper. Recent and historic monthly *returns* for most popular indices may be difficult but not totally impossible to obtain from such providers.[35] But it is much harder to obtain data for the market *values* of the securities in an index. Clearly, the index provider has such information[36]. In cases in which returns for the index are computed using a subset of the securities in the represented universe, the provider should still have sufficient information to provide an estimate of the total market value of the class.

It is not clear whether the lack of widespread availability of asset class market values is due to providers' desires to recover the costs of obtaining such information through subscription fees, a lack of sufficient interest on the part of investors and investment managers, or both. Of course, the thesis of this paper is that asset market values are highly relevant for any decision concerning asset allocation, whether made episodically or adjusted routinely using a procedure such as the one I have described. If more investment managers adopt this view, market value data may become more widely available.

It is difficult for this Financial Economist to understand why funds do not routinely compare their asset allocations with current market proportions in order to insure that differences are commensurate with differences between their circumstances and those of "the average investor". Yet this is rarely done. It is possible that the lack of easily obtained data on market values is the cause, with the absence of such comparisons the effect. Alternatively, the situation may be the reverse, with the lack of available data on market values due to insufficient investor interest.

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[35] Some returns for the Barclay Capital U.S. Aggregate index can be obtained at the web sites of funds and ETFs that use it as a benchmark. Returns for the Wilshire 5000 Index can be obtained at http://www.wilshire.com/Indexes/calculator/.

[36] On its web site Wilshire (http://www.wilshire.com/Indexes/Broad/Wilshire5000/Characteristics.html) provides tables that include the total market values of the securities in its U.S. equity index at the end of the most recent month, but no historic data on market values is provided. The Barclays Capital web site does not provide any data on the market values of the securities in the U.S. Aggregate index. I am grateful to both organizations for providing me with the historic data used in this paper.

I would hope that readers of this paper would request (or demand) that those who provide benchmark indices make equally available the corresponding market values. For publicly offered mutual funds or ETFs, this could be encouraged or required by regulatory authorities.

Second, it would be useful if institutional investors, armed with appropriate market value data, would at least compute the asset allocations that would result from an adaptive policy of the type described here. This could inform discussions between staff members and those charged with oversight, such as the members of investment committees or boards. In time, it is possible that more investment organizations would become sufficiently comfortable with adaptive procedures to substitute them for the contrarian policies associated with the traditional approach.

Third, some mutual fund companies might offer adaptive balanced funds and/or adaptive target-date funds. In time, such vehicles might attract enough investors to represent a significant part of the market. A good first step would be the offering of a balanced index fund designed to truly represent the mix of stocks and bonds in the United States. As shown in Figure 2, such a fund would differ significantly from offerings such as the Vanguard Balanced Index Fund. If successful, a representative balanced fund might pave the way for additional funds to follow adaptive asset allocation policies.

Some will find the arguments in this paper obvious, others will consider them radical. Hopefully sufficient numbers of readers will be convinced to lead to changes in investment practice.

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