The Index Investor

Invest Wisely…Get an Impartial Second Opinion.

Contents

September 2009 Issue: Key Points

Our economic update this month concludes that the odds of our conflict scenario developing have increased, and that returns on asset classes that perform well under the high uncertainty regime are likely to show the highest rolling returns in the months ahead. These include short term government bonds (e.g., SHY for U.S. Treasuries, and ISHG for a mix of short term government bonds from other nations), gold, volatility, Swiss Francs (FXF), and Swiss and European commercial property. In this month's letters to the editor, we respond to a recent Barron's article that concluded that timber was substantially overvalued. We disagree, and conclude that timber is still likely undervalued. This month's feature article summarizes twenty years of fascinating, if rare research across multiple disciplines on a critical subject: failure. We then offer conclusions on the implications of this research for investment managers. The bottom line: self-discipline, humility and relentless curiosity are critical to avoiding

failure. Our product and strategy notes cover a wide range of issues, including commentary on the performance of the Harvard and Yale Endowment Funds, the coming train wreck in U.S. municipal securities, new research papers on asset allocation, illiquidity premia, phase changes in financial systems, volatility and commodities -- including one that concludes that gold is, indeed, different.

Last but not least, we continue to implement changes intended to convey more information in a format that responds to the way subscribers with different needs use our publications (e.g., our PDFs now allow annotation, and we have expanded our momentum data). Expect to see more of these changes in future issues, and please don't hesitate to offer further suggestions about how we could further improve our offerings to better meet your needs.

Global Asset Class Returns

YTD 31 Aug 09	In USD	In AUD	In CAD	In EURO	In JPY	In GBP	In CHF	In INR
Asset Held								
USD Bonds	4.61%	-16.30%	-7.80%	1.37%	6.89%	-8.74%	5.72%	4.82%
USD Prop.	11.37%	-9.54%	-1.04%	8.13%	13.65%	-1.98%	12.48%	11.58%
USD Equity	16.70%	-4.21%	4.29%	13.46%	18.98%	3.35%	17.81%	16.91%
AUD Bonds	8.32%	-12.59%	-4.09%	5.08%	10.60%	-5.03%	9.43%	8.54%
AUD Prop.	24.16%	3.24%	11.75%	20.92%	26.43%	10.80%	25.26%	24.37%
AUD Equity	20.91%	0.00%	8.50%	17.68%	23.19%	7.56%	22.02%	21.13%
CAD Bonds	12.41%	-8.50%	0.00%	9.17%	14.68%	-0.95%	13.51%	12.62%
CAD Prop.	40.07%	19.15%	27.66%	36.83%	42.34%	26.71%	41.17%	40.28%
CAD Equity	12.41%	-8.50%	0.00%	9.17%	14.68%	-0.95%	13.51%	12.62%
CHF Bonds	9.57%	-11.35%	-2.84%	6.33%	11.84%	-3.79%	10.67%	9.78%
CHF Prop.	15.19%	-5.73%	2.78%	11.95%	17.46%	1.83%	16.29%	15.40%
CHF Equity	13.49%	-7.42%	1.08%	10.25%	15.77%	0.14%	14.60%	13.70%
INR Bonds	-11.12%	-32.03%	-23.53%	-14.36%	-8.85%	-24.47%	-10.01%	-10.91%
INR Equity	62.18%	41.27%	49.77%	58.94%	64.45%	48.83%	63.29%	62.39%
EUR Bonds	0.56%	-20.35%	-11.85%	-2.68%	2.83%	-12.80%	1.66%	0.77%
EUR Prop.	29.95%	9.04%	17.54%	26.71%	32.23%	16.60%	31.06%	30.17%
EUR Equity	9.49%	-11.43%	-2.92%	6.25%	11.76%	-3.87%	10.59%	9.70%
JPY Bonds	-3.45%	-24.37%	-15.86%	-6.69%	-1.18%	-16.81%	-2.35%	-3.24%
JPY Prop.	14.30%	-6.61%	1.89%	11.06%	16.57%	0.94%	15.40%	14.51%

YTD 31 Aug 09	In USD	In AUD	In CAD	In EURO	In JPY	In GBP	In CHF	In INR
JPY Equity	7.20%	-13.71%	-5.20%	3.97%	9.48%	-6.15%	8.31%	7.42%
GBP Bonds	13.35%	-7.56%	0.95%	10.12%	15.63%	0.00%	14.46%	13.57%
GBP Prop.	22.99%	2.08%	10.58%	19.75%	25.27%	9.64%	24.10%	23.21%
GBP Equity	13.35%	-7.56%	0.95%	10.12%	15.63%	0.00%	14.46%	13.57%
1-3 Yr US Govt	0.23%	-20.68%	-12.18%	-3.01%	2.51%	-13.12%	1.34%	0.44%
World Bonds	4.57%	-16.35%	-7.84%	1.33%	6.84%	-8.79%	5.67%	4.78%
World Prop.	18.52%	-2.39%	6.11%	15.28%	20.80%	5.17%	19.63%	18.74%
World Equity	20.89%	-0.02%	8.48%	17.65%	23.17%	7.54%	22.00%	21.11%
Commod Long	7.53%	-13.38%	-4.88%	4.29%	9.81%	-5.82%	8.64%	7.74%
Commod L/Shrt	-12.06%	-32.98%	-24.47%	-15.30%	-9.79%	-25.42%	-10.96%	-11.85%
Gold	7.95%	-12.96%	-4.46%	4.71%	10.23%	-5.40%	9.06%	8.17%
Timber	0.58%	-20.34%	-11.83%	-2.66%	2.85%	-12.78%	1.68%	0.79%
Uncorrel Alpha	7.93%	-12.98%	-4.48%	4.69%	10.20%	-5.43%	9.04%	8.14%
Volatility VIX	-34.98%	-55.89%	-47.38%	-38.21%	-32.70%	-48.33%	-33.87%	-34.76%
Currency								
AUD	20.91%	0.00%	8.50%	17.68%	23.19%	7.56%	22.02%	21.13%
CAD	12.41%	-8.50%	0.00%	9.17%	14.68%	-0.95%	13.51%	12.62%
EUR	3.24%	-17.68%	-9.17%	0.00%	5.51%	-10.12%	4.34%	3.45%
JPY	-2.28%	-23.19%	-14.68%	-5.51%	0.00%	-15.63%	-1.17%	-2.06%
GBP	13.35%	-7.56%	0.95%	10.12%	15.63%	0.00%	14.46%	13.57%
USD	0.00%	-20.91%	-12.41%	-3.24%	2.28%	-13.35%	1.11%	0.21%
CHF	-1.11%	-22.02%	-13.51%	-4.34%	1.17%	-14.46%	0.00%	-0.89%
INR	-0.21%	-21.13%	-12.62%	-3.45%	2.06%	-13.57%	0.89%	0.00%

Uncorrelated Alpha Strategies Detail

As we have repeatedly noted over the years, actively managed strategies whose objective is to produce returns with low or no correlation with the returns on major asset classes (so-called "uncorrelated alpha strategies") have an undeniable mathematical benefit for a portfolio. Moreover, the potential size of this benefit increases with the portfolio's long-term real rate of return target. On the other hand, we have also repeatedly noted that, for a wide range of reasons, active management is an extremely difficult game to play consistently well, and that this challenge only increases with time. Hence, in our model portfolios, we have tried to strike an appropriate balance between these two perspectives. We start by limiting allocations to uncorrelated alpha to no more than ten percent of a portfolio. We then equally divide this allocation between four different strategies. Within each strategy, we track the

performance of two liquid, retail funds which can be used to implement it, and which have far lower costs than the 2% of assets under management and 20% of profits typically charged by hedge fund managers using the same strategy (for more on the advantages of such funds, see "How Do Hedge Fund Clones Manage the Real World?" by Wallerstein, Tuchshmid, and Zaker). The following table shows the year to date performance of these funds (which are listed by ticker symbol):

YTD 31 Aug 09	In USD	In AUD	In CAD	In EURO	In JPY	In GBP	In CHF	In INR
Eq Mkt Neutral								
HSKAX	-2.50%	-23.41%	-14.91%	-5.74%	-0.23%	-15.86%	-1.39%	-2.29%
OGNAX	1.09%	-19.82%	-11.32%	-2.14%	3.37%	-12.26%	2.20%	1.31%
Arbitrage								
ARBFX	7.45%	-13.47%	-4.96%	4.21%	9.72%	-5.91%	8.55%	7.66%
ADANX	7.60%	-13.31%	-4.81%	4.36%	9.88%	-5.75%	8.71%	7.81%
Currency								
DBV	15.19%	-5.72%	2.78%	11.95%	17.47%	1.84%	16.30%	15.40%
ICI	1.51%	-19.40%	-10.90%	-1.73%	3.79%	-11.84%	2.62%	1.73%
Equity L/S								
HSGFX	5.40%	-15.52%	-7.01%	2.16%	7.67%	-7.96%	6.50%	5.61%
PTFAX	16.04%	-4.87%	3.64%	12.81%	18.32%	2.69%	17.15%	16.26%
GTAA								
MDLOX	13.16%	-7.75%	0.75%	9.92%	15.44%	-0.19%	14.27%	13.37%
PASAX	14.34%	-6.57%	1.94%	11.11%	16.62%	0.99%	15.45%	14.56%

Table: Market Implied Regime Expectations

We use the following table to provide insight into the weight of market views about which of three regimes – high uncertainty, high inflation, or normal growth – is developing. The table shows rolling three month returns for different asset classes. The asset classes we list under each regime should deliver relatively high returns when that regime develops. We assume that both the cross-sectional and time series comparisons we present provide insight into the market's conventional wisdom – at a specific point in time -- about the regime that is most likely to develop within the next twelve months. To obtain the cross-sectional perspective, we horizontally compare the row labeled "This Month's Average" for the three regimes. In our interpretation, the

regime with the highest rolling three month average is the one which (on the specified date) the market's conventional wisdom believed was the most likely to develop.

For the time series perspective, we vertically compare this month's average rolling three month return for a given regime to the regime's rolling three month average three months ago. We believe this time series perspective provides insight into how fast and in what direction the conventional wisdom has been changing over time.

Rolling Three Month Returns in USD		31-Aug-09
High Uncertainty	*High Inflation*	*Normal Growth*
Short Maturity US Govt Bonds (SHY) **0.43%**	US Real Return Bonds (TIP) **1.12%**	US Equity (VTI) **11.59%**
1 - 3 Year International Treasury Bonds (ISHG) **1.89%**	Long Commodities (DJP) **-0.21%**	EAFE Equity (EFA) **13.01%**
Equity Volatility (VIX) **-10.06%**	Global Commercial Property (RWO) **21.91%**	Emerging Equity (EEM) **6.97%**
Gold (GLD) **-2.91%**	Long Maturity Nominal Treasury Bonds (TLT)* **3.56%**	High Yield Bonds (HYG) **8.53%**
This Month's Average *-2.66%* *Three Months Ago:* *3.65%*	*Average (with TLT short)* *4.81%* *Three Months Ago:* *17.76%*	*Average* *10.03%* *Three Months Ago:* *34.72%*

* falling returns on TLT indicate rising inflation expectations

As you can see, at the end of August 2009, the conventional wisdom still seemed to favor a relatively quick return to normal times (though with an undercurrent of worry about higher inflation). From a dynamic perspective, however, we can see that rate at which these expectations were improving has sharply slowed. However,

this has yet to translate into rising expectations for a return to the high uncertainty regime. Psychologically, we can understand the need to cling to the view that good times are about to return; we can also understand that in some cases this need is reinforced by the incentives facing some professional investors. However, as we describe at length in this month's Economic Update, we believe that this hope is misplaced, and that the probability of moving again into the high uncertainty regime is quickly rising.

Table: One Year Asset Class Valuation Conclusions and Recent Momentum

The following table sums up our conclusions (based on the analysis summarized in this article) as to potential asset class under and overvaluations at the end of **August 2009**, over a one year time horizon. Note that over views on valuation over a longer-term time horizon sometimes differ from our short-term views. As we repeatedly note, when discussing asset class valuation (or any forecast, for that matter), being specific about the time horizon is critical. Our longer term valuation views are contained in the Global Asset Class Valuation Analysis section of each month's journal.

We believe that asset prices reflect the interaction of three broad forces. The first is fundamental valuation, as reflected in the balance between the expected supply of and demand for returns. The Global Asset Class Valuation Analysis of each month's journal contains an extensive discussion of fundamental valuation issues. One of our core beliefs is that while asset prices are seldom equal to their respective fundamental values (because the system usually operates in disequilibrium), they are, in the medium and long-run strongly drawn towards that attractor.

The second driver of asset prices, and undoubtedly the strongest in the short run, is investor behavior, which results from the interaction of a complex mix of cognitive, emotional and social inputs – the latter two comprising Keynes' famous "animal spirits". We try to capture the impact of investor behavior in each month's Market Implied Expectations Analysis, as well as in two measures of momentum for different asset classes – one covering returns over the most recent three months (e.g.,

June, July and August), and one covering returns over the previous non-overlapping three month period (e.g., March, April, and May).

The third driver of asset prices is the ongoing evolution of political and economic conditions and relationships, and the degree uncertainty that prevails about their future direction. We capture these longer term forces in our economic scenarios.

The following table summarizes our current views about current prices compared to fundamental valuation estimates over a one year time horizon. Specifically, we reach conclusions about whether different asset classes appear close to fairly priced (in which case our rating is "neutral"), or whether they are under or overvalued.

The extent to which we believe over or undervaluation to be the case is reflected in the confidence rating we assign to each conclusion. We believe it is extremely important for the recipient of any estimate or assessment to clearly understand the analyst's confidence in the conclusions he or she presents. How best to accomplish this has been the subject of an increasing amount of research (see, for example, "Communicating Uncertainty in Intelligence Analysis" by Steven Rieber; "Verbal Probability Expressions in National Intelligence Estimates" by Rachel Kesselman, "Verbal Uncertainty Expressions: Literature Review" by Marek Druzdzel, and "What Do Words of Estimative Probability Mean?" by Kristan Wheaton).   We use a three level verbal scale to express our confidence level in our valuation conclusions. "Possible" represents a relatively low level of confidence (e.g., 25% – 33%, or a 1 in 4 to 1 in 3 chance of being right), "likely" a moderate level of confidence (e.g., 50%, or a 1 in 2 chance of being right), and "probable" a high level of confidence (e.g., 67% to 75%, or a 2 in 3 to 3 in 4 chance of being right). We do not use a quantitative scale, because we believe that would give a false sense of accuracy to judgments that are inherently approximate due to the noisy data and subjective assumptions upon which they are based.

An exception to this approach is our assessment of the future return to local investors for holding U.S. dollars. In this case, our conclusions are mechanically driven by interest rate differentials on ten year government bonds. To be sure, the theory of

Uncovered Interest Rate Parity, which calls for exchange rates offsetting interest rate differentials does not often hold in the short-run, as the apparent profitability of the carry trade has shown (i.e., borrowing in low interest rate currencies to invest in high interest rate currencies). However, other research has shown that a substantial portion of these profits represents compensation for bearing so-called "crash" risk (see "Crash Risk in Currency Markets" by Farhi, Fraiberger, Gabaix, et al) – as many who were long Icelandic Krona in 2007 and 2008 learned the hard way.

Our fundamental valuation estimates over a one year time horizon, as well as recent momentum, are summarized in the following table. We stress that these conclusions represent our assessment at a given point in time, which implies no forecast as to when any over and undervaluations will be reversed. Indeed, before such a reversal occurs, current over and undervaluations could actually become more extreme. That said, common sense suggests that more extreme situations are more likely to be recognized and reversed. An example of this would be a situation in which an asset class was deemed likely or probably overvalued, but where momentum data indicated an accelerating increase in prices. As so many authors have noted throughout history, trends that can't continue don't continue. Finally, conclusions about potential price reversals also have to be seen in the longer term context of the likely evolution of future political/economic scenarios and their implications for asset class valuations and investor behavior (see, for example, our monthly Economic Updates). This is also an important input into investment decisions, as we do not believe that the full implications of these scenarios are typically reflected in current asset prices and investor behavior.

Valuation at 31 Aug 09	Fundamental Valuation Estimate Based on a One Year Time Horizon	Rolling 3 Month Return in Local Currency	Rolling 3 Month Return 3 Months Ago
AUD Real Bonds	Neutral	-2.50%	-4.31%
AUD Bonds	Possibly Undervalued	-12.26%	-12.01%
AUD Property	Neutral	3.24%	-15.93%

Valuation at 31 Aug 09	Fundamental Valuation Estimate Based on a One Year Time Horizon	Rolling 3 Month Return in Local Currency	Rolling 3 Month Return 3 Months Ago
AUD Equity	Neutral	9.10%	14.12%
CAD Real Bonds	Neutral	2.33%	5.39%
CAD Bonds	Possibly Undervalued	1.61%	0.02%
CAD Property	Neutral	28.29%	13.08%
CAD Equity	Likely Overvalued	3.91%	21.35%
CHF Bonds	Neutral	2.00%	-2.01%
CHF Property	Possibly Undervalued	20.89%	11.85%
CHF Equity	Likely Overvalued	22.30%	4.58%
EUR Real Bonds	Neutral	7.47%	3.81%
EUR Bonds	Possibly Undervalued	0.78%	-2.67%
EUR Prop.	Possibly Undervalued	26.25%	4.64%
EUR Equity	Possibly Undervalued	7.08%	0.90%
GBP Real Bonds	Neutral	0.66%	0.68%
GBP Bonds	Neutral	4.96%	1.84%
GBP Property	Possibly Overvalued	40.96%	7.81%
GBP Equity	Probably Undervalued	10.69%	10.52%
INR Bonds	Neutral	-8.75%	-0.02%
INR Equity	Probably Overvalued	66.22%	55.17%
JPY Real Bonds	Neutral	3.30%	-3.53%
JPY Bonds	Possibly Undervalued	-0.10%	-2.05%
JPY Property	Neutral	31.68%	14.67%
JPY Equity	Probably Overvalued	25.76%	18.12%
USD Real Bonds	Neutral	5.73%	4.17%
USD Bonds	Possibly Undervalued	5.37%	2.27%
USD Property	Possibly Overvalued	34.81%	10.50%
USD Equity	Probably Overvalued	27.21%	13.41%
Following in USD:			
Credit (HYG)	Possibly Overvalued	8.53%	
Emerging Mkt Equity (EEM)	Probably Overvalued	64.23%	26.58%

Valuation at 31 Aug 09	Fundamental Valuation Estimate Based on a One Year Time Horizon	Rolling 3 Month Return in Local Currency	Rolling 3 Month Return 3 Months Ago
Commodities Long	Neutral	13.33%	13.57%
Commodities L/S	N/A	-11.14%	-6.95%
Gold	Possibly Undervalued	2.29%	5.35%
Timber	Neutral	17.99%	22.69%
Uncorrelated Alpha	N/A	9.13%	5.56%
Volatility (VIX)	Likely Undervalued	-41.99%	-35.50%
Return in Local for holding USD:			
Returns to AUD Investor	Positive	-27.30%	-21.69%
Returns to CAD Investor	Neutral	-12.78%	-13.04%
Returns to EUR Investor	Neutral	-10.25%	-8.94%
Returns to JPY Investor	Negative	3.25%	6.01%
Returns to GBP Investor	Neutral	-13.12%	-11.92%
Returns to CHF Investor	Negative	-6.64%	-7.48%
Returns to INR Investor	Positive	-0.11%	-3.72%

This Month's Letters to the Editor

In its August 10, 2009 issue, Barron's has an article about "Trouble in the Forest." Its general conclusion is that timber is overvalued, and "could decline by as much as 50% in coming years." How do you respond to the arguments made in this article?

Judging from the volume of email this article produced, we have a lot of *Barron's* readers among our subscribers. Let's start with the key points in the *Barron's* article's arguments:

1. "Timberland prices have risen steadily since the mi-1990s, even as the price of logs, lumber and other forest products scrapes multiyear lows."

2. One possible reason for this increase in timberland prices is that private timber investment management organizations (usually limited partnerships) or "TIMOs" "are hustling to 'put money to work' in funds they created just before the

financial crisis in order to avoid refunding these monies to fund investors" and thus getting lower management fees.

3. "Timber prices could be vulnerable to a decline of as much as 50% in coming years". One reason for this is "the underlying cash flow is highly dependent on cyclical industries like housing, paper and newspapers." Regarding the latter two, "demand could weaken as the world goes digital and uses less paper." Another is that "one of timber's great selling points, its renewable nature, also means wood is less likely ever to be in tight supply. With many of the trees maturing in recent years 'remaining on the stump,' we certainly do not see an immediate log-price jump when lumber markets heat up, as there will be a 'pent up' supply of logs for several years."

4. "Timberland prices may decline as timber investment management organizations, or TIMOs, which hold millions of timber acres on behalf of institutional investors, begin to sell holdings in the next several years…as their funds hit predetermined liquidation dates, often eight to ten years after [their] inception."

5. "If you look at income per acre, you're only earning about a 1% return."

6. Timber price declines "likely would sting a group of real estate investment trusts focused on timber, including Plum Creek (PCL) and Potlatch (PCH), as well as Weyerhaeuser (WY), the forest products company whose most valuable asset is two million acres of prime forest in the Pacific Northwest."

7. Finally, there is some good news for holders of publicly traded timber REITS like Plum Creek and Rayonier (RYN), since the private market for timber [values] is even more inflated than the timber values embedded in public REITs. Plum Creek, for instance, is valued at about $1,100 an acre, versus an average national private market price of $1,800 an acre [for TIMOS] according to NCREIF" [the National Council of Real Estate Investment Fiduciaries]… "In

the future, the timber market could see a shift in assets toward REITs and away from TIMOs. We do not see sufficient benefits of having a private and illiquid interest in a multiyear timber fund versus having a highly liquid investment in a diversified timber portfolio owned through shares in a publicly traded timber REIT… the TIMO model also is in trouble because endowments and other institutions increasingly prize liquidity."

8.   The *Barron's* article concludes, "Timber is one of those overhyped investments whose supposed virtues don't hold up well under closer scrutiny. It is hard to find an asset that has appreciated so much, even as the products created from it are so weak. This doesn't bode well for private holders of timber and investors in timber REITs."

Let me start with those points where we are in agreement with *Barron's*, or believe they are plausible. The first is the illiquidity of investments in TIMOs, compared to publicly traded timber REITs like Plum Creek and Rayonier, or comparable products in other countries. We have previously noted our suspicion that illiquidity risk, in timber as well as other investments, was not being accurately priced. Hence, we have strongly favored publicly traded timber investments, whose valuation is likely to be more accurate, on average. We also find it plausible that aggressive buying by newer TIMOs could have put upward pressure on timberland prices, perhaps to the point of making some properties overvalued. And that forced sales by some TIMOs with liquidation dates could have the opposite effect in the future. In both cases, non-value based motives (e.g., putting money to work to earn management fees on a timber fund, or selling due to fund expiration) could cause prices to diverge from fundamentally based valuations. Finally, we agree that nominal prices for timber and forest products have declined during the economic downturn, and indeed before that, in some cases (e.g., newsprint).

Now let's move on to our disagreements with the *Barron's* article. We strongly disagree with the implication that just because the average TIMO income

yield per acre is 1%, timberland is an inferior investment. Apple doesn't pay a dividend at all – but does that make it an unattractive investment? Or what about an oil and gas company, that holds leases that provide access to reserves that are appreciating in value, but which hasn't yet drilled, produced gas or oil, and generated any income? The key point here is that the current income return, whether from dividends or interest, is only one part of the total return on an investment – the other driver, change in capital value over time, is also critically important. In essence, *Barron's* argument is that, for an investor buying timberland today, total shareholder return, over an unspecified future period, should be negative because capital values should decline, due to falling prices for products derived from timberland, as well as a relatively high volume of selling by expiring TIMO funds.

On the falling prices forecast, we think that *Barron's* presented a rather one-sided view. While newspaper demand many be in structural decline, continuing sales of HP printers and reams of paper at Staples and Office Depot, not to mention record numbers of books being published, hint that any suggestion the paperless world is about to arrive may be a bit premature. Also, as developing economies expand, so too will their demand for paper. Moreover, rising affluence in these countries should also lead to rising demand for wooden furniture to fill larger houses and apartments, which in addition may employ more wood in their construction. On the supply side, mountain pine beetle damage to timberlands continues to mount in the Pacific Northwest. Taken together, these factors lead us to be less alarmist than *Barron's* about long-term real timber prices. This is not to say that these prices are not volatile. In fact, IMF data show that while the real price of timber was essentially flat between 1981 and 2007, with an average annual increase of just 0.1% and annual volatility of 9.2%. So significant declines in real timber prices are not that unusual. But historically, over the long-term, they have been offset by subsequent increases. For example, while the November 2009 lumber futures contract on the CME is trading at $176, the September 2010 contract is currently trading at $235.

Finally, owners of timberland may soon have a new source of revenue. Explicit pricing of carbon emissions could also lead to explicit pricing of the carbon sequestration benefits provided by forests. For example, estimates of the amount of CO_2 sequestered each year per acre of growing timberland range from 84 to 172 metric tons. Current forecasts call for CO_2 emissions allowances and offsets to trade at between USD 25 and USD 50 per metric tonne, depending on the shape of the cap and trade system that is finally passed by the U.S. Congress. At this level of pricing per metric tonne of sequestered CO_2, the potential new revenues to owners of timberlands would be significant relative to their current revenue (for more on this, see "Estimates of Carbon Mitigation Potential from Agricultural and Forestry Activities", published in June 2009 by the U.S. Congressional Research Service, and "Forging the Climate Consensus: Domestic and International Offsets" by the National Commission on Energy Policy).

However, our most important criticism of the *Barron's* article is its failure to incorporate the points it raises into an explicit valuation model for timber as an asset class. Every month, in our asset class valuation update, we very clearly describe our asset class valuation model for timber, and present our conclusion about whether it is over, under, or close to fully valued. At best, after reading the *Barron's* article, we are left with a general impression of an implicit valuation model in which timber and other forest product prices, as well as investor behavior play critical roles – but just how these pieces fit together and drive a quantified valuation conclusion is never made clear. Nor is there any recognition that the long-term returns realized by investors in timberland, or any other asset class for that matter, depend not on today's price (which is relevant only for an investor buying or selling today), but rather on the price originally paid for the investment. *Barron's* also fails to state what it thinks is an appropriate real rate of return that an investor should require for investing in timber as an asset class. We believe that, given the low correlation that timber returns displayed with returns on other asset classes during the worst of the 2008 crisis (which logically reflects the fact that part of timber's return generating process – physical growth – is shared with no other asset class), this return should

have fallen in recent months, giving an upward boost to fundamental valuation. Finally, apart from a vague reference to falls in timber investment vehicle prices "in the coming years", we have no idea of the time horizon that *Barron's* was using when they reached their valuation conclusion.

Our fundamental valuation model assumes a long-term holding period, as befits the outlook of an investor who is either accumulating funds for retirement or, having retired, trying to achieve long-term income and bequest goals. Clearly, an investor with a shorter time horizon might reach different conclusions than we do. In sum, every month we not only present our asset class valuation conclusions, but we explicitly describe the models and assumptions upon which they are based. We do this because we want our readers to understand, and challenge, our reasoning, because we believe this is the best way to ensure that our thinking continues to evolve and improve. Unfortunately, the *Barron's* article on timber fell short of this standard.

I recently read a good article in Fund Selector ("The Tough Questions to Ask Fund Managers" by Roland Meerdter) that contained this quote: "of the hundreds of questions a research analyst might ask a fund manager, 'What do you see that others do not?' is one of the most thought provoking and pertinent." How would you answer that question?

The mark of a great question is that it causes you to think about your answer for quite a while – and this one is certainly in that category! Honestly, it cuts to the heart of the value added by everyone who analyzes and writes about investments, whether or not they are actually managing money. In our case, I offer four answers. First, since we specialize in strategic asset allocation across eight different functional currencies, I think we see more aspects of this issue than many others do, including the strengths and weaknesses of various methodologies. Second, I think we spend more time than most other analysts on broad asset class valuation and warning about dangerous downside risks. As we frequently note, one of our core assumptions is that once an

investor has chosen a strategic asset allocation with an acceptable probability of achieving his or her long-term goals within given risk constraints, the most important challenge is to avoid large downside losses. This brings me to my third point: our analytical methodology, which is grounded in a complex adaptive systems view of financial markets, helps us to generate insights that are often different from those produced by other analysts who have a more traditional approach to financial market dynamics. In this regard, we very strongly advocate combining our views with others derived using different methodologies. Research has shown that this approach often produces more accurate forecasts. Finally, when it comes to the active versus passive debate, I think we have a differentiated and practical view of the respective strengths and weaknesses of passive management, indexing, active management, and uncorrelated alpha strategies, which is reflected in the construction of our model portfolios as well as our analysis.

Can you at some point provide seven year forecasts for real returns across different asset classes as GMO does?

We agree that this would be a good idea, and have, in fact, been working up to the point that each month we can provide an updated version of the information you seek. As you know, over the past few months, across the eight functional currencies we cover, we have presented analyses that documented and analyzed the existence of three different risk/return/correlation regimes, which we term high uncertainty, high inflation, and normal times. These are the same regimes whose likelihood we analyze each month in our Market Implied Regime Expectations section. Our objective is to combine these changing regime expectations with the results of our historical regime analyses to produce a dynamic set of forecasts for future asset class returns over a given time horizon. With any luck, we will launch this feature in next month's issue.

I'd like to suggest that you expand your valuation table for credit beyond HYG, to cover some other categories.

We agree. We initially chose HYG (which tracks a high yield bond index) because we already use it as part of our fixed income sector rotation update. Starting next month, we will add two new products to our monthly valuation table. CIU tracks the Barclays investment grade corporate bond index. Where the bonds included in the HYG portfolio have an average S&P rating of B- and an average duration of 4.3 years, the bonds in CIU have an average rating of BBB+ and an average duration of 4.2 years (we considered LQD, but while the average rating is the same as CIU, the average duration is much longer, at 7.1 years). To facilitate comparison with Treasuries, we will also add IEI, which tracks 3-7 year bonds and has an average duration of 4.4 years.

September 2009 Economic Update

We assume that under normal conditions, the "base case" or "policy" asset allocations employed by our readers are sufficient to achieve their long-term goals within acceptable risk limits. Given this assumption, the main threat our readers' face is a substantial downside loss that breaches these risk limits, and substantially reduces the probability they will achieve their long-term goals. The goal of our economic updates is to provide timely warning about dangerous overvaluations that could lead to such losses in one or more asset classes. Our main focus is on what is known as "strategic warning" – "the what and the why", with a lesser focus on "operational warning" – "the how". Our objective is not to provide tactical warnings – "who, when and where" – that are more commonly known as "trading tips" intended to increase short term returns.

Our economic analysis methodology is based on a technique known as "analysis of competing hypotheses", or "ACH." Human beings normally seek to collect information that supports a hypothesis. However, since a piece of information may be consistent with more than one hypothesis, this method is inefficient. In contrast, ACH focused on disproving hypotheses, and values information on this basis. For example, a piece of evidence that has a very low probability of being observed under a given

hypothesis is more valuable than a piece of evidence that is consistent with multiple hypotheses.

Our economic hypotheses take the form of two alternative scenarios. When it becomes apparent that one of them is much more consistent with the accumulated evidence, we generate two new ones. Our two current scenarios are based on traditional behavior patterns for complex social systems operating in far from equilibrium conditions. The first is enhanced cooperation and the second is higher levels of conflict. Realization of the cooperative scenario should result in a higher level of stability and predictability in the system's operations, while development of the conflict scenario will prolong and quite possibly worsen the system's instability. These scenarios are described in more detail in our previous issues, which (as you go back in time), also describe the scenarios that preceded them.

We further assume that financial market returns reflect the complex interplay between political and economic conditions, which in turn reflect the actions of key groups (i.e., networks), which in turn are comprised of individuals whose behavior is based on an evolving mix of cognitive, informational, emotional and social factors. In our analysis, we use both bottom up and top down approaches to develop our scenarios and guide our search for information that provides insight about which of them is developing.

The assumptions we make in our analyses, and the conclusions we reach, are inescapably uncertain. We believe it is extremely important for the reader of any estimate or assessment to clearly understand the analyst's confidence in the conclusions he or she presents. How best to accomplish this has been the subject of an increasing amount of research (see, for example, "Communicating Uncertainty in Intelligence Analysis" by Steven Rieber; "Verbal Probability Expressions in National Intelligence Estimates" by Rachel Kesselman, "Verbal Uncertainty Expressions: Literature Review" by Marek Druzdzel, and "What Do Words of Estimative Probability Mean?" by Kristan Wheaton). In our analyses, we are standardizing on the use of a three level verbal scale to express our confidence level in our estimates. "Possible" represents a relatively low level of confidence (e.g., 25% – 33%, or a 1 in 4 to 1 in 3

chance of being right), "likely" a moderate level of confidence (e.g., 50%, or a 1 in 2 chance of being right), and "probable" a high level of confidence (e.g., 67% to 75%, or a 2 in 3 to 3 in 4 chance of being right). We do not use a quantitative scale, because we believe that would give a false sense of accuracy to judgments that are inherently approximate.

With respect to the situation we face today, we believe three issues must be resolved in order for the world economy to return to a period of sustained growth and relatively normal conditions in financial markets – (1) high levels of household debt across much of the Anglosphere; (2) a deeply weakened world financial system; and (3) unsustainable structural imbalances in the economies of the United States and China, and in these countries' current account balances. We further believe that the actions of three groups – middle class Americans, Chinese peasants, and Iranian youth, are linchpins that could have an outsized impact on the future evolution of political and economic events, and, through them, on the resolution of the three critical issues we face and on future asset class valuations and returns.

Over the past month, Olivier Blanchard, the IMF's Chief Economist, published an article ("Sustaining a Global Recovery") that well summed up the situation we face today. "The world is not in a run-of-the-mill recession. The turnaround will not be simple. The crisis has left deep scars, which will affect both supply and demand for many years to come...Growth will not be quite strong enough to reduce unemployment, which is not expected to crest until some time next year...[Current] growth forecasts are largely predicated on a combination of fiscal stimulus and inventory rebuilding by firms, rather than on strong private consumption and fixed investment spending. Sooner or later, the fiscal stimulus will have to be phased out. And inventory adjustment will also naturally come to an end. The question then, is what will sustain the recovery. Two rebalancing acts will have to come into play. First, rebalancing from public to private spending. Second, rebalancing aggregate demand across countries, with a shift from domestic to foreign demand in the United States and a reverse shift from foreign to domestic demand in the rest of the world, particularly in Asia...The United States was not only at the origin of the crisis, it is

central to any world recovery. Consumption represents 70 percent of total U.S. demand, and its decline was the main near-term cause of the fall in output in this crisis....[U.S. consumption is likely to be lower] as U.S. consumers save more...The best guess is that there will be a 3 percent fall in the ratio of consumption to GDP, and will have to be made up by other types of spending. Will this come from investment? This seems unlikely...Housing investment was too high in the years preceding the crisis...As for business fixed investment, capacity utilization is at a historical low, and will take a long time to recover...Fiscal stimulus by government will eventually have to be phased out...[This means} that the U.S. current account deficit must decrease, and the rest of the world must reduce its current account surplus...Sustained world recovery is likely to require an increase in U.S. net exports and an corresponding decrease in the rest of the world, coming mainly from Asia [and China in particular]...The next question is whether these rebalancing acts will take place. It is clear that they may not, at least not on the scale needed."

To understand why this is the case, we need to look at developments in other parts of our model. With the anniversary of the Lehman bankruptcy, we have yet to see any meaningful reform of the financial system. Instead, we see banks that are "too big to fail" leveraging their effectively government guaranteed funding to report substantial profits and bonus accruals. As Niall Ferguson wrote in the 11 September issue of Newsweek, it looks like we are heading into "Wall Street's New Gilded Age." This cannot help but increase the populist resentment that has been building for months in the United States, as the middle class has come to realize that is bearing the brunt of the recession, and will likely suffer the largest decline in long-term living standards. As Bloomberg's Margaret Carlson recently wrote about bankers, "a more unapologetic groups you are unlikely to find...Bankers have given up nothing compared to the damage they caused. Top heads at Lehman rolled, but at many other banks it was those lower down the ladder who lost their jobs...The bonuses never stopped, despite an outcry from the public horrified to see failure rewarded...One year in, we know the awful truth. Nothing has changed. Little will. Banks are not just too big to fail and too big to regulate...They're way to big to be sorry. Even insincerely."

Unfortunately, strains in the system continue to build, including worsening conditions in commercial real estate lending and municipal securities (see this month's Product and Strategy Notes for more on the latter), increasing failure rates among small and medium size banks, declining reserves in the FDIC and Pension Benefit Guarantee Corporation insurance funds (which represent more potential calls on Treasury borrowing capacity), mortgage market problems moving into higher credit quality and higher income categories, continuing foreclosures and house price declines (with high end homes particularly hard hit), rising unemployment (with the broadest definition in the United States now at nearly 17%), and rising credit card delinquencies and bankruptcy filings by businesses and consumers.

Middle class consumers have been very hard hit by these trends, particularly as they had the greatest percentage of their wealth in residential real estate. For example, a recent Gallup poll found 31% of workers worried about being laid off, up from 15% a year ago. And *The Economist* (in its 20 August edition) reported a massive consumption shift in the U.S. and Europe away from higher priced branded goods and into private label and store brand products. In our view, in a society that has long been preoccupied with branding, "aspirational goods" and being seen to "keep up with the Joneses" this is not a move that people are making lightly, and it speaks volumes about their current outlook. Perhaps more important, an increasing number of analysts are expressing uncertainty about the ultimate political, economic, and financial consequences of the increasing level of frustration and anger felt by many American middle class households. As noted above, the U.S. probably faces an extended period of unusually high unemployment that will only be made worse for people unable to move because of significant negative equity in their house. The American middle class is also acutely aware of the need to improve their healthcare security – 80% of respondents in a recent poll supported health care reform (though they disagreed on the form it should take). Yet they see reform initiatives stalled by the tactics of the most partisan wings of the Democratic and Republican Parties. A recent Education Next poll found confidence in America's schools and support for spending more money to improve them to be at record low levels (see "What the

Public Thinks of Public Schools" by Paul Peterson in the 8 September *Wall Street Journal*). Yet here too reform seems to have been stymied by political partisans. Many families face decimated retirement savings and homes with negative equity values that in many cases are still falling. Yet they have seen no meaningful attempt at reforms in this area, which would necessarily require either substantial debt forgiveness or conversion into some type of equity. Hard pressed middle class households are also now regularly treated to the sight of public sector unions demanding higher state and local taxes and fighting any reduction in compensation packages that are now far superior to those found in comparable private sector jobs. Finally, they also know that higher federal taxes are inevitable in the wake of the enormous increase in government debts taken on as a result of the economic crisis. In light of all these developments, it should come as no surprise that self-identification as a Democrat or Republican is falling in the latest polls, while identification as an Independent is rising.

A recent column by Ken Rogoff (who increasingly seems to have taken on the role of Bill White, after the latter's retirement from the BIS) well described our sense of the current situation: "Having reached the epiphany that financial restructuring must be avoided at all costs, the governments of the world have in turn cast a huge safety net over banks (and whole countries in Eastern Europe) woven from taxpayer dollars...So what is the game plan now? There is talk of regulating the financial sector, but governments are afraid to shake confidence. There is recognition that the housing bubble collapse has to be absorbed, but no stomach for acknowledging the years of slow growth in consumption that this will imply. There is acknowledgement that the US-China trade relationship needs to be rebalanced, but little imagination on how to proceed. Deep down, our leaders and policymakers have convinced themselves that for all its flaws, the old system was better than anything we are going to think of, and that simply restoring confidence will fix everything, at least for as long as they remain in office...Within a few years, western governments will have to sharply raise taxes, inflate, partially default, or some combination of all three. As painful as it may seem, it would be far better to start bringing fundamentals in line now."

Given the current context, headlines touting renewed economic growth produced by huge fiscal and monetary stimulus have the air of reports from the "phony war" in the first months of 1940, or the encouraging news reports from Japan during the early 90s, when recovery from the implosion of their equity and property bubbles was said to be right around the corner. Yet Japan remains trapped in period of slow growth and occasional deflation that has lasted for twenty years, with no end in sight.

Another critical issue that lurks beneath the surface in many countries today is the sustainability of the current rate of increase in government debt that to fund the stimulus spending that is keeping the world economy afloat. In our experience, there is no better analyst to turn to on this problem than Tim Congdon, who first clarified the key issues in his book The Debt Threat, which was published in the wake of the 1980s LDC debt crisis. In a recent column in the *Financial Times*, ("How Debt Could Turn Into a Run Away Ghoul" 2 August 2009), Congdon succinctly summarized the problem we face today. "The budget deficit can be split into two elements, debt interest and the so-called "primary balance" (the excess of non-interest expenditures over tax receipts)....If the primary balance is nil, debt will grow faster than real GDP when the real interest rate is higher than the trend rate of output growth. Alternatively, if the real interest rate is equal to the trend growth rate, a continuing primary deficit would also cause debt to grow faster than GDP. Of course, a nation both running a primary deficit and paying a high real interest rate on its debt would see its public financed deteriorate with particular rapidity." Consider the situation facing the United States. Because of the recession and widespread deleveraging, the private sector balance (Output less private sector consumption less private sector investment) has turned strongly positive as a percent of GDP. By definition, the private sector balance plus the public sector balance must equal the balance on the current account. To put it differently, the domestic balance (the sum of the private and public sector balances) must be offset by a country's balance with the rest of the world. Therefore, the sharp positive change in the private sector balance (reflecting less consumption and investment) must be offset by changes in the public sector balance and the current account balance. This leads to the United States' current policy dilemma, between the sustainability of large

government deficits and the ability to achieve reductions in the current account deficit if other nations, particularly China, are unwilling to change their focus on export led growth. Going back to Congdon's framework, the danger of prolonged government deficits is twofold. First, by crowding out private investment (directly in the capital markets, and indirectly via fear of higher taxes to come and the inefficiencies created in an economy where government plays a large role), they can reduce the growth rates of productivity and output. Second, to the extent that they raise investor uncertainty about government's willingness and ability to repay its debt, they can lead to higher real interest rates. As Congdon has emphasized for more than twenty years, the combination of deficits on the government's primary balance, falling potential output growth, and rising real interest rates is (as we have seen repeatedly in Latin America) almost guaranteed to eventually create a solvency crisis. In sum, we believe that uncertainty is probably rising again, and with good reason. And we don't seem to be alone in holding this view – at U.S. public companies, the ratio of insider selling to insider buying has been at or close to record levels for the past few weeks.

Moving on to the other challenging economic transition highlighted in Blanchard's paper, the past month has also seen a number of interesting developments related to China. Two papers from the IMF (which we're sure Blanchard read) were particularly interesting. In "Is China's Export-Oriented Growth Sustainable?", Guo and N'Diaye conclude that it is not, as "there are limits to the global market share a country can occupy. Rebalancing growth toward private consumption would [therefore] provide a large impetus to output growth and reduce the need for gaining further share in export markets." In a subsequent paper ("Employment Effects of Growth Rebalancing in China"), however, the same authors make clear that there are serious political obstacles to the rebalancing they advocate, and which is one of the keys to a return to sustainable global growth. "While rebalancing China's growth toward a domestic demand led economy would likely raise aggregate employment and job growth in the longer term, there could be employment losses in the short-run as the economy moves away from the tradable sector toward the non-tradable sector."

It should therefore come as no surprise that China's stimulus program has thus far emphasized rapid credit expansion and high levels of investment in state-owned companies and export-oriented industries, including a well-funded initiative to build a strong position in a range of clean technologies (see recently published "China Greentech Report"). On the one hand, this stimulus program has apparently kept growth and unemployment at acceptable levels. But many question the eventual consequences of the strains that the stimulus program is creating. For example, there have been reports that substantial amounts of new lending has been directed to state owned companies, and that more than a third of it may have gone to fuel speculation in equity and property markets. In this regard, it was recently reported that industrial company profits were down 17 percent through the end of July, and we have also seen rising volatility in Chinese property and equity markets, with some analyses concluding they are in a bubble regime (see "Bubble Diagnosis and Prediction of the 2005 – 2007 and 2008-2009 Chinese Stock Market Bubbles" by Jiang, Zhou, Sornette et al).

More worrying is the rising level of trade tensions with the West, as exemplified by spying charges leveled against Rio Tinto's local staff, by threats to retaliate against the recent imposition by the United States of anti-dumping duties on Chinese tire exports, and by the apparent refusal of a number of Chinese state owned companies to make billions in dollars of payments owed under commodity hedging contracts. While we can appreciate the delicious irony of the Chinese taking a page from the bankers' own book ("heads I win, tails you lose"), the fact remains that Chinese claims that they were exploited by western banks can only escalate tensions and fan the flames of Chinese nationalism. It was in this context that we read a very interesting article in this summer's issue of Parameters, the quarterly journal of the U.S. Army War College, in which Robert Scobell asks "Is There a Civil-Military Gap in China's Peaceful Rise?" and answers in the affirmative. He concludes that, "there are civil-military gaps in China's peaceful rise strategy. Military members being permitted or even encouraged to express warlike bravado and engage in overzealous actions seems to demonstrate the point…[Therefore, if] a crisis or confrontation develops, the

potential for unintended escalation is significant." As we have long noted, China's stability and apparent self-confidence is likely much more fragile than it appears. As is true in similar cases throughout history, this underlying insecurity can easily manifest itself rapidly escalating nationalist resentment in the face of perceived wrongs. In China's case, these feelings are no doubt made more acute by memories of the way the country was treated by western powers in the 19th century. For this reason, we have long assumed that a crumbling of Chinese internal stability would likely lead to a sharp rise in nationalism, with highly uncertain and probably negative consequences for the world economy and financial markets.

The past month also saw significant developments in Iran. As time has passed, the struggle among various leadership factions in Iran has increasingly come to resemble a classic war among New York's five mafia families. In this case, the Khamenei-Ahmadinejad family seems to have formed alliances with the Larijani family and the Revolutionary Guard Corps (aka, "the muscle"), and in so doing solidified its position in the face of attempts by the Rasfanjani and Moussavi/Khatami families to gain more power in the wake of this summer's disputed election. Opposition leaders have been arrested, and trials begun. While the chimera of "Iranian Democracy" has been destroyed, and with it any semblance of legitimacy for the current regime, the Khamenei-Ahmadinejad family has apparently solidified its control of an openly authoritarian government. Equally interesting have been external developments in Iran. As you may recall, following Ahmadinejad's rejection of the Obama's initial attempt at "constructive engagement", the latter drew a "line in the sand" and demanded the start of negotiations over the future of Iran's nuclear program before the start of the G7 summit the last week of September. Reports from Israel suggested that this was accompanied by the threat to impose sanctions on Iran's gasoline imports (which account for forty percent of domestic consumption). Since then, it has become clear that neither China nor Russia will not support such sanctions – in fact, the latter could easily overcome them by exporting gasoline to Iran. In the meantime, Iran has offered to meet with the United States and Western European nations to discuss a wide range of issues – that notably excludes the status of its nuclear

program. Apparently, this meeting will now take place on the first of October. It would therefore seem that Ahmadinejad has carried the day, not only in the domestic power struggle, but also in its first showdown with the Obama administration. However, as many commentators have noted, the future actions of Israel remain a key uncertainty in any forecast of how this situation will develop. From Israel's perspective, Iranian development of a nuclear weapon is clearly unacceptable (see "Is War Between Iran and Israel Inevitable?" by Erich Follath in *Spiegel,* 22 June 2009). Hence, it is logical to conclude that, with the Obama administration apparently backing down in the face of Russian pressure, the probability has increased that Israel will take matters into its own hands and attack Iran. If this happens, the impact on world oil markets (e.g., due to the mining of the Strait of Hormuz) and the incipient global recovery – not to mention investor uncertainty – is likely to be severe.   In sum, in our view events over the past month largely constitute additional evidence that the cooperative scenario, which would result in the fastest recovery from the global recession, and a return to a normal regime in global capital markets, is not developing. This does not bode well for returns on many asset classes in the months ahead, with the exception of those that deliver the highest relative returns when uncertainty rises. These include short term government bonds (e.g., SHY for U.S. Treasuries, and ISHG for a mix of short term government bonds from other nations), gold, volatility, Swiss Francs (FXF), and Swiss and European commercial property.   (For more detail on key scenario-related evidence accumulated over the past three months, please see the Appendix).

Global Asset Class Valuation Analysis

Our asset class valuation analyses are based on the belief that financial markets are complex adaptive systems, in which prices and returns emerge from the interaction of multiple rational, emotional and social processes. We further believe that while this system is attracted to equilibrium, it is generally not in this state. To put it differently, we believe it is possible for the supply of future returns a market is expected to provide to be higher or lower than the returns investors logically demand, resulting in over or undervaluation. The attraction of the system to equilibrium means

that, at some point, these situations are likely to reverse in the direction of their fundamental valuation. However, the complex adaptive nature of the system means that it is difficult if not impossible to accurately forecast how and when such reversals will occur. Yet this does not mean that valuation analyses are a fruitless enterprise. Far from it. For an investor trying to achieve a multiyear goal (e.g., accumulating a certain amount of capital in advance of retirement, and later trying to preserve the real value of that capital as one generates income from it), avoiding large downside losses is mathematically more important than reaching for the last few basis points of return. Investors who use valuation analyses to help them limit downside risk when an asset class appears to be substantially overvalued can substantially increase the probability that they will achieve their long term goals. This is the painful lesson learned by too many investors in the 2001 tech stock crash, and then learned again in the 2007-2008 crash of multiple asset classes.

We also believe that the use of a consistent quantitative approach to assessing fundamental asset class valuation helps to overcome normal human tendencies towards over-optimism, overconfidence, wishful thinking, and other biases that can cause investors to make decisions they later regret. Finally, we stress that our monthly market valuation update is only a snapshot in time, and says nothing about whether apparent over and undervaluations will in the future become more extreme before they inevitably reverse. That said, when momentum is strong and quickly moving prices far away from their fundamental values, it is usually a good indication a turning point is near.

Equity Markets

In the case of an equity market, we define the future supply of returns to be equal to the current dividend yield plus the rate at which dividends are expected to grow in the future. We define the return investors demand as the current yield on real return government bonds plus an equity market risk premium. While this approach emphasizes fundamental valuation, it does have an implied linkage to the investor

behavior factors that also affect valuations. On the supply side of our framework, investors under the influence of fear or euphoria (or social pressure) can deflate or inflate the long-term real growth rate we use in our analysis. Similarly, fearful investors will add an uncertainty premium to our long-term risk premium, while euphoric investors will subtract an "overconfidence discount." As you can see, euphoric investors will overestimate long-term growth, underestimate long-term risk, and consequently drive prices higher than warranted. In our framework, this depresses the dividend yield, and will cause stocks to appear overvalued. The opposite happens under conditions of intense fear. To put it differently, in our framework, it is investor behavior and overreaction that drive valuations away from the levels warranted by the fundamentals. As described in our November 2008 article "Are Emerging Market Equities Undervalued?", people can and do disagree about the "right" values for the variables we use in our fundamental analysis. Recognizing this, we present four valuation scenarios for an equity market, based on different values for three key variables. First, we use both the current dividend yield and the dividend yield adjusted upward by .50% to reflect share repurchases. Second, we define future dividend growth to be equal to the long-term rate of total (multifactor) productivity growth. For this variable, we use two different values, 1% or 2%. Third, we also use two different values for the equity risk premium required by investors: 2.5% and 4.0%. Different combinations of all these variables yield high and low scenarios for both the future returns the market is expected to supply (dividend yield plus growth rate), and the future returns investors will demand (real bond yield plus equity risk premium). We then use the dividend discount model to combine these scenarios, to produce four different views of whether an equity market is over, under, or fairly valued today. The specific formula is (Current Dividend Yield x 100) x (1+ Forecast Productivity Growth) divided by (Current Yield on Real Return Bonds + Equity Risk Premium - Forecast Productivity Growth). Our valuation estimates are shown in the following tables, where a value greater than 100% implies overvaluation, and less than 100% implies undervaluation. In our view, the greater the number of scenarios that point to overvaluation or undervaluation, the greater the probability that is likely to be the case.

Equity Market Valuation Analysis at 31 August 2009

Australia	Low Demanded Return	High Demanded Return
High Supplied Return	68%	97%
Low Supplied Return	98%	130%

Canada	Low Demanded Return	High Demanded Return
High Supplied Return	78%	129%
Low Supplied Return	137%	199%

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Eurozone	Low Demanded Return	High Demanded Return
High Supplied Return	52%	86%
Low Supplied Return	85%	124%

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Japan	Low Demanded Return	High Demanded Return
High Supplied Return	106%	163%
Low Supplied Return	180%	251%

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United Kingdom	Low Demanded Return	High Demanded Return
High Supplied Return	30%	66%
Low Supplied Return	62%	105%

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United States	Low Demanded Return	High Demanded Return
High Supplied Return	100%	161%
Low Supplied Return	180%	258%

Switzerland	Low Demanded Return	High Demanded Return

High Supplied Return	82%	133%
Low Supplied Return	142%	257%

India	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	87%	178%
Low Supplied Return	217%	350%

Emerging Markets	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	105%	192%
Low Supplied Return	145%	233%

In our view, the key point to keep in mind with respect to equity market valuations is the level of the current dividend yield (or, more broadly, the yield of dividends and buybacks), which history has shown to be the key driver of long-term real equity returns in most markets. The rise in uncertainty that accompanied the 2007-2008 crisis undoubtedly increased many investors' required risk and uncertainty premium above the long-term average, while simultaneously decreasing their long-term real growth forecasts. The net result was a fall in equity prices that caused dividend yields to increase. From the perspective of an investor with long-term risk and growth assumptions in the range we use in our model, in some regions this increase in dividend yields more than offset the simultaneous rise in real bond yields, and caused the equity market to become undervalued (using our long-term valuation assumptions). On the other hand, in a still weak economy, many companies have been cutting dividends at a pace not seen since the 1930s. Hence the numerator of our dividend/yield calculation may well further decline in the months ahead, which, all else being equal, should further depress prices. Despite this, the past few months have seen a very strong rally develop in many equity markets, which, in some cases, has caused our valuation estimates to rise into the "overvalued" region. Given the absence of progress in reducing the three main obstacles that block a return to

sustainable economic growth (see our Economic Update), we believe that these rallies reflect investor herding (and the incentives of many professional investment managers to deliver positive returns on 2008's disastrous end-of-year base), rather than any improvement in the underlying fundamentals.

Real Return Bonds

Let us now move on to a closer look at the current level of real interest rates. In keeping with our basic approach, we will start by looking at the theoretical basis for determining the rate of return an investor should demand in exchange for making a one year risk free investment. The so-called Ramsey equation tells us that this should be a function of a number of variables. The first is our "time preference", or the rate at which we trade-off a unit of consumption in the future for one today, assuming no growth in the amount of goods and services produced by the economy. The correct value for this parameter is the subject of much debate. For example, this lies at the heart of the debate over how much we should be willing to spend today to limit the worst effects of climate change in the future. In our analysis, we assume the long-term average time preference rate is two percent per year.

However, it is not the case that the economy does not grow; hence, the risk free rate we require also should reflect the fact that there will be more goods and services available in the future than there are today. Assuming investors try to smooth their consumption over time, the risk free rate should also contain a term that takes the growth rate of the economy into account. Broadly speaking, this growth rate is a function of the increase in the labor supply and the increase in labor productivity. However, the latter comes from both growth in the amount of capital per worker and from growth in "total factor productivity", which is due to a range of factors, including better organization, technology and education. Since capital/worker cannot be increased without limit, over the long-run it is growth in total factor productivity that counts. Hence, in our analysis, we assume that future economic growth reflects the growth in the labor force and TFP.

Unfortunately, this rate of future growth is not guaranteed; rather, there is an element of uncertainty involved. Therefore we also need to take investors' aversion to risk and uncertainty into account when estimating the risk free rate of return they should require in exchange for letting others use their capital for one year. There are many ways to measure this, and unsurprisingly, many people disagree on the right approach to use. In our analysis, we have used Constant Relative Risk Aversion with an average value of three (see "How Risk Averse are Fund Managers?" by Thomas Flavin). The following table brings these factors together to determine our estimate of the risk free rate investors in different currency zones should logically demand in equilibrium (for an excellent discussion of the issues noted above, and their practical importance, see "The Stern Review of the Economics of Climate Change" by Martin Weitzman):

Region	Labor Force Growth %	TFP Growth %	Steady State Econ Growth %	Std Dev of Econ Growth Rate %	Time Preference %	Risk Aversion Factor	Risk Free Rate Demanded* %
Australia	1.0	1.20	2.2	1.1	2.0	3.0	3.2
Canada	0.8	1.00	1.8	0.9	2.0	3.0	3.8
Eurozone	0.4	1.20	1.6	0.8	2.0	3.0	3.9
Japan	-0.3	1.20	0.9	0.5	2.0	3.0	3.8
United Kingdom	0.5	1.20	1.7	0.9	2.0	3.0	3.8
United States	0.8	1.20	2.0	1.0	2.0	3.0	3.5

- The risk free rate equals time preference plus (risk aversion times growth) less (.5 times risk aversion squared times the standard deviation of growth squared).

The next table compares this long-term equilibrium real risk free rate with the real risk free return that is currently supplied in the market. Negative values indicate that real return bonds are currently overvalued, as their prices must fall in order for their yields (i.e., the returns they supply) to rise. The valuation is based on a comparison of the present values of ten year zero coupon bonds offering the rate demanded and the rate supplied, as of **31 August 2009**.

Region	Risk Free Rate Demanded	Actual Risk Free Rate Supplied	Difference	Overvaluation (>100) or Undervaluation (<100)
Australia	3.2	3.0	-0.1	101
Canada	3.8	1.8	-1.9	121
Eurozone	3.9	1.8	-2.2	123
Japan	3.8	2.3	-1.5	115
United Kingdom	3.8	0.7	-3.1	136
United States	3.5	2.0	-1.6	116

We reiterate that this analysis is based on a medium term view of the logical value of the risk free real return investors should demand. For example, the sharp fall in consumer spending around the world implies a lower time preference rate than the 2.0% we have used in our analysis, which would reduce the estimated overvaluation of this asset class. Such a fall would be consistent with recent research findings that as perceived uncertainty increases, individuals typically reduce their time preference discount rate – that is, they become less impatient to consume, and more willing to save (see, for example, "Uncertainty Breeds Decreasing Impatience" by Epper, Fehr-Duda, and Bruhin).

Finally, we also recognize that certain structural factors also affect the pricing (and therefore yields) of real return bonds. For example, some have argued that in the U.K., the large number of pension plans with liabilities tied to inflation has created a permanent imbalance in the market for index-linked gilts, causing their returns to be well below those that models (such as ours) suggest should prevail. A similar set of conditions may be developing in the United States, particularly as demand for inflation hedging assets increases. Finally, valuation of real return bonds is further complicated by deflation, which affects different instruments in different ways. For example, US TIPS and French OATi adjust for inflation by changing the principal (capital) value of the bond. However, they also contain a provision that the redemption value of the bond will not fall below its face value; hence, a prolonged period of deflation could produce significant real capital gains (this is known as the "deflation put"). In light of

these considerations, we have a neutral view on the valuation of real return bonds in all currency zones.

Government Bond Markets

Our government bond market valuation update is based on the same supply and demand methodology we use for our equity market valuation update. In this case, the supply of future fixed income returns is equal to the current nominal yield on ten-year government bonds. The demand for future returns is equal to the current real bond yield plus historical average inflation between 1989 and 2003. We use the latter as a proxy for the average rate of inflation likely to prevail over a long period of time. To estimate of the degree of over or undervaluation for a bond market, we use the rate of return supplied and the rate of return demanded to calculate the present values of a ten year zero coupon government bond, and then compare them. If the rate supplied is higher than the rate demanded, the market will appear to be undervalued. This information is contained in the following table:

Bond Market Analysis as of 31 August 09

	Current Real Rate*	Average Inflation Premium (89-03)	Required Nominal Return	Nominal Return Supplied (10 year Govt)	Yield Gap	Asset Class Over or (Under) Valuation, based on 10 year zero
Australia	3.04%	2.96%	6.00%	5.49%	-0.51%	4.92%
Canada	1.81%	2.40%	4.21%	3.37%	-0.84%	8.46%
Eurozone	1.77%	2.37%	4.14%	3.23%	-0.91%	9.12%
Japan	2.32%	0.77%	3.09%	1.30%	-1.79%	19.12%
UK	0.71%	3.17%	3.88%	3.56%	-0.32%	3.11%
USA	1.95%	2.93%	4.88%	3.41%	-1.47%	15.16%
Switz.	1.93%	2.03%	3.96%	2.03%	-1.93%	20.63%
India	1.93%	7.57%	9.50%	7.53%	-1.97%	19.94%

*For Switzerland and India, we use the average of real rates in other regions with real return bond markets

It is important to note some important limitations of this analysis. Our bond market analysis uses historical inflation as an estimate of expected future inflation over the long-term. This may not produce an accurate valuation estimate, if the historical average level of inflation is not a good predictor of future average inflation levels. This is especially true today, when a period of deflation is a distinct possibility in many countries, particularly over the next 12 months. In this case, many nominal return bonds might in fact be undervalued today, over a shorter term time horizon. On the other hand, a sharp currency depreciation could certainly change this view, particularly in countries like the U.K., that are significantly exposed to international trade.

However, this raises the issue of how long a period of deflation might last, and how deep it might be, particularly given the unprecedented levels of monetary and fiscal deficit expansion that have been undertaken in many countries in response to the worst downturn since the Great Depression. History suggests that over the long-term, they are likely to result in higher rates of inflation. The following table, shows historical average inflation rates (and their standard deviations) for the U.K. and U.S. over longer periods of time, and helps to put our valuation analysis (and inflation assumptions) into context:

	U.K.	*U.S.*
Avg. Inflation, 1775-2007	2.19%	1.62%
Standard Deviation	6.60%	6.51%
Avg. Inflation, 1908-2007	4.61%	3.29%
Standard Deviation	6.24%	5.03%
Avg. Inflation, 1958-2007	5.98%	4.11%
Standard Deviation	5.01%	2.84%

In sum, over a long-term time horizon in which inflation levels revert to their long-term averages, many government bond markets appear overvalued today (i.e., prevailing nominal yields appear to be too low). However, over a short-term time horizon, during which inflation should either be low or negative, one can make the case that many government bond markets are significantly undervalued today. As is always the case

when it comes to questions about valuation levels, the underlying assumption about the time horizon being used is critical.

Credit Spreads

Let us now turn to the subject of the valuation of non-government bonds. Some have suggested that it is useful to decompose the bond yield spread into two parts. The first is the difference between the yield on AAA rated bonds and the yield on the ten year Treasury bond. Because default risk on AAA rated companies is very low, this spread primarily reflects prevailing liquidity and jump (regime shift) risk conditions (e.g., between a low volatility, relatively high return regime, and a high volatility, lower return regime). The second is the difference between BAA and AAA rated bonds, which tells us more about the level of compensation required by investors for bearing relatively high quality credit risk. Research has also shown that credit spreads on longer maturity intermediate risk bonds has predictive power for future economic demand growth, with a rise in spreads signaling a future fall in demand (see "Credit Market Shocks and Economic Fluctuations" by Gilchrist, Yankov, and Zakrajsek).

The following table shows the statistics of the distribution of these spreads between January, 1986 and December, 2008 (based on daily Federal Reserve data – 11,642 data points). Particularly in the case of the BAA spread, it is clear we are not dealing with a normal distribution!

	AAA – 10 Year Treasury	**BAA-AAA**
Average	1.20%	.94%
Standard Deviation	.44%	.34%
Skewness	.92	3.11
Kurtosis	.53	17.80

At **31 August 2009**, the AAA minus 10 year Treasury spread was 1.71%. The AAA minus BAA spread was 1.26%. Since these distributions are not normal (i.e.,

they do not have a "bell curve" shape), we take a different approach to putting them in perspective. Over the past twenty three years, there have been only 775 days with a higher AAA spread (6.7% of all days) and 745 days with a higher BAA spread (6.4% of all days in our sample). Clearly, and despite all the talk one hears about "green shoots", current spreads still reflect relatively a high degree of investor uncertainty about future liquidity and credit risk, despite the declines in the BBB and AAA spreads from their crisis highs. However, given the unchartered economic waters through which we are still passing, and our belief that the conventional wisdom underestimates the amount of trouble on the horizon, we believe that these spread possibly reflect the undervaluation of liquidity and credit risk – or, to put it differently, the overvaluation of AAA and BBB rated bonds – on a one to three year time horizon.

Over a longer term time horizon, where risk premiums return to more normal levels, one can argue that credit is probably undervalued today. However, that argument critically depends on underlying assumptions about future default rates and loss rates conditional upon default. A decision to buy 50,000 in bonds at what appears to be a very attractive yield from a long-term perspective can still generate negative total returns if the future default rate (and losses conditional upon default) more than wipes out the apparently attractive extra yield. And since the differences between current AAA and BBB credit spreads and their long-term averages are well under 100 basis points today, it doesn't take much of a mis-estimation of future default rates (and losses conditional on default) to turn today's apparently good decision into tomorrow's painful outcome. On balance, the "historically attractive yields" argument gets (non-linearly) less convincing the further down the credit ratings ladder you go. On balance, we think that even on a long-term view, credit is at best fully valued today, and quite possibly overvalued, given the uncertain economic outlook.

Currencies

Let us now turn to currency valuations. For an investor contemplating the purchase of foreign bonds or equities, the expected future annual percentage change

in the exchange rate is also important. Study after study has shown that there is no reliable way to forecast this, particularly in the short term. At best, you can make an estimate that is justified in theory, knowing that in practice it will not turn out to be accurate, especially over short periods of time (for a logical approach to forecasting equilibrium exchange rates over longer horizons, see "2009 Estimates of Fundamental Equilibrium Exchange Rates" by Cline and Williamson).

In our case, we have taken the difference between the yields on ten-year government bonds as our estimate of the likely future annual change in exchange rates between two regions. According to theory, the currency with the relatively higher interest rates should depreciate versus the currency with the lower interest rates. Of course, in the short term this often doesn't happen, which is the premise of the popular hedge fund "carry trade" strategy of borrowing in low interest rate currencies, investing in high interest rate currencies, and, essentially, betting that the change in exchange rates over the holding period for the trade won't eliminate the potential profit. Because (as noted in our June 2007 issue) there are some important players in the foreign exchange markets who are not profit maximizers, carry trades are often profitable, at least over short time horizons (for an excellent analysis of the sources of carry trade profits – of which 25% may represent a so-called "disaster risk premium", see "Crash Risk in Currency Markets" by Farhi, Frailberger, Gabaix, Ranciere and Verdelhan). Our expected medium to long-term changes in exchange rates are summarized in the following table:

Annual Exchange Rate Changes Implied by Bond Market Yields on 31 August 09

	To AUD	To CAD	To EUR	To JPY	To GBP	To USD	To CHF	To INR
From								
AUD	0.00%	-2.12%	-2.26%	-4.19%	-1.93%	-2.08%	-3.46%	2.04%
CAD	2.12%	0.00%	-0.14%	-2.07%	0.19%	0.04%	-1.34%	4.16%
EUR	2.26%	0.14%	0.00%	-1.93%	0.33%	0.18%	-1.20%	4.30%
JPY	4.19%	2.07%	1.93%	0.00%	2.26%	2.11%	0.73%	6.23%
GBP	1.93%	-0.19%	-0.33%	-2.26%	0.00%	-0.15%	-1.53%	3.97%
USD	2.08%	-0.04%	-0.18%	-2.11%	0.15%	0.00%	-1.38%	4.12%
CHF	3.46%	1.34%	1.20%	-0.73%	1.53%	1.38%	0.00%	5.50%
INR	-2.04%	-4.16%	-4.30%	-6.23%	-3.97%	-4.12%	-5.50%	0.00%

Commercial Property

Our approach to valuing commercial property securities as an asset class is also based on the expected supply of and demand for returns, utilizing the same mix of fundamental and investor behavior factors we use in our approach to equity valuation. Similar to equities, the supply of returns equals the current dividend yield on an index covering publicly traded commercial property securities, plus the expected real growth rate of net operating income (NOI). A number of studies have found that real NOI growth has been basically flat over long periods of time (with apartments showing the strongest rates of real growth). This is in line with what economic theory predicts, with increases in real rent lead to an increase in property supply, which eventually causes real rents to fall. However, it is entirely possible – as we have seen in recent months – that rents can fall sharply over the short term during an economic downturn.

Our analysis also assumes that over the long-term, investors require a 3.0% risk premium above the yield on real return bonds as compensation for bearing the risk of securitized commercial property as an asset class (see this month's feature article on commercial property as an asset class).   Last but not least, there is significant research evidence that commercial property markets are frequently out of equilibrium, due to slow adjustment processes as well as the interaction between fundamental factors and investors' emotions (see, for example, "Investor Rationality: An Analysis of NCREIF Commercial Property Data" by Hendershott and MacGregor; "Real Estate Market Fundamentals and Asset Pricing" by Sivitanides, Torto, and Wheaton; "Expected Returns and Expected Growth in Rents of Commercial Real Estate" by Plazzi, Torous, and Valkanov; and "Commercial Real Estate Valuation: Fundamentals versus Investor Sentiment" by Clayton, Ling, and Naranjo). Hence, it is extremely hard to forecast how long it will take for any over or undervaluations we identify to be reversed. The following table shows the results of our valuation analysis as of **31 August 2009**: We use the dividend discount model approach to produce our estimate

of whether a property market is over, under, or fairly valued today, assuming a long-term perspective on property market valuation drivers. The specific formula is (Current Dividend Yield x 100) x (1+ Forecast NOI Growth) divided by (Current Yield on Real Return Bonds + Property Risk Premium - Forecast NOI Growth). Our estimates are shown in the following tables, where a value greater than 100% implies overvaluation, and less than 100% implies undervaluation.

Country	Dividend Yield	Plus LT Real Growth Rate	Equals Supply of Returns	Real Bond Yield	Plus LT Comm Prop Risk Premium	Equals Returns Demanded	Over or Undervaluation (100% = Fair Value)
Australia	5.6%	0.2%	5.8%	3.0%	3.0%	6.0%	104%
Canada	7.5%	0.2%	7.7%	1.8%	3.0%	4.8%	61%
Eurozone	5.7%	0.2%	5.9%	1.8%	3.0%	4.8%	80%
Japan	6.3%	0.2%	6.5%	2.3%	3.0%	5.3%	81%
Switzerland*	4.5%	0.2%	4.7%	1.9%	3.0%	4.9%	105%
U.K.	4.0%	0.2%	4.2%	0.7%	3.0%	3.7%	88%
U.S.A.	5.4%	0.2%	5.6%	2.0%	3.0%	5.0%	88%

Using the current dividend yield, the valuation of the Swiss property market appears to be significantly out of line with the others. Hence, our analysis is based on the estimated income yield on directly owned commercial property in Switzerland instead of the dividend yield on publicly traded property securities.

As you can see, on a long-term view, a number of commercial property markets look undervalued today, despite the sharp recent increase in property share prices in many countries. Over the next twelve months, however, we believe the balance of risks points in the other direction. Consumer spending remains weak in many markets, occupancy rates are declining, rents are stagnant at best, and landlords continue to struggle with debt refinancings (indeed, the press is full of stories about the declining quality of commercial mortgage backed securities). It is hard to see how government fiscal stimulus, strong though it is, will improve this situation very much, as long as the underlying problems – high consumer leverage, a weak financial system, and

continuing international imbalances – remain unresolved. Moreover, the development of real return bond and commodity markets has weakened, to some extent, property's traditional attraction as an inflation hedge. In sum, we believe that the recent sharp run up in property security prices is yet another sign of some combination of investor over-optimism about the speed and size of economic recovery, and/or the tendency of institutional investors to herd rather than risk losing assets (or their jobs) due to their underperforming an asset class benchmark. The exception to our general view may come in Switzerland and the Eurozone, where rising insecurity often triggers an increased allocation to property, on the basis of traditional wealth preservation principles.

Commodities

Let us now turn to the Dow Jones AIG Commodity Index, our preferred benchmark for this asset class because of the roughly equal weights it gives to energy, metals and agricultural products. One of our core assumptions is that financial markets function as a complex adaptive system which, while attracted to equilibrium (which generates mean reversion) are seldom in it. To put it differently, we believe that investors' expectations for the returns an asset class is expected to supply in the future are rarely equal to the returns a rational long-term investor should logically demand. Hence, rather than being exceptions, over and undervaluations of different degrees are simply a financial fact of life. We express the demand for returns from an asset class as the current yield on real return government bonds (ideally of intermediate duration) plus an appropriate risk premium. While the former can be observed, the latter is usually the subject of disagreement. In determining the risk premium to use, we try to balance a variety of inputs, including historical realized premiums (which may differ considerably from those that were expected, due to unforeseen events), survey data and academic theory (e.g., assets that payoff in inflationary and deflationary states should command a lower risk premium than those whose payoffs are highest in "normal" periods of steady growth and modest changes

in the price level). In the case of commodities, Gorton and Rouwenhorst (in their papers "Facts and Fantasies About Commodity Futures" and "A Note on Erb and Harvey") have shown that (1) commodity index futures provide a good hedge against unexpected inflation; (2) they also tend to hedge business cycle risk, as the peaks and troughs of their returns tend to lag behind those on equities (i.e., equity returns are leading indicators, while commodity returns are coincident indicators of the state of the real business cycle); and (3) the realized premium over real bond yields has historically been on the order of four percent. We are inclined to use a lower ex-ante risk premium in our analysis (though reasonable people can still differ about what it should be), because of the hedging benefits commodities provide relative to equities. This is consistent with the history of equities, where realized ex-post premiums have been shown to be larger than the ex-ante premiums investors should logically have expected.

The general form of the supply of returns an asset class is expected to generate in the future is its current yield (e.g., the dividend yield on equities), plus the rate at which this stream of income is expected to grow in the future. The key challenge with applying this framework to commodities is that the supply of commodity returns doesn't obviously fit into this framework. Broadly speaking, the supply of returns from an investment in commodity index futures comes from four sources. First, since commodity futures contracts can be purchased for less than their face value (though the full value has to be delivered if the contract is held to maturity), a commodity fund manager doesn't have to spend the full $100 raised from investors to purchase $100 of futures contracts. The difference is invested – usually in government bonds – to produce a return.

The second source of the return on a long-only commodity index fund is the so-called "roll yield." Operationally, a commodity index fund buys futures contracts in the most liquid part of the market, which is usually limited to the near term. As these contracts near their expiration date, they are sold and replaced with new futures contracts. For example, a fund might buy contracts maturing in two or three months, and sell them when they approached maturity. The "roll yield" refers to the gains and

losses realized by the fund on these sales. If spot prices (i.e., the price to buy the physical commodity today, towards which futures prices will move as they draw closer to expiration) are higher than two or three month futures, the fund will be selling high and buying low, and thus earning a positive roll yield. When a futures market is in this condition, it is said to be in "backwardation." On the other hand, if the spot price is lower than the two or three month's futures price, the market is said to be in "contango" and the roll yield will be negative (i.e., the fund will sell low and buy high). The interesting issue is what causes a commodity to be either backwardated or contangoed.   A number of theories have been offered to explain this phenomenon. The one that seems to have accumulated the most supporting evidence to date is the so-called "Theory of Storage": begins with the observation that, all else being equal, contango should be the normal state of affairs, since a person buying a commodity at spot today and wishing to lock in a profit by selling a futures contract will have to incur storage and financing costs. In addition to his or her profit margin, storage and financing costs should cause the futures price to be higher than the spot price, and normal roll yields to be negative.

However, in the real world, all things are not equal. For example, some commodities are very difficult or expensive to store; others have very high costs if you run out of them (e.g., because of rapidly rising demand relative to supply, or a potential disruption of supply). For these commodities, there may be a significant option value to holding the physical product (the Theory of Storage refers to this option value as the "convenience yield"). If this option value is sufficiently high, spot prices may be bid up above futures prices, causing "backwardation" and positive roll-yields for commodity index funds. Hence, a key question is the extent to which different commodities within a given commodity index tend to be in backwardation or contango over time. Historically, most commodities have spent time in both states.   However, contango has generally been more common, but not equally so for all commodities. For example, oil has spent relatively more time in backwardation, as have copper, sugar, soybean meal and lean hogs. This highlights a key point about commodity futures index funds – because of the critical impact of the commodities they include, the

weights they give them, and their rebalancing and rolling strategies, they are, in effect, uncorrelated alpha strategies. Moreover, because of changing supply and demand conditions in many commodities (e.g., global demand has been growing, while marginal supplies are more expensive to develop and generally have long lead times), it is not clear that historical tendencies toward backwardation or contango are a good guide to future conditions. To the extent that any generalizations can be made, higher real option values, and hence backwardation and positive roll returns are more likely to be found when demand is strong and supplies are tight, and/or when there is a rising probability of a supply disruption in a commodity where storage is difficult. For example, ten commodities make up roughly 75% of the value of the Dow Jones AIG Commodities Index. The current term structures of their futures curves are as follows on **31 August 2009**:

Commodity	2009 DJAIG Weight	Current Status
Crude Oil	13.8%	Contango
Natural Gas	11.9%	Contango
Gold	7.9%	Contango
Soybeans	7.6%	Backwardated
Copper	7.3%	Backwardated
Aluminum	7.0%	Backwardated
Corn	5.7%	Contango
Wheat	4.8%	Contango
Live Cattle	4.3%	Contango
Unleaded Gasoline	3.7%	Backwardated
	74.0%	

Given the continued presence of so many contangoed futures curves, expected near term roll returns on the DJAIG as a whole are still negative, absent major supply side shocks. On a weighted basis, the forward premium (relative to the spot price) has fallen to 3.1% from 5.70% two months ago. However, we also note that under these conditions, commodity funds that can take short as well as long positions may still deliver positive returns.

The third source of commodity futures return is unexpected changes in the price of the commodity during the term of the futures contract. It is important to stress that the market's consensus about the expected change in the spot price is already included in the futures price. The source of return we are referring to here is the unexpected portion of the actual change. This return driver probably offers investors the best chance of making profitable forecasts, since most human beings find it extremely difficult to accurately understand situations where cause and effect are significantly separated in time (e.g., failure to recognize how fast rising house prices would – albeit with a time delay – trigger an enormous increase in new supply).

Again, large surprises seem more likely when supply and demand and finely balanced – the same conditions which can also give rise to changes in real option values and positive roll returns. Given our economic outlook, at this point we view negative surprises on the demand side that depress commodity prices as more likely than supply surprises that have the opposite effect.

The fourth source of returns for a diversified commodity index fund is generated by rebalancing a funds portfolio of futures contracts back to their target commodity weightings as prices change over time. This is analogous to an equity index having a more attractive risk/return profile than many individual stocks.   This rebalancing return will be higher to the extent that price volatilities are high, and the correlations of price changes across commodities are low. Historically, this rebalancing return has been estimated to be around 2% per year, for an equally weighted portfolio of different commodities. However, as correlations have risen in recent years, the size of this return driver has probably declined – say to 1% per year.

So, to sum up, the expected supply of returns from a commodity index fund over a given period of time equals (1) the current yield on real return bonds, reduced by the percentage of funds used to purchase the futures contracts; (2) expected roll yields, adjusted for commodities' respective weights in the index; (3) unexpected spot price changes; and (4) the expected rebalancing return. Of these, the yield on real return bonds can be observed, and we can conservatively assume a long-term rebalancing return of, for example, 1.0%. These two sources of return are clearly less

than the demand for returns that are equal to the real rate plus a risk premium of, say, 3.0%. The difference must be made up by a combination of roll returns (which, given the current shape of futures curves, are likely to be negative in the near term) and unexpected price changes, due to sudden changes in demand (where downside surprises currently seem more likely than upside surprises) and/or supply (where the best chance of a positive return driver seems to be incomplete investor recognition of slowing oil production from large reservoirs and/or the medium term impact of the current sharp cutback in E&P and refining investments).

Another approach to assessing the valuation of commodities as an asset class is to compare the current value of the DJAIG Index to its long-term average. Between 1991 and 2008, the inflation adjusted (i.e., real) DJAIG had an average value of 91.61, with a standard deviation of 16.0 (skewness of .52, and kurtosis of -.13 – i.e., it was close to normal). The inflation adjusted **31 August 2009** closing value of 79.93 was .73 standard deviations below the long term average. Assuming the value of the index is normally distributed around its historical average (which in this case is approximately correct), a value within one standard deviation of the average should occur about 67% of the time, and a value within two standard deviations 95% of the time. Whether the current level of the inflation adjusted DJAIG signifies that commodities are undervalued depends upon one's outlook for future roll returns and price surprises, and, critically, the time horizon being used.

Two factors argue in favor of undervaluation over the medium to long-term. The first is the large amount of monetary easing underway in the world, which, at some point, will likely lead to higher inflation. The second factor is the equally large amount of fiscal stimulus being applied to the global economy, with its focus on infrastructure projects and clean fuels, both of which should eventually boost demand for commodities (and indirectly boost economic growth in commodity exporting countries like Australia and Canada). Gold prices should also benefit from rising investor uncertainty and/or worries about future inflation, which should generate higher retail flows into the expanding range of gold ETF products that make easier to invest in this commodity.

The argument in favor of a negative view on commodity valuations is (as more fully discussed in our Economic Update) is based on the length of time that will pass before the three critical problems that underlie this global recession are resolved: excessive consumer debt, insolvent banks, and substantial world current account imbalances. Until this happens, the impact of fiscal stimulus on global real growth (and hence commodity prices) is likely to be, at best, weakly positive, with a significant potential for a sharp increase in inflation. At the end of **August 2009** we believe that the balance of probabilities favors an increase in commodity prices over the medium term; hence we believe that, on a long-term view, commodities are possibly undervalued today. Over a one year time horizon, we are neutral. Similarly, we continue to believe that gold is possibly undervalued in the short-term, given our view that the majority of market participants have underestimated the chances of a sharp increase in uncertainty over the next 12 months, and in inflation thereafter.

Timber

The underlying diversification logic for investing in timber is quite simple: the key return driver is biological growth, which has essentially no correlation with factors driving returns on other asset classes. That said, the correlation of timber returns with other asset classes should be different from zero, as it also depends on the price of timber products (which depends, in part, on GDP growth) as well as changes in real interest rates and investor behavior – factors affect returns on other asset classes as well as timber.

However, in valuing timber as a global asset class, we face a number of significant challenges. First, the underlying assets are not uniform – they are divided between softwoods and hardwoods, at different stages of maturity, located in different countries, face different supply conditions (e.g., development, harvesting, and environmental regulations and pest risks), and different demand conditions in end-user markets. Second, the majority of investment vehicles containing these assets are illiquid limited partnerships, and the few publicly traded timber investment vehicles

(e.g., timber REITs) provide insufficient liquidity to serve as the basis for indexed investment products. Finally, the two indexes that attempt to measure returns from timberland investing (the NCREIF Index in North America, and IPD Index in Europe) are regional in coverage and utilize an appraisal based valuation methodology based on timber limited partnerships, which tends to understate the volatility of returns and their correlation with other asset classes. Given these challenges, the result of any valuation estimate for timber as a global asset class must be regarded as, at best, a rough approximation.

Our valuation approach is based on two timber REITs that are traded in the United States: Plum Creek (PCL) and Rayonier (RYN). We chose this approach because both of these REITs are liquid, publicly traded vehicles, and both derive most of their revenues from their timberland operations. This avoids many of the problems created by appraisal based approaches such as the NCREIF and IPD indexes. That said, tor the reasons noted above, this approach is still far from a perfect solution to the asset class valuation problem presented by timber.

As in the case of equities, we compare the returns that a weighted mix of PCL and RYN are expected to supply (defined as their current dividend yield plus the expected growth rate of those dividends) to the equilibrium return investors should rationally demand for holding timber assets (defined as the current yield on real return bonds plus an appropriate risk premium for this asset class). We note that, since PCL and RYN are listed securities, investors should not demand a liquidity premium for holding them, as they would in the case of an investment in a TIMO Limited Partnership (Timber Management Organization). Two of the variables we use in our valuation analysis are readily available: the dividend yields on the timber REITS and the yield on real return bonds. The other two variables, the expected rate of growth and the appropriate risk premium, have to be estimated. The former presents a particularly difficult challenge.

In broad terms, the rate of dividend growth results from the interaction of physical, economic, and regulatory processes. Physically, trees grow, adding a certain amount of mass each year. The exact rate depends on the mix of trees (e.g.,

southern pine grows much faster than northern hardwoods), on silviculture techniques employed (e.g., fertilization, thinning, etc.), and weather and other natural factors (e.g., fires, drought, and beetle invasions). Another aspect of the physical process is that a certain number of trees are harvested each year, and sold to provide revenue to the timber REIT. A third aspect of the physical process is that trees are exposed to certain risks, such as fire, drought, or disease (e.g., the mountain pine beetle in the northwest United States and Canada). And fourth physical process is that, through photosynthesis, trees sequester a portion of the carbon dioxide that would otherwise be added to the earth's atmosphere.

In the economic area, three processes are important. First, as trees grow, they can be harvested to make increasingly valuable products, starting with pulpwood when they are young, and sawtimber when they reach full maturity. This value-increasing process is known as "in-growth." The speed and extent to which in-growth occurs depends on the type of tree; in general, this process produces greater value growth for hardwoods (whose physical growth is slower) than it does for pines and other fast-growing softwoods. At the level of individual timber investments, the rate of in-growth is a key driver of returns; however, at the asset class level, we have decided to assume a constant mix of grades over time. The second economic process (or, more accurately, processes) is the interaction of supply and demand that determines changes in real prices for different types and grades of timber. As is true in the case of commodities, there is likely to be an asymmetry at work with respect to the impact of these processes, with prices reacting more quickly to more visible changes in demand, while changes in supply side factors (which only happen with a significant time delay) are more likely to generate surprises. In North America., a good example of this may be the eventual supply side and price impact of the mountain pine beetle epidemic that has been spreading through the northwestern forests of the United States and Canada. The IMF produces a global timber price index that captures the net impact of demand and supply fluctuations, which is further broken down into hardwood and softwood. The average annual change in real prices (derived by adjusting the IMF

series for changes in U.S. inflation) between 1981 and 2007 are shown in the following table:

	Average	**Standard Deviation**
Hardwood	0.4%	11.8%
Softwood	1.7%	21.6%
All Timber	0.1%	9.2%

As you can see, over the long term, prices have been quite stable in real terms, though with a high degree of volatility from year to year (and additional volatility across different regional markets).

The third set of economic processes that affects the growth rate of dividends includes changes in a timber REIT's cost structure, and in its non-timber related revenue streams (e.g., proceeds from selling timber land for real estate development or conservation easements). For example, if wood prices decline, and non-timber sources of revenue dry up (as is happening during the current recession), a timber REIT (or timber LP) will have to either cut operating costs and/or distributions to investors, or increase the physical volume of trees that are harvested.

Regulatory processes also affect the future growth rate for timber REIT dividends. In the past, the most important of these included restrictions on harvesting or land development. In the future, the most important regulatory factor is likely to be the imposition of carbon taxes or a cap and trade systems to limit carbon emissions. These new environmental regulations could provide an additional source of revenue for timber REITs in the future (for an early attempt at establishing the CO_2 sequestration value of timberland, see "Economic Valuation of Forest Ecosystem Services" by Chiabai, Travisi, Ding, Markandya and Nunes. For a review of similar studies, see "Estimates of Carbon Mitigation Potential from Agricultural and Forestry Activities" by the U.S. Congressional Research Service).

The following table summarizes the assumptions we make about these physical and economic variables in our valuation model:

Growth Driver	Assumption
Biological growth of trees	We assume 6% as the long term average for a diversified timberland portfolio. We stress that biological growth rates can vary widely for different types of timber investment (with softwoods and timber located in tropical countries delivering the highest growth, and hardwoods and timber in more temperate climates delivering the slowest growth rates). We have also changed our valuation model to assume a constant mix of product grades, to present a better approximation for timber as a global asset class.
Harvesting rate	As a long term average, we assume that 5% of tree volume is harvested each year. As a practical matter, this should vary with timber prices and the REITs prevailing dividend level. So 5% is a "noisy" long-term estimate for timber as a global asset class.
Change in prices of timber products	In line with IMF data, we assume that over the long term, average timber prices will just keep pace with inflation. Again, this is a "noisy" estimate, because the IMF data also shows that real prices are highly volatile. Moreover, there are indications that climate change is causing increasing tree deaths in some areas, which should lead to future real price increases (see "Western U.S. Forests Suffer Death by Degrees" by E. Pennisi, *Science*, 23Jan09). Hence we believe our long term price change assumption is conservative.
Carbon credits	Until more comprehensive regulations are enacted, we assume no additional return to timberland owners from the CO_2 sequestration service they provide. Again, given the high level of global concern with limiting the increase in atmospheric CO_2 levels, we believe this is a conservative assumption.

This leaves the question of the appropriate return premium that investors should demand to compensate them for bearing the risk of investing in timber as an asset class. Historically, the difference between returns on the NCRIEF timberland index and those on real return bonds has averaged around six percent. However, since the timber REITS are much more liquid than the properties included in the NCRIEF index, and since timber has displayed a very low correlation with returns on other asset classes (particularly during the worst of the 2008 crisis, even in the case of liquid timber vehicles), we use three percent as the required return premium for investing in liquid timberland assets. Given these assumptions, our assessment of the valuation of the timber asset class at **31 August 2009** is shown in the following table. We use the dividend discount model approach to produce our estimate of whether timber is over, under, or fairly valued today. The specific formula is (Current Dividend Yield x 100) x (1+ Forecast Dividend Growth) divided by (Current Yield on Real Return Bonds + Timber Risk Premium - Forecast Dividend Growth). A value greater than 100% implies overvaluation, and less than 100% implies undervaluation.

Average Dividend Yield (70% PCL + 30% RYN)	5.10%
Plus Long Term Annual Biological Growth	6.00%
Less Percent of Physical Timber Stock Harvested Each Year	(5.00%)
Plus Long Term Real Annual Price Change	0.00%
Plus Other Sources of Annual Value Increase (e.g., Carbon Credits)	0.00%
Equals Average Annual Real Return Supplied	**6.10%**
Real Bond Yield	1.95%
Plus Risk Premium for Timber	3.00%
Equals Average Annual Real Return Demanded	**4.95%**
Ratio of Returns Demanded/Returns Supplied Equals Valuation Ratio (less than 100% implies undervaluation)	**77%**

We stress that this is a long-term valuation estimate that contains a higher degree of uncertainty that valuation estimates for larger and more liquid asset classes. Over a one year time horizon, you could easily reach a different valuation conclusion. For example, if you believe that real timber prices will decline over the next year, and/or that physical harvesting rates will increase to cover costs and dividends, then you could argue that, in so far as PCL and RYN are roughly accurate proxies for the asset class as a whole, timber is likely overvalued today. On the other hand, whether looking over a short or long-term time horizon, if you believe that new revenues from timber's CO_2 sequestration service are likely to be significant, and/or that four percent is too high a risk premium to use, then you could argue that timber is actually undervalued today on a medium term view, and possibly on a short-term view, depending on your outlook for cap and trade legislation. Finally, you could also argue (as Robert Hagler does in "Re-Allocating Timber Investment Portfolios for the Decade Ahead") that timber remains a relatively inefficient asset class in which it is still possible for active managers to generate significant additional returns.

In sum, timber valuation is an issue upon which reasonable people can and do disagree, in no small measure because of their different time horizons and the different underlying assumptions and methodologies they use to reach their conclusions. On balance, taking a long-term view, we continue to believe that timberland is likely undervalued today, for three reasons: (1) future revenue growth related to CO_2 sequestration is likely to be significant; (2) the negative impact on timber prices caused by the recession and long-term slowdown in North American housing construction will be moderated or offset by the impact of supply side changes, such as the mountain pine beetle problem, and by rising demand for wood products that will accompany rising incomes in China. On a one year view, however, we are neutral, with downward price risk balanced against the upside potential inherent in pending environmental legislation.

Volatility

Our approach to assessing the current value of equity market volatility (as measured by the VIX index, which tracks the level of S&P 500 Index volatility implied by the current pricing of put and call options on this index) is similar to our approach to commodities. Between January 2, 1990 and December 30, 2008, the average daily value of the VIX Index was 19.70, with a standard deviation of 7.88 (skewness 2.28, kurtosis 9.71 – i.e., a very "non-normal" distribution).   On **31 August 2009**, the VIX closed at 26.01, To put this in perspective, only 733 days, or 15.3% of our sample had higher closing values of the VIX. In the short term – say, over the next 12 months -- this very high (by historical standards) level of implied volatility may still be too low, if (as described in this month's economic update) investors' hopes for a fast return to normalcy eventually meet with disappointment as the conflict scenario and/or a worsening global influenza pandemic develops. As we noted above with respect to commodities, despite the likely impact of fiscal stimulus on aggregate demand, and monetary growth on price levels (i.e., reducing the risk of prolonged deflation), the core issues that lie at the heart of the current recession remain unresolved. Critically, we do not believe that this information and its likely impact on future uncertainty levels has been fully incorporated into S&P 500 option prices, and hence into the VIX. For these reasons, at the end of **August 2009** we estimate that volatility is likely undervalued over a short-term time horizon. However, over a longer term time horizon, volatility is possibly overvalued today. We hesitate to take a stronger stance on this issue, because we believe that structural changes – such as electronic trading, faster dispersal of information to investors, and the substantial amount of money committed to various quantitative trading strategies -- may well have made equity prices permanently more volatile than they have been in the past.

Sector and Style Rotation Watch

The following table shows a number of classic style and sector rotation strategies that attempt to generate above index returns by correctly forecasting turning points in the economy. This table assumes that active investors are trying to earn high returns by investing today in the styles and sectors that will perform best in the next stage of the economic cycle. The logic behind this is as follows: Theoretically, the fair price of an asset (also known as its fundamental value) is equal to the present value of the future cash flows it is expected to produce, discounted at a rate that reflects their relative riskiness.

Current economic conditions affect the current cash flow an asset produces. Future economic conditions affect future cash flows and discount rates. Because they are more numerous, expected future cash flows have a much bigger impact on the fundamental value of an asset than do current cash flows. Hence, if an investor is attempting to earn a positive return by purchasing today an asset whose value (and price) will increase in the future, he or she needs to accurately forecast the future value of that asset. To do this, he or she needs to forecast future economic conditions, and their impact on future cash flows and the future discount rate. Moreover, an investor also needs to do this before the majority of other investors reach the same conclusion about the asset's fair value, and through their buying and selling cause its price to adjust to that level (and eliminate the potential excess return).

We publish this table to make an important point: there is nothing unique about the various rotation strategies we describe, which are widely known by many investors. Rather, whatever active management returns (also known as "alpha") they are able to generate is directly related to how accurately (and consistently) one can forecast the turning points in the economic cycle. Regularly getting this right is beyond the skills of most investors. In other words, most of us are better off just getting our asset allocations right, rather than trying to earn extra returns by accurately forecasting the ups and downs of different sub-segments of the U.S. equity and debt markets (for three good papers on rotation strategies, see "Sector Rotation Over Business Cycles" by Stangl, Jacobsen and Visaltanachoti; "Can Exchange Traded Funds Be Used to

Exploit Industry Momentum?" by Swinkels and Tjong-A-Tjoe; and "Mutual Fund Industry Selection and Persistence" by Busse and Tong).

That being said, the highest rolling three month returns in the table do provide us with a rough indication of how investors expect the economy and interest rates to perform in the near future. *The highest returns in a given row indicate that a plurality of investors (as measured by the value of the assets they manage) are anticipating the economic and interest rate conditions noted at the top of the next column* (e.g., if long maturity bonds have the highest year to date returns, a plurality of bond investor opinion expects rates to fall in the near future). Comparing returns across strategies provides a rough indication of the extent of agreement (or disagreement) investors about the most likely upcoming changes in the state of the economy. When the rolling returns on different strategies indicate different conclusions about the most likely direction in which the economy is headed, we place the greatest weight on bond market indicators. Why? We start from a basic difference in the psychology of equity and bond investors. The different risk/return profiles for these two investments produce a different balance of optimism and pessimism. For equities, the downside is limited (in the case of bankruptcy) to the original value of the investment, while the upside is unlimited. This tends to produce an optimistic view of the world. For bonds, the upside is limited to the contracted rate of interest and getting your original investment back (assuming the bonds are held to maturity). In contrast, the downside is significantly greater – complete loss of principal. This tends to produce a more pessimistic (some might say realistic) view of the world (although some might argue that the growth of the credit derivatives market has undermined this discipline). As we have written many times, investors seeking to achieve a funding goal over a multi-year time horizon, avoiding big downside losses is arguably more important than reaching for the last few basis points of return. Bond market investors' perspective tends to be more consistent with this view than equity investors' natural optimism. Hence, when our rolling rotation returns table provides conflicting information, we tend to put the most weight on bond investors' implied expectations for what lies ahead.

Three Month Rolling Nominal Returns on Classic Rotation Strategies in the U.S. Markets

Rolling 3 Month Returns Through	*31 August 09*			
Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
Style and Size Rotation	Small Growth (DSG) **14.91%**	Small Value (DSV) **18.96%**	Large Value (ELV) **10.78%**	Large Growth (ELG) **11.23%**
Sector Rotation	Cyclicals (RXI) **12.18%**	Industrials (EXI) **13.45%**	Staples (KXI) **10.22%**	Utilities (JXI) **9.67%**
Bond Market Rotation	Higher Risk (HYG) **8.53%**	Short Maturity (SHY) **0.43%**	Low Risk (TIP) **1.12%**	Long Maturity (TLT) **3.56%**

Feature Article: What Causes Failure?

In the business world, failure is the rule rather than the exception. Most companies liquidate or cease to be independent after just a few years of existence. A look at the history of the S&P or Fortune 500 shows that even attaining size and success does not guarantee longevity. For example, in their paper on "Sustained Competitive Advantage" Wiggins and Ruefli analyze twenty five years of data covering 6,772 firms and conclude that "(1) while some firms exhibit superior economic performance, (2) only a very small minority do so, and (3) superior performance rarely persists for long time frames." The world of investment management is no different. As time passes, the percentage of active managers who have succeeded in outperforming their relevant index benchmark drops sharply, even before the effects of fees and taxes are taken into account. At a higher level, the lives of many financial products, including

many narrowly defined index products, are also very short. Despite this, the number of business books that focus on the causes of failure remains a small fraction of those that claim to offer the secrets of success. To some extent, this undoubtedly reflects an essential and admirable aspect of human nature – our optimism is critical to our willingness to take risks, and drive the evolutionary process of variation and selection that constantly renews our fitness to survive in an ever changing environment.   Yet I have also long felt that the dearth of books about failure reflects a fear of fully confronting the true scale of uncertainty we face, and learning the lessons life's most painful chapters can teach us. With that in mind, I spent the summer re-reading some of the best of these books I've collected over the years. In this article, I'll highlight their key findings, and summarize the lessons I think they hold for investment managers.

Let me begin with this quote: "Economists at this moment are called upon to say how to extricate the free world from the serious threat...which, it must be admitted, has been brought about by policies which the majority of economists recommended and even urged governments to pursue. We have indeed at the moment little cause for pride: as a profession we have made a mess of things." Sounds like something that could have been said last week, doesn't it? It comes from the speech Friedrich von Hayek gave on December 11, 1974 when he received the Nobel Prize in economics. Back then, the serious threat came from accelerating global inflation. Hayek went on to offer his view of the root cause of the failings he cited. "This brings me to the crucial issue. Unlike the position that exists in the physical sciences, in economics and other disciplines that deal with essentially complex phenomena, the aspects of the events to be accounted for about which we can get quantitative data are necessarily limited and might not include the important ones...In the physical sciences, the investigator will be able to measure what, on the basis of prima facie theory, he thinks important. [In contrast], the social sciences often treat as important that which is accessible to measurement. This is sometimes carried to the point where it is demanded that our social science theories must be formulated in such terms that they refer only to measurable magnitudes. It can hardly be denied that such a demand

quite arbitrarily limits the facts which are to be admitted as possible causes of the events which occur in the real world...”

　　“What looks superficially like the most scientific procedure is often the most unscientific...Confidence in the unlimited power of science is too often based on a false belief that the scientific method consists in the application of a ready-made technique, or in imitating the form rather than the substance of scientific procedure...It sometimes seems as if the techniques of science are more easily learned than the thinking that shows us what the problems are and how to approach them...The chief point we must remember is that the great and rapid advance of the physical sciences took place in fields where it proved that explanation and prediction could be based on laws which accounted for the observed phenomena as functions of comparatively few variables – either particular facts or relative frequencies of events. This may even be the ultimate reason why we single out these realms as “physical” in contrast to those more highly organized structures which I have called essentially complex phenomena...As we advance from the realm in which relatively simple laws prevail into the range of phenomena where organized complexity rules, we find more and more frequently that we can in fact ascertain only some but not all the particular circumstances which determine the outcome of a given process. In consequence, we are able to predict only some but not all the properties of the result we expect. Often, all that we shall be able to predict will be some characteristic of the pattern that will appear. Yet these are still predictions which can be falsified, and are therefore of empirical significance. Of course, compared with the precise predictions we have come to expect in the physical sciences, this sort of pattern prediction is a second best...Yet the danger of which I want to warn is precisely the belief that in order to have a claim to be accepted as scientific it is necessary to achieve more. This way lie charlatanism and worse...If man is not to do more harm than good in his efforts to improve the social order, he will have to learn that in economics, as in all other fields where essential complexity prevails, he cannot acquire the full knowledge which would make mastery of events possible.”

Eight years after Hayek gave his Nobel speech, Air Force Colonel John Boyd began a remarkable series of Pentagon briefings entitled "Discourse on Winning and Losing" which, in effect, presented a framework for explaining failure and success in navigating complex adaptive systems. Boyd began with the assumption that the purpose of strategy was "to improve our ability to shape and adapt to unfolding circumstances, so that we can survive on our own terms." Boyd proposed a continuous cycle of analysis and synthesis, interaction with the environment and isolation that has come to be known as the "OODA Loop." In the first phase, an individual or organization observes the world. Failure can result when scarce attention is focused on the wrong indicators. The most critical phase of the loop is orientation, in which we use our observations to make sense of our situations, and formulate alternative courses of action to achieve our goals. The causes of failure in this phase include developing a dangerously inaccurate picture of one's situation, and/or inappropriate courses of action. At this point a decision is made about the course of action to pursue. In essence, Boyd regards decisions as hypotheses about the likely evolution of the environment, and cause and effect relationships within it. Failure in this phase can be caused by delay in making a decision, or by choosing the wrong decision. Action, the last phase, implements the chosen plan, and, in effect, tests the hypothesis, and generates new observations that begin the process all over again. In this phase, failure can be caused by poor execution, or by randomness (i.e., bad luck). As competition between intelligent players or organizations unfolds over time (Boyd began to develop his ideas when analyzing the causes of pilots' failures and success in dogfights), the player that executes the OODA loop more quickly and more accurately gains an ever increasing advantage over opponents. Moreover, when a player "gets inside an opponent's decision cycle", he or she causes an exponential accumulation of disorder inside the opponent's organization, causing it to make more mistakes, and hastening its failure.

In 1985, seven years after Boyd began to give his briefings, Dietrich Dorner published The Logic of Failure, which I still consider the best book on this subject. In essence, Dorner added more detail to both sides of Hayek's argument – both the

nature of complex systems and humans' shortcomings when comes to accurate perception and goal achievement when complex systems are involved. Regarding the former, Dorner describes the by now familiar mix of positive and negative feedback loops, goal directed agents with varying degrees of interconnectivity, and the evolution of key relationships over time that together create a complex adaptive system. What I think makes Dorner's book particularly valuable, however, is his insights into the many reasons we fail to reach our intended objectives – that is, we fail – when operating in complex adaptive systems.

Dorner notes that in such systems, "we must keep track of constantly changing conditions and never treat any image we form of a situation as permanent. Everything is in flux, and we must adapt accordingly.   The need to adapt to particular circumstances, however, runs counter to our tendency to generalize and form abstract plans of action This is an example of how an important element of human intellectual activity can be both useful and harmful." Dorner also anticipates a lot of later writing about the problem of what is now known as "information overload." In a complex adaptive system, "anyone who has a lot of information, thinks a lot, and by thinking increases his understanding of a situation will have not less but more trouble coming to a decision. To the ignorant, the world looks simple. If we pretty much dispense with gathering information, it is easy for us to form a clear picture of reality and come to clear decisions based on that picture...Once we start gathering information, however, we run into trouble, because we realize how much we still don't know...The self-reinforcing feeling of uncertainty, anxiety and insecurity that results [from gathering information about a complex adaptive system]...may explain why some people deliberately refuse to take in information...We end up combating our uncertainty either by acting hastily on the basis of minimal information or by gathering excessive information, which inhibits action and may even increase our uncertainty. Which of these patterns we follow depends on time pressure, or the lack of it....Eventually we may pull back into a small cozy corner of reality where we feel at home [i.e., narrow our focus to that part of the system we think we understand] or, alternatively, escape vertically, by creating a more abstract model of reality."

With respect to understanding actions that unfold over time, Dorner highlights human beings default reliance on linear extrapolation of events based on a few hypothesized simple cause and effect relationships. As a result, "when we have to cope with systems that do not operate in accordance with very simple temporal patterns we run into major difficulties." In particular, Dorner notes that "in situations where feedback [about the results of our actions] is not frequent and where the intervals between action and feedback are longer, we can expect ritualization to wax luxuriant." In particular, most people tend to forget some simple guidelines: "The essence of planning is to think through the consequences of certain actions, stringing individual actions together in sequences, and seeing whether those actions will bring us closer to our desired goal...Try to understand the internal dynamics of the process. Make notes on those dynamics so that you can take past events into account and not be at the mercy of the present moment. Try to anticipate what will happen." Dorner notes that, when faced with the challenge of achieving a goal in a complex adaptive system, a frequent cause of failure is overplanning. He notes that "if we expect the unexpected, we are better equipped to cope with it that if we lay extensive plans and believe that we have eliminated the unexpected…In very complex and quickly changing situations, the most reasonable strategy is to plan only in rough outline and to delegate as many decisions as possible to subordinates" and instead focus maintaining an awareness of the evolving situation. Dorner also reemphasizes "a point first made by Clausewitz: 'In war everything is simple, but it's the simple things that are difficult'…Plans often fail because the planners have not factored in all the irksome little conditions, or 'frictions' as Clausewitz called them, that have to be dealt with if the plan is to succeed. The plan may be simple; carrying it out is the hard part." On the other hand, Dorner concedes that simple plans also "often give us something we sorely need, namely, optimism and courage. There are many tasks we would never dare to take on if we didn't first conceive of them in very simple terms."

Another source of failure highlighted by Dorner is the unwillingness to evaluate the consequences of our plans and actions. In effect, humans tend to ignore opportunities for learning in order "to preserve the illusion of our competence." Indeed,

this psychological need is so strong that it "contributes significantly to shaping the direction and course of our thought processes…We often redirect our thinking from our actual goals to the goal of preserving our sense of competence."

More recently, in 2006 Stephan Fruhling, of the Strategic and Defense Studies Centre of the Australian National University, published a paper that built on many of the issues raised by Dorner. He noted that, "strategy in practice inevitably involves the forecasting of future cause-effect relationships. Five basic sources of uncertainty make it difficult to predict and test these relationships and the variables associated with them…Aleatory uncertainty refers to the uncertainty inherent in a stochastic, random phenomenon" – what most people call randomness or luck. "The second cause of uncertainty in strategy is the existence of dynamic systems caused by nonlinearity and complexity…A third source of uncertainty derives from the fact that humans are limited in their cognitive and physiological abilities to process information…Fourth, the enemy himself is a fourth major source of uncertainty in strategy…a battle of two or more wills seeking to achieve their respective goals… Finally, the difficulty in predicting non-linear changes is compounded by the fact that information about the current state of the system – intelligence – is inevitably limited and uncertain."

As you have no doubt concluded by now, failure is a far more popular topic among military analysts than it is among business writers, perhaps because its consequences are so much more serious in the former realm. Among the many good pieces of writing by military authors on the subject of failure is Cohen and Gooch's 1991 book Military Misfortunes, in which they used historical examples to illustrate three critical sources of organizational failure. These included failure to anticipate the future, failure to adapt in the present, and failure to learn from the past. In some cases, more than one of these causes was at work, leading to that they termed "compound" failures. Failure to anticipate has also been the subject of a series of books on surprise attack, including Roberta Wohlstetter's classic Pearl Harbor: Warning and Decision, Richard Betts' Surprise Attack: Lessons for Defense Planning, and Ephraim Kam's Surprise Attack: The Victim's Perspective. All of these books

echoed the findings that would later be reached by the multiple commissions that studied the events leading up to the 9/11 attacks. In different ways, all of these books employed a version of Bayes Theory, which describes a methodology for updating a prior view in light of new evidence. In the case of surprise attack, failure can be caused by the difficulty of separating signals from noise, and in evaluating the diagnostic value and credibility of signals that often conflict. A more fundamental problem, however, lay in the nature of the prior views that were held before the attack. As more than one study of the 9/11 attacks concluded, the real problem was not so much a technical failure to "collect the dots" or an analytical failure to connect them, but rather a more fundamental failure to imagine a wide enough range of scenarios and possibilities to guide the search for the dots in the first place. In the face of information overload, which has been made orders of magnitude more challenging by technology, there are two ways to attack the sensemaking and warning problem. The first is to use technology to attack the problem with brute force, through software that can generate "novel insights from massive data sets." To use an investment analogy, this is equivalent to algorithmic trading, which uses machine learning software (e.g., neural networks and genetic algorithms) to inductively predict the evolution of data points in a time series from empirical relationships found in the historical data, rather than deducing them on the basis of theories about how a system should behave. The second approach is to attack the sensemaking and warning problem with imagination, generating a series of hypotheses (e.g., scenarios) and proactively seeking evidence that falsifies them (i.e., that you would not expect to see if the hypothesis was true). In an age of information overload, both of these approaches are more efficient than simply trying to "make sense" of a stream of incoming data.

The engineering world has also published numerous studies of failure, often based on lessons learned from thorough investigations of aircraft crashes and industrial accidents. Perhaps the best known of these is Charles Perrow's 1999 book Normal Accidents, which concluded that two factors make a system highly susceptible to catastrophic failure. The first is "tight coupling", or the tendency in a system for events to be closely related to each other in time. The second is "interactive

complexity", or systems in which there are interrelationships between elements, some of which are non-linear. This makes their behavior hard for operators and observers to fully understand and anticipate, while tight coupling reduces the time available to react to unanticipated events. In 2001, James Chiles published a fascinating book called Inviting Disaster: Lessons from the Edge of Technology.   Among the many interesting points that emerge from Chiles recounting of various disasters, three stood out for me. The first is the critical importance of learning from "near misses" and small "system anomalies" rather than dismissing them as "noise." Chiles stresses that more often than not, they provide early warnings of unanticipated pathways to potentially far more serious problems. This is also consistent with the findings of Mandelbrot and others that the behavior of some complex systems is "fractal" in nature, or displays similar power law distributions across different time scales. When confronted with a near miss, it always pays to ask, "what caused this problem? How could it have led to a much bigger problem?" The second point Chiles makes is that "part of the trick in high fear situations is knowing what needs to be done immediately, what can wait, and which actions cannot be reversed after second thoughts." This is why operators of complex systems employ elaborate checklists and substantial amounts of simulation training. Finally, Chiles stresses that "we know from technological disasters that transitions in their broadest sense – from aircraft landings to factory crew changes to start-ups after maintenance shut-downs – are the times of greatest danger for a complex system."

Psychologists, sociologists, and biologists have also contributed to the study of different failure modes. Examples include the dangers of groupthink (which Irving Janis describes as "a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action"), herding by unrelated individuals or organizations (for an investment oriented analysis of this source of failure, see "Thought and Behavior Contagion in Capital Markets" by Hirshliefer and Teoh), and the transmission of panic (see "Learning Fears by Observing Others" by Olsson, Nearing and Phelps). In our experience, one of the

most useful frameworks for thinking about the sources of failure has been provided by Stuart Kauffman, who popularized the NKCS model, which captures the complex balance between internal and external sources of failure. The model assumes the existence of two or more systems, each of which is composed of different organizations (technically, "agents"). At the end of each time period, organizations with a "fitness level" (i.e., performance compared to one or more metrics) below a given minimum are removed from the game – that is, they fail. Internally, an organization is composed of N elements (e.g., strategic choices). Each choice is, on average, related to K other choices. The fitness impact of a decision to change the value of a given element depends both on the direct result of the change, plus the indirect impact on K other elements. Organizations also have an average of C connections with S other organizations that exist in other systems (technically, "ecosystems"). Hence, a change in just one of N elements in an organization can affect the fitness of S other organizations in other ecosystems, via their C connections with the organization making the original change (for example, think of the cascading consequences of credit contraction at large money center banks). Moreover, this process works both ways. The great power of this model is that it shows multiple pathways that can result in failure, not due to some exogenous shock, but rather due to changes in relationships within the system itself (i.e., due to endogenous changes). As Kaufman shows, the risk of failure (i.e., fitness below the failure threshold) increases with the degree of imbalance in the NKCS model.   If the product N*K is greater than C*S, it produces excessive stability, which is one source of failure. If N*K is significantly less than C*S, it produces chaotic behavior (think of it as lurching from one new initiative to another, in an uncoordinated manner), which is another source of failure. On the other hand, when N*K and C*S are closely balanced, the organization is said to be in the region of maximum adaptivity and resiliency, with the lowest risk of failure.

Another biological concept that significantly bears on the causes of failure is "path dependence." This refers to the tendency of choices made in one period to constrain the range of possible choices that can be made in the face of evolving

circumstances many periods into the future. A business example of this would be the impact of a substantial financial commitment to a given market or technology, or the multiperiod impact of poor customer experience and its reputational consequences in an age of ubiquitous communications. Indeed, as most CEOs can tell you, the interrelated effects of path dependence and randomness are far more powerful than most investors (and not a few boards) would care to admit.

Following a great deal of research into failure in other disciplines, in recent years, the subject of failure has finally become, if not popular, than at least more interesting in the eyes of business book publishers (though success recipes still outsell them by a large multiple). An excellent example is Why Most Things Fail by Paul Ormerod. He notes at the outset that "within economics, we will look in vain for any satisfactory account of why firms fail." In response, Omerod asks "how can it be that not just failure, but patterns of failure, are so similar in biology and human organization when there is such a sharp contrast between the abilities to act with the conscious intent of improving one's prospects for survival?" Omerod begins with an exposition of the similarity between the distribution of the size and frequency of failures across multiple domains – all of which are shown to follow similar power laws. He then delves into the causal processes that produce this outcome, comparing the impact of exogenous and endogenous shocks. He concludes that the latter are far more important when it comes to explaining failure. However, we found Omerod's most interesting conclusion to be the relatively low potential for superior information and cognition – as one would expect an business organization to display – to affect the chances of failure, once it has successfully survived the most dangerous (in terms of failure probabilities) early years of existence. As he notes, "despite the ability of humans and human institutions to act with intent, in reality it is if they operate close to the paradigm of the agent with zero cognitive ability. They do not have to mimic it completely, and a small amount of ability to translate intent into desired outcome is compatible with the evidence we observe, but no more than that…[Analysis of the historical record of failures leads one to conclude that] agents have very limited capacities to acquire knowledge about the true impact of either their strategies on

others or of others on them…The future remains covered in a deep veil to all in complex dynamic environments which evolve over time."

In How the Mighty Fall, Jim Collins describes a five-step process of organizational decline. The first is "hubris born of success". According to Collins, "it sets in when people become arrogant, regarding success as virtually an entitlement, and lose sight of the factors that created success in the first place…Luck and chance play a role in many successful outcomes, and those who fail to acknowledge the role luck may have played in their success – and thereby overestimate their own merit and capabilities – have succumbed to hubris."   This stage is also characterized by a decline in curiosity and learning. The next stage is "the undisciplined pursuit of more of whatever those in power see as 'success'…This often causes them "to stray from the disciplined creativity that led them to greatness in the first place, making undisciplined leaps into areas where they cannot be great or growing faster than they can achieve with excellence or both." In the third state, "denial of risk and peril" Collins concludes that "internal warning signs begin to mount, yet external results remain strong enough to 'explain away' disturbing data, or to suggest the difficulties are temporary…or that 'noting is fundamentally wrong.'" In this stage, "leaders discount negative data, amplify positive data, and put a positive spin on ambiguous data…The vigorous fact-based dialogue that characterizes high performance teams dwindles or disappears altogether." By stage four, "grasping for salvation", the problems have become too visible to deny, and the organization seeks a magic bullet that will quickly reverse the decline. "The key point is that they go for a quick, big solution or a bold stroke to jump-start a recovery, rather than embark on the more pedestrian, arduous process of rebuilding long-term momentum." As Collins notes, "the signature of mediocrity is not an unwillingness to change. The signature of mediocrity is a chronic inconsistency…The longer a company stays in stage four, the more likely it will continue to spiral downward to stage five", which he terms "capitulation to irrelevance or death."

In Why Smart Executives Fail, Sydney Finkelstein highlights four broad causes of corporate decline, including brilliant execution of the wrong plan, hubris that

suppresses dissent, a failure to face up to data that shows the need for change, and the personal shortcomings of corporate leaders. The latter include "seeing themselves and their companies as dominating their environments", identifying too closely with their company, thinking they have all the answers, "ruthlessly eliminating anyone who isn't 100 percent behind them", "becoming obsessed with the company's image", "underestimating major obstacles" to the implementation of plans, and "stubbornly relying on what worked in the past", regardless of mounting evidence to the contrary.

As I said at the outset, I have, over the years, been a keen student of failure. I have come to realize that failure is not simply the flip side of success. Rather, they are distinct phenomena, if by "success" one means achieving performance in the right tail of the distribution, as opposed to simply avoiding failure and delivering performance that is in the middle of the bell curve. For that reason, failure merits study as a critical phenomenon in its own right. After reading the studies summarized above, and others like them, I have developed my own theory of failure. My starting point is the observation that the fitness of all organisms and organizations can be measured according to three metrics: Effectiveness (the extent to which their actions result in achievement of their goals); Efficiency (the extent to which the resources acquired in a given period exceed the resources expended); and Adaptability (the ability to survive and thrive in the face of change). In my view, most of the causes of failure fall into these three categories.

Effectiveness results from the proper balancing of ends (i.e., the alignment of goals with the metrics driving selection in the environment), ways (i.e., the plan for achieving the chosen ends), and means (i.e., the resources available to execute the plan). The greater the degree of imbalance between these three elements, the higher the risk of failing to pass the selection test. This raises the question of what causes risk to be high. In some cases, this is a deliberate decision – think of an army with its back to the wall, a manager who wants to stay on the good side of a domineering boss, or perhaps a fund manager trailing far behind her benchmark and fearing the loss of her job who takes on significant leverage to make a big bet that will vault her into the first performance quartile if it pays off. In other cases, organizations can back

into high risk decisions without fully realizing what they are doing. For example, magic bullet solutions (which, one way or another, always assume extreme effectiveness relative to available resources) are inevitably predicated on magically accurate forecasts (even if this usually isn't explicitly acknowledged).

However, experience has taught me that more often than not, high risk bets are made inadvertently because the decision maker lacks an adequate understanding of the complex adaptive system within which he or she must act. Cohen and Gooch would call these failures of anticipation. As many other authors have noted, the root cause of these errors lies in fundamental aspects of human cognition and emotion and social interaction. On the one hand, I am confident that advances in agent based and network modeling are leading to better decision aids to help us more clearly understand the dynamics of complex adaptive systems. However, as Hayek noted 35 years ago, there are inherent limitations as to how far advances in this area can take us – we can become better at recognizing patterns and preparing for different types of outcomes (i.e., become more effective by becoming more resilient), but we will generally not be able to improve the accuracy of our point forecasts. Still, there is evidence that even slight improvements in our mental models of complex adaptive systems can significantly improve effectiveness, and reduce the chance of failure (see not only Omerod, but also "Mental Models, Decision Rules, Strategies and Performance Heterogeneity" by Gary and Wood and RAND's work decision making under deep uncertainty). On the other hand, I am less sure that we will ever be able to overcome some of the emotional limitations (e.g., our aversion to uncertainty, and tendency to want to stick with the crowd when uncertainty is high) that limit our ability to deal with complex adaptive systems.

I see two broad sources of failure caused by falling short of the efficiency criteria. The first is derivative – failures to adequately allow in plans for what Clausewitz termed "frictions" (and the Irish call "Murphy's Law") that result in resources that are insufficient to execute a plan as designed. Practically, this is what I view as a failure to learn from the past. Examples of this type of failure abound (e.g., see Bent Flyberg's excellent papers on the causes of major project cost overruns), as evidenced

by the many rules of thumb suggested to help people avoid them (e.g., double your original estimate of the amount of time and money required to complete a project). The second cause of failure I have frequently observed in this area is Omerod's "exogenous shock." Perhaps the most famous recent examples of this are those related to oil, exchange rates, and credit – though depending on how broadly you draw the boundaries system involved, they could also be termed endogenous (indeed, if you define the system broadly enough, only asteroid hits and alien landings would be deemed exogenous).

As I have grown older, however, I have come to realize that, assuming a company gets the basics right (and, as the failure statistics show, a surprising number don't), it is failure to adapt to a constantly evolving environment that most often results in an organization being selected out of independent existence. One cause of adaptation failures already noted is path dependency, or the tendency of previous decisions to limit your current options (which, of course, argues strongly for keeping options created and closed off clearly in mind when making decisions). However, I believe the far more important sources of adaptation failures lie in a range of individual (cognitive and emotional), group, and institutional (e.g., information flows and incentives) causes that have been described in many different ways by the authors we have cited in this article. One further source of adaptive failure, not often mentioned but critical nonetheless, is the widespread tendency to judge the models we use by how well they explain the past. Research has shown that in a complex adaptive system, this standard is guaranteed to produce prediction failures (see, for example, "The Good, The Bad, and The Ugly of Predictive Science" by Hemez and Ben-Haim, or, in the context of recent failures in economics and finance, Paul Krugman's article "How Did Economics Get It So Wrong?" or an excellent paper by Shojai and Feiger, "Economists' Hubris – The Case of Asset Pricing"). Unfortunately, when confronted with their inability to accurately predict the future, too many organizations have sought not higher resiliency (i.e., robustness to future uncertainty), but higher efficiency, and in so doing significantly reduced their ability to adapt.

What then, are the lessons for investors, and asset allocators in particular, from this review of the causes of failure across a wide range of other domains? I think there are many, including:

- Goal specification is critical. This cannot be said strongly or often enough. There is a world of difference between trying to outperform an external benchmark, and trying to achieve the portfolio return target required to meet accumulation, income and/or bequest goals.

- Any statistical technique will likely underestimate the true risk (i.e., probability of shortfall) involved as the mismatch grows between goals and resources.

- In formulating asset allocation strategies, our starting point should be equal weighting, since that assumes no ability to forecast the future beyond simple luck. That said, the evidence also shows that, even in the case of a complex adaptive system, it is possible to develop forecasting models that perform better than this, and therefore justify portfolios that do not have equal weights. We should, however, be humble about the likely accuracy of our forecasts, particularly as the time horizon extends, as the evidence shows that it is unlikely to be high. We should only increase our confidence in our forecasts when approaches based on different methodologies lead to similar conclusions.

- Instead of trying to design highly efficient strategies whose success depends on highly accurate forecasts, we should instead aim for strategies that, while apparently less efficient, are more resilient to shocks, and sufficiently robust to achieve goals under a wide range of future conditions.

- The difficulty of forecasting future outcomes for complex adaptive systems should also make us cautious about the use of active management strategies. The best of these are likely to be based on the use of more than one forecasting methodology,

recognition of broad patterns, and a strong focus on continuous learning and adaptation.

- The investment equivalent of overly optimistic business plans are assumptions that higher than average returns will more than offset higher than average expenses, manager compensation, trading volumes, tax costs, and illiquidity. As the time horizon lengthens, fewer and fewer of these bets pay off.

- We must constantly seek evidence that falsifies our current theories, and never fail to ask what the person on the other side of a trade sees that we have missed. And when we share the same goals and incentives with someone on the other side of a trade, we should be especially curious. In pursuing this approach we must expect to confront resistance from our emotions, social forces and occasionally the incentives we confront. Over the long run, self-discipline, humility, and relentless intellectual honesty are critical to avoiding failure.

Product and Strategy Notes

Interesting Commodities Research

With various regulators trying to decide whether investors in commodity index funds are evil speculators or a stabilizing force, we call your attention to four recent research papers that bear on this issue. In "How Important are Common Factors in Driving Non-Fuel Commodity Prices", Isabel Vansteenkiste of the European Central Bank analyzes commodity prices from 1957 to 2008, using an approach similar to the principal components methodology we use to analyze asset class risk and return regimes. Her results show that, in addition to idiosyncratic factors unique to one or just a few commodities, "there exists one common significant factor...[that] has recently become increasingly important in driving non-fuel commodity prices. However, during the seventies and eighties, comovement of commodity prices with this factor was much higher...[and] idiosyncratic shocks remain important" in explaining

recent price changes for the 32 non-fuel commodities she studied. Vansteenkiste then conducted further analysis to identify the macroeconomic variables that were most closely linked to changes in this common factor. The finds that they include oil prices, the U.S. dollar exchange rate, the real interest rate and global industrial production. She concludes that "this would lead us to reject the hypothesis that speculation results in higher correlation between [changes in commodity prices]."

In "More on the Energy/Non-Energy Commodity Price Link", John Bafes of the World Bank analyzes a data set covering 1960 to 2008, covering energy and 11 non-energy commodities. He finds that the average price transmission elasticity from energy to non-energy commodities is .28 (e.g., a 10% increase in energy prices is, on average, associated with a 2.8% increase in the 11 non-energy commodities). In some cases the relationship is much stronger (e.g., precious metals, at .46). Bafes notes that this large value "reflects the association of high energy prices with inflationary pressures, slower economic growth and resource scarcity, all of which prompt investors to view precious metals (especially gold) as safe investment alternatives, therefore increasing their demand and hence their prices." Bafes concludes that "for as long as energy prices remain elevated, most non-energy commodity prices are also expected to be high." Elsewhere in his paper, Bafes also makes the interesting note that "nominal commodity prices do not exhibit a strong mean-reverting process, nor do they move around a linear trend; instead, they are best characterized by a long memory process."

At the U.S. Federal Reserve, George Korniotis has published "Does Speculation Affect Spot Price Levels? The Case of Metals With and Without Futures Markets." After analyzing a data set covering 1991 to 2008, he concludes that comovement of prices between metals in both catetories "has not weakened in recent years" and "has been driven by economic fundamentals because world GDP growth is strongly correlated with metal price growth, especially after 2002." He also uses returns on the S&P Goldman Sachs Commodity Index as a proxy for the alleged volume of speculative activity, and finds "that these returns are unrelated to metal

prices." In sum, Kornioties finds that "the run up in spot metal prices after 2003 is related to economic fundamentals and not to speculation by financial investors."

Another very insightful paper is "Limits to Arbitrage and Hedging: Evidence from Commodity Markets" by Acharya, Lochstoer and Ramadorai. They describe a new model in which producers' desire to hedge commodity price risk is driven by their financial condition (as measured by default spreads on their debt in the credit default market), and speculators face constraints on their ability to deploy capital to buy the futures contracts commodity producers wish to sell. As producers desire to reduce their price risk by selling more futures, this will tend to depress futures prices and thus make hedging more expensive. In turn, this makes it more expensive for producers to hold inventories, so they sell more product in the spot market, which causes spot prices to decline by an even larger amount than futures. An increase in the capital constraints on speculators (which would limit their capacity to buy the volume of futures producers want to sell at a given price) would have the same effect. The authors test their theory using data on energy futures and producers from 1980 to 2006, and find support for it. "An increase in the default risk of energy producers forecasts an increase in the default risk of producers forecasts an increase in returns on short term futures for these commodities."

Finally, Roache and Rossi from the IMF analyze a question that has long interested us and many of our readers: "The Effects of Economic News on Commodity Prices: Is Gold Just Another Commodity?" After analyzing data for 12 commodity futures contracts from 1997 to 2009, the authors reach a number of interesting conclusions, finding that "gold behaves very differently from other commodities." Their starting point is the observation that "a number of key U.S. indicators, including inflation, GDP, and employment statistics, repeatedly show the ability to move some commodity prices; in general, energy prices have tended to be less sensitive, while gold has been the most sensitive." The authors note that "commodity prices, in common with financial assets, incorporate expectations regarding the future. As a result, the impact of news announcements should focus on the surprise component in the news." They find that energy prices show the least reaction to news

announcements, and that agricultural and base metal prices tend to be pro-cyclical (e.g., rising with news of higher employment or faster GDP growth). "In contrast, gold prices tend to be counter-cyclical, with the price rising when activity indicators are surprisingly weak...For gold, this apparent counter-cyclicality in the very short-term contradicts the results from earlier research using sample periods that stretch between 1970 and the early 1990s. Previous work had tended to find that the gold price was pro-cyclical; i.e., it rose when U.S. inflation increased or activity indicators strengthened by more than the consensus had anticipated. Our results do not imply that the inflation-hedging properties of gold have diminished, but instead suggest two features of gold: first, in the short-term sensitivity is higher to market expectations for real interest rates; second, gold is seen as a safe haven during bad times...The shift to a more pro-active U.S. monetary policy stance in the 1980s effectively substituted real interest rate volatility for inflation volatility. This implies that positive inflation surprises increase the probability of counter-cyclical monetary tightening, and higher real interest rates, which tend to appreciate the U.S. dollar and depress gold prices." The authors also find that "Euro area indicators that point to stronger activity or higher interest rate tend to increase the gold price and depreciate the U.S. dollar, providing further evidence of gold's dollar-hedging characteristics." Finally, negative surprises have a much stronger impact on gold prices than positive surprises. The authors conclude that "this is consistent with the view that gold is a safe haven, and financial assets – in this case, gold futures – experience greater volatility during periods in which economic or financial conditions deteriorate."

The Coming U.S. Muni Market Train Wreck

According to the Federal Reserve's June 2009 Flow of Funds Report (Table L.211), U.S. state and local governments have $2,716 billion in municipal securities and loans outstanding. About $193 billion of this amount is industrial revenue bonds (where the primary obligor is a private sector corporation), and $2,117 billion is securities issued by state and local governments with maturities of more than 13 months. Who holds

this paper? Households directly hold $969 billion, money market funds, $483 billion, mutual funds, $406 billion, property and casualty insurance companies, $375 billion, and commercial banks $214 billion. As you can see from these amounts, if something were to go badly wrong in the municipal securities market, another financial crisis would likely result. Yet that is what we believe is probably going to happen at some point in the next three years.

To understand the logic behind this conclusion, one needs to look at the liabilities, operating costs, current revenue streams, and political realities facing many municipal issuers. In terms of liabilities, many state and local governments were facing badly underfunded pension plans, even before the 2008 market crash, a trend that has been worsening since 2000. Moreover, as many commentators have noted, the size of many public plans' unfunded liabilities is likely understated, due to their assuming much higher average annual investment returns (often more than 8%) than comparable private sector plans. A further problem is that many of these plans may be using outdated actuarial tables, which underestimate the likely longevity of their plan participants. Beyond unfunded pension liabilities, state and local bond issuers also face growing liabilities for "other post employment benefits" ("OPEB"), the most important of which is healthcare for retirees. Until recently, the size of these liabilities has not been calculated, and they have been paid out of current revenues on a "pay as you go" basis. However, the Government Accounting Standards Board now requires that the present value of these future liabilities be reported.

On the operating cost front (excluding provisions for pension and OPEB funding), state and local government issuers are facing increased pressure from rising current salary costs (the most important of which is usually from the rising percentage of teachers at the top of the salary scale, due to declining enrollments in many districts), as well as the need to employ higher numbers of teachers to meet various mandates (e.g., for special education and the No Child Left Behind law). At the same time, governments face rising costs for infrastructure maintenance (due to both the ageing of facilities and deferred maintenance from previous years), and for various social safety net programs. The latter has both cyclical causes (the current recession)

as well as structural ones (e.g., widening wage gaps, falling levels of private sector health insurance coverage, and rapidly rising health care costs).

Unfortunately, at the very time that state and local bond issuers face rising costs for funding liabilities and current operations, their revenues are under tremendous downward pressure. In the current recession, all major revenue sources, from sales, income and property taxes (and in many states, gambling), have seen declines. More important, recovery from the current recession is likely to be slow, with unemployment remaining stubbornly high, and house prices and consumer spending low. In the short-term, however, the seriousness of this revenue problem has been masked by a significant inflow of federal stimulus funds into state and local government coffers.   However, even the federal government faces borrowing constraints, and the flow of federal funds can't be expected to last.

In sum, many issuers of municipal securities are now facing very strong pressures to increase the funding of their liabilities, while operating costs are rising and revenues are falling. And the problem seems likely to only grow worse in the next few years. The obvious answer, of course, is to either cut costs or increase taxes. Unfortunately, many municipal issuers are likely to find either of these options extremely hard to implement. On the cost side, many costs are mandated by a higher governmental authority that provides only partial funding for them. In some cases, public employee pension liabilities are guaranteed in the state constitution, while across the country (with California recently providing the most vivid example) public sector unions have strongly resisted any reduction in their compensation, whether via pension benefit reductions, wage cuts, or furloughs (i.e., mandatory days off with no pay).

Tax increases also present steep challenges. With the Obama administration planning higher federal taxes on affluent taxpayers, it will be even harder for states to sustain significant differences in marginal rates on this group, as their sensitivity to this cost should increase as it rises. And make no mistake about the importance of the most affluent taxpayers to many states' revenues – in California, for example,

households with the top one percent of income pay forty percent of the state's income taxes.

Increasing income taxes on the much larger middle class, at a time when many are facing unemployment and struggling to make payments on mortgage and credit card debt would likely trigger a storm of political opposition. Resistance is likely to be particularly acute if the higher taxes will be used to fund public employee pension and retirement benefits that are substantially better than those facing the private sector workers and small business owners being asked to pay (even more) for them. Moreover, the often times dismal levels of service quality provided by too many state and local governments (in comparison to what taxpayers expect from customer service oriented private sector organizations), and the confrontational "entitlement" mentality displayed by too many public sector union leaders are also very likely to engender strong opposition to higher middle class income taxes. Raising property taxes is always an option, but with many homeowners facing negative equity, it seems likely to provoke the same reaction as a middle class income tax increase. Moreover, in more and more jurisdictions, limits have been placed on the maximum annual increase in property tax collections. This leaves sales taxes. Broadening the tax base (as to include a wide range of services (instead of increasing sales tax rates) is perhaps the best of a menu of bad options facing state and local governments. However, the revenue impact is likely to be substantially constrained by the overall decline in consumer spending.

Given this outlook, it seems inescapable that at the municipal level we may see a rising number of Chapter 9 municipal bankruptcies in the years ahead. However, that still leaves unanswered the particularly thorny issues that arise when a state government cannot, or will not, make payments on its General Obligation bonds, as there is no provision in the U.S. bankruptcy code for this scenario. In the past, state governments facing severe fiscal crises have defaulted on their debt, and subsequently either repudiated or renegotiated it (see, for example, two excellent papers by Wallis, Sylia and Grinath: "Debt, Default, and Revenue Structure: The American State Debt Crisis in the Early 1840s" and "Sovereign Debt and Repudiation:

The Emerging-Market Debt Crisis in the U.S. States, 1839-1843"). At the international level, the sovereign debt crises that have occurred since 1982 have provided plenty of examples of negotiated bond exchange offers that substantially reduced the real value of an issuer's obligations. And most recently, the worsening financial situation facing many U.S. Tribal Gaming Casinos (whose debt, in some cases, has been issued by entities that consider themselves sovereign) may provide yet more examples of what lies ahead for some U.S. states.

In sum, for years many investors purchased municipal bonds for the tax advantages they provided, and largely neglected the underlying credit quality issues. In many cases, they relied on bond ratings which, at least in other cases (e.g., CDOs) have proven overoptimistic, or on guarantees provided by insurance companies, which have seen substantial reductions in their claims paying ability. Investors may also have paid insufficient attention to the underlying legal documentation for the municipal securities they own. In many cases, bond documentation was drafted by politically connected local attorneys, who lacked either the motivation or the experience to aggressively protect investors' rights, and who in any case regarded default scenarios as impossibly remote. Unfortunately, all these chickens are about to come home to roost. With the Securities and Exchange Commission pushing for much more extensive disclosure of the financial conditions facing municipal issuers, and with those conditions set to continue to deteriorate (possibly at an accelerating pace), and with increasing litigation set to expose poor underlying documentation, we believe that many owners of municipal bonds face a rising likelihood of a sharp reduction in the value of their portfolios as the current crisis increases in intensity.

<u>New Volatility Research</u>

In our model of financial markets as a complex adaptive system, the most basic building is the investor making buy and sell decisions. These decisions result not only from individual cognitive, emotional and social factors, but also from the information available to the investor, the incentives he or she faces, and the institutional rules and

other arrangements that constrain his or her choices. The end result of all these individual decisions is the time series records of security and asset class returns we observe.

We are therefore always on the lookout for research which provides further insight into the various facets of this process. In this regard, we were very interested to read a recent neurobiology paper, "Uncertainty During Anticipation Modulates Neural Responses to Aversion in Human Insula and Amygdala" by Sarinopoulos, Grupe et al. As you may recall, the amygdala is a primitive part of the human brain that is deeply associated with our unconscious fear reactions, which, for example, can be triggered by loss, increased uncertainty, or a heightened chance of social isolation. In the current paper, the authors begin by noting that "uncertainty about potential negative future outcomes can cause stress and is a central feature of anxiety disorders. The stress and anxiety of uncertain situations may lead individuals to overestimate the frequency with which uncertain cues are actually followed by negative outcomes." Using functional magnetic resonance imaging of the activation of different brain regions in experimental subjects, the authors found that amygdala responses to unpleasant pictures were larger after the receipt of a stimulus designed to induce a higher level of uncertainty, and smaller after the receipt of a cue designed to raise certainty. Also, both pleasant and unpleasant pictures were shown to experiment participants, "nearly 75% of them overestimated the frequency of unpleasant pictures following uncertainty cues." In sum, increased uncertainty not only increases most people's estimated probability of negative outcomes, but it also leads to a stronger fear response if they occur.   To cite a practical example of what this study means, for most people, the heightened degree of uncertainty triggered by the economic and financial events of the past year has not only increased the probability they attach to negative future outcomes (e.g., a recovery that falters), but will also trigger a stronger fear response if this happens (e.g., a very strong reduction in consumer spending, or greater susceptibility to populist appeals). Moreover, if this response is a strong one, it could have a long-lasting impact on investor decisions, in a manner similar to lifelong impact of the Great Depression on an earlier generation of

investors. This view is reinforced by another paper, "How and Why Emotion Enhances the Subjective Sense of Recollection" by Phelps and Sharot. They find that the degree of amygdala activation "modulates the consolidation or storage of memories for arousing events so that they are more likely to be retained over time."

A third recent paper seems to directly link to the first one cited above. "In Asymmetric Responses to Good and Bad News: An Empirical Case for Ambiguity", Christopher Williams from Ross School of Business at the University of Michigan uses changes in the VIX index between 1986 and 2006 to capture changes in perceived ambiguity (uncertainty). He finds that "following increases in the VIX, investors respond asymmetrically, weighing bad earnings news more than good earnings news." However, following a fall in the VIX (i.e., falling uncertainty), the response to good and bad news is symmetrical. In sum, "ambiguity [uncertainty] shocks change how market participants process information." A closely related paper ("A Simple Model of Trading and Pricing Risky Assets Under Ambiguity" by Guidolin and Rinaldi) finds that "provided there is a sufficient amount of ambiguity [uncertainty], market break-downs where large portions of traders withdraw from trading are endogenous to the market, and may be triggered by modest re-assessments of the range of possible scenarios... Risk premia increase with the proportion of traders in the market who are averse to ambiguity [uncertainty]."

In another paper ("Evidence on Investor Behavior from Aggregate Stock Mutual Fund Flows" by Ederington and Golubeva), the authors study data from 1986 and 2008 and "find a strong negative relationship between changes in the VIX index and net equity fund flows... which is entirely due to the effect of heightened volatility on fund outflows." Similarly, Graham and Harvey regularly survey CFO's to obtain their estimates of the current long-term equity market risk premium.   In "The Equity Risk Premium Amid a Global Financial Crisis", they report that changes in these estimates have a strong correlation with changes in both the VIX and in the BBB minus AAA corporate bond yield spread. Finally, in "Tails, Fears and Risk Premia", Bollerslev and Todorov find that "compensation for rare event [i.e., downside tail] risk accounts for a large fraction of the equity and variance risk premia in the S&P 500 market index", and

that the size of the rare event risk (or, more accurately, perhaps, uncertainty) premium tends to vary over time with the VIX. In sum, these papers provide further evidence that a portion of the observed variation in financial returns over time probably has deep roots in human beings' neurobiology.

Harvard and Yale Endowment Results

Like many other asset allocators, we always look forward to the publication of the annual reports for the Harvard and Yale University endowment funds, as these organizations have long been held up as leaders in our field. This year proved no exception to that rule. During the fiscal year ended June 30, 2009 Harvard reported that its portfolio underperformed its strategic asset allocation policy benchmark by 2.1%. Of this amount, 1.0% was due to underperformance (versus the relevant benchmark) in private equity (which includes both venture capital and buyout funds), and another 65 basis points was due to underperformance in absolute return (which includes a range of hedge fund strategies). As the report notes, "while diversification has been a mainstay and a driver of the portfolio's return over the long-term, the benefits of diversification did not bear out through the rapidly evolving and widespread events that unfolded [last year]." On the other hand, HMC also notes that "the [performance of the] natural resources portfolio was nearly flat in an environment of negative returns for virtually all other growth assets, confirming the diversification benefit of this category of investments even in turbulent markets." Elsewhere in the report, HMC notes that one of the major errors in its policy portfolio was taking on too much liquidity risk in light of the university's ongoing need for the endowment to produce annual cash flows to support its operating budget. The impact of this "lesson learned" can be seen in shift in the policy portfolio's allocation to cash from negative (5%) – i.e., net leverage – to positive 2%. Other policy portfolio shifts were also interesting. These include a 14% reduction in allocations to a range of fixed income asset classes, 4% reduction in the allocation to domestic equity, a 6% increase in the

allocation to emerging market equity, and a 4% increase in allocations to absolute return strategies. In broad terms, HMC appears to be repositioning its portfolio to achieve two objectives: ensuring adequate liquidity while also seeking higher returns to make up for some of the losses sustained in 2008. Looking forward, the HMC report notes "we continue to debate the dueling threats of inflation and deflation, and can make cases for both. In any event, we expect a prolonged period of instability and slower growth in some markets. For the economy overall, we do not anticipate a quick return to the rapid, sustained growth experienced in recent times."

Yale's report is equally interesting, particularly with respect to its portfolio division into just six broad asset classes (Fixed Income, Domestic Equity, Foreign Equity, Private Equity, Absolute Return and Real Assets) its strategies within them, and its expectations for their real returns and volatility. With respect to its overarching allocation philosophy, the Yale report notes that "the need to provide resources for current operations as well as preserve the purchasing power of assets dictates investing for high returns, causing the Endowment to be biased towards equity. In addition, the University's vulnerability to inflation further directs the Endowment away from fixed income and toward equity instruments. Hence, 96% of the Endowment is targeted for investment in assets expected to produce equity-like returns, through holdings of domestic and international securities, real assets, and private equity."

Yale also explicitly notes its willingness to take on illiquidity risk in order to earn higher returns: "the heavy allocation to non-traditional asset classes stems from their return potential and diversifying power...The Endowment's long-term time horizon is [also] well suited to exploiting illiquid, less efficient markets such as venture capital, leveraged buyouts, oil and gas, timber and real estate."   Yale's comments about individual asset classes are also quite interesting. In domestic equity, it looks for active managers with "exceptional fundamental bottom-up research capabilities" since "superior stock selection provides the most consistent and reliable opportunity for generating excess returns" [i.e., positive alpha from outperforming an index benchmark]...."The bond portfolio exhibits a low covariance with other asset classes and serves as a hedge against financial accidents or periods of unanticipated

deflation"...[We have] "a skepticism of active fixed income strategies"..."Emerging market [equities] with their rapidly growing economies, are particularly intriguing"...Within absolute return, "approximately half the portfolio is dedicated to event driven strategies...the other half is dedicated to hedged value based strategies"..."Yale's private equity assets concentrate on partnerships with firms that emphasize a value-added approach to investing. Such firms work closely with portfolio companies to create fundamentally more valuable entities, relying only secondarily on financial engineering to generate returns"..."Real estate, oil and gas, and timberland... provide attractive return prospects, excellent portfolio diversification, and a hedge against unanticipated inflation."

After reading these reports, we have the following observations:

- In our view Harvard is much more on target when it includes private equity with other equity asset classes. We question Yale's treatment of it as a separate asset class – the underlying return generating process is fundamentally very similar to those for domestic and foreign (developed market) equities, as can be seen in Harvard's performance last year –public market equities were down 28.3%, while private equity was down 31.6%.

- While we don't question the sincerity of Yale's intention to invest in private equity funds that "work closely with portfolio companies to create fundamentally more valuable entities, relying only secondarily on financial engineering to generate returns", we remain highly skeptical of Yale's ability to find them. We have seen and heard of too many cases where former investment bankers raised a private equity fund and thought it would be easy to buy companies and improve their operating performance. Beyond their naivete about what it takes to improve sustainable operating cash flow, we have seen too many investments that were poisoned from the start by an unbridgeable cultural gulf between the world views of former investment bankers and experienced operating managers. Former bankers reinvented as fund managers tend to assume (not illogically, considering their career experience) that human beings

are primarily motivated by financial incentives, and tight legal documentation is required to control their naturally self-serving behavior. Frankly, I cannot fully describe to you what it is like to watch a 30 something banker tell an older, more experienced CEO who has built and sold more than one multi-billion dollar company that he wants to cut his salary "to ensure he'll be sufficiently hungry and motivated." That certainly sets a long-term tone for the relationship, which inevitably filters down the corporate organization. Fund managers with experience beyond Wall Street are much more likely to recognize that high performing teams are motivated by purpose and excellence as much as financial rewards, and that overly tight formal controls too often block the learning and adaptability that is critical to success in highly uncertain and fast changing environments (see, for example, a new working paper from INSEAD, "Blue Line Management: What Value Creation Really Means" by Kaiser and Young). This is not to say that enlightened private equity partners who can help management teams build great companies that generate great investor returns don't exist – I also know from personal experience that they do. But they are very much the exception, not the rule. And even if Yale and Harvard can find them, and gain access to their funds on acceptable terms (i.e., fees that are less than the expected incremental returns above an appropriate public market equity index), then it must be the case that achieving this goal is well beyond the capability of the average individual investor, or fund-of-funds manager. So in our model portfolios, we stay away from private equity. In our view, anybody wanting to replicate the returns in this area can just as easily buy a small cap ETF on a leveraged basis, and pay far lower fees along the way.

- Absolute return funds raise similar issues with respect to the average investor's ability to identify truly skilled managers who can generate after tax returns in excess of their fees, and then gain access to their funds. On the other hand, as we frequently note, there is an undeniable mathematical attractiveness to adding uncorrelated alpha funds to a portfolio that increases with the portfolio's long term real return target. Our compromise has been to include a small

(relative to Harvard and Yale) allocation to low cost (compared to the 2% of fees and 20% of profits hedge funds typically charge investors), publicly listed uncorrelated alpha investments to our model portfolios.

- We agree with Harvard and Yale on the diversification benefits of commodities and timber, though (as we have noted) we are probably less enthusiastic than they are about real estate (commercial property). And by investing in publicly traded vehicles in these asset classes, we forego potential additional returns that can be earned for bearing illiquidity risk.

- Unlike Harvard (and perhaps Yale, which doesn't break it out), we do not use high yield debt (or, for that matter, emerging market debt) in our model portfolios. In both cases, our analysis shows that the underlying return drivers are too similar to equity to warrant treating these as separate asset classes. And given a choice, we prefer the greater upside that comes from investing in equity rather than high yield debt.

- As we have also noted in the past, we are quite skeptical about the argument that higher rates of economic growth in emerging markets (relative to developed markets) in the years ahead will translate into higher returns on their public market equities. Having spent many years working in the developing world, we recognize that a substantial portion of equity in these markets is privately owned (often by family groups), minority shareholder protections are weak, public markets are often illiquid, and the institutional environment is often prone to finding ever more creative ways to siphon off profits from successful private sector companies. Put in statistical terms, we believe that any estimate of relatively high long-term real returns from emerging market equities not only includes compensation for bearing illiquidity risk, but is also subject to a high level of possible estimation error, which warrants caution when making a policy allocation to this asset class. In addition, as we note in our Global Asset Class Valuation Analysis, rising demand for the available supply of publicly traded emerging market equities has driven their valuations to levels we believe to be excessively high, which should logically lead to lower long-term returns for

investors buying it at current price levels. On balance, we think 10% to 15% is the maximum one should allocate to emerging market equities, and that this allocation should only be implemented when valuations are at attractive levels.

- Last but not least, we note the absence from both the Harvard and Yale portfolios of a policy allocation to volatility as an asset class. As we have noted in the past, this allocation is essentially an insurance policy against tail risk – i.e., uncertainty shocks. The size of the premium equals the reduction in portfolio returns under the normal regime compared to what they would have been in the absence of the allocation to volatility. Based on the multiple regime analyses we have published over the past few months, and assuming equal asset class weights (which, clearly, won't always be the case), the cost of this insurance averaged between 12 and 23 basis points per month between 1992 and 2008. As we have noted, we are already analyzing this issue, and we may well include a policy allocation to volatility in some of our restructured model portfolios. We also know that PIMCO has been examining this same issue, and we suspect that Harvard and Yale are too.

2010 Policy Portfolios	Harvard	*Harvard Change from Last Year*	Yale	*Yale's Expected Real Return*	*Yale's Expected Standard Deviation*
Cash	*2%*	*7%*	*0%*		
Real Return Bonds	5%	-1%			
Domestic Bonds	4%	-7%			
Foreign Bonds	2%	-3%			
High Yield Bonds	2%	-3%			
-- Subtotal: Fixed Income	*13%*	*-14%*	*4%*	2%	10%
Real Estate	9%	-1%			
Commodities	14%	1%			
-- Subtotal: Real Assets	*23%*	*0%*	*29%*	6%	14%

2010 Policy Portfolios	Harvard	*Harvard Change from Last Year*	Yale	*Yale's Expected Real Return*	*Yale's Expected Standard Deviation*
Domestic Equity	11%	-4%	10%	6%	20%
Foreign Equity	11%	1%	6%	6%	20%
Emerging Equity	11%	6%	9%	8%	25%
Private Equity	13%	0%	21%	11%	28%
-- Subtotal: Equity	*46%*	*3%*	*46%*		
Absolute Return	*16%*	*4%*	*21%*	*6%*	*10% - 15%*
Total	100%	0%	100%	6%	13%

More Interesting Research

- Khandani and Lo have published an excellent paper on "Illiquidity Premia in Asset Returns: An Empirical Analysis of Hedge Funds, Mutual Funds, and U.S. Equity Portfolios." The authors "establish a link between illiquidity and positive autocorrelations in asset returns...in portfolios of securities that are generally considered less liquid, [such as] small cap stocks, corporate bonds, mortgage backed securities and emerging market investments." They "conclude that illiquidity premia are generally positive and significant, ranging from 2.74% to 9.91% per year among the various hedge funds and fixed income mutual funds." They also find that the illiquidity premia vary over time, as investors observe market returns, adjust their strategies, and interact with each other: "while 1998 was a difficult year for most funds with large illiquidity exposure, the following four years yielded significantly higher illiquidity premia that led to greater competition in credit markets, contributing to much lower illiquidity premia in the years leading up to the financial crisis of 2007-2008."

- Another excellent paper is "Leverage Causes Fat Tails and Clustered Volatility", by Thurner, Farmer, and Geanakoplos. Our basic mental model is that financial

markets operate as a complex adaptive system. One of the characteristics of such systems is their tendency to operate in different phases or regimes, and to change from one to another when one or more system parameters pass a critical level. Hence a key part of our research agenda has been an exploration of just what these key "control parameters" might be (see, for example, "Explaining What Leads Up to Stock Market Crashes: A Phase Transition Model and Scalability Dynamics" by Yalamova and McKelvey, and "Dragon Kings, Black Swans, and the Prediction of Crises" by Didier Sornette). In this paper, Thurner, Farmer and Geanakoplos present strong evidence that the amount of leverage in a system is one of those key control parameters. "When funds use leverage, price fluctuations become heavy tailed and display clustered volatility...The immediate cause of the increase in extreme risks in our model is the risk control policy of the banks [which lend to the funds]. A prudent bank makes itself locally safer by putting a limit to leverage, so when a fund exceeds its leverage limit, it must partially repay its loan by selling the asset. Unfortunately, this sometimes happens to all the fund simultaneously when the price is already falling [a situation exacerbated, as many have noted, by the use of common approaches to risk management, like Value at Risk models]. The resulting non-linear feedback amplifies downward price movements. At the extreme, this causes crashes, but the effect is seen at every timescale, producing a power law of price disturbances." Of course, this raises the question of what the other key control parameters are in this complex adaptive system. Our current view is that the most important of these is the level of uncertainty perceived/felt by investors. As this increases, many important changes take place, including rising feelings of fear (which are easily socially transmitted through verbal and non-verbal means), increased social connections (which raises the likelihood of herding), and an increase in the perceived probability of negative developments occurring. In sum, the combination of rising uncertainty, modern technology (which facilitates network formation), and high leverage can push a financial system into a new phase in

which crash probabilities sharply increase. Finally, uncertainty and leverage may also be linked. As Geanakoplos points out in another paper ("The Leverage Cycle"), "the crash always involves the same three elements. First is scary bad news that increases uncertainty. This leads to tighter margins as lenders get more nervous. This in turn leads to falling asset prices and huge losses by the most optimistic, leveraged buyers. All three elements feedback on each other; the redistribution of wealth from optimists to pessimists further erodes prices, causing more losses for optimists, and steeper price declines, which rational lenders anticipate, leading them to demand more collateral, and so on."

- Another new paper ("Global Equity Fund Performance, Portfolio Concentration, and the Fundamental Law of Active Management" by Huij and Derwall) investigates the relationship between portfolio concentration and the performance of global equity funds, in the context of Grinold and Kahn's Fundamental Law of Active Management. This posits that the performance of an active investment strategy is driven by a combination of the fund manager's forecasting skill and the "breadth" of the strategy – that is, the number of independent investment decisions to which the manager's forecasting skill is applied. Previous studies have implied that there is a tradeoff between these two drivers, with skill declining as breadth increases – many have found that more concentrated active portfolios, or those that most differ from a benchmark index, tend to earn higher returns. This study aimed to more closely examine the skill versus breadth tradeoff. The authors focus on global equity funds, because of the potential breadth of decisions to which they are potentially exposed, including country, sector, size and style exposures. As expected, they find that the extent of deviation from a benchmark index is, at first pass, correlated with the extent of outperformance compared to the index. However, after further analysis, the authors find that fund managers' outperformance is driven not only by simple deviation of portfolio weights from the overall benchmark, but by the number of decision factors to which they are exposed –

i.e., by breadth -- as measured by the manager's deviation from a variety of country, sector, size and style sub-benchmarks. The authors' conclude that their results have significant implications: "investors who strive to select the best performing funds should not only consider fund managers' preference for taking big bets. More important is that investors take into account the extent to which fund managers concentrate their portfolio holdings across multiple decision factors [i.e., potential tilts]." Time will tell whether and when fund analysis companies like Morningstar will make this type of data easily available to mutual fund investors.

- PIMCO has published a very interesting research note on "Passive Versus Active Management of TIPS." As one of the best active fixed income managers in the world, their views are always interesting. When it comes to TIPS, their key arguments in favor of active management are that (a) relatively illiquid markets and predictable index fund activity (e.g., "market on close" buy and sell orders, and index rebalancing around auctions) facilitate arbitrage by active managers and reduce the return to passive investors. We don't doubt that these costs are real. However, PIMCO's note fails to put them into any type of context. So we'll do that for them. PIMCO's actively managed Real Return Bond Fund (PRTNX) has a 3% front end load and a 1.15% annual management fee. Over the past three years, it delivered average annual nominal returns of 5.56%, with a standard deviation of 10.08%. In comparison, Vanguard's Inflation Protected Securities Fund has no front end load and annual expenses of .20%. Over the same three year period, its average annual return has been 5.20% with a standard deviation of 8.66%. On balance, while we respect the arguments made by PIMCO, when you put the additional costs they cite in context, it is hard not to conclude that the Vanguard fund is the superior offering.

- Last but not least, we call your attention to a fascinating new paper by Jacobs, Muller and Weber from the University of Mannheim. In "How Should Private Investors Diversity: An Empirical Evaluation of Alternative Asset Allocation

Policies" the authors examine different approaches to diversifying both within the global equity asset class, and across a portfolio of global equities, European fixed income, and commodities. In the former case, they conclude that "none of the Markowitz based [i.e., mean-variance optimization] portfolio models is able significantly outperform simple heuristics." Among the latter, they find that GDP weighting is superior to market capitalization weighting. As we have noted with respect to Fundamental Index weighting, we respect the conclusion, but observe that if all investors adopted this approach it would become equivalent to the market capitalization weighted strategy, which is the only one that all investors can simultaneously hold in their portfolio. To put it differently, market cap weighting is the only truly passive strategy. In the broader case, with multiple equity asset classes as sell as European fixed income and commodities, they again conclude that "almost any form of well-balanced allocation over asset classes offers similar diversification [benefits] as even very sophisticated and recently developed portfolio optimization approaches." This paper is very much in line with our thinking on this issue as it has evolved over the years, and our use of a portfolio that gives equal weights to broadly defined asset classes as the benchmark for measuring the performance of our model portfolios. Going forward, in the construction of our updated model portfolios, we are using a shrinkage approach, with final portfolio weights resulting from a combination of the equally weighted portfolio and a portfolio that is based on the results of a more complicated multi-regime asset allocation methodology (for a paper on this type of approach, see "A Generalized Approach to Portfolio Optimization: Improving Performance by Constraining Portfolio Norms: by DeMiguel, Garlappi, Nogales and Uppal).

Model Portfolios Update

Our model portfolios are constructed using a simulation optimization methodology. They assume that an investor understands the long-term compound real

rate of return he or she needs to earn on his or her portfolio to achieve his or her long-term financial goals. We use SO to develop multi-period asset allocation solutions that are "robust". They are intended to maximize the probability of achieving an investor's compound annual return target under a wide range of possible future asset class return scenarios. More information about the SO methodology is available on our website. Using this approach, we produce model portfolios for six different compound annual real return targets: 7%, 6%, 5%, 4%, 3%, and 2% We produce two sets of these portfolios: one assumes only investments in broad asset class index funds. These are our "all beta" portfolios. The second set of model portfolios includes uncorrelated alpha strategy funds as a possible investment. These assume that an investor is primarily investing in index funds, but is willing to allocate up to ten percent of his or her portfolio to equity market neutral investments.

We use two benchmarks to measure the performance of our model portfolios. The first is cash, which we define as the yield on a one year government security purchased on the last trading day of the previous year. For 2009, our USD cash benchmark is 0.37% (in nominal terms). The second benchmark we use is a portfolio equally allocated between the ten asset classes we use (it does not include uncorrelated alpha). This portfolio assumes that an investor believes it is not possible to forecast the risk or return of any asset class. While we disagree with that assumption, it is an intellectually honest benchmark for our model portfolios' results.

The year-to-date nominal returns for all these model portfolios can be found at: http://www.indexinvestor.com/Members/YTDReturns/USA.php

Appendix: Economic Scenarios and Accumulated Evidence

The following table summarizes the accumulated evidence over the past three months (on a rolling basis) <u>against</u> both of our scenarios in the following table. More specifically, we report evidence that seems significantly more likely to be observed if a scenario is false than if it is true. This is in the spirit of the scientific method, where one tries not to *prove* hypotheses, but to *disprove* them.   This approach also helps to minimize the risk that our conclusions will be skewed by the confirmation bias, of the tendency to only look for, and give relatively heavier weight to evidence which confirms one's existing views. We do not claim that this approach is foolproof, nor that it guarantees perfect objectivity and foresight. However, evidence from the use of this approach in the intelligence community suggests that it does help to improve forecast accuracy.

	Cooperative Scenario	**Conflict Scenario**
Brief Scenario Description:	More rapid domestic consumption growth in China and cleantech investment demand in North America return the world to a health rate of growth, and enable preservation of the world trading system, a reduction in global imbalances, and monetary actions to head off an extended period of high inflation.	Domestic politics prevents an increase in cleantech investment in the United States, while China continues to pursue export led growth while encouraging rising nationalism to limit domestic unrest and the political threat to the current Chinese leadership. This only reinforces growing demands for protection in Europe and the United States. Weak global demand is maintained by rising fiscal deficits, which are increasingly monetized, leading to much higher inflation.
Key Agent Level Scenario Assumptions		

	Cooperative Scenario	Conflict Scenario
U.S. Middle Class	Resolution of banking crisis, passage of health care reforms, mortgage relief, and a sharp increase in cleantech driven investment spending lead to reduced uncertainty and a shift towards higher savings and lower consumption, without triggering populist demands for protectionism.	Continued economic stagnation, uncertainty, and insecurity lead to more extreme partisanship and the development of strong populist calls for protectionism and income redistribution.
Chinese Peasants	Land reform and economic growth (which provides jobs) boost incomes while a sharp increase in government spending on health care and education limits resentment of Communist Party corruption and economic inequality compared to coastal elites. This minimizes social unrest and threats to continued legitimacy of the Party's governance of China.	Growing unemployment and a sense that government stimulus is disproportionately benefiting coastal and party elites triggers widespread unrest and peasant alignment with disaffected students, urban unemployed, and members of the military. The Chinese government becomes aggressively nationalist in an attempt to channel this anger outward. At best, this triggers a global retreat into trading blocs; at worst, this strategy fails and China descends into fragmented authoritarian regions with minimal central control.
Iranian Youth	Prolonged economic stagnation and rising inflation lead to the defeat of President Ahmadinejad in June 2009 elections, and widespread pressure for better relations with the West. Economic self-interest trumps the Revolutionary Guards'	Supreme Leader Khamenei ensures that Ahmadinejad is re-elected. Repression and emigration are used to limit resistance by younger Iranians to these policies. The country attempts to improve economic conditions via closer ties with China, while

	Cooperative Scenario	**Conflict Scenario**
	ideological opposition to this opening. Moderation of Iran's conflicts with the west and a renewal of inward investment flows lead to increased hydrocarbon production, limiting upward pressure on global energy prices.	maintaining its nuclear program (which could trigger an attack by Israel) and a conflict-oriented policy versus the US that continues to put upward pressure on energy prices.
Key Issue Level Scenario Assumptions:		
Overleveraged Consumers	Effective mortgage relief plans implemented in most affected countries, while stronger economic growth maintains income needed for debt repayment.	No effective mortgage relief legislation passed. Instead, rise in bankruptcies and mortgage foreclosures puts continuing downward pressure on housing prices.
Financial System Weakness	Combination of stronger investment and export led economic growth and effective bank rescue plans reduces uncertainty about health of system, and enables sufficient flow of credit to support renewed economic growth.	Worsening economic conditions and failure of bank rescue plans (due to design or political resistance) cause uncertainty to remain high, credit flows to be constrained, and defaults to increase, which all contribute to a worsening process of debt deflation.
International Imbalances	Rising domestic consumption spending in China enables a reduction in export dependence, while U.S. imports are reduced by a shift from private consumption to private saving and higher investment spending and greater exports. This reduces global current account imbalances to a manageable level.	China's continued emphasis on export led growth, at a time when the US is incurring high fiscal deficits (and eventually higher taxes) to maintain global demand, triggers demands for greater protection, which in turn precipitate a dollar exchange rate crisis as other countries move to limit the losses on their foreign exchange reserves. Result is a fragmentation of

	Cooperative Scenario	Conflict Scenario
		the global trade and financial system into much less integrated blocs.
***Evidence Over the Previous Three Months <u>Against</u> Each Scenario** (most recent month first)*	***Evidence <u>Against</u> the Cooperative Scenario***	***Evidence <u>Against</u> the Conflict Scenario***
August 2009 (this month's issue)	• IMF recognition that two key transitions needed to escape prolonged slow growth – shift from government to private sector spending in U.S., and to a lower Chinese current account surplus – will both be difficult to achieve. • Unemployment continues to worsen in the U.S., with continuing evidence of credit quality deterioration in multiple sectors, including residential and consumer mortgages, credit cards, municipal securities, and small and medium sized banks • 31% of workers report being worried about layoff; double the number of a year ago. Meanwhile, broadly measured U.S. unemployment is at 16.7%. • Minimal progress towards passage of healthcare reform legislation, and new financial services	• H1N1 influenza epidemic is spreading in Northern Hemisphere as forecast; however, fatality rate thus far is lower than rates implied by some earlier Southern Hemisphere experiences (e.g., in Argentina), and vaccinations will start in October.

	Cooperative Scenario	Conflict Scenario
	industry regulation	
	• Growing resentment of booming profits and bonus accruals at Wall Street firms that benefit from de facto government guarantees of their liabilities.	
	• Chinese spying allegations against Rio Tinto, and U.S. imposition of anti-dumping duties on Chinese tire export	
	• Falling profits reported in many Chinese industrial sectors, despite GDP growth fueled by aggressive bank lending. Bubble conditions in Chinese equity and possibly property markets.	
	• In Iran, Ahmadinejad consolidates his position, and, with Russian's help, apparently forces Western nations to back down on demand for nuclear talks or imposition of sanctions. Israel may decide it has no choice but to attack Iran, as it did Iraq's Osirak reactor in 1981	
July 2009	• Apparent failure of U.S. Treasury meeting with mortgage servicers to make any progress toward reducing mortgage burdens and	• Obama announces support for bipartisan commission to consider ways to solve the growing federal fiscal crisis

	Cooperative Scenario	**Conflict Scenario**
	stem foreclosures. With unemployment benefits running out for a growing number of households, this will put further downward pressure on consumer confidence, and raise the level of middle class frustration • Widespread reports of faster deterioration in the quality of commercial real estate loan portfolios and associated asset backed securities • Sharp falls in economic output in Japan, Eurozone and UK • Rising concern with high levels of loan growth in China, to either finance new investment in industries that already have excess capacity, or speculation in commodities, equity and property markets • Evidence of workers' willingness to use violence to resist restructuring of inefficient industries in China • China launches WTO complaint against foreign nations allegdly blocking access of Chinese exports to their markets	• Cooling of previously aggressive rhetoric between Chinese and U.S. leadership; successful Strategic and Economic Dialogue Conference • Continued uncertainty in Iran (if opposition succeed in replacing Ahmadinejad, it is evidence against Conflict Scenario; if Ahmadinejad consolidates his position, it is evidence against the Cooperative Scenario) • 75% of US stimulus money remains unspent, which should help economy in 2010
June 2009	• Continued evidence of	• Rapidly developing

	Cooperative Scenario	Conflict Scenario
	worsening quality of a wide range of loans and securities, including credit cards, residential and commercial mortgages, construction and development, and LBOs. • Rising FDIC seizures of banks that are not "too big to fail" • Apparent failure of PPIP program to gain traction, as some banks raised new equity and repay TARP funds • Banks have successfully fought off tougher regulation, have raised rates on credit cards, and have let slip that profits and bonus accruals are at record levels • California budget deadlock and issuance of IOUs could heighten foreign creditor fears about creditworthiness of U.S. Government. CBO report highlights need to contain health care costs in order to maintain public sector's fiscal health. • Evidence that Chinese growth may be weaker than previously thought, and that commodity price increase has been driven by speculative buying rather than	events in Iran may lead to more moderate regime. However, this remains highly uncertain at this point.

	Cooperative Scenario	Conflict Scenario
	industrial demand	
	• Both UK and Japanese economy show sharpest drops in 50 years	
	• China imposes a "buy China" policy on use of its stimulus funds; WTO warns of rising protectionism as unemployment mounts in countries around the world	
	• Record support by European Central Bank to regional banks – surpassing amount of support provided by U.S. Federal Reserve	
	• Germany introduces national balanced budge amendment, which if enacted will prevent countercyclical fiscal action by Eurozone's largest economy	
	• World Bank warns of declining flow of capital to emerging markets, which will constrain their growth, and possibly trigger more crises	
	• Rising opposition in US Congress to both energy bill (Senate passage remains uncertain) and health care reform	
	• Chinese central bank survey indicates rise in dissatisfaction with	

	Cooperative Scenario	Conflict Scenario
	household income; government increases crackdown on public corruption (hoping to distract rising social unrest?) • Rising number of indications that Swine H1N1 influenza is evolving in a potentially dangerous direction	