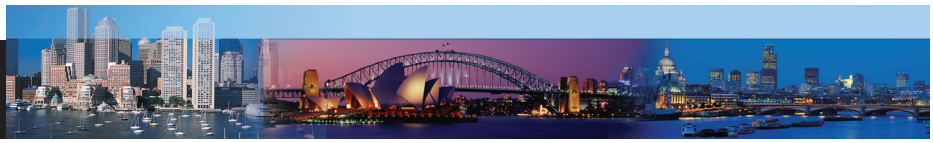
GMO

WHITE PAPER



December 2008

When Diversification Failed

Ben Inker

Introduction

The cry has gone up from institutional investors around the world, "What the hell went wrong with my portfolio? I thought I was diversified." Portfolios that seemed secure against any eventuality have been crumbling in the onslaught of the recent bear market, and many investors have realized that their carefully crafted risk control measures have failed. Every bear market leads to changes in investor behavior, and this one will be no different. The question, though, is whether investors will learn the right lessons. It is too early to know what the investment world will look like in the aftermath of this crisis, but it is not too early to learn important lessons that can improve the way portfolios are managed.

We believe investors need to reassess the virtues of diversification among risk assets. While there are benefits to diversification, they are not quite the ones that many investors think. We also believe investors need to look beyond the standard quantitative risk models and recognize the kinds of risk that those models fail to capture. Quantitative risk analysis and "efficient frontier investing" gave investors a false sense of confidence, taking them down a path that led to greater losses and more than a few bankruptcies. To better protect portfolios against large drawdowns and increase long-term returns, it is time to look beyond static portfolios and risk models to a more dynamic asset allocation.

What We Cannot Do

Before getting into the lessons to be learned from the recent past, we should recognize that once the world was in the situation it was in by the summer of 2007, there was no way that portfolio construction techniques could have reduced the size of the overall losses. In 2007, the world saw the most profound bubble in risk assets ever seen, and it is the bursting of this bubble that has led to the enormous loss of wealth we have experienced to date. While we can try to second guess the government policy decisions that have brought us to where we are today, the truth is that most of the money lost in the last 18 months has simply come from overvalued asset classes reverting to the mean. A single institution could have avoided the fall by selling out of all of their risk assets, but if every institution had tried, they would have simply succeeded in hastening the collapse. The world in general is long risk assets. An individual investor selling out or even going short risk only serves to redistribute the losses; he does not reduce them. The only way to have avoided the aggregate pain would have been to have avoided the bubble in the first place, which would have involved changing the way portfolios were invested in the period between 2000 and 2006.

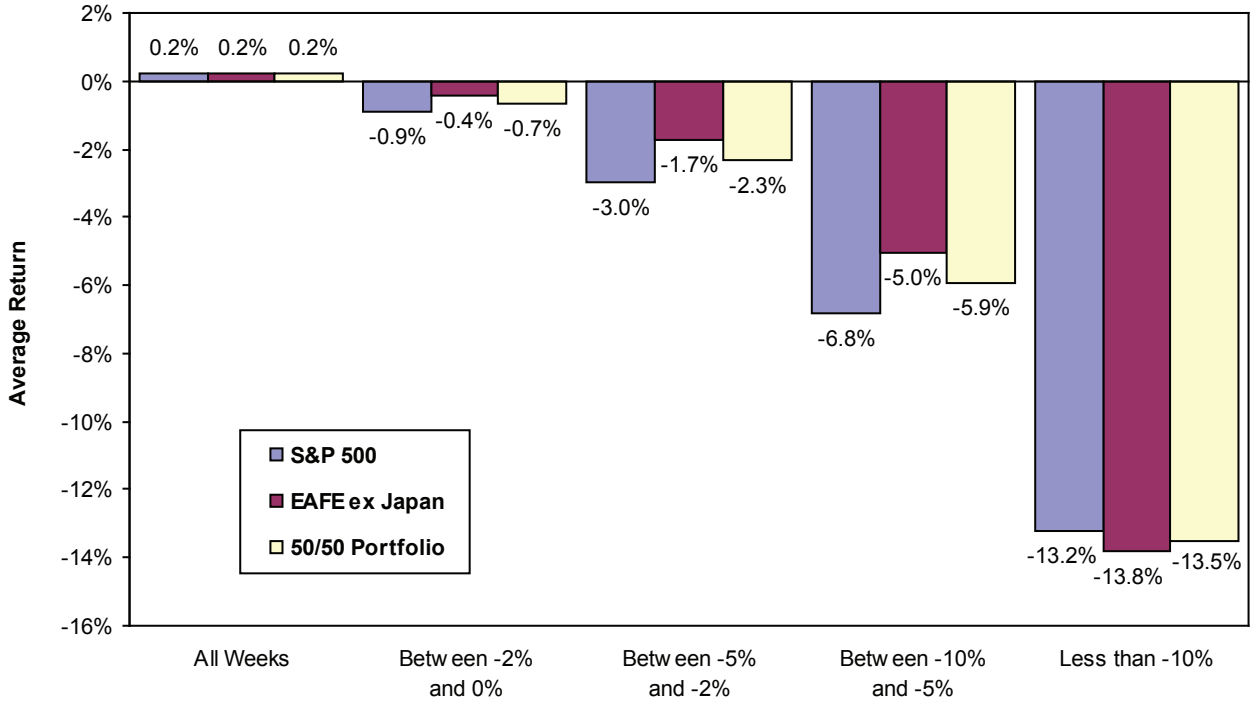
For GMO's part, our strategies were positioned with varying degrees of preparedness for the events of the last 18 months, and we have learned a number of lessons from how they have performed. While many of these lessons are beyond the scope of this particular discussion, we are trying to take what we have learned from both our successes and failures over this period to better manage our clients' assets going forward. We plan to discuss some of the issues more specific to GMO's portfolios in future papers.

The Value and Limits of Diversification – The Many Kinds of Risk

The standard case for diversification can be summarized basically as follows: 1) financial assets have return patterns that are not completely correlated to one another; and 2) a well-constructed portfolio consisting of a number of imperfectly correlated assets can reduce overall risk without reducing expected returns. The argument is straightforward and the math is compelling – well worth a Nobel Prize or two. The trouble is that "risk" is not a simple concept, and while there are some types of risk that diversification can reduce, there are others that it cannot. We can see this fairly easily in the case of the S&P 500 and EAFE ex-Japan. Looking from the standpoint of a U.S.-based investor, does it make sense to diversify into non-U.S. stocks? It all depends on your time horizon and which "risk" you are trying to reduce. As we can see in Figure 1, it does not seem very useful for an investor attempting to reduce the risk of taking a large weekly loss in an equity portfolio.

Figure 1 uses weekly return data for EAFE ex-Japan and the S&P 500 from September 1985 to November 2008, and shows the average return for EAFE ex-Japan and the S&P 500 in various conditions. Over all weeks since September 1985 to present, EAFE ex-Japan and the S&P 500 have had almost exactly the same return of +0.2% per week. Over the total period, it hasn't really mattered whether you owned one, the other, or both. But very few of us are only concerned about the 23-year return of our equity portfolios, and an investor looking for diversification "when it really counts" might reasonably look at what happens to EAFE ex-Japan in the bad weeks for the S&P 500. In the mildly bad weeks, there seems to be some benefit to the diversification. In weeks where the S&P 500 was down between 0% and 2%, EAFE ex-Japan returned an average of -0.4% versus -0.9% for the S&P, so an equal weighted portfolio of the two would have fallen only about 75% as much as an S&P 500-only portfolio. But the mildly negative weeks are not the ones an investor worries about. As the declines grow for the S&P 500, the value of the diversification decreases. For weeks down between 2% and 5%, the 50/50 portfolio falls 80% as much as an S&P 500-only portfolio, rising to almost 90% for declines between 5% and 10%, and 102% for declines worse than 10%. Since the really bad weeks are the ones that CIOs actually lose sleep over, the diversification provided by adding EAFE ex-Japan to your portfolio may seem minimal.

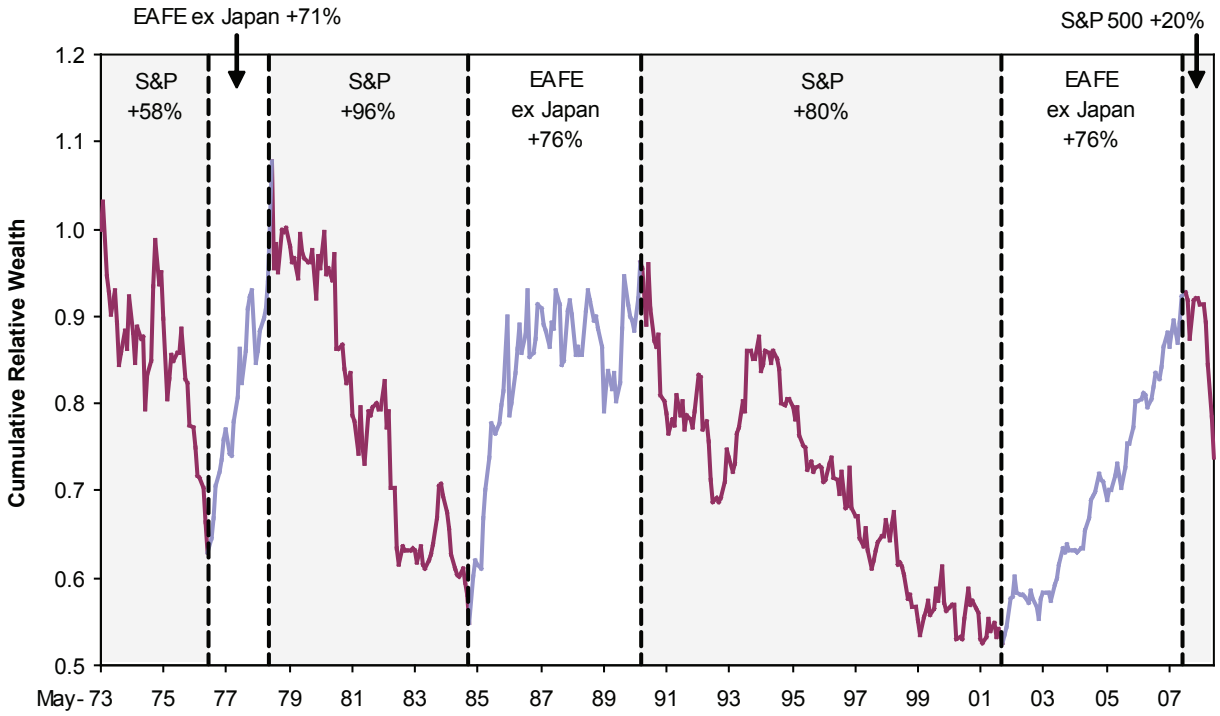
Figure 1 – Weekly Returns of S&P 500 and EAFE ex Japan



Source: MSCI, S&P
October 1985-November 2008

But viewed over a different time horizon, the virtues become more evident. Figure 2 shows the swings in the relative cumulative wealth of owning EAFE ex-Japan and the S&P 500 since 1973.

Figure 2 – EAFE ex Japan versus S&P 500 Cumulative Wealth



Source: GMO As of 5/31/08

Despite the high correlation between these two indices – since 1973 the correlation of monthly returns has been 70%, and since 1990 it has been 80% – there have been very large performance swings between the two. This means that investors with a longer time horizon will have the benefit of a smoother ride by diversifying globally.

The basic reason for the discrepancy in the efficacy of diversification in the two time horizons is that, over the course of a week, the overwhelming driver of returns for equities is the "equity effect" or even the "risk asset effect." A lousy week for the S&P 500 is overwhelmingly likely to be a lousy week for EAFE ex-Japan, or emerging equities, or small caps, or growth stocks, or value stocks. Diversification helps to protect against the idiosyncratic risks of a group of stocks, but not the common risks. This sounds like the basic argument for diversification in modern portfolio theory, but there is a twist. One of the most important idiosyncratic risks for a group of stocks is price risk. This is a risk that is ignored entirely by most risk models. Price risk is the risk associated with the valuation of an asset class. While in the course of any given week the valuation of an asset has little impact on its return, over longer periods of time the effect can be profound. From September 1998 to September 2008, the S&P 500 gave an annualized return of +0.2% real. MSCI Emerging gave an annualized return of +12.4% real. This is despite the fact that in the really awful weeks for the S&P 500 during that period, MSCI Emerging underperformed. Emerging gave little diversification in the short term, but provided a hugely different outcome over the decade. The reason for this, we believe, was price risk. The S&P 500 was substantially overvalued in September 1998, while MSCI Emerging was substantially undervalued. GMO's 10-year asset class forecasts in September 1998, which we based purely on the valuations of the two groups of stocks, were for the S&P 500 to deliver -1.1% real and for emerging to deliver +10.9% real on average over the following decade. The overall numbers wound up being as close as they were to our forecasts because both asset classes ended the period trading quite close to fair value on our data. It was not guaranteed that we would end at fair value, and over the 10-year and 40-day period starting September 30, 1998 and ending November 19, 2008, the

annualized real returns were -3.4% real for the S&P 500 and +8.7% real for MSCI Emerging, somewhat worse than our forecasts. By November 19, both asset classes were trading well below our estimate of fair value, and the forecasts that assumed they would be trading at fair value overstated their return. The gap between the two remained 12.2% on a divided basis versus the 12.1% we estimated.[1]

That gap shows the difference in price risk for the two indices. At the time, price risk argued for holding emerging to the exclusion, or close to it, of the S&P 500. But there are other risks you bear in holding emerging and not the S&P 500. The first is the risk that something goes so wrong with the underlying fundamentals of emerging that the valuation gap doesn't save you. Let's call that "fundamentals risk." The second is that your valuation model for the asset classes might be wrong. Let's call that "model risk." A good example of fundamentals risk would be the plight of the owners of Russian stocks or bonds before 1917. However attractive the returns may have looked on those securities, the Communist takeover of Russia sent the value to zero. An example of model risk would be the plight of anyone who believed the "Dow 36,000" argument in 1999. That prediction turned out to be horrifically wrong because the authors' basic valuation model was flawed. Not only did they assume that the equity risk premium for equities should be zero, an idea that seems laughable today, but they compounded their error by failing to recognize that if the cost of equity capital did fall as they predicted, the return on equity capital would inevitably fall by a similar amount. Their model ignored one of the basic underpinnings of capitalism, and the model risk was immense.

Other risks need to come into the calculation as well. Timing risk and career risk are closely related. Even though the fundamentals risk and the model risk in our predictions for the S&P 500 and MSCI Emerging turned out to be small, the timing risk and career risk of overweighting emerging and underweighting the S&P 500 was significant. Over any given time horizon, the risk of pricing moving against you can be large, even if your model risk and fundamentals risk are small. If an interim drawdown in either absolute or relative terms will be a problem, you cannot afford to ignore the short-term risks that are embodied in most investors' covariance matrices.

Learning the Wrong Lessons

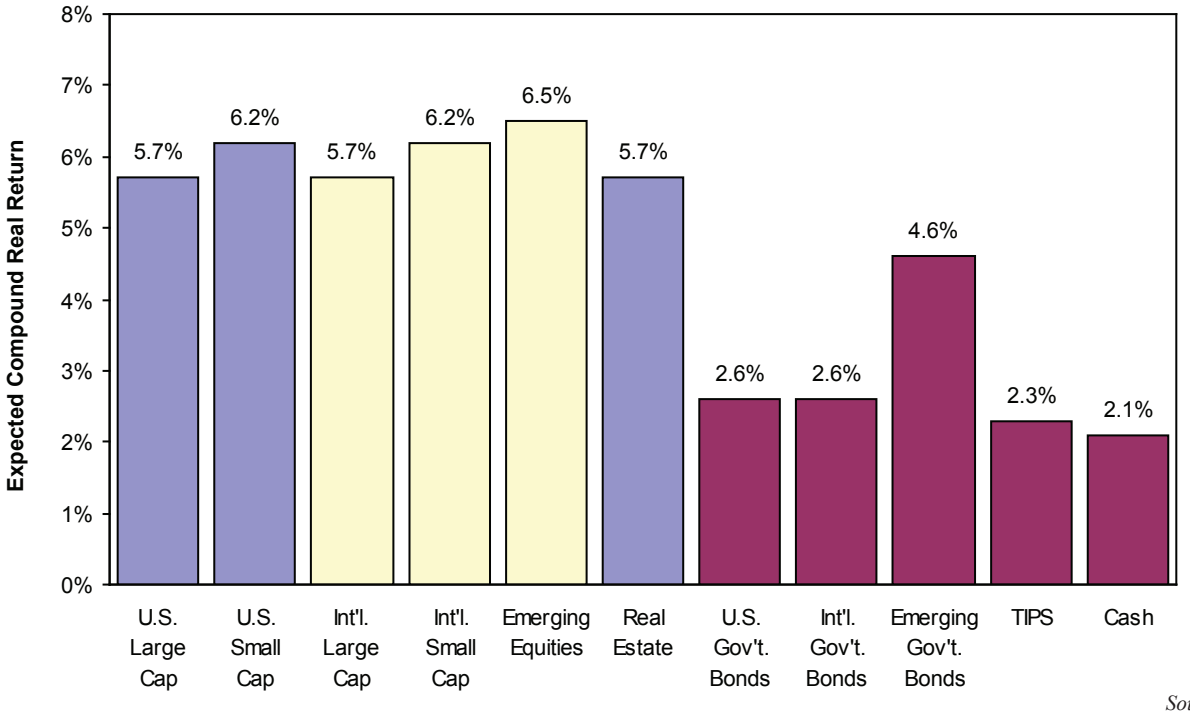
However, few investors have had the problem of ignoring the risks in standard risk models. A much bigger problem for many was believing that the only risks they had to worry about were the ones embodied in their covariance matrices. The period from 2003-07 was probably the Golden Age of the covariance view of risk for institutional investors. The impetus for the move was the bear market of 2000-02, which was very painful for institutions that had the bulk of their risk assets in large cap equities. Looking around for a better model, many investors decided to follow the lead of the large endowments such as Yale and Harvard, which had moved to a much more diversified portfolio of risk assets prior to 2000. These institutions had achieved better than average performance not only in the boom years of the late 1990s, but also the bust years of 2000-02. This result made it seem that diversifying into niche assets like emerging equity and debt, private equity, commodities, real estate, forestry, and infrastructure could give you both higher returns and lower risk than a traditional portfolio. Quantitative risk models gave additional justification for the move and gave investors the confidence to diversify not only their portfolio of risk assets, but to increase the percentage of their portfolio devoted to risk assets as well.

This, unfortunately, turned out to be the wrong lesson to have learned from the Internet Bubble. In the end, the Internet Bubble was an example of the problem of price risk, but few investors truly took the lesson to heart. To understand why it was a price risk issue, we need to dig into the risk/return trade-off for asset classes. Figure 3 shows GMO's estimate of the equilibrium return for a set of assets. This is not intended to be an exhaustive list, but since these are the asset classes for which we have been forecasting for well over a decade at GMO, we can use them to help understand the right and wrong lessons to have learned from 2000.

---

[1] The accuracy of these forecasts does not guarantee that current or future predictions will be accurate either with respect to the ranking of those asset classes over a 10-year period, the absolute levels of real return, or results over shorter periods. The accuracy of forecasted rankings in the asset class forecasts generally varies from period to period.

Figure 3 – Equilibrium Real Returns

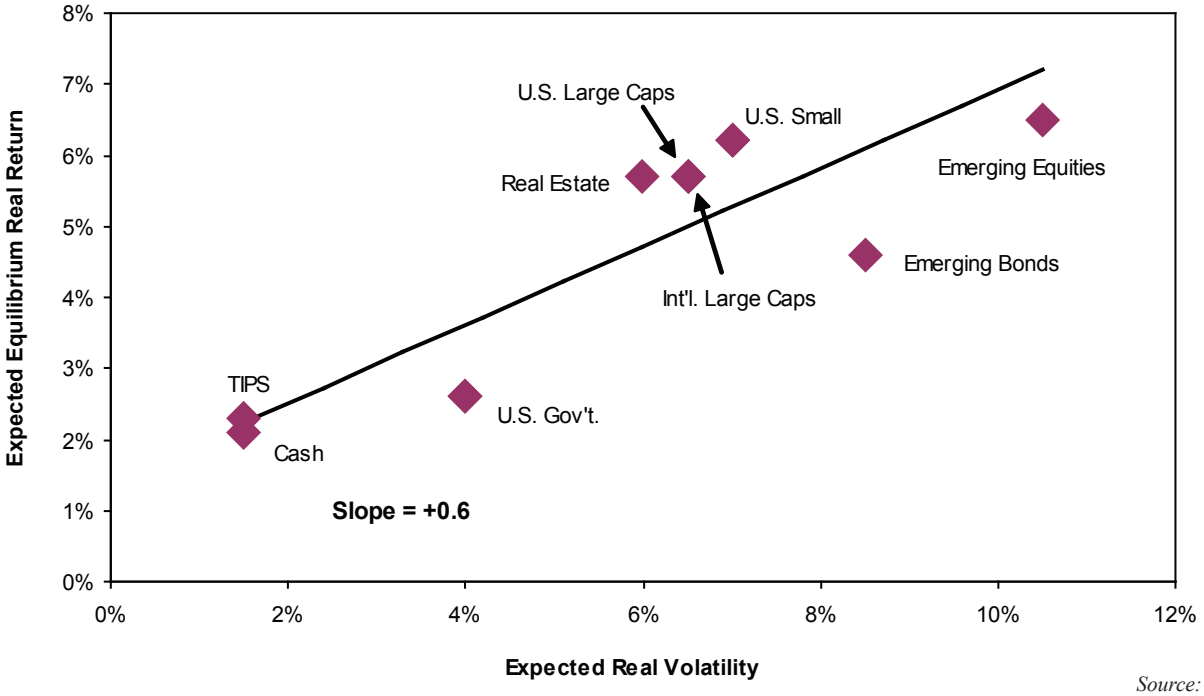


Source: GMO

Note: The equilibrium real returns above are based on the reasonable beliefs of GMO. They are not and should not be construed as guarantee of any future returns. Actual results may differ materially for those above.

At equilibrium we estimate that the higher risk assets will give a higher return, which is the standard assumption. Looking at the data on a risk/return basis as in Figure 4, we can come up with a regression line telling us the expected average risk/return trade-off, given the forecast returns and fairly standard risk estimates.

Figure 4 – Equilibrium Risk Return Trade-off



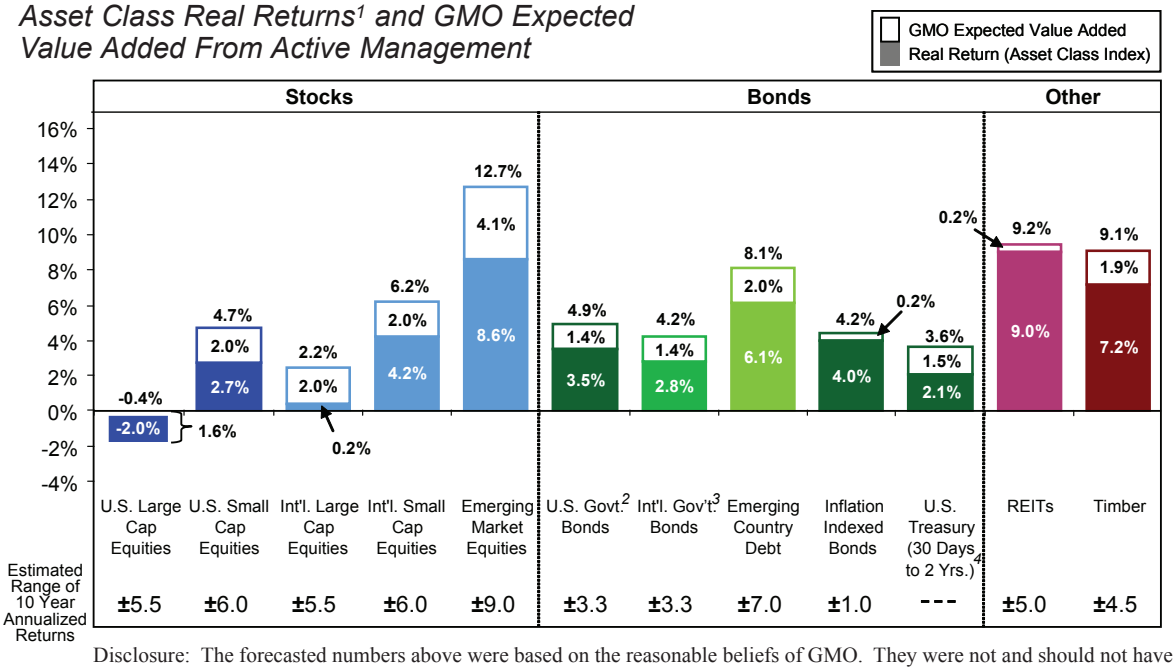
Source: GMO

Note: The equilibrium real returns above are based on the reasonable beliefs of GMO. They are not and should not be construed as guarantee of any future returns. Actual results may differ materially for those above.

The regression line in Figure 4 has a slope of +0.6. This means that for every extra point of annualized 7-year volatility over seven years, you could expect to receive an extra 0.6% of annualized real return. Let's assume that +0.6 is a normal risk/return trade-off, and then look at what the trade-off was in June 2000, just before the peak for the S&P 500. Our forecasts from June 2000 are shown in Figure 5.

Figure 5 – GMO Ten Year Asset Class Return Forecasts as of June 30, 2000

Asset Class Real Returns[1] and GMO Expected Value Added From Active Management



[1] Long-term inflation assumption: 2.2% per year.

[2] Bond with same duration as Lehman Brothers Government Bond Index.

[3] Bond with same duration as J.P. Morgan Non-U.S. Government Bond Index. Forecast is for unhedged international bond returns. Hedged is 0.2% higher.

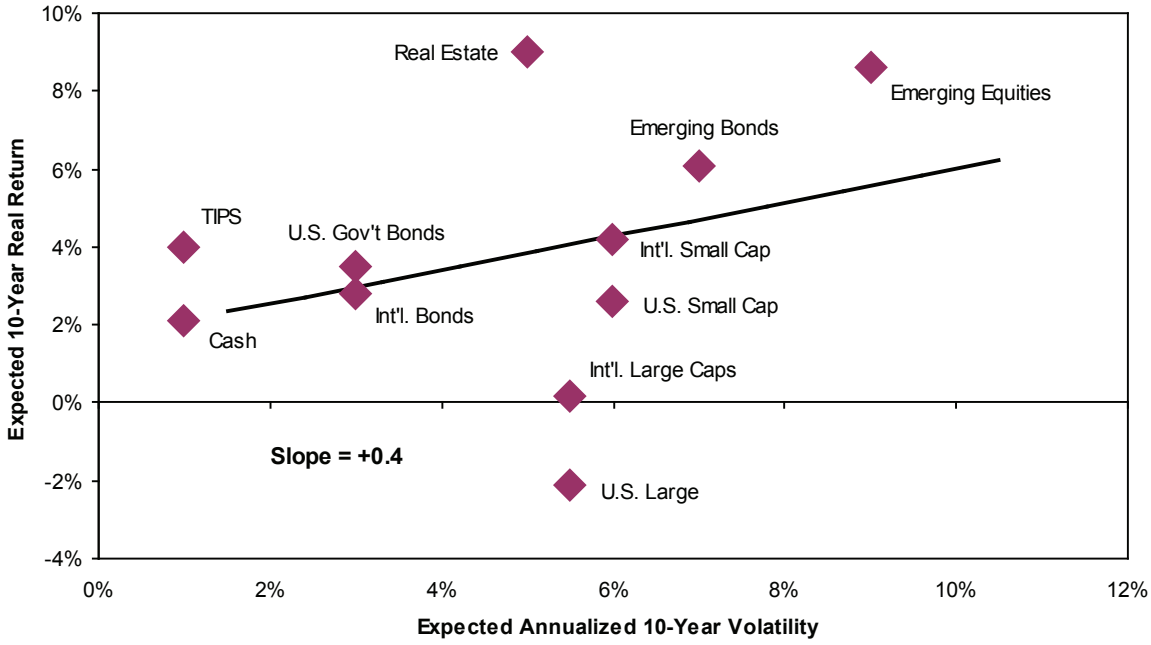
[4] Transported alpha from global equity management.

Disclosure: The forecasted numbers above were based on the reasonable beliefs of GMO. They were not and should not have been construed as a guarantee of any future returns. Actual results may have differed materially from those above.

Source: GMO

At the time we were making 10-year return and risk forecasts instead of the 7-year versions used in the equilibrium example, but this doesn't change the math very much. The risk/return trade-off at the time can be seen in Figure 6.

Figure 6 – Risk Return Trade-off in June 2000

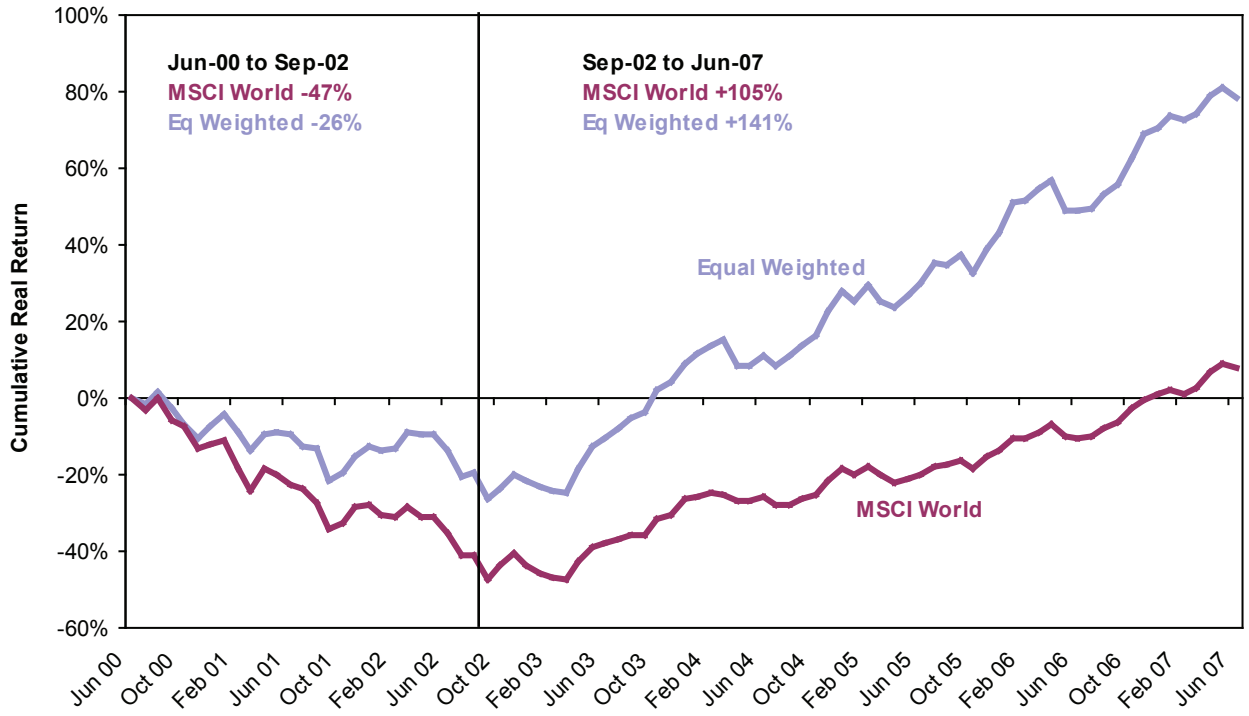


Source: GMO

Disclosure: The expected return and volatility numbers above were based on the reasonable beliefs of GMO. They were not and should not have been construed as a guarantee of any future returns or volatility. Actual results may have differed materially from those above.

At +0.4, the risk/return trade-off was about two thirds of normal – not great, but not horrible either. Even though the forecast for U.S. large caps was significantly negative and international large caps about zero, there were a number of risk assets that were priced to give good returns. Emerging equities and debt, REITs, and global small cap stocks were all somewhere between slightly expensive and quite cheap. On our data, the S&P 500 was about twice fair value and the Nasdaq almost four times, but the bubble was largely restricted to internet and TMT stocks. Since these stocks were so overvalued, they made up a large portion of the overall market capitalization of equities, and many institutions found themselves holding a risk portfolio dominated by hugely overpriced stocks. A portfolio broadly diversified among risk assets would have significantly reduced the price risk in the portfolio, since most of the niche asset classes were not particularly overpriced. From June 2000 to September 2002, MSCI World fell 47%, while an equal weighted portfolio of the risk assets (equities plus emerging debt) fell 26% – a huge loss avoidance. From that point, MSCI World would have had to have outperformed the equal weighted portfolio by 39% to have caught up. As it happened, the equal weighted portfolio continued to outperform strongly, and from June 2000 to June 2007 the equal weighted portfolio achieved an annualized real return of +8.6%, versus +1.1% for MSCI World. The path of the two portfolios from June 2000 to June 2007 is shown in Figure 7.

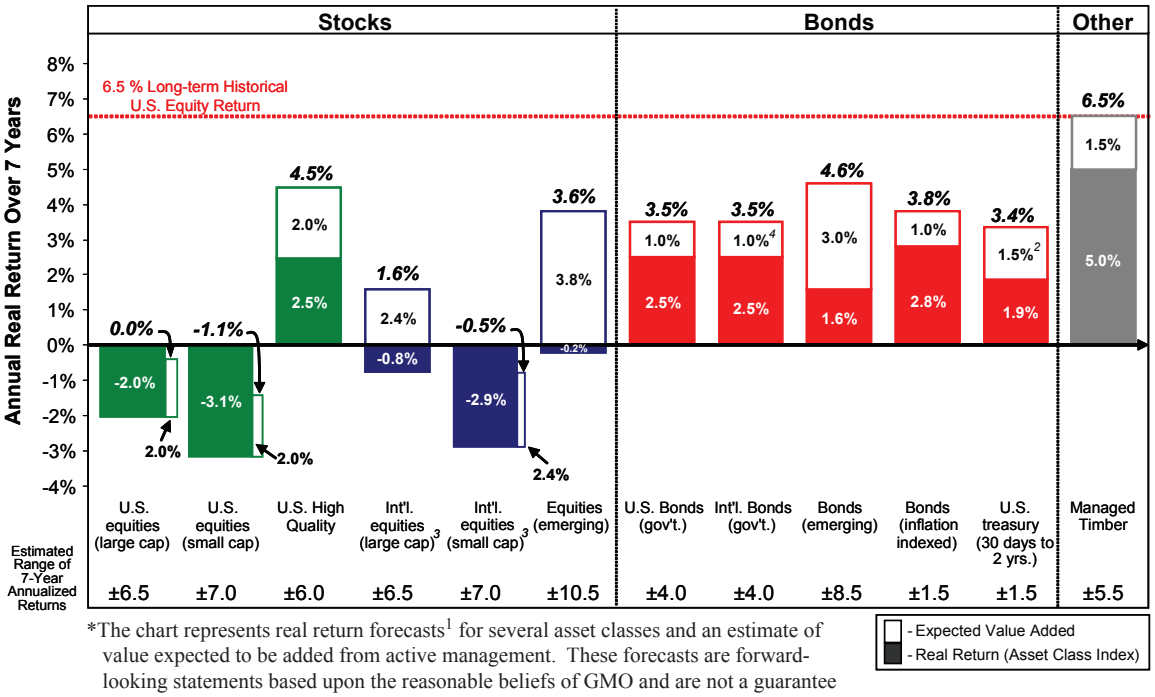
Figure 7
MSCI World vs. Equal Weighted



Source: MSCI, Russell Investments, JPMorgan, GMO As of 6/30/07

This was an extraordinary triumph for the well-diversified portfolio, and appeared to vindicate not only the new diversification, but the further step that many institutions made, which was to increase the overall weight of risk assets in their portfolio. But the investment environment was very different in 2007 than it was in 2000, and the diversified risk portfolio never had a chance. GMO's asset class forecasts from June 2007 are shown in Figure 8.

Figure 8 – GMO 7-Year Asset Class Return Forecasts* as of June 30, 2007



[1] Long-term inflation assumption: 2.5% per year.

[2] Alpha transported from management of global equities.

[3] Return forecasts for international equities are ex-Japan.

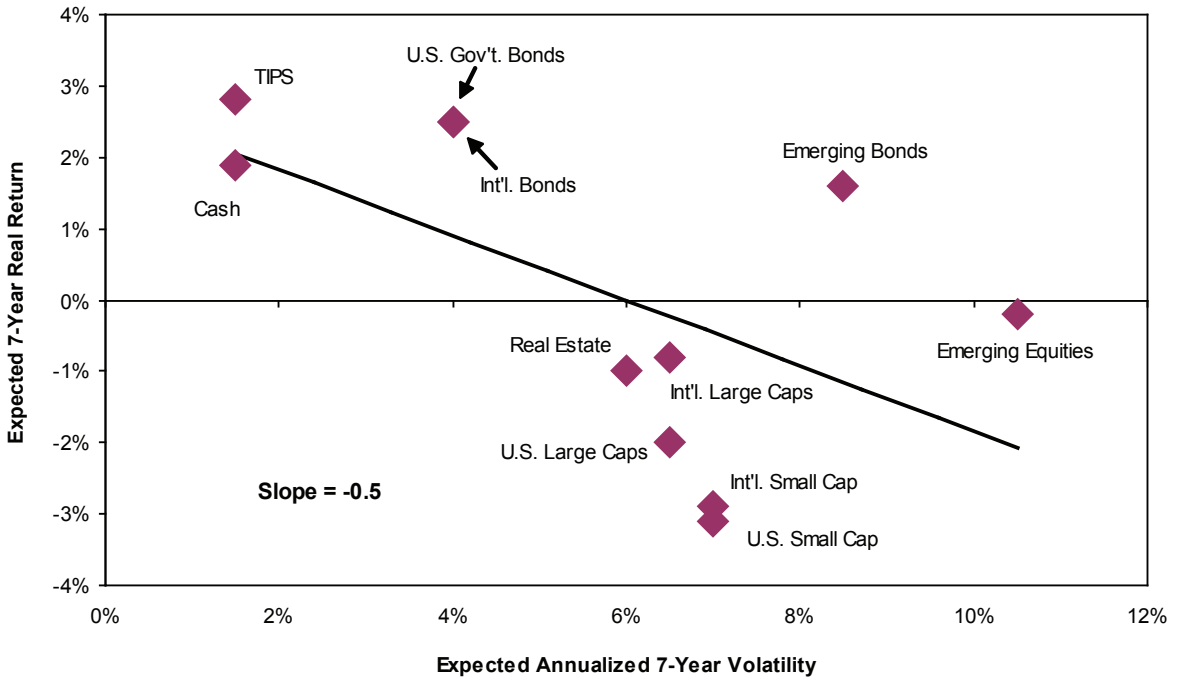
[4] Alpha transported from management of global bonds.

*The chart represents real return forecasts[1] for several asset classes and an estimate of value expected to be added from active management. These forecasts are forward-looking statements based upon the reasonable beliefs of GMO and are not a guarantee of future performance. Actual results may differ materially from the forecasts above.

Source: GMO

This is a very different picture than the forecasts from June 2000, and the resulting risk/return scatterplot is shown in Figure 9.

Figure 9 – Risk Return Trade-off in June 2007



Source: GMO

Disclosure: The expected return and volatility numbers above were based on the reasonable beliefs of GMO. They were not and should not have been construed as a guarantee of any future returns or volatility. Actual results may have differed materially from those above.

The risk/return trade-off in June 2000 was +0.4. In June 2007, it was -0.5! While the environment of June 2000 implied that an equal weighted portfolio of risk assets should outperform MSCI World handsomely and make decent money in absolute terms, valuations in June 2007 suggested that the equal weighted portfolio would do about the same as MSCI World, and both would lose a significant amount of money in absolute terms. From June 2007 to November 19, 2008, the equal weighted portfolio of risk assets fell 49% in real terms, while MSCI World fell an identical 49%.

No one's quantitative risk analysis gave them reason to believe that such an outcome was possible. A -49% return for MSCI World is about a 2.7 standard deviation event – a 100-year flood that might have just made it into a quant's "tail risk" analysis. But the same return for the "diversified" portfolio of risk assets would have appeared to be a 4 standard deviation event – a 34,000-year flood far beyond the scenarios that most institutions worried about.

If the risk analyses had been used passively, checking the risk of portfolios already decided on, the underestimation of risk would have been dangerous enough. But mean-variance optimization took the damage a step further by letting the misestimated risk feed back into the portfolio construction process. Covariance matrices "tamed" risk by reducing it to a single number. Optimization turned risk into a tool for the portfolio manager, by making it seem there was a straightforward trade-off between risk and return. While investors could have taken their diversified portfolios of risk assets and simply enjoyed their expectations of lower projected risk, many chose instead to "move out on the efficient frontier," replacing the old-fashioned risk control of a reserve of low risk assets with the risk control that appeared to come from diversification. With covariance matrices generated over a period in which the valuations of risk assets had been relatively uncorrelated, the results were bound to be grossly inaccurate in an environment when risk assets were universally overvalued. And with the false confidence engendered by the quantification of risk, investors increased the aggressiveness of their portfolios at one of the worst possible times.

Learning the Right Lessons

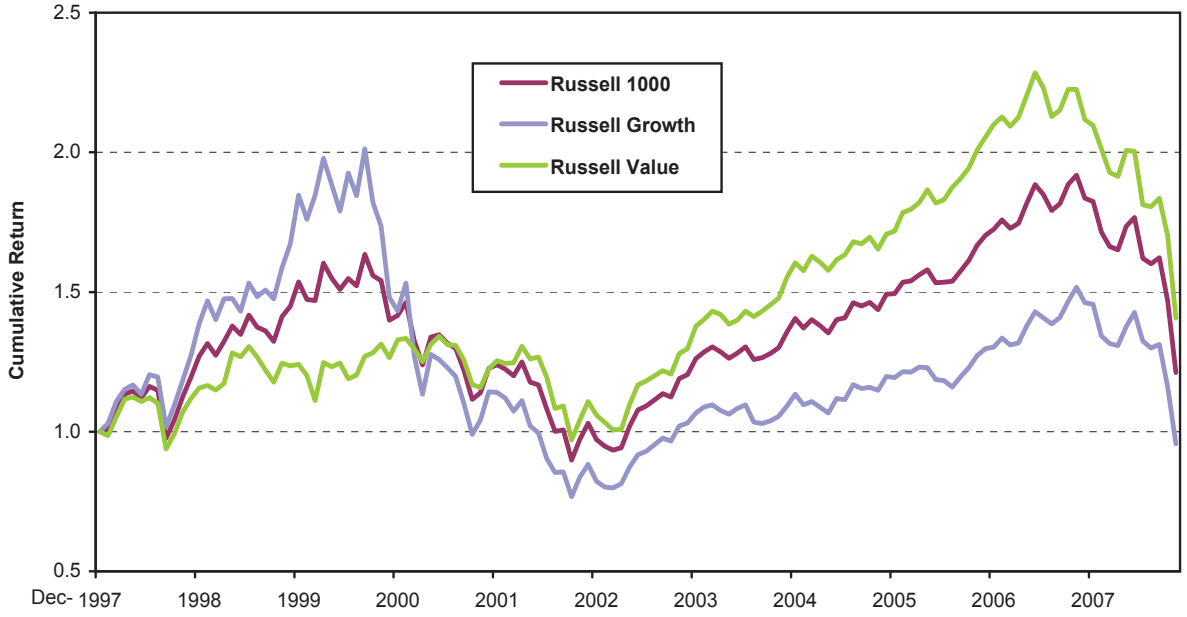
If investors learned the wrong lessons from the bursting of the Internet Bubble, can we do better in the aftermath of the Risk Bubble? One lesson seems fairly clear. While diversifying your portfolio of risk assets will reduce price risk under many circumstances, it does not change the fact that they remain risk assets, and it is unwise to think that the diversification justifies increasing the overall allocation to risk assets. For investors that can take the timing/career risk, it makes sense to go beyond diversification in risk assets and dynamically allocate their portfolios, both in terms of which risk assets to own, and what the overall allocation to risk assets should be.

Diversification seemed the perfect solution to the Internet Bubble because the price risk was all in a few sectors, and the niche asset classes that the new diversified portfolios overweighted were not overvalued. In the Risk Bubble, however, all risk assets were overvalued, and the overvaluation may actually have been worse in the niche assets, so diversification failed. If we are right and one of the primary benefits of diversification is reduction of price risk, then a superior solution would be to actively avoid the asset classes that have price risk, and let your overall allocation to risk assets be driven by the general return to risk that the markets are offering. This does not mean you can afford to ignore fundamentals risk, model risk, timing risk, career risk, quantitative covariance-type risk, or liquidity risk, but layering on an understanding of price risk may help to improve your portfolio significantly. Rather than having a static allocation to each class of risk asset, it makes more sense to keep all of them on the menu, but shift the allocations as valuations, and therefore risk/return trade-offs, shift. This puts a particular burden on illiquid asset classes such as private equity, timber, and real estate, since it is difficult to shift allocations in any reasonable time frame. Illiquidity has a considerable cost even for long-term investors, since there is an opportunity cost to not being able to shift in and out as valuations change. Investors should ensure that they are being appropriately compensated for that cost.

Many investors look down on dynamic asset allocation as mere "market timing." Getting the timing right on asset class moves is extremely difficult. But coming up with reasonable estimates of fair value for an asset class is achievable. An investor who refuses to run dynamic portfolios is making the fairly heroic assumption that prospective asset class

returns and risks are not dependent on starting valuations. Those of us who sold out of large cap growth stocks in 1998 looked foolish for a couple of years and would have done better selling in March 2000, but there is no question that moving to value in 1998 gave higher returns and lower risk than holding onto growth for the duration, as we can see in Figure 10.

Figure 10 – Russell 1000 Value and Growth



Source: Russell Investments, GMO As of 10/31/08

Notice the different responses of the Russell Value index in the two bear markets. It was hugely defensive in the Internet Bust, but not at all in the Risk Bust. In June 2000 the Russell Value was extremely cheap versus the market. In June 2007, it was quite expensive. In June 2007, the cheap sector of the market was high quality stocks. The performance of these sectors in the two bear markets is shown in Figure 11.

Figure 11 – Performance in Bear Markets

	June 2000 to September 2002	June 2007 to November 19, 2008
Russell 1000	-42%	-46%
Russell Growth	-60%	-43%
Russell Value	-18%	-48%
High Quality	-39%	-28%

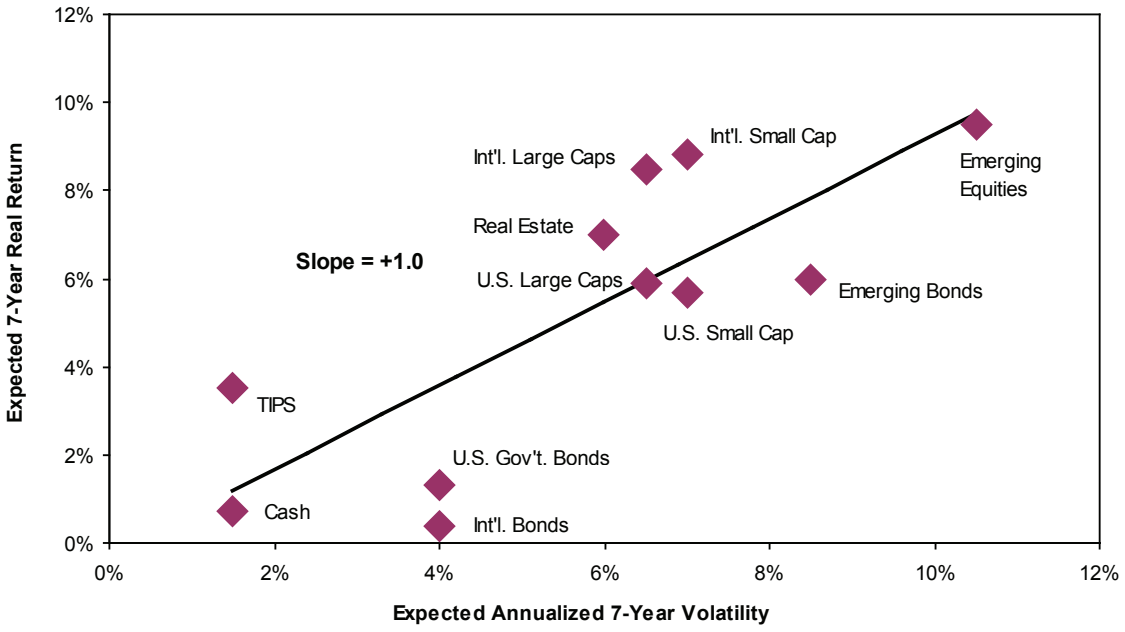
Source: Russell Investments, GMO

Value was extremely defensive in the Internet Bust, falling 23% less than the Russell 1000. High quality stocks, by contrast, fell almost as much as the overall market. But in the Risk Bust, Russell Value underperformed, while high quality outperformed the market by 17%. In June 2000, high quality stocks were not particularly cheap and value stocks were their cheapest ever, relative to the market. In June 2007, value stocks were expensive, and high quality stocks were at their cheapest ever. Neither value stocks nor quality stocks are inherently defensive in bear markets, but when they are cheap, they can be extremely defensive. To ignore the valuations of the style sectors out of fear of a repeat of 1998-2000 is to consider career risk almost to the exclusion of the risk of actually losing money.

What Should Investors Do Now?

Institutional portfolios did not come into this crisis well protected. But that is the past, and price risk has changed profoundly since June 2007. Given GMO's October asset class forecasts, the risk/return trade-off looks like that presented in Figure 12.

Figure 12 – Risk Return Trade-off in October 2008



Source: GMO

Disclosure: The expected 7-year returns and volatility are based on the reasonable beliefs of GMO. They are not and should not be construed as a guarantee of any future returns. Actual results may differ materially from those above.

In June 2007, the risk/return trade-off was -0.5. Now it is +1.0, almost twice normal levels. Institutions came into this crisis with too high a weight in risk assets, but asset valuations today suggest there will be a very high return for taking risk over the next seven years. Institutions that insist on having static allocations are at least in a position where their target weights make far more sense today than they did in the past few years. For those willing to go to dynamic weighting, price risk argues for a move to a larger than normal allocation to risk assets.

For our part, we are tempering the move back to risk in our asset allocation portfolios due to concerns over very high levels of fundamentals risk – the global economy is in bad enough shape that some risky investments may not survive long enough for their valuations to matter – and a bit of greed. Our forecasting models assume that asset classes will revert to fair value from here, while the history of major asset class bubbles suggests that there is usually a large overshoot on the downside when a bubble bursts. We are therefore holding a fair bit of our fire in the expectation that as good as the opportunities are today, they may get even better in the coming months. But in the last two months we have been actively buying risk assets for the first time in several years, and we expect to continue to do so over the next year or two.

Our attempts to "market time" by slowing our move back into risk assets may or may not pay off in the end. We believe they will, but it is a calculated risk on our part. Investors who buy risk assets today – and, better yet, the risk assets trading cheaper than average – we believe are very likely to look back a decade from now and be satisfied with their returns, however wild the ride will be. The risk of risk assets, as high as it may feel, is far lower than it was in June 2007.

Mr. Inker is the chief investment officer for quantitative equities in global developed markets and director of asset allocation at GMO.