

The Index Investor

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This Month's Issue: Key Points

Our first feature article analyzes the turbulent events in many financial markets last month. Rather than a broad change in investor risk aversion, we conclude that the falls in asset prices reflected investors' changing forecasts about the probability of future downside scenarios occurring, and other investors' likely response to these changing perceptions. Until we see sharp rises in the price of low risk assets, it is incorrect to say that a broad change in risk aversion has occurred. Finally, we observe that, in the absence of substantial changes to retail investors' balance sheets, any increase in risk aversion is likely to be temporary.

Our second feature article presents an overview of key customer, technology and competitor trends in retail financial services, and the opportunities they create for both advisers and their clients. We conclude that it is long past time for a comprehensive approach to risk management to migrate from the institutional to the retail world. Our first product and strategy note reviews key elements of the technological "arms race" now underway between hedge funds and investment banks' proprietary trading desks. We find that in the quickly evolving world of "intelligent finance", it is harder than ever for most mere mortals to consistently profit from active management. Our second note summarizes a number of recent research studies on the subject of hedge funds. On balance, we conclude that our preference for a relatively small policy allocation to equity market neutral (and perhaps to global macro, for those wishing to "outsource" their tactical asset allocation) still makes sense. Our last note is an update on

H5N1 influenza developments. We conclude that readers should carefully monitor developments in Indonesia, and we provide three web resources to help you do this. Last but not least, this month's issue also contains a large number of interesting letters from our readers, on topics that include convergent versus divergent investing strategies, the valuation of the Japanese equity market, equity market neutral versus long/short hedge funds, country versus sector diversification, and the pros and cons of backtesting.

This Month's Letters to the Editor

What is the difference between a "convergent" and "divergent" investment strategy?

In broad terms, two active investing strategies interact in financial markets. The first focuses on the estimated fundamental value of an asset as the predictor of its future price. It rests on two assumptions: that it is possible to forecast asset value with a degree of accuracy beyond luck, and that investor behavior will eventually cause the market price to return to this fundamental value. It seeks to profit from the convergence of market prices and fundamental value, by selling short overvalued assets, and buying undervalued ones. In the hedge fund world, the equity market neutral strategy is an example of this approach.

The second investment strategy does not believe that it is possible to successfully forecast fundamental asset value. It recognizes that investor behavior can cause asset prices to diverge for long periods from estimates of fundamental value exist, particularly when these estimates are more uncertain than is normally the case. This strategy seeks to forecast future investor behavior, and profit from the continuation and reversal of trends. In the hedge fund world, the global macro strategy is an example of this approach.

Just to confuse investors, both of these two basic strategy types are known by a variety of names. The convergent strategy is also called "value", "contrarian", and "fundamental." The divergent strategy is also called "momentum", "chartist" or "trend-following." Finally, the amount of money that is invested using the convergent and divergent approaches varies over time. This gives rise to the complicated and unpredictable patterns in asset returns that make it so difficult for active managers to outperform index funds over the long-term.

What is the difference between “equity market neutral” funds and “long/short equity” funds?

Equity market neutral funds have a mix of long and short positions (in either individual stocks of the overall equity market) that are basically balanced. As a result, EMN funds have little or no exposure to, or correlation with, returns on the overall equity market. Their objective, to use the technical term, is to deliver “uncorrelated alpha.” In contrast, Long/Short funds hold a mix of positions, but usually have a net long exposure to the equity market. That means that a portion of their returns are due to market movements, rather than the stock picking skill of their manager. In other words, the return they deliver contains a mix of beta (market returns) and alpha (the return generated by manager luck or skill). For this reason, the returns on long/short funds tend to have higher correlations with the overall equity asset class.

Could you please explain again why you include equity market neutral in some of your model portfolios?

The logic behind our optional allocation to the equity market neutral strategy (since hedge funds are not, technically, a distinct asset class) is that its objective is to produce "uncorrelated alpha" -- that is, returns that have low or no correlation with the returns on broad asset classes (i.e., beta returns). If it can be achieved, uncorrelated alpha raises the probability of achieving our model portfolios' goals; hence we include it as an option. We also like uncorrelated alpha strategies because, though they incur higher fees than asset class index (beta) investments, you may also get something quite valuable in return (uncorrelated alpha). In contrast, traditional "long only" equity mutual funds (or, indeed, other hedge fund strategies) charge "active (alpha) prices" for what are, in fact, a combination of beta and alpha returns.

However, this begs two questions. First, how likely is it that any manager will be able to consistently deliver uncorrelated alpha? The honest answer is that while the data show that some managers can do this, they are rare and impossible to reliably identify in advance. In our view, this uncertainty argues for making EMN an option in our model portfolios, and limiting its maximum weight when used. The second question is how to invest in the equity market neutral strategy. Unfortunately, there is not, as yet, a product on offer that combines investments in many equity market neutral funds into a single retail package (again, it would be

stretch to call such a package an "index fund"). We have thus used a "second best" solution -- a mix of five publicly available mutual funds, each of which uses a strategy that tries to be close to, if not perfectly equity market neutral (i.e., they are more akin to long/short funds). The tickers for these funds are JAMNX, HSGFX, ANGLX, OGNAX, and RYMQX.

We acknowledge that this approach is open to criticism -- e.g., why should one expect these five funds (or any, for that matter) to deliver uncorrelated alpha in the future? As noted above, there is no way you can answer this question with anything approaching statistical confidence. Hence, we fell back on the "five P" approach. The PEOPLE running the funds appear, based on public filings, to be reputable; their investment POLICY aligns with our objectives; it is reflected in their PORTFOLIOS, at least in the public filings we have examined; their historical PERFORMANCE shows that, at least in the past, their approach has worked; and their PRICING did not seem high enough to offset their potential incremental portfolio benefits. We agree that this is a less than perfect solution; that is why we've made an allocation to EMN an optional ingredient in our model portfolios.

Why is the year-to-date return on the Pimco Commodities Real Return Strategy Fund (PCRDY) lagging significantly behind the Dow Jones AIG Commodities Index it is supposed to track?

We believe that the key difference lies in the performance of the asset classes in which the fund and the index invest their excess cash funds. Recall that, because a commodities futures contract can be purchased for less than its face value, an index fund based on commodities futures has a substantial amount of cash to invest. In effect, a commodity futures based index fund is a portable alpha strategy, in that this excess cash can be used to generate returns in excess of those on the underlying commodities contracts. The reported returns for the Dow Jones AIG Index assumes this cash is invested in short term U.S. Treasury Bills. However, PIMCO invests its fund's surplus cash in U.S. inflation protected securities (TIPS). This is logically consistent with PIMCO's view that its fund is primarily a hedge against unexpected inflation. However, because real interest rates have risen this year, the performance of TIPS has been negative, while short term Treasury Bills have generated slightly positive returns.

Japan's economy is growing at about 4% per annum, unemployment has fallen to 4.1% - the lowest for 8 years, and deflation seems to be finally ending. Against this apparently healthy backdrop, many 'value' oriented investors are seeing a lot of potential in Japanese equities. Yet your most recent equity valuation update highlights Japan as particularly overvalued. Please explain....

The issue you raise has two roots: the first is the distinction between attractively valued stocks and an attractively valued market. The second is the distinction between different implied time horizons. We don't doubt that, given the cyclical changes underway in Japan, there may be some undervalued assets available there today. However, implicit in that statement is some assumption about the time horizon; specifically, one would expect that at some point, the prices of these assets will converge to their fundamental values, and they will no longer be overvalued.

In contrast, our monthly asset class valuation analysis does not focus on individual securities. Rather, we apply a simple dividend growth model to reach a judgment about the valuation of the overall equity market on a fundamental basis from the perspective of an investor with a long-term time horizon. In the case of Japan, we have concluded that the equity market appears overvalued, based on alternative assumptions about future dividend growth rates and the appropriate equity market risk premium. This naturally raises a question about the reasonableness of the dividend growth and equity risk premium assumptions we use (the other terms in the valuation model, the real bond yield and current dividend yield, are readily observed and much less contentious).

Our future dividend growth rate assumption is based on the assumed growth rate for total factor productivity (TFP). Our low case assumption is 1% per year, and our high case assumption is 2%. These are lower than the overall economic growth rate, which also reflects growth in labor and capital inputs. Using TFP seems reasonable to us, as other authors have shown that dividend growth has historically been much lower than overall economic growth (see Arnott and Bernstein "Earnings Growth: The Two Percent Dilution" and, more recently, Dimson, Marsh and Staunton, "The Worldwide Equity Risk Premium"). In fact, our dividend growth estimates for Japan may actually be over-optimistic. According to OECD data, between 1993 and 2002, average annual TFP growth was only .6%, compared to 1.2% in the

United States. And according to Dimson, Marsh and Staunton's paper, between 1900 and 2005 Japan's average real annual dividend growth rate was actually a negative 2.39%. Finally, Japan is quickly aging and, culturally, has had great difficulty absorbing immigrants. Neither of these augurs well for strong total factor productivity growth in the future.

In our analysis, our low case equity risk premium assumption is 2.5%, and our high case assumption is 4%. The former reflects arguments that investors have reduced their required equity premium in recent years (for example, due to expanded diversification opportunities, and more flexible financial systems that make it easier to borrow rather than liquidate investments to smooth consumption over time). The latter is in line with recent academic research on the long-term world average ERP (see the Dimson, Marsh and Staunton paper). Again, when it comes to Japan, these are fairly aggressive estimates in historical terms. For example, between 1900 and 2005, the ERP versus bonds in Japan was 5.9% on a geometric basis (see Dimson, Marsh and Staunton, "Global Investment Returns Yearbook"). Between 1950 and 2005, it was 5.3%. Granted, between 1970 and 2005 (which saw the expansion and collapse of the Japanese bubble), it was only 0.4%. Yet that low realized premium reflects the incredible volatility experienced by Japanese equity market investors over this period, which surely could not have been anticipated in advance. It seems inconceivable to us that, after that experience, investors in the Japanese equity market wouldn't demand a higher risk premium today to invest in the overall equity market (once burned, twice shy and all that).

When you use these different assumptions in the dividend growth model, even in the most favorable valuation case (2% long-term TFP and dividend growth, and an ERP of only 2.5%), the Japanese equity market as a whole still appears to be fully valued today. And if you use either lower TFP growth or a higher ERP, it looks quite overvalued.

We all accept that correlations increase at times of crisis. Moreover, correlations between say UK and world equities have risen dramatically over the past ten years as have correlations between hedge funds and world equities. We all understand the problems of forecasting long term returns but is it perhaps the problems associated with forecasting volatility and above all correlation which are under-estimated ?

You have asked a very interesting question, which has generated a lot of thought but no easy answers in recent years. As you note, an examination of the historical data shows that many financial time series show evidence of two regimes, a “normal” one with relatively higher returns and lower volatility and correlations, and a “turbulent” one with lower returns and higher volatility and correlations. As one of the keys to achieving long-term investing goals is avoiding large losses, investors should try to protect themselves against the effects of turbulent regimes. The devil, of course, lies in the details. One way to do this, of course, would be to find a way to successfully forecast changes in volatility. On the one hand, over the last twenty years, much progress has been made in this area (for two excellent surveys, see “Volatility Forecasting” by Andersen, Bollerslev, Christoffersen, and Diebold, and “Forecasting Volatility in Financial Markets” by Poon and Granger). On the other hand, models that do this for multiple assets at the same time are still very challenging (for an overview, see “Multivariate Garch Models: A Survey” by Bauwens, Laurent and Rombouts), and open to the criticism that the methods they employ, while mathematically ingenious, do not reflect the way real investors behave (see “Forecasting Volatility” by Stephen Figlewski).

In the absence (so far) of reasonable models that can be used to forecast changes in volatility and correlation for multiple asset classes over long periods, we have taken three other steps. The first is to include in our basic model portfolios a wide range of asset classes, on the theory that this reduces average asset class correlation even during periods of high volatility. The second is to treat unhedged foreign currency bonds as a separate asset class. Some asset allocation models treat currency hedged foreign bonds as part of a larger fixed income asset class. However, our analysis of the historical record shows that unhedged foreign bonds have been one of the few asset classes whose correlation with others tends to fall rather than rise during crises. Finally, in our last asset allocation review, we included equity market volatility as a separate asset class in one set of our model portfolios. While we still lack products in this asset class that are easy for individual investors to use (which was also true of commodities until a few years ago, and foreign commercial property until quite recently), we thought it important to show how an allocation to equity volatility could provide a valuable hedge during a period of market turbulence. In sum, we agree with your points, and are taking what steps we can to address them.

I am concerned about the possibility of an extended downturn. Can you tell us how your model portfolios would have performed from about 1968 to 1982?

Unfortunately, while we share your concern about the future economic environment, your question does not have a simple answer. Unfortunately, we cannot backtest our portfolios over the dates you mention because many of the asset classes we use in our model portfolios either did not exist over the 1968 to 1982 period (e.g., real return bonds) or do not have available data series that go back to 1968 (e.g., domestic commercial property securities, commodities, timber, emerging markets equities, equity market neutral, and equity market volatility). Moreover, even if we could, there is no guarantee that the range of asset class returns over this period will match those that will occur during a future severe economic downturn. While history certainly tends to repeat itself, it never does so exactly. Because the global economy is a constantly evolving complex system, many fundamental changes have occurred in its structure since 1982 that have probably altered the return generating process for some asset classes, as well as the relationships between them. For this reason, even when the data are available, backtested results provide far less assurance than many people would like to believe. In truth, there is an irreducible level of uncertainty associated with investing that can never be fully quantified in terms of asset class statistics (e.g., risk, return, and correlation assumptions, etc.). The best steps we can take to manage our exposure to this uncertainty are to ensure our portfolios contain a range of significantly different return generating processes (i.e., are diversified across broad asset classes), and to monitor early warning indicators of impending trouble (see our March Economic Update) and to have a plan in place for adjusting our portfolio if they indicate danger ahead (see our January article on “Portfolios Under Different Crisis Situations”). We’re sure this is not a wholly satisfactory answer to your question. However, it is a very honest one.

Thank you for the article on timber. How much, if any, do you think that the housing slowdown (presumably to be followed with reduced new construction and reduced renovation) will hurt timber in the near term? Is timber correlated with residential real estate?

As we have noted in our writing, the return generating process for timber as an asset class essentially has two elements. The first is natural biological (volume) growth, which is essentially uncorrelated with returns on other asset classes. The second is demand for timber, and hence its price, which, as you note, is fundamentally dependent on the overall health of the economy (specifically, because of technological changes, demand for timber tends to grow somewhat more slowly than the overall economy). So, assuming an economic slowdown, the supply of timber keeps growing, while demand falls. Prices should therefore fall too. However, there is a force working against price falls — the ability of timberland owners to withhold timber from the market, and “store it on the stump” (i.e., not cut it down and sell it). This tends to limit price declines during economic downturns, which further contributes to timber’s low correlation of returns with other asset classes. So, as we have noted, in an economic downturn, we expect some decline in timber returns, but not to the extent we expect to see other asset classes suffer. Moreover, if the economic decline is severe, it may well trigger deflation, followed by a concerted attempt by central banks to reflate via Japan-style monetary expansion. This would tend to benefit timber, which as a physical asset is a good store of value during inflationary periods.

As a Swiss resident, I would like to thank you very much for introducing the edition for CHF investors! My question: I noticed that the weight allocated to equities - especially for the higher target return portfolios - is heavily tilted towards Swiss equities, much more so as compared to the EUR edition with regard to Eurozone equities. Knowing that the Swiss Stock Market Index (SMI) in itself is not well diversified (especially with the financial and pharmaceutical heavyweights in the Index), I would have assumed the substantial diversification benefits would result by allocation a larger equity portion to the different foreign equity regions. Could you please explain the rationale behind that strong focus on Swiss equities?

This issue you raise is one we, and others, have argued about, and not just in regard to Switzerland. The underlying issue is the trade-off between industry/sector and country diversification. On the one hand, there is an industry-based argument that one should regard Switzerland as part of a larger equity market -- whether that is defined as the Eurozone or Europe (including the UK and other non-Euro countries). This would produce an equity

allocation that is better diversified across industries. On the other hand, and certainly in the case of Switzerland (or, more specifically, people's confidence in its currency and stability), country effects have historically been very important. In our most recent biennial asset allocation review (the next one is in 2007), we decided that country effects were relatively more important. Hence our definition of "domestic equity" for Swiss Franc based investors, and the weight we gave to it. Only hindsight will tell if this was the right decision to make; reasonable people can and do disagree on this issue. However, as we noted in our March issue, the world economy seems inevitably headed for a period of quite rough weather. Under these circumstances, we believe that country effects will become more important relative to industry effects. And in this case, the advantage will undoubtedly be on Switzerland's side. That being said, we will undoubtedly be revisiting this issue again in next year's asset allocation review.

How often should an investor change her asset allocation?

In answering this question, we distinguish between an investor's long-term allocation (also known as the "strategic" or "policy" allocation) and temporary short-term ("tactical") adjustments that may be made to it. As we have described at length on our website (and now made easier via our new model portfolio pull-down menus), the minimum compound annual return an investor needs to earn on his or her portfolio is a function of four variables: (1) starting capital; (2) expected future savings rate; (3) size of accumulation goal; and (4) the number of year remaining until the target date for achieving that goal. Strategic asset allocation policy determines the mix of asset classes that will maximize the probability of achieving that compound rate of return over the long-term, while taking on as little risk as possible. Its determination is a function of (a) the way in which asset classes are defined, and which are included in the set of possible portfolio choices; (b) the assumptions made about asset classes' future returns and risks, and the relationships between them; (c) any constraints set on the maximum allocation to an asset class; and (d) the way the multiple period portfolio optimization problem is modeled.

This highlights a number of circumstances under which an investor might reconsider his or her strategic asset allocation: (1) if there is a significant change to available capital, the savings rate, or the size and timing of the accumulation goal (e.g., if one had a child, or

received a large inheritance); (2) new asset classes became available (e.g., as has happened in the case of real return bonds, foreign commercial property, commodities, and, we hope, equity market volatility); (3) there is a significant change in the long-term return or risk outlook for one or more asset classes; and/or (4) there is a significant advance in technology that permits better modeling of the multi-period asset allocation problem.

In our approach, risk management should be the primary motivation for significant short-term departures from long-term asset class weights (e.g., those not associated with the regular rebalancing process). Specifically, in our monthly asset class valuation analyses we try to identify asset classes that have become substantially overvalued, while our semi-annual economic updates (and early warning indicators) aims to identify emerging situations that could have substantially negative consequences for one or more asset classes.

Global Asset Class Returns

YTD 31May06	In USD	In AUD	In CAD	In EURO	In JPY	In GBP	In CHF	In INR
Asset Held								
US Bonds	-1.00%	-3.63%	-6.56%	-9.24%	-5.80%	-9.69%	-8.72%	1.70%
US Prop.	7.50%	4.87%	1.94%	-0.74%	2.70%	-1.19%	-0.22%	10.20%
US Equity	3.10%	0.47%	-2.46%	-5.14%	-1.70%	-5.59%	-4.62%	5.80%
AUS Bonds	-2.27%	-4.90%	-7.83%	-10.51%	-7.07%	-10.96%	-9.99%	0.43%
AUS Prop.	3.60%	0.97%	-1.96%	-4.64%	-1.20%	-5.09%	-4.11%	6.31%
AUS Equity	10.58%	7.95%	5.02%	2.34%	5.78%	1.89%	2.86%	13.28%
CAN Bonds	4.63%	2.00%	-0.93%	-3.61%	-0.17%	-4.06%	-3.09%	7.33%
CAN Prop.	8.34%	5.71%	2.78%	0.10%	3.54%	-0.35%	0.62%	11.04%
CAN Equity	10.96%	8.33%	5.40%	2.72%	6.16%	2.27%	3.24%	13.66%
Euro Bonds	6.49%	3.86%	0.93%	-1.75%	1.69%	-2.20%	-1.23%	9.19%
Euro Prop.	18.13%	15.49%	12.57%	9.88%	13.33%	9.44%	10.41%	20.83%
Euro Equity	13.08%	10.45%	7.53%	4.84%	8.28%	4.40%	5.37%	15.79%
Japan Bonds	3.72%	1.09%	-1.84%	-4.52%	-1.08%	-4.97%	-4.00%	6.42%
Japan Prop.	-0.08%	-2.71%	-5.64%	-8.32%	-4.88%	-8.77%	-7.80%	2.62%
Japan Equity	3.55%	0.92%	-2.01%	-4.69%	-1.25%	-5.14%	-4.17%	6.25%
UK Bonds	7.62%	4.99%	2.06%	-0.62%	2.82%	-1.07%	-0.10%	10.32%
UK Prop.	19.79%	17.16%	14.23%	11.55%	14.99%	11.10%	12.07%	22.49%
UK Equity	12.38%	9.75%	6.82%	4.14%	7.58%	3.69%	4.66%	15.08%
World Bonds	1.85%	-0.78%	-3.71%	-6.39%	-2.95%	-6.84%	-5.87%	4.55%
World Prop.	8.55%	5.92%	2.99%	0.31%	3.75%	-0.14%	0.83%	11.25%
World Equity	6.55%	3.92%	0.99%	-1.69%	1.75%	-2.14%	-1.17%	9.25%
Commodities	1.30%	-1.33%	-4.26%	-6.94%	-3.50%	-7.39%	-6.42%	4.00%
Timber	0.60%	-2.03%	-4.96%	-7.64%	-4.20%	-8.09%	-7.11%	3.30%
EqMktNeutral	2.91%	0.28%	-2.65%	-5.33%	-1.89%	-5.78%	-4.81%	5.61%
Volatility	36.21%	33.57%	30.65%	27.96%	31.41%	27.52%	28.49%	38.91%
Currency								
AUD	2.63%	0.00%	-2.93%	-5.61%	-2.17%	-6.06%	-5.08%	5.33%
CAD	5.56%	2.93%	0.00%	-2.69%	0.76%	-3.13%	-2.16%	8.26%
EUR	8.24%	5.61%	2.69%	0.00%	3.44%	-0.45%	0.53%	10.95%
JPY	4.80%	2.17%	-0.76%	-3.44%	0.00%	-3.89%	-2.92%	7.50%
GBP	8.69%	6.06%	3.13%	0.45%	3.89%	0.00%	0.97%	11.39%
USD	0.00%	-2.63%	-5.56%	-8.24%	-4.80%	-8.69%	-7.72%	2.70%
CHF	7.72%	5.08%	2.16%	-0.53%	2.92%	-0.97%	0.00%	10.42%
INR	-2.70%	-5.33%	-8.26%	-10.95%	-7.50%	-11.39%	-10.42%	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	74%	110%
Low Supplied Return	113%	154%

<i>Canada</i>	Low Demanded Return	High Demanded Return
High Supplied Return	102%	168%
Low Supplied Return	190%	275%

<i>Eurozone</i>	Low Demanded Return	High Demanded Return
High Supplied Return	68%	111%
Low Supplied Return	115%	165%

<i>Japan</i>	Low Demanded Return	High Demanded Return
High Supplied Return	91%	188%
Low Supplied Return	233%	377%

<i>United Kingdom</i>	Low Demanded Return	High Demanded Return
High Supplied Return	49%	88%
Low Supplied Return	87%	132%

<i>United States</i>	Low Demanded Return	High Demanded Return
High Supplied Return	122%	185%
Low Supplied Return	211%	292%

<i>Switzerland</i>	Low Demanded Return	High Demanded Return
High Supplied Return	88%	151%
Low Supplied Return	168%	246%

<i>India</i>	Low Demanded Return	High Demanded Return
High Supplied Return	127%	208%
Low Supplied Return	253%	367%

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	2.58%	2.96%	5.54%	5.74%	0.20%	-1.88%
Canada	1.84%	2.40%	4.24%	4.36%	0.13%	-1.19%
Eurozone	1.89%	2.37%	4.26%	3.96%	-0.30%	2.91%
Japan	0.93%	0.77%	1.70%	1.82%	0.12%	-1.20%
UK	1.42%	3.17%	4.59%	4.58%	-0.01%	0.13%
USA	2.42%	2.93%	5.35%	5.07%	-0.28%	2.68%
Switz.	1.58%	2.03%	3.61%	2.68%	-0.93%	9.44%
India	2.86%	7.57%	10.43%	7.86%	-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, bond markets would generally look even more overvalued. It 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, it will reduce any apparent overvaluation.

Second, this analysis looks only at ten-year government bonds. The relative valuation of non-government bond markets is also affected by the extent to which their respective credit spreads (that is, the difference in yield between an investment grade or high yield corporate bond and a government bond of comparable maturity) are above or below their historical averages (with below average credit spreads indicating potential overvaluation). Today, in many markets credit spreads are at the low end of their historical ranges, which would make non-government bonds appear even more overvalued.

Third, 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.

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%	-1.38%	-1.78%	-3.92%	-1.16%	-0.67%	-3.06%	2.12%
CAD	1.38%	0.00%	-0.40%	-2.54%	0.22%	0.71%	-1.68%	3.50%
EUR	1.78%	0.40%	0.00%	-2.14%	0.62%	1.11%	-1.28%	3.90%
JPY	3.92%	2.54%	2.14%	0.00%	2.76%	3.25%	0.86%	6.04%
GBP	1.16%	-0.22%	-0.62%	-2.76%	0.00%	0.49%	-1.90%	3.28%
USD	0.67%	-0.71%	-1.11%	-3.25%	-0.49%	0.00%	-2.39%	2.79%
CHF	3.06%	1.68%	1.28%	-0.86%	1.90%	2.39%	0.00%	5.18%
INR	-2.12%	-3.50%	-3.90%	-6.04%	-3.28%	-2.79%	-5.18%	0.00%

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 year-to-date 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.

As a further check, we have also included rows that describe the typical cycles in the markets for commercial property and commodities. However, rather than being leading indicators of future economic conditions, they tend to coincide with current economic and interest rate conditions. 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.

Year-to-Date Returns on Classic Rotation Strategies in the U.S. Markets

YTD 31May06

<i>Economy</i>	Bottoming	Strengthening	Peaking	Weakening
<i>Interest Rates</i>	Falling	Bottom	Rising	Peak
<i>Style Rotation</i>	Growth (IWZ) -0.25%	Value (IWW) 5.88%	Value (IWW) 5.88%	Growth (IWZ) -0.25%
<i>Size Rotation</i>	Small (IWM) 7.97%	Small (IWM) 7.97%	Large (IWB) 2.65%	Large (IWB) 2.65%
<i>Style and Size Rotation</i>	Small Growth (DSG) 6.10%	Small Value (DSV) 7.90%	Large Value (ELV) 4.72%	Large Growth (ELG) -0.31%
<i>Sector Rotation</i>	Cyclicals (IYC) 1.90% Technology (IYW) -3.22%	Basic Materials (IYM) 9.66% Industrials (IYJ) 7.73%	Energy (IYE) 10.10% Staples (IYK) 1.10%	Utilities (IDU) 2.33% Financials (IYF) 3.88%
<i>Bond Market Rotation</i>	High Risk (VWEHX) 1.40%	Short Maturity (VBISX) 0.50%	Low Risk (VIPSX) -2.00%	Long Maturity (VBLTX) -5.40%

YTD 31May06

Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
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)
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

What Happened to Financial Markets in May?

Many global financial markets went on a wild ride in May. What changes caused the big falls in prices in some asset classes? According to many commentators, they were due to a sudden “increase in risk aversion.” What does this mean? Is that what really happened? Did people really become less willing to take the risk of crossing the street? As always, the truth of the matter is more complicated than many media commentators can squeeze into a thirty second spot. To understand what happened in May, we must first start with a model of how the price of an asset is determined.

So-called “fundamental” asset valuation models usually determine the price of an asset by discounting future cash flows to their present value. The formula for doing this is $[\text{cash flow}/(1+\text{discount rate})^{\text{Year}}]$, where “year” is the number of years from now that the cash flow occurs. These present models use one of two basic methodologies to take risk into account. The first does this by adjusting the discount rate (the denominator of the present value calculation), and the second takes risk into account by adjusting the the cash flows.

The first is by far the most common approach. It forecasts the “most likely” future cash flows an asset will generate, and then discounts them to their present value using a “risk-adjusted rate of return.” The latter is established by starting with the risk free rate (e.g., the current yield on inflation indexed government bonds) and adding to it an additional premium than reflects the riskiness of the cash flows being discounted. To put this slightly differently, this approach takes the riskiness of the future cash flows into account by adjusting the denominator of the valuation calculation.

The alternative approach takes risk into account in the numerator, by adjusting the projected cash flows, which are then discounted to their present value at the risk free rate. Here is a quick and easy example that illustrates this approach. To make it easier, we’ll leave inflation out of it, and assume all payments are in inflation-adjusted (real) terms. Say I offered to sell you a Bolivian government bond that promised contractual payments of U.S. \$100 per year for five years. Like most people, you probably don’t walk around with an appropriate risk premium for Bolivian risk at the top of your mind. However, you can easily answer this question: if I could exchange my five risky Bolivian payments for five annual payments from the U.S. government (or whatever home government you choose), how large would these latter

payments have to be to induce me to make the exchange? If you believe that Bolivian government risk and U.S. government risk are equivalent, then your answer would be \$100 per year. However, if you believe the Bolivian payments to be riskier than the U.S. government payments, you would accept payments of less than \$100 per year from the latter. For example, you might accept five \$70 payments from the U.S. government in exchange for the five \$100 payments from the Bolivian government. Moreover, once you had decided on these amounts, you could easily discount them to their present value at the U.S. government rate for a bond of the same duration (to simplify, let's just call this the five year real government bond rate). Assuming this rate is 2.25%, the present value of the five \$70 payments would be about \$335. This is the maximum price you would logically pay for the Bolivian government bond I am offering you.

Now that you understand the basic concept of taking risk into account in the cash flows rather than the discount rate, let's expand it a bit more. Logically, the amount you would accept from the U.S. government equals the expected value of the Bolivian payments. In turn, this expected value logically reflects the sum of the different amounts you expect to receive under different scenarios, times the probability of those scenarios. The following example helps to make this clear:

Initial Situation	Year 1	Year 2	Year 3	Year 4	Year 5
Most Likely Scenario Cash Flow	10	12	14	20	25
Probability of Most Likely Scenario	60%	60%	60%	60%	60%
Upside Scenario Cash Flow	12	14	20	25	30
Probability of Upside Scenario	10%	10%	10%	10%	10%
Downside Scenario Cash Flow	5	6	6	8	10
Probability of Downside Scenario	30%	30%	30%	30%	30%
Expected Cash Flows	8.7	10.4	12.2	16.9	21

Initial Situation	Year 1	Year 2	Year 3	Year 4	Year 5
Risk Free Discount Rate	2.25%				
Present Value	64.12				
Implied Risk Premium	4.86%				

As you can see, the 8.7 expected cash flow in Year 1 equals the forecast cash flow under the Most Likely Scenario (10) times its probability (50%) or 6.0, plus the probability adjusted cash flows under the Upside (12 x 10%) and Downside (5 x 30%) Scenarios, or (8.7 = 6.0 + 1.2 + 1.5). When the five annual expected cash flows (shaded) are discounted at the risk free rate of 2.25%, their present value is 64.12.

It is also easy to convert this calculation into the more traditional approach that takes risk into account in the denominator (discount rate) rather than the numerator (cash flows). You do this by determining the “risk adjusted” discount rate that makes the present value of the Most Likely Scenario’s cash flows equal to 64.12. In this case, that discount rate is 7.11%. This discount rate is composed of two parts. The first is the 2.25% risk free rate. The second is an Implied Risk Premium of 4.86%. This premium compensates investors for bearing the risk inherent in the asset’s cash flows.

So far, so good. We’ll now extend this example a bit further to generate some insight into May’s events. Let’s first examine what happens in our example if something in the economy changes, and causes forecast cash flows under all scenarios to be reduced by 10%. This result is shown in the following table:

Lower Growth Rate	Year 1	Year 2	Year 3	Year 4	Year 5
Most Likely Scenario Cash Flow	9	10.8	12.6	18	22.5
Probability of Most Likely Scenario	60%	60%	60%	60%	60%
Upside Scenario Cash Flow	10.8	12.6	18	22.5	27
Probability of Upside Scenario	10%	10%	10%	10%	10%

Lower Growth Rate	Year 1	Year 2	Year 3	Year 4	Year 5
Downside Scenario Cash Flow	4.5	5.4	5.4	7.2	9
Probability of Downside Scenario	30%	30%	30%	30%	30%
Expected Cash Flow	7.83	9.36	10.98	15.21	18.9
Risk Free Discount Rate	2.25%				
Present Value	57.71				
Implied Risk Premium	4.86%				

As you can see, while the reduction in forecast cash flows affects their expected present value, it has no affect on the Implied Risk Premium. To put it slightly differently, an economic change that reduces expected cash flows across all scenarios can reduce the price of an asset without implying any increase in the premium an investor requires to hold the asset. This is one explanation for the falls in some asset class values in May. For example, the announcement by the World Health Organization in mid-May that there was increasing evidence of easier human-to-human transmission of H5N1 influenza might have caused some investors to reduce their cash flow forecasts under all scenarios.

Now let's look at what happens if, instead of the forecast cash flows under all scenarios being affected, there is instead a change in the *probabilities* attached to different scenarios. More specifically, let's look at what happens if the probability assigned to the Downside Scenario over the next three years increases. The affect of this change is shown in the next table:

Revised Downside Probability	Year 1	Year 2	Year 3	Year 4	Year 5
Most Likely Scenario Cash Flow	10	12	14	20	25
Probability of Most Likely Scenario	55%	55%	55%	60%	60%
Upside Scenario Cash Flow	12	14	20	25	30

Revised Downside Probability	Year 1	Year 2	Year 3	Year 4	Year 5
Probability of Upside Scenario	5%	5%	5%	10%	10%
Downside Scenario Cash Flow	5	6	6	8	10
Probability of Downside Scenario	40%	40%	40%	30%	30%
Expected Cash Flow	8.1	9.7	11.8	16.9	21
Risk Free Discount Rate	2.25%				
Present Value	61.83				
Implied Risk Premium	6.04%				

As you can see, in this case, not only has the expected present value declined, but the Implied Risk Premium has also increased. The increased probability that the Downside Scenario will occur means that the asset is riskier; hence a higher premium is required to compensate an investor for holding it. This is another explanation for the falls in asset class prices we saw in May. For example, news about growing weakness in the United States housing market (which supports consumer spending, and, indirectly global economic demand) could have changed investors' estimate of the likelihood of a significant downturn in the global economy.

Undoubtedly, some of you reading this will say that what we have written thus far is a far too rational explanation of the way financial markets work. And of course you are right. In reality, there are an infinite number of possible scenarios and associated subjective beliefs about the probability they will occur (e.g., see our March economic update for examples). More importantly, not all investors in a market make their buy and sell decisions on the basis of some notion of fundamental (i.e., present) value. Rather, there is a second broad group of investors who use a different forecasting approach, and they too can have a large impact on prices. These investors forecasts the future price for an asset based not on its underlying economic fundamentals, but rather on the basis of the expected actions of other investors. In many cases, the forecasted behavior of other investors is derived from an analysis of past prices

for the asset in question. This investing strategy is known by many names, including “momentum”, “charting”, and “trend-following.” It is not necessarily an irrational approach. The more difficult it is to accurately forecast the fundamental (i.e., present) value of an asset, the more its price is likely to be affected by investor psychology and market price trends. In other words, the weaker the anchor provided by fundamental valuation, the more emotion (or, as John Maynard Keynes called them, “the market’s animal spirits”) will determine the price of an asset. (For more on this, see “Valuation Uncertainty and Behavioral Biases” by Alok Kumar, “Information Uncertainty and Stock Returns” by Frank Zhang, “Technological Revolutions and Stock Prices” by Pastor and Veronesi, and “Investor Sentiment and the Cross-Section of Stock Returns” by Baker and Wurgler). However, these conditions are inherently less stable than those in which there is a greater consensus about fundamental values. As a result, prices in markets dominated by trend-following investors tend to be more volatile, and prone to large changes over short periods of time.

The most interesting question is what causes these sharp changes to occur. There is no easy answer here, because of the underlying “infinite regress” problem involved, of the “I expect that you expect that I expect...” variety. (For more on this see “Everything That I Have to Say Has Already Crossed Your Mind” by Koppl and Rosser and “A Cognitive Hierarchy Model of Games” by Camerer, Ho and Chong). Moreover, accurately forecasting the behavior of other investors is made more difficult by the awkward fact that some of them are not perfectly rational (though that cannot be said of model-driven trading programs). There is ample evidence that not every investor has the same amount of knowledge, nor the same access to information, nor the same ability to learn from experience. They also suffer, to varying degrees, from different cognitive biases (e.g., excessive optimism and a reluctance to change one’s opinions, even in the face of conflicting evidence), pay attention to different news items, and have differing needs for social conformity (i.e., to make the same trades as their peers). The presence of such “boundedly rational” players in a market sometimes gives rise to herding, fads and similar behavior patterns (for two interesting non-financial examples, see “Information Cascades in Multi-Agent Models” by Devang and Lee, which looks at the movie industry, and “Management Fads, Pedagogies, and Other Soft Technologies” by Bendar, Huberman and Wu). In the context of investing, this can lead to bubbles and crashes, in which asset prices can

depart, sometimes for long periods and by significant amounts, from some notion of their underlying fundamental values before a sharp correction occurs.

In a market characterized by a substantial percentage of trend-following investors, large price swings occur when an accumulation of changes, both bits of news and communications between investors, reaches a “critical” or “tipping” point. Sometimes this tipping point is catalyzed by a highly visible story of the “emperor has no clothes” variety. More often, however, there is no highly visible cause; for example, people still argue about just what triggered the October 1987 equity market collapse. These cases are typically characterized by a growing feeling that “the market” is changing, that culminates in a decision to act. When many investors reach this point at about the same time, a significant order imbalance can result (e.g., many more sellers than buyers), causing market liquidity to dry up and a large price change to occur.

Could we have seen just this process occur in May? One could certainly argue that (as we did in our March Economic Update) there is a high degree of uncertainty in the global economy today, which translates into similar uncertainty about the fundamental value of many asset classes. And there are plenty of commentators who have stated their belief that trend-based trading has increased. Under these circumstances, a highly visible piece of news like Philip Coggan’s May 13/14 *Financial Times* “Something’s Gotta Give” article, or trades out of certain assets by highly regarded fundamental investors could certainly have catalyzed a significant change in investor emotion and behavior. Moreover, in a market characterized by the presence of many leveraged investors (like hedge funds), even moderate asset price changes can trigger substantial selling volumes. So a change in trend-followers’ forecast for the most likely behavior of other investors – triggering a decision to get out first -- is a third theory that explains the asset price falls we saw in many markets in May 2006.

In point of fact, the most likely case is that all three explanations played a role in last month’s events. Yet do any of them indicate a widespread rise in investor “risk aversion?” There is a difference between an overall change the compensation investors require to bear a given amount of risk and a change in an investor’s perception of the riskiness of a given asset. The former is truly a change in “risk aversion”, while the latter is a forecast change. When a change in risk aversion occurs, one would expect to see not only declines in the price of more risky assets, but also increases in the price of less risky assets. While May saw significant falls

in prices for risky asset classes such as emerging markets equities, it did not see significant increases in prices for low risk assets like short term U.S. Treasuries. While this may yet occur, it did not happen last month. Moreover, if an increase in risk aversion does occur, it seems likely to be a temporary rather than permanent change.

Given the size of their long-term financial goals compared to their current savings, many investors have recognized (no doubt reluctantly) that, unless they are willing to sharply reduce current consumption (and few are), they must bear a high level of investment risk. Absent this, they have no chance of earning the relatively high returns they need to achieve their objectives. While at some point in the future widespread debt forgiveness and/or a cultural shift away from conspicuous consumption may cause this situation to change, today these still seem unlikely to occur. Thus, any increase in investor risk aversion that happens seems likely to reverse.

None of this should be interpreted to mean that we don't expect further declines in some asset prices in the months ahead. As described at length in our March Economic Update, we expect investors to continue to increase the probability they give to downside scenarios, with additional negative consequences for prices in some asset classes, including equities of all types, riskier bonds, commodities (especially products that track energy heavy indexes like the GSCI), and commercial property (though like commodities, its price fall should be limited by its attractiveness as an inflation hedge). At some point, these falls will most likely trigger a true increase in risk aversion, which will be marked by rising prices for government bonds (both real and nominal return), foreign currency bonds (especially if you are a U.S. Dollar based investor), timber, and probably gold and silver. Our guess is that this will occur when asset price declines spread to domestic equity or commercial property markets. However, contrary to assertions by some market commentators last month, we have not yet reached this point.

Retail Financial Services Trends and Opportunities

For many years, I worked for a management consulting company, and did many projects in the financial services industry. As many of our readers are either advisers or sophisticated users of their services, we thought you would appreciate a short overview of how we see the industry is evolving, and the opportunities it presents.

Let's start with our theory of the competitive environment, and focus on customer needs, technology, and competitor offerings. Future customer needs are being driven by a number of very clear and accelerating trends. The first is the rapid ageing of the population in most OECD countries, driven not only by the baby boom generation, but also by the fact that all generations are living much longer.

HSBC Bank recently published a comprehensive survey of this subject, titled "*The Future of Retirement.*" Based on interviews with over 20,000 people in multiple developed and developing countries, one of its key conclusions was that "when given the choice between higher taxes, lower pensions, working longer and compulsory saving (in the form of enforced additional private savings) nearly 40% of all respondents choose compulsory saving. In almost every country and across all age ranges, more people choose compulsory saving than any other solution. Only in Singapore, Japan, China and Sweden do other policies receive greater support. In Singapore and Japan people say they would prefer the retirement age to be raised; in China and Sweden the largest groups support tax rises. Throughout the world no fewer than 93% of people – young and old – reject a reduction in pensions. Although many governments have shied away from compulsory savings, people recognize the necessity for them. They want to be in control and they are happy for pensions to be funded by private rather than tax-financed savings – but they need help to help themselves. This call for compulsory savings is a reflection of the confidence gap. Around the world people are saying to their governments: 'We need to finance our old age and are willing to do so, but we do not feel confident that you can do this for us. Nor are we confident, if taxes were raised, that the proceeds would be spent on providing for us in retirement.'" These findings also reflect a natural and growing concern with longevity risk.

The survey also found that "family, friends, and fitness" were the perceived as the keys to a satisfying retirement, while poor health was people's biggest fear. Two thirds of those surveyed wanted to travel during retirement, while 50% wanted to do more volunteer work or take up a new hobby. Substantial percentages of people around the world plan to work part-time in retirement, though for different reasons. In the USA, France, India and Japan, the primary motivation is to earn money; in Germany and the UK it is for the mental stimulation work provides; in Sweden it was for the social connections; and in Canada and Japan it was because work provides a meaningful way to spend their time. Despite these similarities across

countries, there was a significant difference in the extent to which retirement was associated with positive feelings, from a high of 84% in North America, to 68% in Europe and only 60% in Asia.

Individuals today are being forced to bear more than just the risk associated with accumulating the savings needed to achieve their retirement income goals. Health care is a growing worry for many people, even in countries with national health insurance systems, where rapidly rising costs are forcing governments to consider limiting coverage for some “luxury” type services, while allowing consumers to buy optional coverage for them in the private market. And in the United States, the cost of health insurance is rapidly rising for many people, as deductibles and copays are increased. Recent efforts to hold down these costs via the use of tax advantaged health savings accounts have created an even more explicit linkage between health and investment risks.

Education costs are also a growing worry for many investors, as poor public school quality forces more parents to bear the cost of private school, and government financial support for universities is cut back, forcing students (and their parents) to pay higher prices. And university costs continue to rise much faster than the rate of inflation.

Many of these same investors are also significantly exposed to interest rate risk, as they have substantial amounts of floating rate mortgage and credit card debt on their balance sheets. All of these factors make it hard to save as much as people might want. However, as HSBC found, they are equally unwilling to reduce their retirement goals. This has forced many of them to take on more investment risk than they might otherwise prefer.

Rising taxes are also a concern for many investors, as strong public sector unions, generous social programs, and growing pension and health care costs continue to exert upward pressure on government spending. All of these risks are compounded by what may be the biggest change of all: the increasing uncertainty and anxiety that many investors feel about their future income in a world characterized by intense global competition and substantial economic imbalances. They have seen the middle class shrink, as more and more people shift to either end of the income and wealth distribution. And they fear their next move may be down.

In sum, investors today face significantly more uncertainty and bear more risk than in the past, and feel much more anxious about it. In many cases, this is undoubtedly compounded

by the overall time pressure in their lives, and the information overload they encounter when trying to educate themselves about the issues they face and their options for managing them.

Broadband and search technologies have made it much easier to access relevant information; in addition, voice mail, email, TiVO, MP3s, streaming video and a host of other technologies have enhanced convenience by making time shifting possible. In the face of the flood of information produced by these technologies, the focus of software development (as noted elsewhere in this issue) is more and more on helping users make sense of the huge amount of data they confront. This is in line with another trend, which sees people paying premium prices for attractively designed, easy to use, well-integrated offerings that work right the first time. The Apple iPod epitomizes this trend. Yet at the other end of the spectrum, these same customers are aggressively seeking to save money by minimizing the price they pay for offerings that have effectively become commoditized.

In the retail financial services industry, we see a number of important changes in competitors' offerings. To begin with, there has been great emphasis in recent years on improving electronic accessibility and customer service. There has also been a great emphasis on delivering a broader offering to clients, that aim to satisfy the full range of customer needs, including forecasting and planning, making payments, borrowing, making and managing investments in real and financial assets, hedging risks and minimizing taxes. However, one gets the sense that the execution of many of these initiatives has been uneven, with weak integration across customer needs and a lingering traditional focus on products and transactions. In addition, these initiatives appear to be increasingly in conflict with growing customer price discrimination between differentiated and commodity offerings. Hence we are seeing a shift away from the product-centric approach, and toward the marketing of outcomes and results (which could also be called "solutions") that directly respond to customers needs. Tax managed products and lifecycle funds are examples of this. We also seeing the gradual appearance of more structured products that attempt to better address customers' risk management needs (e.g., new types of annuities), and an increasing split between low cost beta (index) products and higher cost products (like hedge funds) that seek to deliver low or uncorrelated alpha (i.e., returns with a low correlation to those on broad asset class indexes).

Where then, are the opportunities today in this market? Clearly, we believe that the separation of alpha and beta in the retail market has yet to run its course, and that the demand

will continue to grow for offerings that help customers make sense of the flood of information, and better educate themselves about the challenges they face and the choices they can make. And, as noted above, there are still many opportunities to improve the integration of existing offerings into more customer-friendly solutions. However, we believe that by far the biggest opportunity in the market is to deliver a much more comprehensive risk management offering to retail investors. The potential coverage of such an offering can be established by dividing risk between its cash flow and balance sheet components, as shown in the following table.

The Risks Individuals Must Manage

Decreased Income	Increased Expenses	Decreased Asset Value	Increased Liability Value
<ul style="list-style-type: none"> • Unemployment • Disability • Dying too soon • Living too long 	<ul style="list-style-type: none"> • Interest costs • Energy costs • Health care costs • Inflation in excess of income growth 	<ul style="list-style-type: none"> • Traditional property loss (e.g., storm damage) • Decline in residential property value • Decline in financial asset value 	<ul style="list-style-type: none"> • Traditional casualty loss (e.g., lawsuit) • Liability for future education expenses • Future retirement income liability (e.g., due to changes in company defined benefit plan or Social Security)

Clearly, there are many products that can be used to hedge these risks today, and more are on the way (e.g., residential property and macroeconomic derivatives). But products are not the only way to manage some of these risks. For example, financial advisers can help limit income risks by facilitating networking among their clients, and/or by helping them access angel investors and in other ways help them to become successful independent businesspeople. Taking this a step further, helping overstretched clients renegotiate and restructure their

borrowings during a prolonged economic downturn might also become a highly valued service offering. But perhaps the most valuable offering of all would be one that would enable a retail investor to take a comprehensive view of the multiple risks he or she faces. To some extent, this is old news in the institutional world; however we believe that this type of offering to retail investors, along with a broader mix of risk management products, would go a long way toward calming the almost free-floating anxiety many of them feel today. And it goes without saying that in so doing it would also vastly strengthen an investor's relationships with his or her adviser. In sum, I have the strong sense that there is a substantial opportunity in retail financial services today, created by quite rapid changes in customer needs and the slow and/or inadequate response to them by many industry leaders.

Tom Coyne
Editor

Product and Strategy Notes

On the Frontier of Technology and Active Management

As we have frequently noted, successful active investment management ultimately comes down to successful forecasting, of either fundamental asset values and/or the future actions of other investors. In turn, successful forecasting requires either access to superior information, and/or to a superior model to derive actionable investing insights from it. While almost every investor will, at some point, generate a superior insight, the data show that it is extremely difficult to do this consistently year after year. Superior information sources dry up or are copied, while superior models are replicated by competitors or have their key assumptions invalidated by changes in the structure of the real economy. This is why, as the investment horizon lengthens, the percentage of active managers who outperform index funds shrinks so dramatically.

However, the exploding number of hedge funds and still large number of actively managed mutual funds provide ample evidence that there are still many managers and investors who believe it is possible to outperform a well-diversified portfolio of index products over the long-term. In point of fact, the success of those index funds requires this belief in active

management. If at least some investors did not believe they could “beat the market”, nobody would search for new information or build new models, and asset prices would soon become inaccurate, thereby invalidating indexing’s basic premise.

What most people fail to appreciate is just how difficult “beating the market” has become. Essentially, there is a “technological arms race” underway among the world’s most active (and highly-compensated) managers, which generally include investment banks’ proprietary trading desks and hedge funds. This arms race has four main components. The first is developing new means to fuse multiple types of information (e.g., quantitative and qualitative data) in order to make sense of complicated and fast changing markets. The second is developing new models that simultaneously capture the multiple processes underway over multiple time frames within and across the markets for different financial assets. The third seeks to build game theory insights into analytical and trading models. Game theory studies the behavior of players in competitive situations, such as the contest between investment managers to earn the highest returns. This reflects the fact that, professional traders are, in a sense, like poker players. To succeed, both require not just an understanding of the odds (e.g., the distribution of past price changes for a given asset), but also insight into other players’ likely behavior (to put this more technically, trading and poker both involve a mix of decision and game theory). The fourth component of the technological arms race focuses on the minimization of so-called “trading friction”, or the costs involved in translating insights into portfolio positions. These costs include not only explicit commissions and bid/ask spreads, but also the impact of a trade on market prices. One name that has been given to this arms race is “intelligent finance”, the title of a recent overview by Pan, Sornette, and Kortanek.

This month, we’ll highlight one example of this trend. In the years since the September 11, 2001 terrorist attacks, the U.S. and other intelligence agencies have made substantial R+D investments in the field known as “NIMD”, for “Novel Intelligence from Massive Data Sets.” This is a technological response to the failure of the intelligence agencies to “connect the dots” in the period before 911, when, in hindsight, clues were available that, if they had been correctly combined, would have provided warning of the impending attack. We should note here that we are referring not to “strategic warning” (i.e., what and why?), which existed, but rather to so-called “operational warning” (how?) and “tactical warning” (when, where and who?), which were lacking. Crucially, many NIMD investments are focused on mining textual

and other non-numeric data to automatically generate hypotheses, marshal and evaluate evidence for and against them, and generate conclusions for human review. This new technology goes well beyond simple “search”, and focuses instead on “sensemaking.” Its implications are enormous, and its application to active investment management is obvious.

In fact, they are beginning to occur. One example of this is a fascinating working paper by Feng Li of the University of Michigan. In “Do Stock Market Investors Understand the Risk Sentiment of Corporate Annual Reports?”, he analyzes 10-K filings (which are available electronically) using a simple algorithm that counts the frequency of what Li calls “words related to risk and uncertainty.” He finds that companies with a higher number of these words in their 10-K have a much higher probability of negative earnings and returns during the subsequent year, and shows how a trading strategy based on this system would, in hindsight, generated substantial alpha (returns above the relevant market index).

Another implementation of this new technology is known as “news-based algorithmic trading.” This approach correlates historical news events and asset price changes to build models that can identify (and perhaps automatically trade on) similar “high price impact” news events in the future. See, for example, the paper “Which News Moves the Euro Area Bond Market?” by Anderson, Hansen and Sebestyeu. Another example is the so-called “heat index” produced by Relegence Corporation (www.relegence.com) for professional traders. It provides real time tracking of more than 10,000 news feeds, and highlights companies and other key phrases mentioned with the highest frequency. Today, this is being used to warn of impending increases in an asset’s volatility (which is correlated with an increasing number of news mentions).

In sum, there is a reason that hedge funds and investment bank proprietary trading desks are now filled with more physics, math, and psychology PhD’s than many university departments – consistently successful active management (i.e., the ability to consistently generate alpha) is becoming an ever-more capital and technology intensive, and extremely difficult game to play successfully over the long-term.

Hedge Funds Update

Hedge funds have once again been in the news, with Federal Reserve Bank of Atlanta holding a conference dedicated to the issues they raise, and the European Central Bank publishing a commentary on them in its latest Financial Stability Review. One of the most controversial subjects in the world of hedge funds is the extent to which existing indexes provide an accurate picture of the risks and returns from these investment strategies. The essential problem is that hedge funds self select when they will start reporting their results, and to which index they will contribute them. This creates a number of potential biases including selection (only successful funds will choose to report), survivorship (the indexes don't reflect the results of funds that stop reporting) and backfill (when firms start reporting, the index is "backfilled" with the fund's results up to that point, which often aren't matched by subsequent performance). Many academic papers have asserted that the net impact of these biases is a substantial overstatement of hedge fund returns, and an understatement of risk. In particular, a paper by Malkiel and Saha ("Hedge Funds: Risk and Return") that found a 4.5% over statement of average annual return has been a particular target of criticism by hedge fund supporters. Their counterargument is that survivorship bias is actually quite low, because it isn't just failing hedge funds that stop reporting, but also successful funds that are closed to new investors (the apparent logic being, "why report to an index if you aren't seeking new funds from investors?"). At the FRB Atlanta forum, Malkiel and Saha responded with another paper ("Why Do Hedge Funds Stop Reporting Their Performance") that found funds that ceased to report are more likely to be failing than delivering high returns.

Another issue that came up at the conference was the lower returns on so-called "investable" hedge fund index products, compared to those on the broader hedge fund indexes that they seek to replicate. Two explanations were offered, and both make sense. The first is that, because they allow more frequent capital withdrawals than the typical hedge fund, the investable index products should logically have lower returns because they carry less liquidity risk. The second point is that these investable products are based on larger hedge funds, and hedge funds' performance (like mutual funds') tends to decline with size (e.g., because great \$25 million dollar investment ideas are easier to find and profitably execute than great \$1 billion investment ideas).

Another set of papers looked at just how successful hedge funds have been at delivering alpha – that is, returns above some type of investable asset class benchmark index. In “How Smart Are The Smart Guys?”, Griffin and Xu make a number of interesting observations: the median equity hedge funds trades twice as much as the median mutual fund, its portfolio has a lower correlation to the market index than its median mutual fund peer, and it has a more pronounced tendency to prefer small value stocks. However, the authors cannot prove that “hedge funds in general are any better at long stock picking or timing sectors than mutual funds,” leading them to “question the ability of long-equity hedge funds to add value.” They acknowledge, however, that “hedge fund firms seem to have more differential ability in stock picking than mutual funds,” lending support to the widely held belief that the most talented active managers have moved from mutual to hedge funds because of the superior potential compensation they provide for active managers who are either very lucky or very skilled. In a related paper (“Sources of Hedge Fund Returns: Alphas, Betas, and Costs”), Ibbotson and Chen find that, in aggregate (and this varies across styles), underlying asset class returns (beta) account for the majority of hedge fund net returns after manager fees (5.4%, versus average alpha of 3.7%).

As always, the problem lies in identifying hedge fund managers who are truly skilled at generating alpha. In this regard, two other papers provide a sobering perspective. In “A Portrait of Hedge Fund Investors”, Baquero and Verbeek show that while investors are quite quick to pull their money from underperforming funds (unlike the average investor in actively managed mutual funds), they show no reliable ability to pick winning managers in advance. In “Hedge Funds: Performance, Risk and Capital Formation”, Fung, Hsieh, Naik and Ramadorai find diminishing returns to scale as hedge funds grow in size, as well as declining risk adjusted returns as they have become more popular and attracted more managers and capital. Specifically, they find that Funds of Hedge Funds (their proxy for an investable index) have seen declining returns, and on average deliver zero alpha (though about one in five did manage to deliver statistically significant alpha). Another paper (“Do Funds of Funds Deserve Their Fees on Fees?” by Ang, Kropf, and Zhuo) argues that because of the services they provide investors, funds of hedge funds deserve the fees they charge. However, other commentators have argued that the so-called “multistrategy” fund (in which a single fund company utilizes multiple strategies) is a more efficient approach than the fund-of-funds structure with its higher

level of fees. Time will tell who is right.

This brings us to the European Central Bank paper. Its primary concern is the potential impact of the growth of hedge funds on the stability of the financial system. It begins by noting both the rising correlation of returns between funds within different hedge fund categories (with equity market neutral and global macro notable exceptions to this trend) and the rising correlations between the categories themselves. For example, our own research shows that, in the two years ended April 30, 2006, the average monthly return correlation between hedge fund categories in the value weighted Tremont Hedge Index has risen by .27 compared to the five years ended in April, 2004. In the eyes of the ECB, “the increasingly similar positioning of individual hedge funds within broad hedge fund investment strategies is another major risk for financial stability which warrants close monitoring despite the essential lack of any possible remedies. This risk is further magnified by evidence that broad hedge fund investment strategies have also become increasingly correlated, thereby further increasing the potential adverse effects of disorderly exits from crowded trades. It is difficult to gauge what could cause correlated sell-offs and how damaging these could be, but one possible trigger could be an abrupt end of the recent global search for yield possibly induced by the tightening of global liquidity conditions. A further slowdown of inflows into hedge funds or even widespread redemptions could also exert pressures on individual hedge funds to liquidate increasingly less liquid holdings, as more hedge funds seem to be venturing into less liquid markets in order to earn [additional returns from] the associated liquidity premium.”

What is an investor to make of commentaries like these? The first lesson is that, as is usually the case, when a system becomes homogenous – that is, when it ceases to contain sufficient diversity – it becomes very vulnerable to sudden and substantial changes. In the opinion of the European Central Bank, this is also true for financial systems, and the increasingly homogenous alpha generation strategies employed by many of the world’s 8,000 plus hedge funds. The second lesson is that, despite the intense competition among hedge fund managers, there are still those who can generate alpha, whether that is due to superior insight into fundamental value or the psychology of other investors. As always, the problem is how to identify these skilled managers in advance. The latest research shows that people who invest in hedge funds are no better at this than mutual fund investors, though the former are quicker to cut their losses.

In our opinion, this leads to a third lesson – while uncorrelated alpha is a very welcome addition to any portfolio, it is so hard to consistently generate that an average investors long-term asset allocations to these strategies should be relatively small. As we have noted in other writing in this journal, the equity market neutral strategy seems to most consistently deliver alpha that has a very low correlation with returns on broad asset class indexes. That is why it is our preferred vehicle for a long-term policy allocation. In addition, if one wanted to “outsource” the tactical shifting of one’s allocations between asset classes, it would be logical to add a second allocation to a global macro type strategy. Unfortunately, there are still relatively few investment vehicles available to individual investors that make it easy for them to implement these allocations. Most mutual funds that claim “market neutrality” fail to achieve it, and are, in fact, long/short funds with a long bias. They retain more exposure to overall equity market risk than we would like to see. As for global macro funds, there are still too few in existence, and those that are available often use too few asset classes. In the United States, the Pimco All Asset Fund (PASAX), with its long-term five percent target real return of remains our favorite by far.

H5N1 Update

As we have repeatedly noted in our economic updates, the possibility of an H5N1 influenza pandemic is the principal “wildcard” global economic scenario we have been monitoring. The most recent developments have not been encouraging. Particularly in Indonesia, there is growing evidence of more efficient human-to-human transmission. The fact that the U.S. government has sent a portion of its strategic Tamiflu stockpile to “an unnamed Asian country” is evidence that we are not the only ones who have reached this conclusion. However, because of poor reporting by local health authorities, the mortality rate from the more transmissible virus is unclear at this time. For cases who have been hospitalized, it has been quite high, but nobody seems to have a good idea of the total number of people who have been infected. As always, we recommend the World Health Organization website (www.who.int/csr/disease/avian_influenza/en/), the U.S. Center for Disease Control site (www.pandemicflu.gov) and Recombinomics Inc. (www.recombinomics.com) for the most up-to-date information on this evolving situation.

2006-2007 Model Portfolios Update

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

We use two benchmarks to measure the performance of our model portfolios. The first is cash, which we define as the yield on a one year government security purchased on the last trading day of the previous year. For 2006, our U.S. cash benchmark is 4.40% (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.

Model Portfolios Year-to-Date Performance

<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 31May06	Weight	Weighted Return
	In US\$		In US\$
7% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	0.0%	0.0%
U.S. Bonds	-1.0%	0.0%	0.0%
Non-U.S. Bonds	4.7%	10.0%	0.5%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	5.0%	0.5%
Commodities	1.3%	17.5%	0.2%
Timber	0.6%	2.5%	0.0%
U.S. Equity	3.1%	55.0%	1.7%
Foreign Equity (EAFE)	10.7%	5.0%	0.5%
Emerging Mkt. Equity	6.3%	5.0%	0.3%
Equity Market Neutral	2.9%	0.0%	0.0%
		100.0%	3.8%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
6% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	2.5%	-0.1%
U.S. Bonds	-1.0%	0.0%	0.0%
Non-U.S. Bonds	4.7%	10.0%	0.5%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	15.0%	0.2%
Timber	0.6%	5.0%	0.0%
U.S. Equity	3.1%	45.0%	1.4%
Foreign Equity (EAFE)	10.7%	15.0%	1.6%
Emerging Mkt. Equity	6.3%	7.5%	0.5%
Equity Market Neutral	2.9%	0.0%	0.0%
		100.0%	4.1%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
5% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	2.5%	-0.1%
U.S. Bonds	-1.0%	27.5%	-0.3%
Non-U.S. Bonds	4.7%	12.5%	0.6%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	15.0%	0.2%
Timber	0.6%	5.0%	0.0%
U.S. Equity	3.1%	17.5%	0.5%
Foreign Equity (EAFE)	10.7%	10.0%	1.1%
Emerging Mkt. Equity	6.3%	10.0%	0.6%
Equity Market Neutral	2.9%	0.0%	0.0%
		100.0%	2.7%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
4% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	5.0%	-0.1%
U.S. Bonds	-1.0%	32.5%	-0.3%
Non-U.S. Bonds	4.7%	15.0%	0.7%
Domestic Commercial Property	7.5%	5.0%	0.4%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	10.0%	0.1%
Timber	0.6%	10.0%	0.1%
U.S. Equity	3.1%	0.0%	0.0%
Foreign Equity (EAFE)	10.7%	15.0%	1.6%
Emerging Mkt. Equity	6.3%	7.5%	0.5%
Equity Market Neutral	2.9%	0.0%	0.0%
		100.0%	2.9%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
3% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	12.5%	-0.3%
U.S. Bonds	-1.0%	42.5%	-0.4%
Non-U.S. Bonds	4.7%	10.0%	0.5%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	12.5%	0.2%
Timber	0.6%	0.0%	0.0%
U.S. Equity	3.1%	5.0%	0.2%
Foreign Equity (EAFE)	10.7%	10.0%	1.1%
Emerging Mkt. Equity	6.3%	7.5%	0.5%
Equity Market Neutral	2.9%	0.0%	0.0%
		100.0%	1.7%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
2% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	22.5%	-0.5%
U.S. Bonds	-1.0%	32.5%	-0.3%
Non-U.S. Bonds	4.7%	10.0%	0.5%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	7.5%	0.1%
Timber	0.6%	5.0%	0.0%
U.S. Equity	3.1%	7.5%	0.2%
Foreign Equity (EAFE)	10.7%	10.0%	1.1%
Emerging Mkt. Equity	6.3%	5.0%	0.3%
Equity Market Neutral	2.9%	0.0%	0.0%
		100.0%	1.4%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
Equally Weighted Portfolio	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	10.0%	-0.2%
U.S. Bonds	-1.0%	10.0%	-0.1%
Non-U.S. Bonds	4.7%	10.0%	0.5%
Domestic Commercial Property	7.5%	10.0%	0.8%
Foreign Commercial Property	9.7%	10.0%	1.0%
Commodities	1.3%	10.0%	0.1%
Timber	0.6%	10.0%	0.1%
U.S. Equity	3.1%	10.0%	0.3%
Foreign Equity (EAFE)	10.7%	10.0%	1.1%
Emerging Mkt. Equity	6.3%	10.0%	0.6%
		100.0%	4.1%

<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>		<i>Unlike the other target return portfolios, these allow investment in uncorrelated alpha (equity market neutral) funds.</i>	
	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
7% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	0.0%	0.0%
U.S. Bonds	-1.0%	0.0%	0.0%
Non-U.S. Bonds	4.7%	0.0%	0.0%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	7.5%	0.7%
Commodities	1.3%	12.5%	0.2%
Timber	0.6%	7.5%	0.0%
U.S. Equity	3.1%	52.5%	1.6%
Foreign Equity (EAFE)	10.7%	5.0%	0.5%
Emerging Mkt. Equity	6.3%	10.0%	0.6%
Equity Market Neutral	2.9%	5.0%	0.1%
		100.0%	3.9%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
6% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	0.0%	0.0%
U.S. Bonds	-1.0%	5.0%	-0.1%
Non-U.S. Bonds	4.7%	7.5%	0.4%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	10.0%	0.1%
Timber	0.6%	10.0%	0.1%
U.S. Equity	3.1%	37.5%	1.2%
Foreign Equity (EAFE)	10.7%	15.0%	1.6%
Emerging Mkt. Equity	6.3%	10.0%	0.6%
Equity Market Neutral	2.9%	5.0%	0.1%
		100.0%	4.0%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
5% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	2.5%	-0.1%
U.S. Bonds	-1.0%	22.5%	-0.2%
Non-U.S. Bonds	4.7%	10.0%	0.5%
Domestic Commercial Property	7.5%	2.5%	0.2%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	15.0%	0.2%
Timber	0.6%	5.0%	0.0%
U.S. Equity	3.1%	12.5%	0.4%
Foreign Equity (EAFE)	10.7%	10.0%	1.1%
Emerging Mkt. Equity	6.3%	10.0%	0.6%
Equity Market Neutral	2.9%	10.0%	0.3%
		100.0%	3.0%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
4% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	12.5%	-0.3%
U.S. Bonds	-1.0%	27.5%	-0.3%
Non-U.S. Bonds	4.7%	0.0%	0.0%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	2.5%	0.2%
Commodities	1.3%	12.5%	0.2%
Timber	0.6%	7.5%	0.0%
U.S. Equity	3.1%	5.0%	0.2%
Foreign Equity (EAFE)	10.7%	15.0%	1.6%
Emerging Mkt. Equity	6.3%	7.5%	0.5%
Equity Market Neutral	2.9%	10.0%	0.3%
		100.0%	2.4%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
3% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	12.5%	-0.3%
U.S. Bonds	-1.0%	32.5%	-0.3%
Non-U.S. Bonds	4.7%	12.5%	0.6%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	10.0%	0.1%
Timber	0.6%	5.0%	0.0%
U.S. Equity	3.1%	5.0%	0.2%
Foreign Equity (EAFE)	10.7%	10.0%	1.1%
Emerging Mkt. Equity	6.3%	5.0%	0.3%
Equity Market Neutral	2.9%	7.5%	0.2%
		100.0%	1.9%

	YTD 31May06	Weight	Weighted Return
	In US\$		In US\$
2% Target Real Return	<i>YTD Returns are Nominal</i>		
<i>Asset Classes</i>			
Real Return Bonds	-2.0%	17.5%	-0.4%
U.S. Bonds	-1.0%	35.0%	-0.4%
Non-U.S. Bonds	4.7%	12.5%	0.6%
Domestic Commercial Property	7.5%	0.0%	0.0%
Foreign Commercial Property	9.7%	0.0%	0.0%
Commodities	1.3%	7.5%	0.1%
Timber	0.6%	5.0%	0.0%
U.S. Equity	3.1%	5.0%	0.2%
Foreign Equity (EAFE)	10.7%	5.0%	0.5%
Emerging Mkt. Equity	6.3%	5.0%	0.3%
Equity Market Neutral	2.9%	7.5%	0.2%
		100.0%	1.2%