



C A M B R I D G E A S S O C I A T E S L L C

BETTER BETA BOXES?

Unconventional Approaches to Asset Allocation

2006

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ABSTRACT

1. A distinct class of products using unconventional asset allocation (UAA) is emerging in the marketplace. While these products differ in some respects, they all start from the point of view that traditional policy portfolios are too equity biased. UAA products add more low-correlation asset classes to improve portfolio diversification and expected Sharpe ratios relative to equity-biased portfolios. Since these asset classes tend to have lower investment returns, the product manager engineers risk parity (in terms of standard deviations) by leveraging lower return/lower volatility asset classes such as fixed income and reducing the exposure to equities.
2. In seeking risk parity, these products follow the basic premise that it is less risky to have more diversification with modest leverage than minimal diversification with no leverage. The view is that leverage, constructively used, has the potential to reduce, rather than increase risk, but we would caution that the true risk of using leverage cannot be captured in standard deviations alone because leverage enhances the tail risk of market responses to very rare, but extreme events. Adding leverage only works if the other asset classes added for diversification maintain their low correlations during extreme tail events and do not move in the same direction as the leveraged asset class.
3. Cambridge Associates' asset allocation philosophy has always involved some degree of risk allocation, and shares with UAA modelers the common goal of building a portfolio that seeks to provide sufficient protection against a broad range of risks without incurring significant opportunity costs. However, we subscribe to the notion of having a high equity allocation to meet spending requirements without eroding principal in real terms, while hedging against low-probability, high-catastrophe, fat-tail outcomes, which historically have been deflation or prolonged economic contractions, and unexpected inflation. At the same time, we advocate diversifying the remainder of the portfolio to reduce volatility.
4. Relative to highly diversified equity-biased portfolios, UAA portfolios do offer some advantages. For example, products that rely on beta exposures alone do not require the significant resources necessary for building and maintaining alternative asset programs. However, an investor implementing unconventional asset allocation strategies that utilize leverage directly, rather than through a manager, would require significant risk management and derivatives expertise. In addition, although their higher allocation to bonds ensure that such portfolios are well hedged against economic contractions, they may not be as well protected against unexpected inflation, despite relatively high allocations to inflation-indexed bonds and commodities, because they generally lack allocations to other kinds of inflation-hedging assets (e.g., oil and gas, timber, real estate).

5. Although UAA products have been developed independently by a number of different firms, they share some common characteristics:
 - The extensive use of derivatives to gain exposure to beta.
 - The use of leverage to increase beta exposure at the portfolio level or in certain lower-returning asset classes, most commonly fixed income.
 - The permanent addition to the asset allocation mix of less-traditional asset classes, most commonly commodities, but also emerging markets equities, emerging markets debt, REITs, and high-yield bonds.
 - Some firms add sources of alpha that are independent of the beta allocation. Other firms offer a beta-neutral “alpha” hedge fund separately as an overlay or complement to their pure “better beta box” product.

6. Managers of UAA products have both absolute and relative return goals. On a relative basis, they are positioned as a superior alternative to a traditional 60%/40% stock/bond policy portfolio allocation, targeting higher (equity-like) returns while matching the lower risk (volatility) level of a traditional balanced portfolio. Absolute return *targets* are Consumer Price Index (CPI) plus 5% to 9% (on the higher end if an alpha component is included). Typically, the target nominal annual return is 8% to 12% and volatility, 6% to 10%. Long-term Sharpe ratio targets are 0.5 to 0.7 (or potentially higher if alpha sources are included), against traditional balanced portfolio Sharpe ratios of about 0.4. We would caution that our modeling of return expectations for Bridgewater’s All-Weather portfolio (which we select as representative because it provides significant asset allocation transparency), suggests expected returns at the low end of this range based on our risk, return, and correlation assumptions.

7. Individual UAA products have varying degrees of transparency and use significantly different modeling processes to create and then dynamically adjust their beta portfolios. Products fall into two basic categories: those offering a pure form of re-engineered beta portfolios, and those embedding and combining alpha strategies with the beta portfolio in more comprehensive stand-alone products.

8. While UAA products offer potentially attractive risk/return characteristics, investors should be aware of some structural and timing risks:
 - The leverage used in these products in theory exposes investors to higher risks and potentially very large losses in certain market situations.
 - Leveraged exposure to fixed income in the current environment could also create timing risk. Bond yields are near their lowest levels in 40 years, and are unlikely to generate future returns comparable to those of the great bond bull market of 1982-2002.
 - While many of the derivatives traded in UAA products are exchange-traded futures, they also include over-the-counter derivatives and swaps that incur counter-party risks.
 - Many of these products provide little transparency about their beta allocations, degree of total leverage, and (if they have them) specific sources of alpha.

- With the exception of Bridgewater’s All-Weather, most UAA products have short track records and have not been tested in different market environments. Even Bridgewater’s track record, starting in 1996, covers a period that has been relatively insulated from the worst environments for leverage—periods of yield curve inversions and sharp increases in yields.
- A key driver of risk/return in these products is the combining of asset classes assumed to have a low correlation with each other. If correlations are higher than assumed or change in unanticipated ways over time, performance could be negatively impacted.
- Some UAA products charge hedge fund-type performance fees for the combined beta and alpha product that may seem excessive for the high proportion of the returns that comes from beta exposures.
- Commodity exposure is common to most of the UAA products, but the track record of diversified long-only commodity index performance is quite short, and return expectations uncertain.
- The use of leverage for on-shore versions of these UAA products may result in unrelated business tax income for some tax-exempt investors, and the use of futures to gain exposures make these products tax inefficient relative to holding the assets outright for long periods of time.
- Investors considering such an approach for most or all of their total portfolio incur significant “maverick” risk; that is, they would at times be badly “out of step” with peers during periods when this strategy underperformed more conventional asset allocations and this could well lead to their abandoning the strategy at the worst possible time.

9. UAA products could potentially serve any of three basic roles in a portfolio:

- **As one of several managers in a diversified alternatives or hedge fund program.** For such a role the individual products that include alpha sources and have absolute return targets of CPI +5% to 9% could provide good diversification and low correlation with other funds in such a program.
- **As a 10% to 20% carve-out within an investment pool to complement the total portfolio.** This would work best with the UAA products that are the most transparent and that can most easily be customized and adapted to specific client risk tolerances.
- **As a substitute for the whole beta portfolio.** This is the most problematic application of UAA because it would magnify some of the concerns and limitations discussed above.

SUMMARY

Introduction

Equities have traditionally been investors' primary source of returns over time. As a result, they typically constitute as much as 60% to 80% of most policy portfolios. However, the 2000-02 bear market provided a painful reminder that equities also represent investors' greatest source of risk. Coupled with the perception that, after a three-year rebound, equities remain fully valued, this greater sensitivity to equity risk has led investors to seek new sources of absolute returns and alpha in alternative strategies such as hedge funds. At the same time, the significant global expansion of futures markets and other liquid derivatives over the past decade has made it possible to unbundle beta from alpha, where the desired beta exposures can be obtained independent of a potential alpha source. Consequently, rather than making capital allocation decisions among asset classes and then seeking the best source of alpha within each asset class, investors are more frequently acquiring passive exposures to beta and then seeking sources of alpha independent of those beta allocations. This approach often leads to the implementation of portable alpha strategies, which enable investors to think more in terms of active risk budgets than of capital allocation.

Unfortunately, the search for portable alpha can be quixotic and fraught with difficulties.¹ Since the capture of alpha is a zero-sum game, persistent sources of alpha can be elusive and variable. In particular, growing numbers of talented managers in the increasingly crowded world of hedge funds are vying to capture the same alphas in the same ways. The result has been a significant decay in absolute returns and delivered alpha in recent years. Moreover, it is often difficult to pick out what is true alpha: for many long-biased hedge funds, more of the delivered returns come from beta exposures than alpha; in addition, many supposed forms of alpha are arguably just another systemic form of "exotic" beta (e.g., merger arbitrage strategies) that investors could replicate without great difficulty.

Better Beta Boxes: New Approaches to Asset Allocation

Against this backdrop, a small but growing number of investment products are appearing that are swinging the pendulum back from a fixation on alpha to a focus on asset allocation and the re-engineering of beta portfolios. This comes in part from a recognition that most investment risk (and most investment return) comes not from alpha but from beta decisions, asset allocation, and leverage, both implicit and explicit.

Although these unconventional asset allocation (UAA) products have been developed independently by a number of different firms, they share some common characteristics:

- The extensive use of derivatives to gain exposure to beta.
- The use of leverage to increase beta exposure at the portfolio level or in certain lower-returning asset classes, most commonly fixed income.

¹ See our 2005 publication, *Portable Alpha: A Closer Inspection*.

- The permanent addition to the asset mix of less-traditional asset classes, most commonly commodities, but also emerging markets equities, emerging markets debt, REITs, and high-yield bonds.
- The addition (but only by some firms) of sources of alpha that are independent of the beta allocation. Other firms offer a beta-neutral “alpha” hedge fund separately as an overlay or complement to their pure “better beta box” product.

Pure UAA products that focus on beta allocations alone (e.g., Bridgewater’s All-Weather and PanAgora’s Risk Parity) offer customized separate account vehicles and/or other implementation options that allow investors to set risk and return assumptions designed to meet their specific objectives. An investor could, for example, dial down the volatility target to the point where there is no leverage in the portfolio (e.g., a 4% volatility target would tend to use no leverage). The other products, which add in multiple other alpha sources, offer only a one-size-fits-all investment vehicle and would have more limited applications.

Observations and Assumptions Underlying UAA Strategies

The starting point for all these UAA products is the view that traditional asset allocation is too equity biased. The need to generate high enough returns to support spending levels has led to giving equities, the highest-returning asset class available, the greatest weight in investment pools. However, for many investors, that has come at the cost of greater risk and more severe drawdowns, as demonstrated by the 2000-02 equity bear market, which produced one of the worst performance periods in a generation. Those investors who had significantly diversified their equity portfolios fared much better than those who did not, as not all equity-biased portfolios are created equal.

While the expected returns and risks of different asset classes can vary greatly, modern portfolio theory dictates that their risk-adjusted returns will be quite similar, hovering in the 0.2 to 0.35 range of Sharpe ratios. Given roughly equal expected return and risk, the primary benefit of combining different asset classes in a portfolio is to take advantage of low correlations of returns, which reduces risk and increases the overall Sharpe ratio.

UAA products extend these principles by adding more low-correlation asset classes to the mix, and then engineering risk parity (in terms of standard deviations) across the portfolio by leveraging lower return/lower volatility asset classes such as fixed income and reducing the exposure to equities. This is similar to modern portfolio theory with Tobin’s extension that suggests investors should find the optimal portfolio on the efficient frontier (the point at which portfolios on the frontier with higher and lower risk have lower risk-adjusted returns, or the tangency of the capital market line that begins at the risk-free rate and runs tangent to efficient frontier at the point of optimal efficiency) and then lever or de-lever to match their desired return and risk tolerance level. In seeking risk parity, these products follow the basic premise that it is less risky to have more diversification with modest leverage than minimal diversification and no leverage. In other words, they assert that leverage, constructively used, has the potential to reduce, rather

than to increase risk. The goal is to turn a capital allocation approach into a risk allocation exercise to produce a diversification-biased portfolio rather than an equity-biased portfolio.

However, we would caution that the true risk of using leverage cannot be captured in standard deviations alone, because much of the risk resides in the tail risk of market responses to very rare, but extreme events. Adding leverage only works if the other asset classes added for diversification maintain their low correlation during extreme tail events and do not move in the same direction as the leveraged asset class.

Managers of UAA products have both absolute and relative return goals. On a relative basis, they are positioned as a superior alternative to traditional equity/bond policy portfolio allocations, targeting higher (equity-like) returns while matching the lower risk (volatility) level of a traditional balanced portfolio. Absolute return targets are Consumer Price Index (CPI) plus 5% to 9% (on the higher end if an alpha component is included). Typically, the *target* nominal annual return is 8% to 12% and volatility, 6% to 10%. Long-term Sharpe ratio targets are 0.5 to 0.7 (or potentially even higher if alpha sources are included), against traditional balanced portfolio Sharpe ratios of about 0.4, and against individual asset class Sharpe ratios that all cluster around 0.2 to 0.35 over the long term.

Analysis based on our long-term risk, return, and correlation assumptions suggests that investors could build portfolios with similar return and standard deviation characteristics to those of UAA portfolios using only beta sources and no leverage. The key is to remove constraints on allowable allocations to bonds, commodities, and other asset classes to which investors typically limit their exposure either because they have low return expectations or high volatility, or performance expectations are relatively uncertain. Based on our modeling of Bridgewater's All-Weather portfolio, which utilizes 2:1 leverage, the product has an expected real return of 5.4%, a standard deviation of 9.4%, and a Sharpe ratio of 0.47. (Note that these expectations are lower than Bridgewater's stated objective of a Sharpe ratio of 0.7 gross of fees.) As shown in Example 1 on the following page, comparable unleveraged diversified portfolios require a higher allocation than UAA portfolios to equities, and a higher allocation to bonds than is typically held in equity-biased portfolios. Alternatively, as shown in Example 2, portfolios can include slightly less equities and bonds and an allocation to long/short hedge funds, which have a lot of beta, but arguably include some alpha exposure. Equity-biased, highly diversified portfolios that include both alpha and beta return sources² have higher expected returns, standard deviations, and similar Sharpe ratios relative to these unleveraged diversified portfolios and beta-only UAA portfolios, such as Bridgewater's All-Weather. Of course, adding alpha to UAA portfolios would also increase their expected returns.

² Our long-term asset class return assumptions only reflect alpha to the extent that it is inherent in the asset class as a whole. For example, our expected return for venture capital does not presume a skillful portfolio managers can add alpha through manager selection, but rather reflects expected returns for the asset class as a whole.

Asset Classes	Unleveraged Portfolios with Comparable Risk and Return Characteristics to Leveraged UAA (%)		Highly Diversified, Equity- Biased, Unleveraged Portfolio Including Alt Assets* (%)
	Example 1	Example 2	
U.S. Equity	22.5	20.0	27.2
Global ex U.S. Equity	20.0	15.0	15.9
Emerging Markets Equity	5.0	5.0	5.5
Absolute Return	---	---	7.3
Hedge Funds	---	15.0	12.5
Venture Capital	---	---	3.0
Private Equity	---	---	5.2
REITs	10.0	10.0	1.3
Real Estate	---	---	3.4
Commodities	10.0	10.0	1.0
U.S. Fixed Income	15.0	10.0	9.5
U.S. TIPS	5.0	5.0	2.1
Global Fixed Income	12.5	10.0	1.2
Cash	---	---	2.1
Oil & Gas	---	---	1.8
High-Yield Bonds	---	---	0.6
Emerging Markets Debt	---	---	0.2
Real Arithmetic Return (%)	5.5	5.7	6.4
Standard Deviation(%)	9.4	9.5	11.6
Real Compound Return (%)	5.1	5.3	5.8
Sharpe Ratio	0.48	0.49	0.47

* Based on the average asset allocation 73 tax-exempt institutions with assets over \$1 billion responding to our survey for March 31, 2006 asset allocation data. An average allocation of 2.5% to other asset classes/strategies was distributed proportionately across asset classes utilized by these investors.

Cambridge Associates' asset allocation philosophy has always involved some degree of risk allocation, and shares with UAA modelers the common goal of building a portfolio that seeks to provide sufficient protection against a broad range of risks without incurring significant opportunity costs. However, we subscribe to the notion of having a high equity allocation to meet spending requirements without eroding principal in real terms, while hedging against low-probability, high-catastrophe, fat-tail outcomes, which historically have been deflation or prolonged economic contractions, and unexpected inflation. To protect against these risks, we recommend holding intermediate- to long-term Treasuries and a variety of hard assets and inflation-linked bonds. At the same time, we advocate diversifying the remainder of the portfolio to reduce volatility. However, we generally do not recommend holding as much fixed income, for example, as is held in UAA products because the opportunity cost of holding these securities on an unleveraged basis is too high for most investors. Furthermore, we do not incorporate leverage at the policy portfolio level, as it is

our view that only a select few investors have sufficient risk-management capabilities to utilize negative cash exposures.

Relative to highly diversified equity-biased portfolios, UAA portfolios do offer some advantages. Products that rely on beta exposures only do not require the significant resources necessary for building and maintaining alternative asset programs. However, an investor implementing unconventional asset allocation strategies that utilize leverage directly, rather than through a manager, would require significant risk management and derivatives expertise. In addition, to the extent that their higher allocations to bonds are predominantly in high-quality issues, these portfolios may be better protected against deflation. However, despite relatively high allocations to inflation-indexed bonds and commodities, they may not be better protected than highly diversified equity-biased portfolios against unexpected inflation because the latter typically include allocations to hard assets like natural resources and timber, which provide a more diversified inflation hedge.

Performance Track Record

The UAA product with the longest live track record, Bridgewater's All-Weather, has generated 10.9% annualized returns (gross of fees) for the ten-year period ended June 30, 2006, compared to 7.8% for a 60%/40% S&P 500/Lehman Brothers Aggregate mix (Exhibit 1). Over that ten-year period, All-Weather's largest drawdown has been a modest -10.0% (May 1998 to August 1998), compared to a much longer and deeper -22.8% for the 60%/40% mix (September 2000 to September 2002).

Relative to highly diversified, equity-biased portfolios (as represented by the 274 U.S.-based institutional investors that have been our clients over the last ten years and provided a complete performance history), the All-Weather has outperformed the average investor slightly, but generally done so with a lower standard deviation, which may be expected given the higher allocations to asset classes with low correlations. From July 1, 1996 through March 31, 2006, our average client experienced a return of 10.2%, with a standard deviation of 11.3 and a Sharpe ratio of 0.6, compared to Bridgewater's All-Weather, which returned 11.4% on a gross basis (10.9% net of fees based on a 50-basis point [bp] annual fee), with a standard deviation of 8.3 and a Sharpe ratio of 0.9. Roughly 30% (77 clients) outperformed the All-Weather net of fees, but generally with higher risk, as the median standard deviation and Sharpe ratio were 10.8 and 0.8, respectively.

A longer-term simulation of All-Weather back to 1970 (Exhibit 3) shows a similar pattern of smaller maximum drawdowns, and a different performance distribution (weaker relative performance for All-Weather during periods of inverted yield curves or sharply rising rates in 1979-82 and 1994, and stronger relative performance during major equity bear markets such as 1973-74). This is only a simulation, of course, but does convey the types of return patterns that leveraging bonds and underweighting equities would have relative to more traditional allocations in different market environments.

Differences in Investment Process and Execution

Beyond these broad commonalities, individual UAA products have varying degrees of transparency and use significantly different modeling processes to create and then dynamically adjust their beta portfolios. Products fall into two basic categories: those offering a pure form of re-engineered beta portfolios, and those embedding and combining alpha strategies with the beta portfolio in more comprehensive stand-alone products.

Pure Better Beta Boxes

Bridgewater's All-Weather and PanAgora's Risk Parity strategies both offer the purest form of re-engineered beta portfolios, with a commensurately lower fee structure than products that also include an alpha component. While both seek to deliver higher returns than traditional balanced portfolios with similar risk, the investment approach and portfolio construction differ significantly. A major advantage of these products is the relative transparency of their beta exposures and the ability of investors to customize the risk/return characteristics in separate accounts.

Bridgewater

Bridgewater's All-Weather is the only UAA product that sticks to a fixed set of beta exposures. Relative to a traditional 60% equity/40% fixed income portfolio, the All-Weather sharply reduces the equity weighting, increases the weight of fixed income, broadens the mix of asset classes, and then leverages the fixed income positions. The result is a much more diversified portfolio with a higher long-term *expected* Sharpe ratio (0.7 gross of fees, or 0.6 net of fees) and smaller drawdowns. Because the portfolio is implemented mostly with futures, the whole portfolio can be leveraged up to a target level of returns and/or volatility. Leverage is achieved exclusively through futures.

Although the use of bonds and equities alone improves risk diversification relative to undiversified equity-dominated portfolios, Bridgewater achieves even greater diversification by adding to the portfolio a custom variation of the GSCI Commodity Index wherein the energy weight is reduced from the index's 70% weight to 45%, and the precious metals exposure is increased from 2% to 14%. The final components of the All-Weather Portfolio consist of global equities (hedged), global nominal bonds (hedged), global inflation-linked bonds (TIPS), corporate/mortgage spreads versus Treasuries, emerging markets debt spreads versus Treasuries, and commodities.

How does Bridgewater determine the mix? The firm believes that a simple extrapolation of historical correlations data does not work well, because correlations between asset classes do change over time and tend to become highly correlated just when one needs them to be most uncorrelated. For Bridgewater, the better solution is to look at the correlation of asset class returns to different economic environments rather than look at covariance matrices across asset classes. They generate a four-box economic matrix of rising

growth, falling growth, rising inflation, and falling inflation regimes, and then seek to determine which mix of assets works best under each of these circumstances. These four optimal mixes are then weighted equally to constitute the total portfolio, with risk within and across the four components equalized through varying degrees of leverage for the fixed income components and differential beta weightings.

PanAgora

PanAgora's Risk Parity Portfolio (RPP) bears a structural resemblance to Bridgewater's All-Weather in that it leverages bonds to achieve "risk parity" with equities and adds exposure to commodities. Unlike Bridgewater's optimized but static mix, however, RPP's beta mix is switched over time between two static portfolios based on U.S. Fed "regimes" (easing and tightening). The easing regime portfolio favors equities and the tightening regime favors bonds and commodities.

UAA Products with Additional Alpha Sources Included

Both Bridgewater (pure alpha) and PanAgora (multi-alpha strategy) offer separate alpha products to complement and combine with their pure better beta boxes. PanAgora offers both the beta and alpha products in a single package called Parity Plus. Bridgewater's Pure Alpha uses futures and other derivatives exclusively, while PanAgora offers a mix of alpha strategies that use both derivatives and more traditional stock selection.

The other three firms introducing UAA products cited here (Bain Capital, Goldman Sachs, and HighVista) all add an alpha component to their better beta box portfolios in single alpha-beta products that are offered as a kind of one-stop shop for investors. Each seeks to deliver alpha in a different way. Bain is the least transparent about additional alpha sources, but currently uses a small number of internally generated strategies implemented with derivatives, with the expectation that more will be developed over time. Goldman Sachs incorporates a broad range of active in-house products that provide some of the beta exposure, but which also have an expected alpha from stock or bond selection. HighVista seeks to generate alpha by allocating capital to external managers across a broad spectrum of strategies in hedge funds, private equity, and venture capital.

Bain Capital

Bain Capital's Absolute Return Capital Partners offers less transparency than the others as to their specific beta-engineering methodology or their exact beta allocation. (They also charge investors a hedge-fund fee of 1 and 20 over T-bills.) Broadly defined, their methodology seeks to adjust exposures based on the perceived global macroeconomic environment over the next 12 to 36 months in regard to inflation, interest rates, economic growth, and current valuations of various markets. Asset allocation is based on qualitative assessments rather than quantitative models. As with Bridgewater, performance depends on

correctly anticipating the cross-correlations among different asset-class returns in different macroeconomic environments. Whereas Bridgewater has constructed a static mix that is optimized to all potential macroeconomic environments, Bain seeks to adjust the mix tactically over time to fit changing regimes. The product is still evolving and will probably be adding sources of alpha either internally from Bain or from outside managers since they regard alpha sources not as overlays to the beta portfolio, but as other uncorrelated return streams that will improve the portfolio's risk/return characteristics.

As with other better beta box portfolios, there is a smaller allocation to equities (less than 20%) and a much larger allocation to fixed income (greater than 50%), especially inflation-linked bonds and non-U.S. sovereign bonds. Leverage of 2:1 to 3:1 is applied at the portfolio level, with an equity-like total return target of 4% to 8% over T-bills with lower volatility (6% to 10% annualized).

Goldman Sachs

As the name implies, Goldman Sachs' Alpha-Beta Continuum product also seeks to combine return streams both from a better beta portfolio, and alpha from internal Goldman Sachs products. Like the other UAA products, they use leverage (up to 150% at the portfolio level) and add commodities and other types of less commonly adopted asset classes (e.g., emerging equities, emerging debt, high yield, global REITs) for diversification. Also, they regard the beta of these asset classes as persistently mispriced and therefore affording greater return opportunities. They think in terms of a risk budget that allocates risk between beta and alpha sources, and estimate about 54% of their risk will come from market (beta) exposures, and about 46% from active risk (alpha) in Goldman Sachs actively managed strategies.

What distinguishes this product most from the other UAA products is that it includes no allocation to bonds in its portfolio (but does include high yield and emerging markets debt) for two primary reasons. First, many of the institutional investors in this product are liability driven, and Goldman Sachs sees its product as a complement to these institutions' traditional 60/40 balanced portfolios. Leaving out a government bond exposure serves to lower the beta and correlation of the Goldman Sachs product relative to these institutions' policy portfolios and makes it more complementary and more diversifying. The second reason is tactical: for the foreseeable future Goldman Sachs expects government bonds to generate negative real returns, and anticipates generating positive returns from other alpha strategies in the product should there be a period (such as a deflationary environment) when high-quality government bonds is the only asset class performing well.

Their return/risk target is 10% to 12% nominal annualized returns with volatility of 8% to 10%. Thirteen different internal Goldman Sachs actively managed strategies are used to acquire alpha and beta, other than global equity beta exposure, which is obtained entirely through futures. Like Bain, Goldman Sachs charges a hedge fund-type fee of 1.5 and 20 for Alpha-Beta.

HighVista

HighVista's Endowment Strategies Program is similar to Bain's in its lack of transparency, but has lower fees (150 bps flat). As with all the other products, it uses leverage, de-emphasizes equities, and includes commodities and other types of less commonly utilized beta in the asset allocation mix. A distinctive feature of their methodology is the modeling of volatility shifts in different asset classes in response to events and regime shifts. They view recent volatility trends as a key predictor of changes in asset class returns and are consequently more pro-active than any of the other products in adjusting their portfolio leverage daily in response to volatility changes. Another distinguishing feature is that they have developed a taxable version of their product.

HighVista views alpha and beta as separate "streams" of returns, each actively managed. Like Goldman Sachs, their performance goal is approximately 11% nominal a year, with a target volatility of 8% to 9%, and a Sharpe ratio close to 1.0. They expect about 6% per year of the return to come from the alpha "stream," which will include opportunistic investments in a broad range of outside managers in marketable and non-marketable asset classes: private equity, venture capital, hedge funds, real estate, oil and gas, and timber. They believe they have a strategic advantage in gaining access to the best, most-seasoned producers of alpha through their extensive contacts.

Unconventional Asset Allocation Versus Global Tactical Asset Allocation

There are similarities and overlaps between some of the UAA products and global tactical asset allocation (GTAA) products that can be a source of confusion within what is really a continuum of products. Both make substantial use of derivatives to acquire beta exposures, and both use a broad mix of asset classes globally. The major difference is that the majority of the derivatives-based GTAA products use shorting extensively and will not make significant directional beta bets. They are in fact usually beta-neutral in their unconstrained forms. UAA products, on the other hand, are enhanced beta strategies that are usually more than 100% net long in their beta exposures, do not use shorting, and may or may not include an additional alpha component in their product.

UAA products more closely resemble fully funded GTAA products, whose returns have a major beta component and which tend not to use shorting. The major differences are that firms with fully funded GTAA products tend to use actively managed internal products where the beta and alpha are linked, whereas UAA products tend to acquire beta exposure with derivatives, use a significant amount of leverage, and then seek independent sources of alpha either inside or outside the firm.

Cautions and Caveats

While UAA products offer potentially attractive risk/return characteristics, investors should be aware of some of the structural and timing risks of these approaches:

- The leverage used in these products in theory exposes investors to higher risks and potentially very large losses in certain market situations. Much of the leverage in these products is concentrated in fixed income exposures to increase the return to equity-like levels. When the yield curve inverts or there is a sharp rise in short rates and/or long rates, these products can be exposed to outsized losses in the fixed income portion of the portfolio because they are borrowing at short-term rates to increase exposures to longer-duration bonds. Bridgewater's All-Weather posted its largest losses (in the historical simulation) in periods of inverted yield curves or sharply rising rates such as 1981-82, 1990, and 1994. Larger overall portfolio losses also could occur if correlations rise among the different asset classes in a declining market environment. This was true for Bridgewater's All-Weather portfolio in August of 1998, with a one-month decline of -8.4%. The counter-argument of UAA providers is that these potential sources of loss are still smaller than those incurred by traditional portfolios with high equity weightings in bear markets, and that a weighting in low correlation commodities helps mitigate these risks. Furthermore, they counter that traditional portfolios heavily weighted to equities also have embedded leverage, because the underlying companies themselves are leveraged with debt on their balance sheets.
- Leveraged exposure to fixed income in the current environment could also create timing risk. Bond yields are near their lowest levels in 40 years, and prospective returns are unlikely to approach those of the great bond bull market of 1982-2002.
- While many of the derivatives traded in UAA products are exchange-traded futures, they also include other types of over-the-counter derivatives and swaps that incur counter-party risks.
- Many of these products provide little transparency about their beta allocations, degree of total leverage, and specific sources of alpha (if any). They are "alpha-beta soups" with minimal disclosure of the specific ingredients or recipes.
- With the exception of Bridgewater's All-Weather, most UAA products have short track records and have not been tested in different market environments. Even Bridgewater's All-Weather portfolio has not been tested in a prolonged, severe environment, such as one in which the yield curve remained inverted over a relatively long time horizon.
- A key driver of risk/return in these products is the combining of asset classes assumed to have low correlations of returns. If correlations were higher than assumed or change in unanticipated ways over time, performance could be negatively impacted. High correlations among asset classes during extreme market events (such as the Long-Term Capital collapse of 1998) might have an outsized negative impact on performance that leverage would only exacerbate.
- Some of the beta-only UAA products have competitive flat fees (50 bps) that are only slightly higher than those of enhanced index funds, and lower than those of many traditional benchmark-sensitive active products; however, others charge hedge fund-type performance fees for the combined beta and

alpha product that may seem excessive for the high proportion of the returns that comes from beta exposures.

- Commodity exposure is common to most of the UAA products, but the track record of diversified long-only commodity indices is quite short, and return expectations uncertain. Further, backtesting of commodity index returns in these products is subject to a relatively high degree of error, since the construction of commodity indices has changed significantly over time. For example, the GSCI had no exposure to energy futures until 1982, yet energy now accounts for about 74% of the index. Commodity returns are a function of spot price returns, roll yield returns, and returns on cash collateral for commodity futures. However, there is no evidence that commodity spot prices over the long term have a positive Sharpe ratio or deliver real returns over cash. In fact, GSCI spot prices since 1969 (through November 2005) have underperformed CPI by a cumulative 21% over the last 36 years, and have underperformed cash by a cumulative 46% over the same period, while the long-term trend of commodity prices adjusted for inflation over the past 200 years has been downward.³ Most of the commodity index returns have come from the other sources of returns, which have an uncertain outlook. In particular, the roll yield, which generated much of the historical return, has been negative over the past couple of years. Nonetheless, the diversification properties and inflation-hedging characteristics of commodities make commodity investments attractive, even if prospective returns prove to be lower than those experienced in the past. We assume that the expected return for commodities is 5% in inflation adjusted terms, with a standard deviation of 19.
- The use of leverage for on-shore versions of these UAA products may result in unrelated business tax income for some tax-exempt investors, and the use of futures to gain exposures make these products tax-inefficient relative to holding the assets outright for long periods of time.
- Finally, one of the most significant, yet generally least appreciated, risks with these unconventional asset allocation approaches is the “maverick” risk incurred by investors adopting such an approach for most or all of their total portfolio. Such investors would at times be badly “out of step” with peers during periods when this strategy underperformed more conventional asset allocations (e.g., during equity bull markets) and this could well lead to their abandoning the strategy at the worst possible time—especially in light of the dependence on derivatives and leverage, with which few investors are truly comfortable. As John Maynard Keynes famously observed, “investors may be quite willing to take the risk of being wrong in the company of others, while being much more reluctant to take the risk of being right alone.”

³ Please see our upcoming paper on commodities for further discussion.

Appropriate Use of UAA in Investment Pools

UAA products could serve any of three basic roles in a portfolio:

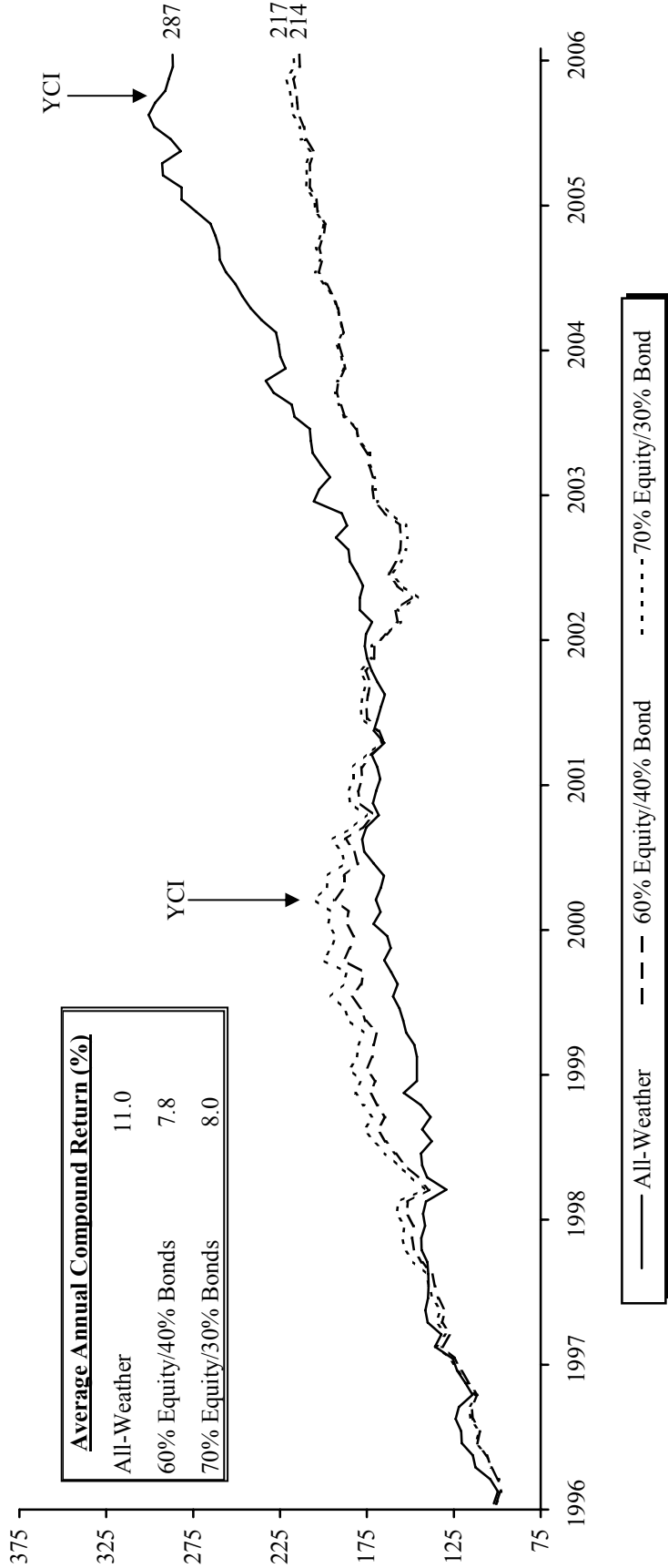
- **As one of several managers in a diversified alternatives or hedge fund program.** For such a role the individual products that include alpha sources and have absolute return targets of CPI +5% to 9% (e.g., Bain, High Vista) could provide good diversification and low correlation with other funds in such a program. Bridgewater's All-Weather and PanAgora's Risk Parity, as pure beta products, would probably be less appropriate for this role unless used in combination with their alpha products.
- **As a carve-out within an investment pool to complement the total portfolio.** This would work best with the UAA products that are the most transparent and that can most easily be customized and adapted to specific client risk tolerances, such as Bridgewater's All-Weather and PanAgora's Risk Parity. A 10% to 20% carve-out would be enough to make a difference, but not be so much as to introduce too much manager- or product-specific risk into the total investment pool. Because these products are derivatives-based, it would also be possible to combine such a carve-out with a portable alpha program.
- **As a substitute for the whole beta portfolio.** This is probably the most problematic application of UAA because it would magnify some of the issues involved with using these products: high exposure to derivatives and related risks, increased leverage, higher fees, timing risk relative to interest rates, manager-specific risk, shortness of track records, lack of transparency, and "maverick" risk. As pure beta products, only Bridgewater's All-Weather and PanAgora's Risk Parity would really fit this use, and of the two only Bridgewater has a credibly long product history. It might be tempting to try to replicate these UAA strategies in-house, but taking such an approach would require substantial in-house execution skills in derivatives trading, the rolling of futures contracts, and risk management.

EXHIBITS

Exhibit 1

COMPARATIVE PERFORMANCE OF BETTER BETA BOXES AND CONVENTIONAL PORTFOLIOS
Bridgewater All-Weather Portfolio (Live Returns Only) and Simplified Portfolio Benchmarks

June 1, 1996 - June 30, 2006
 Cumulative Wealth Index
 (May 31, 1996 = 100)



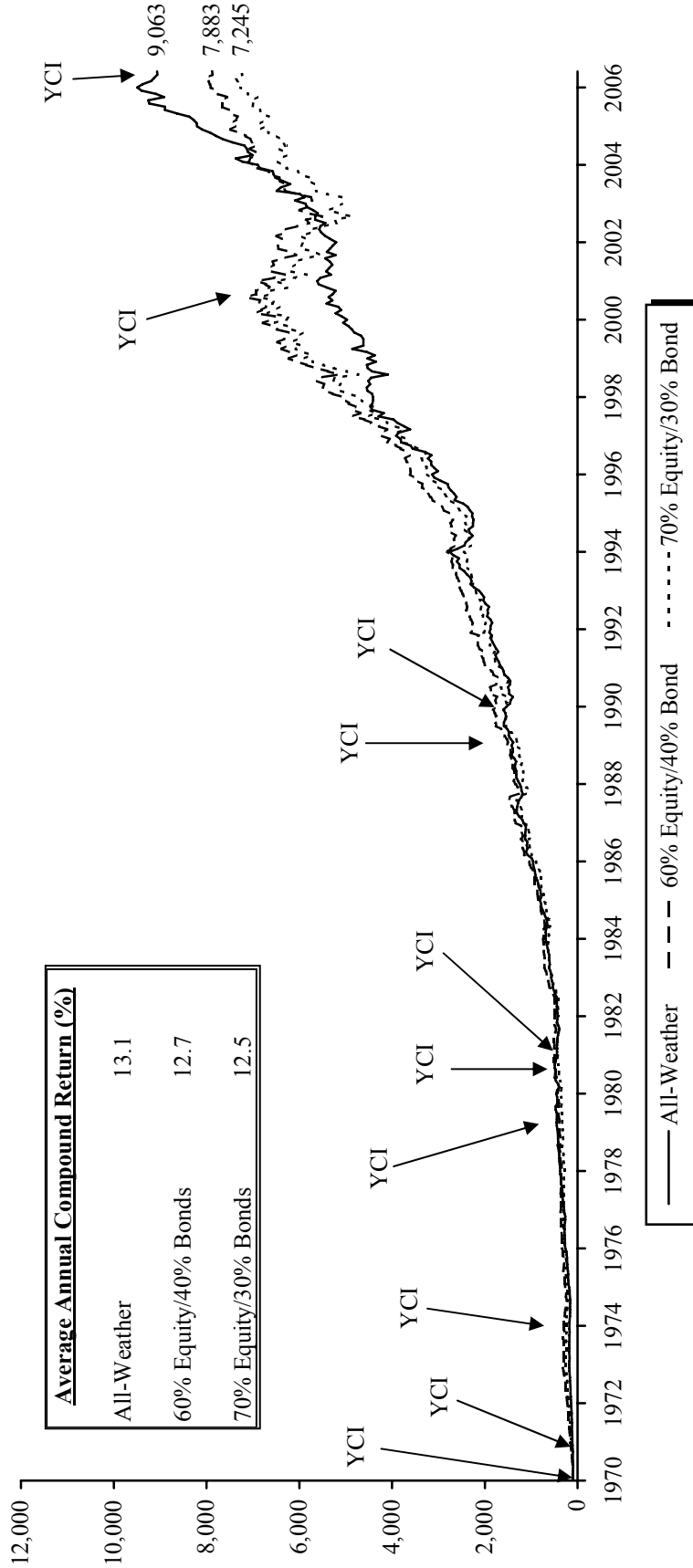
Sources: Bridgewater Associates Inc., Federal Reserve Board, Lehman Brothers, Inc., Standard & Poor's, and Thomson Datastream.

Notes: YCI = Yield curve inversion. YCI was calculated based on the spread between the 91-Day T-bill yields and the ten-year Treasury yield using monthly data. Equity series represent the S&P 500 Index returns and bond series represent the Lehman Brothers Aggregate Index.

Exhibit 2

COMPARATIVE PERFORMANCE OF BETTER BETA BOXES AND CONVENTIONAL PORTFOLIOS
Bridgewater All-Weather Portfolio (Simulated and Live Returns) and Simplified Portfolio Benchmarks

January 1, 1970 - June 30, 2006
 Cumulative Wealth Index
 (December 31, 1969 = 100)



Sources: Bridgewater Associates Inc., Federal Reserve Board, Lehman Brothers, Inc., Standard & Poor's, and Thomson Datastream.

Notes: YCI = Yield curve inversion. YCI was calculated based on the spread between the 91-Day T-bill yields and the ten-year Treasury yield using monthly data. Equity series represent the S&P 500 Index returns. Bond series represent the ten-year Treasuries from January 1, 1970 to December 31, 1972, Lehman Brothers Govt/Credit Index from January 1, 1973 to December 31, 1975, and Lehman Brothers Aggregate Index from January 1, 1976 to present. Bridgewater All-Weather returns are simulated prior to June 1996.

Exhibit 3

**PERFORMANCE OF BETTER BETA BOXES AND CONVENTIONAL PORTFOLIOS
DURING YIELD CURVE INVERSIONS**

Bridgewater All-Weather Portfolio (Simulated and Live Returns) and Simplified Portfolio Benchmarks

January 1, 1970 - June 30, 2006

Yield Curve Inversion Period	Duration (Months)	Average Annual Compound Returns (%)			
		<u>Bridgewater All-Weather</u>	<u>60% Equity/ 40% Bond</u>	<u>70% Equity/ 30% Bond</u>	
Jan 1970-Feb 1970	2	21.2	34.1	21.2	
Mar 1971	1	35.4	72.1	68.6	
May 1973-Oct 1974*	16	-2.9	-6.9	-4.7	
Oct 1978-Mar 1980	18	-6.5	1.0	2.0	
Sep 1980-Feb 1981	6	-15.6	10.7	13.1	
Apr 1981-Aug 1981	5	-22.3	-14.6	-15.3	
May 1989-Jul 1989	3	30.6	51.5	54.1	
Oct 1989	1	-11.3	-4.8	-10.2	
Jul 2000-Dec 2000	6	6.4	-4.8	-7.9	
Feb 2006	1	-13.8	3.7	3.5	

Sources: Bridgewater Associates Inc., Federal Reserve Board, Lehman Brothers, Inc., Standard & Poor's, and Thomson Datastream.

Notes: YCI = Yield curve inversion. YCI was calculated based on the spread between the 91-Day T-bill yields and the ten-year Treasury yield using monthly data. Equity series represent the S&P 500 Index returns. Bond series represent the ten-year Treasuries from January 1, 1970 to December 31, 1972, Lehman Brothers Govt/Credit Index from January 1, 1973 to December 31, 1975, and Lehman Brothers Aggregate Index from January 1, 1976 to present. Bridgewater All-Weather returns are simulated prior to June 1996.

* Yield curve was not inverted at the end of June and September 1974. These two months were not taken into account in the calculation.