Balancing Risk and Return Using Dynamic Asset Allocation

A well-designed long-term asset allocation is crucial to the success of any investment program. But even a thoroughly diversified portfolio is vulnerable to large losses, particularly when a financial-market shock occurs. We have developed dynamic tools that can be used to adjust an asset-allocation strategy systematically as market conditions change.

The past 10 years have offered a stark reminder of just how volatile the capital markets can be. Over this period, global equities have twice suffered peak-to-trough falls of more than 45%, followed by sharp recoveries.[1] Global investment-grade corporate bonds underperformed government bonds by almost 17% in 2008, only to beat them by 15% in the first nine months of 2009.[2]

Central banks have adjusted monetary policy rates dramatically on several occasions, and commodity price movements have been unprecedented, with oil fluctuating between $20 and $150 a barrel in the past decade.

This type of volatility can be extremely unsettling to investors and may even cause lasting damage to the growth of their portfolios. The traditional way of mitigating these types of violent capital markets swings is portfolio diversification, in the form of a well-balanced long-term asset allocation. Spreading assets across a wide array of weakly correlated investments can reduce the short-term volatility of returns without giving up much performance in the long run. Many investors have adopted such an approach, adding a wide array of asset types and strategies to their mix—not only global stocks and fixed income but also real estate, commodities, and alternative investments such as hedge funds.

Deciding on a well-diversified long-term asset-allocation strategy is one of the most important calls an investor is ever likely to make. But even a thoroughly diversified long-term strategy is vulnerable to unusually large losses. During extreme and unexpected financial-market shocks (sometimes referred to as "tail events"), equity volatility soars and correlations between assets can increase rapidly, making diversification less effective just when investors need it most.

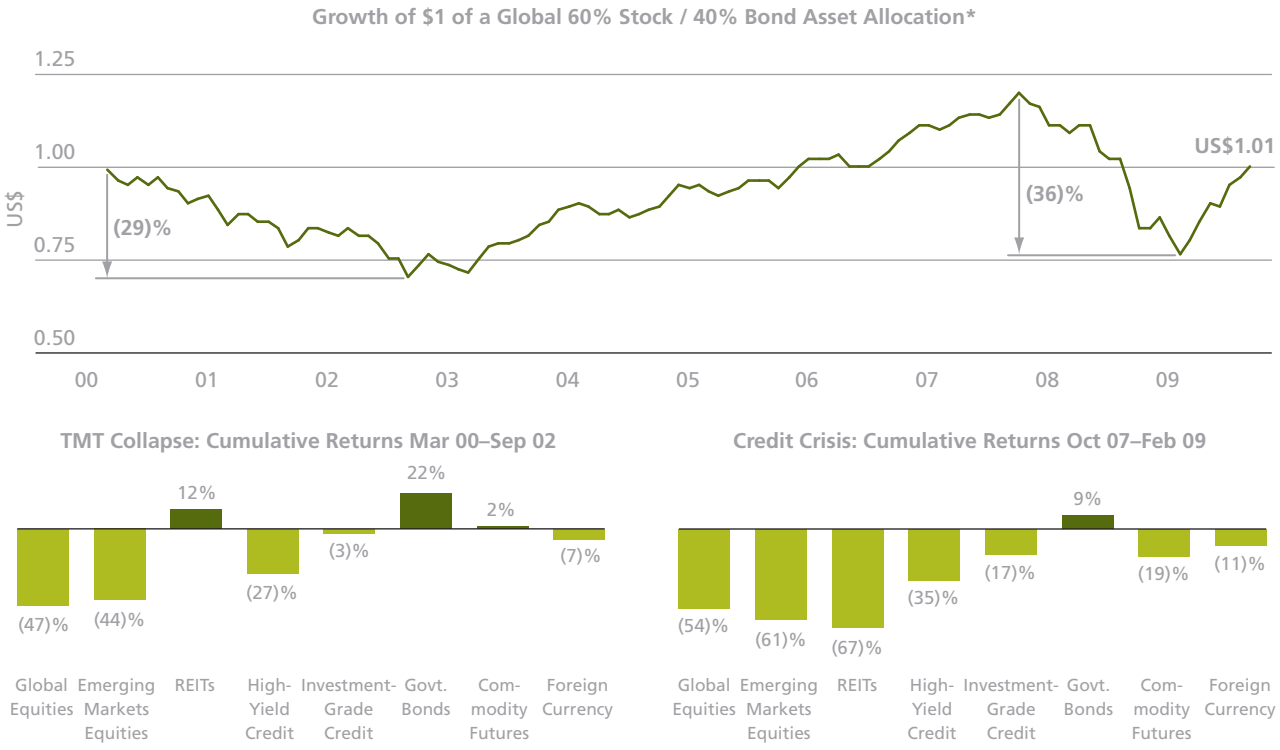
The chart at the top of *Display 1, following page,* shows how, over the past decade, a portfolio invested in a balanced mix of 60% equities and 40% fixed income would have suffered large fluctuations while generating hardly any real growth.

[1] Global equity returns refer to the MSCI All Country World Index after November 2000 and a market-weighted combination of the MSCI World and MSCI Emerging Markets indices before that.

[2] Investment-grade corporate bond outperformance refers to the excess returns relative to government bonds of the Barclays Global Aggregate Corporate Index, hedged into US dollars.

Display 1

A Balanced Allocation Has Had a Bumpy Ride over the Past Decade



Display 2

The Volatility of a Balanced Account Has Fluctuated Widely

Through September 30, 2009

Past performance is not indicative of future results.

*Refers to 60% in the MSCI All Country World Index and 40% in the Barclays Global Aggregate Index, rebalanced monthly. Growth of $1 is calculated on an inflation-adjusted basis. Returns to high-yield and investment-grade credit refer to excess returns over comparable-dated government bonds.

†Throughout this article, unless otherwise noted, global bonds refer to government bonds, and global stocks refer to developed-country equities, with returns hedged into US dollars.

Global equities are represented by MSCI All Country World Index or MSCI Developed World Index; emerging markets equities by the MSCI Emerging Markets Index; non-US equities by MSCI Europe, Australasia, and the Far East (EAFE) Index; REITs by the FTSE NAREIT Global Real Estate Index; high-yield credit by Barclays Capital US High Yield Index; investment-grade credit by Barclays Capital US Investment Grade Index; global government bonds by Barclays Capital Global Aggregate Treasury Index; US Treasury bonds by Barclays Capital US Treasury Index; commodity futures by a proprietary composite; foreign currency by a GDP-weighted basket of currency returns relative to the US dollar.

Source: Barclays Capital, Bloomberg, FTSE NAREIT, Global Financial Data, MJK Associates, MSCI, Thomson Reuters, and AllianceBernstein

And diversifying by adding other asset classes would not have made much difference to the outcome. Few asset classes provided a safe haven during the technology, media, and telecommunications (TMT) collapse, and only government bonds offered any protection during the credit crisis (*Display 1, bottom*).

A Balanced Allocation Can Behave in Different Ways

The discomfort that investors suffer during market downturns illustrates a broader problem: the tendency for the risk profile of any fixed asset mix to stray materially from investors' expectations. Over the past four decades, the 60/40 portfolio—an asset allocation designed to suit an investor with a moderate tolerance for risk—has at times displayed the volatility of an all-bond portfolio and at other times been as volatile as an all-equity portfolio (*Display 2*).

Any major shift in volatility alters the range of returns that an investor is likely to experience. For example, a portfolio with an expected return of 7% and an expected volatility of 9% (which is how the 60/40 mix behaves over the long run) should generate returns somewhere between a gain of 25% and a loss of 11% in a given year, exceeding an 11% loss only about once in 40 years.

If volatility shot up to 15%, this would substantially increase both the upside and downside potential of the portfolio, to a gain of 37% on one hand and a loss of 23% on the other.[3] It's unlikely that an investor with a moderate profile would be comfortable with that degree of uncertainty.

It seems counterintuitive that a "balanced" portfolio should behave in such different ways. The fact is that even though a 60/40 mix is balanced in terms of asset allocation, it is concentrated in terms of risk. One asset class—equities—drives the lion's share of portfolio volatility. Since stocks are three to four times more volatile than bonds, they generate an average of about 90% of the performance variability of the typical 60/40 portfolio. So, when equity-market volatility ebbs and flows, it tends to take the whole portfolio along with it.

Mitigating the threat of a disconnect between investors' expectations and actual portfolio outcomes is most important during periods of high or rising volatility, which usually coincide with bear markets. At these times, investors are likely to be feeling severe pressure in other areas that affect their investment plans. For example:

- Individuals are more likely to lose their jobs and income;
- Foundations and endowments are likely to face declines in charitable contributions;
- Pension funds are likely to see their funding capacity decline as public plans are hit by falling tax revenues and private plans face underfunding due to declining corporate profits; and
- Assets become illiquid and access to credit dries up.

[3] In this example, if volatility fell to 5%, that would reduce both the upside potential and downside risk, to a gain of 17% and a loss of 3%. This assumes a 95% level of confidence. In statistical terms, assuming returns occur in a normal distribution, if an investment has an annual expected return of 7% and a volatility of 9%, there is a 68% probability of generating returns in a range of 7% plus or minus 9%, in other words, (2)%–16% (a one-standard-deviation event). There is a 95% probability of generating returns in a range of 7% plus or minus 2 × 9%, in other words, (11)%–25% (a two-standard-deviation event).

Stormy Weather: How Our Volatility Model Works

We use an adaptive risk-modeling framework to forecast volatility and the correlations between asset classes. First we estimate the volatilities and correlations of the major market risk factors, such as global equity price movements and interest rates. We can then estimate any asset's sensitivity to those risk factors, and any residual—the amount of volatility and correlation that is unexplained by those market risk factors.

When modeling each component, we consider a combination of its recent realized volatility and correlations, as well as its long-term averages, so that we can best capture the changing nature of the risks as capital markets conditions evolve.

Short-Term Risk: This measure helps us gauge very recent changes in market sentiment so that our forecasts can pick up sudden shifts in market risk. Volatility observations in the past three weeks count for half the weight in our short-term measure.

Medium-Term Risk: Our medium-term factor has a slightly longer "look back" period, with the goal of understanding whether we are operating in a generally high- or low-risk environment. This measure is important since the short-term risk factor can at times become quite volatile, swinging above and below the long-term average.

Long-Term Risk: This factor in our model is based on our analysis of very long-term capital markets return data from each asset class. The long-term measure captures the tendency of all asset classes to revert toward their long-term averages over time.

To illustrate how these different measures work in concert to form our dynamic risk forecasts, we sampled four time periods. The display on the facing page breaks out the readings for each of the three factors—short-, medium-, and long-term risk—and shows our resulting one-year global equity market volatility forecasts.

The Credit Crisis, 2007–2009

The credit crisis, which started in mid-2007, gathered momentum in February and March 2008, around the time of the collapse of the investment bank Bear Stearns. In historical simulations for this period, our short-term volatility readings rose above 20%.

But soon after the Bear Stearns failure, short-term equity market volatility began to fade, falling below its average. Nevertheless, the initial pickup in volatility sent our medium-term measure upward, highlighting the fact that we were in an environment of high investor anxiety. As a result, our volatility forecast remained at or above the long-term average throughout the credit crisis. Once volatility began to escalate again in September with the collapse of Lehman Brothers, our short-term volatility measure quickly registered the spike in market anxiety and caused our forecast to shoot up simultaneously.

As the markets began to recover in 2009, volatility edged back down toward its long-term norm. But by the end of September 2009, our tools were still counseling caution as volatility remained above normal.

The TMT Bubble and Collapse, 1998–2002

The technology, media, and telecommunications (TMT) bubble peaked in March 2000. Its subsequent collapse was punctuated by a series of shocks to the financial markets, including the terrorist attacks of September 11, the bankruptcy of Enron in December 2001, the collapse of WorldCom in July 2002, and the demise of Arthur Andersen, Enron's audit firm, in August 2002.

In simulations during this period, the short-term volatility measure in our model fluctuated significantly, spiking and subsiding several times. In concert, the factors in our model worked well, highlighting the elevated risks and the need for caution.

The 1990s Bull Market

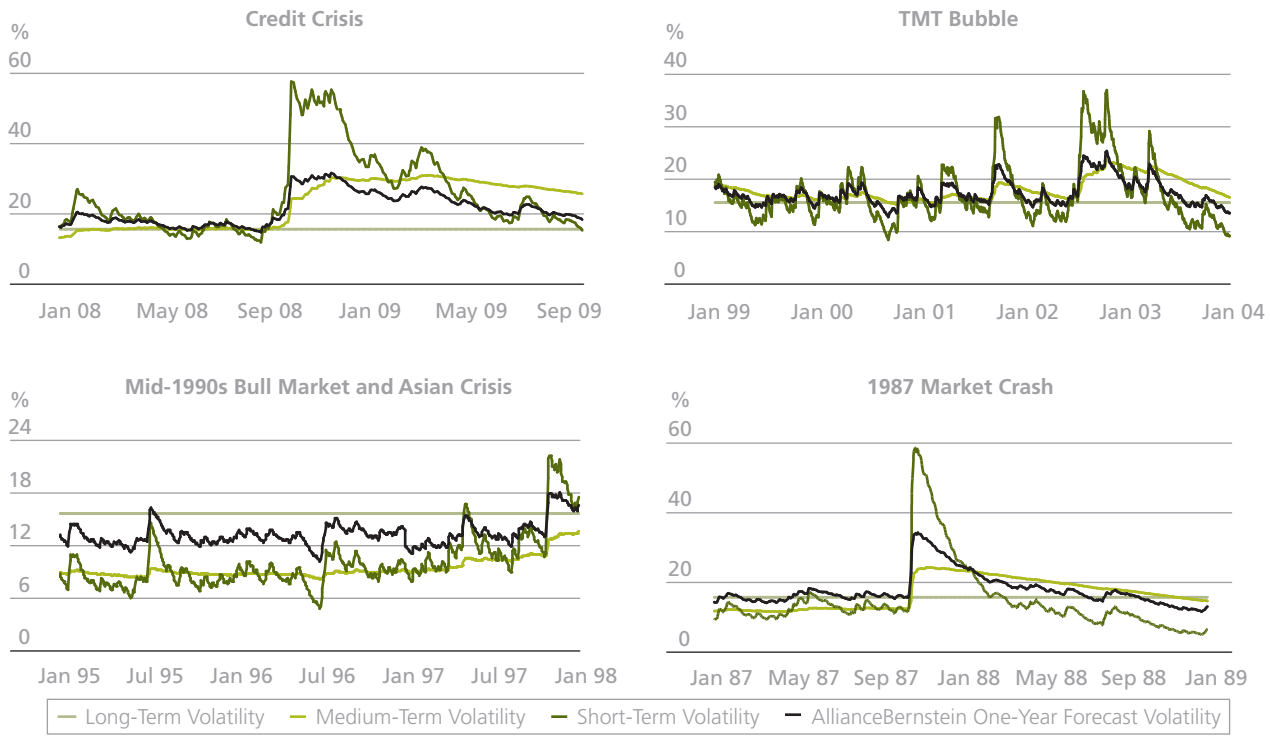
The mid-1990s—until the collapse of the Thai baht marked the start of the Asian crisis in July 1997—was a period of below-average global equity volatility. Historical simulations showed that this lull would have been reflected in the short- and medium-term volatility factors in our model. But our long-term metric would have indicated that volatility was likely to move back up somewhat toward its average. The resulting forecast would have allowed for increased risk-taking given the low-volatility environment, but would have sounded a note of caution given that depressed volatility was unlikely to persist indefinitely.

The 1987 Stock Market Crash

"Black Monday"—October 19, 1987, when global stock markets plunged—was not successfully signaled by our model in the historical simulation, although our risk forecasts adapted reasonably well to the sharp rally that followed. The crash was preceded by a period of low volatility. The simulation showed that our risk forecasts for the period would have been moderate, reflecting reasonably low short- and medium-term volatility, qualified by the assumption that below-average volatility was likely to correct upward over time.

The suddenness of the stock market crash meant that our risk forecasts would not have given early warning of the spike. However, we found that our return forecasts were well below normal, reflecting increasingly expensive valuations and rising interest rates, resulting in an underweight in equities. This illustrates the importance of incorporating additional tools besides volatility forecasting in measuring the risk/return trade-off.

Volatility Forecasting: Global Equity Case Studies



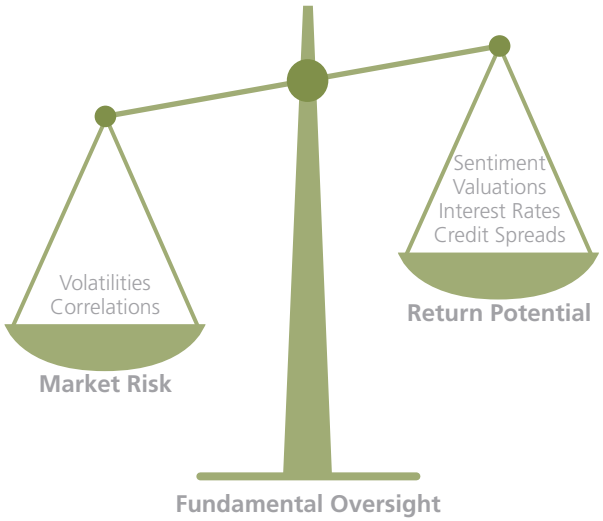
Through September 30, 2009

At times, our one-year forecast can be greater than its three components. This is due mainly to an adjustment for autocorrelation in daily returns.

Source: Global Financial Data, MSCI, and AllianceBernstein

Display 3

Weighing Risk and Return



Source: AllianceBernstein

In short, equity market misery is often compounded by other factors that can make a bear market even more painful. These realities argue for a more flexible approach to asset allocation—one that can enhance a long-term strategy by providing a smoother pattern of returns.

Dynamic Asset Allocation: Responding to Prevailing Market Conditions

The goal of our research was to find a systematic and durable way to monitor changes in the market environment in order to find a better balance between changes in market risk structure and changes in return potential (*Display 3*).

This is not a new idea: as long as capital markets have existed, investors have been seeking systems for buying low and selling high. Unfortunately, the results of such systems have been inconsistent at best. In our view, this is because most strategies focus almost exclusively on returns, even though it is extremely challenging to predict short-term turns in the markets with a high degree of accuracy.

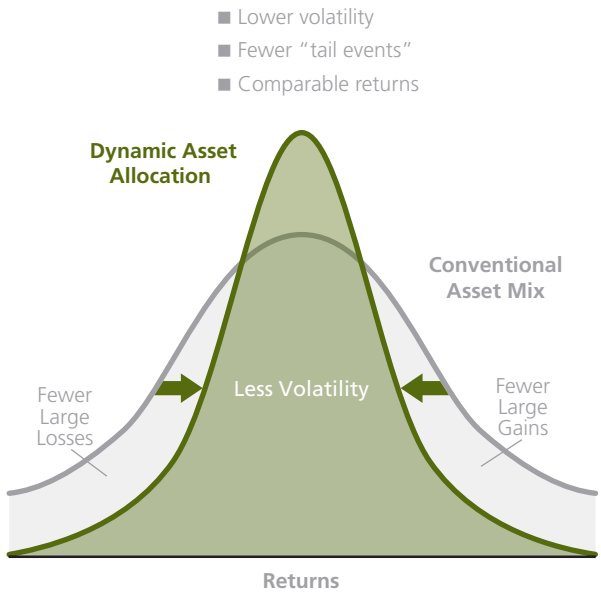
In the course of our research, we started to question whether the focus on predicting market returns was too one-sided. After all, risks can change significantly as well.

We found that risk could be forecast with considerably more confidence, and that improvements in forecasting could have a significant impact on the efficacy of a dynamic strategy. This is where our approach really diverges from traditional tactical asset allocation—it seeks to improve the risk/reward trade-off primarily by mitigating risk, rather than by reaching for higher returns.

Our tools measure the expected risks of a portfolio (by estimating asset volatilities and correlations) and the expected returns available, so that when the risk environment changes, we can determine whether investors are being paid enough to maintain or increase their exposure.

Display 4

Dynamic Allocation Seeks to Improve Distribution of Returns



Source: AllianceBernstein

When applied in a systematic way over time, we believe that dynamic asset allocation will produce measurable benefits, namely:

> Less portfolio volatility;

> Fewer extreme negative outcomes, reducing the probability of large losses; and

> Comparable long-term returns.

A reduction in "tail events" both mitigates outsize losses and reduces outsize gains (*Display 4*). This tends to result in outperformance in bear markets and underperformance in recoveries.

The Portfolio Impact of Dynamic Asset Allocation

We know that a well-designed long-term asset allocation is crucial to the success of any investment program. We also know that market risk structures and return opportunities are constantly changing. So how can we use this insight to enhance a given long-term asset-allocation strategy?

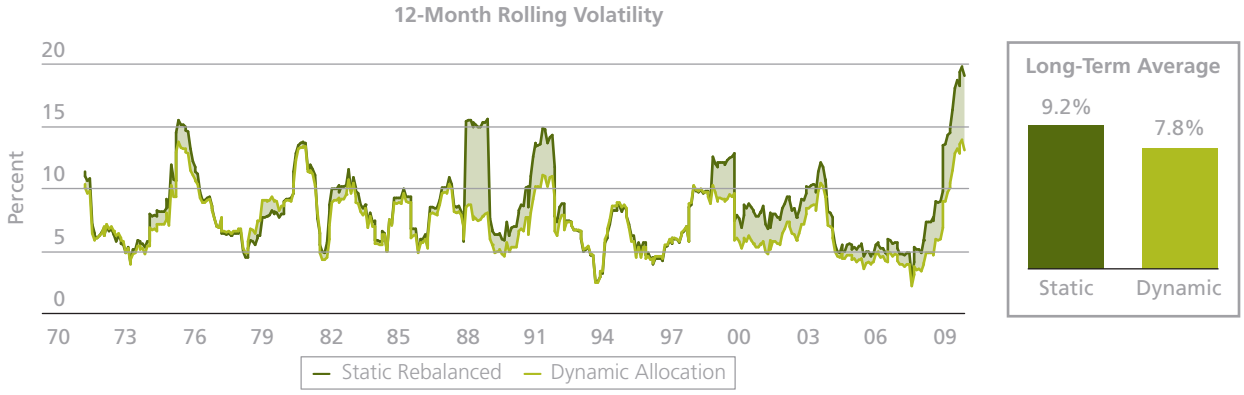
Smoothing Volatility

Our research suggests that dynamic asset allocation may be helpful in reducing portfolio volatility. The simulation results in *Display 5* show the volatility of a dynamically managed portfolio that invests in global stocks, REITs, bonds, and cash, and the volatility of a static portfolio that had a long-run average of 55% stocks, 35% bonds, 10% REITs, and 0% cash, rebalanced monthly. At times of moderate volatility, the dynamic strategy behaved in much the same way as the rebalanced static allocation, but at times of high volatility, there were significant differences. The static portfolio was susceptible to large fluctuations during each of the bear markets of the last 40 years, whereas the dynamic approach was more stable.

As a result of their different behavior in high-volatility periods, the dynamic strategy's long-term annualized volatility was considerably lower than that of the static portfolio—7.8% compared with 9.2%.

Display 5

Dynamic Asset Allocation Can Result in a Smoother Ride over Time



Through September 30, 2009

The performance depicted above is hypothetical and is derived from a back-tested simulation. Please read "Note on Dynamic Asset Allocation Simulation Results" on page 56 for important additional information.

Static portfolio results are based on a portfolio that is 55% MSCI World Index, 35% Barclays Global Aggregate Index (as adjusted to reflect duration only), and 10% FTSE NAREIT, rebalanced halfway back to target when weights stray +/–5% from their long-term target. For physical security positions, we assume one-way transaction costs of 0.6% for equities and bonds and 1.0% for REITs. For equity and bond derivatives, we assume total one-way transaction costs and cost of financing of 0.5%.

Source: Barclays Capital, MSCI, and AllianceBernstein

Display 6

Dynamic Approach Can Help Outperform in Bear Markets

Simulated Performance During Bear Markets
Percent

	Static Rebalanced	Dynamic Allocation	Relative
Oct 07–Feb 09	(34)	(23)	11
Jan 00–Sep 02	(18)	(11)	7
Jan 90–Sep 90	(18)	(12)	6
Sep 87–Nov 87	(15)	(7)	8
Jan 73–Sep 74	(27)	(23)	4

Simulated Performance During Recoveries (Year After Decline)
Percent

	Static Rebalanced	Dynamic Allocation	Relative
Mar 09–Sep 09	30	21	(9)
Oct 02–Sep 03	14	13	(1)
Oct 90–Sep 91	22	19	(3)
Dec 87–Nov 88	19	16	(3)
Oct 74–Sep 75	22	21	(1)

Through September 30, 2009

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Source: Barclays Capital, FTSE NAREIT, Global Financial Data, MSCI, and AllianceBernstein

Since the dynamic approach tends to scale back exposure during periods of elevated volatility, investors can experience a smoother, more consistent pattern of returns. The bumpier ride provided by the static allocation reflects more frequent disconnects from the investor's desired returns and risk profile, because current market forces are not taken into account.

Trimming the "Tails"

We argued at the beginning of this article that long-term investors are justified in worrying about short-term risks because of the damage done by extreme ("tail") events. *Display 6* shows simulated total returns generated by the dynamic asset allocation approach during bear market periods and in the recoveries that followed.

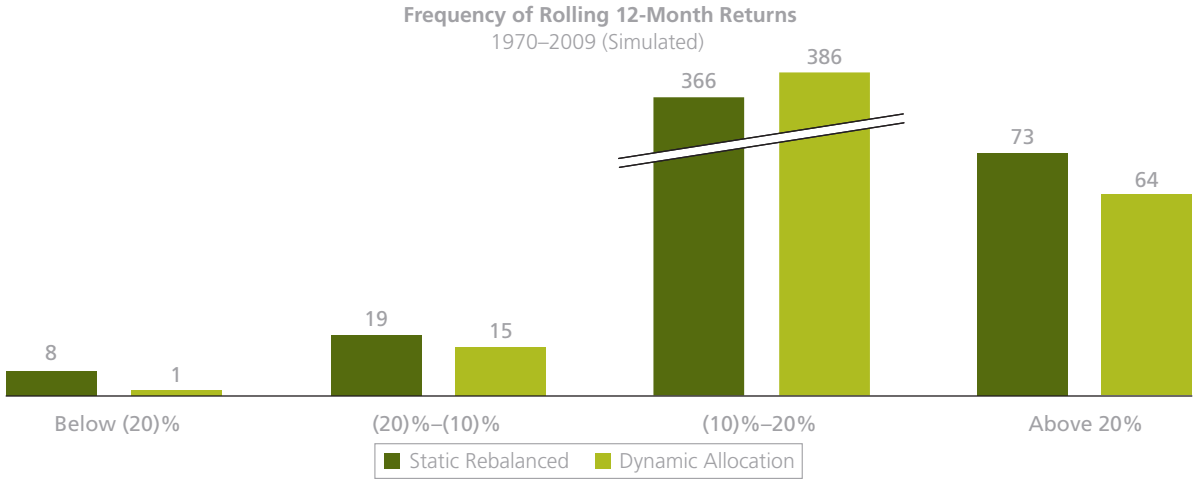
During the bear markets in our study, the dynamic approach would have significantly outperformed the static allocation, mainly by reducing the portfolio's exposure to high volatility. Dynamic allocation would have outperformed in all five of the major bear markets of the past 40 years.

For example, in the simulation the dynamic approach lost 23% during the credit crisis from 2007 to early 2009, compared with 34% for the static allocation. And during the TMT collapse, the dynamically managed portfolio lost 11%, compared with 18% for the static allocation. On average, when the markets fell, the loss suffered by the dynamic strategy was 20% less severe than that of the static allocation.

Of course, there is no such thing as a free lunch. In the 12-month periods following bear market troughs, the dynamic approach underperformed the static allocation, typically because still-elevated volatility and correlation forecasts were calling for more cautious exposure to the markets. This meant that not as much of the upside was captured. For example, as the markets rallied between the beginning of March and the end of September 2009, the simulated dynamic portfolio returned 21% compared with the static allocation's 30%.

Display 7

Dynamic Allocation May Reduce the Frequency of Extreme Losses



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Source: Barclays Capital, FTSE NAREIT, Global Financial Data, MSCI, and AllianceBernstein

And in the recovery following the Black Monday crash in 1987, the dynamic approach lagged the static portfolio by about 3%.

But while the dynamic strategy tended to lag initially during recoveries, over the entire simulation history, we found that it performed nearly as well in rising markets, capturing more than 90% of the gains that a static mix would have achieved. In other words, the dynamic portfolio's ability to keep more of its capital intact during downturns, along with its greater flexibility in consistently exploiting day-to-day return opportunities, largely compensated for its modest underperformance in recoveries. *Display 7* shows how the distribution of returns of a static portfolio compared with the returns of a dynamic allocation approach over the past four decades. We found that more of the dynamic strategy's returns would have fallen within the (10)%–20% range, reflecting lower average portfolio volatility. "Tail events" were also less frequent. The incidence of extreme gains was lower, but so was the frequency of extreme losses, with annual losses of more than 20% reduced from eight occurrences to just one.

Enhancing Risk-Adjusted Returns

Although boosting returns is not a primary aim of our dynamic asset-allocation tool set, simulations showed that a dynamic approach would have generated slightly higher average total returns than a conventional balanced strategy since 1970. Much of the time, these extra returns were picked up during risk-reduction periods, but at other times they were generated by exploiting return opportunities during periods of normal volatility.

Compared with the rebalanced 55% equity, 35% bond, 10% REIT portfolio discussed above, we found that a dynamic approach significantly enhanced risk-adjusted total returns, resulting in a Sharpe ratio of 0.46 compared

Tale of Two Crises: How Our Return Model Works

Return forecasting not only helps measure the opportunity, but can also signal changing risk levels. For example, before a market shock, volatility may still be low, but escalating risks may be visible in rising interest rates or sky-high valuations. Conversely, volatility often remains high at the end of a bear market, which may be a time of high opportunity, as reflected in lower asset valuations.

Our multifaceted approach to return forecasting takes account of the market's current view of expected returns, historical risk/return relationships, and numerous market and economic indicators that help to explain the likely path of future returns. The display on the facing page illustrates how our forecasts are built up, focusing on how our tools performed when we back-tested them during the TMT bubble and the credit crisis.*

The TMT Bubble and Collapse, 1998–2002

In February 2000, as the TMT bubble was approaching its collapse, the global equity markets implicitly had a bullish view of stocks. The average market participant held a high weighting in equities, implying favorable return expectations. As a result, the global market sentiment component of our model added 1.5% to our overall expected return number.

But despite buoyant market sentiment and the fact that our volatility forecasts were not yet alarmingly high, the other factors in our model were starting to signal that market pressures were building. In particular, the feeding frenzy for technology, media, and telecommunications stocks had chased equity valuations extremely high by historical standards—implying unrealistic earnings expectations—and government bond yields had risen.

Collectively, our equity, credit, and government bond-market factors detracted 4.7% from our overall forecast, resulting in a one-year expected return of 2.1% over cash—significantly less than the 5.2% long-term average expected return.

Given the environment of lower-than-average expected returns and somewhat higher-than-average risks, our model would have called for an underweight in equities. (For an illustration of how the asset allocation would have changed for a typical 60/40 investor, see "Enhancing Risk-Adjusted Returns," page 9.)

By March 2003, six months after the lowest point of the TMT decline, forecast volatility was still running well above average, at 21.8%. But the factors in our return model had started pointing to improving conditions. Equity valuations had risen somewhat but remained depressed by historical standards, and returns on equity had fallen to unusually low levels, with the result that the equity component of our model added 0.6% to our return forecast. Government bond factors were also positive, reflecting developments such as falling yields as central banks had slashed short-term interest rates.

Against that backdrop, although the risks remained elevated, our one-year expected excess return from global equities had risen to 7.9%, and our framework would have been calling for an overweight in equities.

The Credit Crisis, 2007–2009

In August 2008, just before the most extreme phase of the credit crisis began, forecast volatility was quite high, although it was nowhere near the peaks it would reach at the height of the crisis. But signals from the factors that make up our own return view were uniformly negative and pointing to building pressures.

Equity and government bond variables detracted somewhat from the overall expected return number,

* The display does not show the contribution of economic factors, because during the two periods under discussion they were not a material driver of expected returns in our models.

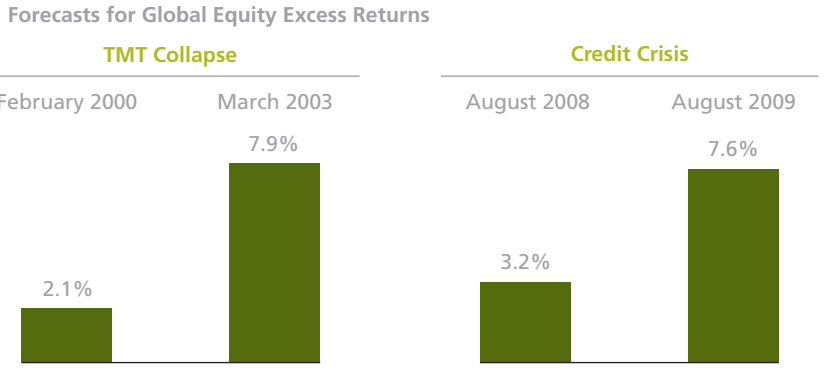
but the one market that was speaking particularly loudly was credit. This was not surprising given that credit had been an early victim of the subprime mortgage crisis in 2007. Spreads on corporate bonds had moved sharply wider as credit sold off, preceding the most dramatic of the falls in equity valuations and interest rates, and acting as a potential warning signal of a large disconnect in the markets.

The fact that credit market factors had become such a dominant number in our results meant that our return forecasts were 1.7% lower than they might otherwise have been. Accordingly, driven more by our return expectations than by our volatility forecasts, our dynamic asset-allocation tool set would have recommended an underweight in equities in August 2008.

By August 2009, six months after the low point in the credit crisis, our return forecast was reflecting a different picture. Corporate bond spreads had tightened following a strong credit market rally, equity valuations had risen, central bank policy rates remained extraordinarily low, and long-dated government bond yields were below average. Collectively, these factors significantly increased our estimate of the excess return opportunity in equities, to 7.6%.

Given the increase in expected returns, we would have been adding to our equity exposure by this stage. But, with risk levels still well above their historical norms, our tool set would still have been calling for a modest underweight in this case.

Return Forecasts Seek to Identify Gathering Storms and Improving Conditions



	February 2000	March 2003	August 2008	August 2009
Long-Term Equity Risk Premium	**5.2%**	**5.2%**	**5.2%**	**5.2%**
Global Market Sentiment	+1.5	+1.8	+0.8	+1.0
Typical Risk/Return Relationship	+0.1	+0.1	0.0	+0.5
Equity Factors	(3.4)	+0.6	(0.9)	+1.6
Credit Factors	(0.3)	(0.3)	(1.7)	(1.2)
Government Bond Factors	(1.0)	+0.5	(0.3)	+0.5
Total Excess Return	2.1	7.9	3.2	7.6
Volatility Forecast	15.8%	21.8%	17.0%	19.6%

As of September 30, 2009
Source: Barclays Capital, Global Financial Data, MSCI, and AllianceBernstein

with 0.36 for the static allocation (*Display 8*). We found that including more asset classes in the asset-allocation decision could improve risk-adjusted returns even further.

It's worth noting that these results were achieved without dramatic changes in portfolio weights. For example, the most turbulent phase of the credit crisis in late 2008 would have called for a weighting of about 61% in bonds, while the lowest bond allocation, in 1978, was about 15%. We found that the bond allocation would have been within 20% of the long-term target for roughly 90% of the time.

Conclusion

The long-term asset-allocation decision is one of the most important decisions an investor is ever likely to make, but we believe that complementing the long-term allocation with a dynamic asset-allocation strategy can add further value by making portfolio positioning more sensitive to short- and medium-term fluctuations in forecast risk and return.

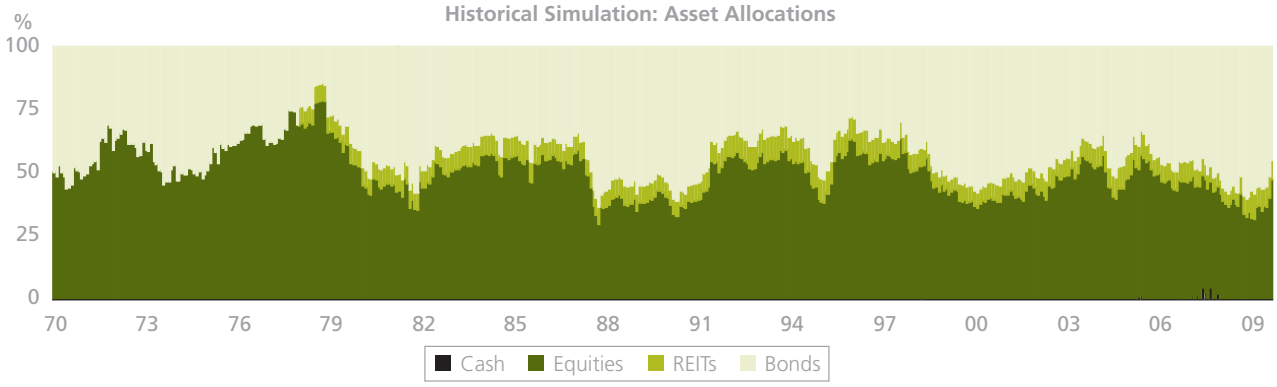
While much of the existing body of research on dynamic asset allocation focuses on boosting investment returns, we believe that the strategy has more to offer from a risk management perspective. We believe that a dynamic approach can create a more consistent fit between investor objectives and portfolio outcomes, smoothing volatility and reducing the incidence of outsize losses, without necessarily sacrificing return potential. ■

This article is excerpted from *Designing a Smoother Ride: Balancing Risk and Return Using Dynamic Asset Allocation*, an AllianceBernstein research publication.

Display 8

Dynamic Allocation Can Enhance the Risk/Return Trade-Off

	Dynamic Allocation	Static Rebalanced	Change
Total Return	9.5%	9.1%	+0.4%
Volatility	7.8%	9.2%	(1.4)%
Sharpe Ratio	0.46	0.36	+0.1



Through September 30, 2009

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Source: Barclays Capital, FTSE NAREIT, Global Financial Data, MSCI, and AllianceBernstein

Note on Dynamic Asset Allocation Simulation Results

The asset-allocation framework discussed in this article is a new strategy for which actual data are not yet available. The portfolios and their performance are hypothetical and do not represent the investment performance or the actual accounts of any investors. The securities in these hypothetical portfolios were selected with the full benefit of hindsight, after their performance over the period shown was known. The results achieved in our simulations do not guarantee future investment results.

The model performance information in this presentation is based on the back-tested performance of hypothetical investments over the time periods indicated. Back-testing is a process of objectively simulating historical investment returns by applying a set of rules for buying and selling securities, and other assets, backward in time, testing those rules, and hypothetically investing in the securities and other assets that are chosen. Back-testing is designed to allow investors to understand and evaluate certain strategies by seeing how they would have performed hypothetically during certain time periods.

It is possible that the markets will perform better or worse than shown in the projections; that the actual results of an investor who invests in the manner these projections suggest will be better or worse than the projections; and that an investor may lose money by investing in the manner the projections suggest. The projections assume the reinvestment of dividends and include transaction costs of 0.6% for purchases and sales of equities and bonds and 1.0% for real estate investment trusts (REITs). For equity and bond derivatives, we assume total one-way transaction costs and cost of financing of 0.5%. We assume no deduction for advisory fees, and that assets are allocated in the manner the projections suggest for nearly 40 years and are rebalanced monthly.

Although the information contained herein has been obtained from sources believed to be reliable, its accuracy and completeness cannot be guaranteed. While back-testing results reflect the rigorous application of the investment strategy selected, back-tested results have certain limitations and should not be considered indicative of future results. In particular, they do not reflect actual trading in an account, so there is no guarantee that an actual account would have achieved the results shown. Back-tested results also assume that asset allocations would not have changed over time and in response to market conditions, which might have occurred if an actual account had been managed during the time period shown. AllianceBernstein L.P. may have a different investment perspective and maintain different asset allocation or other recommendations from those shown here.

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