SMART VOLATILITY MANAGEMENT IN A RISK ON/RISK OFF WORLD

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Key Ideas

Having learned first-hand how quickly stock-market volatility can destroy wealth, many investors now have an increased awareness of the importance of risk management. This has sparked widespread interest in low volatility equity strategies. Ideally, investors would be able to dynamically adjust the level of risk reduction in their portfolios so as to invest in a conventional core equity strategy during normal market environments, and switch, in a timely manner, to a more defensive portfolio during a crisis. Conventional wisdom suggests that solutions that require market timing are fraught with peril—it cannot be reliably done. We believe it can be done in a different way: by constructing a portfolio based on the level of market volatility instead of return forecasts, it will be able to adapt more readily to changing market conditions. This paper explores the value of applying a dynamic risk-reduction approach to equity management in varying volatility regimes.

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To illustrate these ideas, consider the following three idealized portfolios:

- Portfolio A implements a relative-risk strategy and achieves an excess return of 3% above the MSCI World Index every year (zero tracking error);
- Portfolio B implements a low volatility strategy and achieves an annual return equal to one-half of that of the MSCI World Index every year (high tracking error);
- Portfolio C responds dynamically to changing market environments, behaving more like Portfolio A during stable market environments and more like Portfolio B during highly volatile market environments.

As Table 1 shows, despite the spectacular skill of achieving outperformance with zero tracking error, Portfolio A still experiences a significant drawdown in absolute terms over the 2008-2009 period. Portfolio B would weather this period much better, but still experience a high tracking error that may be tolerable — indeed, desirable — during the crisis, but may equally pose significant challenges in normal market environments.

TABLE 1
MSCI WORLD INDEX AND THREE HYPOTHETICAL PORTFOLIOS

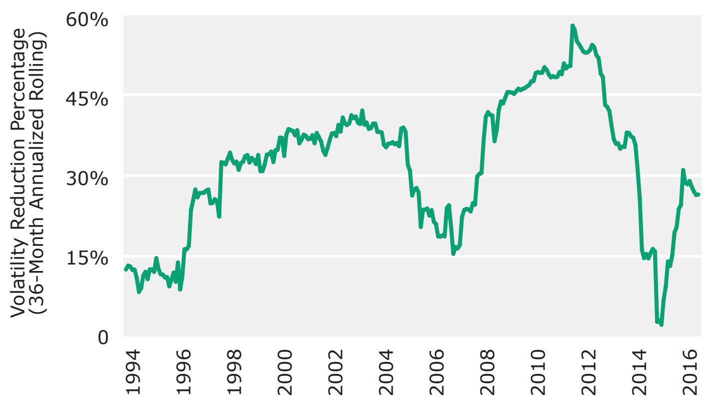
	2008	2009	2010	2008 – 2009	2008 – 2010
MSCI World Index	-40.3%	30.8%	12.4%	-22.0%	-12.3%
Portfolio A	-37.3%	33.8%	15.4%	-16.1%	-3.3%
Portfolio B	-20.2%	15.4%	6.2%	-7.9%	-2.2%
Portfolio C	-18.7%	9.2%	17.5%	-11.2%	4.3%

The results achieved by Portfolio C are both more realistic and more effective than either of the other portfolios. The portfolio's beta depends on the market volatility. It is comparable to that of Portfolio B in the midst of the crisis, but it quickly jumps up higher when it is safer to do so, resulting in a more robust recovery after a few years. Because of this dynamic risk reduction, the strategy is arguably superior at truly managing portfolio volatility over time than either of the other two strategies. For this reason, we propose that the term 'adaptive volatility' should not be synonymous with 'low volatility,' and should in fact be reserved for strategies, such as Portfolio C, which can adjust their volatility to accommodate different market environments.

Volatility is Volatile

To design an adaptive volatility strategy like that employed in Portfolio C, one must answer the following question: how does one decide when to switch between low volatility and core equity? A way to avoid relying on market timing can be found by considering one of the lessons of low volatility equity portfolio construction, where the amount of volatility reduction already depends on the market levels of volatility. This is the case when the portfolio optimization is designed in such a way as to minimize the portfolio volatility subject to the constraint of at least matching the market return over the long term. As shown in Figure 1, when market volatility is higher (e.g., around the times of the 2000 and 2008 crises), the market is more inefficient and substantial reduction in risk is more readily achievable.[1]

FIGURE 1
VOLATILITY REDUCTION FOR A HYPOTHETICAL LOW VOLATILITY STRATEGY COMPARED TO THE MSCI WORLD INDEX

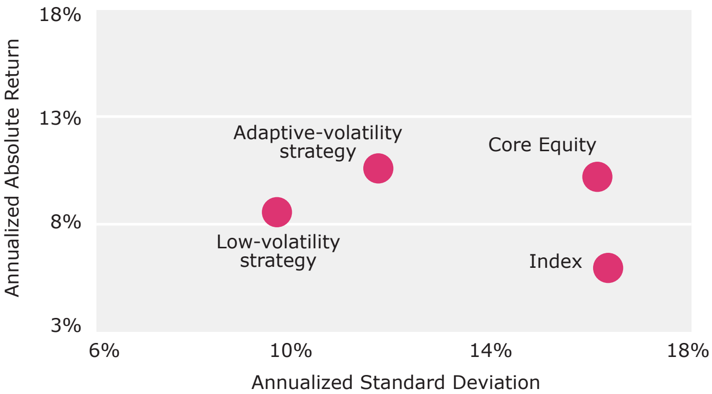


This variation in market volatility implies that the traditional static chart comparing long-term risk/reward relationships shown in Figure 2 can be quite misleading. For example, even though the annualized standard deviation of the MSCI World Index is about 15.2%[2] over the entire period, the annualized three-year rolling standard deviation lies outside the range of 10.4%–17.6% as much as half of the time.

[1] The plot is based on a realistic simulation of a strategy that includes trading costs and can be managed at high capacity with low liquidity demands.
[2] Annualized standard deviation of monthly logarithmic MSCI World index returns (gross, USD) during the period 1992–2016.

FIGURE 2

HYPOTHETICAL RISK/REWARD CHARACTERISTICS (BASED ON THE MSCI WORLD INDEX, 1992-2016)



The market volatility has such a wide range that it may be more sensible to attempt to distinguish between these two distinct market regimes shown in Figure 3 rather than simply assume the relevance of the long-term static view presented in Figure 2. We denote these regimes as the low- and high-risk regimes for simplicity; note, however, that both the typical market return and volatility are quite different (and anti-correlated) in each regime.[3]

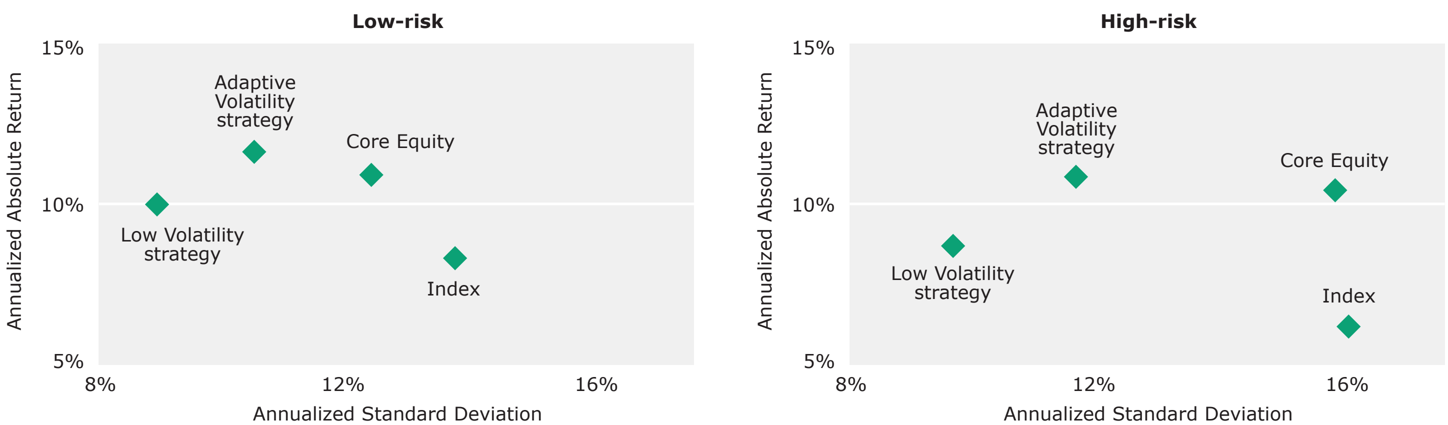
Inspired by the low volatility strategy, it makes sense to attempt to construct an adaptive volatility strategy by setting up the optimization as follows: minimize the portfolio volatility subject to the constraint of *outperforming* the market portfolio by a given target over the long term. This may, at first glance, appear equivalent to the portfolio optimization approach of maximizing returns subject to a maximum volatility constraint. However, this is far from being the case, since the two market regimes identified above are so distinct, and long-term returns cannot be estimated as accurately as risk.

For one thing, expressing the return objective in *relative* rather than *absolute* terms is likely to be necessary for the optimization to result in a reasonably reliable portfolio. For example, suppose that the long-term return of the market is 8% and the long-term relative return target of the portfolio is 3%. It is clear that this implies the portfolio's long-term return expectation should be 11%. However, to continue to target a portfolio return of 11% at all times, even in a period where the market return is strongly negative is not sensible: even if a solution is found in the optimization, it is very likely that the corresponding portfolio will be very concentrated and extremely sensitive to estimation errors. Instead, targeting 3% outperformance will alleviate these concerns by being agnostic to the level of market return in any particular time period.

Optimizing this way, in the low-risk regime (the left-hand side of Figure 3), the adaptive volatility portfolio is usually closer to a typical core equity strategy, both in terms of performance and holdings. Conversely, when the volatility spikes upward (the right-hand side of Figure 3), the adaptive volatility strategy moves only slightly to the right, indicating a moderate increase in risk and more closely resembling a low volatility portfolio.

FIGURE 3

HYPOTHETICAL RISK/REWARD CHARACTERISTICS IN THE TWO MARKET REGIMES (BASED ON THE MSCI WORLD INDEX, 1992-2016)



[3] The hypothetical example reflects monthly returns divided into low- or high-risk based on whether the preceding three-year rolling standard deviation of the index falls below or above the standard deviation of the entire period (1992–2016). There are approximately 47% low-risk months vs. 53% high-risk months.

Protection When You Need it Most

This approach results in a far more focused reduction in volatility as shown in Figure 4. Even though the maximum volatility reduction is only moderately diminished during periods of heightened market volatility (e.g., about 32% in 2002, compared to about 38% for the low volatility strategy), the risk reduction drops to much lower levels during normal market conditions (e.g., no reduction in the mid 2000's compared to about 16% for the low volatility strategy).

FIGURE 4

VOLATILITY REDUCTION FOR A HYPOTHETICAL ADAPTIVE VOLATILITY STRATEGY COMPARED TO THE MSCI WORLD INDEX

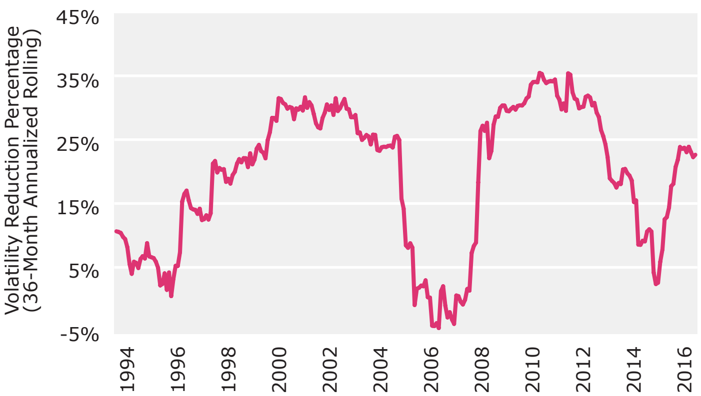
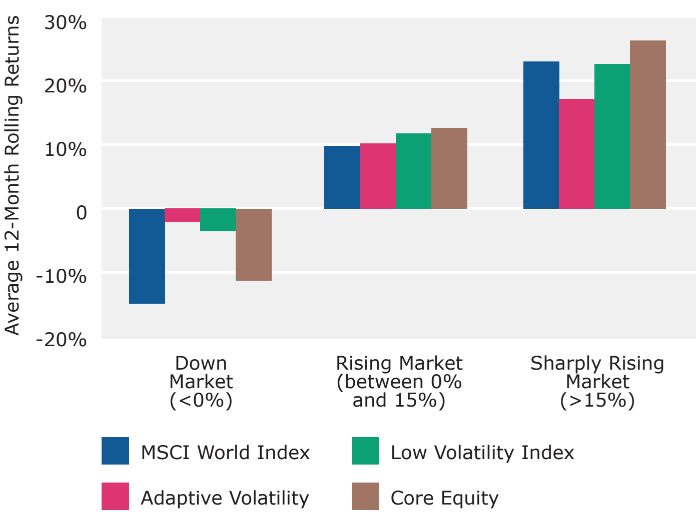


FIGURE 5

AVERAGE PERFORMANCE OF HYPOTHETICAL STRATEGIES IN DIFFERENT MARKET ENVIRONMENTS (BASED ON THE MSCI WORLD INDEX, 1992-2016)



The dynamic volatility reduction achieved by this approach to optimization does not depend on market timing, but exclusively on volatility estimates, which can be shown to be far more reliable. If the market volatility spikes upward, the portfolio volatility will already typically be lower than that of the market, because the portfolio is more diversified than the market. The increased efficiency resulting from the optimization generally raises the Sharpe ratio sufficiently such that, even after allowing for the increased absolute return, the volatility is materially decreased.

Furthermore, if the increase in volatility persists, the volatility estimates will typically reflect the change fairly promptly, resulting in a more defensive optimization solution and realignment trades as the strategy assumes the optimal posture for the new market regime. These two mechanisms allow the adaptive volatility strategies to both weather sharp volatility spikes and avoid whipsawing. For example, in a hypothetical adaptive volatility strategy during the 2008 crisis, the level of volatility reduction jumps from almost no reduction in March to about 10% in September, and then to approximately 30% in November.

The increased focus of the risk reduction during those periods when it is especially needed has two major benefits. Firstly, it helps the portfolio to outperform the market over the long-term. Secondly, it increases the likelihood of greater consistency of outperformance. This is demonstrated in Figure 5 for hypothetical low volatility and adaptive volatility strategies, respectively (a hypothetical core equity strategy is also included). In both absolute volatility strategies, the volatility reduction proves its value by preserving the capital in periods where the market exhibits large drawdowns. Moreover, both strategies handily keep up with the market when the latter grows only moderately (up to 15% over the preceding 12 months). However, only the adaptive volatility strategy can switch to the core-like configuration swiftly enough to keep up with the market even when the latter grows strongly (greater than 15% over the preceding 12 months).

Is it really possible to estimate the volatility structure of the market accurately enough to achieve this outcome? The answer to this question is a clear 'Yes!' The market generally transitions slowly between regimes, and risk metrics measured by competent statistical methodologies can identify those shifts in a timely fashion, especially if updated regularly. Even during the 2008 crisis, which evolved much faster than the bursting of the tech bubble in the late 1990's, the level of risk reduction of adaptive volatility strategies implemented in the fashion we described would have sharply jumped up from about 0% to about 30% in less than a year, as mentioned earlier.[4]

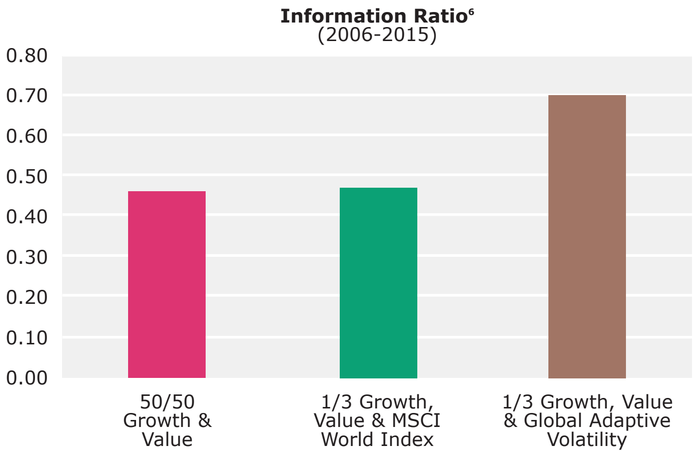
[4] This agility is facilitated by using non-conventional measures of volatility to avoid crowding-out of the necessary trades. It can be further boosted by relying on the rebalancing premium as the alpha source, so that diversification does not interfere with, but instead enhances, outperformance.

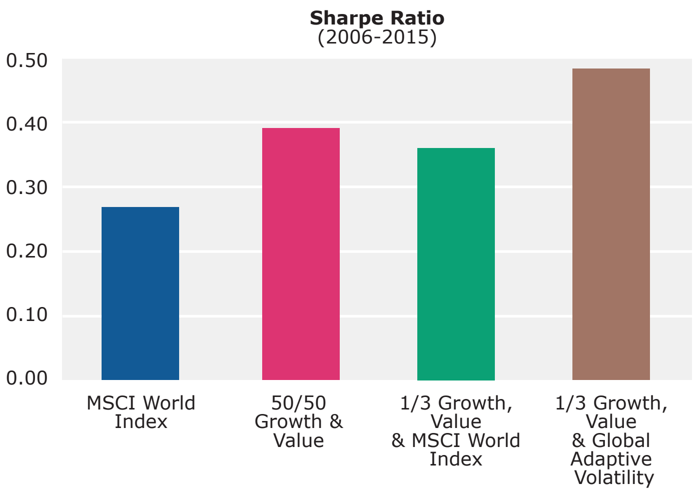
We now consider how to effectively employ this flavor of adaptive volatility strategies within an overall equity allocation plan. The flexibility of the approach implies that there are many reasonable alternatives. One simple scenario is to use these adaptive volatility strategies to complement return-seeking assets, without giving up outperformance, while at the same time meaningfully lowering the overall absolute volatility. For example, allocating equally to two top-quartile growth and value managers in the global-equity space over the period 2006-2015 would have resulted in outperformance of the MSCI World Index of 2.6%.[5] However, even though the Sharpe ratio would have increased compared to the index (see Figure 6), so would the absolute volatility (from 16.4% to 17.9%). Switching to equal allocations between the index and the growth and value managers would have helped to reduce absolute volatility (to 17.2%), but at a commensurate loss of return (both absolute and risk-adjusted).

However, employing equal allocations of the adaptive volatility, the growth and the value managers would have dramatically improved both the absolute volatility (which would have been reduced from 17.9% back down to 15.4%) and long-term return, thereby substantially increasing both the information and Sharpe ratios.

FIGURE 6

RISK-ADJUSTED PERFORMANCE OF THREE ASSET ALLOCATIONS (BASED ON THE MSCI WORLD INDEX, 2006-2015)





[5]Source: eVestment Alliance. Results assume annual rebalancing.
[6]Information ratios are relative to the MSCI World Index.

Conclusion

We have discussed the value of employing a dynamic risk-reduction approach in equity management, especially given the wide variety of market environments that can be more simply understood in terms of two distinct volatility regimes. In this context, we showed how a reliable implementation of the adaptive volatility framework can be achieved through a simple recasting of the portfolio optimization objective. We discussed the resulting methodology on its own merits, as well as its possible role in an equity allocation plan. Given the wide range of market volatility experienced during different market conditions, a dynamic approach to volatility reduction could be vital to properly balance capital preservation with capital appreciation.

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