

Rebalancing a Global Policy Benchmark: How to Profit from Necessity

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Introduction

The need to rebalance institutional assets to a policy benchmark is a simple fact of life. While it may be possible for a fund sponsor to allow his portfolio to drift over a period of time, he will eventually have to address the misallocation this causes – having disproportionately overweighted the riskier asset classes and underweighted those asset classes with a more conservative level of risk. One sponsor may choose to do so by implicitly rebalancing whenever he directs new money into the portfolio or when he chooses the source for withdrawals, while another may choose to do so on a quarterly basis, before she is called upon to report to her investment committee. But however loosely the constraints on active moves away from policy benchmark are defined, the fact remains that a fund's assets and liabilities must appropriately balance, and drifting too far from the policy benchmark can prove disastrous when markets fail to deliver what one has been conditioned to expect.

This concern was most relevant last year when we are reminded that markets do not invariably march upward, despite what the prior five years lead us to expect. After two decades of a bull market (and five years of a particularly raging one) many managers may have found it tempting to allow equity allocations to drift steadily upward. But there

are ways of increasing the allocation to the riskier assets far more wisely than a buy-and-hold strategy will do. And, while it may become harder to sing the praises of a rebalancing strategy from a return perspective during bullish times, the risks of abandoning the discipline inherent in rebalancing become most pronounced when rebalancing appears most unappealing. In these times, it becomes ever more crucial to incorporate the risk control aspects of rebalancing into a rational approach toward controlling one's asset allocation.

After briefly reviewing the passive allocation alternatives that are most commonly adopted, we will discuss a number of topics that focus on the benefits of rebalancing, both from an alpha perspective and a risk control perspective. Lastly, we present an appendix that includes tables of results to various domestic and global rebalancing strategies over the last 30 years.

Simple Rebalancing Alternatives

Portfolios may be rebalanced for various reasons and in different ways. Here are some of them:

- **Calendar Rebalancing.** The calendar has advanced a month, quarter or year. The asset mix is rebalanced back to its policy benchmark.
- **Range Rebalancing.** There are two approaches that can be used to keep the portfolio within a certain range of the benchmark at all times.
 - 1) **Rebalancing to the Allowed Range.** This assures that the asset mix does not depart from the extremes of the allowed range, but makes no attempt to return to benchmark at any time. For example, consider a 60 percent benchmark in equities with 5 percentage points of tolerance. This signals a sale of 1 percent when stocks reach 66 percent of the assets.
 - 2) **Threshold Rebalancing.** This approach assigns much more weight to the wisdom of the original policy. Here, a move beyond the tolerance range dictates a return back fully to the policy benchmark. Our hypothetical institution, with a 66 percent equity weight and 60 percent benchmark, would reduced its equity commitment by 6 percent of the assets in the same situation.
- **Opportunity-Based Rebalancing.** This enhancement to the rebalancing process simply recognizes that the optimal period or range to determine rebalancing events is not static. It has the powerful ability to allow the portfolio mix to drift longer and farther from benchmarks during trending periods and to rebalance frequently and with tighter effective ranges during mean-reverting times.
- **Drifting Mix.** One might (either purposefully or not) choose to “go with the flow”, drifting with the markets. The sponsor who adopts this “non-strategy” runs the risk of not meeting his fund’s liabilities and ignores the probable risk-aversion of his Committee. Although one would expect very long-term returns approaching those of stocks¹, the risk in the meantime (both portfolio risk and the resultant career risk!) make it unlikely that either the strategy or the sponsor will remain in place to enjoy these returns.

We have included a number of exhibits in an appendix to this study that essentially updates the findings of our previous rebalancing studies^(2, 3, 4, 5). First, there is a simple comparison of the various methods of rebalancing for a Global Balanced Portfolio and secondly a discussion of asset class rebalancing, both from a global and US domestic perspective.

¹ Which would occur over several decades as the portfolio drifts further and further into stocks. For example, over the 50 years ending in December 1999, a portfolio which began with a 50%/50% stock/bond mix in 1950, with stock dividends reinvested in stocks and bond coupons reinvested in bonds, would have drifted to a 98%/2% mix by December 1999, based on data from Ibbotson Associates. Accordingly, the drifting mix would have delivered returns approaching equity market returns and risk comparable to stock market risk. Obviously, this is not a practical rebalancing alternative, since it assumes more risk than most institutional

investors could tolerate.

² “Managing the Asset Mix” (First Quadrant L.P., 1990 #2).

³ “Policy Asset Allocation: Plugging the Performance Drain” (First Quadrant L.P., 1991 #3).

⁴ “Rebalancing: Why, When, How Often?” (First Quadrant L.P., 1992 #3)

⁵ “Rebalancing to Benchmark” (First Quadrant L.P., 1994 #4)

Focus on Alpha

Having agreed that rebalancing is to some extent inevitable in order to keep a basic level of control on strategic risk, the challenge then becomes one of attempting to enhance the return delivered by a rebalancing process. This alpha can be quite powerful because 1) it is earned on the entire fund and 2) it overlays, rather than replaces, the more dramatic alphas that may be generated by active management of the underlying assets. After researching the rebalancing process with a focus on adding alpha, we have identified two alternatives that notch up the portfolio risk in a controlled fashion, in order to intelligently address concerns about the opportunity cost of rebalancing during a bull market. These alternatives are daily rebalancing and opportunity-based rebalancing.

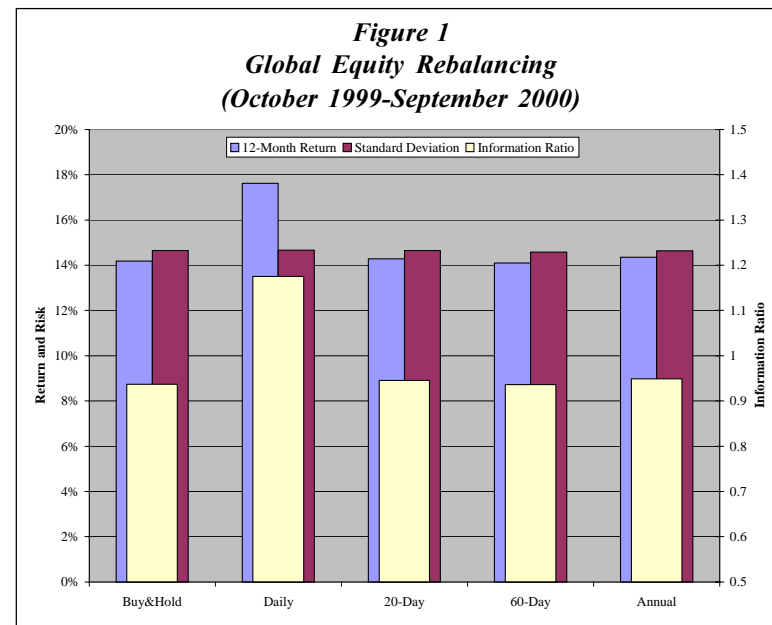
Global Equities: Daily Rebalancing over Mixed Periods

The benefits of daily rebalancing are most apparent when reversion to the mean occurs frequently, which is not true in markets that are dominated by a strong bull or bear trend. When longer periods of time are analyzed, the marginal difference in the alpha attributed to different types of rebalancing strategies virtually disappears, as there are periods (during trending market environments) when less frequent rebalancing (every 3-12 month) outperforms and complementary periods in which short-term rebalancing outperforms. It is when we focus on these latter periods, in which markets deliver mixed or turbulent returns, that the benefits of daily rebalancing are most obvious -and most appealing to a manager or fund sponsor for whom recent performance is of vital importance.

⁶ We intend to update this analysis to include the final quarter of 2000 prior to when this paper is released in monograph form.

⁷ We assume all assets are traded via CFTC approved futures markets at an average cost of 10 b.p. per transaction.

Figure 1 compares the results over the 12-month period prior through September 2000⁶ in order to illustrate this benefit over a markedly choppy period for equity returns. While global equity markets earned about 14% as a cap-weighted average during this period, they did so through a pattern of returns that has shown both dramatic surges and downdrafts. During this period, the rebalancing and drifting portfolios performed nearly identically, in terms of both risk and return, with the exception of a daily rebalanced portfolio. That portfolio was able to garner an extra 350 basis points after modest transaction costs⁷.



Opportunity-Based Rebalancing

Opportunity-based rebalancing is a novel concept for conservatively adding value within a rebalancing framework. In essence, it works by rebalancing at different times in different markets, depending on their expected future performance. If assets that previously outperformed appear priced to offer advantageous future returns, or assets that previously underperformed continue to appear overpriced, the process may allow assets to drift away from benchmark; otherwise, it rebalances. In essence, it allows for a longer interval between rebalancing events when the markets appear to be trending and triggers more frequent rebalancing when markets appear to be mean reverting. One market might be rebalanced 12 times in a year, whereas another might be allowed to drift unconstrained over that same year. This process is intended to tailor the rebalancing methodology so that it can be applied in a more optimal fashion, considering current market conditions.

Some practical comments are necessary here. Obviously one cannot rebalance a single market and leave other allocations untouched without changing the portfolio value. In order to avoid that, other markets that have an active allocation in the opposite direction are adjusted (always toward benchmark) in order to maintain 100% investment at all times. Another constraint that we practice is to allow a market to pass from an underweight position to overweight (and vice versa) solely through market movements and never through active allocation. For example, if French equities now appear attractive and have been previously underweight, the process may rebalance this market fully to benchmark, but does not have the freedom to add any additional French exposure.

• Performance

In general, the process can be expected to add between 10-50 basis points of value over monthly rebalancing, depending on the aggressiveness of the strategy, its benchmark and ranges, at roughly the same risk as passive rebalancing. In the following example (Table 1), it adds 23 basis points of value, with the identical level of risk to monthly rebalancing.

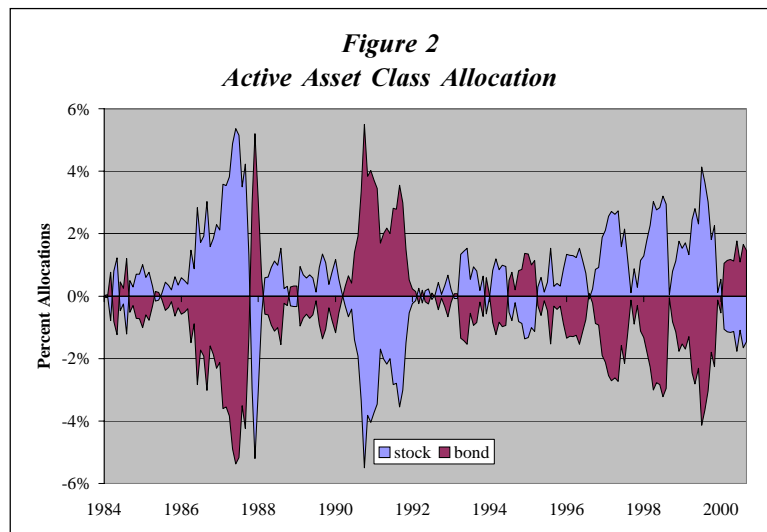
*Table 1
Global Rebalancing Strategies
January 1984-September 2000*

	Rebalancing Strategies			Drifting Mix
	Opportunity-Based	Passive Rebalancing		
		Monthly	Quarterly	
Annualized Returnⁱⁱ	13.43%	13.20%	13.26%	13.26%
Standard Deviation	9.47%	9.47%	9.43%	10.29%
Return/Risk Ratio	1.42	1.39	1.41	1.29

• Allocation

An asset-class level view of the active portfolio allocation over the simulation period is shown below in Figure 2. While the strategy is global, with each market either drifting or rebalancing distinct from the other markets, a chart of the individual active allocations has too many markets to interpret easily; aggregating the markets into asset classes serves to simplify the picture.

As you can clearly see, some market environments encourage longer periods between rebalancing events, whereas others demand a more frequent return to the policy mix.



Focus on Risk

In Appendix 1: Comparing Rebalancing Alternatives, we update our study in 1991⁸ study of the effects of Domestic US Rebalancing and note that the drifting mix achieves a final equity allocation of 80% after 33 years (Table 7). But what might be the future implications for a fund that followed this non-strategy? What is the impact on the funding level of such a fund if a market correction should occur? What are the other drawbacks of this lack of discipline? This section is intended to serve as a cautionary tale about the risks of a drifting mix and, as such, is applicable to all funds, global or domestic.

⁸ "Rebalancing: Why, When, How Often?" (First Quadrant L.P., 1992 #3)

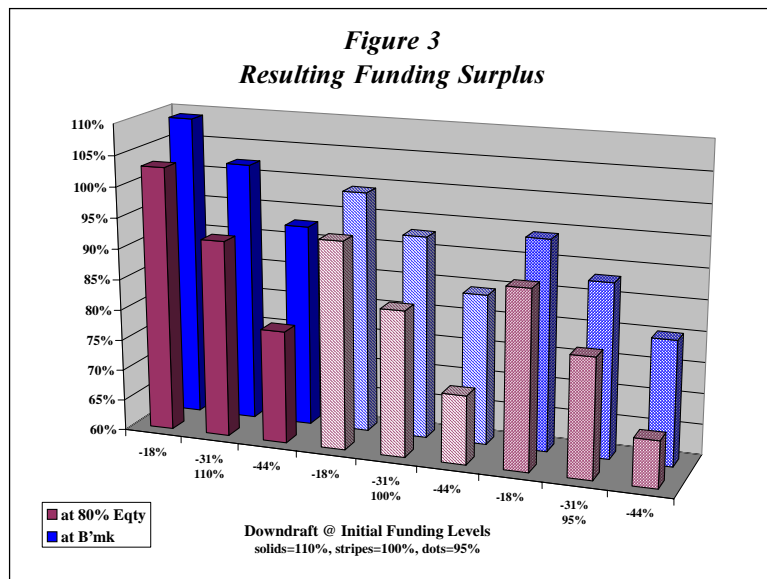
Value at Risk

While equities are often the outperforming asset class over a medium- to long-term horizon, individual months or quarters can easily show significant losses for equities relative to bonds. For example, US stocks have outperformed in 60% of the quarters since 1926, in 54% of the quarters since 1980, and in only 1 of the last 4 quarters (through September 2000). The underperforming quarters include relative losses of 18% to 44%, in the three periods discussed.

Figure 3 shows the impact on funding level for three hypothetical funds, with initial funding levels of 110%, 100% and 95%. Were these portfolios to experience market downdrafts equivalent to these extreme historical ones, the portfolios would see far greater losses had they not been rebalanced. For example if a portfolio starts with a funding level of 110%, even the most extreme downdraft (in which stocks underperform bonds by 44%) only reduces the funding level to 93%, whereas the same event would cause the unbalanced portfolio (with 80% equity content) to drop to a dangerously low funding level of 78%.

While no single quarter of performance will make or break the average pension fund, a downdraft this extreme could certainly cause an investment committee to reconsider in whose hands the fate of their fund should be allowed to rest in the future.

**Figure 3
Resulting Funding Surplus**



Single Shot Strategy

Are there other drawbacks to this lack of discipline beyond the value at risk of the portfolio? Yes, primarily that the strategy has diminishing returns at higher equity levels and is thus essentially a “single shot” strategy.

Let’s imagine that a sponsor ignores these dire warnings and allows his portfolio to remain at 80% equities despite the mismatch with his purported policy benchmark. What rewards can he expect should his gamble pay off? A single quarter of positive earnings does not have the same impact as a quarter of negative earnings, so let’s examine this scenario over a longer term. Precisely, let us consider the performance of the fund going forward, if the next 33 years are identical to the last.

A glance back at the comparison of US domestic rebalancing alternatives over the past 33 years (Table 7 in the appendix) shows that the drifting mix outperformed by 42 basis points on an annualized basis. Disappointingly, the subsequent 33 years would provide a mere 9 basis points of outperformance, a pretty slim reward for such a risky strategy (Table 2).

**Table 2
Hypothetical Domestic US Rebalancing
(if next 33 years matches last 33 years)
Benchmark = 80% Equities**

Asset Classes		Annualized Return ⁱⁱ	Std Deviation	Return/Risk Ratio	Equity Allocation	
					End	Average
Equities		12.79%	15.23%	0.84	100.0	100.0
	Bonds	7.94%	10.65%	0.75	0.0	0.0
Drifting Mix		11.99%	13.51%	0.89	93.2	84.3
Quarterly Rebalancing		11.90%	13.05%	0.91	80.0	80.0

Rebalancing to a Higher Risk Mix

A different fund might have a policy benchmark that contains 80% equities. In other words, rather than starting with a 50% equity benchmark back in 1968 (leading to returns shown in Table 7), this fund’s sponsor would have been managing to an 80% equity benchmark during the last 33 years (leading to returns shown in Table 2). What does this fund sponsor learn from our last exercise? There is both good news and bad news for her.

• **The Good News**

The good news is that the higher equity content does earn her 119 basis points of added-value, when comparing her quarterly rebalanced, 80% equity benchmark to the previous sponsor’s quarterly rebalanced, 50% equity benchmark. This compensation far

and away dwarves any value-added that changing the frequency of rebalancing might provide. This is discussed in greater detail in the following section, *Jazzing up Your Rebalancing Strategy*.

- The Bad News

Quite simply, while the sponsor with a 50% equity benchmark could add 42 basis points by allowing his portfolio allocation to drift upward, our sponsor with an 80% equity benchmark only stands to gain 9 basis points by the same risk-tolerant strategy. However, as she's already added over 100 basis points simply through applying his different policy mix, she's unlikely to be especially glum. Actually, the bad news is not so bad at all!

Jazzing Up Your Rebalancing Strategy

While there is a both a risk and a cost to allowing your portfolio to drift, a buy and hold strategy will almost certainly outperform a rebalancing strategy in years when a raging bull market reigns. If we buy and hold a portfolio over a four or five year window⁹, the portfolio weights will drift over this period and the assets that outperform will grow to represent a larger portion of the portfolio. We view this additional return as the compensation for taking on greater risk. However, the "cost" of rebalancing is not as great as you might naturally assume and the best way to jazz up the returns to a rebalancing approach is not to abandon it outright.

⁹ This is an heroic assumption in the real world, in which cash inflows and withdrawals, not to mention periodic reviews of policy benchmarks, force constant asset allocation decisions.

¹⁰ This period was "cherry-picked" to illustrate what might occur during times of extreme return differentials between markets. Other periods would show a lesser cost of rebalancing or even a high return to rebalanced portfolios.

The Cost of Rebalancing

A naïve approach toward assessing the cost of rebalancing might easily lead one to assume a greater cost than is indeed experienced. For example, in the period from January 1996 - April 2000¹⁰, stocks outperformed bonds tremendously in the US (by 18.16%, annualized), but the value-added as a result of the higher equity component in the drifting mix is not a product of this return differential and the difference in average equity weights to the two strategies. In fact, the actual value-added is just over half as much as this naïve assumption might lead one to believe.

In Table 3, we first show the initial, end and average allocations to both a quarterly rebalanced portfolio and a drifting portfolio that began with a 50% allocation in both equities and bonds. We then show the returns to each portfolio, as well as to portfolios containing 100% equities and 100% bonds. The last two rows illustrate the difference between the "naïve value-added assumption" as computed by the following formula and the actual value-added to the drifting mix relative to the quarterly rebalanced portfolio (due to its higher level of average equity allocation).

While the "cost" of rebalancing can be high during markets that show a strong, persistent trend, it is rarely as high as one might imagine. In the example below, rather than adding 185 basis points through allowing one's equity allocation to drift with market movement, the drifting strategy adds under 100 basis points. The difference between these two numbers can be considered as the positive value that a rebalancing strategy adds through its contrarian tendency to buy low and sell high.

$$\text{naïve VA assumption} = (\text{return differential} * \text{average equity allocation gap})$$

Table 3
US Domestic Rebalancing
When One Asset Class Dominates
January 1996-April 2000

	Quarterly Rebalancing	Drifting Mix	Asset Class Portfolios	
			Equities	Bonds
Initial Equity Allocation	50.0	50.0	100.0	0.0
End Equity Allocation	49.4	66.5	100.0	0.0
Average Equity Allocation	50.2	59.6	100.0	0.0
Annualized Return	15.07%	16.04%	23.94%	5.78%
Naïve VA Assumption		1.85		
Actual VA		0.97		
Risk-Adjusted Rebalancing Gain		0.88		

Making the Most of your Risk Budget

But let us now question what benchmark to use for the most valid comparison between a buy and hold strategy and a rebalancing strategy. Rather than comparing strategies with the same initial equity allocation, it might be more appropriate instead to compare ones for which the rebalancing benchmark is set to:

- 1) the average allocation of the drifting mix; or
- 2) the final allocation of the drifting mix.

¹¹ Measured as the standard deviation of the returns over the period. In fact, the quarterly rebalanced portfolio that has an average allocation equal to that of the buy and hold strategy has a slightly lower risk.

The first is likely to have similar historical risk¹¹, whereas the latter has a similar VAR going forward. In the latter case, it is like saying to an investor “if you know that you are willing to tolerate the risk related to holding 66.5% in equities at the end of the period, then you might as well start out with that at the outset.”

Unsurprisingly, the higher equity benchmark strategies dominate. Most notably, the quarterly rebalanced portfolio that uses the average allocation of the drifting mix as its benchmark adds 77 basis points of value over the drifting mix, while *reducing* the portfolio risk by 23 basis points.

The answer is simple. First decide on the maximum equity allocation, as justified by your future liability stream, utility and risk tolerance, and then set this as your benchmark equity allocation. This simplistic method is virtually guaranteed to beat any other passive strategy (rebalancing or drifting) that maintains an equivalent or lesser equity allocation and portfolio risk level.

Table 4
US Domestic Rebalancing
January 1996-April 2000

	Quarterly Rebalanced to:			Drifting Mix	Asset Classes	
	50.0	59.6	66.5			
Initial Equity Allocation	50.0	59.6	66.5	50.0	100	0
End Equity Allocation	49.4	59.0	66.0	66.5	100	0
Average Equity Allocation	50.2	59.8	66.7	59.6	100	0
Annualized Return¹¹	15.07%	16.81%	18.05%	16.04%	23.94%	5.78%
Annualized Risk	9.54%	10.56%	11.38%	10.79%	15.93%	8.14%
Return/Risk Ratio	1.58	1.59	1.59	1.49	1.50	0.71

Conclusion

A buy and hold strategy leads to a drifting portfolio mix that is both untenable in most situations and unprofitable when compared to the appropriate alternative. Rebalancing is imperative from a risk control standpoint and is the only passive option that systematically addresses the policy benchmark. Even though a drifting mix may appear to outperform in a strongly trending market, in which one asset class dominates all others, rebalancing still wins relative to drifting mix strategies with similar risk; it is difficult to find a scenario in which rebalancing fails to outperform on a risk-adjusted basis. Rebalancing strategies also consistently outperform drifting mix strategies at times when the major asset classes have similar returns.

The alternative of allowing the mix to drift without limit is neither practicable nor prudent. The essential question, therefore, is not whether to rebalance, but instead how to do so. Any systematic rebalancing strategy will provide the risk control mechanism that is the core benefit of this class of strategies. Choosing amongst rebalancing alternatives thus becomes an exercise of enhancing alpha.

In this paper, we discussed three elements in the process of enhancing the returns to a rebalancing strategy. The first is the decision on rebalancing frequency and methodology. One option is to undertake daily rebalancing, which will add value most during turbulent periods and will perform similarly to longer-term rebalancing approaches over most multi-year windows. Less aggressive rebalancing strategies are almost as effective in any but the most turbulent markets. Secondly, in the past it has been critical to set your rebalancing benchmark to contain the maximum equity content consistent with your risk

considerations; this would allow you to most benefit from the higher risk premium on equities, while maintaining necessary risk limits. With a diminished risk premium this may no longer be true; if stock and bond returns are similar in the years ahead, as we think is highly likely, the merits of rebalancing should become more significant and more obvious than in the trending bull markets of the past. Thirdly, an approach that seeks to shift the frequency of rebalancing in an opportunistic fashion presents clear benefits, when implemented in a disciplined fashion¹².

¹² This may merit consideration as well. This differs dramatically from ad-hoc shifts in a fund's strategic benchmark in that it proactively assesses the future returns to the asset classes and markets in the portfolio, rather than reactively buying assets after they performed well.

Appendix 1: Comparing Rebalancing Alternatives

Global Balanced Portfolio

All disciplined rebalancing strategies, either period or range-driven, that include the discipline of rebalancing fully to benchmark will experience similar returns over most periods, while the drifting mix may outperform or underperform over various periods, depending on the degree of trending in the markets and the return differential between asset classes and markets. In Table 5 below, the performance of various rebalancing strategies are compared to a drifting mix for a global¹³ balanced 60%/40% portfolio over the last 17 years. The returns net of transaction costs span a tight, 15 basis point spread, and the return-to-risk ratio of the worst rebalancing strategy (rebalancing to range, with a return/risk ratio of 1.35) is only slightly lower than the best (quarterly rebalancing, with a return/risk ratio of 1.41). The drifting mix has a return over this period equivalent to those of the rebalancing strategies, but underperforms on a risk-adjusted basis (return/risk ratio = 1.29).

Table 5
Global Rebalancing Strategies
January 1984-September 2000

	Rebalancing Strategies					Drifting Mix
	Periodic Rebalancing			Range Rebalancing ⁱ		
	Monthly	Quarterly	Annual	to the Range	to B'mk	
Annualized Returnⁱⁱ	13.20%	13.26%	13.19%	13.11%	13.11%	13.26%
Standard Deviation	9.47%	9.43%	9.62%	9.71%	9.67%	10.29%
Information Ratio	1.39	1.41	1.37	1.35	1.36	1.29

ⁱ Ranges are ± 5%.

ⁱⁱ All returns shown are net of simulated transaction costs of 10 b.p.

Asset Class Rebalancing

The shortcoming of rebalancing on an asset class level is due to the number of markets available to allocate across. When there are several markets with similar mean returns in a portfolio (e.g. multiple equity markets), then the rebalancing process can add value by the contrarian stance of selling out of recently successful markets (which are often resultantly overpriced) and buying into recently underperforming markets (which are often a good value). When we have a single equity market, bond market and cash market amongst which to allocate, a drifting mix will eventually outpace the rebalanced portfolio, due to its inexorable overweighting of equities. In this situation, rebalancing remains critical in controlling the risk level, which will otherwise spiral out of control. But the safer rebalancing approach is likely to garner lesser returns *due to the lower risk that is targeted*.

• Domestic US Rebalancing

Domestic rebalancing mandates have been particular successful recently in controlling risk, but at a certain cost in return. Table 6 below shows that quarterly rebalancing from 1968-2000¹⁴ held the risk level down to 10.57% on an annualized basis, 66 basis points lower than the drifting mix over that same period, but at a cost of only 11 basis points in performance. But the true risk implications are shown by comparing the end positions in the drifting mix to that of the rebalanced strategies. Were the US stock market to crash tomorrow, the drifting mix would experience that loss over nearly 75% of the portfolio, as opposed to only 50% of the portfolio being at risk in the rebalanced strategies.

¹³ Including only CFTC-traded futures markets

¹⁴ A starting date of 1968 was used in "Rebalancing: Why, When, How Often?" (First Quadrant L.P., 1992 #3) and is used here to allow direct comparison to that original work.

Table 6
Domestic US Rebalancing
1968-2000

		Annualized Return ⁱⁱ	Standard Deviation	Return/Risk Ratio	Equity Allocation	
					End	Average
Asset Classes	Equities	12.13%	15.29%	0.79	100.0	100.0
	Bonds	8.55%	10.42%	0.82	0.0	0.0
Drifting Mix		10.79%	11.23%	0.96	74.5	58.2
Rebalancing	Monthly	10.63%	10.59%	1.00	50.0	50.0
	Quarterly	10.68%	10.57%	1.01	50.0	50.1
	Annual	10.64%	10.65%	1.00	50.0	50.7
	to the Range ⁱ	10.62%	10.63%	1.00	47.8	51.4
to Benchmark ⁱ		10.56%	10.64%	0.99	47.6	50.6

• Global Asset Class Rebalancing

This analysis can also be done on the aggregated global equity and bond asset classes. The results (Table 7) similarly show a slide into the riskier assets in the drifting mix, which causes higher volatility (59 basis points higher than the quarterly rebalanced mix). In this case, the returns are virtually indistinguishable across strategies. However, a sponsor who does not rebalance will experience a downdraft over a broader portion of the fund if a correction in global equity prices occurs.

Table 7
Global AC Rebalancing
January 1970-September 2000

		Annualized Return ⁱⁱ	Standard Deviation	Return/Risk Ratio	Equity Allocation	
					End	Average
Asset Classes	Equities	12.17%	14.33%	0.85	100.0	100.0
	Bonds	9.34%	7.83%	1.19	0.0	0.0
Drifting Mix		11.02%	9.78%	1.13	65.4	60.2
Rebalancing	Monthly	11.00%	9.21%	1.19	50.0	50.0
	Quarterly	11.09%	9.19%	1.21	50.0	50.2
	Annual	11.02%	9.23%	1.19	46.6	51.8
	to the Range ⁱ	11.03%	9.25%	1.19	51.6	53.9
to Benchmark ⁱ		11.14%	9.24%	1.21	49.2	51.7

ⁱ Ranges are $\pm 5\%$.

ⁱⁱ All returns shown are net of simulated transaction costs of 10 b.p.