

# The Index Investor

*Invest Wisely...Get an Impartial Second Opinion.*

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## This Month's Issue: Key Points

Our first article this month tries to summarize why we increasingly find ourselves sleeping fitfully at night, even while global equity markets flirt with their all time highs and credit risk premiums are near historic lows. To put it succinctly, when something seems too good to be true, it usually isn't. As we note in the article, nature has endowed human beings with an instinct for impending danger that, while devalued in the modern world, we still ignore at our peril. This inner voice has been speaking to us with increasing urgency, and this month we try to explain why and what it means for investors. For the first time in ten years, we think moving into cash looks like a good idea.

This month's product and strategy notes compares year to date returns on the global market cap weighted portfolio to the equally weighted portfolio and finds that, in six of seven functional currencies, the latter has outperformed. We also look at clever ideas that are (belatedly) appearing in the financial mainstream, good articles you shouldn't miss, and new financial planning software from Windham Capital Management.

## **This Month's Letters to the Editor**

*It seems like whenever I reach a certain combination of inputs, your site returns the same portfolio no matter how high I want my returns to be. In other words, the model seems to max out and then the only variable that changes is the probability of achieving the return goes lower. My question is: are there portfolios along the efficient frontier that would allow an investor to take on significantly more risk along with achieving a higher return? What would be some options for achieving returns / risks that would be higher? Is there simply a maximum achievable return that can be accomplished with a diversified portfolio of assets? Is less diversification the only option for moving farther along on the efficient frontier or does the efficient frontier max out also?*

To start with, you are correct that there are regions of the efficient frontier that are not included in any of our model portfolios. To use an extreme example, an investor could, in theory, invest his or her entire portfolio in emerging market equities. That would certainly result in some non-zero probability of achieving a very high compound rate of return over a given time horizon. However that probability is not likely to be high, and raises issues for us about where we should draw the line with respect to the prudence of different model portfolio allocations. Given our outlook for future asset class returns two years ago, we concluded that a compound annual real return target of seven percent was the limit of what an investor could achieve with a reasonably diversified asset class portfolio (and, in some cases, an allocation of no more than ten percent of it to equity market neutral actively managed strategies). Later this year we will go through our biennial asset allocation review and revisit this matter again. Of course, there are two other ways besides giving an extreme weight to a single asset class that one could increase expected returns. One approach would be to add leverage to a portfolio, in a similar manner to the way in which residential real estate is usually purchased. However, the housing price declines now sweeping the United States have once again brought home the painful truth that leverage can be a two edged sword – that extra expected return comes only at the price of higher risk. The second alternative would be a greater allocation to active management, based on the belief that an investor could (directly or indirectly) identify a manager whose forecasting skill was superior, likely to endure, and capable of regularly producing returns in excess of the additional costs (e.g., fees and taxes) that would be incurred in comparison with investing in index products. Unfortunately, as many investors in hedge

and private equity funds have found out the hard way, this approach is a lot harder to successfully implement than most people realize.

*Nowhere in your publications have I found a discussion of the transition issues facing an investor passing from the “saving accumulation” stage of life, to the one that is preoccupied with maintaining a given level of income while not running out of money. Do you plan to address this?*

We certainly do! We recognize this is an important issue that has traditionally been neglected by most financial planners. As we noted last month, we suspect this is one of the main reason a recent McKinsey study found such a high percentage of people switching financial advisers shortly after they retire. While we have written about the importance of this issue, and of not letting oneself get “backed into” income and bequest goals by an artificial shift towards a conservative asset allocation as one approaches retirement, we have not yet completed our quantitative modeling. Our goal is to produce a comprehensive model portfolio tool that covers both the accumulation and decumulation stages of life. Unfortunately, the programming involved is “non-trivial” and we haven’t finished it yet. But please rest assured we’re on the same page as to the importance of the issue.

## Global Asset Class Returns

<b>YTD 30Apr07</b>	<b><u>In USD</u></b>	<b><u>In AUD</u></b>	<b><u>In CAD</u></b>	<b><u>In EURO</u></b>	<b><u>In JPY</u></b>	<b><u>In GBP</u></b>	<b><u>In CHF</u></b>	<b><u>In INR</u></b>
Asset Held								
<b>US Bonds</b>	2.00%	-3.43%	-3.50%	-1.38%	2.42%	-0.13%	0.99%	-5.09%
<b>US Prop</b>	3.40%	-2.03%	-2.10%	0.02%	3.82%	1.27%	2.39%	-3.69%
<b>US Equity</b>	5.40%	-0.03%	-0.10%	2.02%	5.82%	3.27%	4.39%	-1.69%
<b>AUS Bonds</b>	6.00%	0.57%	0.50%	2.62%	6.42%	3.86%	4.99%	-1.09%
<b>AUS Prop</b>	5.00%	-0.43%	-0.50%	1.61%	5.42%	2.86%	3.99%	-2.10%
<b>AUS Equity</b>	15.28%	9.84%	9.78%	11.89%	15.69%	13.14%	14.27%	8.18%
<b>CAN Bonds</b>	4.93%	-0.51%	-0.57%	1.54%	5.34%	2.79%	3.91%	-2.17%
<b>CAN Prop</b>	13.33%	7.90%	7.83%	9.94%	13.75%	11.19%	12.32%	6.23%
<b>CAN Equity</b>	11.76%	6.33%	6.26%	8.38%	12.18%	9.63%	10.75%	4.67%
<b>Euro Bonds</b>	1.48%	-3.95%	-4.02%	-1.90%	1.90%	-0.66%	0.47%	-5.61%
<b>Euro Prop.</b>	9.40%	3.97%	3.90%	6.02%	9.82%	7.27%	8.39%	2.31%
<b>Euro Equity</b>	11.27%	5.84%	5.77%	7.89%	11.69%	9.14%	10.26%	4.18%
<b>Japan Bnds</b>	-0.02%	-5.46%	-5.52%	-3.41%	0.39%	-2.16%	-1.03%	-7.12%
<b>Japan Prop</b>	20.94%	15.51%	15.44%	17.56%	21.36%	18.81%	19.93%	13.85%
<b>Japan Eqty</b>	0.49%	-4.94%	-5.01%	-2.89%	0.91%	-1.64%	-0.52%	-6.60%
<b>UK Bonds</b>	-0.22%	-5.65%	-5.72%	-3.60%	0.20%	-2.35%	-1.23%	-7.31%
<b>UK Prop.</b>	-6.77%	-12.20%	-12.27%	-10.15%	-6.35%	-8.90%	-7.78%	-13.86%
<b>UK Equity</b>	6.15%	0.72%	0.65%	2.77%	6.57%	4.02%	5.14%	-0.94%
<b>World Bnds</b>	2.30%	-3.13%	-3.20%	-1.08%	2.72%	0.17%	1.29%	-4.79%
<b>World Prop.</b>	7.45%	2.02%	1.95%	4.07%	7.87%	5.32%	6.44%	0.36%
<b>World Eqty</b>	6.65%	1.22%	1.15%	3.27%	7.07%	4.52%	5.64%	-0.44%
<b>Commod</b>	5.03%	-0.41%	-0.47%	1.64%	5.44%	2.89%	4.02%	-2.07%
<b>Timber</b>	2.51%	-2.92%	-2.99%	-0.87%	2.93%	0.38%	1.50%	-4.58%
<b>EqMktNtrl</b>	3.05%	-2.39%	-2.45%	-0.34%	3.46%	0.91%	2.03%	-4.05%
<b>Volatility</b>	23.01%	17.58%	17.51%	19.63%	23.43%	20.88%	22.00%	15.92%
<b>Currency</b>								
<b>AUD</b>	5.43%	0.00%	-0.07%	2.05%	5.85%	3.30%	4.42%	-1.66%
<b>CAD</b>	5.50%	0.07%	0.00%	2.12%	5.92%	3.36%	4.49%	-1.59%
<b>EUR</b>	3.38%	-2.05%	-2.12%	0.00%	3.80%	1.25%	2.37%	-3.71%
<b>JPY</b>	-0.42%	-5.85%	-5.92%	-3.80%	0.00%	-2.55%	-1.43%	-7.51%
<b>GBP</b>	2.13%	-3.30%	-3.36%	-1.25%	2.55%	0.00%	1.12%	-4.96%
<b>USD</b>	0.00%	-5.43%	-5.50%	-3.38%	0.42%	-2.13%	-1.01%	-7.09%
<b>CHF</b>	1.01%	-4.42%	-4.49%	-2.37%	1.43%	-1.12%	0.00%	-6.08%
<b>INR</b>	7.09%	1.66%	1.59%	3.71%	7.51%	4.96%	6.08%	0.00%

## Asset Class Valuation Update

Our market valuation analyses are based on the assumption that markets are not perfectly efficient and always in equilibrium. This means that 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. 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. As described in our May, 2005 issue, people can and do disagree about the “right” values for these variables. 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  $(\text{Current Dividend Yield} \times 100) \times (1 + \text{Forecast Productivity Growth})$  divided by  $(\text{Current Yield on Real Return Bonds} + \text{Equity Risk Premium} - \text{Forecast Productivity Growth})$ . 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 30Apr07*

<i>Australia</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	81%	118%
<b>Low Supplied Return</b>	122%	165%

<i>Canada</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	94%	156%
<b>Low Supplied Return</b>	173%	253%

<i>Eurozone</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	82%	130%
<b>Low Supplied Return</b>	138%	195%

<i>Japan</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	97%	190%
<b>Low Supplied Return</b>	235%	372%

<i>United Kingdom</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	57%	99%
<b>Low Supplied Return</b>	100%	150%

<i>United States</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	118%	183%
<b>Low Supplied Return</b>	210%	294%

<i>Switzerland</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	78%	133%
<b>Low Supplied Return</b>	142%	262%

<i>India</i>	<b>Low Demanded Return</b>	<b>High Demanded Return</b>
<b>High Supplied Return</b>	163%	247%
<b>Low Supplied Return</b>	312%	432%

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 the historical average inflation premium (the difference between nominal and real bond yields) between 1989 and 2003. 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 30Apr07***

	<b>Current Real Rate</b>	<b>Average Inflation Premium (89-03)</b>	<b>Required Nominal Return</b>	<b>Nominal Return Supplied (10 year Govt)</b>	<b>Return Gap</b>	<b>Asset Class Over or (Under) Valuation, based on 10 year zero</b>
Australia	2.76%	2.96%	5.72%	5.89%	0.17%	-1.61%
Canada	1.76%	2.40%	4.16%	4.15%	-0.01%	0.07%
Eurozone	2.09%	2.37%	4.46%	4.15%	-0.31%	3.02%
Japan	1.06%	0.77%	1.83%	1.63%	-0.20%	1.98%
UK	1.53%	3.17%	4.70%	5.04%	0.34%	-3.15%
USA	2.23%	2.93%	5.16%	4.63%	-0.53%	5.17%
Switz.	1.66%	2.03%	3.69%	2.76%	-0.93%	9.43%
India	3.38%	7.57%	10.95%	8.38%	-2.57%	26.41%

\*Derived from ten year yield and forecast inflation

It is important to note some important limitations of this analysis. First, it uses the current yield on real return government bonds (or, in the cases of Switzerland and India, the

implied real yield if those bonds existed). Over the past forty years or so, this has averaged around 3.00% in the United States. Were we to use this rate, the required rate of return would generally increase. Theoretically, the “natural” or equilibrium real rate of interest is a function of three variables: (1) the expected rate of multifactor productivity growth (as it increases, so should the demand for investment, which will tend to raise the real rate); (2) risk aversion (as investors become more risk averse they save more, which should reduce the real rate of interest, all else being equal); and (3) the time discount rate, or the rate at which investors are willing to trade off consumption today against consumption in the future. A higher discount rate reflects a greater desire to consume today rather than waiting (as consumption today becomes relatively more important, savings decline, which should cause the real rate to increase). These variables are not unrelated; a negative correlation (of about .3) has been found between risk aversion and the time discount rate. This means that as people become more risk averse, they also tend to be more concerned about the future (i.e., as risk aversion rises, the time discount rate falls).

All three of these variables can only be estimated with uncertainty. For example, a time discount rate of 2.0% and risk aversion factor of 4 are considered to be average, but studies show that there is wide variation within the population and across the studies themselves. The analysis in the following table starts with current real return bond yields and the OECD’s estimates of multifactor productivity growth between 1995 and 2002 (with France and Germany proxying for the Eurozone). We then try to back out estimates for risk aversion and the time discount rate that would bring theoretical rates into line with those that have been observed in the market. The real rate formula is [Time Discount Rate + ((1/Risk Aversion Factor) x MFP Growth)].

***Real Interest Rate Analysis at 30Apr07***

<b>Real Rate Analysis</b>	AUD	CAD	EUR	JPY	GBP	USD
Risk Aversion Factor	4.0	5.0	5.0	6.0	6.0	4.0
Time Discount Rate	2.25%	1.50%	1.75%	1.00%	1.25%	2.00%
MFP Growth	1.60%	1.20%	1.40%	0.60%	1.40%	1.40%
Theoretical Real Rate	2.65%	1.74%	2.03%	1.10%	1.48%	2.35%
Real Rate	2.76%	1.76%	2.09%	1.06%	1.53%	2.23%

Our bond market analysis also uses historical inflation as an estimate of expected future inflation. This may not produce an accurate valuation estimate, if the historical average

level of inflation is not a good predictor of average future inflation levels. For example, if expected future inflation is lower than historical inflation, required returns will be lower. All else being equal, this would reduce any estimated overvaluation or increase any estimated undervaluation. For example, if one were to assume a very different scenario, involving a prolonged recession, accompanied by deflation, then one could argue that government bond markets are actually undervalued today.

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 may primarily reflect 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 BBB and AAA rated bonds, which may tell us more about the level of compensation required by investors for bearing credit risk. For example, between August and October, 1998 (around the time of the Russian debt default and Long Term Capital Management crises), the AAA-Treasury spread jumped from 1.18% to 1.84%, while the BBB-AAA spread increased by much less, from .62% to .81%. This could be read as an indication of investor's higher concern with respect to the systematic risk implications of these crises (i.e., their potential to shift the financial markets into the low return, high volatility regime), and lesser concern with respect to their impact on the overall pricing of credit risk.

The following table shows the average level of these spreads between January, 1970 and December, 2005 (based on monthly Federal Reserve data), along with their standard deviations and 67% (average plus or minus one standard deviation) and 95% (average plus or minus two standard deviations) confidence range (i.e., based on historical data, 95% of the time you would expect the current spreads to be within two standard deviations of the long term average).

	<b>AAA – 10 Year Treasury</b>	<b>BBB-AAA</b>
Average	.97%	1.08%

	<b>AAA – 10 Year Treasury</b>	<b>BBB-AAA</b>
Standard Deviation	.47%	.42%
Avg. +/- 1 SD	1.44% - .50%	1.51% - .66%
Avg. +/- 2 SD	1.91% - .03%	1.93% - .23%

At 30 April 2007, the AAA minus 10 year Treasury spread was .77%. This is still below the long-term average compensation for bearing liquidity and jump risk (assuming our model is correct).

At the end of the month, the BBB minus AAA spread was .91%. This is also below the long-term average compensation for bearing credit risk. Given other developments underway in the world economy, we believe that it is more likely that credit risk is underestimated rather than overestimated today, and that corporate bonds are overvalued rather than undervalued.

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. At best, you can make an estimate that is justified in theory, knowing that in practice it will not turn out to be accurate. That is what we have chosen to do here. Specifically, 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. This information is summarized in the following table:

***Annual Exchange Rate Changes Implied by Bond Market Yields on 30Apr07***

	<b>To AUD</b>	<b>To CAD</b>	<b>To EUR</b>	<b>To JPY</b>	<b>To GBP</b>	<b>To USD</b>	<b>To CHF</b>	<b>To INR</b>
From								
<b>AUD</b>	0.00%	-1.74%	-1.74%	-4.26%	-0.85%	-1.26%	-3.13%	2.49%
<b>CAD</b>	1.74%	0.00%	0.00%	-2.52%	0.89%	0.48%	-1.39%	4.23%
<b>EUR</b>	1.74%	0.00%	0.00%	-2.52%	0.89%	0.48%	-1.39%	4.23%
<b>JPY</b>	4.26%	2.52%	2.52%	0.00%	3.41%	3.00%	1.13%	6.75%
<b>GBP</b>	0.85%	-0.89%	-0.89%	-3.41%	0.00%	-0.41%	-2.28%	3.34%
<b>USD</b>	1.26%	-0.48%	-0.48%	-3.00%	0.41%	0.00%	-1.87%	3.75%
<b>CHF</b>	3.13%	1.39%	1.39%	-1.13%	2.28%	1.87%	0.00%	5.62%

<b>INR</b>	-2.49%	-4.23%	-4.23%	-6.75%	-3.34%	-3.75%	-5.62%	0.00%
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Our approach to valuing commercial property securities as an asset class is hindered by a lack of historical data about rates of dividend growth. To overcome this limitation, we have assumed that markets are fairly valued today (i.e., the expected supply of returns equals the expected returns demanded by investors), and “backed out” the implied future real growth rates for dividends (which over time should correlated with the real change in rental income) to see if they are reasonable in light of other evidence about the state of the economy (see below). This analysis assumes that investors require a 2.5% risk premium above the yield on real return bonds to compensate an investor for the risk of securitized commercial property as an asset class. The following table shows the results of this analysis:

***Commercial Property Securities Analysis as of 30Apr07***

<b>Country</b>	<b>Real Bond Yield</b>	<b>Plus Commercial Property Risk Premium</b>	<b>Less Dividend Yield on Commercial Property Securities</b>	<b>Equals Expected Rate of Future Real Dividend Growth</b>
Australia	2.76%	2.50%	5.5%	-0.3%
Canada	1.76%	2.50%	3.8%	0.5%
Eurozone	2.09%	2.50%	2.1%	2.5%
Japan	1.06%	2.50%	1.1%	2.5%
Switzerland	1.66%	2.50%	2.9%	1.2%
United Kingdom	1.53%	2.50%	1.8%	2.2%
United States	2.23%	2.50%	3.7%	1.0%

If you think the real growth estimates in the last column are too high relative to your expectation for the future real growth in average rents, this implies commercial property securities are overvalued today. On the other hand, if you think the implied growth rate is too low, that implies undervaluation. Since we expect a significant slowdown in the global economy over the next few years, we are inclined to view most of these implied real growth assumptions as too optimistic (Australia excepted), and therefore to believe that the balance of

business cycle and valuation evidence suggests that commercial property securities in many markets are probably overvalued today.

To estimate the likely direction of short term commodity futures price changes, we compare the current price to the historical distribution of futures index prices. Between 1991 and 2005 period, the Dow Jones AIG Commodities Index (DJAIG) had an average value of 107.6, with a standard deviation of 21.9. The 30 April 2007 closing value of 173.22 was about 3.0 standard deviations above the average (assuming the value of the index is normally distributed around its historical average, a value greater than three standard deviations away from that average should occur less than 1% of the time). Given this, the probability of a near term decline in the spot price of the DJAIG still seems much higher than the probability of an increase. At any given point in time, the current price of a commodity futures contract should equal the expected future spot price less some premium (i.e., expected return) the buyer of the future expects to receive for bearing the risk that this forecasted future spot price will be inaccurate. However, the *actual* return realized by the buyer of the futures contract can turn out to be quite different from the expected return. When it occurs, this difference will be due to unexpected changes in the spot price of the contract that occur after the date on which the futures contract was purchased but before it is closed out. If the unexpected change in the spot price is positive, the buyer of the futures contract (i.e., the investor) will receive a higher than expected return; if the unexpected price change is negative, the buyer's return will be lower than expected. In a perfectly efficient market, these unexpected price changes should be unpredictable, and over time net out to zero. On the other hand, if the futures market is less than perfectly efficient – if, for example, investors' emotions cause prices to sometimes diverge from their rational equilibrium values – then it is possible for futures contracts to be over or undervalued.

Our approach to assessing the current valuation of timber is based on two publicly traded timber REITS: Plum Creek (PCL) and Rayonier (RYN). As in the case of equities, we compare the return these 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). As is the case with equities, two of these variables are published: the dividend yields on the timber REITS and the yield on real return bonds. The other two variables have to be estimated. A number of factors contribute to the expected future growth rate of timber REIT dividends. These are listed in the following table, along with the assumptions we make about their future values:

<b>Growth Driver</b>	<b>Assumption</b>
Biological growth of trees	While this varies according to the maturity a given timber property, we assume 6% as the long term average.
Change in prices of timber and land on which the trees are growing	We assume that over the long term they just keep pace with inflation. Hence, their contribution to the real growth rate is zero.
Diversification across countries	As in the case of commodities, that an investor in an internationally diversified portfolio of timber assets should earn a diversification return, similar to the one earned by investors in a well diversified portfolio of commodity futures contracts. In the interest of conservatism, we assume that in the case of timber this equals zero.
Carbon credits	In the future, investors in timberland may earn additional returns from the receipt and resale of carbon credits. However, since the future value of those credits is so uncertain, we have assumed no additional return from this source.

This leaves the question of the appropriate return premium to assume for the overall 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, we have used four percent as the required return premium for investing in liquid timberland assets (i.e., 6% less an estimated 2% illiquidity premium).

Given these assumptions, our assessment of the current valuation of the timber asset class is as follows:

1. Forecast supplied return = 4.25% (Div Yld) + 6.00% (Long Term Growth) = 10.25%
2. Return demanded = 1.76% (Real Bond Yield) + 4% (Risk Premium) = 5.76%
3. Return Demanded/Return Supplied = 56.2%
4. Conclusion: Timber is undervalued today.

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, 2005, the average value of the VIX Index was 19.45, with a standard deviation of 6.40. The one standard deviation (67% confidence interval) range was 13.05 to 28.85, and the two standard deviations (95% confidence) range was from 6.65 to 32.25. On 30 April 2007, the VIX closed at 14.22. This is somewhat less than one standard deviation below the VIX's long term average value. This level strikes us as low in light of rising uncertainty in the world economy and financial markets. Hence, we conclude that equity volatility is likely undervalued today.

### **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, and implementing them via index funds 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. That being said, the highest rolling three month returns in the table give 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 most investors 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. 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. Unfortunately, at the end of April, they seem as uncertain as everyone else.

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

<i>Rolling 3 Month Returns Through</i>		<b>30-Apr-07</b>		
<b><i>Economy</i></b>	Bottoming	Strengthening	Peaking	Weakening
<b><i>Interest Rates</i></b>	Falling	Bottom	Rising	Peak
<b><i>Style and Size Rotation</i></b>	Small Growth (DSG) <b>4.45%</b>	Small Value (DSV) <b>2.85%</b>	Large Value (ELV) <b>3.91%</b>	Large Growth (ELG) <b>2.82%</b>
<b><i>Sector Rotation</i></b>	Cyclicals (IYC) <b>-0.41%</b>	Basic Materials (IYM) <b>7.21%</b>	Energy (IYE) <b>9.75%</b>	Utilities (IDU) <b>13.39%</b>
	Technology (IYW) <b>2.35%</b>	Industrials (IYJ) <b>5.47%</b>	Staples (IYK) <b>3.64%</b>	Financials (IYF) <b>-0.35%</b>
<b><i>Bond Market Rotation</i></b>	Higher Risk (LQD) <b>2.20%</b>	Short Maturity (SHY) <b>1.48%</b>	Low Risk (TIP) <b>2.61%</b>	Long Maturity (TLT) <b>2.54%</b>

The next tables describe the typical cycles in the markets for commercial property and commodities. We believe they should be read in conjunction with current situation in the bond market. However, rather than being leading indicators of future economic conditions, commercial property and commodity market returns tend to coincide with current economic and interest rate conditions (i.e., those at the top of the same column, rather than the next one to the right). When many investors share the same expectations about future economic conditions, one would expect to see alignment between bond and equity market year-to-date returns, and conditions in commodity and commercial property markets. However, we also note that this is when markets are most fragile; large moves can occur if something happens to change these closely aligned expectations. In contrast, when investors do not share the same

expectations for the future, you would expect to see misalignment between year-to-date returns in bond, equity, commodity and commercial property markets.

<b>Economy</b>	Bottoming	Strengthening	Peaking	Weakening
<b>Interest Rates</b>	Falling	Bottom	Rising	Peak
<b>Commodities</b>				
<b>Commodity Inventories</b>	Peaking	Falling	Bottoming	Rising
<b>Spot Prices</b>	Bottoming	Rising	Peaking	Falling
<b>Futures Prices Relative to Spot Price</b>	Contango (futures higher than spot)	Uncertain	Backwardation (futures lower than spot)	Uncertain
<b>Profitability of long commodity futures position, before diversification and collateral yields</b>	Negative (falling spot and negative roll yield)	Uncertain (rising spot, uncertain roll yield)	Positive (rising spot and positive roll yield)	Uncertain (falling spot, uncertain roll yield)
<b>Comm'l Property</b>				
<b>Commercial Property Vacancy Rates</b>	Peaking	Falling	Bottoming	Rising
<b>Rents</b>	Low	Rising	High	Falling
<b>New Construction Completion (space coming onto the market)</b>	Falling	Bottoming	Rising	Peaking
<b>Property Valuation Ratios</b>	Bottoming	Rising	Peaking	Falling
<b>Expected Future Property Returns</b>	Peaking	Falling	Bottoming	Rising

The following table sums up our subjective view of possible asset class under and overvaluations at the end of April 2007. The distinction between possible, likely and probable reflects a rising degree of confidence in our conclusion.

<b>Probably Overvalued</b>	Commodities, Corporate Bonds
<b>Likely Overvalued</b>	Commercial Property, Most Equity Markets (except, perhaps, for the UK)
<b>Possibly Overvalued</b>	
<b>Possibly Undervalued</b>	Australian and Canadian Bond Markets
<b>Likely Undervalued</b>	Equity Volatility
<b>Probably Undervalued</b>	Non-U.S. Dollar Bonds (based on expected XR changes); Timber

## Why We Don't Sleep Well These Days

Long-time readers of The Index Investor and Retired Investor know that we have a soft spot for quantitative analysis, as we believe it helps prevent our decisions from being overly influenced by emotion and the cognitive limitations that are hard wired into all human beings. That being said, we also believe that eons ago we were also endowed with an “inner voice” or instinct (perhaps “Spider Sense” is a more appropriate modern term) that warned us we were in danger, however unaware we might be of its specific source. Our modern preoccupation with quantitative analysis (not to mention political correctness) too often causes us to ignore these instinctive warnings, sometimes with disastrous consequences.

With that in mind, this article we will try to summarize why our inner voice is growing louder with its warning that big (and negative) changes are not too far away in the world economy, even as global growth continues to be strong, equity indexes around the world hit new highs, and credit risk margins are at near record lows.

Our starting point is our frequently made observation that global financial markets function as a complex adaptive system, in which a wide range of investors, pursuing different goals and wealth, interact through a range of strategies which they constantly adapt based on the results they produce. Such systems are not easy to understand, or to successfully forecast over long periods of time. As we have noted, such systems are said to be “non-stationary” in the sense that underlying return generating processes tend to change, which invalidates the

assumptions used in heretofore successful forecasting models. However, this is not necessarily the case over shorter periods of time, particularly when positive feedback loops develop that accelerate the system's rate of change in a given direction, which in turn provides the highest rewards to the most overconfident investors, and in so doing encourages more and more people to join the herd (for more on this, see the excellent series of papers written over the years by Didier Sornette from UCLA). This is the underlying flywheel that gives rise to what John Maynard Keynes legendarily described as "the market's animal spirits."

Herding violates a key assumption of the efficient markets hypothesis – that every investor is making his or her decision independently, causing the market price for an asset to be efficient (in the sense that it incorporates all available information). When herding occurs, people often disregard information they have that is inconsistent with the majority's view. Sornette refers to this growing alignment of investor behavior as the "maturation of systemic instability that warns of an impending crash." For example, we find it entirely plausible to believe that herding has increased with the amount of money controlled by hedge funds, whose managers have very strong incentives (the famous 2% of the assets under management and 20% of this year's profits) to stay fully invested (usually on a leveraged basis) for as long as their peers do the same. Moreover, the use of sophisticated trading software that breaks up large orders into small ones to minimize transaction costs may have had the unintended side-effect of also reducing volatility, and in so doing encouraging further herding to occur.

Yet there is still an element of chance as to what it will be the event or events that reverses the herd and sets the crash in motion. That these events frequently aren't clear, even in retrospect – just read the studies about the events of 1929, 1987 or 2001 -- makes it clear that forecasting them is basically impossible (closer to home, ask your friends what caused housing prices in the United States to reverse course this year, or read "Seemingly Irrelevant Events Affect Economic Perceptions and Expectations" by Dohmen, Falk, Huffman and Sunde).

However, we are not without indicators that something dangerous is building up in the system. Multiple researchers (Sornette among them) have identified the existence of a power law distribution of the size of changes experienced by complex adaptive systems. Many of these are based on experiments with artificial stock markets populated with heterogenous

investors (for example, see “Artificial Agents and Speculative Bubbles” by Sernet, Gelly, Schoenauer, and Sebag; or the many good papers on this subject by Blake Lebaron, Cars Hommes, Doyne Farmer and many others). One of the most interesting of these is “Varieties of Competitive Parity” by Thomas Powell. He finds power law distributions across a wide range of situations in which human beings compete with each other, either as individuals or groups. All of these sources provide evidence that large changes are far less frequent than small ones, and tend to be preceded by events that could have provided some forewarning of the danger that lay ahead. Granted, hindsight is clearer than foresight; however, that being said, the global economic and financial system has been giving off warning signs over the past few years.

For example, earlier this year we had a sudden burst of volatility that disappeared almost as quickly as it arrived. There is ample evidence that the world economy is as dependent as ever on the heavily leveraged U.S. consumer (whose house is now likely falling in value), that the U.S. middle class is becoming more frustrated with their condition and politically volatile as a result, that social unrest and economic imbalances continue to grow in China, and that foreign central banks – not private investors – are today funding most of the U.S. current account deficit (which makes the health of the global financial decision as much an exercise in geopolitics as rational – and irrational -- economics). Most recently, we have seen many U.S. housing indicators plunge, without apparent impact on consumer spending or financial market risk premiums and returns (see Sornette’s prescient paper “Is There a Real-Estate Bubble in the United States?” in which he forecasted a turning point in mid-2006).

Similarly, Laurance Kotlikoff of Boston University has published a fascinating series of papers (“Is the U.S. Bankrupt?”, “Americans’ Dependence on Social Security”, and “Averting America’s Bankruptcy with a New New Deal”) that describe in compelling detail the impending fiscal crisis in the United States. Wynne Godley and his colleagues at the Levy Economics Institute have published similarly incisive material on the same issue. And this week, Tobias Adrian of the Federal Reserve Bank of New York published a paper (“Measuring Risk in the Hedge Fund Sector”) that noted the similarities of today’s conditions to those that preceded the meltdown of Long Term Capital Management in 1998.

As you recall, LTCM had no shortage of smart people on its staff; Myron Scholes and Robert Merton were both directors, and its founder, John Meriwether had been head of bond

trading at Salmon Brothers. Yet their firm blew up when unanticipated changes in the world economy (the rush into quality bonds and the disappearance of liquidity) following Russia's debt default invalidated their risk management model's assumptions.

There is no doubt – absolutely none – that something similar could easily happen again. There is also no doubt that liquidity is at record levels, and that this is typically associated with the quickening development and subsequent rapid deflation of financial market bubbles (see, for example, “Credit Derivatives and Bank Credit Supply” by Beverly Hirtle for evidence that the existence of these new instruments had made lending standards more lax, and “Financial Market Risk and U.S. Money Demand” by Choi and Crook of the IMF). There is also considerable evidence (see this month's Market Valuation Update section) that many asset classes have simultaneously become overvalued, which is clearly a rare event in historical terms. Moreover, as Stephen Cecchetti described in his excellent paper (“Measuring the Macroeconomic Risks Posed by Asset Price Booms”), the collapse of housing bubbles is likely to have a far more severe impact than the collapse of an equity bubble.

Yet researchers have repeatedly found that analysts tend to underestimate the risk they face (for a recent example, see “The ECB Survey of Professional Forecasters: A Review After Eight Years' Experience”), and that financial models – including the Value At Risk Models that underpin many institutional investors' risk management plans – also inadequately capture it. For example, in “Estimation Error in the Assessment of Financial Risk Exposure”, Stephen Figlewski of NYU shows how the non-stationarity of the returns generating process and mis-estimation of volatility can lead to substantial underestimation of the probability and severity of so called “tail events” that in point of fact may well be much more likely than most risk models assume. In recent years, this has led to much greater focus on “extreme value theory”, which looks at the extent to which tail events in different asset classes tend to happen at the same time (see, for example, “Extreme Value Theory in Finance” by Brodin and Kluppelberg), and to new techniques to measure this risk (see, for example, articles on the use of copula theory as a replacement for traditional correlation measures, the use of regime switching models, and replacement of the normal return assumption often used in risk models with more realistic Student-t and other statistical distributions). Yet we cannot forget that

Long Term Capital also operated with the most sophisticated risk models of its day, and still blew up.

Finally, we cannot escape the implications of the stunning contrast between equity markets touching their all time highs even as real interest rates languish near their all time lows. Both Robert Barro (“Rare Disasters and Asset Markets in the Twentieth Century”) and Xavier Gabaix (“A Unified Theory of Ten Financial Puzzles”) point to this combination as an indication of investors’ rising concern with the occurrence of a serious crisis. We cannot escape the conclusion that greed and fear are finely balanced today, and it won’t take much to tip the balance in the latter direction. Moreover, given the scale of hedge funds’ trading in financial markets today, the amount of leverage they have deployed, the “2 and 20” incentives governing their managers’ behavior, and the strong linkages between asset classes created by developments in the derivatives markets, we think any downturn could quickly accelerate and spread across many asset classes.

As we said at the beginning of this article, it is hard to point to unassailable quantitative evidence that a momentous change is headed our way. Yet that is what our inner voice is saying today, even as investors as experienced and successful as Warren Buffet tell us that everything is fine. We don’t think it is, and in this article have tried to describe the multiple strands of thought that are coming together in our mind to produce the warning we hear. As we have often written, for investors pursuing long-term goals, avoiding big downside losses is more important than reaching for the last few basis points of higher returns. That prejudice (and backgrounds in fixed income and credit) naturally predispose us to be cautious in the face of euphoria. But what we sense today goes beyond that. In the ten years our publications have been in existence, we have never suggested taking what for us is a radical step: reducing one’s exposure to different asset classes, and raising holdings of cash. We have long believed that, over the long-term, a well-diversified portfolio should be able to weather most storms. However, at this point, we’re not so sure that’s true about the one we see on the horizon. For that reason, and in spite of the possibly unpleasant tax consequences, we think that reducing exposure to the most overvalued asset classes (again, see our Asset Class Valuation Update Section for more on this) and either raising allocations to undervalued asset classes or moving into cash (or short term government bonds) looks more and more like

the most prudent course of action. We wish that wasn't so. But we can't ignore the increasingly insistent warning voice that keeps us awake at night.

*We have many readers who also think deeply about these issues. We look forward to receiving your comments on this article. If we get enough of them, we will print them next month (without any attribution as to their source).*

## Product and Strategy Notes

### Global Market Cap versus Equally Weighted Portfolios

Following up on last month's note on the most recent asset class weights in the global market capitalization weighted portfolio, this month we compare the year to date nominal returns of these portfolios to those on the equally weighted portfolio. They are interesting, to say the least:

Functional Currency	Global Market Cap Portfolio YTD Return	Equally Weighted Portfolio YTD Return
Australian Dollars	(0.8%)	1.0%
Canadian Dollars	(0.9%)	1.3%
Euro	1.0%	2.0%
Japanese Yen	4.5%	5.4%
Swiss Franc	3.3%	3.8%
UK Pounds	2.2%	1.1%
U.S. Dollars	4.6%	4.9%

Starting next month, we will add the year-to-date results (and asset class weights) for the global market cap weighted portfolio to our regularly reported results.

### Gee, What a Clever Idea!

Recent weeks have seen the launch of a number of new products (e.g., by ALPS Fund Services and XTF Advisors that offer pre-packaged portfolios composed of different ETF index funds. We have also seen a number of articles noting that investors could create their own "hedge funds" (that aim to deliver consistent returns across a wide range of market conditions) by diversifying their portfolios across a range of asset class ETFs. We're still

struggling with the shock of seeing many of the ideas we've written about over the last ten years "going mainstream." Overall, however, we think that if this trend spreads, it can't help but be good news for many investors. Anybody doubting this should read a new article by Ross Miller, one of our favorite writers (and no relation to our publisher). As you recall, in his article "Measuring the True Cost of Active Management", Miller showed how expensive the "active" portion of traditional long-only mutual funds really is. He has now followed up with another article on the same subject ("Stansky's Monster: A Critical Examination of Fidelity Magellan's Frankenfund") that makes even more painfully clear how expensive actively managed mutual funds can really be to investors. Miller's work provides very strong evidence that, instead of investing in traditional "long only" actively managed mutual funds, most investors would be much better off diversifying their portfolios across different types of beta risk (i.e., broadly defined asset class index funds) and separately deciding how much to allocate to pure active management products (in the form of market neutral funds), where the expenses and returns of active management are made clear. To cite one example of how this might be done, in our model portfolios, our reported results for market neutral products represent an equally weighted allocation to four equity oriented products (James Market Neutral, JAMNX; Hussman Strategic Growth, HSGFX; Analytic Investors Global Long-Short, ANGLX; J.P. Morgan Market Neutral, OGNAX; and DBV, the Deutsche Bank G10 Currency Harvest ETF that pursues a market neutral foreign exchange based strategy). Finally, in the clever idea department, we also note Societe Generale's launch of a World Timber Index (TIMBEX) product in Europe. Our only concern about it is a lack of underlying investments in South American timberland. However, it does a good job of covering other regions. We hope that similar products are soon launched in other markets.

### Other Articles Not You Shouldn't Miss

The first two of these have received some coverage in the press, and deservedly so. They are both worth reading. Roger Ibboston and colleagues have written about "National Savings Rate Guidelines for Individuals" in the Journal of Financial Planning. While we may reasonably quibble that they have used only two asset classes in their analysis (and made their own assumptions about future risks and returns) we believe that just getting this discussion going

on a national (if not international) scale is a positive step. We're not so sure this is the case for "The Age of Reason: Financial Decisions of the Lifecycle" by Sumit Agarwal et al. Their finding that "the sophistication of financial choices peaks at about age 53" seems to raise as many questions as it answers. Then again, if "53 is the new 25", we don't think many of our readers are going to complain!

We found two other articles interesting with respect to the neural and biochemical bases for the investing decisions we make. In "Sensation Seeking, Overconfidence and Trading Activity", Grinblatt and Keolharju find that investors whom psychological tests show are prone to sensation seeking (which, obviously, covers a lot of things besides investing) are also prone to overtrading, with negative results for their returns. In "The Neural Basis of Financial Risk Taking", Kuhnen and Knutson show how mistakes due to excessive risk-seeking and risk-aversion have entirely different neurological roots. This is interesting, as it dovetails with other findings (e.g., "Firm Performance and the Axis of Errors" by Thomas Powell) that find superior performance depends as much as avoiding losses (or just getting the basics right) as it does brilliant strategic insights. In short, losing and winning are not, in reality, simply two sides of the same coin. Rather, they increasingly appear to be separate and equally important phenomena to understand in their own right.

### New Planning Software From Windham

We have long been fans of the writing of Mark Kritzman, president of Windham Capital Management. He and his team have done some pioneering research, for example about the theoretical merits of asset allocation versus security selection decisions, and about the wisdom of taking higher moments (skewness and kurtosis) into account in asset allocation decisions (which Windham calls "full scale optimization"). In the last few years, Windham has moved to incorporate many of these insights into software products. The first initiative was Windham Portfolio Advisor, which was aimed at the institutional market. Windham recently launched (in beta) Windham Financial Planner, which is intended to make its tools available to individuals and their advisors. We recently took this software for a test run. Like all beta products, it still has some room for improvements, which will probably be made before its official launch (for example, we'd like to see a more user friendly approach to risk budgeting,

more use of simple shrinkage estimators, and the ability to easily add fixed rate benchmarks, like the minimum rate of return required to meet an investor's long-term goals). However, on balance we found it a very impressive product. Among the many features we liked were the multiple approaches to return estimation it offered (including rates implied by the market portfolio and the Black Litterman approach), the ability to separate risk into different regimes (e.g., turbulent and normal), the calculation of "within horizon" rather than just "end of period" risk, the ability to pursue multiple goals (e.g., minimizing year to year volatility and at least a given probability of matching a benchmark return), and the use of "full scale optimization." We also liked the instructional videos that accompany the software, that feature some clever animation, background music, and a narrator with a wonderfully "plummy" English accent. We expect that sophisticated financial advisers will find the Windham Financial Planner a welcome addition to their tool chest.

## 2006-2007 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 equity market neutral (uncorrelated alpha) 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 2007, our Pounds Sterling cash benchmark is 5.30% (in nominal terms). The second benchmark we use is a portfolio equally allocated between

the ten asset classes we use (it does not include equity market neutral). 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 here:

<http://www.indexinvestor.com/Members/YTDReturns/UK.php>