

The Index Investor

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This Month's Issue: Key Points

With this month's double issue, we are shifting our publishing schedule to the beginning of the month. Of course, long-time subscribers will remember that this is how we started in 1997. Sometime later, in response to reader requests, we changed our publishing schedule so that our cover month matched the year-to-date model portfolio returns we reported. Now, with many more new readers asking what possessed us to take a different approach than most other financial publications, we have decided to switch back to our original course. Life is like that, sometimes.

There are four feature articles in this double issue. The first summarizes a very important new report on the economics of climate change that was published by the U.K. Treasury (aka, the Stern Review). We believe it will mark a turning point in the debate, and end our coverage with a review of emissions credits as a possible new asset class. Our second feature takes a closer – and very disturbing – look at other systemic risk issues that have been growing more dangerous beneath the deceptively calm surface of the world's financial markets.

We summarize key points from the U.S. Comptroller General's "Fiscal Wake Up Tour", and a recent IMF working paper on pension, longevity, health care and housing risks.

Our third feature follows logically from the first two, and takes a closer look at market microstructure, and how it contributes to volatility, liquidity and correlation risk. We conclude that the stage has been set for a very severe problem at some point in the future. Finally, our fourth feature article reviews yet another dismal report about individual investor's self-defeating (and very costly) behavior, and as well as recent research into investor decision making that highlights some of its possible causes and the implications for how financial services businesses should change their practices.

Our product and strategy notes cover the Bank for International Settlements' cheerleading for greater use of the Euro as a reserve currency; the collapse of the Canadian Income Trusts sector; infrastructure, the latest new new thing in investing (we've seen this movie before); new ways for U.S. investors to gain exposure to international commercial property, and two good reads that should be on your Christmas list.

This Month's Letter to the Editor

There are so many indexes, that it is difficult to know what people mean when they talk about "the market", and I wonder if the MSCI World index could be considered to be a reasonable approximation of "the market" for practical purposes.

We agree with you that, with the profusion of indexes available today, it is hard to know what people mean when they refer to how their portfolio has performed versus "the market." As a practical matter, when most people use this term they are referring to some type of domestic equity index. Assuming an investor's portfolio contains more than this one asset class, this comparison doesn't tell you much. While the MSCI World or All Country World Indexes would be an improvement, an even better comparison would be to an index that contains all the asset classes found in the investor's portfolio. Of course, there would still be a question of how to weight the different asset classes in this index. For example, as we have noted in the past (see our December 2004 article on "Investing in Debt Markets"), there are good arguments for using an equally weighted matrix-based index to measure bond market returns, and people can

and do argue for hours about the right way to construct a commodity index, or how best to index residential property. Unfortunately, the perfect multi-asset class market index does not exist today. However, there is one that comes much closer than anything else: the Global Capital Markets Index published by Morgan Stanley Capital International. It includes a capitalization weighted mix of real return, investment and non-investment grade bonds, commercial property, and equity securities that covers most of the world's markets. However, it does not include timber, commercial and residential property investments that are not securitized and traded on exchanges, nor commodity futures. More information about the GCMi can be found here: <http://www.msci.com/gcm/overview.html>. The most recent year-to-date returns for the GCMi (in multiple currencies) can be found here: <http://www.msci.com/gcm/indexperf/dailyperf.html>.

Global Asset Class Returns

<i>YTD 31Oct06</i>	<u>In USD</u>	<u>In AUD</u>	<u>In CAD</u>	<u>In EURO</u>	<u>In JPY</u>	<u>In GBP</u>	<u>In CHF</u>	<u>In INR</u>
Asset Held								
US Bonds	3.61%	1.11%	-0.44%	-4.16%	2.95%	-7.22%	-2.69%	5.47%
US Prop.	31.40%	28.90%	27.35%	23.63%	30.74%	20.57%	25.10%	33.26%
US Equity	11.72%	9.22%	7.67%	3.95%	11.06%	0.89%	5.42%	13.58%
AUS Bonds	-1.68%	-4.18%	-5.74%	-9.45%	-2.35%	-12.52%	-7.98%	0.18%
AUS Prop.	20.33%	17.84%	16.28%	12.56%	19.67%	9.50%	14.04%	22.20%
AUS Equity	22.38%	19.89%	18.33%	14.61%	21.72%	11.55%	16.09%	24.24%
CAN Bonds	7.77%	5.27%	3.72%	0.00%	7.11%	-3.06%	1.47%	9.63%
CAN Prop.	23.04%	20.55%	18.99%	15.27%	22.38%	12.21%	16.75%	24.91%
CAN Equity	14.79%	12.30%	10.74%	7.02%	14.13%	3.96%	8.50%	16.66%
Euro Bonds	8.78%	6.28%	4.73%	1.01%	8.12%	-2.05%	2.48%	10.64%
Euro Prop.	38.84%	36.35%	34.79%	31.07%	38.18%	28.01%	32.55%	40.71%
Euro Equity	25.43%	22.94%	21.38%	17.66%	24.77%	14.60%	19.14%	27.30%
Japan Bonds	0.63%	-1.87%	-3.42%	-7.14%	-0.03%	-10.20%	-5.67%	2.49%
Japan Prop.	16.49%	13.99%	12.44%	8.72%	15.83%	5.66%	10.19%	18.35%
Japan Equity	2.14%	-0.35%	-1.91%	-5.63%	1.48%	-8.69%	-4.15%	4.01%
UK Bonds	13.12%	10.62%	9.07%	5.35%	12.46%	2.29%	6.82%	14.98%
UK Prop.	48.12%	45.62%	44.07%	40.35%	47.46%	37.29%	41.82%	49.98%
UK Equity	23.25%	20.75%	19.20%	15.48%	22.59%	12.42%	16.95%	25.11%
World Bonds	4.77%	2.27%	0.71%	-3.01%	4.10%	-6.07%	-1.53%	6.63%
World Prop.	30.20%	27.70%	26.15%	22.43%	29.54%	19.37%	23.90%	32.06%
World Equity	15.08%	12.58%	11.02%	7.30%	14.41%	4.24%	8.78%	16.94%
Commodities	-1.83%	-4.33%	-5.88%	-9.60%	-2.49%	-12.66%	-8.13%	0.03%
Timber	4.04%	1.54%	-0.02%	-3.73%	3.37%	-6.80%	-2.26%	5.90%
EqMktNeutral	5.79%	3.30%	1.74%	-1.98%	5.13%	-5.04%	-0.50%	7.66%
Volatility	-8.04%	-10.53%	-12.09%	-15.81%	-8.70%	-18.87%	-14.33%	-6.17%
Currency								
AUD	2.50%	0.00%	-1.56%	-5.27%	1.83%	-8.34%	-3.80%	4.36%
CAD	4.05%	1.56%	0.00%	-3.72%	3.39%	-6.78%	-2.24%	5.92%
EUR	7.77%	5.27%	3.72%	0.00%	7.11%	-3.06%	1.47%	9.63%
JPY	0.66%	-1.83%	-3.39%	-7.11%	0.00%	-10.17%	-5.63%	2.53%
GBP	10.83%	8.34%	6.78%	3.06%	10.17%	0.00%	4.54%	12.70%
USD	0.00%	-2.50%	-4.05%	-7.77%	-0.66%	-10.83%	-6.30%	1.86%
CHF	6.30%	3.80%	2.24%	-1.47%	5.63%	-4.54%	0.00%	8.16%
INR	-1.86%	-4.36%	-5.92%	-9.63%	-2.53%	-12.70%	-8.16%	0.00%

Asset Class Valuation Update

Our market valuation analyses are based on the assumption that markets are not perfectly efficient and always in equilibrium. This means that it is possible for the supply of future returns a market is expected to provide to be higher or lower than the returns investors logically demand. In the case of an equity market, we define the future supply of returns to be equal to the current dividend yield plus the rate at which dividends are expected to grow in the future. We define the return investors demand as the current yield on real return government bonds plus an equity market risk premium. As described in our May, 2005 issue, people can and do disagree about the “right” values for these variables. Recognizing this, we present four valuation scenarios for an equity market, based on different values for three key variables. First, we use both the current dividend yield and the dividend yield adjusted upward by .50% to reflect share repurchases. Second, we define future dividend growth to be equal to the long-term rate of total (multifactor) productivity growth, which is equal to either 1% or 2%. Third, we use two different values for the equity risk premium required by investors: 2.5% and 4.0%. Different combinations of these variables yield high and low scenarios for both the future returns the market is expected to supply, and the future returns investors will demand. We then use the dividend discount model to combine these scenarios, to produce four different views of whether an equity market is over, under, or fairly valued today. The specific formula is $(\text{Current Dividend Yield} \times 100) \times (1 + \text{Forecast Productivity Growth})$ divided by $(\text{Current Yield on Real Return Bonds} + \text{Equity Risk Premium} - \text{Forecast Productivity Growth})$. Our valuation estimates are shown in the following tables, where a value greater than 100% implies overvaluation, and less than 100% implies undervaluation:

<i>Australia</i>	Low Demanded Return	High Demanded Return
High Supplied Return	66%	101%
Low Supplied Return	102%	142%

<i>Canada</i>	Low Demanded Return	High Demanded Return
High Supplied Return	95%	159%
Low Supplied Return	178%	261%

<i>Eurozone</i>	Low Demanded Return	High Demanded Return
High Supplied Return	67%	113%
Low Supplied Return	117%	171%

<i>Japan</i>	Low Demanded Return	High Demanded Return
High Supplied Return	103%	199%
Low Supplied Return	251%	397%

<i>United Kingdom</i>	Low Demanded Return	High Demanded Return
High Supplied Return	44%	84%
Low Supplied Return	83%	130%

<i>United States</i>	Low Demanded Return	High Demanded Return
High Supplied Return	124%	190%
Low Supplied Return	218%	303%

<i>Switzerland</i>	Low Demanded Return	High Demanded Return
High Supplied Return	81%	149%
Low Supplied Return	165%	244%

<i>India</i>	Low Demanded Return	High Demanded Return
High Supplied Return	145%	236%
Low Supplied Return	303%	438%

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:

	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	2.34%	2.96%	5.30%	5.66%	0.36%	-3.36%
Canada	1.71%	2.40%	4.11%	4.02%	-0.09%	0.87%
Eurozone	1.72%	2.37%	4.09%	3.74%	-0.35%	3.43%
Japan	1.09%	0.77%	1.86%	1.73%	-0.13%	1.29%
UK	1.14%	3.17%	4.31%	4.52%	0.21%	-1.99%
USA	2.35%	2.93%	5.28%	4.61%	-0.67%	6.59%
Switz.	1.32%	2.03%	3.35%	2.42%	-0.93%	9.46%
India	2.87%	7.57%	10.44%	7.87%	-2.57%	26.55%

*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%. 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 should the demand for investment, which will tend to raise the real rate); (2) risk aversion (as investors become more risk averse they save more, which should reduce the real rate of interest, all else being equal); and (3) the time discount rate, or the rate at which investors are willing to trade off consumption today against consumption in the future. A higher discount rate reflects a greater desire to consume today rather than waiting (as consumption today becomes relatively more important, savings decline, which should cause the real rate to increase). These variables are not unrelated; a negative correlation (of about .3) has been found between risk aversion and the time discount rate. This means that as people become more risk averse, they also tend to be more concerned about the future (i.e., as risk aversion rises, the time discount rate falls).

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

Real Rate Analysis	AUD	CAD	EUR	JPY	GBP	USD
Risk Aversion Factor	4.0	5.0	5.0	6.0	6.0	4.0
Time Discount Rate	2.00%	1.50%	1.50%	1.00%	1.00%	2.00%
MFP Growth	1.60%	1.20%	1.40%	0.60%	1.40%	1.40%
Theoretical Real Rate	2.40%	1.74%	1.78%	1.10%	1.23%	2.35%
Real Rate on 31Oct06	2.34%	1.71%	1.72%	1.09%	1.14%	2.35%

Our 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. Also, 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. 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 default 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%.

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).

	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 31 October, 2006 the AAA minus 10 year Treasury spread was .78%. This was somewhat below the long-term average compensation for bearing liquidity and jump risk (assuming our model is correct).

At the end of the month, the BBB minus AAA spread was .86. This was below the long-term average compensation for bearing default risk. The stability of this spread in the face of other developments (e.g., rising concern over the future strength of the global economy) lead us to conclude that it is more likely that corporate bonds today are overvalued than undervalued.

Finally, for an investor contemplating the purchase of foreign bonds or equities, the expected future annual percentage change in the exchange rate is also important. Study after study has shown that there is no reliable way to forecast this. At best, you can make an estimate that is justified in theory, knowing that in practice it will not turn out to be accurate. That is what we have chosen to do here. Specifically, we have taken the difference between the yields on ten-year government bonds as our estimate of the likely future annual change in exchange rates between two regions. This information is summarized in the following table:

Annual Exchange Rate Changes Implied by Bond Market Yields

	To AUD	To CAD	To EUR	To JPY	To GBP	To USD	To CHF	To INR
From								
AUD	0.00%	-1.64%	-1.92%	-3.93%	-1.14%	-1.05%	-3.24%	2.21%
CAD	1.64%	0.00%	-0.28%	-2.29%	0.50%	0.59%	-1.60%	3.85%
EUR	1.92%	0.28%	0.00%	-2.01%	0.78%	0.87%	-1.32%	4.13%
JPY	3.93%	2.29%	2.01%	0.00%	2.79%	2.88%	0.69%	6.14%
GBP	1.14%	-0.50%	-0.78%	-2.79%	0.00%	0.09%	-2.10%	3.35%
USD	1.05%	-0.59%	-0.87%	-2.88%	-0.09%	0.00%	-2.19%	3.26%
CHF	3.24%	1.60%	1.32%	-0.69%	2.10%	2.19%	0.00%	5.45%
INR	-2.21%	-3.85%	-4.13%	-6.14%	-3.35%	-3.26%	-5.45%	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 expected supply of returns equals the expected returns demanded by investors), and “backed out” the implied growth rates 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 them for the risk of securitized commercial property as an asset class. The following table shows the results of this analysis:

Country	Real Bond Yield	Plus Commercial Property Risk Premium	Less Dividend Yield on Commercial Property Securities	Equals Expected Rate of Future Real Dividend Growth
Australia	2.34%	2.50%	5.9%	-1.1%
Canada	1.71%	2.50%	4.3%	-0.1%
Eurozone	1.72%	2.50%	2.5%	1.7%
Japan	1.09%	2.50%	1.2%	2.4%
Switzerland	1.32%	2.50%	1.5%	2.3%
United Kingdom	1.14%	2.50%	2.1%	1.5%
United States	2.35%	2.50%	3.8%	1.1%

A very rough way to test the reasonableness of these expected growth assumptions is to compare them to the expected real annual change in commercial rental income over the next five years. If you think the real growth estimates are too high, that implies overvaluation. On the other hand, if you think they are 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, and therefore to believe that the balance of business cycle and valuation evidence suggests that commercial property in many markets is probably overvalued today.

To estimate the likely direction of short term commodity futures price changes, we compare the current price to the historical distribution of futures index prices. Between 1991 and 2005 period, the Dow Jones AIG Commodities Index (DJAIG) had an average value of 107.6, with a standard deviation of 21.9. The October 31st closing price of 166.82 was 2.7 standard deviations above the average. This places it outside the range within which prices are expected to lie 95% of the time (i.e., the average price plus or minus two standard deviations). Given this, we judge the probability of a near term decline in the spot price of the DJAIG to be higher than the probability of an increase. We therefore conclude that commodities are probably overvalued today.

Our approach to assessing the current value of equity market volatility (as measured by the VIX index, which tracks the level of S&P 500 Index volatility implied by the current

pricing of put and call options on this index) is similar to our approach to commodities. Between January 2, 1990 and December 30, 2005, the average value of the VIX Index was 19.45, with a standard deviation of 6.40. The one standard deviation (67% confidence interval) range was 13.05 to 28.85, and the two standard deviations (95% confidence) range was from 6.65 to 32.25. On October 31, 2006, the VIX closed at 11.10. The value for a normally distributed variable should lie within one standard deviation of its average about 68% of the time, and within two standard deviations about 95% of the time. The VIX is currently 1.3 standard deviations below its long term average value. This strikes us as unusual in light of rising uncertainty about the continued strength of the world economy and weakening housing markets in the United States. Hence, we conclude that equity volatility is probably undervalued today.

Sector and Style Rotation Watch

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

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

We publish this table to make an important point: there is nothing unique about the various rotation strategies we describe, which are widely known by many investors. Rather, whatever active management returns (also known as "alpha") they are able to generate is directly related to how accurately (and consistently) one can forecast the turning points in the economic cycle. Regularly getting this right is beyond the skills of most investors. In other words, most of us are better off just getting our asset allocations right, and implementing them via index funds rather than trying to earn extra returns by accurately forecasting the ups and downs of different sub-segments of the U.S. equity and debt markets. That being said, the highest rolling three month returns in the table give a rough indication of how investors expect the economy and interest rates to perform in the near future. *The highest returns in a given row indicate that most investors are anticipating the economic and interest rate conditions noted at the top of the next column* (e.g., if long maturity bonds have the highest year to date returns, a plurality of bond investor opinion expects rates to fall in the near future). Comparing returns across strategies provides a rough indication of the extent of agreement (or disagreement) investors about the most likely upcoming changes in the state of the economy.

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

Rolling 3 Month Returns Through 31-Oct-06

<i>Economy</i>	Bottoming	Strengthening	Peaking	Weakening
<i>Interest Rates</i>	Falling	Bottom	Rising	Peak
<i>Style and Size Rotation</i>	Small Growth (DSG) 9.05%	Small Value (DSV) 7.48%	Large Value (ELV) 7.67%	Large Growth (ELG) 8.59%
<i>Sector Rotation</i>	Cyclicals (IYC) 13.11% Technology (IYW) 16.24%	Basic Materials (IYM) 7.06% Industrials (IYJ) 7.65%	Energy (IYE) -3.40% Staples (IYK) 7.46%	Utilities (IDU) 5.45% Financials (IYF) 7.13%
<i>Bond Market Rotation</i>	Higher Risk (LQD) 4.12%	Short Maturity (SHY) 1.61%	Low Risk (TIP) 0.67%	Long Maturity (TLT) 5.88%

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

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

Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
New Construction Completion (space coming onto the market)	Falling	Bottoming	Rising	Peaking
Property Valuation Ratios	Bottoming	Rising	Peaking	Falling
Expected Future Property Returns	Peaking	Falling	Bottoming	Rising

The following table sums up our subjective view of possible asset class under and overvaluations at the end of October 2006. The distinction between possible, likely and probable reflects a rising degree of confidence in our conclusion.

Probably Overvalued	Commodities, Corporate Bonds
Likely Overvalued	Commercial Property, Most Equity Markets
Possibly Overvalued	
Possibly Undervalued	Real Return Bonds
Likely Undervalued	Equity Volatility
Probably Undervalued	Non-U.S. Dollar Bonds

Climate Change and Asset Allocation

In our view, the publication by the U.K. Treasury of its new report “The Economics of Climate Change” marks an important turning point in this debate (the full report is available at http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm). Authored by Sir Nicholas Stern, head of the U.K. Government Economics Service, the report carefully documents the risks and potential returns associated with different course of action available to policymakers. As some of these could have important implications for asset allocation, it is worthwhile exploring the report’s key findings in more depth.

Stern clearly states his key conclusions at the outset of his long report: “The scientific evidence is now overwhelming. Climate change presents very serious global risks, and it demands an urgent global response...No-one can predict the consequences of climate change

with complete certainty; but we now know enough to understand the risks. Mitigation - taking strong action to reduce emissions - must be viewed as an investment, a cost incurred now and in the coming few decades to avoid the risks of very severe consequences in the future. If these investments are made wisely, the costs will be manageable, and there will be a wide range of opportunities for growth and development along the way. For this to work well, policy must promote sound market signals, overcome market failures and have equity and risk mitigation at its core. That essentially is the conceptual framework of this Review.”

However, the data included with the report, and the analysis of it, is equally interesting. “The current level or stock of greenhouse gases in the atmosphere is equivalent to around 430 parts per million (ppm) CO₂, compared with only 280ppm before the Industrial Revolution. These concentrations have already caused the world to warm by more than half a degree Celsius and will lead to at least a further half degree warming over the next few decades, because of the inertia in the climate system. Even if the annual flow of emissions did not increase beyond today's rate, the stock of greenhouse gases in the atmosphere would reach double pre-industrial levels by 2050 - that is 550ppm CO₂e - and would continue growing thereafter. But the annual flow of emissions is accelerating, as fast-growing economies invest in high carbon infrastructure and as demand for energy and transport increases around the world. The level of 550ppm CO₂e could be reached as early as 2035. At this level there is at least a 77% chance - and perhaps up to a 99% chance, depending on the climate model used - of a global average temperature rise exceeding 2°C...

“Under the Business As Usual scenario, the stock of greenhouse gases could more than treble by the end of the century, giving at least a 50% risk of exceeding 5°C global average temperature change during the following decades. This would take humans into unknown territory. An illustration of the scale of such an increase is that we are now only around 5°C warmer than in the last ice age. Such changes would transform the physical geography of the world. A radical change in the physical geography of the world must have powerful implications for the human geography - where people live, and how they live their lives...

“In higher latitude regions, such as Canada, Russia and Scandinavia, climate change may lead to net benefits for temperature increases of 2 or 3°C, through higher agricultural yields, lower winter mortality, lower heating requirements, and a possible boost to tourism. But these regions will also experience the most rapid rates of warming, damaging infrastructure,

human health, local livelihoods and biodiversity. Developed countries in lower latitudes will be more vulnerable - for example, water availability and crop yields in southern Europe are expected to decline by 20% with a 2°C increase in global temperatures. Regions where water is already scarce will face serious difficulties and growing costs. The increased costs of damage from extreme weather (storms, hurricanes, typhoons, floods, droughts, and heat waves) counteract some early benefits of climate change and will increase rapidly at higher temperatures. Based on simple extrapolations, costs of extreme weather alone could reach 0.5 - 1% of world GDP per annum by the middle of the century, and will keep rising if the world continues to warm...

“With such possibilities on the horizon, it was clear that the modelling framework used by this Review had to be built around the economics of risk. Averaging across possibilities conceals risks. The risks of outcomes much worse than expected are very real and they could be catastrophic. Policy on climate change is in large measure about reducing these risks. They cannot be fully eliminated, but they can be substantially reduced...

“Economic forecasting over just a few years is a difficult and imprecise task. The analysis of climate change requires, by its nature, that we look out over 50, 100, 200 years and more. Any such modelling requires caution and humility, and the results are specific to the model and its assumptions. They should not be endowed with a precision and certainty that is simply impossible to achieve. Further, some of the big uncertainties in the science and the economics concern the areas we know least about (for example, the impacts of very high temperatures), and for good reason - this is unknown territory. The main message from these models is that when we try to take due account of the upside risks and uncertainties, the probability-weighted costs look very large. Much (but not all) of the risk can be reduced through a strong mitigation policy, and we argue that this can be achieved at a far lower cost than those calculated for the impacts. In this sense, mitigation is a highly productive investment...

“Emissions have been, and continue to be, driven by economic growth; yet stabilisation of greenhouse-gas concentrations in the atmosphere is feasible and consistent with continued growth. CO₂ emissions per head have been strongly correlated with GDP per head. As a result, since 1850, North America and Europe have produced around 70% of all the CO₂ emissions due to energy production, while developing countries have accounted for less than one quarter.

Most future emissions growth will come from today's developing countries, because of their more rapid population and GDP growth and their increasing share of energy-intensive industries. Yet despite the historical pattern and the Business As Usual projections, the world does not need to choose between averting climate change and promoting growth and development. Changes in energy technologies and the structure of economies have reduced the responsiveness of emissions to income growth, particularly in some of the richest countries. With strong, deliberate policy choices, it is possible to 'decarbonise' both developed and developing economies on the scale required for climate stabilisation, while maintaining economic growth in both.

“Stabilisation - at whatever level - requires that annual emissions be brought down to the level that balances the Earth's natural capacity to remove greenhouse gases from the atmosphere. The longer emissions remain above this level, the higher the final stabilisation level. In the long term, annual global emissions will need to be reduced to below 5 GtCO₂e, the level that the earth can absorb without adding to the concentration of GHGs in the atmosphere. This is more than 80% below the absolute level of current annual emissions. This Review has focused on the feasibility and costs of stabilisation of greenhouse gas concentrations in the atmosphere in the range of 450-550ppm CO₂e.

Stabilising at or below 550ppm CO₂e would require global emissions to peak in the next 10 - 20 years, and then fall at a rate of at least 1 - 3% per year. By 2050, global emissions would need to be around 25% below current levels. These cuts will have to be made in the context of a world economy in 2050 that may be 3 - 4 times larger than today - so emissions per unit of GDP would need to be just one quarter of current levels by 2050. To stabilise at 450ppm CO₂e, without overshooting, global emissions would need to peak in the next 10 years and then fall at more than 5% per year, reaching 70% below current levels by 2050. Theoretically it might be possible to “overshoot” by allowing the atmospheric GHG concentration to peak above the stabilisation level and then fall, but this would be both practically very difficult and very unwise. Overshooting paths involve greater risks, as temperatures will also rise rapidly and peak at a higher level for many decades before falling back down. Also, overshooting requires that emissions subsequently be reduced to extremely low levels, below the level of natural carbon absorption, which may not be feasible. Furthermore, if the high temperatures were to weaken the capacity of the Earth to absorb carbon - as becomes more likely with

overshooting - future emissions would need to be cut even more rapidly to hit any given stabilisation target for atmospheric concentration.

“Achieving these deep cuts in emissions will have a cost. The Review estimates the annual costs of stabilisation at 500-550ppm CO₂e to be around 1% of GDP by 2050 - a level that is significant but manageable. Reversing the historical trend in emissions growth, and achieving cuts of 25% or more against today’s levels is a major challenge. Costs will be incurred as the world shifts from a high-carbon to a low-carbon trajectory. But there will also be business opportunities as the markets for low-carbon, high-efficiency goods and services expand. Greenhouse-gas emissions can be cut in four ways. Costs will differ considerably depending on which combination of these methods is used, and in which sector:

- Reducing demand for emissions-intensive goods and services
- Increased efficiency, which can save both money and emissions
- Action on non-energy emissions, such as avoiding deforestation
- Switching to lower-carbon technologies for power, heat and transport

“Estimating the costs of these changes can be done in two ways. One is to look at the resource costs of measures, including the introduction of low-carbon technologies and changes in land use, compared with the costs of the Business As Usual alternative. This provides an upper bound on costs, as it does not take account of opportunities to respond involving reductions in demand for high-carbon goods and services. The second is to use macroeconomic models to explore the system-wide effects of the transition to a low-carbon energy economy. These can be useful in tracking the dynamic interactions of different factors over time, including the response of economies to changes in prices. But they can be complex, with their results affected by a whole range of assumptions. On the basis of these two methods, central estimate is that stabilisation of greenhouse gases at levels of 500-550ppm CO₂e will cost, on average, around 1% of annual global GDP by 2050. This is significant, but is fully consistent with continued growth and development, in contrast with unabated climate change, which will eventually pose significant threats to growth.

“Resource cost estimates suggest that an upper bound for the expected annual cost of emissions reductions consistent with a trajectory leading to stabilisation at 550ppm CO₂e is

likely to be around 1% of GDP by 2050. This Review has considered in detail the potential for, and costs of, technologies and measures to cut emissions across different sectors. As with the impacts of climate change, this is subject to important uncertainties. These include the difficulties of estimating the costs of technologies several decades into the future, as well as the way in which fossil-fuel prices evolve in the future. It is also hard to know how people will respond to price changes. The precise evolution of the mitigation effort, and the composition across sectors of emissions reductions, will therefore depend on all these factors. But it is possible to make a central projection of costs across a portfolio of likely options, subject to a range.

“The technical potential for efficiency improvements to reduce emissions and costs is substantial. Over the past century, efficiency in energy supply improved ten-fold or more in developed countries, and the possibilities for further gains are far from being exhausted. Studies by the International Energy Agency show that, by 2050, energy efficiency has the potential to be the biggest single source of emissions savings in the energy sector. This would have both environmental and economic benefits: energy-efficiency measures cut waste and often save money. Non-energy emissions make up one-third of total greenhouse-gas emissions; action here will make an important contribution. A substantial body of evidence suggests that action to prevent further deforestation would be relatively cheap compared with other types of mitigation, if the right policies and institutional structures are put in place.

“Large-scale uptake of a range of clean power, heat, and transport technologies is required for radical emission cuts in the medium to long term. The power sector around the world will have to be least 60%, and perhaps as much as 75%, decarbonised by 2050 to stabilise at or below 550ppm CO₂e. Deep cuts in the transport sector are likely to be more difficult in the shorter term, but will ultimately be needed. While many of the technologies to achieve this already exist, the priority is to bring down their costs so that they are competitive with fossil-fuel alternatives under a carbon-pricing policy regime.

“A portfolio of technologies will be required to stabilise emissions. It is highly unlikely that any single technology will deliver all the necessary emission savings, because all technologies are subject to constraints of some kind, and because of the wide range of activities and sectors that generate greenhouse-gas emissions. It is also uncertain which technologies will turn out to be cheapest. Hence a portfolio will be required for low-cost abatement. The shift to

a low-carbon global economy will take place against the background of an abundant supply of fossil fuels. That is to say, the stocks of hydrocarbons that are profitable to extract (under current policies) are more than enough to take the world to levels of greenhouse-gas concentrations well beyond 750ppm CO₂e, with very dangerous consequences. Indeed, under the Business As Usual scenario, energy users are likely to switch towards more carbon-intensive coal and oil shales, increasing rates of emissions growth. Even with very strong expansion of the use of renewable energy and other lowcarbon energy sources, hydrocarbons may still make over half of global energy supply in 2050. Extensive carbon capture and storage would allow this continued use of fossil fuels without damage to the atmosphere, and also guard against the danger of strong climate-change policy being undermined at some stage by falls in fossil-fuel prices. Estimates based on the likely costs of these methods of emissions reduction show that the annual costs of stabilising at around 550ppm CO₂e are likely to be around 1% of global GDP by 2050, with a range from -1% (net gains) to +3.5% of GDP.

“Stabilisation at 450ppm CO₂e is already almost out of reach, given that we are likely to reach this level within ten years and that there are real difficulties of making the sharp reductions required with current and foreseeable technologies. Costs rise significantly as mitigation efforts become more ambitious or sudden. Efforts to reduce emissions rapidly are likely to be very costly. An important corollary is that there is a high price to delay. Delay in taking action on climate change would make it necessary to accept both more climate change and, eventually, higher mitigation costs. Weak action in the next 10-20 years would put stabilisation even at 550ppm CO₂e beyond reach – and this level is already associated with significant risks...

“The current evidence suggests aiming for stabilisation somewhere within the range 450 - 550ppm CO₂e. Anything higher would substantially increase the risks of very harmful impacts while reducing the expected costs of mitigation by comparatively little. Aiming for the lower end of this range would mean that the costs of mitigation would be likely to rise rapidly. Anything lower would certainly impose very high adjustment costs in the near term for small gains and might not even be feasible, not least because of past delays in taking strong action. Uncertainty is an argument for a more, not less, demanding goal, because of the size of the adverse climate-change impacts in the worst-case scenarios.”

Having established the case for change, Stern then goes on to review the mechanisms that might be used to bring this about. One in particular raises questions for future asset allocation policy: “Establishing a carbon price, through tax, trading or regulation, is an essential foundation for climate-change policy. Greenhouse gases are, in economic terms, an externality: those who produce greenhouse-gas emissions are bringing about climate change, thereby imposing costs on the world and on future generations, but they do not face the full consequences of their actions themselves. Putting an appropriate price on carbon – explicitly through tax or trading, or implicitly through regulation – means that people are faced with the full social cost of their actions. This will lead individuals and businesses to switch away from high-carbon goods and services, and to invest in low-carbon alternatives. Economic efficiency points to the advantages of a common global carbon price: emissions reductions will then take place wherever they are cheapest. The choice of policy tool will depend on countries’ national circumstances, on the characteristics of particular sectors, and on the interaction between climate-change policy and other policies. Policies also have important differences in their consequences for the distribution of costs across individuals, and their impact on the public finances. Taxation has the advantage of delivering a steady flow of revenue, while, in the case of trading, increasing the use of auctioning is likely to have strong benefits for efficiency, for distribution and for the public finances. Some administrations may choose to focus on trading initiatives, others on taxation or regulation, and others on a mix of policies. And their choices may vary across sectors.

“Trading schemes can be an effective way to equalise carbon prices across countries and sectors, and the EU Emissions Trading Scheme is now the centrepiece of European efforts to cut emissions. To reap the benefits of emissions trading, schemes must provide incentives for a flexible and efficient response. Broadening the scope of trading schemes will tend to lower costs and reduce volatility. Clarity and predictability about the future rules and shape of schemes will help to build confidence in a future carbon price.

“In order to influence behaviour and investment decisions, investors and consumers must believe that the carbon price will be maintained into the future. This is particularly important for investments in long-lived capital stock. Investments such as power stations, buildings, industrial plants and aircraft last for many decades. If there is a lack of confidence that climate change policies will persist, then businesses may not factor a carbon price into their

decision-making. The result may be overinvestment in long-lived, high-carbon infrastructure – which will make emissions cuts later on much more expensive and difficult. But establishing credibility takes time. The next 10 to 20 years will be a period of transition, from a world where carbon-pricing schemes are in their infancy, to one where carbon pricing is universal and is automatically factored into decision making...

“Creating a broadly similar carbon price signal around the world, and using carbon finance to accelerate action in developing countries, are urgent priorities for international co-operation... The Kyoto Protocol has established valuable institutions to underpin international emissions trading... Decisions made now on the third phase of the EU Emissions Trading System provide an opportunity for the scheme to influence, and become the nucleus of, future global carbon markets (Launched in January 2005, the EU emissions trading scheme (EU ETS) is still in its infancy. The scheme will enter a second, longer phase in 2008, with a major review on the scheme’s design from 2013 to be launched in 2007).

“The EU ETS is currently the world’s largest carbon market. The structure of the third phase of the scheme, beyond 2012, is currently under debate. This is an opportunity to set out a clear, long-term vision to place the scheme at the heart of future global carbon markets. There are a number of elements which will contribute to a credible vision for the EU ETS. The overall EU limit on emissions should be set at a level that ensures scarcity in the market for emissions allowances, with stringent criteria for allocation volumes across all relevant sectors (The first phase of the EU ETS illustrates this. Allocation decisions were based on projections of BAU emissions of the sectors in the scheme, many of which appear to have been overestimated, meaning that total EU allocation was just 1% under projections of BAU of the whole EU ETS). Clear and frequent information on emissions during the trading period would improve transparency in the market, reducing the risks of unnecessary price spikes or of unexpected collapses. Clear revision rules covering the basis for allocations in future trading periods would create greater predictability for investors. The possibility of banking (and perhaps borrowing) emissions allowances between periods could help smooth prices over time. Broadening participation to other major industrial sectors, and to sectors such as aviation, would help deepen the market, and increased use of auctioning would promote efficiency. Enabling the EU ETS to link with other emerging trading schemes (including in the USA and Japan), and maintaining and developing mechanisms to allow the use of carbon reductions made in

developing countries, could improve liquidity while also establishing the nucleus of a global carbon market.”

Today, the emissions trading market is in its infancy. That being said, there are signs that the development for tradable emissions allowances as a distinct asset class is picking up speed. For example, in September, 2006, Climate Change Capital announced that it had raised \$860 million of a planned \$1 billion institutional fund that will invest in carbon assets and derivatives. Previously, in January 2005, Dresdner bank had launched certificates of participation for retail investors whose value was tied to the price of EU ETS allowances (each of which corresponded to the right to one metric ton of CO2 emissions). Unfortunately, these experienced a sharp drop in price following their April, 2006 peak, when the EU released data showing that, as noted above, the amount of emissions allowances that had been issued was basically equal to the business as usual scenario – hence, the allowances had less scarcity value than anybody had realized up to that point. Finally, in September 2006 the two leading climate exchanges, www.europeanclimateexchange.com and www.chicagoclimatex.com merged to form what could easily become a single global emissions exchange trading platform (both are now owned by Climate Exchange Plc., which trades on the London Stock Exchange under the ticker CLE).

Last but not least, it bears asking how standardized emissions or carbon allowances might trade, and how they might fit into a portfolio. The value of these allowances would logically rise and fall with real growth in gross domestic product, subject to uncertainty about the pace of technological change (though there would be additional short term volatility caused, for example, by variations in weather and the resulting impact on energy demand and supply). High GDP growth would increase the demand for energy use, while low growth would produce the opposite. Whether or not these produced rising and falling values for emissions allowances would also depend on the extent to which new low emission producing technologies had been adopted. Hence, emissions certificates would have their highest value in a high growth/slow technology evolution scenario, and their lowest value in a low growth/fast technology evolution scenario. In addition, there would be another source of risk related to future regulatory actions – for example, the amount of new allowances issued, and/or changing government preferences for emissions taxes versus emissions trading. Another source of uncertainty in this equation is the extent to which different regions of the world would

participate in emissions trading, and how emissions trading might affect international capital flows (for an early analysis of this, see “Emissions Trading, Capital Flows and the Kyoto Protocol” by McKibbin, Ross, Shackleton and Wilcoxon). Suffice to say, at this point in time, there is still much uncertainty about how the emissions allowance system will evolve in the future.

The most interesting question is whether the value drivers involved would, in practice, cause the returns on emissions allowances to have a low correlation with the returns on more established asset classes. We suspect that may turn out to be the case; however, given the limited data available today, this is at best a highly speculative conclusion given the data available today. In conclusion, while climate change in general, and the developing emissions allowance asset class in particular are undoubtedly critical issues for investors to monitor (to which end the Stern Review is a landmark event), it is too soon for most investors to add this emerging asset class to their portfolios.

Other Sources of Deep Systemic Risk

In addition to the uncertain impact of climate change, there are other important sources of systemic risk in the global economy whose potential impact has probably not been fully absorbed by a majority of investors. Recently, two important institutions have attempted to remedy this. Their comments make sobering reading.

In the United States, David Walker, the Comptroller General of the United States (in effect, the federal government’s chief accountant) has been giving a series of speeches titled the “Fiscal Wake Up-Tour”. The Comptroller General heads the Government Accountability Office (GAO), serves for a fifteen year term (Walker’s expires in 2013), and is relatively insulated from partisan political pressure.

In his speeches, Walker has repeatedly called attention to what he terms the United States’ “four deficits.” Here is how he described them in a speech earlier this year at the John F. Kennedy School of Government at Harvard University:

“Perhaps the most urgent challenge we face is our nation's deteriorating financial condition and growing fiscal imbalance. The United States now confronts four interrelated deficits with serious implications for our role in the world, our economic growth, our standard

of living, and even our national security. The first deficit is the federal budget deficit, which in 2005 was around \$319 billion on a cash basis. This widely reported number is somewhat misleading, because without the Social Security surpluses, the federal cash-based deficit was actually closer to \$500 billion. Moreover, on an accrual basis, our fiscal 2005 deficit was \$760 billion, up \$144 billion in the last year alone.

“Even more troubling, the federal government's long-term liabilities and unfunded commitments for things like Social Security and Medicare benefits have risen to more than \$46 trillion. That's up from about \$20 trillion just five years ago. The new Medicare prescription drug benefit, which may be one of the most poorly designed, inefficiently implemented, and fiscally irresponsible government programs of all time, has added more than \$8 trillion to this sea of red ink. And these numbers don't even take into account the bills that are coming from rebuilding New Orleans and the Gulf Coast or future costs associated with Iraq and Afghanistan. In recent years, we've heard calls to relieve Americans of burdens like the so-called "death tax," but we need to talk more about the very real and growing "birth burden." That's what I call the staggering amount of government commitments that every American, including newborns, will some day have to pay for.

“As a result, every new birth certificate now comes with a bill of \$156,000. With a birth burden like this, it's no wonder that newborn babies cry! Alternatively, this means that every full-time worker carries a de facto debt load of \$375,000. For a dual-income family, this is like having a \$750,000 mortgage without owning a house! Unfortunately, these numbers are growing every second of every day because of continuing deficits, known demographic trends, and compounding interest costs.

“The second deficit is our savings deficit. Too many Americans--from individual consumers to elected officials--are spending today as if there's no tomorrow. Consequently, America has the lowest overall savings rate of any major industrialized nation. The annual U.S. saving rate as a percentage of disposable personal income has been falling for some time. But last year, for the first time since 1933, our annual saving rate was in negative territory. Think about it. We've returned to saving levels not seen since the depths of the Great Depression. Clearly, many Americans, like the federal government, are living beyond their means and are deeply in debt. This trend is particularly alarming in an aging society such as our own. Those Americans who save more will certainly live better in retirement.

“The bottom line is, those Americans who fail to plan, save, invest, and preserve their savings for retirement are rolling the dice, and given the problems with our nation's retirement system, the odds are heavily stacked against them.

“So, if we aren't saving at home, who's been underwriting America's recent spending spree? The answer is foreign investors. And that brings me to America's third deficit--our overall balance-of-payments deficit. America is simply spending more than it's producing. In 2005, the U.S. trade deficit hit about \$726 billion, up more than \$100 billion from the prior year. While our own saving rates have plummeted, savings rates abroad have not, and overseas money has been pouring into the United States. Thanks to the high savings rates in China, Japan, and elsewhere, it's been relatively cheap for Americans to borrow. But there's a catch, and it's a big one. Increasingly, we are mortgaging our collective future, and some of our leading lenders may not share our long-term national interests. Imagine what would happen to interest rates on Treasury securities if these foreign investors suddenly decided to buy fewer of these securities or, worse yet, started to sell off their U.S. holdings.

“Finally, there's our fourth deficit, and it's probably the most sobering deficit of all. What I'm talking about is America's leadership deficit. Not enough key policymakers are concerned about America's growing fiscal imbalance and the other long-term challenges that I've mentioned. As a result, there have been pitifully few calls for making tough choices or fundamental reform. At both ends of Pennsylvania Avenue, on both sides of the political aisle, and at all levels of government, there have been too few champions who have the courage to speak the truth, to make tough choices, and to bring about real, fundamental, and lasting change. Instead, the government's continuing lack of fiscal discipline and business-as-usual attitude have made our long-term situation even worse. The government's recent spending sprees and tax cuts are nothing less than a body blow to overall fiscal responsibility. Candidly, "tax and spend" policies aren't advisable, but enacting tax cuts and spending hikes at the same time isn't a good idea either. The truth is, if our nation took a fiscal fitness test today, it would flunk!

“Unfortunately, Wall Street and the business community are not being as vocal on this issue as they have in the past. Stated differently, they are largely "missing in action." Both government and the private sector tend to suffer from the dual afflictions of myopia and tunnel vision. At the same time, the private sector really does have a dog in this fiscal fight, because if

government keeps on as it has, companies are going to pay a price, such as rising tax burdens, higher interest rates, and/or the impacts of slower economic growth.

“What we've got going are the elements of a perfect storm, a potent mix of ignorance, apathy, and inaction at all levels and in many sectors of American society. If we continue on our present course, a fiscal crisis is not a matter of if but when.

The second warning was recently issued by the International Monetary Fund, in a working paper titled, “The Limits of Market-Based Risk Transfer and Implications for Managing System Risks.” Again, it makes for very sober reading.

The authors of the IMF paper begin by noting that “there are several significant economic risks facing industrial countries (and many developing economies) in the medium to longer term, which have the potential to produce severe economic costs, and possibly financial market instability.” These include “pension savings, longevity risk, health care costs and related liabilities, and house price risk (particularly as it relates to household retirement savings).” The report notes the “potentially adverse economic and financial stability impacts are likely to be more significant the longer policymakers delay actions designed to mitigate or to better manage these risks and related obligations... Among G-10 policymakers, there seems a clear recognition that these longer-term risks present challenges to public and private finances during the next several decades. However, a number of policymakers have also indicated that necessary reforms to entitlement systems to address these obligations are politically difficult to implement, and may be delayed or lead to undesirable compromises.”

On this point, we note that the combination of demographic and electoral arithmetic makes it harder to implement reforms the longer they are delayed. Why? Because with every year of delay, the ranks of baby boomer retirees will grow, while, thanks to the baby bust, the ranks of working voters will not. The rising “dependency ratio” (i.e., the ratio of retirees to workers) also has serious political consequences. Absent a wholly uncharacteristic burst of generational altruism, it will become harder and harder to win voter approval of fundamental policy changes as the ranks of boomer retirees grow. This may leave changes forced on the system by severe fiscal crises as the only alternative.

As the IMF report notes, “markets dislike uncertainty, and these long-term risks will serve only to increase market uncertainty. Therefore, at some point, possibly before

government actions are taken, as the financial markets begin to more clearly measure and anticipate the economic effects of these challenges, the resulting impact and subsequent adjustments may be disorderly. In short, to delay reform efforts and other policies designed to mitigate or to smooth these large economic and fiscal challenges, governments incur the risk that such policy initiatives may become dictated by, or subject to, adverse financial market reactions, which may heighten financial stability concerns.”

The IMF report then proceeds to evaluate in more depth each of the systemic risks it identifies. “Over the coming decades, public expenditure related to population ageing (i.e., pension, health and long-term care) is widely projected to rise dramatically as a share of GDP, primarily fueled by rising health care and long-term care expenditures (see Figure 1). Ageing-related costs represent explicit liabilities of the state, associated with its role as employer and provider of public social services. In addition, as the primary agent for a variety of systemically significant issues, the responsibilities of the government may go beyond its explicit commitments to encompass the role of “insurer of last resort.” This is a source of additional and possibly significant implicit and contingent liabilities. In many cases, such liabilities may not be fully (or at all) reflected in public accounts, particularly with regard to their variability.

“Absent further reforms, significant spending reductions elsewhere, or changes in the distribution or sharing of risks, the growth of ageing-related government liabilities and the uncertainties associated with them have the potential to generate intense pressure on public finances and sovereign ratings. For example, as highlighted by Standard & Poor’s, the fiscal implications could significantly affect public debt dynamics and undermine the credit standing of many countries, including issuers of key benchmark securities, raising the possibility of new benchmark instruments. The magnitude and timing of the deterioration in fiscal positions may differ significantly, reflecting a variety of factors, including demographic trends, the current fiscal position, and the expected impact of recent structural reforms.” As we have noted in the past the IMF also cites the relatively stronger position of Australia and Canada vis-à-vis these trends, as a result of policy changes they have already enacted.

That being said, the IMF notes that, to varying degrees, “all OECD countries face similar ageing related trends that cause certain expenditures to grow faster than GDP. Over time, the compounding effect (as well as the variability) of rising public expenditures relative to GDP magnifies the systemic nature of the associated risks. For instance, if the annual rate of

growth of health care-related costs exceeds the GDP deflator by 1 percent (with volumes constant), the ratio of these expenditures to GDP (i.e., the additional burden to the economy) increases by a factor of 1.22 after 20 years, and 1.49 after 40 years.

“A fuller recognition of the substantial, but often undisclosed and unfunded, public sector pension and social security liabilities (i.e., explicit and implicit) on government balance sheets would likely have a significant impact on public finances, doubling or even tripling debt levels in some countries. Moreover, given the complexity and sensitivity (i.e., variability) of these calculations to changes in various components or estimates, from a risk management perspective, they present significant challenges.

“Longevity risk is a major source of uncertainty and complexity in the assessment of ageing-related liabilities, as changes in longevity are dependent on unpredictable or difficult-to-forecast events (such as medical developments), and thus less amenable to statistical modeling. An increase in longevity of five years may raise the level of pension liabilities by approximately a third. Of course, if there is a greater move to fund these projected obligations, the financial markets will assume an even larger role. The private sector and financial markets are playing an increasingly important role in managing pension-related risks and exposures. While reforms in pension systems in many countries are increasingly shifting a variety of financial and other risks to the household sector, the state (through social security programs) and the corporate sector (through occupational defined benefit pension plans) remain heavily exposed to many ageing-related risks, including longevity risks. As entities increasingly focus on managing these liabilities and related risks, they may seek to readjust asset portfolios, with potentially significant financial market implications (e.g., pensions funds shifting from equities to fixed-income securities).

“As populations age, the total theoretical level of pension liabilities grows, potentially dwarfing levels recognized thus far, reflecting also the uncertainty associated with such liability estimates. Indeed, the growth in liabilities may be much greater than expected, as increases in longevity have consistently exceeded actuarial forecasts. Therefore, the challenge of managing and maintaining adequate savings levels by the public, corporate, and household sectors have become more urgent. An important issue going forward is the risk management capacity of the recipients of such risks, including households, and related regulatory frameworks. Although accounting and financial reporting requirements have increased, most corporations, as pension

plan sponsors, are not subject to comprehensive prudential requirements regarding their pension and related exposures. In the United Kingdom, for example, with about GBP 900 billion of longevity-linked private pension liabilities outstanding, only GBP 80 billion has been issued by regulated insurers required to put capital against these liabilities...

“The rapid and difficult-to-predict growth of health care costs poses [another] significant financial and risk management challenge for individuals, employers, and governments. In general, the lack of adequate data has hindered the ability to measure or to more actively manage many of these risks. In OECD countries, total health care spending rose from 8.6 to 10.9 percent of GDP from 1990 to 2003. Medical expenses have consistently risen far in excess of general inflation in many countries, reflecting in large part advances in medical technology, as well as factors related to population ageing.¹⁴ In the United States, annual increases in health insurance premiums for employer-sponsored health plans averaged 11 percent between 2000 and 2005, more than four times the average overall inflation rate in this period. At the same time, the pricing of medical services very often remains opaque to beneficiaries, which makes market pricing mechanisms relatively ineffective in limiting the growth of health care spending. In most countries—but especially where universal publicly-funded health care is predominant, such as in Europe and Japan—health care costs are contributing to significant pressures on government budgets and social welfare systems.”

“In countries where health care coverage is provided primarily by private insurers, more costs fall on employers and households. Faced with such rising costs, businesses, in particular small and medium-size enterprises, increasingly decline to offer or withdraw health care coverage for employees, a situation which ultimately increases pressure on the public health care system. Indeed, in 2004, 18 percent of the U.S. (non-elderly) population was estimated to be uninsured. Similar to pension liabilities, there is considerable uncertainty regarding health care cost projections, primarily because the large number of variables affecting health care costs and spending are extremely difficult to model and predict. Nevertheless, scenario analyses indicate that the projection of rapid growth of health and long-term care spending, including as a significant and rising percentage of GDP, is a fairly robust one. For example, in the United States, according to long-term projections of spending for Medicare and Medicaid made by the Congressional Budget Office (CBO), if spending per enrollee grows at the same rate as per capita GDP, the costs for these two programs would be 7 percent of GDP by 2050 (from 4.2

percent of GDP in 2005). However, if spending by enrollee grew one percentage point faster than per capita GDP, the costs would almost double, and reach 12.6 percent of GDP by 2050. Moreover, unlike pension funds, many companies do not fund their long-term health care obligations, and for companies that do fund these liabilities, the level of funding is generally very low, pointing to additional challenges for the corporate sector...

Finally, “as more households regard their homes as long-term savings vehicles, with home equity very often representing over half of household net worth, the potential for house price fluctuations to increase the volatility of savings available for retirement rises. Furthermore, housing assets are typically leveraged, relatively illiquid, and undiversifiable from regional and local price fluctuations, exposing the owner to considerable wealth and savings volatility...For example, econometric studies generally find that household consumption rises or falls by 3–6 percent of any change in housing wealth. A shock to house prices can therefore affect overall consumption significantly and exacerbate economic cycles”

On a positive note, the IMF also notes that market mechanisms for better managing this risk seem to be developing. “A number of recent changes have increased the prospects that house price hedging instruments will become more widely available. Exchange-traded futures and options based on house price indices for ten U.S. cities were launched in May 2006. A major U.S. investment bank reportedly now intends offering forwards and swaps of up to five years’ maturity using the same indices. Separately, in September 2006, the Zurich Cantonal Bank began offering mortgages whose payments are indexed to Zurich house prices. These developments demonstrate the value of creating indices, which financial market participants may then utilize to offer a broad range of financial products. There are numerous potential economic welfare and financial stability benefits from expanding housing-related markets. Such markets could facilitate the smoothing of lifetime consumption by households, and promote housing-related savings“.

Despite this one bright spot, the IMF concludes that “public authorities and others generally have not encouraged or supported the use of market-based risk management tools by governments, insurance companies, and other market participants” to manage the major risks facing the global financial system. Yet at the same time, it recognizes that “there is increasing attention being given to the capacity of governments, insurance companies, corporates, and households to manage these long-term systemic risks.”

In sum, it is hard to read the Walker and IMF documents and not come away with the impression that investors have not fully incorporated into market prices all of the systemic risks facing global financial markets today. As such, the potential for a substantial global dislocation when this happens must be judged to be high. Finally, in terms of the asset allocation implications of these two analyses, the conclusion to us seems clear: the ultimate risk free assets in the world economy today may well be the real return bonds issued by those countries – specifically, Australia and Canada – that have made the most progress toward dealing with the systematic pension, longevity, and health care risks facing developed countries.

Market Microstructure: A Key to Volatility, Liquidity and Correlation Risk

Global financial markets have recently experienced a prolonged period of low volatility. Give the unprecedented imbalances in the world economy, we do not believe this can last. Hence we believe that in the future, volatility will return to the headlines with a vengeance. In preparation for that day, we have prepared a series of two articles. Last month was a basic primer on volatility. This month, we take a more advanced look at the mechanisms that can cause volatility to suddenly and sometimes violently change.

The term “market microstructure” refers to the study of how the processes for trading securities affects their prices and returns. A basic market microstructure model includes four main elements: orders, traders, market makers and funding.

Conceptually, there are two types of orders. “Market orders” demand immediate execution (be it a purchase or sale) and are willing to accept uncertainty about the price required to obtain it. In contrast, “limit orders” demand certainty about the price at which an order will be executed, and are willing to accept uncertainty about when, or if, that will happen. Until they are cancelled (by the traders submitting them), limit orders are stored in the limit order book. In effect, the limit order book is where a securities market stores liquidity (i.e., unexercised buy and sell orders).

Traders differ not only in terms of whether they are buying (providing liquidity to the market) or selling (demanding liquidity from the market), but also in terms of whether their top priority is execution speed (in which case they will submit market orders) or price certainty (in which case they will submit limit orders). Traders face uncertainty about the fundamental

value of a given security (e.g., does a change in price reflect a permanent change in its value, or does it represent a temporary misvaluation). They also face uncertainty about the future actions of other traders, and their collective impact on liquidity.

Market makers exist to reduce, to some extent, traders' uncertainty about liquidity. Market makers ensure an orderly market by standing ready to take the other side of market orders; buying when traders want to sell, and selling when they want to buy. Market makers profit by setting their buying (bid) price for a security below their offering (ask) price. A key risk faced by market makers is finding themselves on the wrong side of informed trades – e.g., in a situation where they are buying a security being sold by traders with private information that its fundamental value has declined.

Funding is the often overlooked, but absolutely critical element in market microstructure. All market makers, and many traders (e.g., hedge funds) fund their securities portfolio with a mix of equity and borrowed funds. The lenders who provide the latter will only provide loans equal to a percentage (say, 80%) of the face value that the market maker or trader pledges as collateral against them. When the price/value of a security pledged as collateral drops below a certain threshold (say, 85% of the loan amount), the lender will issue a so-called “margin call” demanding that the market maker or trader either put up additional collateral to secure the loan, or sell the security in question and repay it.

Now that we understand the key elements in market microstructure, let's move on to looking at how they interact to generate the volatility, liquidity, and correlation risks faced by long-term investors.

A series of recent papers by Doyne Farmer and a number of co-authors has described this with a level of detail that has only been possible since advent of fully electronic markets and the availability of individual transaction data. (see “What Really Causes Large Price Changes?” , “There's More to Volatility than Volume”, “The Key Role of Liquidity Fluctuations in Determining Large Price Changes”, and “Market Efficiency and the Long Memory of Supply and Demand”). Farmer and his colleagues analyzed orders received for different securities that trade on the London Stock Exchange. They reached a number of interesting conclusions. First, “price fluctuations caused by individual market orders are essentially independent of the volume of orders...[Rather], large price fluctuations are driven by liquidity fluctuations – that is, by variations in the market's ability to absorb new market

orders.” More specifically, “even for the most liquid stocks, there can be substantial gaps in the limit order book, corresponding to a block of adjacent price levels containing no orders. When such a gap exists next to the best quoted price, a new order can move the best quote, triggering a large midpoint (bid/ask average) price change. Thus, the distribution of large price changes mainly reflects the distribution of gaps in the limit order book... Large price changes occur when a market order removes all the volume at the best price, and there are gaps in the limit order book.” Farmer and his fellow authors find that stocks differ in the probability that their respective limit order books will contain these large gaps, with lightly traded stocks having a larger risk of large price moves. Statistically, this leads to the distribution of their returns (say, over monthly intervals) having relatively “fatter tails” and therefore being more prone to extreme returns than would be the case if their returns were normally distributed (i.e., if a graph of the returns looked more like the normal distribution or familiar “bell curve”). For more on this, see “Asset Pricing with Liquidity Risk” by Acharya and Pedersen, and (for an excellent overview) “Liquidity and Asset Prices” by Amihud, Mendelson, and Pedersen.

Farmer and his fellow authors also found that the sequence of order placements and cancellations is a key driver of clustered volatility (i.e., volatility that rises and falls over time, rather than remaining constant). While order placement seems to follow a surprisingly predictable distribution (technically, a Student T distribution, with slightly fatter tails than a normal distribution), the order cancellation process appears to be more complicated. At least three different forces appear to be at work: a limit order is more likely to be quickly cancelled when (a) it is placed close to the best quoted price and is not quickly executed (e.g., against an incoming market or another limit order); and (b) when it is the dominant type of order (buy or sell) and is not quickly filled. One way to interpret both of these findings is that they reflect traders’ learning processes in the face of uncertainty – the fact that these types of order are not quickly executed indicates that others may know something the trader doesn’t, increasing his or her perceived uncertainty and causing him or her to either pull back from the market or enter limit orders further away from the best quoted price. In this manner, gaps can develop in the limit order book that have the potential to generate large price changes, which create further uncertainty. For more on this, see “Inference, Arbitrage, and Asset Price Volatility” by Tobias Adrian of the Federal Reserve Bank of New York.

Another interesting aspect of order flow highlighted by Farmer's studies is that the signs involved are not random. Rather, for various reasons, they tend to be correlated with each other over time (i.e., a buy order placement is more likely to be followed by another buy order than by a sell order). Farmer speculates that this may be caused by the increasing use of trading algorithms that break large orders into a sequence of small orders to limit the potential impact of the large order on the market price. Another reason might be the prevalence of momentum style traders active in a given market. Regardless of the reason for the correlation in order signs, what is remarkable is that this does not result in equally predictable prices.

The reason for this is that changes in liquidity almost perfectly offset changes in order flow, resulting in a series of price changes that are very close to random. This liquidity effect happens in at least two ways. The first has been mentioned before: faced with an order imbalance, market makers fear they lack an important piece of information and move to protect their profits by widening the bid/ask spread. The rising flow of orders also tends to attract opposite orders from traders who believe that the change in the perceived fundamental value of the security is either wrong or only temporary.

Unfortunately, the market microstructure mechanisms just described don't always function smoothly. And when they don't, funding problems are usually involved. We have seen how either an asset price shock (i.e., a sudden and substantial change in the price of a security) or simply an increase in the amount of uncertainty felt by traders can lead to the development of large gaps in the limit order book and give rise to a sequence of large price changes (i.e., clustered volatility). Moreover, we have seen how this can become a self-reinforcing process, with rising volatility begetting rising uncertainty and falling liquidity. The line that separates normal liquidity fluctuations from liquidity crises is the one that triggers margin calls by the lenders to market makers and traders. When this happens, the process can become supercharged, with a sharp increase in the order imbalance (i.e., with market sell orders dominating), the disappearance of market maker liquidity, and the accelerating cancellation of limit buy orders by confused and liquidity constrained traders. Moreover, it is easy to see how this type of problem can spread across asset classes via the funding channel. In this sense, clustered volatility and liquidity crises may be the root cause of correlation risk (i.e., the risk that, when markets decline, the correlation between some, if not all, asset classes tends to rise).

For more on this, see “Liquidity Risk and Correlation Risk: Implications for Risk Management” by Acharya and Schaefer.

To stop such liquidity crises in their tracks, in the wake of the 1987 stock market crash, most major exchanges enacted so-called “circuit breakers” which automatically stop trading for increasingly long periods of time when the price of a major index drops by 10%, 20%, or 30% within a short period of time. The U.S. Treasury has argued that circuit breakers have important benefits, including:

- They provide a pause during which market participants can assess what is happening and during which value investors can reflect on the potential bargain prices being offered without the distraction of a fast moving market.
- They potentially avert the possibility of breakdowns in market infrastructure, such as communication and computer systems, whose utilization may be at or near capacity.
- They may relieve payment system, collateral, and margin problems by giving market participants time to make appropriate arrangements to meet their obligations.
- They substitute an orderly and defined halt to all trading for potentially disruptive ad hoc trading halts that result in unplanned, partial market closes. Such ad hoc halts -- due, for example, to large order imbalances -- could exacerbate pressure on those markets that remain open.

However, circuit breakers only officially exist in the case of recognized exchanges; they do not formally exist in over the counter markets, like those for credit default swaps. Hence, the potential exists for significant damage to occur in one or more over the counter markets before the funding channel spreads the problem across asset classes and finally triggers a circuit breaker on a recognized exchange. To put it differently, while circuit breakers have certainly limited the potential for large “tail events” to occur, they have not, by any stretch, wholly eliminated them.

Moreover, recent changes in market microstructure may have increased the likelihood that a serious liquidity driven tail event will eventually occur. Increasing competition between active managers has caused them to focus more closely on ways to limit the price impact of their trades (defined as any adverse changes in bid/ask spreads and/or market prices before they

are completed). This has led to the widespread use of trading software (algorithms) that breaks large orders down into small orders, and executes them over time. The use of these algorithms was made possible not only by changes in the rules of traditional stock exchanges (e.g., that facilitated the automatic execution of small orders), but also by the development of electronic crossing networks (ECNs) that, in essence, are software algorithms that match buy and sell orders at a lower price than those charged by the major exchanges. To further minimize traders' market impact costs, brokers have also developed so-called "dark pools" of liquidity. So long as their volume in a stock does not exceed five percent of total volume, these dark pools are exempt from the regulatory requirement that they display their order book to potential traders. The advantage to traders is that by crossing their orders in such dark pools, they can better hide their trading activities, and prolong the advantage they gain from whatever forecasting advantage they may possess. One recent estimate was that in the United States, twenty percent of share trading volumes now takes place via dark pools.

As described by Hasbrouck and Saar in a recent paper ("Technology and Liquidity Provision: The Blurring of Traditional Definitions"), this new market microstructure, "the role of posted prices (i.e., limit orders) is diminished, and...searches for hidden liquidity [often by software algorithms] are needed to achieve [the best execution price]."

So, we now have a situation in which the world's real economy is faced with unprecedented imbalances, the world's financial markets have experienced a prolonged and historically unusual period of low volatility, and the players at the heart of the system are making liquidity harder to find. If that isn't a recipe for an eventual crisis, we don't know what is.

Recent Research on Investor Decision Making

In a recent working paper ("Mutual Fund Inflows and Investor Returns: An Empirical Examination of Mutual Fund Investor Timing Ability"), Friesen and Sapp provide further evidence to support a sadly familiar story. The authors analyze "whether mutual fund investors make good investment decisions strictly in the timing of their cash flows. That is, for any given fund, do equity fund investors put cash in and take cash out at the right time on

average?” Since this is the first study that, to our knowledge, examines this issue in depth, its findings are worth quoting at some length.

The authors “compute monthly dollar-weighted returns over 1991-2004 [for the 7,125 equity mutual funds in their sample] and find that the geometric average monthly return is 0.62%, while the average monthly dollar-weighted return is 0.49%. Thus, investors underperform by about 0.13% per month, or 1.56% annually, relative to the funds they invest in. This performance gap is twice as large for load funds (0.16% per month) as for no-load funds (0.08% per month).” To put this into perspective, based on \$5,456 billion in equity mutual fund assets just in the United States at the end of September, 2006, the 1.56% annual return shortfall identified by Friesen and Sapp equals \$85 billion each year missing from the pockets of mutual fund investors. That is an enormous sum of money by anybody’s standard.

The authors also find that the “performance gap is largest among the largest quintile of funds in [their] sample. The size of the performance gap is also increasing in fund expenses, turnover, and length of fund history. Overall, the evidence suggests that larger, older, more costly funds seem to attract less-sophisticated investors.”

The authors also examined whether investors who were able to identify funds that generated alpha also suffered from poor timing. They found that the “alpha that is potentially available to investors [in these funds] is largely erased by the poor timing of investors in them.”

When funds were separated by investment objective, the authors found that “consistent with numerous studies in the experimental psychology literature...the gap is largest among objective categories that have the highest return volatility, from 0.25% for aggressive growth funds with the highest volatility, to 0.03% among the lowest-volatility income-growth funds.”

Friesen and Sapp conclude that their “results are consistent with investor return-chasing behavior.” They also note that “it is sobering to reiterate that the performance gap due to poor investor timing largely offsets the value added by actively managed funds in terms of alpha for the subset of funds that does indeed offer a positive alpha. Hence, even investors who are fortunate enough to select the best funds on average sacrifice the potential benefit due to poor timing of cash flows. Overall, our results commend the relative appeal of a simple “buy and hold” strategy to the average investor.”

On a side note, the authors also “separately examined 416 equity index funds. Since index funds do not attempt to select securities or time the market, most investors in index funds

are generally assumed to be pursuing a completely passive investment strategy. However, [here too, Friesen and Sapp] found a performance gap, indicating that some index fund investors may also be trying to time their investments.” However, compared to the active fund gap, the index investor gap “is smaller at 0.05% per month, versus 0.13% for non-index funds.”

From our perspective, the truly interesting question is why studies like Friesen and Sapp’s continue to find such dismal, apparently self-defeating performance by active investors whom, we must assume, make a large number of successful decisions in other parts of their lives. A number of other recent studies shed new light on this issue.

The traditional economic model of decision making in the face of risk makes a number of unrealistic assumptions. The first is that investors all possess virtually unlimited cognitive capacity for processing huge amounts of information that is available to everyone at the same time. In this world of rational decision making, choice comes down to identifying the possible outcomes from a decision, estimating their probabilities, and, given one’s risk preference, choosing the alternative that maximizes expected present value.

A stream of criticism broadly known as behavioral finance has documented many problems with the rational model. For example, it neglects the powerful impact of the way a choice is framed (emphasizing potential losses leads to risk seeking behavior, while emphasizing potential gains leads to risk averse behavior), the importance of the context in which a decision is made (e.g., a recent paper, “Consumption Commitments and Risk Aversion” by Chetty and Szeidl finds that an investor with high fixed costs – such as mortgage payments – will view a decision differently than one without them), and the powerful role of feelings (as one analyst has summarized it, we evaluate choices cognitively but react to them emotionally, leading to phenomena such as regret aversion).

In addition to behavioral finance, there is another stream of criticism aimed at the rational model, which begins with the observation that the decision problems themselves are usually not as simple as theory assumes. This is illustrated by the following framework. In a risky situation, all the possible outcomes of a decision are known, as are their associated probabilities. In an ambiguous situation, while all the possible outcomes are known, their probabilities are not. And in an uncertain situation, neither all the possible outcomes from a decision nor their probabilities are known. In point of fact, most investment decisions are at the very least ambiguous and more often uncertain. Under these circumstances, investors are likely

to employ a very different decision making approach than the one assumed by the rationalist model.

Four recent papers explore this issue in more depth. In “Aspiration Level, Probability of Success and Failure, and the Failure of Expected Utility”, Diecidue and van de Ven find that an investor’s aspiration level is a relevant aspect of decision making, that creates an effective way to quickly screen multiple options (e.g., achieves at least a minimum probability of meeting an aspiration). This facilitates a second round evaluation based on the expected values of different decision options. In a manner very similar to Kahneman and Tversky’s findings about the impact of a reference point in Prospect Theory, Diecidue and van de Ven find that the presence of an aspiration level can simultaneously lead to both risk averse behavior (e.g., buying insurance) and risk seeking behavior (e.g., buying lottery tickets) over others. In comparison, Prospect Theory finds that investors engage in risk seeking behavior when they find themselves below a reference point, but are risk averse when they are above it. Reconciling these two approaches isn’t hard; all you have to do is substitute an aspiration level for the cost of an investment to use as the relevant reference point.

In their paper “The Role of Aspiration Level in Risky Choice”, Lopes and Oden posit that decisions are made by trading off security (i.e., fear, or the probability of avoiding a loss), potential (i.e., greed, or the probability of achieving a gain), and aspiration (i.e., the probability of achieving an emotionally important goal). This construct is therefore known as the SP/A theory. While it intuitively makes sense, it has been criticized for being unclear about how people make these trade-offs in practice, and also for its failure to take into account the possibility of a hierarchy of aspirations (e.g., in the case of portfolio performance, “earning the return needed to fund my retirement”, “outperforming my obnoxious Uncle Carl” and “beating the Pimco All Asset Fund”).

In “It Is Whether You Win or Lose”, John Payne takes a closer look at these criticisms, and finds support for the hypothesis that people prefer to reduce the probability of experiencing a loss, even if this choice is not the one that maximizes the expected present value of a decision.

Finally, “Dual Criteria Decisions” by Anderson, Harrison, Law and Rutstrom is a fascinating analysis of high stakes decision making under real world conditions: competition for the UK pounds 250,000 prize on the television show “Deal or No Deal.” The authors show

that not only are the probability of experiencing a loss or a gain as important as aspiration, but also that different people make different (and often non-linear) trade-offs between them.

All of these papers may help us better understand Friesen and Sapp's findings about the poor results of investors chasing fund performance. If we assume the use of a multicriteria decision process that values avoiding losses as well as future gains and aspirations, it is easy to see how an investor could justify switching into a fund that has recently experienced strong performance, and out of one that has recently experienced a string of losses. While some rational decision theorists may deem this evidence of irrationality, we believe it describes the behavior of smart people who are trying to do their best while playing for high stakes (e.g., their retirement security) in a highly uncertain environment. More specifically, it points to a need to broaden the way the financial services industry describes risk and takes it into account when making decisions, to help investors make better trade-offs between the probability of experiencing a loss in any year and the probability of falling short of one's long-term aspirations. We do not doubt that this is difficult, or that better informed investors will generate lower commissions for some members of the securities industry. However, given the enormous amounts of money that are at stake, and their potential impact on the retirement income security of millions of investors around the world, it strikes us that the investment industry must either make these changes itself or have the regulators do it for them. Time will tell which choice they will make.

Product and Strategy Notes

BIS Endorses Euro as Reserve Currency

As if the U.S. dollar didn't have enough problems, in a new working paper "The Euro as a Reserve Currency", the Bank for International Settlements concludes that the greenback finally has a serious competitor. The BIS "finds that the liquidity and breadth of euro financial markets are fast approaching those of dollar markets, and as a result the euro is eroding some of the advantages that have historically supported the pre-eminence of the US dollar as a reserve currency. This strengthens the incentive for monetary authorities to reconsider the currency composition of their reserves. Nevertheless, the introduction of the euro has not yet resulted in

a significant change in the currency composition of official reserve holdings. The US dollar has maintained its place as the dominant reserve currency, supported perhaps by the edge that dollar financial markets still have over euro markets in terms of size, credit quality and liquidity, as well as inertia in the use of international currencies.” We’re not betting those advantages are going to last much longer.

So Much for Canadian Income Trusts

Among other truisms in life, it is almost always the case that, if a clever way to reduce taxes becomes sufficiently popular, it will trigger a regulatory response usually not to investors’ liking. Take the recent case of Canadian income trusts. Over the past few years, an increasing number of publicly traded Canadian corporations had reorganized as income trusts. These conversions almost always generated a significant increase in the market value of the organization. There were believed to be two reasons for this. The most obvious was a sharp reduction in tax payments. The income of corporations was effectively taxed twice – once at the corporate level and once if it paid dividends to investors who held their shares in a taxable account. Income trusts avoided the corporate level tax, provided most of their free cash flow was paid out to investors. If trust shares (technically called “units”) were held in tax advantaged accounts, the cash received could completely avoid taxation. Because of this, Canadian income trusts became quite popular with retired investors seeking high yields – and equally unpopular with governments facing serious revenue losses.

The second reason for the increase in trust values was more subtle, but no less important. Because most of their free cash flow had to be paid out to investors, income trusts had to return to the market (i.e., issue new units) every time they wanted to fund a significant investment. Among some investors, there was a belief that this resulted in more management discipline, and fewer value destroying investments. Others, however, thought that over the long term, the heavy payout requirement would discourage investment by Canadian income trusts, and lead to a gradual loss of global competitiveness (and, therefore, lower and lower income distributions over time). For better or worse, we will never learn which of these arguments was true. At the end of October, Canada announced that all new trust would effectively be taxed as

corporations, while existing trusts would be taxed that way from 2011 forward, proving once again that it is not wise to tease the tax man.

Has Your Broker Called You About “Infrastructure” Yet?

If not, he or she soon will. You see, infrastructure is the new new thing. So, just what is “infrastructure?” Is it a new asset class? A new sure fire way to make money? No. It is what, in a bygone age, many of us called “utilities.” Today, infrastructure is one of those maddening faddish investment terms whose meanings too often stretch like rubber to cover a multitude of sins. Toll roads and bridges are infrastructure. So are airports. And power plants. And water works. And pipelines. Basically, if George Banks sang about it in *Mary Poppins*, it’s infrastructure (he was just a little ahead of his time, I guess. Who knew?). So what’s the appeal? In theory, steady cash flows, with perhaps a little more upside than a bond, assuming you can either grow your franchise, or negotiate a higher return with the regulators. That’s the theory, at least. However, based on twenty plus years experience with what, in the old days, used to be called “project finance” (before it became “infrastructure”) we have a somewhat more jaded view. First, infrastructure is not a separate asset class. In some cases (e.g., airports, seaports) cash flow has a relatively strong correlation with GDP growth, and therefore with equity markets. In other cases (say, a water utility), share values should move up and down with local interest rates, just like a domestic bond. But unlike a bond, there is more risk involved with infrastructure projects. Just ask anybody who financed an infrastructure project with foreign currency debt and then discovered that it was politically impossible to raise prices (take your pick: tolls, power rates, water and sewer rates etc.) by an amount sufficient to meet rising debt costs. Or anybody who thought that nobody would be crazy enough to put in a competing pipeline. So much for that steady income you expected. Believe us, we’ve seen all of these and more. So excuse us for not jumping on the “infrastructure” bandwagon. We’ve seen this movie before.

Another Way for U.S. Investors to Gain International Commercial Property Exposure

As always, following hard on the heels of impressive returns in an asset class, more investable products appear. Foreign commercial property is no exception to this rule. We've mentioned four of these in the past: the Cohen and Steers International Realty Fund (IRFAX) and Worldwide Realty Income Fund (RWF); the Fidelity International Real Estate Fund (FIREX), and the Northern Trust Global Real Estate Index Fund (NGREX). Last month saw another potentially very interesting addition to this list, as State Street registered a new ETF with the SEC, which will track the DowJonesWilshire exUS Real Estate Index. Initially, the heaviest exposure will be to those countries with the most developed commercial property securities markets, including Australia, Japan, the U.K, and Canada. However, with more countries around the world changing regulations to encourage the securitization of commercial property, expect this to change over time. No word yet on when the new ETF will start trading.

Two Good Reads

Leave it to two professors from Trinity College in Dublin to make learning some important investment lessons memorable and fun. Go to www.ssrn.com and download "The Seven Deadly Sins of Investing" by Dowling and Lucy. You'll be glad you did. Also, frequent readers of our publications know that one of the key assumptions underlying our view of the world is that financial markets (and indeed the global economy) function as a complex adaptive system. If you have ever wanted to read a clear treatment of this subject, your prayers have been answered in an outstanding new book by Eric Beinhocker from the McKinsey Global Institute. We strongly recommend adding The Origin of Wealth your Christmas list. It's a great read.

2006-2007 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 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 2006, our Swiss Franc cash benchmark is 1.48% (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 are shown in the tables on the following pages. Mutual and exchange traded funds that can be used to implement these model portfolios’ asset allocations are listed on our website.

<i>These portfolios seek to maximize the probability of achieving at least the target real return over twenty years, at the lowest possible risk.</i>			
	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
7% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	0.0%	0.0%
Swiss Bonds	-4.8%	0.0%	0.0%
Global Bonds	-1.5%	0.0%	0.0%
Domestic Commercial Property	16.6%	10.0%	1.7%
Foreign Commercial Property	24.0%	0.0%	0.0%
Commodities	-8.1%	7.5%	-0.6%
Timber	-2.3%	7.5%	-0.2%
Swiss Equity	15.8%	70.0%	11.1%
Foreign Equity (US)	5.4%	0.0%	0.0%
Foreign Equity (UK)	17.0%	0.0%	0.0%
Foreign Equity (Eurozone)	19.1%	0.0%	0.0%
Foreign Equity (Japan)	-4.2%	0.0%	0.0%
Emerging Mkt. Equity	9.3%	5.0%	0.5%
Equity Market Neutral	-0.5%	0.0%	0.0%
		100.0%	12.4%

	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
6% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	0.0%	0.0%
Swiss Bonds	-4.8%	0.0%	0.0%
Global Bonds	-1.5%	0.0%	0.0%
Domestic Commercial Property	16.6%	10.0%	1.7%
Foreign Commercial Property	24.0%	0.0%	0.0%
Commodities	-8.1%	7.5%	-0.6%
Timber	-2.3%	7.5%	-0.2%
Swiss Equity	15.8%	70.0%	11.1%
Foreign Equity (US)	5.4%	0.0%	0.0%
Foreign Equity (UK)	17.0%	0.0%	0.0%
Foreign Equity (Eurozone)	19.1%	0.0%	0.0%
Foreign Equity (Japan)	-4.2%	0.0%	0.0%
Emerging Mkt. Equity	9.3%	5.0%	0.5%
Equity Market Neutral	-0.5%	0.0%	0.0%
		100.0%	12.4%

	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
5% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	0.0%	0.0%
Swiss Bonds	-4.8%	0.0%	0.0%
Global Bonds	-1.5%	0.0%	0.0%
Domestic Commercial Property	16.6%	12.5%	2.1%
Foreign Commercial Property	24.0%	0.0%	0.0%
Commodities	-8.1%	15.0%	-1.2%
Timber	-2.3%	5.0%	-0.1%
Swiss Equity	15.8%	62.5%	9.9%
Foreign Equity (US)	5.4%	0.0%	0.0%
Foreign Equity (UK)	17.0%	0.0%	0.0%
Foreign Equity (Eurozone)	19.1%	0.0%	0.0%
Foreign Equity (Japan)	-4.2%	0.0%	0.0%
Emerging Mkt. Equity	9.3%	5.0%	0.5%
Equity Market Neutral	-0.5%	0.0%	0.0%
		100.0%	11.1%

	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
4% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	0.0%	0.0%
Swiss Bonds	-4.8%	10.0%	-0.5%
Global Bonds	-1.5%	0.0%	0.0%
Domestic Commercial Property	16.6%	17.5%	2.9%
Foreign Commercial Property	24.0%	0.0%	0.0%
Commodities	-8.1%	20.0%	-1.6%
Timber	-2.3%	0.0%	0.0%
Swiss Equity	15.8%	47.5%	7.5%
Foreign Equity (US)	5.4%	0.0%	0.0%
Foreign Equity (UK)	17.0%	0.0%	0.0%
Foreign Equity (Eurozone)	19.1%	0.0%	0.0%
Foreign Equity (Japan)	-4.2%	0.0%	0.0%
Emerging Mkt. Equity	9.3%	5.0%	0.5%
Equity Market Neutral	-0.5%	0.0%	0.0%
		100.0%	8.8%

	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
3% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	0.0%	0.0%
Swiss Bonds	-4.8%	30.0%	-1.4%
Global Bonds	-1.5%	0.0%	0.0%
Domestic Commercial Property	16.6%	17.5%	2.9%
Foreign Commercial Property	24.0%	0.0%	0.0%
Commodities	-8.1%	10.0%	-0.8%
Timber	-2.3%	7.5%	-0.2%
Swiss Equity	15.8%	30.0%	4.7%
Foreign Equity (US)	5.4%	0.0%	0.0%
Foreign Equity (UK)	17.0%	0.0%	0.0%
Foreign Equity (Eurozone)	19.1%	0.0%	0.0%
Foreign Equity (Japan)	-4.2%	0.0%	0.0%
Emerging Mkt. Equity	9.3%	5.0%	0.5%
Equity Market Neutral	-0.5%	0.0%	0.0%
		100.0%	5.7%

	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
2% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	0.0%	0.0%
Swiss Bonds	-4.8%	80.0%	-3.8%
Global Bonds	-1.5%	5.0%	-0.1%
Domestic Commercial Property	16.6%	0.0%	0.0%
Foreign Commercial Property	24.0%	0.0%	0.0%
Commodities	-8.1%	0.0%	0.0%
Timber	-2.3%	10.0%	-0.2%
Swiss Equity	15.8%	5.0%	0.8%
Foreign Equity (US)	5.4%	0.0%	0.0%
Foreign Equity (UK)	17.0%	0.0%	0.0%
Foreign Equity (Eurozone)	19.1%	0.0%	0.0%
Foreign Equity (Japan)	-4.2%	0.0%	0.0%
Emerging Mkt. Equity	9.3%	0.0%	0.0%
Equity Market Neutral	-0.5%	0.0%	0.0%
		100.0%	-3.3%

	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
Equally Weighted Portfolio	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	10.0%	0.0%
Swiss Bonds	-4.8%	10.0%	-0.5%
Global Bonds	-1.5%	10.0%	-0.2%
Domestic Commercial Property	16.6%	10.0%	1.7%
Foreign Commercial Property	24.0%	10.0%	2.4%
Commodities	-8.1%	10.0%	-0.8%
Timber	-2.3%	10.0%	-0.2%
Swiss Equity	15.8%	10.0%	1.6%
Foreign Equity (US)	5.4%	6.0%	0.3%
Foreign Equity (UK)	17.0%	1.0%	0.2%
Foreign Equity (Eurozone)	19.1%	2.0%	0.4%
Foreign Equity (Japan)	-4.2%	1.0%	0.0%
Emerging Mkt. Equity	9.3%	10.0%	0.9%
		100.0%	5.7%

As noted above, we have also run our asset allocation model using equity market neutral (our proxy for uncorrelated alpha) as a possible investment. As shown below, only one target return portfolio received an allocation to EMN. We note that this may have something to do with our use of the Tremont Equity Market Neutral Index to measure the return on this strategy. The use of an index that tracked only Swiss Franc native EMN funds might have produced additional allocations to this strategy.

	YTD 31Oct06	Weight	Weighted Return
	In CHF		In CHF
2% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Swiss Real Return Bonds	0.0%	0.0%	0.0%
Swiss Bonds	-4.8%	52.5%	-2.5%
Global Bonds	-1.5%	2.5%	0.0%
Domestic Commercial Property	16.6%	10.0%	1.7%
Foreign Commercial Property	24.0%	0.0%	0.0%
Commodities	-8.1%	5.0%	-0.4%
Timber	-2.3%	10.0%	-0.2%
Swiss Equity	15.8%	10.0%	1.6%
Foreign Equity (US)	5.4%	0.0%	0.0%
Foreign Equity (UK)	17.0%	0.0%	0.0%
Foreign Equity (Eurozone)	19.1%	0.0%	0.0%
Foreign Equity (Japan)	-4.2%	0.0%	0.0%
Emerging Mkt. Equity	9.3%	5.0%	0.5%
Equity Market Neutral	-0.5%	5.0%	0.0%
		100.0%	0.5%