Gathering Implicit Alphas in a Beta World

New questions about alternative assets.

Martin Leibowitz and Anthony Bova

In recent years, U.S. institutional funds have trended toward diversification into a broad range of asset classes. For the most part, this diversification has turned out to be quite productive, helping to materially increase their returns over time. Yet with the proliferation of asset classes, it has become increasingly difficult to gain a clear insight into fundamental risk characteristics of increasingly complex policy portfolios.

In a search for such a risk measure, we have examined a number of institutional-style allocations, from the traditional 60/40 equity/bond approach to more modern allocations, some with as many as 12 different asset classes.

The first step is to identify a primary risk factor. While the natural candidate is the exposure to U.S. equities, the equity percentage by itself is clearly an inadequate risk gauge for highly diversified funds. Some way is needed to capture the *implicit* beta effects contributed by growing allocations to alternative asset classes.

IMPLICIT BETAS AND TOTAL FUND BETAS

One path to these implicit betas led us to the covariance matrix that funds (or their consultants) use to develop recommended allocations. In essence, these covariance matrices represent market models for the statistically anticipated comovements among asset classes.

Exhibit 1 presents a sample of the components that might constitute such a covariance matrix.

From the assumed comovement of an asset class with U.S. equities, it is possible to calculate an implicit beta measure as in Exhibit 2. Then, for a given allocation, all the weighted beta values—both implicit and explicit—would

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EXHIBIT 1

Sample Return/Covariance Matrix

	Expected Return	Volatility	Correlations			
			REITs	US Equity	US Bonds	Cash
REITs	6.50	14.50	1.00	0.55	0.30	0.00
US Equity	7.25	16.50	0.55	1.00	0.30	0.00
US Bonds	3.75	7.50	0.30	0.30	1.00	0.00
Cash	1.50	0.00	0.00	0.00	0.00	1.00

Source: Morgan Stanley Research.

EXHIBIT 2

Beta: REITs

$$Beta = Correlation\ with\ US\ Equity\left[\frac{Volatility\ of\ REITs}{Volatility\ of\ US\ Equity}\right]$$

$$= 0.55\left[\frac{14.50}{16.50}\right]$$

$$= 0.48$$

Source: Morgan Stanley Research.

be rolled up to arrive at a *total* beta sensitivity for the fund as a whole.

Exhibit 3 is representative of the results when this total beta analysis is applied to a wide range of institutional allocations. Four surprises immediately emerge.

The first surprise is that virtually every U.S. pension, endowment, and foundation fund has a total volatility in the 10.00% to 11.50% range. While most funds knew their own volatility level, they were quite surprised to find that other funds, some of them looking very different, are also clustered within this same narrow volatility band.

The second surprise is that roughly 90% or more of this total volatility is explained by the correlation with U.S. equity. Thus, in spite of their diversification into multiple asset classes, most funds' volatility characteristics remain fundamentally unchanged—that is, dominated totally by equity risk.

The third surprise comes from calculating a total beta by combining the explicit equity percentage with the implicit betas based on the correlation of each asset class with equities. The resulting total beta values all fall into a common range between 0.55 and 0.65. When the total beta values are multiplied by the volatility of equity, the resulting beta-based volatility accounts for 90% or more of the allocation's total volatility. This volatility dominance applies even to the most highly diversified allocations with as little as 20% direct exposure to equities.

EXHIBIT 3

Model Portfolios with Clustered Betas and Volatilities

	A	B	S	C
Swing Assets				
US Equity	60%	60%	45%	20%
US Bonds		40%	35%	20%
Cash	40%			
Total Swing Assets	100%	100%	80%	40%
Alpha Core				
International Equity			20%	15%
Emerging Mkt Equity				5%
Absolute Return				10%
Venture Capital				10%
Private Equity				10%
Real Estate				10%
Alpha Core %	0%	0%	20%	60%
Total Beta	0.60	0.65	0.65	0.57
Expected Return	4.95	5.85	6.03	7.08
Total Volatility	9.90	11.17	11.43	10.45
Beta x Equity Volatility (16.5%)	9.90	10.80	10.75	9.45
% Volatility from Beta	100.0%	96.7%	94.1%	90.4%

Source: Morgan Stanley Research.

The fourth surprise is that the diversification into a broader range of asset classes does not significantly reduce a fund's total volatility but it does materially improve the expected return.

Exhibit 4 displays a computer-generated efficient frontier based on a return/covariance matrix. This graph confirms the narrow range of volatilities, even though the four model portfolios represent very different levels of diversification. Thus, we see that, contrary to conventional wisdom, diversification as typically pursued improves expected returns but has a relatively minor impact on fund volatility.

The early work on this total beta concept is described in Leibowitz and Hammond [2004] and Leibowitz [2005a].

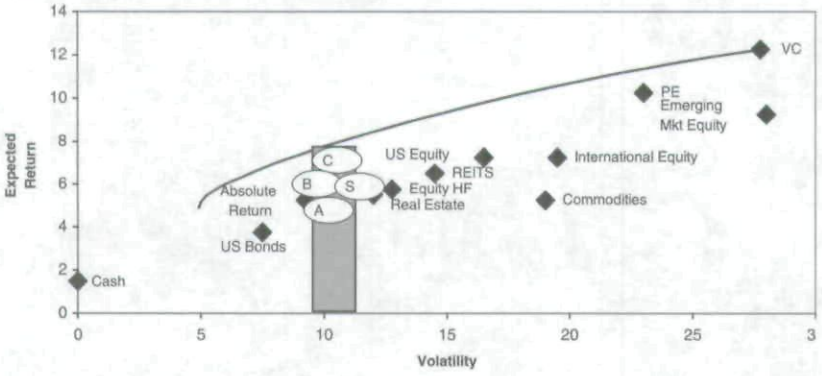
NEW QUESTIONS

These findings raise several questions:

- Why is fund volatility not reduced by the standard form of diversification?
- What is the nature of the incremental expected return derived from diversification?

EXHIBIT 4

Unconstrained Efficient Frontier with Model Portfolios



Source: Morgan Stanley Research.

- If these incremental returns can be achieved without increased volatility risk, why not pursue them more aggressively?
- Can such incremental return be stable in an increasingly competitive market?
- Why do funds appear to set their volatility risks at roughly the same level?
- What are the implications for the construction and monitoring of a fund's policy portfolio?

In this article we attempt to provide some answers.

BETA-PRESERVING DIVERSIFICATIONS

The natural tendency is to equate diversification with risk reduction. Yet diversification can take many forms; some reduce a fund's risk, while others may actually increase it.

Exhibit 5 illustrates three ways to diversify a standard 60/40 portfolio into an allocation that is 20% real estate investment trusts. First, with 20% equities as the funding source, both the beta and the volatility are obviously reduced. Second, funding with 20% bonds increases both the beta and the total volatility. The third case, however, is more representative of the actual practice among institutional funds—the funding source is some combination of high-beta equity and low-beta bonds.

This exchange of a mid-beta funding package for a new mid-beta asset results in a relatively unchanged portfolio beta. With the total beta preserved, the volatility remains about the same, even as the expected return increases.

IMPLICIT ALPHAS

The incremental returns in Exhibit 5 are derived from the return/risk characteristics of REITs.

As shown in Exhibit 6, one component (2.88%) of REITs expected 5.00% return premium can be ascribed to its implicit beta value of 0.48 and its corresponding comovement with U.S. equities. After this beta-based return is deducted, the residual return of 2.22% can be viewed as an implicit alpha, in the sense that this incremental return can be obtained without significant increases in the fund-level volatility.

These implicit alphas are passive in that there is no presumption of positive outcomes from the selection of superior managers or from direct active investment by an asset manager.

By definition, these implicit alphas will always have a zero correlation with U.S. equity. At the same time, the original covariance model may imply that these implicit alphas themselves are subject to a high level of non-equity-related volatility risk. Because of the generally fragmented allocation and weak cross-correlations, however, the sum total of these model-based alpha volatilities will typically have a minimal impact at the portfolio level.

Thus, allocation to such an alternative asset will directly add its weighted alpha to the fund's return and its weighted beta to the fund's beta, but its model-based alpha volatility will have only a minimal impact at the total fund level.

HUNTING ACTIVE ALPHAS, GATHERING IMPLICIT ALPHAS

The term *alpha* has multiple meanings in the financial literature. One common usage refers to the hoped-for incremental return derived from superior security selection, accessing the best-performing managers, or successful timing strategies. Such active alphas call for a higher skill level or a greater flexibility to achieve favorable outcomes.

In Leibowitz [2005b], we use the metaphor of a "beta-grazer" to describe index funds that seek simply low-cost index-like exposure to the traditional equity and fixed-income markets. The term "alpha hunter" is used to characterize the highly proactive effort needed to track down and capture the fleeting opportunities derived from

EXHIBIT 5

Diversification and Total Volatility

	Portfolio Allocation			Risk/Return Characteristics			
	Equity	Bonds	REITs	Total Beta	Total Volatility	Total Return	% Vol from Beta
	60%	40%	0%	0.65	11.17	5.85	96.7%
Diversifying Move into 20% REITs Funded with:							
20% Equity	40%	40%	20%	0.55	9.82	5.70	92.4%
20% Bonds	60%	20%	20%	0.72	12.26	6.40	97.3%
10% Bonds 10% Equity	50%	30%	20%	0.64	10.99	6.05	95.6%

Source: Morgan Stanley Research.

EXHIBIT 6

Implicit Passive Alpha: REITs

Total Return	6.50
Less Risk-Free Rate	(1.50)
REIT Risk Premium	5.00
Less (REIT Beta 0.48 * Equity Risk Premium 5.75)	(2.88)
Implicit REIT Alpha	2.22

Source: Morgan Stanley Research.

market inefficiencies and anomalies. These active alphas are intrinsically zero-sum in the sense that for every gain by one market participant, there must be a corresponding loss (or forgone opportunity) taken from some other participant.

Unlike these active alphas, the implicit alphas described above are broadly accessible through a semi-passive process of moving incrementally toward a more effective strategic allocation. These implicit alphas can serve a valuable role in acting as vectors that point the fund toward more optimal allocations. They are thus not zero-sum, in that they need not be direct takeaways from other market participants.

In a sense, taking advantage of the implicit alphas that are truly available—and digestible—lies somewhere between passive beta-grazing and aggressive hunting for active alphas. To push the metaphor one step further, implicit alphas can enrich the diet of herbivores who are willing to raise their sights to include a limited amount of low-hanging fruit and berries (and maybe even nuts). Going even further into the metaphoric wilderness, it perhaps should be noted that some berries could be poisonous. Finally, while omnivores are fairly rare in nature, they may be the most popular species in the financial markets.

Implicit alphas are thus quite distinct from active alphas. Both forms of alpha offer the potential for enhanced return, and they can sometimes be combined to create exceptional opportunities. All the same, they are quite different concepts, and are pursued in different ways.

- Active alphas must be hunted.
- Implicit alphas can be gathered.

THE ALPHA WALL

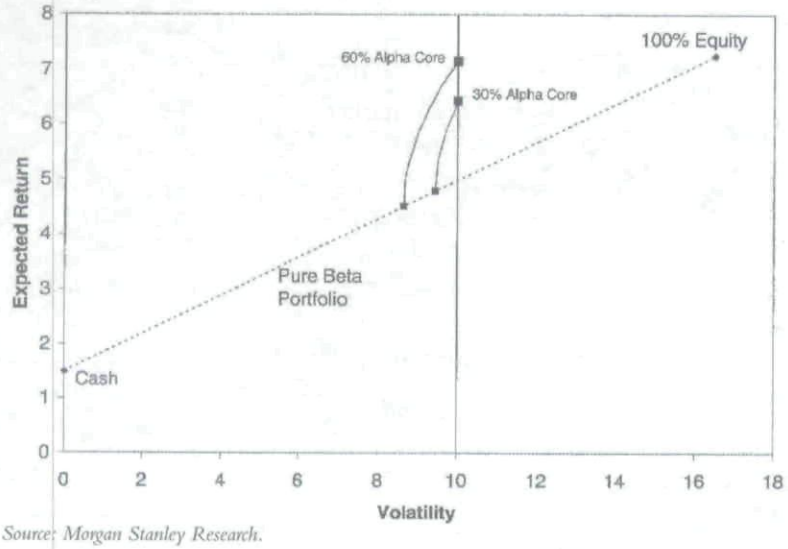
The term *alpha core* can be used to refer to the sub-portfolio of alternative assets. We have said that the beta risk in most institutional portfolios tends to overwhelm any volatility impact from an alpha core. Thus, rather than the oft-cited diversification argument, the alpha core's real benefit is return enhancement.

The nature of this beta domination and the core's return-enhancing role can be dramatically illustrated by transforming the standard return/risk diagram into the alpha *wall* format shown in Exhibit 7. The dashed line is the cash/equity line. The wall coming from this point represents the added return derived from an increasing weight assigned to the alpha core. When this assigned core percentage reaches 30%, we have a portfolio with an enhanced total return at the prescribed 10% volatility.

The key point of the alpha wall diagram is to show how the addition of the core enhances the return/risk characteristics of the overall portfolio. With a low core percentage and a high level of beta domination, the fund return climbs almost vertically up the alpha wall, reflecting the significant return enhancement obtainable with only minimal added volatility.

The diagram also shows how the portfolio's return and risk would shift if additional weight could theoretically be added to the given core structure. As the core weight moves beyond 30% to 60%, the wall bends increasingly to the right, as the incremental volatility addition becomes more significant—but the total volatility can be kept at a specified 10% target level by a modest reduction in the fund's total beta exposure.

EXHIBIT 7
The Alpha Wall



Source: Morgan Stanley Research.

ALPHA CONSTRAINTS AND BEYOND-MODEL RISKS

Asset classes with positive implicit alphas can provide the fund with a higher expected return with little impact on total volatility. Why not pursue this apparently free lunch more vigorously? A related question is why not concentrate the alternative allocation on the single highest-alpha source, rather than scattering the weight over multiple alpha assets.

In practice, the allowable allocation into any alternative asset is always subject to constraints. These constraints play a fundamental role in the ultimate outcome of any allocation study. The position limits may be based on a variety of factors: underdeveloped financial markets, liquidity concerns, limited access to acceptable investment vehicles or first-class managers, problematical fee structures, regulatory or organizational strictures, peer-based standards, headline risk, or insufficient or unreliable historical data. Regardless of any optimization results based upon a given return/covariance matrix, it is these beyond-model risks that determine the percentage weight ultimately assigned to the various alpha sources.

Some limits placed on acceptable asset classes may be due to a lack of familiarity, unfounded fears, or absence of peer support. Other constraints may have a very rational basis in valid beyond-model considerations, even when a precise articulation of the reasoning may be elusive. Whatever the reason, at any given point in a fund's evolution, some of these constraints will be binding and thereby limit the available allocations. Consequently, moving to higher percentages in the alpha core may not be possible if it tips one or more asset classes over their set limits.

Thus, unlike the simple example illustrated in Exhibit 7, a given alpha core may not be scalable in a continually proportional fashion, whether by increased allocation weighting or by leveraging. At some point, one or more of the asset classes will approach its limit, requiring a revision in the core's percentage composition as it grows in weight or aggregate exposure.

It should also be noted that while the total volatility is the standard measure of fund risk, there are other risk concerns that deserve mention. In addition to the beyond-model risks, there are other risks associated with the fund's ultimate ability to meet its (possibly complex) set of liabilities. (This issue of surplus risk is a critically important factor in many settings, but it is beyond our asset-only focus.)

Fund-level tracking error represents the statistical deviation of returns measured relative to the passive policy portfolio. The year-by-year deviations between any two funds can be significantly different even when both funds have the same level of total volatility over time. These year-by-year deviations may also have to be considered in assessing the various concerns associated with peer group comparisons.

THE ALPHA/BETA MATRIX

The alpha/beta matrix in Exhibit 8 attempts to classify the various forms of portfolio management styles using an alpha/beta template.

- The *beta grazers* are the index funds that passively feed off the return premiums that are broadly available to all.
- The *gatherers* are funds that expand their allocation by diversifying, but passively, into a wider range of asset classes with the intention of accessing the implicit alphas.

EXHIBIT 8
Fund-Level Alpha/Beta Structures

Metaphor	Betas	Management Styles	Nature of Alphas	Fund Level Effects: Fund Volatility	Fund Level Effects: Model Risk	Fund Level Effects: TE vs. Policy
Beta Grazing	Stapled	Passive Investing in Broad Equity/Fixed Income Markets	Risk Premium	Fundamental Source	Very Low	Zero
Alpha Hunting	Beta-Targeted	Risk-Controlled Active Equity Market Neutral Active Extension	Active Management	Low	Low	Low
Alpha Gathering	Correlation-Based	Diversification into New Asset Classes Concentrated Long-Only Some Hedge Funds	Implicit Correlation-Based Passive Alphas and Selection Alphas	Low	High	Low/High
Alpha Foraging	Free Range Betas	Beta-Agnostic Opportunistic Investment Some Hedge Funds Macro Funds	Hyper Active	High	High	High

Source: Morgan Stanley Research.

- The alpha *hunters* are the active managers who aggressively seek excess returns from the exercise of superior investment skill. Unlike gathering, hunting is an intrinsically zero-sum activity.
- Then there are the *foragers*, who venture forth and seek returns wherever they can be found.

All of these return-seeking pursuits can prove valuable if pursued successfully, but they differ materially in the character of the risks entailed—and the nature of their fund-level effects.

Benchmark-centric alpha hunting should ideally have risks that take the form of a moderate level of uncorrelated tracking error (TE). Benchmark-sensitive alpha hunting will involve higher levels of tracking error and some degree of beta variability.

The gathering of implicit alphas in new asset classes may entail a substantial degree of uncorrelated TE, but the more significant risk in expanded diversification arises from the beyond-model risks. While these risk factors may not be formalized, they reveal themselves at the fund level through the de facto limits imposed on the non-traditional asset classes.

Free-range foraging can incur any and all of these forms of risk. The fund-level impact depends on the intensity of the risks and the percentage of the overall allocation deployed in each form of active management.

Clearly, these activities can be mixed and matched. For example, an alpha-gatherer fund may well elect—at the outset or subsequently—to become a hunter and pursue active alphas—as well as the passive alphas—implicit within the new asset classes.

REVERSING THE STANDARD OPTIMIZATION

The allocation process has historically proceeded from a basic equity/fixed-income allocation and then evolved step-by-step toward some alternative assets. Now the central role of the alpha core in determining the fund's expected return argues for consideration of a reversal of the conventional approach.

One problem with any formal mean-variance analysis is that it often devolves into a tortured optimization process. Using the raw input of returns, volatilities, and correlations for different asset classes, the initial computer-based solution will usually be unacceptable. Certain asset classes will be given weights that far exceed credible limits. The typical next step is to impose a sequence of ad hoc constraints, until repeated optimization produces a portfolio that becomes palatable.

There is nothing fundamentally wrong with this procedure when a reasonable portfolio is the final outcome.

Yet the mathematical and computer complexities involved in the standard optimization can obscure the more intuitive decision process that should play a fundamental role in the final outcome.

One way to address this problem is to accept some approximations in order to obtain a simpler and more naturally intuitive framework. It turns out that the alpha/beta framework can provide a path to this simplification. Moreover, this alpha/beta approach may even better reflect how portfolios are structured in practice.

The underlying philosophy is that any set of market assumptions is inherently imprecise—at best. Therefore, it is far better to develop approximate guidelines than to become enmeshed in a complex methodology that promises theoretically refined solutions, but obscures the role that should be played by intuition, judgment, and common sense.

The key is to use the alpha/beta approach to decompose a portfolio's assets into two groups: 1) the alpha core, and 2) the swing assets, i.e., the traditional liquid assets—U.S. equity, U.S. bonds, and cash—that are used relatively freely to help shape the portfolio's overall risk structure.

The alpha core approach presumes that the fund will first determine the maximum acceptable limits for each asset class outside the basic swing assets. The next decision will be to combine these asset choices into a coherent alpha core subportfolio. The composition of this subportfolio will generally involve both intuitive and qualitative considerations that go well beyond the explicit quantitative characteristics embedded in the return/covariance matrix.

For modern portfolios, structuring the alpha core demands concentrated research, judgment, and deliberation, both by fund sponsors and by their managers. While they might not use the specific term, alpha core, we believe large funds already devote major effort to this decision, at both the allocation and the implementation levels.

Once an acceptable alpha core has been formed, its return and risk characteristics can be transformed into basic alpha/beta terms. Taken together, these core assumptions then allow the allocation problem to be decomposed into three basic steps: 1) determining the size limits for asset classes that can be used to form the alpha core; 2) developing an optimal alpha core, given these constraints; and 3) incorporating the swing assets to adjust the portfolio's desired balance of return and risk.

The basic idea is that, rather than using the standard optimization procedure with its sequential constraints, a better portfolio may be obtained from a more deliberate (and perhaps more deliberated) confrontation of the many issues that go into forming an acceptable alpha core.

RISK AS RISK TO THE POLICY PORTFOLIO

One question raised by this analysis is why most funds have total fund volatilities that fall within the same 10%-11% range.

A fund's strong reluctance to being forced to shift away from its policy portfolio may play an underappreciated role in setting the fund's risk tolerance and in shaping its policy portfolio in the first place. When an institution shifts to a lower-risk or higher risk allocation, it departs from the policy portfolio that it has considered to represent an optimal allocation.

Institutional funds are understandably reluctant to move away from these preestablished policy portfolios. Indeed, a fund's rebalancing behavior is specifically geared toward sustaining this portfolio structure. Most institutional managers would view it as particularly unfortunate if the fund were forced by an extreme market movement—or by the fund's investment committee—to abandon its presumably optimal approach and shift into a lower-risk strategy.

Potential trigger points for such mandated shifts lurk in the background of every investor's mind, however, acting as fence posts that define the outer limits of tolerable risk. These fence posts may also play a feedback role in setting the policy portfolio's overall risk level in the first place.

For example, suppose adverse movements of 15%-20% are considered the tolerable outer limit of the risk envelope. Then, a fund might reasonably wish to control the prospect of any such triggering event by reducing this probability to a minimal level. It can be shown that a combination of reasonable shortfall constraints leads total betas toward the 0.55-0.65 range and portfolio volatilities of 10%-11%, i.e., exactly where risk levels are located in practice.

Under the banner of diversification, funds adopt different mixes of active alpha hunting or implied alpha gathering that they find suitable as a way to enhance their expected return. Yet there seems to be a surprising commonality in their determination to avoid roughly the same level of catastrophic risk. With the equity beta serving as the dominating risk factor for virtually all institutional funds, it is likely that any such catastrophic event would be the result of—or at least associated with—a major equity downturn. Consequently, it may not really be too

surprising that total fund betas are generally found to lie in the narrow range of 0.55–0.65.

STRESS BETAS

A fund's beta essentially determines its total volatility level, but the implied betas and the fund's volatility are both based on the probability distribution of overall returns. In fact, the critical risk event may actually be an adverse market move so severe as to force a reconsideration of the current policy allocation. Such a sharp market movement would likely create short-term technical conditions leading to tightened correlations and higher betas across virtually all financial assets.

Moreover, any persistent downturn is likely to be driven by a significant decline in equities. In this case, the conditional correlations and betas would tend to remain quite high—even after relaxation of the shorter-term technical tightening described above. In other words, in a persistent severe downturn, even a highly diversified portfolio is likely to exhibit a much higher equity correlation than normal. This persistent effect is quite distinct from the more frequently mentioned sudden-move tightenings.

A severe stress situation may be the defining risk scenario that determines the structure of a fund's policy portfolio. Thus, to the extent that the total fund beta is a precursor of these higher stress betas, it may prove to be

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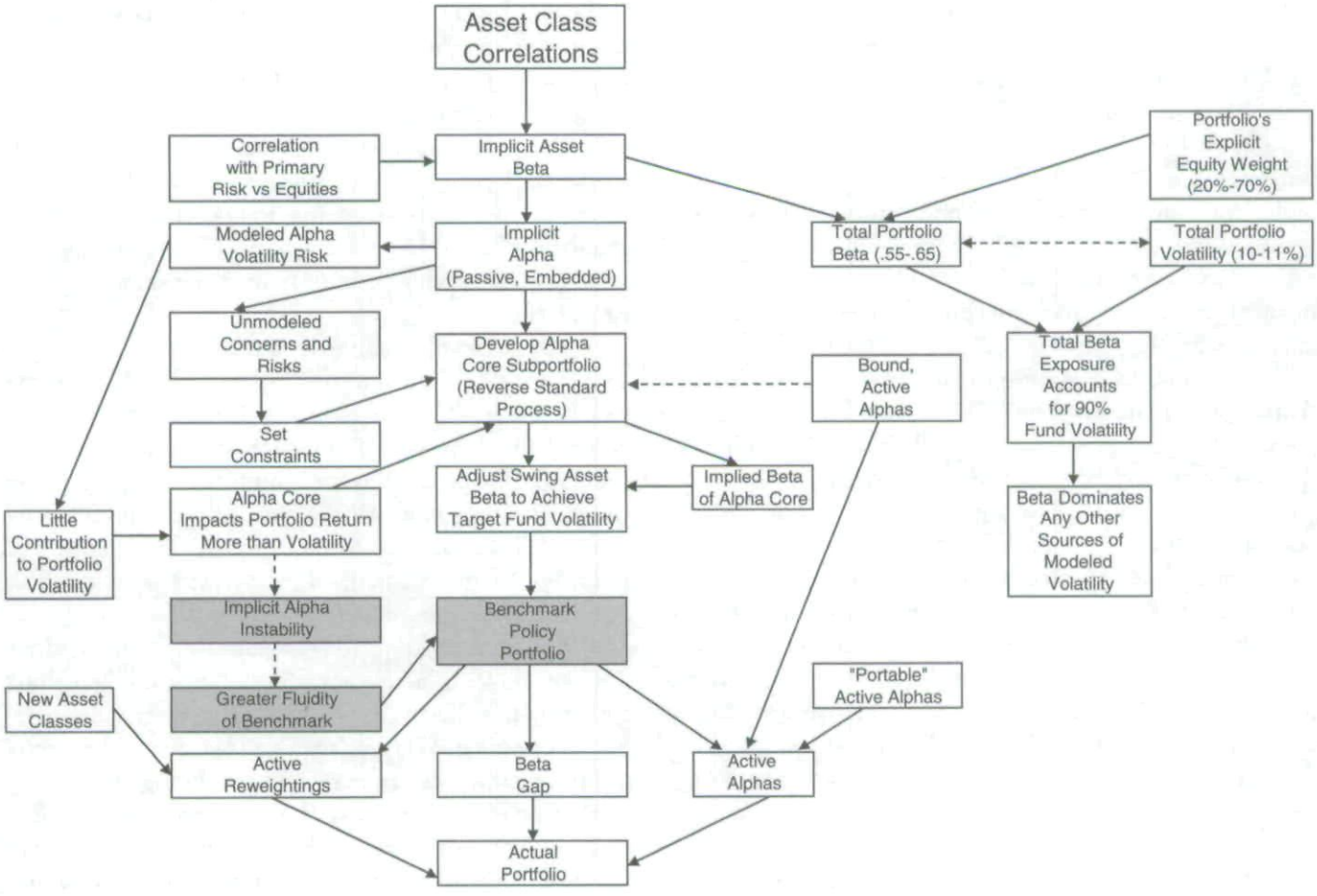
EXHIBIT 9
Overview of Beta-Based Asset Allocation



Source: Morgan Stanley Research.

a better gauge of the fundamental risk characteristics than the fund's standard volatility measure.

ALPHA EROSION UNDER BETA DOMINATION

The growing acceptance (and even fashionability) of alternative asset classes engenders new dollar flows that could lead to a reduction in prospective alpha returns. When the source of an alpha is limited, return erosion would be the natural evolution as a market moves toward a rational equilibrium under the pressure of such new demand.

In reality, there are always multiple sources of demand for a given asset class. As the alphas are pushed down by one new source of demand, they will at the same time be driving away other preexisting sources of support. At some point, the net effect of attracted new demand (or supply) will just balance the exit of the earlier supporters, and going-forward returns will then reach some non-zero equilibrium value.

GREATER FLUIDITY IN THE POLICY PORTFOLIO

The schematic flow chart in Exhibit 9 traces out a number of the implications of this beta-based analysis.

Positive implicit alphas will act as a powerful magnet for any beta-dominated fund. As funds that control large pools of assets become increasingly flexible in their allocation philosophy, they can deploy significant dollar flows into these positive alpha sources, and almost surely lower the prospective alpha returns.

This dynamic environment has major implications for the development and monitoring of policy portfolios. One such implication is that the return/covariance models may become increasingly unstable, with the rapidly evolving role of alternative assets in institutional portfolios. The return/covariance assumptions are the fundamental ingredients that shape the fund's policy portfolio at any given time. Fund flows that are so overwhelming as to discernibly depress an asset's prospective alpha returns can quickly affect the continuing validity of the policy portfolio.

A stable policy portfolio serves many valuable organizational needs, but the intrinsic return instability in alpha sources would seem to argue that policy portfolios with broad-based alpha cores should be subject to more frequent review and to a more fluid decision-making process.

REFERENCES

Leibowitz, Martin L. "Allocation Betas." *Financial Analysts Journal*, vol. 61, no. 4 (July/August 2005a), pp. 70-82.

———. "Alpha Hunters and Beta Grazers." *Financial Analysts Journal*, vol. 61, no. 5 (September/October 2005b), pp. 32-39.

Leibowitz, Martin L., and P. Brett Hammond. "The β-Plus Measure in Asset Allocation." *The Journal of Portfolio Management*, vol. 30, no. 3 (Spring 2004), pp. 26-36.

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