The Index Investor

Invest Wisely…Get an Impartial Second Opinion.

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This Month's Issue: Key Points

This month's feature article looks at the causes and consequences failure of many active quantitative strategies last summer, and the challenging issues this raises for our understanding of financial markets. We conclude that, due to the challenges posed by accurately modeling and forecasting complex social dynamics, long periods of success interrupted occasional spectacular failures will continue to characterize the performance of most quantitative active management strategies. Our letters to the editor include two timely questions, one on the impact of commodity index funds on oil prices (we conclude it is relatively low compared to other factors) and another on the current economic situation (we continue to believe the balance of forces favors higher inflation).

This month's product and strategy notes also cover a range of interesting topics, including the new Goldman Sachs Absolute Return Tracker Fund (another vehicle that can be used to implement an allocation to uncorrelated alpha strategies), the efficacy of sector rotation strategies (low), understanding the supply and demand of returns from residential property investment and their implications for local market valuations (rising risk premiums and declining expected growth rates imply further price falls), and the new iPath Global Carbon Index ETN from Barclays (another arrow in the uncorrelated alpha strategies quiver).

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This Month's Letters to the Editor

What do you think of iShares' new timber ETF?

In our view, the iShares S&P Global Timber and Forestry Index ETF (ticker: WOOD, annual expenses, 0.48%) is very similar to CUT, the timber EFT launched by Claymore a few months ago. In order to obtain adequate liquidity, these products not only include timber REITs like Plum Creek (PCL) and Rayonier (RYN), but also the shares of companies that are involved in the timber and forest products industry. This dilutes an investor's exposure to timber by including exposure to companies' industrial processes, the equity market and the overall economy. In our model portfolios, we will continue to use PCL and RYN, because they provide more focused exposure to the underlying return generating process for timber as an asset class.

Do you think commodity index funds are responsible for the sharp increase in oil prices this year?

We believe the impact of commodity index funds on oil prices has been small relative to changes on the physical side of the market – though we also believe that index funds are a convenient scapegoat for too many politicians in an election year when the global middle class is suffering real economic pain and uncertainty. Let's start with what has been happening in the physical oil market. The Energy Information Administration of the U.S. Department of Energy publishes a detailed estimate of the world oil balance. In 2005, world supply was estimated to be 84.6 million barrels per day (mbpd), while demand was estimated to be 83.6 mbpd. By 2007, supply had remained constant at 84.6 mbpd, but its composition had changed, with OECD production falling by .47 mbpd and OPEC production falling by .68 mbpd (e.g., due to falling production in Venezuela and Nigeria), which was offset by rising production in the former USSR and other non-OPEC countries. Over this period, demand for oil actually fell by .71 mbpd in the OECD. However, it rose by 2.44 mbpd outside the OECD, with China alone

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accounting for a .86 mbpd increase in demand. As a result, aggregate demand for oil grew to 85.4 mbpd, which led to a fall in inventories.

This alone would naturally lead to a significant rise in prices, and an increase in their volatility due to tightening inventories and rising concerns about supply interruptions. However, there is even more to the story. In contrast to the examples taught in economics classes, in the real world, supply and demand curves are not linear. Consider the oil industry. Up to a certain level of supply, the marginal cost of producing an incremental barrel of oil is quite low; in fact, one of the original inspirations for the formation of OPEC was to manage available supply so as to boost prices and members' revenues. However, as one moves further out on the supply curve, you encounter very non-linear jumps in the marginal cost of producing another barrel of oil, because you have to employ increasingly sophisticated and expensive production techniques (e.g., deepwater drilling or oilsands upgrading). As the demand curve shifted to the right, it inevitably encountered these steeper regions of the supply curve and the result was a sharp increase in prices. This price change has also been given a further boost by a growing mismatch between the configuration the world's refinery capacity (much of which is still oriented towards the use of light weight, lower sulphur crude oil grades like Brent, West Texas Intermediate, or Bonny Light from Nigeria), changes in regulation (which increasingly require the production of petroleum based fuels with much lower sulphur content than before) and the rising percentage of heavy weight, high sulphur crude being produced from many of the world's new fields. This further boosted the relative price of the light, low sulphur crudes that are the basis for the most commonly traded futures contracts – at $40/bbl or so, the discount at which heavy, sour crude trades versus the light sweet grades that are the basis for the most popular futures contracts has never been higher than today. And since it takes a long time and a lot of investment to enable refineries to use more heavy sour crude, this underlying pricing pressure on light sweet crude isn't going to go away any time soon.

It is in this "physical context" that we have to examine the marginal impact of commodity index funds on crude oil prices. In theory, the actions of arbitrageurs should limit the impact of buying pressure by commodity index funds on oil prices. Here is a simple example. Let's say investors increase their allocation to commodity funds, either because they are speculating on rising prices and/or because they believe commodities will preserve the real value of their assets in the face of rising inflation and a falling value of the U.S. dollar. These

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commodity funds' increased buying causes the price of the one year futures contract to initially rise by $30/bbl relative to the spot and near term futures contract price. Let's say the cost to store oil for one year is $20/bbl. An arbitrageur could then buy a near term futures contract and take delivery (or buy spot oil), sell a one year futures contract to the index fund, and make a profit of $10/bbl. This arbitrage process would cause one year futures prices to fall (and spot/near term futures prices to rise) until the opportunity to make arbitrage profits was eliminated. However, if there are constraints on the ability of arbitrageurs to act (e.g., a limit on their access to financing or physical storage, or a risk limit on their ability to absorb the risk of a change in the basis between the price of the light sweet crude used by the futures and the heavier crude they must buy on the physical side of the arbitrage), then buying by commodity index funds could drive futures prices higher (relative to spot prices) than would normally be the case. We believe that, to some extent, these constraints have been binding on arbitrageurs, and that buying by commodity investment funds has, to some extent, boosted oil prices to a higher level than would be the case if arbitrage mechanisms operated without any frictions. However, we also believe that the price impact of these "arbitrage frictions" is much lower than the price impact of the changes that have happened on the physical side of the market. We expect that this will soon become quite clear as falling demand for oil (due to its rising price and a slowing world economy) causes its price to start falling, despite the increasing flows of money into futures based commodity investment funds.

In his June letter, PIMCO's Bill Gross warns that higher inflation may be with us for quite a while. Do you agree? And if so, what are the asset allocation implications of this change?

We agree with him. In fact, his analysis is quite consistent with the position we've taken in our Economic Updates over the past few years. We have long said that the end game for reversing the large and unsustainable imbalances that have built up in the world economy would involve a difficult trade-off between deflation and inflation, and that both economic and political reality probably would favor the latter as the "least bad" solution. Recent events, and the current situation, can be succinctly summarized. The bursting of the U.S. housing bubble triggered major problems in the world credit markets. To limit them, the U.S. Federal Reserve increased

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money supply growth and cut interest rates. All else being equal, that should have triggered a decline in the value of the U.S. dollar. In some cases (e.g., versus the Euro) this happened. However, this was not the case for countries – the most important of which is China – that have pegged their currency to the value of the U.S. dollar. In the case of China, a sharp rise in the exchange rate would threaten the viability of the export industry which remains critical to the country's economic growth (and perhaps its political stability, as it is unclear whether the Chinese political system could endure a sharp rise in middle class unemployment). To prevent its exchange rate from rising versus the U.S. dollar, China must sell a large amount of domestic currency to exporters and buy U.S. dollars. The challenge for Chinese policymakers has been to limit the impact of these purchases on the growth of the domestic money supply, and therefore on domestic inflation. They have used two primary policy mechanisms. First, it has sold government bonds. This has forced down domestic interest rates and stimulated domestic investment spending to a very high level. Second, it has raised banks' reserve requirements (i.e., the percentage of their funds that must be kept on deposit with the central bank, and which therefore cannot be loaned out). However, the higher reserve requirements rise, the more likely that a cutback in lending will trigger additional problems in the Chinese economy (e.g., witness how credit constraints have recently affected the U.S. property market). Despite these monetary policies, domestic inflation in China has been rising sharply, due to higher costs for imported oil, and domestic supply constraints (e.g., a growing shortage of skilled workers) in the face of still rapidly growing real demand. In turn, this rising domestic inflation is now flowing through into rising domestic currency prices for China's exports – and into rising prices experienced by U.S. consumers who import goods made in China. In addition, continued strong economic growth in China has kept pressure on oil markets, and contributed to the rise in oil prices, which have also had a strong impact on global inflation levels.

In essence, as long as developing countries like China continue to peg their currencies to the U.S. dollar, the U.S. Federal Reserve is making their monetary policy. And it is caught between the proverbial "rock and a hard place." The right answer for the U.S. economy – which is facing the threat of recession and debt deflation – is to cut interest rates still further. But the right answer (economically, if not, perhaps, politically) for the overheating Chinese economy is a rise in interest rates to reduce inflationary pressures. We continue to believe that both of the key players in this game – the U.S. Federal Reserve and the political leadership of

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China – tacitly agree that cutting interest rates and accepting higher inflation is preferable to debt deflation in the U.S., and the consequences of a sharp rise in China's exchange rate.

That said, there is still a lot of uncertainty about whether these latter developments can be avoided. For example, it is not clear that cutting interest rates in the U.S. can maintain demand in the face of continuing declines in housing values and a fundamental negative change in consumer psychology. Similarly, we believe that underlying tensions – both economic and political – continue to sharply rise in China, and may well come to a head after this summer's Olympics. Given this, we continue to believe that the most prudent asset allocation stance is to maintain higher cash reserves (in light of the rising probability of extended economic weakness), to diversify invested funds across a range of asset classes that will perform well under three different conditions: high inflation (e.g., real return bonds, commodities, timber, property); deflation (nominal return government bonds and U.S. TIPS), and normal circumstances (equities), and to rebalance in light of both long-term target portfolio weights and tactical views on substantial over and undervaluations of different asset classes.

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Global Asset Class Returns

YTD 30May08	In USD	In AUD	In CAD	In EURO	In JPY	In GBP	In CHF	In INR
Asset Held								
US Bonds	1.05%	-7.55%	1.73%	-5.24%	-4.78%	1.77%	-7.32%	8.21%
US Prop	8.28%	-0.32%	8.96%	1.99%	2.45%	9.00%	-0.09%	15.44%
US Equity	-2.96%	-11.56%	-2.28%	-9.25%	-8.79%	-2.24%	-11.33%	4.20%
AUS Bonds	6.65%	-1.95%	7.33%	0.35%	0.81%	7.37%	-1.72%	13.81%
AUS Prop	-13.56%	-22.15%	-12.87%	-19.85%	-19.39%	-12.83%	-21.92%	-6.39%
AUS Equity	1.56%	-7.04%	2.24%	-4.73%	-4.27%	2.28%	-6.81%	8.72%
CAN Bonds	1.85%	-6.74%	2.54%	-4.44%	-3.98%	2.58%	-6.51%	9.02%
CAN Prop	-1.99%	-10.58%	-1.30%	-8.28%	-7.82%	-1.26%	-10.35%	5.18%
CAN Equity	5.71%	-2.89%	6.39%	-0.59%	-0.13%	6.43%	-2.66%	12.87%
Euro Bonds	5.05%	-3.54%	5.74%	-1.24%	-0.78%	5.78%	-3.31%	12.22%
Euro Prop.	5.57%	-3.03%	6.25%	-0.72%	-0.26%	6.29%	-2.80%	12.73%
Euro Equity	-4.06%	-12.66%	-3.38%	-10.35%	-9.89%	-3.33%	-12.42%	3.11%
Japan Bnds	3.59%	-5.01%	4.27%	-2.70%	-2.24%	4.32%	-4.77%	10.76%
Japan Prop	-0.47%	-9.07%	0.21%	-6.76%	-6.30%	0.25%	-8.84%	6.69%
Japan Eqty	1.88%	-6.72%	2.56%	-4.41%	-3.95%	2.60%	-6.49%	9.04%
UK Bonds	-4.56%	-13.16%	-3.88%	-10.85%	-10.39%	-3.84%	-12.93%	2.60%
UK Prop.	-13.61%	-22.21%	-12.93%	-19.90%	-19.44%	-12.89%	-21.98%	-6.45%
UK Equity	-5.36%	-13.96%	-4.68%	-11.65%	-11.19%	-4.63%	-13.72%	1.80%
World Bnds	2.75%	-5.85%	3.43%	-3.55%	-3.09%	3.47%	-5.62%	9.91%
World Prop.	-2.88%	-11.48%	-2.20%	-9.17%	-8.71%	-2.16%	-11.25%	4.28%
World Eqty	-2.54%	-11.13%	-1.85%	-8.83%	-8.37%	-1.81%	-10.90%	4.63%
Commod	16.49%	7.89%	17.17%	10.19%	10.65%	17.21%	8.12%	23.65%
Timber	2.66%	-5.94%	3.34%	-3.63%	-3.17%	3.39%	-5.71%	9.82%
EqMktNtrl	-1.42%	-10.02%	-0.74%	-7.71%	-7.25%	-0.69%	-9.78%	5.74%
Volatility	-20.76%	-29.35%	-20.07%	-27.05%	-26.59%	-20.03%	-29.12%	-13.59%
Currency								
AUD	8.60%	0.00%	9.28%	2.31%	2.77%	9.32%	0.23%	15.76%
CAD	-0.68%	-9.28%	0.00%	-6.97%	-6.51%	0.04%	-9.05%	6.48%
EUR	6.29%	-2.31%	6.97%	0.00%	0.46%	7.02%	-2.07%	13.45%
JPY	5.83%	-2.77%	6.51%	-0.46%	0.00%	6.56%	-2.54%	12.99%
GBP	-0.72%	-9.32%	-0.04%	-7.02%	-6.56%	0.00%	-9.09%	6.44%
USD	0.00%	-8.60%	0.68%	-6.29%	-5.83%	0.72%	-8.37%	7.16%
CHF	8.37%	-0.23%	9.05%	2.07%	2.54%	9.09%	0.00%	15.53%
INR	-7.16%	-15.76%	-6.48%	-13.45%	-12.99%	-6.44%	-15.53%	0.00%

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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 (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 30 May 2008

Australia	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	64%	95%
Low Supplied Return	96%	131%

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Canada	Low Demanded Return	High Demanded Return
High Supplied Return	89%	153%
Low Supplied Return	170%	253%

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Eurozone	Low Demanded Return	High Demanded Return
High Supplied Return	65%	101%
Low Supplied Return	103%	144%

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Japan	Low Demanded Return	High Demanded Return
High Supplied Return	84%	154%
Low Supplied Return	173%	266%

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United Kingdom	Low Demanded Return	High Demanded Return
High Supplied Return	35%	70%
Low Supplied Return	67%	106%

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United States	Low Demanded Return	High Demanded Return
High Supplied Return	90%	151%
Low Supplied Return	166%	245%

Switzerland	Low Demanded Return	High Demanded Return
High Supplied Return	56%	96%
Low Supplied Return	97%	241%

India	Low Demanded Return	High Demanded Return
High Supplied Return	150%	254%
Low Supplied Return	344%	508%

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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 30May08

	Current Real Rate	Average Inflation Premium (89-03)	Required Nominal Return	Nominal Return Supplied (10 year Govt)	Return Gap	Asset Class Over or (Under) Valuation, based on 10 year zero
Australia	2.56%	2.96%	5.52%	6.54%	1.02%	-9.15%
Canada	1.59%	2.40%	3.99%	3.71%	-0.28%	2.75%
Eurozone	2.24%	2.37%	4.61%	4.45%	-0.16%	1.52%
Japan	1.30%	0.77%	2.07%	1.74%	-0.33%	3.30%
UK	1.05%	3.17%	4.22%	4.98%	0.76%	-6.98%
USA	1.70%	2.93%	4.63%	4.05%	-0.58%	5.67%
Switz.	1.63%	2.03%	3.66%	3.23%	-0.43%	4.24%
India	2.66%	7.57%	10.23%	8.46%	-1.77%	17.57%

*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 to

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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. Higher risk aversion factors and lower time discount rates indicate more conservative attitudes on the part of the average investor in a given currency zone. Increasing conservatism raises the risk of sharp downward price moves and increases in volatility when they occur at a time when many asset classes appear to be overvalued. If this conservatism becomes excessive (which is admittedly very hard to gauge), undervaluations may result. In contrast, falling risk aversion and rising time discount factors may indicate a rising danger of overvaluations occurring in asset markets. The real rate formula is [Time Discount Rate + ((1/Risk Aversion Factor) x MFP Growth)].

Real Interest Rate Analysis at 30May08

Real Rate Analysis	AUD	CAD	EUR	JPY	GBP	USD
Risk Aversion Factor	3.5	4.5	4.0	5.5	6.0	5.0
Time Discount Rate	2.00%	1.50%	1.75%	1.00%	0.75%	1.25%
MFP Growth	1.60%	1.20%	1.40%	0.60%	1.40%	1.40%
Theoretical Real Rate	2.46%	1.77%	2.10%	1.11%	0.98%	1.53%
Actual Real Rate	2.56%	1.59%	2.24%	1.30%	1.05%	1.70%

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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).

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	AAA – 10 Year Treasury	BBB-AAA
Average	.97%	1.08%
Standard Deviation	.47%	.42%
Avg. +/- 1 SD	1.44% - .50%	1.51% - .66%
Avg. +/- 2 SD	1.91% - .03%	1.93% - .23%

At 30 May 2008, the AAA minus 10 year Treasury spread was 1.62%. This is was a significant decline from its high, which indicates some moderation in fixed income market jitters. However, it is still remains significantly above the long-term average compensation for bearing liquidity and jump risk (assuming our model is correct), and reflects continuing investor concerns about the problems that have roiled the fixed income markets since August and have yet to fully abate.

At the end of the month, the BBB minus AAA spread was 1.39%. This is not significantly above the long-term average compensation for bearing credit risk. However, it still seems low given that conditions in the real economy continue to deteriorate. We still believe that it is more likely that credit risk is underpriced rather than overpriced today, and that corporate bonds remain 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, 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. 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. 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

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profit maximizers, carry trades are often profitable, at least over short time horizons. 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 30May08

	To AUD	To CAD	To EUR	To JPY	To GBP	To USD	To CHF	To INR
From								
AUD	0.00%	-2.83%	-2.09%	-4.80%	-1.56%	-2.49%	-3.31%	1.92%
CAD	2.83%	0.00%	0.74%	-1.97%	1.27%	0.34%	-0.48%	4.75%
EUR	2.09%	-0.74%	0.00%	-2.71%	0.53%	-0.40%	-1.22%	4.01%
JPY	4.80%	1.97%	2.71%	0.00%	3.24%	2.31%	1.49%	6.72%
GBP	1.56%	-1.27%	-0.53%	-3.24%	0.00%	-0.93%	-1.75%	3.48%
USD	2.49%	-0.34%	0.40%	-2.31%	0.93%	0.00%	-0.82%	4.41%
CHF	3.31%	0.48%	1.22%	-1.49%	1.75%	0.82%	0.00%	5.23%
INR	-1.92%	-4.75%	-4.01%	-6.72%	-3.48%	-4.41%	-5.23%	0.00%

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 expect 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:

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Commercial Property Securities Analysis as of 30May08

Country	Real Bond Yield	Plus Commercial Property Risk Premium	Less Dividend Yield on Commercial Property Securities	Equals Implied Rate of Future Real Dividend Growth
Australia	2.6%	2.5%	7.4%	-2.3%
Canada	1.6%	2.5%	5.3%	-1.2%
Eurozone	2.2%	2.5%	4.7%	0.0%
Japan	1.3%	2.5%	2.0%	1.8%
Switzerland	1.6%	2.5%	3.6%	0.6%
United Kingdom	1.1%	2.5%	3.9%	-0.3%
United States	1.7%	2.5%	4.7%	-0.5%

If you think the implied 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 (with the possible exception of Australia), and therefore believe that the balance of business cycle and valuation evidence suggests that commercial property securities in many markets are likely 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 May 2008 closing value of 213.95 was nearly five standard deviations above the long term 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). If history is any guide, mean reversion will eventually cause these prices to fall back toward their long-term average levels. That said, we are clearly in unchartered territory today, whether due to speculation, a collective fear of high future inflation and/or a substantial decline in the value of the U.S. dollar versus many other currencies, and/or fundamental structural changes in supply and demand conditions

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in many commodity markets (e.g., the peak oil thesis, changing diets, and the increasing use of agricultural commodities for fuel as well as food). For a much more extensive review of the different explanations for why commodity prices are so high, see the April 2008 World Economic Outlook published by the International Monetary Fund. Until the underlying factors driving the DJAIG higher become clearer, we continue to believe that the probability of a near term decline in the spot price of the DJAIG still seems much higher than the probability of a substantial further 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). 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, which presents a particularly difficult challenge with respect to the rate at which dividends will grow in the future. 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:

Growth Driver	**Assumption**
Biological growth of trees	This varies widely according to the type and maturity a given timber property (and,

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	indeed, biological growth doesn't directly translate into returns as different trees and growing arrangements also involve different costs. We assume 6% as the long term average.
Harvesting rate	In order to produce a timber REIT's dividend, a certain physical volume of trees must be harvested each year. This will vary over time; for example, when prices are high, a smaller volume will have to be cut to pay for a given level of dividends. As a long term average, we assume that 5% of tree volume is harvested each year.
In-growth of trees	This refers to the fact that as trees grow taller and wider, they are capable of producing products with substantially higher values. This so called "grade change" will cause an increase in value (and hence return) of timber even when prices within each product category are falling. We assume this adds 3% per year to the return on timber assets.
Change in prices of timber and land on which the trees are growing	We assume that over the long term prices will just keep pace with inflation. In the U.S. some data shows real price increases of 2% per year over the past 20 years; however, IMF data shows real price declines on a world timber price index. Hence, we assume the contribution of real timber price changes to long term timber returns is zero. That said, given housing market problems around the world, in the short term we may seen substantial declines in timber prices.
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

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	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.

Given these assumptions, our assessment of the valuation of the timber asset class at 30 May 2008 is as follows:

Average Dividend Yield	3.90%
Plus Long Term Annual Biological Growth	6.00%
Less Percent of Physical Timber Stock Harvested Each Year	(5.00%)
Plus Average Annual Increase in Stock Value due to Ingrowth	3.00%
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	**7.90%**
Real Bond Yield	1.70%
Plus Risk Premium for Timber	4.00%
Equals Average Annual Real Return Demanded	**5.70%**
Ratio of Returns Demanded/Returns Supplied Equals Valuation Ratio (less than 100% implies undervaluation)	**72.1%**

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

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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 May 2008, the VIX closed at 17.83, slightly below its long term average value. However, we believe this level is too low in light of rising uncertainty in the world economy and continuing turmoil in financial markets. Hence, we conclude that equity volatility is likely still 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

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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.

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

Rolling 3 Month Returns Through	***30May08***			
Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
Style and Size Rotation	Small Growth (DSG) **9.40%**	Small Value (DSV) **6.63%**	Large Value (ELV) **3.04%**	Large Growth (ELG) **9.28%**
Sector Rotation	Cyclicals (IYC) **4.49%** Technology (IYW) **14.43%**	Basic Materials (IYM) **11.88%** Industrials (IYJ) **7.88%**	Energy (IYE) **12.44%** Staples (IYK) **1.85%**	Utilities (IDU) **9.20%** Financials (IYF) **-1.77%**
Bond Market Rotation	Higher Risk (HYG) **3.80%**	Short Maturity (SHY) **-0.93%**	Low Risk (TIP) **-1.99%**	Long Maturity (TLT) **-3.03%**

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 April 2008. The distinction between possible, likely and probable reflects a rising degree of confidence in our conclusion.

Probably Overvalued	Commodities, Corporate Bonds/Credit Risk, Equity Markets in Canada, Japan, the U.S. and India
Likely Overvalued	Commercial Property except Australia
Possibly Overvalued	India, U.S., Canada and Eurozone Govt Bonds
Possibly Undervalued	Australian Dollar and UK Pound Govt Bonds; UK Equity; Australia Commercial Property; Non-U.S. Dollar Bonds
Likely Undervalued	Australian Dollar Real Return Bonds; U.K. Equity; Equity Volatility; Timber (in long run, if not short run given downward pricing pressure)
Probably Undervalued	

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The Quants' Failure, and the Metaphysics of Financial Markets

As one would expect, the significant negative returns produced during last summer's market credit and liquidity crises by any quantitative model-based active management strategies has caused many academics to investigate what happened. One of the best of these is "Challenges in Quantitative Equity Management" by Fabozzi, Focardi and Jonas, on behalf of the Research Foundation of the CFA Institute. The authors "seek to understand how a discipline that was designed to avoid the herd behavior of fundamental analysts would up, in effect, creating its own brand of herd behavior…[and] why the performance of quantitative managed funds began to fall apart in the summer of 2007."

The authors begin by noting the "explosion of information and [investment strategy options] that no human can process…our need to analyze huge amounts of information quickly and seamlessly is a powerful argument in favor of modeling." However, unlike models of physical processes that are stable over time, "models in finance are…estimated through a process of statistical learning guided by economic intuition…In practice, they are embodied in relatively simple mathematical relationships (linear regressions are the workhorse of financial modeling) in which the ratio of true information to noise is small…As a consequence, models must be continuously adapted and are subject to the risk that something in the economy will change abruptly or has simply been overlooked."

The authors then ask, "as models gain broad diffusion and are made responsible for the management of a growing fraction of equity assets, one might ask what the impact of model-driven investment strategies will be on market efficiency, price processes and performance." They note that while this trend will definitely affect markets, "because of the variety of modeling strategies in use, how they will affect prices processes is difficult to understand. Some strategies are based on reversion to the means and realign prices; others are based on momentum and cause prices to diverge." They further note that "two broad classes of models are in use in investment management – models that make explicit return forecasts (and are key to defining investment strategies and portfolio construction and models that capture exposure to risk factors, and are key to managing portfolio risk. Changes in market processes come from the use of both of these types of model."

However, the authors also note that "empirically, every once in a while, assets managed with computer-driven models suffer major losses" [e.g., the October 1987 market crash, Long

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Term Capital Management in 1998, and the events of last summer]. A number of explanations are offered for these breakdowns. One of these is the widespread use of leverage to boost returns in increasingly competitive markets. This not only put additional upward pressure on some prices, but increased the quant funds' exposure to the risk that a sharp reduction in the liquidity would occur (a risk that, in retrospect, many of them did not fully take into account). We find this interesting, as just this scenario had been identified and analyzed in the past by some academics (see, for example, the 2005 paper "Large Investors: Implications for Equilibrium Asset Returns, Shock Absorption, and Liquidity" by Matthew Pritsker of the Federal Reserve Board, and "Liquidity, Default and Crashes" by Yale's John Geanakoplos which was published in 2001).

A second explanation is the alleged tendency of many quantitative model builders to rely on similar academic theories and indicators (the "we all read the same papers" phenomenon), resulting in many so-called "crowded trades" where many quantitative funds held similar positions. This interacted with their use of large amounts of leverage to cause even sharper price declines when liquidity contracted and forced the unwinding of their positions. This source of problems may have been further exacerbated in recent years by the increasing concentration of hedge fund assets in a smaller number of large funds (75% of hedge fund assets are now managed by the top 100 firms).

A third explanation is that "what appears to be model breakdown may, in reality, be nothing more than the inevitable fat-tailed behavior of model errors…[caused by a hard to predict] shift from a normal regime to a risky regime in which noise can be fat tailed." The authors of the CFA report emphasize that "much uncertainty remains in [the use of statistical techniques to estimate] the parameters of extreme value distributions and, in turn, the probability of extreme events…[Moreover] some events are both too rare and too extreme either to be estimated through standard statistical methods or to be extrapolated from less extreme events, as extreme value theory allows one to do." A fourth explanation (frequently cited in our writing) is simply that "models break down because economic and market processes behave differently today from how they behaved in the past" – in other words, changes in the real economy and investor behavior invalidate a model's assumptions.

In conclusion, Fabozzi and his fellow authors quote a Swiss banker who observes that "models work relentlessly. [So] rather than making occasional mistakes, they make mistakes

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systematically when they are misspecified." In spite of that, the CFA report authors also note that, despite the occasionally large dips in quantitative funds' performance, many of the industry practitioners they interviewed "believe that model-driven funds deliver better and more consistent returns than people-driven funds." We note that this finding is also consistent with the conclusions reached by many researchers in other areas where models typically outperform humans in making choices in repetitive (but not novel) situations.

However, there is another paragraph in the CFA report which, in our mind, points to an even more important, if somewhat metaphysical, question: "The fundamental idea on which the active asset management industry is based is that of mispricing. The assumption is that each stock has 'fair price' and that this fair price can be discovered. A further assumption is that, for whatever reason, stock prices may be momentarily mispriced (i.e., prices may deviate from the fair prices) but that the market will reestablish the fair price. Asset managers try to outperform the market by identifying mispricings. Fundamental managers do so by analyzing financial statements and talking to corporate officers; quantitative managers do so by using computer models to capture the relationships between fundamental data and prices or the relationships between prices. The basic problem underlying attempts to discover deviations from the "fair price" of securities is the difficulty in establishing just what a stock's fair price is…In a market economy, goods and services have no intrinsic value. The value of any good or service is what the market is willing to pay for it…In absolute terms, stocks are priced by the laws of supply and demand; there is nothing fair or unfair about a price."

An absolutely fascinating, if underappreciated paper on this subject was authored by Andre Orlean in 2006. Titled "Knowledge in Finance: Objective Value Versus Convention" it is an extended critique of the economics' profession's belief in objectivity (and in particular objective probability distributions and valuations) that argues in favor of wider recognition that fundamental uncertainty (i.e., an impossibility of knowing with certainty either the full range of possible future scenarios, nor their probabilities) and subjective estimates are central to our understanding of finance. Orlean responds to those who point to discounted cash flow analysis as a means of identifying "true" fundamental value with the observation that (even in a simple form like the dividend discount model) it is dependent on two highly subjective inputs: the risk premium and the expected rate at which dividends will grow in the future. He then argues, "this idea that, in a financial market, diverse opinions about the value of the same security can

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rationally coexist leads us to uphold that it is impossible to define ex ante such a thing as a unique 'true estimate' or fundamental valuation. This impossibility poses a radical challenge to the idea of informational efficiency, to the extent that it is no longer possible to determine ex ante an estimate to serve as a yardstick by which to measure the capacity of the market to accurately evaluate [the value of] securities." Orlean then asks, "what then, is the nature of the market price? What collective knowledge does it express?" His answer is that "the financial market is a cognitive machine whose function is to produce a reference opinion, perceived by all the operators as an expression of 'what the market thinks'. This is because of the self-referential nature of specialization, where each individual makes his or her mind up [about relative valuation] according to what he or she anticipates the majority opinion to be"[as also noted by Keynes in his famous "beauty contest" analogy]…"It follows that the market price is best understood as a convention… which is neither natural nor objective, but historically and socially constructed…the result of a self-referential process of shared beliefs…Instead of assuming that there exists an objective representation of the future imposed on all agents, we should rather consider the financial markets as the producers of conventional representations that serve as points of reference for investment decisions…This is the only line of reasoning suited to the non-stationary nature of the economy…[That said] we mustn't forget that ex-post, investors can judge perfectly well whether these conventions [i.e., market prices] have proved to be accurate. This is an important fact, which greatly limits the arbitrariness of conventions. The interpretation of the future adopted by the convention must be backed up, if not by full verification, then at least by an absence of contradiction in the economic developments subsequently observed. For a convention to endure, the subsequently observed facts must be in keeping with the predicted facts." At the same time, "there is nothing automatic about the falsification of a convention: it is only abandoned after a continual accumulation of anomalies [i.e., discordant observations]." Given his views, Orlean concludes that "the central issue is to understand what it is that causes the emergence of one unique conventional valuation reference out of a heterogenous group of individual beliefs."

Orlean's initial answer to this question focuses on the interaction of investors, and the self-referential, social construction of beliefs as they try to determine the valuation logic that their peers will find most salient. This is a critical aspect of market behavior and asset pricing that is also the subject of a number of other recent papers. In "The Collective Dynamics of

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Belief", Duncan Watts provides an extended review of how "rules which are simple, intuitive and even rational from an individual's perspective can generate collective dynamics that are complex, unpredictable and counterintuitive. As a result, collective outcomes are ambiguously related both to individual preferences and also contextual variables, and causality in historical processes is rendered elusive." Given this, Watts concludes that "the characterization of financial markets as rational or irrational is not so much right or wrong, as simply missing the point. The point is that 'the market' is not some single entity which typically behaves rationally, and just has occasional, albeit unpredictable bouts of irrationality; rather, it compromises large numbers of individual actors, each of whom is behaving more or less sensibly, but who are each forming their opinions about what is reasonable in response to their observations about what other people are doing. And it is in the aggregation process that the appearance of irrationality, or for that matter, rationality, arises. Individuals, in other words, may or may not behave rationally – it may not actually matter. The point is that they do not behave independently, and that the interdependencies are every bit as responsible for shaping collective behavior as the preferences of the individuals themselves…As markets become increasingly global, and the costs of information, communication and trading continue to drop precipitously, the social processes by which collectives determine their beliefs about the world are becoming ever more consequential."

A number of other papers have relevant insights in this area. Three of them make the point that the happiness of many consumers and investors depends not only on absolute income or wealth, but also on their relative positioning versus their peers. In turn, this can cause them to copy their peers' investing decisions in order to "keep up with the Joneses", giving rise to herding, momentum and bubbles (see "Neighbors as Negatives: Relative Earnings and Well Being" by Erzo Luttmer; "Portfolio Choice When Relative Income Matters" by Sangkyun Park, "Relative Wealth Concerns and Technology Bubbles" by DeMarzo, Kaniel, and Kremer; and "The Institutional Nature of Price Bubbles" by Levine and Zajac).

Taking a different tack, In "A Psychological Interpretation of dot.com Stock Valuations", Taffler and Tuckett argue that the sharp run up in dot.com stock valuations was caused by "investors becoming caught up emotionally in what they were doing. In buying and selling dot.com stocks they were first mainly driven by compelling and exciting emotions and then [later] by terrifying and shameful ones. In each case, these emotions, amplified by

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investors' experience as members of a group caught up in a particular collective behavior, dominated and distorted their cognitive capacities." They describe how, thanks to growing media attention, for some investors, internet stocks became "phantastic objects – new, exhibitable, and enriching -- ownership of which was felt able, magically, to transform an individual in unconscious fantasy from a normal kind of existence into an omniscient and omnipotent one." They term this first stage of the eventual internet bubble "emerging to view." The next phase was the "rush to possess", characterized by a "euphoric craze" among a growing number of investors who believed possessing internet stocks conferred substantial social benefits. Following these two phases [there was] a third stage with internet stocks "tenaciously maintaining their high valuations, despite growing evidence this might be foolish." The authors term this the "psychic defense" stage, which is not unlike the struggle cited by Orleans when investors struggle to maintain a valuation convention in the face of a growing number of anomalies. However, Taffer and Tuckett note that "mental highs are not indefinitely sustainable and there is an exponentially increasing emotional cost to psychic defense. External reality ultimately intrudes and forces investors to ask questions of themselves they have previously 'not heard.' At this point, as the logic holding dot.com prices up was no longer underpinned by their unconscious status as revered phantastic objects, stock valuations collapsed overnight, and ownership of such stocks was seen as shameful, which could contaminate and stigmatize their owners." The authors term this the "panic phase." As Watts notes in his paper, "when existing beliefs suddenly give way, then until some new, stable set of beliefs take its place, it is unclear just how much less one should pay. As a result, the price of an asset can plummet in a way that is wildly disproportionate to the importance of the information that triggered the shift in beliefs."

In Taffler and Tuckett's last phase, "after the dramatic collapse in valuations, shame and guild continue to predominate…causing revulsion and further stigmatization. And to these would be added the experience of loss. The psychic defense of projection might then predominate, and with it a concurrent culture of persecution where investors will look for others to condemn for being seduced by these highly emotionally charged psychic objects known as internet stocks." Taffler and Tucket conclude that "to learn from such dramatic valuation errors it is necessary to take full [psychological] responsibility for them and to face loss, which is painful. If this doesn't happen, the search for a new phantastic object remains to

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be potentially activated." Like investment in residential real estate, for example. But we digress.

A number of other papers help us to understand in more detail the social construction of conventional beliefs. In "Susceptibility to Interpersonal Influence in an Investment Context", Hoffmann and Broekhuizen find that people with low investment knowledge and high social needs are likely to have a high interpersonal component to their decision making. In "Influentials, Networks and Public Opinion Formation", Watts and Dodds find that, contrary to popular wisdom, cascades are driven not by the adoption of a view by people regarded as influential, but rather "by a critical mass of easily influenced individuals". While a change in view by influentials can be important, it is not necessary for a cascade to occur. The reason why is highlighted in "The Structure of Information Pathways in a Social Communication Network" by Kossinets, Kleinberg and Watts. They find that communications between a relatively small number of players in a network – what they term the "network backbone" – can diffuse information surprisingly quickly and broadly. In our investment context, the psychological and cognitive make up of the individuals who comprise the nodes of this backbone appear to be critical to speed and manner in which conventions and valuations develop and evolve. In another paper, "Theory of Collective Opinion Shifts: From Smooth Trends to Abrupt Swings", Michard and Bouchaud present some initial analysis of measurable examples of social imitation (e.g., the appearance and dissipation of clapping in a theater). They find that across a range of contexts, there appears to be a consistent relationship between the height and width of a graph showing the speed at which a phenomenon rises and then falls, with higher peaks of imitative intensity consistently associated with faster rises and falls. Finally, Harras and Sornette pull together a number of different strands of thought in their paper "Endogenous versus Exogenous Origins of Financial Rallies and Crashes." They present an agent based model in which investors form opinions and decide whether to invest based on three inputs: "public information (i.e., news, which they model as a random process), private information, and information from their social network that promotes imitation." The agents adapt the weights they give to these three inputs over time, based on their recent performance. They find that "rallies and crashes occur as amplifications of random lucky or unlucky streaks of news , due to … the positive feedback loop created by the learning and imitation mechanisms…By reinforcing each other, these result in the emergence of higher degrees of

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imitation, which culminate in rallies and crashes." According to this view, "a crash occurs because the market has entered an unstable phase toward the culmination of a bubble and any small disturbance or process may reveal the presence of this instability…Essentially, anything can trigger the avalanche once the system is ripe." Will quantitative models ever be able to capture these complex dynamics? Time will tell. We're not there yet; however, there are some signs we may be someday (see, for example, "Detecting Speculative Bubbles Created in Experiments via Decoupling in Agent Based Models" by Roszczynska et al). For now, it seems that long periods of success interrupted occasional spectacular failures will continue to characterize the performance of most quantitative active management strategies.

Product and Strategy Notes

Criminalizing Doubt?

The recent indictment of two former Bear Stearns hedge fund managers raises a number of troubling issues in our mind. After trawling through the fund's email records, the U.S. government has essentially asserted that the fund's managers have committed criminal fraud. However, the evidence presented in the indictment to support these charges seems weak at best. For example, the federal indictment contains this statement by one of the managers: "I'm fearful of these markets…It's either a melt down or the greatest buying opportunity ever. I'm leaning more towards the former." And this one: "if [the report] is correct, then the entire subprime market is toast." The essence of the government's fraud allegation appears to be that failure to disclose these and similar views to investors made the statements the managers actually made intentionally false, and therefore constituted securities fraud. In our view, the U.S. government is treading on very thin ice with this indictment. Over time, we have seen a slow but steady movement towards what we call the "socialization of risk" – that is, the knee jerk initial reaction on the part of a growing number of people that anybody who loses money is somehow a victim, who must be bailed out with taxpayer money. Of course, the existence of victims logically implies the existence of victimizers. And increasingly, there seems to be a trend toward attempting to prosecute them for their alleged "crimes." We saw this with a few equity analysts after the internet bubble crashed, and now we are beginning to see it as the crash of the housing bubble unfolds. Yet rather than pursuing some rather obvious parties --

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say, borrowers who lied on their mortgage applications, real estate agents who made deceptive or untrue representations about the houses being sold to potential buyers, and appraisers who overvalued the properties – the federal prosecutors have focused on two hedge fund managers. When the political motivations behind prosecutors' decisions get this obvious, an increase in cynicism is the usual result. More important, perhaps, are the wider (and no doubt unintended) consequences of the Bear Stearns indictment. How much more difficult it will be to manage a mutual fund or public company if the very expression of doubt (which, we stress, is normal when one has to make decisions in the face of an inherently uncertain future) potentially exposes board members and officers to charges of securities fraud unless any and all doubts are fully and immediately disclosed? This could eventually make the consequences of Sarbanes Oxley look like child's play. Needless to say, we will be closely following future developments in this case.

Goldman Sachs Absolute Return Tracker Fund

On the new product front, the most interesting launch over the past month has been a new fund from Goldman Sachs (ticker: GARTX). In recent years, many researchers have pointed out that a substantial portion of many hedge funds' returns is correlated with the returns on a mix of broadly defined asset class indices (also known as "traditional betas") and a number of other easily replicated factors (e.g., the difference in return between long term and short term bonds, or between small and large cap stocks, which are – confusingly – sometimes called "exotic betas"). The twist in all this, however, is that the exact mix of long and short exposures to these "traditional" and "exotic" betas changes over time, depending on what period (and indeed, what series) of hedge fund index returns is being analyzed. The new product from Goldman represents a very interesting attempt to do two things: (a) use a quantitative model to dynamically replicate – in the form of the Goldman Sachs Absolute Return Tracker Index – this shifting mix of asset class and factor exposures over time, and (b) package the resulting returns in a product that is available to retail investors. Granted, this doesn't come cheap in comparison to a traditional index fund – the A Shares carry a 5.50% front end load and a 1.60% annual expense charge. However, in comparison to the 2% of assets and 20% of profits typically charged by hedge funds it is a bargain. Obviously, there are risks involved. The most

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important is that the assumptions underlying the model are invalidated by changes in the economy and the fund's managers do not recognize these changes and react in sufficient time to avoid large losses. However, following the intensive modification of quantitative models that has occurred since the sub-prime crisis gathered force last summer (such as the inclusion of more liquidity related factors), we believe that this risk, while still significant, is lower than it was in the past. Our bottom line is that this is another product that could be used to implement our model portfolios' allocation to uncorrelated alpha strategies.

Three Interesting Research Papers

We recently finished three research papers that should be of interest to many of our readers. In "Globalization and the Determinants of Domestic Inflation", William White from the Bank for International Settlements provides an outstanding analysis of the various hypotheses that have been offered to explain the so-called "great moderation" in inflation between 1990 and 2006. He concludes that since each individual explanation has both strengths and weaknesses, the most reasonable conclusion is that the great moderation was produced by their interaction. These explanations include, on the demand side, (1) more effective domestic monetary policies, and (2) a sharp increase in global savings that reduced global demand for goods and services relative to their global supply. On the supply side, the forces at work included (1) increased domestic deregulation, competition and productivity growth, and (2) increased global competition in labor and product markets. White also highlights the delicate balance between the risk of higher inflation and the risk of deflation that has been struck in recent years, as faster money supply growth in many countries has been used to stimulate demand in order to offset the deflationary impact of increased global competition, higher global productivity and output and higher global savings. How much longer this process can continue in the face of worsening global imbalances, and what will happen when it unwinds, is a question that worries White. He notes that "two potential problems emerge looking forward [from March, 2008]. One is that inflation might re-emerge on a global scale, since global demand and supply seem once more in equilibrium… It seems to be the case that global excess capacity has, for a time at least, shrunk considerably…We are perhaps seeing aspects of this in the recent sharp increases in the prices for food and energy. Moreover, in some emerging market economies, like China,

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but also in some industrial countries as well, wage pressures already indicate the beginnings of second round effects on production costs. Should inflationary expectations also begin to rise, this would constitute a serious challenge for policymakers, as we really don't know whether low inflationary expectations to date have been tooted in the credibility of policy regimes or rather just the recent historical experience of low inflation. A second problem is that the various imbalances built up over the long period when credit conditions have been very accommodative could unwind. We are perhaps seeing aspects of this in the current turmoil in financial markets, with significantly tighter credit conditions being increasingly seen as a real threat to growth. Indeed, in a worst case scenario, rising inflation could prompt tighter monetary conditions, or impede easing, so as to aggravate the unwinding of the financial imbalances. In such a case, a dangerous deflation might well be the end game…History teaches us that the economic losses associated with downturns of this nature can be very great, and the recovery time can be very long."

The second paper we found interesting is "Mr. Wicksell and the Global Economy: What Drives Real Interest Rates?" by Brzoza-Brzezina and Cuaresma. They examine real interest rates in 22 OECD countries between 1983 and 2005, and a wide range of variables that potentially could explain them. The authors find that a single global factor explains 48% of the changes in real rates in the 22 countries studied, while regional and national factors explain the remainder. They also find that the global factor accounted for a fall of approximately 4% in the average real rate of interest over the period they studied. 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 to should the demand for investment, which will tend to raise the real rate, assuming no change in the supply of savings); (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 economic actors – including households, firms and governments – 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, assuming no change in demand). At the global level, the world has seen increases in productivity growth rates over the pas twenty years; the observed decline in the average real rate must therefore have been driven by a

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rise in risk aversion and/or a fall in the time discount rate (or, put differently, economic actors becoming more long-term oriented and willing to save rather than consume). While increased risk aversion and longer term focus have not characterized households in the Anglo-Saxon countries over this period, the same cannot be said for companies (which have strengthened their balance sheets) and governments (which have tended to reduce their deficits) in this region, nor for households, companies and governments in Asia. Hence a number of other factors seem to be consistent with the conclusions reached in this paper.

The third interesting recent piece of research is "Sector Rotation over Business Cycles" by Stangl, Jacobsen, and Visaltanachoti of Massey University in New Zealand. They note that "sector rotation is a widely followed strategy in the investment community. Conventional market wisdom suggests that timing investments in particular sectors with different business cycle stages generates additional performance." They then "examine the performance of a "perfect foresight" strategy that rotates sectors in accordance with conventional market wisdom over business cycles between 1948 and 2007." They find that this generates at best a 2.5% improvement in performance versus an equity index, and that this apparent advantage is quickly eliminated once uncertainty and trading costs are taken into account. Yet more evidence of the enduring wisdom of one of our favorite Will Rogers quotes: "It isn't what we don't know that gives us trouble, it's what we know that ain't so."

Some Perspective on the Housing Crisis

Recent research reports and media stories continue to paint a grim picture of the state of the housing crisis in the United States. For example, the recently issued "State of the Nation's Housing" report by Harvard University's Joint Center for Housing Studies had this to say: "By early 2008, housing market problems had spread to the rest of the economy. The sharp drop in home building, the turmoil in the credit and stock markets, and the impact of falling home prices on borrowing and consumer spending all contributed to the slowdown. Mounting job losses in the first quarter of 2008 added to the misery, raising the risks of even sharper price declines and higher [mortgage] delinquencies ahead…While deep construction cutbacks have begun to pare down the supply of unsold new homes, the number of vacant homes for sale or held off the market remains high. Reducing this excess will take some combination of

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additional declines in prices, a slowdown in foreclosures, further cuts in mortgage interest rates, and a pickup in job and income growth. Until the inventory of vacant homes is worked off, the pressure on prices will persist. Further price declines will not only increase the probability that mortgage defaults end in foreclosure, but also put a tighter squeeze on consumer spending."

Another excellent analysis in *The Weekly Standard* echoed these dismal sentiments. In "It's Only Going to Get Worse", Lawrence Lindsey, a former member of the Board of Governors of the Federal Reserve and Director of the National Economic Council, notes that "America has not had a nationwide housing crash since the 1930s…[when] the bulk of the problem was related to the general economic downturn…In contrast, the current downturn is due almost exclusively to a change in the housing credit cycle from excessively easy to modestly restrictive. Housing turned down before the economy, and even now, nearly 18 months into the housing recession, the national unemployment rate is still at what economists consider full employment. That is unlikely to last, as credit problems spread into the consumer sector, layoffs spread, and the resulting rise in unemployment makes the consumer credit situation still worse." Lindsey emphasizes that "it is the uniqueness of the current housing crash that adds to its intractability...[Policymakers] must deal with three simultaneous and interrelated excesses: homebuilders made too many houses, prices rose too high, and credit standards dropped too low..[They] haven't been here before, so they're not certain of the way out." Lindsey concludes that "just as 2007 was the year that mortgage credit dried up, 2008 will be the year that home prices plummet."

So what, if anything, can an investor or homeowner do to help spot the bottom of the residential real estate market? Our basic analytical approach to all asset classes begins with the assumption that, while attracted to equilibrium, markets are seldom in it, and there is usually some imbalance between the supply of and demand for returns. We define the demand for returns as equal to the current yield on government real return (inflation protected) bonds plus a risk premium that is appropriate for the asset class. We define the supply of returns as equal to the current cash flow produced by the asset (expressed as function of its price – i.e., as a yield) plus the expected growth rate of that cash flow in the future. When the return demanded exceeds the returns the asset class is expected to supply, prices usually decline (to raise the yield); when the return demanded is less than the return the asset class is expected to supply prices usually rise. Typically, two of the four elements in our valuation equation are relatively

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easy to identify: the current yield on the asset class and the current real risk free rate. However, the other two – the expected growth rate and the appropriate risk premium – are unavoidably subjective estimates (even those that are quite widely held by investors).

In the case of housing, our proxy for the current asset yield is the rent/price ratio – that is, the ratio of the current gross rent to the current sale price for similar properties. As Davis, Lehnert, and Martin note in their paper "The Rent Price Ratio for the Aggregate Stock of Owner Occupied Housing", between 1960 and 1995, this ranged between 5.0% and 5.5% in the United States. However, as the housing boom gained strength and prices rose faster than rents, this ratio subsequently declined to 3.5% by the end of 2006 (for an analysis of the historical evolution of this ratio in the U.K., see "Asset Pricing and the Housing Market" by Olaf Weeken of the Bank of England).

When it comes to the rate at which rents are expected to grow, other analyses find that, historically, this has varied by region and metro area. For example, in their paper "What Moves Housing Markets: A Variance Decomposition of the Rent-Price Ratio", Campbell, Davis, Gallin and Martin find that, between 1975 and 2007, this ranged from a real change of minus (0.08%) per year in the U.S. Midwest to plus 0.91% per year in the Mountains and West region (in their analysis of 23 metro areas, the two extremes were minus (0.37%) in Houston and plus 1.37% per year in San Francisco). The average was .42% and the median .22%. These growth rates reflect a mix of underlying factors, including the extent to which increases in new supply are constrained by regulation or geography (as is the case in San Francisco, but not in Houston), as well as changes in population (and household formation) and median income.

An even more difficult variable to estimate is the appropriate risk premium on residential real estate. Our starting point here is basic asset pricing theory, which starts with the assumption that an investor's primary goal is to minimize large fluctuations over time in his or her real consumption. Given this, asset classes that deliver relatively high returns when the overall economy (and, in many cases, labor income) is weak will carry a very low risk premium, while investors should require a higher premium to hold assets whose returns decline at the same time as the overall economy. To make matters more complicated, one can further expand the different possible states of the economy, say to include high inflation, low growth, or deflation. When it comes to the risk premium for housing, there are a number of further

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issues that could affect the required risk premium. First, most people invest in a single house rather than a diversified "housing index." All else being equal, this lack of diversification should raise the risk premium. Second, housing is a relatively illiquid asset, which should also raise the risk premium. Third, different tax treatment of renting versus borrowing might affect the risk premium (e.g., the tax deductibility of mortgage interest in the United States might lower it). Finally, in so far as one can buy a house using a fixed rate mortgage, one can hedge one's exposure to the risk of future increases in rent. All else being equal, this might lower the risk premium an investor requires. Any attempt to estimate the required premium on housing must also consider the premiums that have actually been realized in the past. For the 23 metros they studied, Campbell, Davis, Gallin and Martin found that this averaged 2.99% per year between 1975 and 2007. The median was 3.95%, with a high of 6.45% in Seattle and a low of 1.84% in Cincinnati. As is the case with other asset classes, there is a danger in using the historical realized premium as the forward looking risk premium, as some portion of the historical return might not have been anticipated. However, in this case, given the 3.5% to 4.0% forward looking equity risk premium we use in our analyses, and the fact that housing downturns tend to coincide with equity market declines, a similar risk premium seems warranted.

Pulling this altogether, a current yield on ten year TIPS (U.S. government inflation protected bonds) of 1.43% and a 4.0% housing risk premium, add up to a 5.43% required real rate of return on housing. On the other side, both the rent/price ratio and the expected future growth in rents are highly local figures. Indicative rent/price data for some markets is available on www.hotpads.com (though they use the inverse – the price/rent ratio). However, when it comes to investing in a specific property, it is probably better to gather your own data on prices and rents for similar properties.

For example, let's say you estimate that the local rent/price ratio (yield) is 4.0%. In order for the market to be in equilibrium (that is, for the returns the local housing market is expected to supply to be just equal to the returns a rational investor would demand), you would have to believe that rents would grow by an average of 1.43% per year in the future – well above the historical national average (and median) annual rate of real growth. Logically, in order to believe this, you would also have to believe that this exceptional growth rate must be due to some combination of constrained supply and rising population and/or income (note that a

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potential problem in forming accurate growth estimates is that housing supply only reacts with a lag to increases in population and income; hence, it is easy for investors to overestimate long term growth). Alternatively, let's say you expected a more normal .25% annual real rate of growth in rents. You would therefore need a rent price ratio of 5.18% or higher (5.43% - .25%) in order for you to logically believe that an investment in housing was going to create value. Admittedly, this is an imperfect approach to assessing the economic attractiveness of a given housing market or property. However, it is also a rational one, which investors can balance against the emotional sales pitches they too often receive from other players in the housing market. Finally, rearranging the terms in our valuation equation makes it easy to identify the drivers of housing booms and busts, since the rent/price ratio must equal the real bond yield plus the housing risk premium less the expected real growth rate. Falls in real rates and required housing risk premiums, and/or increases in the expected real growth rate drive down the rent/price ratio and fuel booms; reversals in one or more of these drivers fuel busts.

New iPath Global Carbon Index Exchange Traded Note

The global carbon market got a lot more interesting recently, thanks to two developments: World Bank published its annual "State and Trends of the Global Carbon Market Report", and Barclays Global Investors launched a new Exchange Traded Note tied to the performance of its Global Carbon Index. The World Bank report notes that "the carbon market is the most visible result of early regulatory efforts to mitigate climate change. Regulation constraining carbon emissions has spawned an emerging carbon market that was valued at U.S. $64 billion in 2007." Broadly speaking, there are two major segments of the carbon market: emissions allowances and project-based emission credits. In an emissions allowances system, a government determines a maximum target level of carbon emissions over a given period of time (the "cap") and allocates (via some mechanism) carbon emission allowances to entities covered by the system. This raises two critical issues. The first is the size of the so-called "short" position – the difference between the expected volume emissions of different entities in a "business as usual" scenario and the volume of emissions covered by the aggregate allowances. This is the amount that must be either reduced via abatement or offset via project based credits (see below). This is, essentially, a political decision. That said, one would

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reasonably expect the short position to become larger (and hence emissions allowances more valuable) to the extent that damaging climate changes were becoming more visible.

The second critical issue is the means by which emissions allowances should be distributed (e.g., should they be issued via an auction process, or should they be issued directly to entities in proportion to their carbon emissions over some historical period?). Once the emissions allowances have been distributed, entities which, due to changes in their operations (e.g., reduced production or implementation of emissions reduction initiatives) have surplus allowances can then sell them in the secondary market. In terms of the return generating process for emissions allowances, it is important to note here the potential influence of economic growth. A slowing economy should not only lead to falling returns in different asset classes (e.g., equities and property), but also in reduced value for emissions allowances. On the other side of the market, entities whose expected emissions are in excess of their allowances (the number of which might well rise in a strong economy) can purchase additional ones in the secondary market.

By far the largest emissions allowance system is the European Union's Emissions Trading Scheme (ETS), which accounted for 78% of carbon market trading value in 2007. The so-called "Phase III" extension of the EU ETS (due to start in 2012) is now being negotiated. It is expected that it will impose a short position of between 20% and 30% compared to the 1990 baseline emissions level, which is greater than in the first two phases of the program.

Project based emissions credits (so called Certified Emissions Reduction credits) are generated (via a cumbersome certification process) under the United Nations' Kyoto Clean Development Mechanism. New projects such as wind power that produce avoided carbon emissions generate CER credits which can then be resold (e.g., to companies in Europe that need to either buy ETS allowances or CER's on the secondary market). According to the World Bank, primary CER's accounted for 12% of carbon market value in 2007, while secondary trading in CER's accounted for a further 9% of total market value. China was the biggest seller of CERs, accounting for 73% of the primary market. However, the CER market also faces substantial problems. As the World Bank noted, "procedural inefficiencies and regulatory bottlenecks have strained the capacity of the CDM infrastructure to deliver CERs on schedule, as too many projects await registration and issuance…Projects are currently taking an average of one to two years to be issued from the time they enter the pipeline…[Thus far] over

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70% of issued CERs have come from industrial gas projects, with the vast majority of energy efficiency and renewable energy projects remaining stuck somewhere in the pipeline."

The World Bank reports sums up the current state of the carbon market as follows: "CDM project registration and CER issuances are generally lower and slower than expected and regulatory efforts to reform and streamline the process are urgently needed…After some growing pains in its first phase, the EU ETS has created a robust structure to cost-effectively reduce greenhouse gas emissions. Created by regulation, the carbon market's biggest risk today is caused, perversely, by the absence of market continuity beyond 2012 and this can only be provided by policymakers and regulators. This will require increased efforts well beyond what is envisaged by the current policies of major world emitters." Going forward, the future size and shape of the carbon market remains a moving target, which depends both on the evolution of the current system, and how initiatives proposed elsewhere play out. At this point, more cap and trade systems seem likely to develop; for example, both U.S. Presidential candidates have expressed support for them, as have leading politicians in Australia and Canada. However, their eventual size remains very uncertain. For example, the International Energy Agency has recently estimated that the carbon emissions price would have to rise to $200/ton (versus $44/ton today for EU ETS allowances) in order to halve greenhouse gas emissions by 2050. In addition, the IEA noted that $45 trillion in new investment (e.g., in nuclear plants and fuel cell vehicles) would be required during the next 40 years to achieve this emissions reduction target, of which sixty percent would need to be made in developing countries like China and India. We continue to believe that only a series of very negative environmental events (i.e., ones causing largescale loss of life and economic damage) would generate widespread support for such a dramatic change in economic priorities.

It is in this context that Barclays Global Investors has launched an exchange traded note (ticker GRN; annual expenses .75%) that tracks its Global Carbon Index. The latter is based on an 82%/18% mix of liquid EU ETS and CDM carbon credits. Between November 2006 and May 2008, Barclays reports that this index generated an average annual U.S. dollar return of 35.8% with a standard deviation of 34.8%. In our opinion, given the relative immaturity of this market, these figures should not be regarded as indicative of future performance. In terms of the correlation of the GCI's returns with those on other asset classes, Barclays reported the following for the period from November 2006 to March 2008: S&P 500, (.21); MSCI EAFE,

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(.08); Lehman Aggregate U.S. Bond Index, .04, and Dow Jones AIG Commodities Index, .32. Assuming these correlations are maintained in the future (a very uncertain assumption given the evolving nature of the market and short length of the data series), this would argue for investors requiring a relatively low risk premium on this asset class, since it appears to provide attractive diversification benefits. On the other hand, as described above, the underlying return generating process for carbon credits seems to be driven not only by unpredictable environmental events (with worse ones raising expected returns) but also by overall economic activity (in a slowing economy, the emissions shortage built into the EU ETS would shrink). This would tend to argue for a higher risk premium, since the return on carbon emissions would drop at the same time as the return on other asset classes (in contrast to the correlation data presented by Barclays). Only time will tell how the correlations will turn out in practice as the market matures. Therefore, for the time being we see this new ETN as another way for an investor to implement an allocation to uncorrelated alpha strategies. As we have noted in the past, these are very valuable to a portfolio when they work, but there is also substantial uncertainty about their long term viability (e.g., over time, the profitability of many active management approaches is reduced either by copying and/or by changes in the way the economy and financial markets function). Depending on how the carbon market evolves, in the future it could warrant treatment as a full fledged asset class in our model portfolios. But we are not there yet.

Model Portfolios Year-to-Date Performance

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

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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 2008, our Indian Rupee cash benchmark is 7.94% (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/India.php

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