Targeting Volatility: A Differentiated Asset Allocation Proposition

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Summary

• In the wake of the global financial crisis, investors’ appetite for solutions to dampen portfolio volatility has intensified.
• Volatility targeting takes advantage of an asset’s risk-return interaction to smooth the return profile.
• There are many different approaches to targeting volatility: options, linear derivatives, and active asset allocation. We believe the most effective approach for the long-term investor is active asset allocation.
• In our view, it is important to consider asset classes across the risk spectrum when targeting volatility (i.e., looking beyond the traditional two-asset approach of equities and bonds).

Risk and Return as Determinants of Asset Allocation

As an objective measure of risk and uncertainty, volatility is a consideration at the center of most investment decisions. The global financial crisis has clearly made investors more aware of the effect that volatility can have on investments. Realized volatility on the S&P 500 Index reached 89% at the height of the crisis in 2008. Over the last five years, the price of the S&P 500 Index has experienced a daily move greater than five standard deviations on seven separate occasions. Statistical models assuming a normal distribution would predict each of these five standard deviation events to occur about once every 13,417 years. It is no surprise that in the aftermath of the crisis, many tools have emerged to help protect against surges in volatility.

Ultimately, volatility is a measure of uncertainty surrounding asset returns. However, it can be measured in several different ways. There are two main families of volatility measurement—historical volatility, known as realized volatility; and expected future volatility, which is known as implied volatility. Realized volatility is calculated as the standard deviation of asset returns over some period of time. This can then be annualized to provide a normalized measure of how much that asset’s value has fluctuated over a particular time period.

Implied volatility, on the other hand, is the volatility of a particular asset that is implied by the options market for that asset. Nobody knows exactly what the future volatility will be on a particular asset, so with implied volatility, the options market is used to provide some measure of what the market expectations are for volatility in the future. The price of options are tied to volatility because the more an
asset’s price fluctuates, the greater the chance that an option will have value at expiration. The popular VIX Index is an example of a measure of implied volatility. This index essentially aggregates the implied volatilities of options expiring in the next couple of months on the S&P 500 Index to gauge the market’s expectation of volatility over approximately the next 30 days.

The relevance of volatility for asset allocation is governed by the trade-off between risk and reward: reward in the form of an expected return and risk being the degree of uncertainty surrounding that expected return—or, volatility.

The often-cited 60% equity/40% fixed income allocation, or other combinations, are typically driven by an investor’s risk tolerance. The mix is determined by picking a spot on an efficient frontier that coincides with a level of volatility that is commensurate with that investor’s risk tolerance and investment goals. The top chart in Exhibit 1 depicts an efficient frontier constructed using realized return and volatility data for US equities and bonds from 1980 to 2014. It shows that equities have returned an additional 3.4% per year, and that the cost of this 3.4% of added return has been an additional 10% in annualized volatility.

A static allocation between equities and fixed income over that 34-year period would have been appropriate if the risk-reward tradeoff were consistent over that period. However, the bottom chart in Exhibit 1 shows that the risk-reward profile of equities and fixed income was actually quite different at different times during those 34 years.

For example, during the 1990s equities added an almost 10% annualized return for a roughly 10% increase in volatility. Whereas in the first decade of the 2000s, the efficient frontier line actually dropped down and to the right—meaning that equities actually detracted almost 8% annualized for the 13% they added in volatility.

The lack of uniformity in the risk-return profile over the observed period indicates that opportunities existed to add considerable value—both from return enhancement as well as risk reduction—from an asset allocation process that was more active. These results argue against having a fixed asset allocation and moving toward a more active asset allocation approach. The question then becomes, on which factor does an investor base that active asset allocation decision? For many investors, asset allocation decisions are made on the basis of forecasting asset returns. However, we would argue that forecasting volatility is a more tractable task.

Characteristics of Volatility Are Used to the Advantage of Asset Allocators

Plotting the monthly return on the x-axis versus the following month’s return on the y-axis indicates there is no discernible relationship between one month’s returns and the subsequent month’s returns (Exhibit 2). The R squared (or explanatory power) is 0.0. If there were a relationship, we would expect to see some pattern emerge rather than randomly distributed points.

While past returns themselves do not help predict future returns, the magnitude of past returns does, in fact, have some explanatory

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**Exhibit 1**

The Risk-Reward Relationship Is Not Static

**Efficient Frontier 1980–2014**

![Efficient Frontier Chart](chart1.png)

**Efficient Frontiers over Different Sub-Periods**

For the period January 1980 to January 2014

Equities = S&P 500 Index; Bonds = Barclays Capital US Aggregate Bond Index. This information is for illustrative purposes only. The performance quoted represents past performance. Past performance is not a reliable indicator of future results. The indices listed above are unmanaged and have no fees. It is not possible to invest in an index. Index performance does not represent the performance of any product managed by Lazard.

**Source:** Bloomberg

**Exhibit 2**

(Recent) Past Performance Is Not Indicative of Future Results

**S&P 500 Index Returns**

![Monthly Returns Chart](chart2.png)

For the period February 1984 to February 2014

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**Source:** Bloomberg
power on the magnitude of future returns. Large returns tend to be followed by large returns while small returns tend to be followed by small returns. Stated another way, periods of both high and low volatility tend to persist—clustering together for periods of time. To illustrate this, we computed the autocorrelation of the absolute value of S&P 500 Index returns lagged by a number of weeks (Exhibit 3). Autocorrelation is simply the correlation of one asset’s return to itself at a different time; and using the absolute value of the returns enables us to focus on the change in magnitude of the return rather than the direction of the return.

The correlation of the absolute return of the S&P 500 Index with the same absolute return lagged for one week is greater than 0.2. This relationship becomes weaker as the lag period increases and by the time we reach a 30-week lag, the relationship is essentially non-existent. The magnitude of future returns are dependent, to a degree, upon the magnitude of past returns, with this dependence fading over time. As a result of this relationship, past volatility actually has a reasonable amount of explanatory power over future volatility.

In similar fashion to the returns plot in Exhibit 2, we illustrate this for volatility in Exhibit 4. In contrast to the random pattern of returns, we can see a broad linear relationship between past and current volatility. The R squared is 0.35, meaning that the volatility in one month explains about 35% of the volatility in the subsequent month on average. It is this persistence of volatility that makes it considerably easier to predict than asset returns. In addition, volatility has a strong negative correlation with asset returns.

Over more than 20 years, the correlation between the VIX Index and the returns of the S&P 500 Index has fluctuated between about -0.9 and -0.23 and has remained consistently negative throughout (Exhibit 5). Ultimately, a targeted volatility approach to asset allocation aims to benefit from these two market relationships: the negative correlation between volatility and return as well as the persistence of volatility (i.e., the tendency of periods of high and low volatility to cluster together for sustained periods of time).

Targeting a particular level of volatility takes advantage of these relationships to smooth the return profile and provide a degree of downside protection in a rising volatility environment. In its simplest form, this is achieved by selling equities while equity volatility is rising and buying equities while equity volatility is falling to maintain a particular level of volatility throughout different market environments.

Exhibit 3
The Magnitude of Past Returns May Have Explanatory Power
Autocorrelation of S&P 500 Index Returns (Absolute Value)

For the period January 1990 to March 2014
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Source: Bloomberg

Exhibit 4
Past Volatility Partly Explains Future Volatility
S&P 500 Index Volatility

For the period February 1984 to February 2014
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Source: Bloomberg

Exhibit 5
Volatility and Return Are Negatively Correlated
VIX and S&P 500 Index Correlation

As of 12 March 2014
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Source: Bloomberg
Different Approaches to Targeted Volatility

In our recent Investment Research, *Dynamic Volatility Targeting*, we examined in depth the characteristics of several solutions for volatility targeting. We share a summary of our observations in this section.

We conducted a simple backtest which uses an allocation to global, developed-market equity and bond indices to create a portfolio with a target of 10% annualized volatility (Exhibit 6). Two asset allocation optimizations are run in parallel: short- and long-term volatility series are evaluated to drive the asset weights dynamically, based on the volatility environment. Only past, realized volatility is used, so no forward-looking estimates were applied in this instance.

The top chart in Exhibit 6 shows the rolling 52-week volatility for the equity and fixed income components, the backtest portfolio, and a passive asset mix (the weights of the passive mix represent the average equity/fixed income allocation for the backtest through the entire period). The backtest’s volatility remains in an 8% to 12% range—
even during the crisis when realized volatility spiked. By contrast, the passive 62% equity/38% fixed income allocation was considerably less stable than the active approach (backtest).

The bottom chart in Exhibit 6, illustrates the performance of the backtest versus the passive allocation. The smoother pattern of returns is visible, underscoring that the backtest provided a degree of downside protection during the crisis as well as an ability to participate in rallies.

Many different methods to targeting volatility have arisen in recent years. Exhibit 7 summarizes key characteristics for options, linear derivatives, and active allocation approaches to target volatility.

The use of options as a hedging instrument to target volatility has gained popularity due to their non-linear or asymmetric payoff structure. Put options are unique in that they provide effective downside protection while preserving upside potential in the event of large and unforeseen market moves. However, this asymmetric payoff structure is embedded in the option premium. While this will certainly help at the height of a crisis or spike in volatility, in our view, the cost of this asymmetric payoff structure exceeds the benefit over the long term.
Using linear derivatives like total return swaps, futures, or forwards all involve reducing equity risk exposure by effectively shorting an equity index. This requires less rebalancing and is considerably cheaper than an options approach, since the investor is not paying for an asymmetric payoff structure. As a result, linear swaps dampen as much of the upside as the downside and provide volatility reduction by incorporating an asset class with a long-term negative expected return.

Taking an active asset allocation approach focuses on combining asset classes with positive long-term expected returns. This approach to targeting volatility (which utilizes asset classes across the risk spectrum) provides downside protection, can result in a smoother return pattern, and enables the incorporation of fundamental views on different asset classes.

In an environment with high levels of equity volatility, a targeted volatility approach pushes investors toward a large allocation to fixed income. In the falling interest-rate environment of the past 20 years, a large position in fixed income enhanced the performance of risk parity approaches to asset allocation.

Now, as the global economy becomes less dependent upon central bank policies and a low interest-rate environment, the long-term trajectory for interest rates is higher for the foreseeable future. This is likely to be a headwind for bonds and a concern for any asset allocation approach which relies exclusively upon the low-volatility characteristics and diversification benefits of a bond portfolio. This is why we believe it is important to incorporate other asset classes along the risk spectrum, in particular, low volatility asset classes with relatively little sensitivity to rising interest rates. One such asset class is low-volatility equities.

Low-volatility equities are a tool that can be used in a volatility targeting portfolio to replace a portion of a fixed income allocation. These stocks are primarily companies with more defensive balance sheets in more defensive sectors. With less debt in their capital structure, less volatile earnings, and higher dividend payout ratios, the risk profile of low-volatility equities resembles that of bonds while the returns exhibit less interest-rate sensitivity.

Examining the performance (since 1999) of the S&P 500 Low Volatility Index versus the standard S&P 500 Index we observed that the low-volatility version provided a degree of downside protection during market corrections. The volatility reduction effect has been strongest during crisis episodes. As such, low-volatility equities can be used as a reliable source of intermediate risk in a volatility targeting portfolio, in our view.

In general, having asset classes across the risk spectrum—as opposed to simply choosing between equities and cash or equities and fixed income—enables investors to incorporate some fundamental views on these different asset classes rather than just being hard-wired to the volatility levels of two asset classes when targeting volatility. This consideration leads to greater flexibility in that it provides a variety of potential allocations to meet a volatility target.
Conclusion

In the aftermath of the global financial crisis, many tools have emerged to help protect against surges in volatility—as investors have been made keenly aware of the effect that volatility can have on the value of their investments.

Active asset allocation for targeting volatility is one such tool and it can be an effective method to provide protection on the downside as well as maintaining upside capture to smooth the pattern of asset returns.

A dynamic allocation across the risk spectrum and across asset classes, driven by volatility (which includes equities, bonds, as well as low-volatility equities) will accelerate the benefits of time diversification. Due to the persistence of volatility, it is possible to target a range of volatility by taking a dynamic approach and maintaining exposure to securities with positive expected long-term returns without the use of portfolio insurance (via derivatives). Due to the negative correlation between asset returns and volatility, systematically reducing an allocation to securities with lower expected risk-adjusted returns in exchange for securities with a higher level of risk-adjusted returns can enhance the overall return of a balanced portfolio by providing some downside protection and maintaining a stable range of long-term volatility.

Notes

1 Paper available at http://www.lazardnet.com/investment-research/

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