

Legg Mason Perspectives®

Risk {Re}considered

New Approaches in the Black Swan's Wake

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In a world where the nature of risk is constantly evolving, it's important to consider a broad spectrum of viewpoints about its past, present and, most important of all, its future. Legg Mason is pleased to present **Risk (Re)considered**, a new thought leadership series featuring original perspectives into the changing realities of risk management from Legg Mason's diverse array of specialized investment management firms.

Our goal is to promote a meaningful dialogue on this timely topic, drawing on each firm's expertise to address the central questions posed by recent market events: What have we learned about risk from the recent past? Is there a need for a fundamental reassessment of risk management, or simply adjustments to traditional approaches? What new techniques should be considered going forward? And ultimately, how can we help investors meet their investment objectives?

We welcome comments from all our colleagues in the investment community on the concepts and conclusions explored in this series.

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Risk {Re}considered

Executive Summary

Can the classical long-term approach to risk management be successfully adapted to protect portfolios against the recurrence of another “black swan” pullback?

Can techniques designed to address “fat tail” risk be implemented without hindering portfolio performance under more normal conditions?

With the economy still finding its footing in the wake of the financial crisis, it's critical for all engaged in portfolio construction and management to have clear answers to these questions. This paper is designed to offer a constructive framework to develop those answers, through the following:

- The asset allocation approach rooted in Modern Portfolio Theory (MPT) retains its relevance, thanks to continuing innovation by researchers.
- Finding practical ways to contain hedging costs is the key to developing practical safeguards to “fat tail” risk that build on these innovations. Implemented properly, these solutions can help optimize portfolio performance in stressed environments without interfering with opportunities in up markets.
- Dynamic Risk Management, a cost-effective hedging strategy developed by Legg Mason Global Asset Allocation for use with strategic long-term portfolios, offers one such approach.
- Dynamic Risk Management can also provide asset allocation modelers with quantitative signals to help guide tactical strategies in extreme market environments.
- Complex systemic risk factors are constantly emerging and changing in the global financial market — flaws that need to be addressed before the Black Swan's next visit.

Risk{Re}tooled

The Quest to Mend Modern Portfolio Theory Evolution of risk management



More than a year after stock prices bottomed, many investors remain reluctant to commit to the market. “Fat tails” have entered the vocabulary as a symbol of preoccupation with short-term risk, and investors need reassurance that portfolios can be protected. At the same time, investment professionals need to reconsider whether portfolio construction theory and practice are up to the task.

The period from 1982 to 2007 — what has come to be known as the “Great Moderation” — was a golden time for Modern Portfolio Theory (MPT). During that time, it was easy to buy in to the core tenets of MPT:

- Over the long term, reward increases with risk.
- Risk can be dialed up or down by constructing a portfolio at the appropriate spot on the efficient frontier.

The financial crisis served as a reminder that short-term realities stubbornly coexist within long-term theory. The portfolios that are arrayed along the frontier represent different estimations of return and risk, given enough time for the performance of asset classes to reach equilibrium. In the short term, however, the market can be scarily irrational and inefficient, and apparently with greater frequency and severity than the normal distribution of returns envisioned by MPT. The concept has even acquired its own icon of sorts, thanks to the Black Swan, based on Nassim Nicholas Taleb’s book of the same title.¹

As Taleb’s Black Swan suggests, the normal distribution of MPT appears to underestimate the threat to wealth. The loss to the S&P 500 during the crisis was more than 50% — closer to three standard deviations — not the 28.5%,² two-standard-deviation move predicted by MPT. Compared with the normal bell curve, the distribution tails may be fatter and longer. To get a better handle on the implications of this phenomenon, we first review how we got here.

¹ Taleb, Nassim Nicholas. *The Black Swan: The Impact of the Highly Improbable*; ©2007, 2010 Nassim Nicholas Taleb. Published by Random House, Inc.

² Legg Mason Global Asset Allocation, 2010.

MPT's Promise and Pitfalls

The core principles of MPT have withstood the test of time since it was introduced by Harry Markowitz in 1952. However, a number of issues quickly surfaced, especially as investment professionals tried to apply MPT to real-world portfolio construction.

For example, in 1992, Fischer Black and Robert Litterman published seminal research addressing a key problem that arose as global portfolio allocations became increasingly commonplace.³ Quantitative models that used MPT's straightforward mean-variance optimization (MVO) methods were producing impractical results. (MVO is the model for producing an efficient frontier using historical asset prices and correlations.)

To demonstrate the problems with MPT, Black and Litterman produced a MVO portfolio based on historical average inputs. The long-only portfolio specified a zero weighting in equities and U.S. bonds. Recall that this was 1992 — in the 10 subsequent years, the S&P 500 averaged 12.9% (Exhibit 1). For MVO to function as a credible asset allocation tool, it was clear that more work was needed. The Black-Litterman model that emerged modified MPT so that it produced portfolios with market capitalization weightings as the starting point, while allowing users to modify it, depending on their market views.

Thinking Outside the Bell Curve

Since the Black-Litterman model was introduced, much work has been done to analyze returns and correlations outside of the normal distribution framework — initiatives that gained further appeal in the wake of the crisis.

A good recent example is “The Myth of Diversification,” by David B. Chua, Mark Kritzman and Sebastien Page, published in fall 2009.⁴ The authors validated, on a general historical basis, what was painfully obvious during the crisis: Assets tend to be correlated on the downside and uncorrelated on the upside — the opposite of what is desirable, and what is predicted by MVO.

Chua, Kritzman and Page developed a technique they call “full-scale optimization,” using the non-normal distribution features of real-life returns, unlike classic MVO. With full-scale optimization, they were able to produce hypothetical portfolios whose diversification benefits hold up significantly better on the downside.

The Chua, Kritzman, Page study is reviewed here as an example of the kind of thinking that needs to guide the broad reconsideration of risk — it is not presented as a “magic bullet.” As with every other strategy, it requires informed judgment. For example, investors must determine which prior historical returns — and their associated distribution — are the best fit for the time horizon they are most concerned about.

Exhibit 1: Early MPT Portfolios Produced Impractical Results — (Such as 0% Allocation to Equities)

	Unconstrained						
	Germany	France	Japan	U.K.	U.S.	Canada	Australia
Currency Exposure	-78.7	46.5	15.5	28.6	—	65.0	-5.2
Bonds	30.4	-40.7	40.4	-1.4	54.5	-95.7	-52.5
Equities	4.4	-4.4	15.5	13.3	44.0	-44.2	9.0

	With Constraints Against Shorting Assets						
	Germany	France	Japan	U.K.	U.S.	Canada	Australia
Currency Exposure	-160.0	115.2	18.0	23.7	—	77.8	-13.8
Bonds	7.6	0.0	88.8	0.0	0.0	0.0	0.0
Equities	0.0	0.0	0.0	0.0	0.0	0.0	0.0

In 1992, a MPT long-only portfolio would have had no equities or U.S. bonds.

Source: Fischer Black, Robert Litterman, “Global Portfolio Optimization,” *Financial Analysts Journal*, September-October 1992.

³ Fischer Black, Robert Litterman, “Global Portfolio Optimization,” *Financial Analysts Journal*, September-October 1992. **Past performance is no guarantee of future results.** This information is provided for illustrative purposes only and does not reflect the performance of an actual investment. Indexes are unmanaged and not available for direct investment.

⁴ David B. Chua, Mark Kritzman, Sebastien Page, “The Myth of Diversification,” *The Journal of Portfolio Management*, Fall 2009.

Risk{Re}calibrated

Portfolio Allocation in the Black Swan's Wake

New short-term risk management techniques



Given this backdrop, we believe that effective management of tail risks, and any short-term hedging strategy, should be based on three core principles:

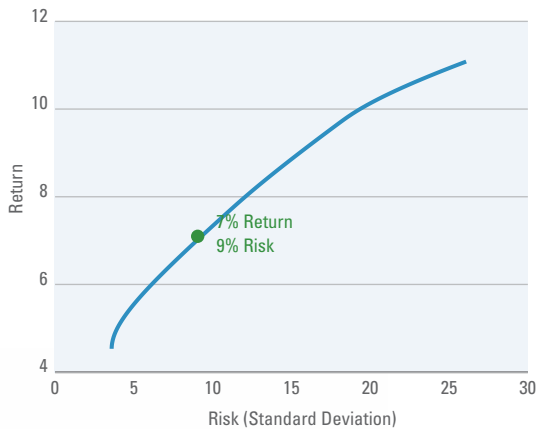
- **Removing risk entails costs**, whether in the form of opportunity costs, rollover costs, or options premiums. The key to cost-effective hedging is to balance such costs against the probability of specific market threats to the portfolio.
- **Positive long-term returns over cash** cannot be achieved without taking market risk.
- **A diversified portfolio of assets** is the best way to manage risk over a long period.

We believe the foundation is a hypothetical strategic portfolio designed for the long term (Exhibit 2), developed using the Black-Litterman model (see sidebar on page 6). We use the maximum number of historical returns possible and up-to-date market values to create an efficient frontier. Along that frontier, we identify a strategic allocation with a level of risk and return similar to that of many institutional policy portfolios — currently it has an expected return of 7% and a standard deviation of 9%.

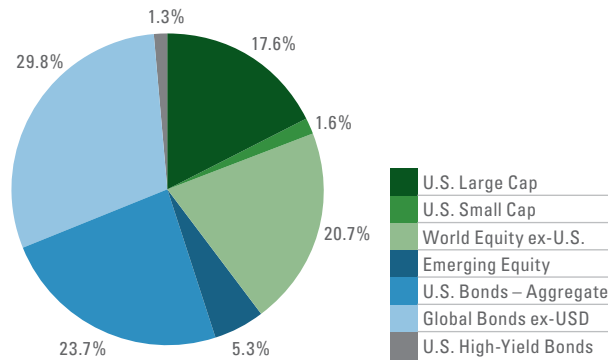


Exhibit 2: Hypothetical Long-Term Strategic Portfolio: Expected return, 7%; Standard deviation, 9%

Efficient Frontier



Asset Allocation



The Long-Term Strategic Portfolio is the foundation upon which short-term hedging strategies are implemented.

Source: Legg Mason Global Asset Allocation, 2010. The model portfolios discussed herein were constructed based on back-testing of asset class returns, volatility and correlation factors during historical market events, including recent severe extended market downturns. It is important to keep in mind that these model portfolios were constructed based on known events and that model results are inherently limited. Professional asset allocation services entail fees and charges that will reduce returns. As well, frequent trading strategies (e.g., allocating between securities and cash) could entail additional fees and charges, including trading costs. These fees and charges were not considered as part of any performance illustration herein. Diversification is no guarantee of future results. Please also note that other portfolio allocations may have similar expected returns and risk characteristics. The Long-Term Strategic Portfolio is composed of 29.8% Global Bonds (ex-USD; as measured by the Citigroup Non-U.S. World Government Bond Index (WGBI)-Unhedged, an unmanaged index of approximately 600 high-quality bonds issued in several different currencies), 23.7% U.S. Bonds Aggregate (as measured by the Barclays Capital U.S. Aggregate Index, a broad-based bond index composed of government, corporate, mortgage and asset-backed issues rated investment grade or higher and having at least one year to maturity), 20.7% World Equity ex-U.S. (as measured by the MSCI EAFE Index, a free float-adjusted market-capitalization index designed to measure developed market equity performance, excluding the U.S. and Canada. The MSCI EAFE Index consists of the following 21 developed market country indexes: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom), 17.6% U.S. Large Cap (as measured by the S&P 500 Index, an unmanaged index of 500 stocks that is generally representative of the performance of larger companies in the U.S.), 5.3% Emerging Equity (as measured by the MSCI Emerging Markets Index, a free float-adjusted market-capitalization index that is designed to measure equity market performance in the global emerging markets. The MSCI Emerging Markets Index consists of the following 25 emerging market country indexes: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand and Turkey), 1.6% U.S. Small Cap (as measured by the Russell 2000 Index, which measures the performance of the 2,000 smallest companies in the Russell 3000 Index, which represents approximately 8% of the total market capitalization of the Russell 3000 Index) and 1.3% U.S. High Yield Bond Fund (as measured by the Barclays Capital U.S. Corporate High Yield Index, an index of the 2% Issuer Cap component of the Barclays Capital U.S. Corporate High Yield Index, which covers the U.S. dollar-denominated, non-investment-grade fixed-rate, taxable corporate bond market). **Past performance is no guarantee of future results.** This information is provided for illustrative purposes only and does not reflect the performance of an actual investment. Indexes are unmanaged and not available for direct investment.

The Black-Litterman Model: A Good Idea Whose Time is Still Now

While the Black-Litterman model has been in use for almost two decades, its advantages still make it a valuable portfolio construction tool:

- **A neutral starting point** — The model uses the implied returns in market capitalization weights as the portfolio's starting point to avoid generating impractical weightings like those produced originally by MPT.
- **Flexible customization** — Investors can modify the neutral weightings depending on their market view. Few investors have informed views on every asset class, so the flexibility is very useful — where there is no particular view, the neutral weight can remain the default value.
- **Relative strength inputs** — Earlier models required absolute return inputs for every asset class. Black-Litterman allows forecast inputs based on relative strength to other assets — especially useful for benchmarked portfolios.
- **Degrees of conviction accommodated** — Not all views are held with equal strength, and Black-Litterman models can account for varying degrees of conviction for different views.

A Risk Management Framework for Long- and Short-Term Horizons

This long-term approach envisions only gradual changes in the strategic mix over time to keep risk exposure in line with risk/reward expectations (illustrated in the bottom tier of Exhibit 3). However, we believe that it's important to have a clear short-term approach to risk exposure — ideally, with a minimum floor value of the portfolio that the investor would not like to breach. The key to any short-term risk management process is to either remove risky assets from the portfolio (top tier, Exhibit 3) or hedge with derivatives, to avoid breaching the floor.

The importance of the Long-Term Strategic Portfolio as a foundation is underscored by recent history. While the S&P 500 had a negative cumulative return over the past 10-year periods, the return on the Long-Term Strategic Portfolio was 4%, with much lower volatility (Exhibit 4). Moreover, while there have been a number of 10-year losing periods for the S&P 500, there have been considerably fewer of such instances for balanced allocations like the Long-Term Strategic Portfolio.

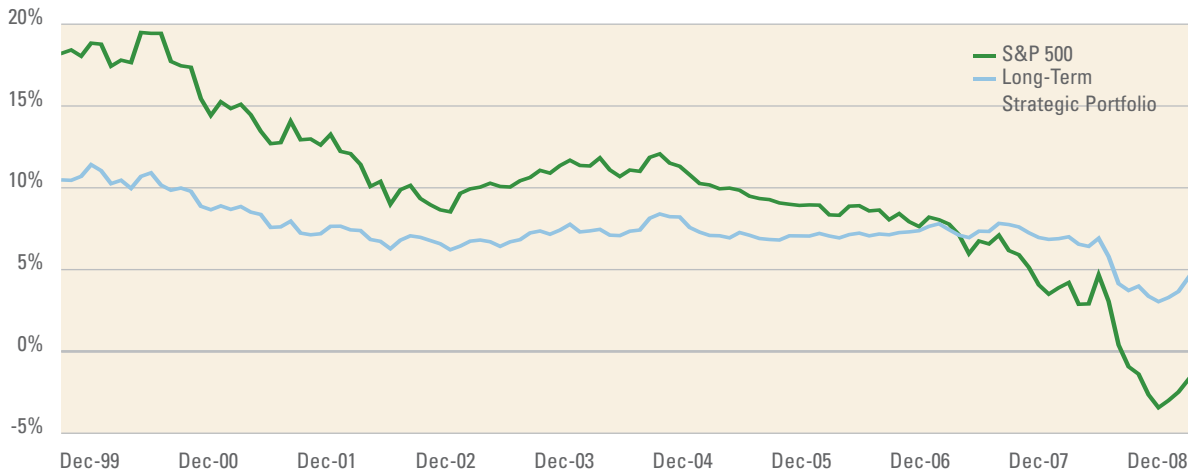
Exhibit 3: Legg Mason Global Asset Allocation Risk Management Framework



Source: Legg Mason Global Asset Allocation, 2010. The model portfolios discussed herein were constructed based on back-testing of asset class returns, volatility and correlation factors during historical market events, including recent severe extended market downturns. It is important to keep in mind that these model portfolios were constructed based on known events and that model results are inherently limited. Professional asset allocation services entail fees and charges that will reduce returns. As well, frequent trading strategies (e.g., allocating between securities and cash) could entail additional fees and charges, including trading costs. These fees and charges were not considered as any part of any performance illustration herein. **Past performance is no guarantee of future results.** This information is provided for illustrative purposes only and does not reflect the performance of an actual investment. Indexes are unmanaged and not available for direct investment.

Exhibit 4: In a difficult decade, the Long-Term Strategic Portfolio would have had greater return and smoother performance

Rolling 10-year Returns, January 2000 – December 2009



Source: Legg Mason Global Asset Allocation, 2010. The model portfolios discussed herein were constructed based on back-testing of asset class returns, volatility and correlation factors during historical market events, including recent severe extended market downturns. It is important to keep in mind that these model portfolios were constructed based on known events and that model results are inherently limited. Professional asset allocation services entail fees and charges that will reduce returns. As well, frequent trading strategies (e.g., allocating between securities and cash) could entail additional fees and charges, including trading costs. These fees and charges were not considered as part of any performance illustration herein. **Past performance is no guarantee of future results.** This information is provided for illustrative purposes only and does not reflect the performance of an actual investment. Indexes are unmanaged and not available for direct investment.

Selecting the Appropriate Short-Term Strategy

With this model portfolio in place, we can then evaluate the impact of implementing a complementary short-term hedging approach. The approaches that we analyze are Dynamic Risk Management, an asset allocation technique, and a Derivatives Volatility Strategy, an overlay program. For reasons we will discuss, we found Dynamic Risk Management best suited to our style and focus.

We also considered Value at Risk (VaR) but decided not to include it in our analysis. VaR is a common risk measurement that is conceptually very similar to downside standard

deviation (i.e., the distribution to the left of the mean). It is a popular and useful tool that expresses the dollar amount at risk in a portfolio or institution over a specified short-term period. However, VaR is not a hedging strategy. It lacks the straightforward, systematic implementation in portfolio construction that is possible with Dynamic Risk Management and Derivatives Volatility strategies.

Implementing Dynamic Risk Management

Dynamic Risk Management systematically reduces risk as the portfolio approaches its maximum tolerable loss level, through the following steps:

1	2	3	4	5
Set Floor Threshold	Calculate Gap	Determine Beta	Calculate Multiplier	Apply Multiplier to the Gap
At the beginning of each year we set a floor for the amount we are "willing" to lose in the portfolio. In this analysis it is 10%, approximating the expected loss from a two-standard-deviation event for our Long-Term Strategic Portfolio.	Each day we calculate the gap between the portfolio value and the 10% loss value.	We then calculate the six-month rolling beta of the Long-Term Strategic Portfolio to the S&P 500.	Divide one by the VIX (the S&P 500 Volatility Index), scaled by the beta. In this analysis we used one half of the six-month rolling beta, which results in a multiplier.	This provides the percent that should be invested in the strategic portfolio. The remaining assets should be invested in cash.

Dynamic Risk Management Strategy has the advantage of being a relatively straightforward technique for applying the forward-looking volatility information conveyed in VIX options pricing to the actual portfolio construction. In our back test, the strategy called for cash allocations in excess of 95% in late 2008 and early 2009 (Exhibit 5), while gradually scaling the allocation back up to 100% of the strategic portfolio by August 2009.

Applying Dynamic Risk Management to a Broad Range of Portfolios

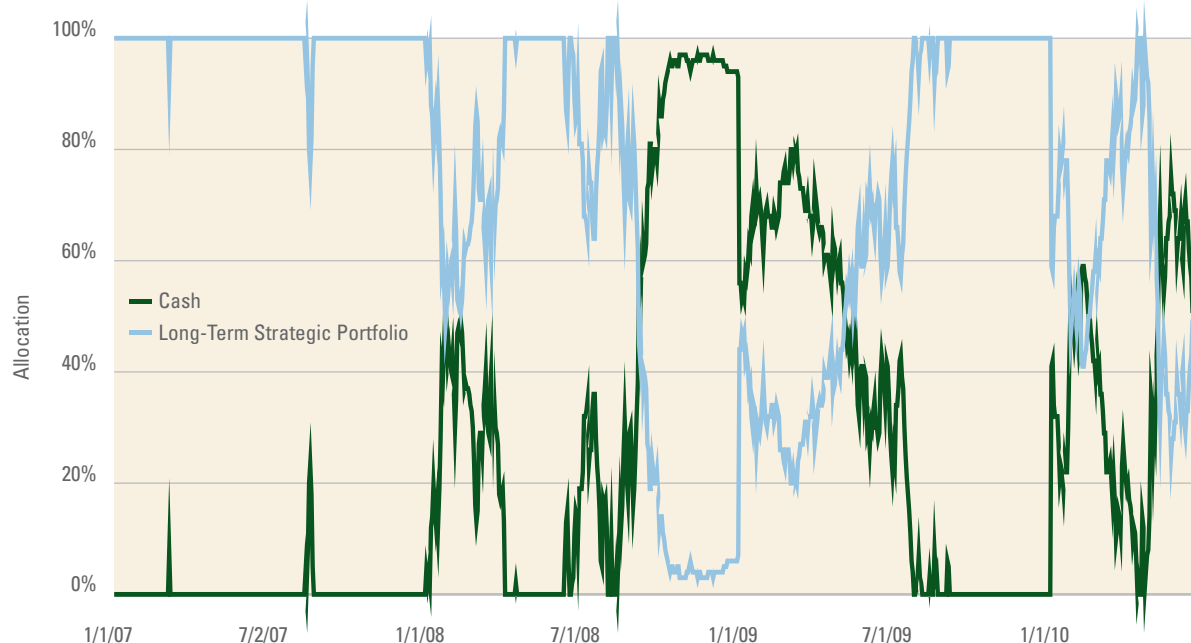
Many asset allocation models have specific guidelines that limit deviations from strategic targets. Few have the latitude to exit risky assets altogether and build large cash positions, as we have done in our hypothetical example.

However, the general principles of the strategy can be adapted to create a tactical asset allocation (TAA) signal. Our Long-Term Strategic Portfolio uses indexes to represent asset sectors, and we add or lower cash levels to make adjustments. But the approach can also be used for a multi-strategy fund portfolio, for example, by adding or lowering the level of low-beta assets.

The benefit of using such a quantitative signal is that it can help overcome the behavioral bias of doing nothing when markets are falling and volatility begins to spike. This quantitative measure can be scaled accordingly to match TAA parameters. This represents a pre-commitment to take a certain course of action when the signal hits certain levels. Of course, the judgment and expertise of an investment professional remain key in any reallocation. However, we believe that a quantitative TAA signal based on Dynamic Risk Management can be a valuable decision-making input, especially during a crisis or other extreme market environments.

Exhibit 5: How Dynamic Risk Management can adjust cash levels in a crisis

Dynamic Risk Management, January 2007 – June 2010



The allocations to cash and the Long-Term Strategic Portfolio sum to one — as volatility increases, cash levels increase and the rest of the portfolio is correspondingly reduced.

Source: Legg Mason Global Asset Allocation, 2010. The model portfolios discussed herein were constructed based on back-testing of asset class returns, volatility and correlation factors during historical market events, including recent severe extended market downturns. It is important to keep in mind that these model portfolios were constructed based on known events and that model results are inherently limited. Professional asset allocation services entail fees and charges that will reduce returns. As well, frequent trading strategies (e.g., allocating between securities and cash) could entail additional fees and charges, including trading costs. These fees and charges were not considered as part of any performance illustration herein. **Past performance is no guarantee of future results.** This information is provided for illustrative purposes only and does not reflect the performance of an actual investment. Indexes are unmanaged and not available for direct investment.

Selecting the Right Derivatives Volatility Strategy

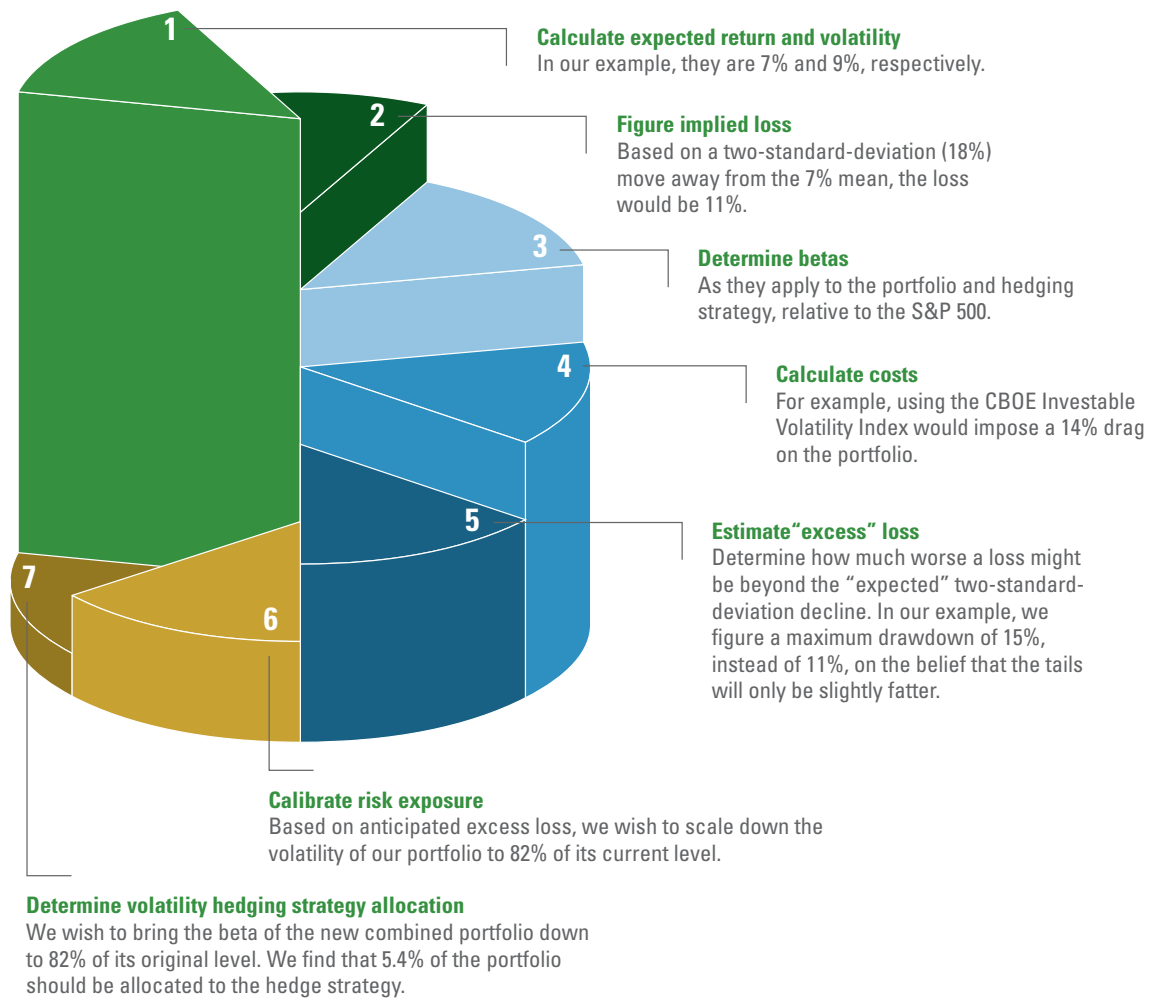
Derivatives can also be used to hedge short-term tail risk. However, the choice of the specific derivative used can be critical to making it work. For example, the futures contract on the VIX, traded on the Chicago Board Options Exchange, would appear to be a likely candidate. But our analysis showed that while the VIX gained 55% from October 2007 to June 2010, a strategy using the VIX futures would have *lost* 26%.⁵ The key reason for this is that futures are short-term contracts that capture the forward view of the market. Thus, in a period of rising volatility, the market will tend to push up the

cost of rolling over each futures contract, and the hedge becomes very expensive.

We have found a promising alternative to the VIX futures strategy, based on the Chicago Board Options Exchange Investable Volatility Index.⁶ By entering into a swap based on this Index — which we call our “Derivatives Volatility Strategy” — an investor can replicate the futures strategy at significantly lower costs. The trade-off is that the Derivatives Volatility Strategy is slightly less sensitive to VIX than rolling over futures contracts. But in our opinion, it is more suitable to ongoing tail risk hedging.

Implementing a Derivatives Volatility Strategy

Following are the basic steps required to hedge portfolio risk with a Derivatives Volatility Strategy:



⁵ Legg Mason Global Asset Allocation, 2010.

⁶ The Chicago Board Options Exchange Investable Volatility Index uses the S&P 500 volatility term structure, calculated by CBOE using the VIX methodology, to estimate the future volatility of the U.S. equity markets as reflected by options on the S&P 500. The Index is designed to permit passive investments to track it. Bear in mind, the Volatility Index provides a snapshot in time of future volatility. A strategy of adjusting allocations between an investment portfolio and cash based upon the Volatility Index will provide favorable outcomes when there is extended volatility and down markets (such as in 2008). Employing this strategy during short-term market swings would likely result in failing to capture up market rebounds and underperforming the returns of a fully invested portfolio.

Examining Risk Management Potential of Hedging Strategies

Our analysis looked at the back-tested performance of Dynamic Risk Management and the Options Volatility strategies, comparing them both to the stand-alone Long-Term Strategic Portfolio and the S&P 500 (Exhibits 6a, 6b and 6c).

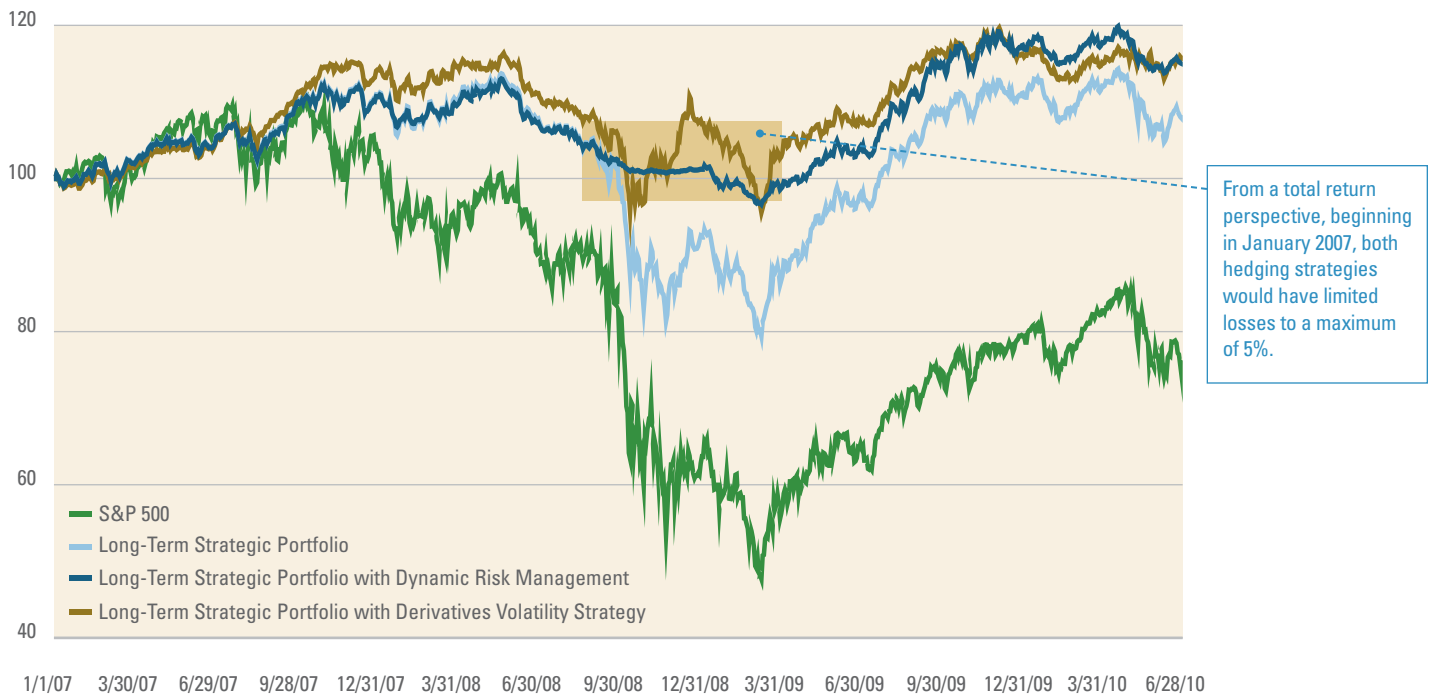
Both hedging strategies would have greatly improved overall portfolio performance during the most volatile periods (Exhibit 6a). Just as importantly, over the same stretch, losses for any rolling 12-month period never would have exceeded much more than 11% (Exhibit 6b). Recall that the 11% loss is equivalent to a two-standard-deviation move away from the expected mean of 7% in our Long-Term Strategic Portfolio – within the generally accepted bounds of what investors can “live with” for volatility.

The two strategies diverged slightly in our examination of the two years prior to the crisis, representing sideways and up market environments (Exhibit 6c). Performance of the Dynamic Risk Management strategy would have imposed virtually no drag on the Long-Term Strategic Portfolio (note, however, that our analysis did not include transaction costs). The Derivatives Volatility hedge would have imposed a 4-percentage-point drag in total return over the period.

Short-term Risk Management Strategies Show Promise in Reducing Tail Risk

The performance lines labeled Dynamic Risk Management and Derivatives Volatility Strategy represent the hypothetical performance of the Long-Term Strategic Portfolio, augmented by either one of those hedging strategies, as described above. Also shown are the stand-alone performance of the Long-Term Strategic Portfolio and the S&P 500.

Exhibit 6a: Comparison of risk management strategies: Total return 2007–2010



Source: Legg Mason Global Asset Allocation, 2010. The model portfolios discussed herein were constructed based on back-testing of asset class returns, volatility and correlation factors during historical market events, including recent severe extended market downturns. It is important to keep in mind that these model portfolios were constructed based on known events and that model results are inherently limited. Professional asset allocation services entail fees and charges that will reduce returns. As well, frequent trading strategies (e.g., allocating between securities and cash) could entail additional fees and charges, including trading costs. These fees and charges were not considered as part of any performance illustration herein. **Past performance is no guarantee of future results.** This information is provided for illustrative purposes only and does not reflect the performance of an actual investment. Indexes are unmanaged and not available for direct investment.

Exhibit 6b: Comparison of risk management strategies: Rolling year-over-year returns, 2008–2010

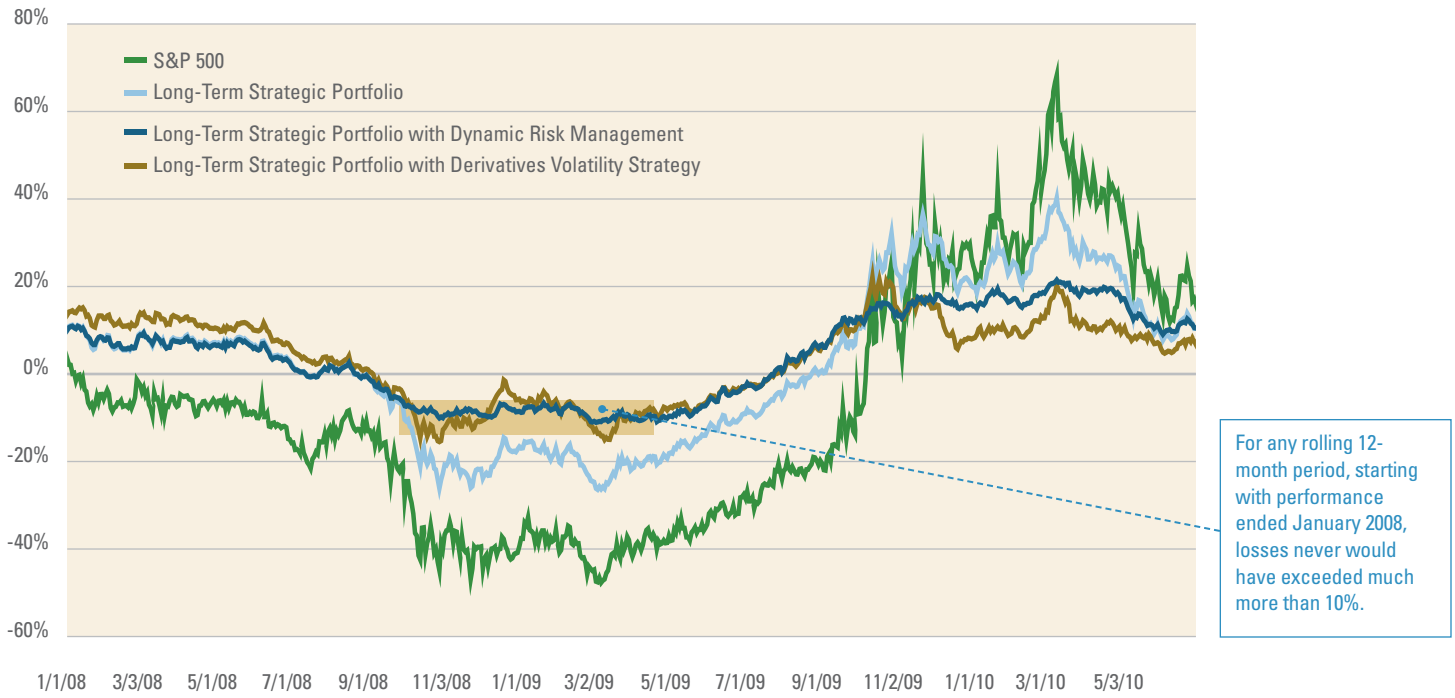
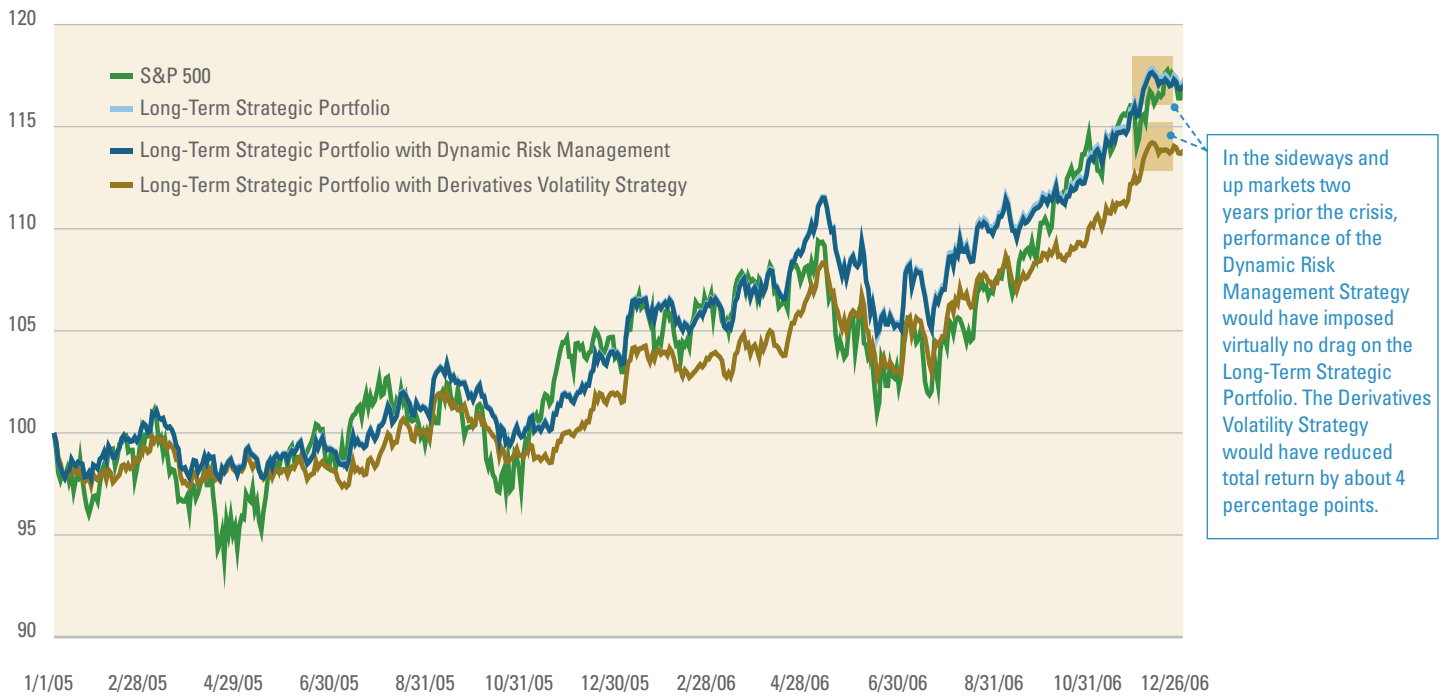


Exhibit 6c: Comparison of risk management strategies: Total returns, 2005–2007



Source: Legg Mason Global Asset Allocation, 2010. The model portfolios discussed herein were constructed based on back-testing of asset class returns, volatility and correlation factors during historical market events, including recent severe extended market downturns. It is important to keep in mind that these model portfolios were constructed based on known events and that model results are inherently limited. Professional asset allocation services entail fees and charges that will reduce returns. As well, frequent trading strategies (e.g., allocating between securities and cash) could entail additional fees and charges, including trading costs. These fees and charges were not considered as part of any performance illustration herein. **Past performance is no guarantee of future results.** This information is provided for illustrative purposes only and does not reflect the performance of an actual investment. Indexes are unmanaged and not available for direct investment.

The Bottom Line

The strengths and weaknesses of the Dynamic Risk Management and the Derivatives Volatility strategies need to be assessed in terms of the investor’s goals and capabilities (Exhibit 7). While either can be effective, we prefer Dynamic Risk Management. The detailed daily analysis required for its implementation can be integrated seamlessly with a portfolio construction process.

Exhibit 7

	Dynamic Risk Management	Derivatives Volatility Strategy
Ease of Implementation	Direct Attention Required Involves ongoing portfolio adjustments according to process	Low Maintenance Process can be outsourced as an overlay program
Expense	Cost-Effective Involves no options premium expenses or roll costs. Does involve opportunity costs	Potentially Expensive Forward roll costs increase as volatility rises
Considerations	Liquidity, transaction and market impact costs must be managed	Forward roll costs can result in portfolio losses if investor over-allocates to strategy

Source: Legg Mason Global Asset Allocation, 2010. The views expressed are those of the portfolio managers as of July 15, 2010 and are subject to change based on market and other conditions.

Risk{Re}kindled

Lessons and Challenges from the Crisis Systemic flaws that must be addressed



The big market collapse exposed how interrelated market sectors are, and how awareness of risk had diminished. Derivatives enabled highly levered positions, but the margins or collateral reserves demanded by counterparties proved insufficient in an extreme market environment. Margin calls helped create a “brushfire” phenomenon, where the problems of subprime spread to fixed income, then to equities, and worldwide trading linkages quickly made it a global meltdown. Liquidity dried up, even for short-term, triple-A instruments such as commercial paper. Within the whirlpool of major systemic collapse, there were numerous systemic risk eddies that were exposed, such as:

- **The “Uncorrelated Return Myth”** — Alternative investments (including hedge funds, commodities and real estate) were held out to be largely *uncorrelated* with the market (as measured by the S&P 500). However, in general, during the crisis, alternative investments proved to be largely *correlated* with the market (see Exhibit 8). Richard M. Ennis, editor of the *Financial Analysts Journal*, described the phenomenon eloquently: “The notion of the existence of ‘uncorrelated return’ assets with handsome risk premiums flies in the face of financial theory and conflicts with empirical evidence. So, reject it we must.”⁷ In other words, the greater risk premiums that were commonly available on alternatives can be viewed as a function of their betas with the market.

Exhibit 8: Correlation of return of assets with the S&P 500, October 1, 2006 to September 30, 2009

Asset	Correlation with S&P 500
Real Estate	0.81
Hedge Funds	0.66
Private Equity	0.84

Source: “The Uncorrelated Return Myth,” by Richard M. Ennis, CFA, Executive Editor, *Financial Analysts Journal (FAJ)*TM, November/December 2009. Real estate is represented by the Dow Jones U.S. Select RETI Index, hedge funds by the HFRI Fund of Funds Composite Index, and private equity by an equal-weighted average of the returns of six private equity funds with listed shares. The Dow Jones REIT Composite Index contains all the publicly traded U.S. REITs in the Dow Jones U.S. stock universe. The S&P 500 Index is a capitalization-weighted, composite index of 500 stocks designed to measure the performance of the broad domestic economy through changes in the aggregate market value of 500 stocks representing all major industries. The table above is presented for informational purposes only and does not represent performance of any specific investment. **Past performance is no guarantee of future results.**

⁷ Richard M. Ennis, “The Uncorrelated Return Myth,” *Financial Analysts Journal*, November-December 2009.

- **“Hidden” or “Alternative” beta** — Academics had theorized for years that many hedge fund strategies claiming to produce unique, independent alpha, in fact had a high degree of shared performance factors — a hedge fund beta. Post-crash attribution analyses confirmed this.
- **“Endogenous” risk** — This is the risk of too many parties being on the same side of a trade and employing a similar strategy with other firms. The performance in August 2007 of a subset of quant firms revealed to a surprising degree how many of them shared similar algorithms, leading to steep declines when they tried to unwind at the same time.
- **Counterparty risk** — This is quite well known on Wall Street, but like so many other risk factors, it took on new and larger dimensions during the crisis. Every practitioner is reviewing counterparty exposure guidelines, collateral requirements and analytical tools to get a better handle on this for every swap, repurchase agreement or other OTC arrangement on their books. Financial reform could have a major impact on this, to the extent that such transactions are required to move to exchange trading.
- **“Perceived Quality” or “Complexity” risk** — In the years running up to the financial crisis, there was a much-discussed breakdown between what investors actually bought and what they understood they were buying. In addition, the reliance placed on ratings agencies proved in some cases to be open to question. At its heart, the subprime debacle was a fundamental misunderstanding of real estate risk, and the perils of applying historical models (about potential default rates, for example) to the current environment. But it also represented a form of concentration risk, to the extent that so many investors relied on a handful of ratings agencies and their models.

From a narrow perspective, the threat level posed by these risks depends on the nature of the firm and/or the kind of strategy being employed. We have seen, however, how they can collectively amplify a systemic downturn and contribute to fatter tails. All investment professionals have a stake in understanding how well new risk dimensions that emerged in the crisis are being quantified and managed. Failure to do so heightens the risk of yet more uninvited visits from Taleb’s Black Swans, and more dire consequences on those occasions.

Risk {Re}evaluated

Shaping the Future of Risk Management

Risk management in the wake of the financial crisis is still a matter of evolution rather than revolution. New approaches outside of the MPT framework in no way invalidate it — they just add to the scope of the toolkit available to the risk management process. We have found that the fatter tails associated with short-term time frames can be effectively hedged by monitoring volatility and systematically adjusting exposure. But hedging carries costs, and we have not discovered a system that replaces the skill, judgment and experience of an investment professional.

The nature of interdependencies within complex systems like our global financial market — and the notion of tipping points that could hasten collapse — are just beginning to be seriously studied. For investment professionals, the challenge is twofold: maintaining the progress that MPT began in refining risk management theory, and addressing the systemic flaws that hit close to home. Innovating on both fronts gives us the best chance we have to insulate portfolios from the risks we know, as well as those just beginning to emerge.

In applying what we have learned from the financial crisis to the challenges of risk management in the years to come, we feel that there are several principles that deserve consideration by portfolio managers, whether in the service of broadly used asset allocation models or portfolios specifically constructed for individual investors:

- It's essential to have a systematic approach to address volatility. Without a clearly defined set of parameters in place, valuable time can be lost in executing a strategic reallocation.

- Hedging strategies can be a valuable tool to help ensure that managers are properly “paid” for the risk levels they take. The steps we have outlined to implement Dynamic Risk Management can be readily adapted as a TAA signal for a wide variety of portfolios.
- Though systematization is important to identify key pivot points in the markets, there is no substitute for judgment and expertise in the implementation of allocation strategies.

In addition, we encourage everyone involved in portfolio construction and evaluation to have a clear point of view on the following points:

- Did the crisis change your mind about the viability of MPT and/or the desirability of short-term hedging strategies?
 - Do you feel there is room for improvement in short-term risk management strategies that you currently use?
 - Did you find them to be cost-effective?
 - Which systemic risk factors that emerged during the crisis do you find to be the most threatening?
 - Do you think enough is being done to address them?
 - Do you think systemic risk is greater or lesser than before the crisis?
 - What lies ahead and how do you properly position portfolios?
-

A large, textured, light-colored sphere is balanced on a smaller, smooth, dark-colored sphere. The background is white. The large sphere has a rough, porous texture, while the smaller sphere is smooth and dark. The composition is simple and balanced.

About the Author

Wayne Lin currently serves as Portfolio Manager and Investment Strategy Analyst of Legg Mason Global Asset Allocation, LLC, developing investment strategies for both strategic and tactical asset allocation mandates. Mr. Lin has diverse experience in both investment management and management consulting, and has earned both an A.B. from the University of Chicago and an MBA from Columbia Business School.

Legg Mason Global Asset Allocation offers a broad range of asset allocation capabilities to meet the needs of retail and institutional investors in the global marketplace. The Group's services include strategic asset allocation, tactical asset allocation, manager selection and monitoring, and ongoing portfolio management and rebalancing. As of March 31, 2010, Legg Mason Asset Allocation serves as general portfolio manager for over \$4 billion in assets under management in asset allocation products, supporting both funds-of-funds and manager-of-manager methodologies.

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Since its founding in 1899 as a brokerage firm in Baltimore, Maryland, Legg Mason has evolved into one of the largest asset management firms in the world, serving individual and institutional investors in 190 countries on six continents.

Today's Legg Mason is a diversified group of best-in-class global asset management firms ("affiliates"), including Legg Mason Global Asset Allocation, who are recognized for their proven investment expertise and long-term performance. The principal investment affiliates of Legg Mason are among the industry leaders in their respective areas of specialization, with unique investment approaches that have been developed over decades. The distinctive Legg Mason "multi-affiliate" business model provides clients with a broad spectrum of Equity, Fixed Income, Liquidity and Alternatives solutions, from mutual funds to college savings plans to variable annuities to separately managed accounts.

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What should I know before investing?

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