



Investment

Management

Reflections

**REBALANCING:
WHY?
WHEN?
HOW OFTEN?**

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Periodic rebalancing of institutional portfolios is no mere option - it is unavoidable. No manager can allow such a portfolio to drift indefinitely with the market. He or she directs new money somewhere and withdrawals must have a source.

Failure to confront these obligatory decisions in a disciplined fashion is a functional abdication of the asset mix to the whims of the market. Why, then, do so many portfolios fail to implement a carefully planned rebalancing process?

The asset mix changes constantly and established policy receives occasional reviews, often at less than propitious times.¹ Interestingly, our work suggests that disciplined rebalancing can boost returns as much as a fairly large shift in the policy mix itself. For instance, the policy choice between 60 or 50 per cent in stocks means *less* than the decision on how and when to rebalance.

Rational investors set an explicit asset allocation policy incorporating allowable ranges for each major asset class. Suppose, for example, that a pension sponsor decides that the fund's optimal normal mix is 60 per cent stocks, 30 per cent bonds, and 10 per cent alternative investments. Typically, he or she might determine that rebalancing is necessary when any class strays more than five percentage points from its benchmark. We find this response inadequate. A disciplined framework for rebalancing is demonstrably superior to the laxness implied by this kind of range.

HOW DOES REBALANCING RELATE TO TACTICAL ASSET ALLOCATION?

Tactical asset allocation and rebalancing are related strategies tending to buy on weakness and sell into strength. They are not, however, identical. Using TAA is no substitute for a disciplined rebalancing structure.

Either we see the markets as efficient, making active asset allocation inappropriate, or we perceive them as offering periodic profit opportunities. In either case, we must be alert to any

drift in asset mix which affects the *non-tactical* portion of the asset base.

Consider an institution which allots 50 per cent of its portfolios to stocks, 30 per cent to bonds and 20 per cent to tactical asset allocation. Thus, it has established a 60/40 normal mix with leeway to deviate up to ten percentage points in either direction. With this structure, a falling stock market might prompt the TAA strategy to put 5 per cent more into stocks, while the non-TAA assets drift 5 per cent out of stocks. Volatile markets, causing drift in the non-TAA assets, can actually *cancel* TAA allocation shifts, which tend to counter recent market moves. To recapture the value of the TAA component, we still need to rebalance the non-tactical assets.

WHAT ARE OUR ALTERNATIVES?

Owners rebalance for various reasons and in different ways. Here are some of them:

- **Calendar Rebalancing.** The calendar has advanced a month, quarter or year (or the Finance Committee meeting is coming up). The asset mix is returned to "normal."
- **Rebalancing to Allowed Range.** This assures that the asset mix does not depart from the extremes of the allowed range. For example, consider a 60 per cent normal equity mix, with five percentage points of tolerance. This signals a sale of 1 per cent when stocks reach 66 per cent of assets.
- **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 all the way to the normal mix. Our hypothetical institution, with a 66 per cent stock weight and a 60 per cent policy, would reduce its equity commitment by 6 per cent of assets in the same situation.

¹ All too often, such adjustments are a reaction to recent events. For example, after the 1987 market crash, a number of large funds made a "policy" shift out of equities and then reversed the decision after the market had rallied 20 per cent. See "Managing the Asset Mix" and "Policy Asset Allocation: Plugging the Performance Drain" (First Quadrant Corp., 1990 #2, 1991 #3).

- **Drifting Mix.** One might (through inattention or ignorance) choose to “go with the flow”; drifting with the markets. The sponsor who adopts this alternative evidences little respect for policy or the probable risk-aversion of any Committee. Although one would expect very long-term returns approaching those of stocks (because the portfolio drifts further and further into stocks)², it is unlikely that he or she will remain employed to enjoy these returns.

This paper assesses the historical return and risk profiles of alternative rebalancing strategies, where a normal mix is 50/50 stocks and bonds. We find that more frequent rebalancing has been beneficial and that wide tolerance for departures from policy has not. Laxness has permitted

excessive portfolio exposures at just the wrong times. *Its surprising cost exceeds the reward one would expect from adopting ten percentage points more equity exposure!*

The fact that most of the return differences in Exhibit 1 seem small raises an uncomfortable question. Is rebalancing worth the bother? Yes. If a \$1 billion fund invests in markets which return 10 per cent annually over a decade, a single basis point return advantage compounds to \$3 million. Monthly rebalancing adds 17 basis points per year over the least disciplined rebalancing approach (9.16% versus 8.99%), roughly matching what we might expect from an additional 5 per cent in the risky asset. The resulting \$51 million gain, even spread over a decade, is hardly insignificant.

Exhibit 1
Risk and Reward for Various Rebalancing Guidelines
50/50 Normal Policy Mix (1968-1991)

	Stocks	20-Yr Bonds	Drifting Mix	Calendar Rebalancing		
				Monthly	Qtrly	Annual
Avg Return	10.59%	6.91%	9.09%	9.16%	9.12%	9.02%
Std Deviation	16.02%	11.76%	11.96%	11.47%	11.44%	11.53%
Treynor Ratio	0.661	0.588	0.760	0.798	0.798	0.782
Best Decade	17.55%	15.18%	16.74%	16.82%	16.80%	16.51%
Worst Decade	3.04%	0.07%	3.18%	3.55%	3.52%	3.48%
Avg Mix: Stocks	100.0%	0.0%	58.1%	50.0%	50.1%	50.9%
Bonds	0.0%	100.0%	41.9%	50.0%	49.9%	49.1%
Annual Turnover	0.0%	0.0%	0.0%	10.4%	6.2%	2.8%
	Rebalancing to Range			Threshold Rebalancing		
	45-55%	48-52%	49-51%	+/- 5%	+/- 2%	+/- 1%
Avg Return	8.99%	9.09%	9.10%	9.10%	9.10%	9.10%
Std Deviation	11.47%	11.45%	11.45%	11.49%	11.45%	11.46%
Treynor Ratio	0.784	0.794	0.794	0.792	0.795	0.793
Best Decade	16.49%	16.68%	16.73%	16.69%	16.71%	16.76%
Worst Decade	3.28%	3.48%	3.49%	3.49%	3.51%	3.47%
Avg Mix: Stocks	51.3%	50.4%	50.1%	50.4%	50.1%	50.0%
Bonds	48.7%	49.6%	49.9%	49.6%	49.9%	50.0%
Annual Turnover	1.0%	2.9%	4.8%	2.9%	5.8%	7.8%

² For example, over the 65 years ended 1990, a portfolio which began with a 50/50 stock/bond mix in 1926, with stock dividends reinvested in stocks and bond coupons reinvested in bonds, would have drifted to a 97/3 mix by 1990, 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.

Exhibit 1 has some other interesting messages.

- Diversification is worthwhile. Neither stocks nor bonds offer a reward/risk tradeoff (Treyner ratio) better than *any* of the balanced portfolios. A 50/50 normal mix offers *expected* reward halfway between stock and bond returns. With stocks returning 10.59 per cent, and bonds 6.91 per cent, we might anticipate a blended return of 8.75 per cent ($10.59 \times .50 + 6.91 \times .50$). Even the crudest of these rebalancing strategies adds at least 24 basis points to that expectation. The best adds 41 points. For our hypothetical \$1 billion plan, these translate to a rebalancing gain ranging from \$72 million to \$123 million over a decade.
- The drifting mix is surprisingly disappointing. Given the 368 basis point advantage of stocks over bonds, and with 58.1 per cent average equity exposure, we should have expected 30 basis points more return than from 50/50 rebalancing ($.081 \times 368$ basis points). In fact, the drifting mix did add 34 basis points to our “expected” 8.75 per cent; but it *underperformed* 50/50 monthly rebalancing by seven basis points, despite an 8.1 per cent larger average stock exposure. In short, the better forms of rebalancing were just that...better. Those who allowed their mix to drift paid the price of the higher volatility and lower Treynor ratio than any of the rebalancing disciplines.
- Over this period, regular monthly rebalancing returns dominated less active approaches. Should one infer that daily rebalancing is better still? Our data cannot say, but it seems plausible.
- Rebalancing to the outer bounds of a range performs far worse than the more aggressive alternative of restoring the policy mix whenever the market pushes us beyond our established range. Though emotion in the face of market turbulence argues that “things are different this time,” it has generally paid to bet the other way.

- Less restrictive rebalancing guidelines degrade results, particularly if we merely rebalance to the outer bounds of the allowed range.
- Threshold rebalancing performs very well, nearly matching monthly rebalancing, if we aggressively return to the normal portfolio. Surprisingly, the breadth of the thresholds seems to make no meaningful difference to returns.
- Effective rebalancing requires only slightly higher transaction costs since income reinvestment and allocation of cash flows can provide most of the necessary funds. Monthly rebalancing requires just 10 per cent annual turnover. If we assume that 6 per cent turnover can be achieved “for free” through reinvestment of income and targeting of portfolio cash flows, then we must incur only 4 per cent additional annual turnover. Such low turnover costs far less than failure to rebalance. The futures markets can help to make even these marginal costs smaller still.
- Note that the '80s provided gratifying returns to long-term investment markets and strategies to rebalance among them. The past is a useful teacher, but it is *not* prologue. The 1990s may well be less rewarding than the 1980s, increasing the relative weight of decisions which add basis points at the margin.

Establishing an optimum long-term normal portfolio is the most important strategic decision facing any investor. Nevertheless, twenty-four years of history suggests that devoting one day each month to rebalancing might add 41 basis points to the annual return of a 50/50 portfolio (9.16% versus 8.75%). That gain, equivalent to the reward expected from an 11 percentage point addition to the equity allocation, seems worthwhile to us.³

³ Stocks returned 3.68 per cent more than bonds. An 11 per cent policy shift should have affected returns by $.11 \times 3.68$ or 40 basis points. Had we known 24 years ago what the returns for stocks and bonds would be over that span, we would have expected:

Normal Mix	Return	Normal Mix	Return	Normal Mix	Return	Normal Mix	Return
0/100	6.91%	30/70	8.01%	55/45	8.95%	80/20	9.85%
10/90	7.28%	40/60	8.38%	60/40	9.12%	90/10	10.22%
20/80	7.65%	50/50	8.75%	70/30	9.49%	100/0	10.59%

WHAT OF TRADING COSTS?

Clearly, the modest turnover required to effect rebalancing would not incur much in the way of trading costs. The highest turnover strategy that we tested, monthly static-mix rebalancing, requires only 10 per cent annual turnover. Furthermore, the portfolios generate income to reinvest. That reinvestment, coupled with portfolio contributions and withdrawals, makes much of the turnover costless. We can simply reinvest income and contributions into the underweight asset class and take withdrawals from the overweight asset class.

The easiest way to cope with this portion of portfolio rebalancing is with a "sweep account." Suppose all stock dividend income and all bond coupon income goes into a centralized account. That money can be *synthetically* invested, using stock and bond futures, pending redeployment to one manager or another. As cash builds up to a size that is worth redeploying, determine

whether stocks or bonds are underweight, and fund either a stock or bond manager accordingly. Most plan sponsors have disdained this simple and efficient tactic.

If we use derivatives (futures and options) to effect the remaining turnover, total trading costs are likely to be less than 20 basis points, implying a *maximum* annual tariff of just two basis points (10 per cent turnover times 20 basis points trading cost) to rebalance monthly. That is far less than the benefit.

What if the fund cannot use derivatives? Trading in stocks and bonds is more costly. This holds true especially if we shift our asset mix by withdrawing assets from an equity manager, liquidating them, and giving the proceeds to a bond manager. In this most costly approach to rebalancing, we might pay 2 per cent in trading costs for shifts which cannot be accomplished by simply directing cash flows. Exhibit 2 displays the return implications of incremental trading costs for rebalancing strategies. These exclude

Exhibit 2
**Risk and Reward for Various Rebalancing Guidelines
 After 1% Trading Costs, 50/50 Policy Mix (1968-1991)**

	Stocks	20-Yr Bonds	Drifting Mix	Calendar Rebalancing		
				Monthly	Qtrly	Annual
Avg Return ¹	10.59%	6.91%	9.03%	9.10%	9.08%	9.06%
Net Turnover ²	0.00%	0.00%	0.00%	5.2%	2.5%	0.7%
Std Deviation	16.02%	11.76%	11.46%	11.47%	11.44%	11.49%
Treynor Ratio	0.661	0.588	0.788	0.793	0.794	0.788
	Rebalancing to Range			Threshold Rebalancing		
	45-55%	48-52%	49-51%	+/- 5%	+/- 2%	+/- 1%
Avg Return ¹	9.07%	9.08%	9.08%	9.09%	9.07%	9.04%
Net Turnover ²	0.2%	1.1%	2.1%	1.2%	3.1%	4.9%
Std Deviation	11.46%	11.45%	11.46%	11.45%	11.46%	11.47%
Treynor Ratio	0.784	0.794	0.794	0.798	0.792	0.789

¹ After subtracting 1 per cent trading cost each way for any "Net Turnover."

² We assume 0.5 per cent per month in cash flow (income available for reinvestment and other sources). Any rebalancing turnover which can be effected by directing these cash flows can be executed at no incremental cost, since that money would need to be invested in any event. This "Net Turnover" excludes deployment of cash flows.

from consideration any rebalancing trades smaller than 0.5 per cent in any month, since we can direct cash flows to effect these. Even a hefty 2 per cent trading cost is not a valid excuse for choosing not to rebalance institutional portfolios.

Another implication of our data is that one need not set normal *policy* mix with decimal point precision, so long as we follow its dictates faithfully. This is the hardest challenge. Anecdotal evidence persuades us that many investors failed to meet this challenge when it really counted: 1974, 1982, 1987 and as recently as 1990.

WHY NOT REBALANCE?

There are sound reasons for some investors not to rebalance. Most hinge on the difference between the “utility” of an investment and its return. For most investors, “success” (utility, in the parlance of finance theory) does not hinge solely on returns, but on some blend of return, risk and comfort. If an investment policy delivers 100 basis points more in returns, at a cost of spectacular volatility, few would select it. If an investment policy seeks profits by buying failed companies, either through junk bonds or “junk stocks,” most investors would see discomfort (disutility) as a partial offset to expected superior returns. We have long been taught that there is “no such thing as a free lunch!”

Nobel laureate Bill Sharpe constructs a logical framework for asset allocation⁴, helping us to understand why rebalancing and tactical asset allocation should enhance returns without increasing long-term portfolio risk. Better returns, without a corresponding increase in risk, can accrue only if rebalancing or tactical asset allocation is an uncomfortable strategy which many find intolerable. Recall that few investors were rushing to buy bonds during the peak yields of the early ‘80’s. Still fewer bought stocks in late 1974 or immediately after the market crashed in 1987.

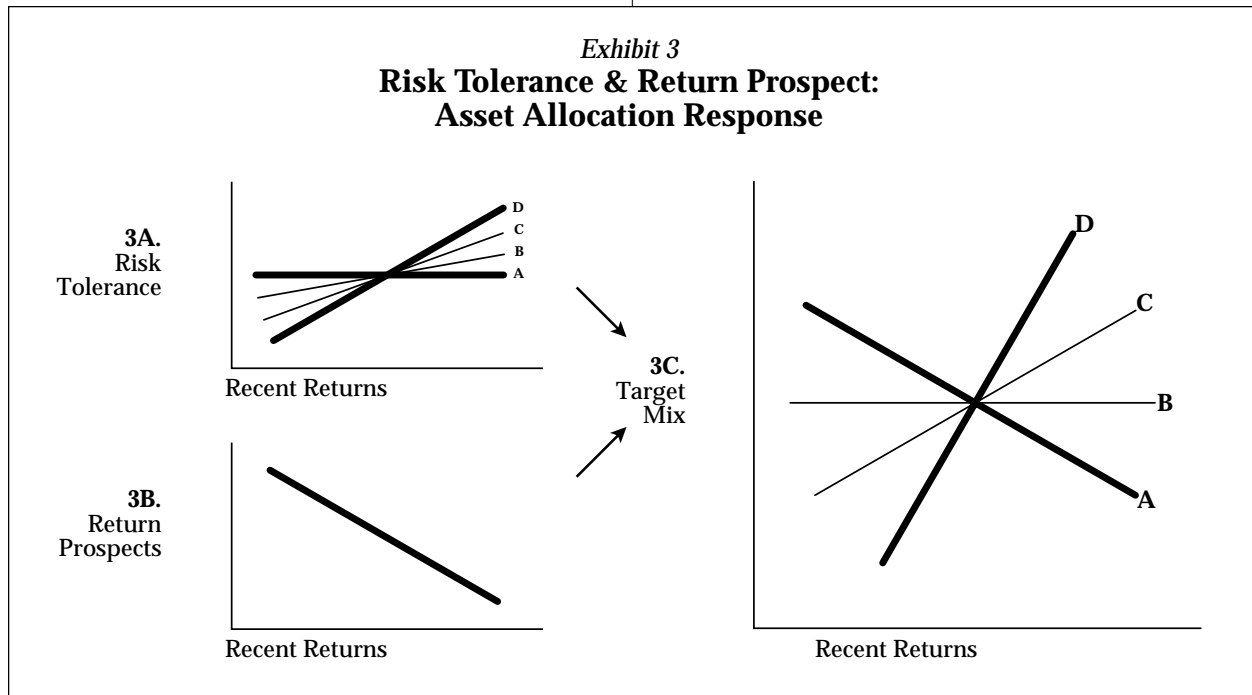
As markets rise, so does wealth. Unfortunately, it is easy to forget the simultaneous drop in prospective returns (Exhibit 3A). However,

different investors exhibit different responses to changes in their wealth. These differences are logically appropriate.

- Exhibit 3A shows that some investors (“A”) are blissfully unaffected by shifts in wealth. As they become more wealthy, their tolerance for investment risk is largely unchanged and they should be inclined to pounce on the opportunities offered by a declining market (see Exhibit 3C). These investors may be drawn towards tactical asset allocation. The improved return prospects which come with a newly-fallen market improve its attractiveness; with unchanged risk tolerance, this investor should buy.
- Others (“B”) will be somewhat sensitive to recent changes in wealth. As it rises, their tolerance for prospective investment risk also rises slightly. Investors with slight sensitivity to market movements will find that a market drop reduces their tolerance for risk, but only somewhat. For these improved return prospects for equities are just large enough to justify a return to a static mix. They are candidates for a simple rebalancing process.
- Yet another class (“C”) shows more sensitivity to recent market behavior. Here, risk aversion rises sharply as the portfolio declines. They should permit their asset mix to drift with the market. As it falls, so does their tolerance for risk, along with their exposure to it. They need not trade. These investors will permit their mix to drift with the whims of the market.
- Finally, we have others (“D”) reacting strongly to recent behavior. As the market rises, so does their tolerance for risk. As it falls, they want out. They are the preferred clientele for insurance strategies.

Therefore, we find a product for everyone. Rebalancing is not right for everyone because better long-term returns do not necessarily mean coincident improvement in utility. Rebalancing

⁴ William Sharpe, “Investor Wealth Measures and Expected Return,” *Quantifying the Market Risk Premium*, ICFA (Sep., 1989).



has historically improved returns without increasing risk. Theoretically it can continue to do so. But it succeeds only because total return and investor utility are not equivalent. When wealth is declining, many investors abandon risk. Rebalancing or tactical asset allocation aims to exploit their discomfort by selling them the insurance they demand.

Counterintuitively, rebalancing can provide comfort. Once adopted, the discipline allows a reassuring way to buy when it is difficult and sell when it is uncomfortable to sell. When a market is down, human nature conditions us to abhor further participation. Most committees will demur. *But*, if yours has endorsed rebalancing, it may be loathe to override itself in a crisis.

STAYING THE COURSE

The hardest challenge in institutional asset management is staying the course. Given a policy range for our asset mix; human nature will encourage us to believe that “things are different this time,” whenever that range is exceeded. It has happened to all of us too many times.

The hidden value of rebalancing overlaying a sound normal policy lies in dissuading committees from overreacting to pain. There is no reason to believe that generally efficient markets will compensate either conventional thinking or individual comfort. Reluctant to override strategies they themselves endorsed, committees are less likely to repeat others’ classic errors.

Given that we must rebalance, we should do it right. For the last 24 years, doing it right has meant frequent rebalancing directly to the normal policy stance. Our research suggests that *any* latitude for drift in asset mix incurs a cost in reduced portfolio performance.

This is not to say that active shifts in asset allocation are inappropriate. If an investor has a

discipline for tactical asset allocation deemed likely to earn rewards, allowing a tactical response in the asset allocation can be profitable. However, absent a tactical discipline, a drifting asset mix is still not suitable. Assets which fall outside of the allowed tactical range should not be allowed to drift; but be subject to systematic rebalancing.

Efficient rebalancing has yielded striking benefits. Though they may seem modest in basis point terms, these compound over time to multi-million dollar gains to any but the smallest funds. Indeed, our data suggest that a sponsor is better off rebalancing than by incurring the additional risk of committing ten more percentage points to the volatile asset. We should rebalance every asset, excluding those explicitly dedicated to tactical allocation.



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