

Retired Investor

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This Month's Issue: Key Points

Our first feature article this month reports on our quantitative analysis of different strategies for either withdrawing or contributing funds to a portfolio on a regular basis. On balance, our analysis of different withdrawal strategies led us to two key conclusions. First, given the assumptions that underlie our model (e.g., about asset class risks, returns and correlations, and rebalancing strategy), the impact of different withdrawal strategies on goal achievement (measured by the probability of achieving a target bequest) was relatively low compared to the impact of other decisions (e.g., asset class weights and rebalancing strategy). Second, the impact of the withdrawal strategy chosen increased with the size of the income target, length of the time horizon, and expected level of portfolio volatility. Finally, if taxes were not a consideration, the sell your losers approach is generally preferred to the others. However, its advantage over the sell equal amount of winners and losers may be offset by the tax benefits from the latter strategy.

When an investor is systematically contributing funds to his or her portfolio, we found that he or she is well advised to buy an equal mix of the asset classes that are most over and underweight relative to their target asset allocations.

Our second article analyzes the new Oil MacroShares ETFs issued by Claymore Securities and MacroMarkets LLC. We do not find a compelling case for treating oil MacroShares as a separate asset class. Rather, the "up" share is best seen as a way of tilting one's commodity exposure more towards oil (which you could also do by switching from a fund that tracks the Dow Jones AIG Commodity Index to one that tracks the more energy oriented Goldman Sachs Commodities Index). As for the "down" share, there are better ways - like equities - to profit from a fall in the price of oil. That being said, we are quite enthusiastic about the MacroShares concept, and suggest other ways it could be applied with greater potential benefits to investors.

This month's product and strategy notes this month review sector rotation with REITS, summarize a number of recently published research papers on various aspects of investing, and also examine the wave of new ETF products that have recently been introduced.

This Month's Letters to the Editor

John Dizard of the FT has recently written two interesting columns. One noted that because commodity index funds' futures contract rollovers are predictable, traders have been making around 1.5% per year at the expense of commodity index investors. The other suggested that VIX futures were not an effective hedge against a stagnant equity market. Any reaction?

John Dizard (as well as his brother Stephen, who spent much of the last two decades running Citigroup's global special situations group) is a very smart guy, whom one does not disagree with lightly. In this case, we're not going to try. Rather, we'd like to expand a bit on his remarks. As is true of most actions that are predictable, there is no denying that commodity index funds' futures contract rollovers provide opportunities for other traders to earn low risk returns. The same used to be true of predictable reconstitutions of membership in the Russell 2000 Index. But over time, Russell changed its index rules to make this arbitrage harder to execute. We don't doubt that this will also happen with commodity index products. However, even with the added 1.5% in effective cost, we still believe that the substantial

long-term portfolio diversification benefits one can obtain from investing in commodities make it money well spent. Regarding the VIX, the point Dizard made is accurate: it “will not protect you from the chronic slow losses brought about by a bear market.” However, to use a sports analogy, that is not its role on a portfolio team. Long term protection against chronic equity bear markets is more effectively provided by other asset classes, such as high grade bonds, timber, property, and perhaps uncorrelated alpha strategies. Rather, the role of the VIX is more akin to crash protection, or a hedge against so-called extreme downside “tail events.” As we have noted in the past, avoiding large losses is perhaps more important than earning an extra .5% in average return when it comes to achieving long term portfolio goals, particularly for investors who are regularly withdrawing funds. Under these circumstances, we continue to believe there is a valid role for some volatility exposure in many portfolios, and hope that a product that makes it available to retail investors is eventually launched.

What do you think about the new global water iShare that Barclays just launched in the U.K.?

On the one hand, we appreciate the trend toward growing water scarcity in many parts of the world. On the other hand, it is very hard to see how this that trend will easily translate into high returns for investors – the political obstacles to raising water prices in line with the market value of the commodity are extremely challenging. That being said, there may be high returns to earn from investing in water purification, conservation and other technologies that will see rising demand as traditional water sources are put under increasing pressure. But that makes a water fund just a very specialized technology fund, the returns on which should be strongly correlated with overall equity market movements. In sum, it is hard for us to see how one can make a convincing argument for treating water as a separate asset class.

Global Asset Class Returns

YTD 28Feb07	In USD	In AUD	In CAD	In EURO	In JPY	In GBP	In CHF	In INR
Asset Held								
US Bonds	1.42%	1.62%	1.74%	1.17%	0.92%	1.11%	1.41%	1.38%
US Prop	5.90%	6.10%	6.22%	5.65%	5.40%	5.59%	5.89%	5.86%
US Equity	0.23%	0.43%	0.55%	-0.02%	-0.27%	-0.08%	0.22%	0.19%
AUS Bonds	2.28%	2.49%	2.60%	2.04%	1.78%	1.97%	2.27%	2.24%
AUS Prop	0.32%	0.52%	0.64%	0.07%	-0.18%	0.01%	0.31%	0.27%
AUS Equity	4.68%	4.89%	5.00%	4.43%	4.18%	4.37%	4.67%	4.64%
CAN Bonds	0.26%	0.46%	0.58%	0.01%	-0.24%	-0.05%	0.25%	0.22%
CAN Prop	9.85%	10.06%	10.17%	9.60%	9.35%	9.54%	9.84%	9.81%
CAN Equity	2.66%	2.86%	2.98%	2.41%	2.16%	2.35%	2.65%	2.61%
Euro Bonds	0.15%	0.36%	0.47%	-0.10%	-0.35%	-0.16%	0.14%	0.11%
Euro Prop.	6.28%	6.49%	6.60%	6.04%	5.79%	5.97%	6.27%	6.24%
Euro Equity	0.53%	0.74%	0.85%	0.28%	0.03%	0.22%	0.52%	0.49%
Japan Bnds	0.80%	1.00%	1.11%	0.55%	0.30%	0.48%	0.78%	0.75%
Japan Prop	1.17%	1.37%	1.49%	0.92%	0.67%	0.86%	1.16%	1.13%
Japan Eqty	3.87%	4.08%	4.19%	3.62%	3.37%	3.56%	3.86%	3.83%
UK Bonds	0.22%	0.42%	0.53%	-0.03%	-0.28%	-0.10%	0.21%	0.17%
UK Prop.	1.85%	2.05%	2.17%	1.60%	1.35%	1.54%	1.84%	1.81%
UK Equity	-0.81%	-0.61%	-0.49%	-1.06%	-1.31%	-1.12%	-0.82%	-0.86%
World Bnds	0.93%	1.13%	1.24%	0.68%	0.43%	0.61%	0.91%	0.88%
World Prop.	2.87%	3.07%	3.19%	2.62%	2.37%	2.56%	2.86%	2.83%
World Eqty	0.63%	0.83%	0.94%	0.38%	0.13%	0.31%	0.61%	0.58%
Commod	3.23%	3.43%	3.55%	2.98%	2.73%	2.92%	3.22%	3.18%
Timber	3.04%	3.25%	3.36%	2.79%	2.54%	2.73%	3.03%	3.00%
EqMktNtrl	0.45%	0.66%	0.77%	0.20%	-0.05%	0.14%	0.44%	0.41%
Volatility	33.39%	33.60%	33.71%	33.14%	32.89%	33.08%	33.38%	33.35%
Currency								
AUD	-0.20%	0.00%	0.11%	-0.45%	-0.70%	-0.52%	-0.22%	-0.25%
CAD	-0.32%	-0.11%	0.00%	-0.57%	-0.82%	-0.63%	-0.33%	-0.36%
EUR	0.25%	0.45%	0.57%	0.00%	-0.25%	-0.06%	0.24%	0.20%
JPY	0.50%	0.70%	0.82%	0.25%	0.00%	0.19%	0.49%	0.46%
GBP	0.31%	0.52%	0.63%	0.06%	-0.19%	0.00%	0.30%	0.27%
USD	0.00%	0.20%	0.32%	-0.25%	-0.50%	-0.31%	-0.01%	-0.04%
CHF	0.01%	0.22%	0.33%	-0.24%	-0.49%	-0.30%	0.00%	-0.03%
INR	0.04%	0.25%	0.36%	-0.20%	-0.46%	-0.27%	0.03%	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.

Equity Market Valuation Analysis at 28Feb07

<i>Australia</i>	Low Demanded Return	High Demanded Return
High Supplied Return	72%	107%
Low Supplied Return	110%	150%

<i>Canada</i>	Low Demanded Return	High Demanded Return
High Supplied Return	98%	163%
Low Supplied Return	184%	268%

<i>Eurozone</i>	Low Demanded Return	High Demanded Return
High Supplied Return	76%	123%
Low Supplied Return	129%	184%

<i>Japan</i>	Low Demanded Return	High Demanded Return
High Supplied Return	110%	209%
Low Supplied Return	269%	420%

<i>United Kingdom</i>	Low Demanded Return	High Demanded Return
High Supplied Return	50%	92%
Low Supplied Return	92%	140%

<i>United States</i>	Low Demanded Return	High Demanded Return
High Supplied Return	115%	178%
Low Supplied Return	202%	284%

<i>Switzerland</i>	Low Demanded Return	High Demanded Return
High Supplied Return	88%	157%
Low Supplied Return	176%	243%

<i>India</i>	Low Demanded Return	High Demanded Return
High Supplied Return	149%	237%
Low Supplied Return	300%	427%

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

Bond Market Analysis as of 28Feb07

	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	2.55%	2.96%	5.51%	5.69%	0.18%	-1.70%
Canada	1.77%	2.40%	4.17%	4.03%	-0.14%	1.34%
Eurozone	1.96%	2.37%	4.33%	3.96%	-0.37%	3.58%
Japan	1.16%	0.77%	1.93%	1.64%	-0.29%	2.89%
UK	1.31%	3.17%	4.48%	4.80%	0.32%	-2.98%
USA	2.20%	2.93%	5.13%	4.56%	-0.57%	5.58%
Switz.	1.44%	2.03%	3.47%	2.54%	-0.93%	9.45%
India	3.05%	7.57%	10.62%	8.05%	-2.57%	26.50%

*Derived from ten year yield and forecast inflation

It is important to note some important limitations of this analysis. First, it uses the current yield on real return government bonds (or, in the cases of Switzerland and India, the implied real yield if those bonds existed). Over the past forty years or so, this has averaged around 3.00% in the United States. Were we to use this rate, the required rate of return would generally increase. Theoretically, the “natural” or equilibrium real rate of interest is a function of three variables: (1) the expected rate of multifactor productivity growth (as it

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

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

Real Interest Rate Analysis at 28Feb07

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	2.25%	1.50%	1.75%	1.00%	1.25%	2.00%
MFP Growth	1.60%	1.20%	1.40%	0.60%	1.40%	1.40%
Theoretical Real Rate	2.65%	1.74%	2.03%	1.10%	1.48%	2.35%
Real Rate	2.55%	1.77%	1.96%	1.16%	1.31%	2.20%

Our bond market analysis also uses historical inflation as an estimate of expected future inflation. This may not produce an accurate valuation estimate, if the historical average level of inflation is not a good predictor of average future inflation levels. For example, if expected future inflation is lower than historical inflation, required returns will be lower. 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 (e.g., between a low volatility, relatively high return regime, and a high volatility, lower return regime). The second is the difference between BBB and AAA rated bonds, which may tell us more about the level of compensation required by investors for bearing credit risk. For example, between August and October, 1998 (around the time of the Russian debt default and Long Term Capital Management crises), the AAA-Treasury spread jumped from 1.18% to 1.84%, while the BBB-AAA spread increased by much less, from .62% to .81%. This could be read as an indication of investor's higher concern with respect to the systematic risk implications of these crises (i.e., their potential to shift the financial markets into the low return, high volatility regime), and lesser concern with respect to their impact on the overall pricing of credit risk.

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

	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 28 February 2007, the AAA minus 10 year Treasury spread was .64%. 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 .89%. This was below the long-term average compensation for bearing credit risk. The stability of this spread over the past year 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.

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

Annual Exchange Rate Changes Implied by Bond Market Yields on 28Feb07

	To AUD	To CAD	To EUR	To JPY	To GBP	To USD	To CHF	To INR
From								
AUD	0.00%	-1.66%	-1.73%	-4.05%	-0.89%	-1.13%	-3.15%	2.36%
CAD	1.66%	0.00%	-0.07%	-2.39%	0.77%	0.53%	-1.49%	4.02%
EUR	1.73%	0.07%	0.00%	-2.32%	0.84%	0.60%	-1.42%	4.09%
JPY	4.05%	2.39%	2.32%	0.00%	3.16%	2.92%	0.90%	6.41%
GBP	0.89%	-0.77%	-0.84%	-3.16%	0.00%	-0.24%	-2.26%	3.25%
USD	1.13%	-0.53%	-0.60%	-2.92%	0.24%	0.00%	-2.02%	3.49%
CHF	3.15%	1.49%	1.42%	-0.90%	2.26%	2.02%	0.00%	5.51%
INR	-2.36%	-4.02%	-4.09%	-6.41%	-3.25%	-3.49%	-5.51%	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:

Commercial Property Securities Analysis as of 28Feb07

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	2.55%	2.50%	5.3%	-0.2%
Canada	1.77%	2.50%	3.5%	0.8%
Eurozone	1.96%	2.50%	2.0%	2.4%
Japan	1.16%	2.50%	1.2%	2.5%
Switzerland	1.44%	2.50%	3.4%	0.5%
United Kingdom	1.31%	2.50%	1.9%	2.0%
United States	2.20%	2.50%	3.4%	1.3%

A very rough way to test the reasonableness of these implied expected growth assumptions is to compare them to the expected real annual change in commercial rents over the next five years. If you think the real growth estimates are too high relative to your expectation for changes in rents, 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 (Australia excepted), 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 28 February 2007 closing value of 171.01 was

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

Our approach to assessing the current 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 28 February 2007, the VIX closed at 15.42. This is .6 standard deviations below the VIX's long term average value. This level strikes us as low in light of rising uncertainty in the economy and financial markets. Hence, we conclude that equity volatility is likely undervalued today.

Sector and Style Rotation Watch

The following table shows a number of classic style and sector rotation strategies that attempt to generate above index returns by correctly forecasting turning points in the

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

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

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

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

<i>Rolling 3 Month Returns Through</i>		28-Feb-07		
Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
Style and Size Rotation	Small Growth (DSG) 2.07%	Small Value (DSV) 1.71%	Large Value (ELV) 0.58%	Large Growth (ELG) 0.58%
Sector Rotation	Cyclicals (IYC) 2.99%	Basic Materials (IYM) 5.59%	Energy (IYE) -5.84%	Utilities (IDU) 4.72%
	Technology (IYW) -2.54%	Industrials (IYJ) 2.30%	Staples (IYK) 1.15%	Financials (IYF) 1.04%
Bond Market Rotation	Higher Risk (LQD) 1.16%	Short Maturity (SHY) 0.95%	Low Risk (TIP) -0.14%	Long Maturity (TLT) -0.42%

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.

Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	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
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 February 2007. 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	
Likely Undervalued	Equity Volatility
Probably Undervalued	Non-U.S. Dollar Bonds

Implementing Withdrawal and Savings Strategies

Over the past year, a number of readers have written to us asking if we had ever written about the best way to withdraw or add money to a portfolio. Up to now, we have not. In our modeling, we had assumed that funds withdrawn from or added to a portfolio were divided across different asset classes in proportion to their portfolio weights. Clearly, this was a simplifying assumption that was, in many cases, impractical (or at the very least, expensive) to implement in practice. In response to our readers’ requests, we have recently completed an analysis of different strategies that could be used to annually withdraw or add funds to a portfolio.

We tested three different strategies, as shown in the following table:

Strategy Focus	Withdrawing Funds	Adding Funds
Winners: Asset classes that are most above their target portfolio weights.	<i>Sell asset classes that are above their target weights until withdrawal amount is met. Start with asset class most above target weight, and sell down to target weight. If more money is needed, move on to next asset class. You could also call this: “take your gains.”</i>	<i>Buy asset class that is most above its target weight at time funds are added to the portfolio. Call this the momentum continuation approach.</i>
Losers: Asset classes that are most below their target portfolio weights.	<i>Sell asset classes that are below their target weights until withdrawal amount is met. Start with asset class most below target weight, and sell until target withdrawal amount is realized. If asset class is reduced to zero before target is reached, move on to next asset class. Call this, “cut your losses.”</i>	<i>Buy asset class that is most below its target weight at the time funds are added to the portfolio. Call this the trend reversal approach.</i>
Balanced Approach: Focus on both winners and losers in equal proportions.	<i>Sell asset classes that are most over and underweight in equal amounts to achieve withdrawal target while minimizing taxes.</i>	<i>Divide additions to the portfolio equally between asset classes that are most above and below their target weights.</i>

All our analyses were run in U.S. dollars, using the same asset class real return, risk, and correlation assumptions we used to develop our model portfolios. For each withdrawal strategy, we ran 10,000 simulations of our model to estimate the impact of the withdrawal strategy over a wide range of possible future conditions.

Withdrawal Strategies

Our initial analysis focused on a retiree with a twenty year time horizon who wanted to leave a bequest equal to 100% of the portfolio's starting value, while also withdrawing 4% of the portfolio's value (in real – that is, inflation adjusted – terms) each year. As we were focused on the impact of different withdrawal strategies, we started with an equally weighted asset allocation across eleven different asset classes (real return, domestic and foreign bonds; domestic and foreign securitized commercial property; commodities and timber; domestic, foreign and emerging markets equity; and equity market neutral, our proxy for uncorrelated alpha strategies). To minimize the potential impact of our rebalancing strategy assumption, we set our portfolio rebalancing trigger at 20% -- that is, an asset class would have to be either 20% above or below its target long-term weight to trigger a general rebalancing of the portfolio. Finally, we set the rebalancing adjustment factor equal to zero. To refresh readers' memories, the adjustment factor is designed to take advantage of mean reversion when portfolios are rebalanced. Rather than rebalancing all asset classes back to their target weights, the most overweight asset class is rebalanced to its target weight less the adjustment factor, while the most underweight asset class is rebalanced back to its target weight plus the adjustment factor. Given the similarity to the logic that underlies the winners and losers withdrawal strategies, we did not include a rebalancing adjustment.

At this point, you may be thinking that the analysis we undertook sounds a lot like the three dimensional chess Commander Spock used to play on Star Trek. As it turned out, that is a pretty good description of the dynamics we found. Our fitness criteria was the probability that our investor would achieve his or her bequest goal. Using the equally weighted portfolio, we found that the "sell your losers" strategy had a very slight advantage over the other two approaches (a 1% higher probability of achieving the bequest goal). When we further analyzed the dynamics involved, we found that the impact of the withdrawal strategy selected

was almost completely overwhelmed by the year-to-year changes in asset class and overall portfolio returns. The impact of the choice of withdrawal strategy was also dampened by the rebalancings that occurred over the 20 year period covered by our simulations.

Given this, we ran two further analyses, using equally weighted mixes of low and high volatility asset classes. In the former case, we gave 20% weights to real return, domestic and foreign bonds, along with timber and equity market neutral; in the latter, we used foreign commercial property, commodities, and domestic, foreign and emerging markets equity. We should also note that the higher volatility mix generated about a 7% higher probability (across all three cases) of achieving the bequest goal, compared to the low volatility mix. In the case of the high volatility portfolio, we found a slight disadvantage for the “sell your losers strategy” (about a 1% in terms of the probability of achieving the bequest goal) compared to the sell your winners and sell an equal mix of both strategies. In contrast, in the case of the low volatility portfolio mix, no withdrawal strategy had an advantage over the others.

Our next step was to raise the target annual withdrawal to 6% of the portfolio’s initial value. In this case, for the low volatility portfolio, the sell your losers strategy had a 1% advantage over sell and equal mix of your winners and losers, and a 3% advantage over sell your winners. In the case of the high volatility portfolio (which had about a 20% greater chance of achieving the bequest target, compared to the low volatility mix), sell your losers and sell an equal mix of winners and losers each had a 1% advantage over sell your winners. When we extended the time horizon for this case to thirty years, the relative advantage of the sell your losers strategy increased to 5% over sell your winners (based on an equally weighted portfolio), and 2% over the sell equal amounts of winners and losers approach.

On balance, our analysis of different withdrawal strategies led us to two key conclusions. First, given the assumptions that underlie our model (e.g., about asset class risks, returns and correlations, and rebalancing strategy), the impact of different withdrawal strategies on goal achievement (measured by the probability of achieving a target bequest) was relatively low compared to the impact of other decisions (e.g., asset class weights and rebalancing strategy). Second, the impact of the withdrawal strategy chosen increased with the size of the income target, length of the time horizon, and expected level of portfolio volatility. Finally, if taxes were not a consideration, the sell your losers approach is generally

preferred to the others. However, its advantage over the sell equal amount of winners and losers may be offset by the tax benefits from the latter strategy.

Contribution Strategies

In comparison to a retired investor, an investor who is still in the accumulation stage of life faces a relatively easy problem. In essence, a retired investor makes his or her investment problem harder each time he or she withdraws funds from his or her portfolio. In contrast, an investor saving for retirement makes his or her investment problem easier every time he or she contributes new money to his or her portfolio. That being said, our accumulating investor can still gain an additional edge by carefully choosing the contribution strategy he or she will use.

Our analysis was based on the situation facing an investor with thirty years remaining until retirement, who wanted his portfolio to increase by a multiple of 10x over its starting value. Each year, he also contributed 7.5% of the portfolio's initial value in the form of additional savings. Once again, we started with an equally weighted eleven asset class portfolio, and set our rebalancing trigger to 20% and our rebalancing adjustment factor to zero. Under these circumstances, the choice of contribution strategy had no impact on the probability of achieving the investor's accumulation goal, as it was overwhelmed by the inflow of new savings and fluctuation in asset class returns over time.

In our next analysis, we shifted to the five asset class "low volatility" portfolio. In this case, buying an equal mix of winners and losers had a 1% advantage (in terms of the probability of achieving the accumulation goal) over the buy winners strategy, and a 5% advantage over the buy losers strategy. We then analyzed the impact of switching to five equally weighted high volatility asset classes. Again, we found that buying an equal mix of winners and losers was the superior approach, with a one percent advantage over buying winners and a four percent advantage over buying losers. This was also the case when we cut the annual savings rate from 7.5% of the original portfolio value to 2.5%. In sum, we found that when contributing funds to his or her portfolio, an accumulating investor is well advised to buy an equal mix of the asset classes that are most over and underweight in his or her portfolio.

The Potential Benefits from MacroShares

In November 2006, Claymore Securities and MacroMarkets LLC (a firm co-founded by Robert Shiller, of Yale and “irrational exuberance fame”) issued the first so-called MacroShare ETFs. MacroMarkets and Shiller have long been focused on finding ways to make it easier for investors to hedge and speculate on macroeconomic risk factors. The new MacroShares were one result of this process, while exchange traded futures and options that track U.S. housing price indices were another.

The first issue of MacroShares were focused on oil price risk, as measured by the price of oil futures contracts traded on the New York Mercantile Exchange (NYMEX). Conceptually, the design of the oil MacroShares is elegant. They are issued as a matched pair of ETFs, with equal values when they were initially created. Cash received by Claymore when the ETFs were issued was invested in a portfolio of short-term Treasury securities. When the oil futures price index rises, the so-called “down” oil MacroShare (ticker DCR) makes a payment to the so-called “up” MacroShare (ticker UCR), and vice versa. As these transactions evolve over time, the net asset values of the two oil MacroShares will also evolve.

Unfortunately, UCR and DCR got off to a bit of a rocky start, with actual market prices trading at a premium (in the case of the up share) and discount (in the case of the down share) to their respective NAVs. Rumors had it that this was caused by uneven order flow and some initial issues related to market maker support to offset these market pressures. Whatever the the cause of these initial problems, they seem to be shrinking as the market gets more familiar with this new type of instrument. All of this is interesting, but begs the more important question: does either of these MacroShare ETFs belong in an investor’s portfolio?

For a preliminary answer to this question, we revisited our previous analysis of oil ETFs, and created a data series that tracked the reverse of the change in price of Brent crude oil (granted, this isn’t exactly the same as the NYMEX futures price, but it is close enough for our purposed here). We used this series as a proxy for the real return on the down oil MacroShare between the first quarter of 1989 and the last quarter of 2004. The correlations

between the real return on “down oil” and the real returns on other asset classes are as follows:

Asset Class	Correlation with “Down Oil”
Real Return Bonds	(0.06)
Domestic Bonds	0.18
Foreign Bonds	(0.01)
Domestic Commercial Property Securities	0.24
Foreign Commercial Property Securities	0.24
Commodities (DJ AIG)	(0.54)
Commodities (GSCI)	(0.80)
Timber	0.09
Domestic Equity	0.41
Foreign Equity	0.34
Emerging Equity	0.31
Equity Market Neutral	0.07
Equity Market Volatility	(0.32)

The results are pretty much what you would expect. When oil prices fall, it is good news for equities and commercial property, and generally bad news for investors who are long commodities and equity market volatility. The opposite would be the case for investors in the “up” oil MacroShare. Nowhere in this analysis, however, do we see a compelling case for treating oil MacroShares as a separate asset class. Rather, the “up” share is best seen as a way of tilting one’s commodity exposure more towards oil (which, as you can see in the table above, you could also do by switching from a fund that tracks the Dow Jones AIG Commodity Index to one that tracks the more energy oriented Goldman Sachs Commodities Index). As for the “down” share, there are better ways – like equities – to profit from a fall in the price of oil.

However, none of this should be interpreted as a criticism of the MacroShares concept. Rather, we just wish that MacroShares had been issued that track asset classes that are more useful from a portfolio management perspective. Like what? We have two suggestions: equity market volatility and the real change in U.S. Gross Domestic Product. Both of these

would provide valuable hedging benefits to many retail investors' portfolios. Consider the following table, which shows the correlation of the quarterly real returns on different asset classes with the real return on U.S. equity market volatility, as measured by the VIX index (think of it as the "up" volatility MacroShare) and the inverse of the change in U.S. real GDP, as measured by the U.S. Commerce Department's Bureau of Economic Affairs (think of it as the "down" GDP MacroShare):

Asset Class	Correlation with Volatility	Correlation with Falls in US GDP
Real Return Bonds	0.25	0.12
Domestic Bonds	0.19	0.36
Foreign Bonds	0.25	0.15
Domestic Commercial Property Securities	(0.34)	0.06
Foreign Commercial Property Securities	(0.37)	(0.00)
Commodities (DJ AIG)	(0.10)	(0.11)
Commodities (GSCI)	0.26	(0.07)
Timber	(0.08)	(0.09)
Domestic Equity	(0.61)	(0.17)
Foreign Equity	(0.47)	(0.18)
Emerging Equity	(0.51)	(0.12)
Equity Market Neutral	(0.09)	0.03

Both of these potential MacroShares look like they would be much more attractive candidates for inclusion in a broadly diversified asset class portfolio than the oil shares that are already on the market. Of course, another challenge would be finding enough investor interest on the other side of these MacroShares – that is, finding investors who would want to be short equity volatility (i.e., owning shares that would go up in value when the VIX falls) and long real GDP. The first probably wouldn't present much of a problem, as there is substantial anecdotal evidence that quite a few hedge funds are already boosting their returns by going short volatility. Finding parties to go long GDP might be more of a challenge, as some may believe there are better ways to do that (e.g., by being long domestic or global equity).

However, with the use of leverage, we suspect that the returns on the up GDP MacroShare might be made sufficiently attractive to attract sufficient attention from the hedge fund world.

In sum, in spite of the initial teething pains that have been experienced since their launch, the concept of MacroShares holds great promise for opening up access for retail investors to a range of new asset classes that could provide substantial new diversification benefits to their portfolios. We look forward to the continued expansion of this product line.

Product and Strategy Notes

Style Rotation With REITS

Once confined to equities, style rotation as an investment strategy is slowly spreading to other asset classes as new index products are introduced. At some point, we expect it will come to the market for commercial property securities, especially now that the popularity of Real Estate Investment Trusts (REITS) is growing around the world. So how might REIT sector rotation unfold? Let's start with the four main categories of commercial property securities. Office properties are the most glamorous of the lot, and if they are in a central business district, often come with long term leases and creditworthy tenants. However, office building projects also take a long time to come together, and too often arrive in large numbers just as an economic cycle is peaking. At the other end of the spectrum are apartment REITs. The supply of this type of property is more flexible, and while leases are shorter than in the case of offices, it has the advantage of relatively constant demand (people always need a roof over their heads). For this reason, apartments are considered the most defensive of the four property types. In between offices and apartments lie industrial and retail properties. Industrial properties in REIT form are often in short supply. Like apartments their supply is relatively easy to expand, and like offices they often have quite creditworthy tenants. Retail properties are the wild card of the bunch, as they are more location dependent, and, given their typical lease structure (base plus a percentage of sales), they can generate quite high rents when times are good.

So how might an investor think about putting together a rotational strategy using these four property types? While real estate valuations have historically been considered a contemporaneous economic indicator, as more property has become securitized in the form of

REITS, let’s assume that, like equities, rolling REIT returns increasingly become a leading indicator of the future economic conditions investors expect. In our monthly market valuation update, we describe the four stages of a typical economic cycle as follows:

<i>Economic Growth Rate</i>	Bottoming	Strengthening	Peaking	Weakening
<i>Interest Rates</i>	Falling	Bottoming	Rising	Peaking

If REIT sector returns are indeed forward looking, we would expect rolling three month returns for a given sector to peak in the period before the occurrence of the economic conditions most favorable to its valuation. For example, rolling returns for office properties should peak when the economy is strengthening and interest rates are bottoming, since the next period (when the economy is peaking) will produce the highest demand for office space and the highest average rents. The following table shows how this logic applies to the other three main segments of the commercial property market:

<i>Economic Growth Rate</i>	Bottoming	Strengthening	Peaking	Weakening
<i>Interest Rates</i>	Falling	Bottoming	Rising	Peaking
<i>Highest Rolling REIT Returns</i>	Retail	Office	Apartment	Industrial

As you can see, this table describes a cycle in which as the economy hits bottom and begins to turn, the demand for industrial space is the first to recover. Rising employment and incomes subsequently generate rising retail sales, and later a demand for more office space. Finally, as the economy turns down, there is a defensive move into apartments properties. As always, describing this cycle is much easier than generating superior risk adjusted from an active investment strategy that tries to anticipate its turning points. If one only invests when rolling three month returns for a sector are high, most of the potential upside will logically have accrued to other investors. The key point is that superior returns are generated by superior forecasts – not by waiting to see where the herd is headed and then joining it. Unfortunately, consistently producing superior forecasts of the future performance of publicly traded securities is exceptionally difficult. In this regard, real estate securities are no different from

any other segment of the financial market – we believe that over the long run most investors will be better off buying a broadly based index fund, and leaving the thrills and spills of sector rotation strategies to others.

Interesting Recent Research Papers

As regular readers know, we read a lot of research papers. While we try to incorporate as many of them as possible into longer articles on subjects of interest, some of them don't immediately lend themselves to this purpose. Yet their findings are still interesting. Here are some examples. The OECD recently published two new research papers on a topic we have written about in the past: longevity risk. "Longevity Risk and Private Pensions" Pablo Antolin highlights the fact that many defined benefits pension plans have inadequately taken this risk into account, and attempts to quantify the potential impact. The key finding is that the size of the risk grows as the average age of people in a plan declines, and can reach very substantial levels. Of course, this raises the obvious question as to how plans might hedge this risk. In "Governments and the Market for Longevity-Indexed Bonds", Antolin and Blommestein show how governments already have significant exposure to this risk themselves (e.g., via their commitments to provide old age related benefits), and might logically be reluctant to add to it by issuing longevity indexed bonds. On the other hand, the authors also note that governments are ideally positioned to establish and maintain the longevity indexes which are a necessary precondition to further private sector innovations in this critical area.

Moving on to other topics, in "A Two-Factor Asset Pricing Model and the Fat-Tailed Distribution of Firm Sizes", Malevergne and Sornette note that, while in theory diversification causes the capitalization weighted market portfolio to contain no firm-specific risk, in practice this assumption is violated when the distribution of firm market capitalizations follows a power law. In other words, an investor holding the broad market index may still end up exposed to some firm specific risk in the companies with the largest weights in the index. The authors then show how a combination of the equally weighted portfolio (which proxies for this under-diversification risk) and the market capitalization weighted portfolio is a superior asset pricing model than the market capitalization weighted portfolio alone – that is, a model which forecasts future stock returns based on exposures ("betas") to both factors is

more accurate than one that only uses the market cap weighted factor. This approach is compared with the more widely known four factor model of Fama, French and Carhart (which forecasts returns based on exposure to the market cap weighted factor, plus size, value and momentum factors), and shown to be equivalent to it.

In reading the popular press, one frequently sees assertions that the benefits of international diversification have declined in recent years, as equity markets have become more integrated. However, in a recent paper (“Is the International Diversification Potential Diminishing?”), Karen Lewis of the University of Pennsylvania finds that the covariance between the U.S. and foreign markets has increased only slightly over the past twenty years. Moreover, “when [an investor] is restricted to holding foreign assets in the form of market indexes, the optimal allocation in foreign markets has actually increased over time.”

On another front, in “Forestry and The Carbon Market Response to Stabilize Climate”, Tavoni, Sohngen, and Bosetti explicitly link forestry management to the achievement of the Kyoto Protocol’s objectives to reduce greenhouse gas emissions. They find that biological sequestration of CO₂ (i.e., forestry management) could reduce the price of carbon emissions by 40% by 2050. This suggests that in the future, we may see an inverse correlation between returns on timberland and carbon allowances, when and if trading in the latter grows.

In the past, we have written about the complicated trade-off retired investors face between achieving their bequest goals and hedging their longevity risk via the purchase of annuities. A new paper by Horneff, Maurer, Mitchell and Stamos (“Money in Motion: Dynamic Portfolio Choice in Retirement”) covers the same issues and reaches the same conclusion that we did: the option to annuitize a part of one’s savings should not be exercised all at once, and should never be completely taken up.

Rebalancing strategy is another favorite topic of ours. Vanguard has just published a paper (“Do Trader’s Win? Trading Behavior and 401(k) Portfolio Performance”) that reinforces many of the points we have made over the years. Specifically, the most frequent traders tend to underperform, while a disciplined approach to rebalancing strategy generates superior returns. Unfortunately, Vanguard finds that only nine percent (!) of plan participants rebalance their 401(k) accounts.

Still More New ETF Products

You have to give ETF marketers credit for one thing: they are an industrious bunch, even as we increasingly observe that most of the new products they produce are of little benefit to most investors' portfolios. Recent months have generally not been an exception to this rule. For example, Barclays Global Investors has launched a number of new ETFs that disaggregate the broad fixed income market and allow investors to take on finely targeted exposures to duration (maturity), credit risk, and mortgage prepayment risk. The only question we have is, "why would any non-professional investor want to do this?" As we have noted many times in the past, a most of the return on any domestic fixed income investment comes from changes in the yield of the five year government bond. Returns from other sources are more often than not marginal in comparison, and can be bought en masse by buying a broad based fixed income fund. Up to now, iShares AGG has been the only way for investors to do this via ETFs. However, Vanguard has now made its Total Bond Market Fund available in ETF form (BND) at an expense ratio of only 11 basis points. On the other hand, to give Barclays credit, we are big fans of the new Index Linked Gilt (real return bond) ETF it launched in the UK. Unfortunately, despite all the innovation in fixed income ETFs, we have yet to see a product that makes it easy for investors to gain exposure to foreign currency bonds.

Recent months have also seen an extension of other trends. As advisers and retirees continue to seek ways to earn high income returns, ETF product providers have responded, initially with high dividend oriented products, and now with products that track the high yield bond market (HYG) and U.S. Preferred Stocks (PFF). As we have repeatedly noted in the past, we believe that this focus on income is rooted in an irrational aversion to "eating into one's capital" and can too easily lead to uncomfortably high risk exposures (e.g., who out there thinks that this is just a great time to be adding to your exposure at the more exciting end of the credit risk spectrum, via a product like HYG?). Instead of this approach, we focus on total returns for an asset class (income plus capital gains), and even more important, the total returns to an overall portfolio.

Slicing and dicing a broad asset class into ever smaller pieces is a trend that is now moving beyond equity and fixed income. SSGA has introduced a range of new products that

divide emerging markets equities into regional slices. New commodity products are also being introduced (e.g., iShares new natural gas ETF, which joins oil and precious metals ETFs and soon sub-segments of broader indexes, which will track agricultural, metals, and energy), as are new commercial property products (e.g., products in Europe and the United States that track regional commercial property indexes, and soon products that will track subsegments of the commercial property market like the apartment, industrial, retail and office sectors). While we like the sub-sector commodity products (because they will enable construction of equally weighted exposures to this asset class, which should maximize diversification benefits and returns), and many of the commercial property products (that make it easier for investors to gain exposure to domestic and foreign commercial property markets), too many of the sub-asset class ETF products leave us cold. We fear that they will tempt retail investors to believe they can successfully play the sector rotation game (against the professionals), and/or provide unscrupulous advisers with another opportunity to generate commissions by pitching spurious benefits to unsuspecting and trusting clients (e.g., “diversifying” exposure across products whose returns have correlations of .9 or higher).

2006-2007 Model Portfolios Year-to-Date Nominal Returns

We offer over 2,000 model portfolio solutions for subscribers whose functional currencies (that is, the currency in which their target income and bequest/savings are denominated) include Australian, Canadian, and U.S. Dollars, Euro, Yen, Pounds-Sterling, Swiss Francs and Indian Rupees. In addition to currency, each solution is based on input values for three other variables:

- The target annual income an investor wants her or his portfolio to produce, expressed as a percentage of the starting capital. There are eight options for this input, ranging from 3 to 10 percent.
- The investor's desired savings and/or bequest goal. This is defined as the multiple of starting capital that one wants to end up with at the end of the chosen expected life. There are five options for this input, ranging from zero (effectively equivalent to converting one's starting capital into a self-managed annuity) to two.
- The investor's expected remaining years of life. There are nine possible values for this input, ranging from 10 to 50 years.

We use a simulation optimization process to produce our model portfolio solutions. A detailed explanation of this methodology can be found on our website. To briefly summarize its key points, in order to limit the impact of estimation error, our assumptions about future asset class rates of return, risk, and correlation are based on a combination of historical data and the outputs of a forward looking asset pricing model. For the same reason, we also constrain the maximum weight that can be given to certain asset classes in a portfolio. These maximums include 30% for foreign equities, 20% for foreign bonds, domestic and foreign commercial property, and commodities (including a sub-limit of 10% on timber), and 10% for emerging markets equities. There are no limits on the weight that can be given to real return and domestic bonds, and to domestic equities.

Each model portfolio solution includes the following information: (a) The minimum real (after inflation) internal rate of return the portfolio must earn in order to achieve the specified income and savings/bequest objectives over the specified expected lifetime. (b) The long-term asset allocation strategy that will maximize the probability of achieving this return, given our assumptions and constraints. (c) The recommended rebalancing strategy for the portfolio. And (d) the probability that the solution will achieve the specified income and savings/bequest goals over the specified time frame.

We use two benchmarks to measure the performance of our model portfolios. The first is cash, which we define as the yield on a one year government security purchased on the last trading day of the previous year. For 2007, our U.S. cash benchmark is 5.00% (in nominal terms). The second benchmark we use is a portfolio equally allocated between the ten asset classes we use (it does not include equity market neutral). This portfolio assumes that an investor believes it is not possible to forecast the risk or return of any asset class. While we disagree with that assumption, it is an intellectually honest benchmark for our model portfolios' results.

The year-to-date nominal returns for all these model portfolios can be found here:
<http://www.retiredinvestor.com/Members/Portfolio/USA.php>