Retired Investor

Invest Wisely…Get an Impartial Second Opinion.

Contents

This Month's Issue: Key Points

This month we present our new base case model portfolios, which we will use until our next biennial asset allocation review in 2007. These portfolios contain up to ten asset classes, including real return bonds, domestic investment grade bonds, foreign currency bonds, domestic commercial property, foreign commercial property, commodities, timber, domestic equity, foreign developed market equity and emerging markets equity. Next month we will present two additional sets of portfolios, one that includes our basic ten asset classes plus equity market neutral (our proxy for "uncorrelated alpha" investments in the emerging world of separate alpha and beta investing), and another than includes both equity market neutral and equity market volatility.

This month, we review the methodology we used to generate our updated model portfolios, and, as important, its potential shortcomings. We stress that while deciding on an asset allocation and rebalancing strategy are two of the most important decision an investor makes, all the tools available to help investors make these decisions suffer from weaknesses, particularly regarding their assumptions about future asset class risks and returns. In addition, the sheer mathematical difficulty of a multi-year optimization problem only adds to the irreducible uncertainty we face when choosing an asset allocation and rebalancing strategy. We are the first ones to say that our approach to this problem still has room for improvement. However, we also think it provides a valuable framework for helping people to think logically

©2005 by Index Investors Inc. *One year costs only US$ 59*
ISSN 1554-5067

about the challenges they face, and in so doing raise the probability that they will achieve their financial goals.

The most important conclusion that emerges from our analysis is that, compared to two years ago, it looks like it will be harder in the future to achieve high internal real rate of return targets, and more risk will have to be taken on to have even a diminished probability of success. Practically, this confronts investors with three choices, all of which will reduce one's minimum required internal real rate of return: either (a) retire later; (b) reduce the size of your bequest goal; or (c) reduce your portfolio income (withdrawal) target. We also note that for many investors, tax and valuation concerns argue for taking a "go slow" approach to adjusting from their current asset allocations to the new ones in our model portfolios.

This Month's Letters to the Editor

In last month's issue, you describe three possible states of the economy: deflation, normal, and high inflation. What, in your view, constitutes "high inflation"? -- a reader from the USA

Two replies to your question come to mind. The qualitative one is that inflation is high when it begins to distort people's economic decisions; this is probably around the time that you start to hear a lot of people talking about it. The quantitative answer is based on different regions' experience of inflation since the world went off the gold standard in 1971. The following table shows average annual inflation between 1971 and 2004; the standard deviation of annual inflation, and the average plus one standard deviation. In a statistical sense, this latter figure is probably a good dividing line between "normal" and "high" inflation.

Country	71-04 Avg.	71-04 Std. Dev.	71-04 Avg+Std
Australia	6.5%	4.2%	10.7%
Canada	5.0%	3.4%	8.4%
Germany	3.2%	2.0%	5.2%

Country	71-04 Avg.	71-04 Std. Dev.	71-04 Avg+Std
Japan	3.5%	4.9%	8.4%
Switzerland	3.1%	2.6%	5.7%
U.K.	7.2%	5.6%	12.8%
U.S.A.	4.8%	3.1%	7.9%

Why is your year-to-date return on real return bonds higher than the current real rate of interest on National Savings Index Linked Certificates? -- a reader from the U.K.

First, a point of clarification for our non-UK readers. National Savings Index Linked Certificates are small denomination savings instruments issued by the government that guarantee a fixed real rate of interest. They are very similar to Series I Savings Bonds in the United States. Now on to the answer. Our year-to-date returns are based on an index of real return bonds. The U.K. index uses index-linked gilts; the U.S. index uses TIPS (in both cases, government issued real return bonds traded in the institutional market, and typically owned by real return bond mutual funds, ETFs, unit trusts, OEICs, etc.). Some of the real return bonds included in these indices were issued years ago, and carry relatively high guaranteed real returns. In recent years, including this year, real interest rates have sharply fallen in most countries. This has made real return bonds that guarantee a higher real return more valuable, causing their prices to rise. It is this change in the prices of many real return bonds included in the index that has caused total returns on the index to be relatively high. Theoretically, the same process should also cause the market value of National Savings Index Linked Certificates and Series I Savings Bonds to increase. However, these instruments are not included in real return bond indices, because the secondary market for them is much thinner than the ones for index linked gilts and TIPS.

In addition, rising inflation rates have further boosted the nominal returns on real return bonds, which adjust either their nominal capital value or coupon interest rate to maintain their promised real return in the fact of rising inflation.

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

In sum, falling real yields and rising inflation have generated impressive nominal total returns on real return bonds. However, this raises the question of whether one should expect this to continue in the future. We think that, in real terms, the answer is "no." As evidenced by both the secondary market yields on previously issued index-linked gilts and TIPS, and the real returns on the National Savings Index Linked Certificates and Series I Savings Bonds currently being offered to retail investors, real interest rates are currently at very low levels relative to their historic average. This suggests that, in the future, they are morel likely to rise than fall. And if this happens, the prices of real return bonds with low coupon rates will fall, causing negative total returns.

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

Global Asset Class Returns

YTD 30Nov05	In USD	In AUD	In CAD	In EURO	In JPY	In GBP
Asset Held						
US Bonds	1.40%	6.99%	-1.14%	14.67%	15.77%	11.27%
US Prop.	12.00%	17.59%	9.46%	25.27%	26.37%	21.87%
US Equity	5.80%	11.39%	3.26%	19.07%	20.17%	15.67%
AUS Bonds	-6.06%	-0.47%	-8.60%	7.21%	8.31%	3.81%
AUS Prop.	0.39%	5.97%	-2.16%	13.66%	14.75%	10.26%
AUS Equity	12.87%	18.46%	10.33%	26.15%	27.24%	22.74%
CAN Bonds	8.93%	14.52%	6.39%	22.20%	23.30%	18.80%
CAN Prop.	21.71%	27.30%	19.17%	34.98%	36.08%	31.58%
CAN Equity	21.75%	27.33%	19.20%	35.02%	36.11%	31.62%
Euro Bonds	-9.50%	-3.91%	-12.04%	3.77%	4.87%	0.37%
Euro Prop.	9.92%	15.51%	7.38%	23.19%	24.29%	19.79%
Euro Equity	3.83%	9.41%	1.29%	17.10%	18.20%	13.70%
Japan Bonds	-13.59%	-8.00%	-16.13%	-0.32%	0.78%	-3.72%
Japan Prop.	23.09%	28.68%	20.55%	36.36%	37.46%	32.96%
Japan Equity	14.10%	19.69%	11.56%	27.37%	28.47%	23.97%
UK Bonds	-3.76%	1.83%	-6.30%	9.51%	10.61%	6.11%
UK Prop.	2.03%	7.62%	-0.51%	15.30%	16.40%	11.90%
UK Equity	2.43%	8.02%	-0.11%	15.70%	16.80%	12.30%
World Bonds	-4.00%	1.59%	-6.54%	9.27%	10.37%	5.87%
World Prop.	10.38%	15.97%	7.84%	23.65%	24.75%	20.25%
World Equity	7.85%	13.44%	5.31%	21.12%	22.22%	17.72%
Commodities	15.30%	20.89%	12.76%	28.57%	29.67%	25.17%
Timber	11.42%	17.00%	8.88%	24.69%	25.78%	21.29%
Hedge Funds	2.36%	7.95%	-0.18%	15.63%	16.73%	12.23%
Volatility	-9.26%	-3.67%	-11.80%	4.02%	5.11%	0.62%
A$ Currency	-5.59%	0.00%	-8.13%	7.69%	8.78%	4.28%
C$	2.54%	8.13%	0.00%	15.81%	16.91%	12.41%
Euro	-13.27%	-7.69%	-15.81%	0.00%	1.09%	-3.40%
Yen	-14.37%	-8.78%	-16.91%	-1.09%	0.00%	-4.50%
UK£	-9.87%	-4.28%	-12.41%	3.40%	4.50%	0.00%
US$	0.00%	5.59%	-2.54%	13.27%	14.37%	9.87%

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

Equity and Bond Market 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 (Current Dividend Yield x 100) x (1+ Forecast Productivity Growth) divided by (Current Yield on Real Return Bonds + Equity Risk Premium - Forecast Productivity Growth). Our valuation estimates are shown in the following tables, where a value greater than 100% implies overvaluation, and less than 100% implies undervaluation:

Australia	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	67%	101%
Low Supplied Return	103%	141%

.

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

Canada	Low Demanded Return	High Demanded Return
High Supplied Return	94%	159%
Low Supplied Return	179%	263%

.

Eurozone	Low Demanded Return	High Demanded Return
High Supplied Return	60%	106%
Low Supplied Return	109%	164%

.

Japan	Low Demanded Return	High Demanded Return
High Supplied Return	98%	205%
Low Supplied Return	269%	440%

.

United Kingdom	Low Demanded Return	High Demanded Return
High Supplied Return	48%	88%
Low Supplied Return	88%	134%

.

United States	Low Demanded Return	High Demanded Return
High Supplied Return	117%	183%
Low Supplied Return	210%	296%

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:

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

	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	2.46%	2.96%	5.42%	5.38%	-0.04%	0.34%
Canada	1.66%	2.40%	4.06%	4.06%	0.00%	-0.04%
Eurozone	1.46%	2.37%	3.83%	3.45%	-0.38%	3.74%
Japan	0.87%	0.77%	1.64%	1.44%	-0.20%	1.94%
UK	1.33%	3.17%	4.50%	4.20%	-0.30%	2.90%
USA	2.14%	2.93%	5.07%	4.51%	-0.56%	5.52%

It is important to note some important limitations of this analysis. First, it uses the current yield on real return government bonds. Over the past forty years or so, it 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 estimate.

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

©2005 by Index Investors Inc.
ISSN 1554-5067

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 A$	**To C$**	**To EU**	**To YEN**	**To GBP**	**To US$**
From						
A$	0.00%	-1.32%	-1.93%	-3.94%	-1.18%	-0.87%
C$	1.32%	0.00%	-0.61%	-2.62%	0.14%	0.45%
EU	1.93%	0.61%	0.00%	-2.01%	0.75%	1.06%
YEN	3.94%	2.62%	2.01%	0.00%	2.76%	3.07%
GBP	1.18%	-0.14%	-0.75%	-2.76%	0.00%	0.31%
US$	0.87%	-0.45%	-1.06%	-3.07%	-0.31%	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

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

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 employing different strategies expect the economy 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. Similar returns in multiple columns (within the same strategy) indicate a relative lack of agreement between investors about the most likely future state of the economy.

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

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

YTD 30Nov05

Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
Style Rotation	Growth (IWZ) **5.54%**	Value (IWW) **6.03%**	Value (IWW) **6.03%**	Growth (IWZ) **5.54%**
Size Rotation	Small (IWM) **5.12%**	Small (IWM) **5.12%**	Large (IWB) **6.20%**	Large (IWB) **6.20%**
Style and Size Rotation	Small Growth (DSG) **8.26%**	Small Value (DSV) **5.33%**	Large Value (ELV) **4.70%**	Large Growth (ELG) **2.78%**
Sector Rotation	Cyclicals (IYC) **-1.75%**	Basic Materials (IYM) **1.86%**	Energy (IYE) **32.10%**	Utilities (IDU) **13.41%**
	Technology (IYW) **5.39%**	Industrials (IYJ) **3.46%**	Staples (IYK) **1.20%**	Financials (IYF) **5.08%**
Bond Market Rotation	High Risk (VWEHX) **1.80%**	Short Maturity (VBISX) **0.90%**	Low Risk (VIPSX) **1.50%**	Long Maturity (VBLTX) **3.00%**

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

New Model Portfolios for 2006-2007

The tables at the end of this article present the results of our biennial asset allocation review. We will begin to use those portfolios in our January, 2006 issue, at which time we will also update the model portfolio information on our website. In the following pages, we will first review the optimization methodology and input assumptions we used to generate our model portfolios, discuss potential criticisms of our approach, note the main conclusions we reached, and conclude on what they mean to you.

Methodology

Our target real return model portfolios assume an investor who seeks to achieve both an annual portfolio income (withdrawal) goal and an end of life bequest goal over a defined time period (expected years of remaining life). Specifically, the investor seeks to maximize the probability of achieving his or her bequest goal, provided that the probability of achieving his or her portfolio income (withdrawal) goal is at least 95%.

In order to achieve his or her income and bequest goals, our investor must earn a minimum internal real rate of return on his or her portfolio. In turn, this portfolio return will be a function of the weights given to different asset classes in the portfolio, the sequence of annual returns on these asset classes, the extent to which they are related to each other, and the methodology used to rebalance the portfolio when actual asset class weights deviate from their long-term targets.

We use a technique known as "simulation optimization" to identify a robust asset allocation for this investor. By "robust", we mean an asset allocation that has a high probability of achieving the investor's goals while minimizing the amount of risk taken on (which we define as the volatility of annual returns).

Our model works as follows: We first begin with a "candidate" asset allocation and rebalancing strategy. Asset allocation is defined in terms of the weights placed on different asset classes. Rebalancing strategy is defined by two variables: (a) the amount by which one or more asset classes must deviate from their target weights in order to trigger a rebalancing

©2005 by Index Investors Inc.
ISSN 1554-5067

of the portfolio; and (b) an "adjustment factor" that determines whether a rebalanced asset class is returned to its target weight, or to a weight slightly over or under it. For example, assume the "trigger factor" is 10% and the "adjustment factor" is 5%. At the end of each year, the actual asset class weights are compared to their targets. If an asset class deviates by 10% or more from its target weight (e.g., if it is at 35% instead of 25%), a rebalancing is triggered. In this case, it is rebalanced back to its target less the adjustment factor. Therefore, it would be rebalanced back to 20% (25% less 5%). On the other hand, if the asset class had been more than 10% below its target weight, it would be rebalanced back to 5% above it. All other asset classes (except for those most above or below their target weights) are rebalanced back to their target weights when a rebalancing is triggered.

There are two logics at work in this system. The first is a desire to minimize the transaction costs associated with rebalancing, which are deducted from portfolio returns (we do not consider the tax effects of rebalancing). The second is the desire to exploit, in a very controlled manner, the tendency of real world markets to vacillate between overvaluation and undervaluation, caused by the interaction of "momentum" and "value" investors. When the returns on an asset class have caused its weight in the portfolio to grow significantly above its target, we allow for rebalancing to an underweighted position on the theory that it will soon overcorrect. We allow for the exact opposite rebalancing for asset classes that are significantly below their target weights.

For each candidate asset allocation/rebalancing strategy, we then generate 2,000 twenty-year return scenarios. Each scenario contains twenty independent returns for up to twelve different asset classes – i.e., up to 240 different returns per scenario. The interaction of these asset class returns and the rebalancing strategy produces an internal real return for the scenario. The 2,000 scenarios produce a distribution of internal real returns for the candidate asset allocation/rebalancing strategy, as well as probabilities for meeeting the specified portfolio income (withdrawal) and bequest goals.

The model next generates another candidate asset allocation/rebalancing strategy, and repeats the process. When it is completed, it retains the asset allocation/rebalancing strategy that has the highest probability of achieving the bequest goal. If two strategies are tied, it chooses the one with the lower standard deviation of annual returns (i.e., the one with the lowest annual volatility).

©2005 by Index Investors Inc.
ISSN 1554-5067

So far, so good. However, as the old saying goes, if something seems too easy, it's not. The problem we face is that, because of the number of asset classes and constraints we use (see below), there is a very large number of possible asset allocation/rebalancing strategies to be analyzed. Too many, in fact, for a "brute force" (or "check them all") approach to work. Thus, the model uses evolutionary algorithms to intelligently search the space of possible asset allocation/rebalancing strategies in order to generate a robust solution in a reasonable amount of time (on average, about 1,000 different strategies are tested, using 2,000 scenarios for each one). We cannot say this solution is "optimal", because we cannot be sure that there is not another solution that is better. What we can say, however, is that the solution generated by the model is "robust", in the sense that, relative to all possible strategies, it has one of the highest probabilities of achieving the internal rate of return target. For more information on simulation optimization, we recommend the short paper "Practical Introduction to Simulation Optimization" by April, Glover, Kelly and Laguna.

Asset Classes Used

In various articles this year, we have explored the use of four new asset classes in our model portfolios: foreign commercial property, timber, equity market neutral strategies, and equity market volatility. In the analysis that follows, we present three different cases. The first uses ten asset classes: real return bonds, domestic investment grade bonds, foreign currency investment grade bonds, domestic commercial property, foreign commercial property, commodities, timber, domestic equity, foreign developed market equity, and emerging markets equity.

The second case adds equity market neutral to the first ten asset classes. Our logic here is based on the growing trend toward separating alpha from beta investing. The returns on traditional long-only actively managed funds are compensation for taking both systemic (non-diversifiable) asset class risk (also known as "beta"), and non-systematic security-specific risk (also known as "alpha"). The problem is that the high fees charged by these funds cover both beta and alpha returns. With the growth of index products (mutual and exchange traded funds, unit trusts, etc.) it is now possible to pay much less for beta. This has led to what is known as the separation of alpha and beta investing (see the button labeled

©2005 by Index Investors Inc.
ISSN 1554-5067

"Separating Alpha from Beta Investing" in the free section of www.indexinvestor.com). In this emerging approach, investors divide their portfolios between a mix of low-cost asset class index funds and funds that focus only on generating alpha returns (and charge much higher prices for doing this). The key attraction of these "pure alpha" funds is that they say that their returns have a low correlation with those on various asset class beta products. As our proxy for this strategy, we have used the average return on equity market neutral hedge funds. (For more on this, please see "Fund of Hedge Funds Portfolio Selection: A Multi-Objective Approach" by Davies, Kat and Lu. It reaches the same conclusion we do about the relative attractiveness of EMN compared to other hedge fund strategies).

The third case we use adds the return on the implied volatility of the Standard and Poor's 500 ("equity market volatility") to the original ten plus equity market neutral. This return is calculated as the change in the value of the VIX index. The potential attraction of this asset class is its negative correlation with other types of equity; its drawback is its very high volatility. While no retail volatility funds are available today, we expect that they will be introduced before our next asset allocation review in two years time; hence, we are including volatility as one of this year's model portfolios.

Asset Class Risk and Return Assumptions

In an overview of portfolio optimization methodologies ("The Limits of Certainty"), the Consulting Group at Smith Barney notes that "the combination of Monte Carlo simulation and stochastic optimization offers enticing benefits. It is not a panacea, however. Any optimization process, no matter how sophisticated, remains vulnerable to the limitations of the data inputs fed into it. Given the considerable uncertainty surrounding future asset returns, it would be a serious mistake to believe technology alone can eliminate investment risk."

In last month's issue, we reviewed the methodology we used to develop the asset class risk and return assumptions we have used in our simulation optimization models. To summarize, we use two different approaches. The first derives them from historical returns data, generally from 1989 to 2004. This period generally saw higher returns and lower volatility than was the case for many asset classes with longer return series. The key risk with

©2005 by Index Investors Inc.
ISSN 1554-5067

the historical approach is known as "estimation error." It refers to the risk that the data sample does not accurately reflect the true returns generating process for a given asset class.

Our second approach uses a forward-looking forecasting model to derive asset class assumptions. Our forecast shows somewhat lower returns and higher volatility on many asset classes than is the case in the historical data sample. This is consistent with the finding of different "regimes" in historical time series data, one with higher returns and lower volatility, and the other with just the opposite. The key risk with this approach is known as "model error." It refers to the risk that a forecasting model does not accurately capture the true returns generating process for a given asset class.

We have taken two steps to try to limit the potential impact of estimation and model error. The first is to set constraints on the maximum amount of a portfolio that can be allocated to a given asset class. These constraints are as follows: real return bonds (100%); domestic bonds (100%); foreign bonds (20%); domestic commercial property (20%); foreign commercial property (20%); commodities (20%); timber (10%, plus commodities and timber together cannot exceed 20%); domestic equity (80%); foreign equity (30%); emerging markets equity (10%); equity market neutral (10%); and volatility (10%).

The second step is to utilize both the historically based and the model based assumptions to generate asset class return scenarios when testing different candidate asset allocation and rebalancing strategies. We give each a fifty percent weight. Research has shown that in many cases, the simplest approach to combining forecasts works the best.

Possible Criticisms of our Approach

As noted above, no asset allocation methodology is perfect, and ours is no exception. However, unlike many others, we go out of our way to highlight the potential shortcomings of our approach. Here they are, along with our responses:

Why didn't you use a longer historical data series?

For some asset classes (e.g., real return bonds, domestic and foreign commercial property securities, commodities, timber, emerging markets equity, equity market neutral and

©2005 by Index Investors Inc.
ISSN 1554-5067

volatility), 1989 is at or beyond the limit of the available data. Long data series really only exist for domestic bonds and equity. In statistical terms, use of a longer data series improves the accuracy of an estimate only if it does not contain so-called "structural breaks." These are changes in the nature of the time-series that suggest a fundamental change in the underlying return generating process. A good example of this is the U.S. Treasury – Federal Reserve Accord of March, 1951. Before that date, the Treasury compelled the Fed to manage monetary policy to stabilize government bond prices. After that date, the Federal Reserve was freed from this obligation, and was able to conduct a much more independent monetary policy. A similar agreement was struck in May, 1997 between the U.K. Treasury and the Bank of England (although inflation targeting was started in 1992, after the UK left the European Monetary System). Academic research has found evidence of structural breaks in many long-term equity and bond return data series. For this reason, we decided to use the shorter series, even when longer ones were available.

Why did you use a normal distribution for asset class returns?

A "normal distribution" is the fancy name for the so-called "bell curve" that results when different returns are graphed according to the frequency of their occurrence in the historical data. Because the normal distribution is symmetric, it can be described using only two statistics, the average (i.e., the mean) of the different returns, and their standard deviation (also known as volatility), which measures the extent to which returns fall closer to or farther away from the average. Standard deviation is often used as a proxy for "risk", in the sense that an asset class whose returns have a wider distribution around the mean (i.e., whose returns are more volatile) is believed to be riskier than an asset class whose returns are more tightly grouped.

In reality, most asset class returns are not normally distributed; they are typically slightly asymmetrical (statistically, this is known as "skewness") and have somewhat fatter tails than the normal distribution (statistically, this is known as "positive kurtosis"). Rather than the normal distribution, they are better described by other types of distribution (e.g., a multivariate T, for the technically inclined). However, researchers have concluded that, for most investors (e.g., who invest in broad asset classes rather than options) this distinction is of

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

little practical importance (see, for example, "Portfolio Formation with Higher Moments and Plausible Utility" by Cremers, Kritzman and Page, and "On the Out-of-Sample Importance of Skewness and Asymmetric Dependence for Asset Allocation" by Andrew Patton). For this reason, we chose to assume asset class returns are normally distributed, since that substantially simplifies the math in our models. On the other hand, we will also be presenting, in a later article, the results of some asset allocation experiments using a multivariate T distribution.

Did you assume asset class returns are independent and identically distributed over time?

Another feature of real life asset class returns is that they are not independent from year to year; the return in one year often has a slight statistical relationship with returns in one or more previous years. Technically, this is known as "serial correlation." Another real life phenomenon is that average asset class returns and standard deviations tend to vary over time between different so-called "regimes." This phenomenon is also referred to as "volatility clustering." In the simplest version of this, one can identify two regimes in the historical data. One is usually characterized by low returns and high volatility, while the other has higher returns and lower volatility (of course, this could also be said of a lot of other aspects of life, but that's a story for another day). In other words, real life differs from the assumption used in many models that asset class returns are independent and identically distributed over time.

Here is how we addressed these issues in our models. As previously noted, our models are based on two different regimes, one derived from historical data and one from our forecasting model. These two regimes closely resemble the high return/low volatility and low return/high volatility regimes found in the historical data series for many asset classes. That being said, one could certainly question the 50/50 probability we have used for each regime. As we noted, it is the statistical way of saying, "we really can't forecast this with any confidence beyond luck."

Regarding serial correlation, we included a one-year .20 serial correlation term for real return bonds. This simplified the calculation of our models (compared to using serial correlation for multiple asset classes and/or multiple years of previous returns), while still

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

generating (via the interaction of real return bonds with the cross-correlation of asset classes in any single year) trending in some simulation scenarios.

Why did you use the same correlation assumptions for both regimes?

Another aspect of the regime switching phenomenon is that returns between some asset classes tend to be higher during the low return/high volatility regime, and lower during the high return/low volatility regime. We use a correlation matrix based on the overall historical data series which tends to average out these two extremes. While we would have liked to include two different correlation matrices in our model, it would have required a substantial amount of additional programming. Given scarce resources and competing priorities (e.g., adding rebalancing strategy options, more asset classes, and rewriting our model to take advantage of faster software), we decided that the additional benefits this would generate wasn't worth the effort it would have required. Again, this is something we hope to experiment with in the future.

Conclusions

Deciding on an asset allocation and rebalancing strategy are two of the most important decision an investor makes. Unfortunately, all the tools available to help investors make these decisions suffer from shortcomings, particularly around their assumptions about future asset class risks and returns. In addition, the sheer mathematical difficulty of a multi-year optimization problem only adds to the irreducible uncertainty we face when choosing an asset allocation and rebalancing strategy. We are the first ones to say that our approach to this problem still has room for improvement. However, we also think it provides a valuable framework for helping people to think logically about the challenges they face, and in so doing raise the probability that they will achieve their financial goals.

With that in mind, and after reviewing the results of our asset allocation reviews in Australian, Canadian and U.S. Dollars, Euro, Yen and Pounds Sterling, we offer the following observations.

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

One important conclusion from our analysis is that, compared to two years ago, it looks like it will be harder in the future to achieve high internal real return targets, and more risk will have to be taken on to have even a diminished probability of success. Practically, this confronts investors with three choices, all of which will reduce one's minimum required internal rate of return: (a) retire later; (b) reduce the size of your portfolio income goal; and/or (c) reduce the size of your bequest goal.

Another interesting conclusion from our analyses relates to changes made in the allocations to different asset classes, compared to our current model portfolios. Real return bonds generally receive less weight. There are two logical reasons for this. The first is that across most markets, the yield to maturity on real return bonds (which we take as our proxy for expected return) is at historically low levels. This means that a rise in real yields (which, would cause a fall in bond prices, and therefore low or negative total returns) is more likely than a further fall in yields (which would cause a rise in bond prices, and a positive total return). In the context of our distribution of returns for the real return bond asset class, this view is reflected in the low level of expected return relative to expected volatility. In addition, we have also added new asset classes (foreign commercial property and timber in our base portfolio, and EMN and volatility in the others) that create further opportunities for obtaining robust asset allocation solutions with relatively low allocations to real return bonds.

Domestic investment grade (nominal return) bonds also seem to have picked up some of the allocations that previously went towards real return bonds. However, at a time when many asset classes appear to be (at least in historical terms) fully or overvalued, this raises an important issue. There are three big ways to get hurt from holding domestic investment grade bonds. The first is a rise in real interest rates. Unless this is offset by a fall in inflation, it will cause a fall in the price of domestic nominal return bonds as surely as it will cause a fall in the price of real return bonds. The second danger is a rise in inflation, which, absent a further fall in real rates, would also cause a decline in the price of domestic bonds. The third danger, assuming one’s domestic bond allocation is not limited to government securities (i.e., it includes corporate credit and mortgage backed bonds), is a rise in defaults linked to a downturn in economic conditions. This would logically lead to a widening of credit spreads (i.e., a rise in the yields on non-government bonds), which would cause their price to fall and total returns on holding them to be negative. If one does choose to increase one’s allocation

©2005 by Index Investors Inc.
ISSN 1554-5067

to domestic bonds at this time, doing it via short term government bonds (which are least likely to get hurt by rising inflation, but which could still be hurt by rising real interest rates) seems the prudent course of action in the near term.

We have written at length (in our August, 2005 issue) on the pros and cons of foreign currency bonds. While they are still used in a number of our new model portfolios, their weighting has tended to be reduced by the introduction of other asset classes that provided better expected diversification benefits (e.g., timber and volatility) and the fact that we capped the maximum allocation this year at 20% of the total portfolio. That being said, we remain attracted to this asset class for one key reason: historically, its returns have been negatively correlated to returns on most domestic equity markets.

Both domestic and foreign commercial property receive weightings in multiple portfolios. The latter seems attractive in some cases because its expected returns are superior to those on foreign currency bonds, without too much additional penalty in terms of higher volatility and correlation with other asset classes.

Commodities and timber both receive positive weightings in most portfolios because of the diversification benefits they provide. However, investors considering an increase in their allocations to these asset classes are again confronted with questions about their current valuation levels.

The same issue arises with respect to our model portfolios' allocations to domestic, foreign, and emerging markets equity. We again stress the important point that our equity market return forecasts are based on an "equilibrium" approach – that is, they assume that over the long term, markets will tend toward equilibrium, and asset classes will therefore tend to deliver the returns that investors demand for holding the risk they represent. However, as we have repeatedly written, we also believe that financial markets are a complex adaptive system in which the equilibrium condition is less likely to hold in the short term. In other words, we believe that all financial markets, and equity markets in particular (because of the greater uncertainties inherent in equity valuation) can and do become under and overvalued from time to time. As we note in our market valuation update, at the current time, in many markets, overvaluation seems more likely to be the case than undervaluation. We base this conclusion on the observation that the returns equity markets are currently expected to supply (as estimated by their current dividend yield plus expected rate of total factor productivity

©2005 by Index Investors Inc.
ISSN 1554-5067

growth) are below those we estimate investors would require in equilibrium (as estimated by the current yield on real return bonds plus a four percent equity market risk premium). This implies that a decline in equity prices (which would raise their dividend yield) will be required to bring supplied returns into line with the equilibrium returns demanded by investors.

Based on the hedge fund community's enthusiastic arguments about the joys of "uncorrelated alpha" investments, one would expect to see the portfolios that contain this asset class all receiving full (up to the constraint level) allocations to it. However, this turns out not to be the case. There appear to be a number of reasons for this. First, we have used the return on the CSFB Tremont Equity Market Neutral hedge fund index as our proxy for the average return on this strategy (technically, it is not an asset class). These are reported in U.S. dollars, so currency effects could offset some of this asset class's attractions to investors in other currency regions. Second, while EMN's correlation of returns with equity and other asset classes is low, it is not zero; in some cases, other asset classes turn out to be more effective means of reducing a portfolio's volatility without imposing too much of an expected return penalty. Commodities and timber certainly seem to play this role, as does volatility when it is included.

When it is available, equity volatility is included in many portfolios, even when measured using the U.S. VIX index (which tracks changes in the implied volatility on S&P 500 options), rather than a local equivalent like the VSTOXX in the Eurozone. In effect, the inclusion of volatility allows some of the risk of other equity asset classes to be hedged away, while leaving their higher expected returns. Thus, the typical pattern is for equity market weightings to go up when volatility is included as a possible asset class.

Finally, there is the all-important "so what?" question to address. Should you switch your portfolio's allocation to match one of our new model portfolios? The only accurate answer is, "it depends." First, it depends on your tax situation. If the assets being switched are held in a taxable account, changing your asset allocation could trigger substantial capital gains tax payments. Since we have noted the potential estimation and model errors inherent in our (and everyone else's) asset allocation methodology, if your current weights are reasonably close to those in our model portfolio, it probably makes sense to avoid incurring

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

the very real tax cost for what might turn out to be not much of a relative improvement in your portfolio's performance.

Second, let's suppose that your investments are largely in tax advantaged accounts, and the difference in portfolio weightings is significant. Does this mean you should reallocate now? Perhaps not, if it means moving into an asset class (like many equity markets) that today appear overvalued. Again, it may well be better to wait and see, and reallocate only after equity or bond prices have fallen.

Third, let's assume that your assets are in tax advantaged accounts, and the reallocation in question would not involve increasing your exposure to an asset class that today has a high probability of being overvalued (note to readers: in the coming months, we will be expanding our current market valuation outlook section to cover all the asset classes we use in our model portfolios

For example, suppose you wanted to reallocate a small portion of your portfolio into timber. In this case, a move today, or perhaps a gradual one using dollar cost averaging (to further reduce the risk of getting your market timing wrong) might well make sense. In sum, we believe that investors should take both taxes and current asset class valuations into account when rebalancing their portfolios.

The following tables present our base case (10 asset class) model portfolios for target real returns of 7%, 6%, 5%, 4%, 3% and 2%. For each asset allocation, we show the rounded probability of achieving the bequest target, given a 95% probability of achieving the portfolio income (withdrawal) target. Next month, we will present the new model portfolios that include potential allocations to equity market neutral and equity market volatility.

10 Asset Classes	7% Target Internal Real Return	6% Target Internal Real Return	5% Target Internal Real Return
Rebalancing Trigger	20.0%	20.0%	20.0%
Rebalancing Adjustment	0.0%	0.0%	2.5%
Real Return Bonds	0%	0%	5%
Domestic Bonds	0%	0%	5%
Foreign Bonds	5%	5%	15%
Domestic Commercial Prop.	0%	0%	0%
Foreign Commercial Prop.	15%	15%	5%
Commodities	10%	10%	10%
Timber	10%	10%	10%
Domestic Equity	55%	55%	35%
Foreign Equity	0%	0%	10%
Emerging Markets Equity	5%	5%	5%
Equity Market Neutral			
Equity Volatility			
Total	100%	100%	100%
Probability of Achieving Bequest Tgt	50%	62%	65%

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

10 Asset Classes	**4% Target Internal Real Return**	**3% Target Internal Real Return**	**2% Target Internal Real Return**
Rebalancing Trigger	0.0%	10.0%	10.0%
Rebalancing Adjustment	2.5%	2.5%	2.5%
Real Return Bonds	0%	10%	10%
Domestic Bonds	15%	15%	15%
Foreign Bonds	20%	15%	15%
Domestic Commercial Prop.	0%	0%	0%
Foreign Commercial Prop.	0%	0%	0%
Commodities	10%	15%	15%
Timber	10%	5%	5%
Domestic Equity	30%	25%	25%
Foreign Equity	10%	10%	10%
Emerging Markets Equity	5%	5%	5%
Equity Market Neutral			
Equity Volatility			
Total	100%	100%	100%
Probability of Achieving Bequest Tgt	80%	90%	98%

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

Model Portfolios Year-to-Date Nominal Returns

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

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

We use a simulation optimization process to produce our model portfolio solutions. A detailed explanation of this methodology can be found on our website. To briefly summarize its key points, in order to limit the impact of estimation error, our assumptions about future asset class rates of return, risk, and correlation are based on a combination of historical data (from 1971 to 2002) and the outputs of a forward looking asset pricing model. For the same reason, we also constrain the maximum weight that can be given to certain asset classes in a portfolio. These maximums include 20% for foreign bonds and foreign equities, and 10% each for commercial property, commodities, and emerging markets equities. There are no limits on the weight that can be given to real return and domestic bonds, and to domestic equities.

Each model portfolio solution includes the following information: (a) The minimum real (after inflation) internal rate of return the portfolio must earn in order to achieve the specified income and savings/bequest objectives over the specified expected lifetime. (b) The long-term

©2005 by Index Investors Inc.
ISSN 1554-5067

asset allocation strategy that will maximize the probability of achieving this return, given our assumptions and constraints. (c) The recommended rebalancing strategy for the portfolio. And (d) the probability that the solution will achieve the specified income and savings/bequest goals over the specified time frame.

The following tables show how asset allocations with different target internal real rate of return objectives have performed year-to-date:

	YTD 30Nov05	**Weight**	**Weighted Return**
	In US$		In US$
7% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	1.5%	0%	**0.0%**
U.S. Bonds	1.4%	0%	**0.0%**
Non-U.S. Bonds	-9.4%	20%	**-1.9%**
Commercial Property	12.0%	10%	**1.2%**
Commodities	15.3%	10%	**1.5%**
U.S. Equity	5.8%	50%	**2.9%**
Foreign Equity (EAFE)	8.0%	0%	**0.0%**
Emerging Mkt. Equity	24.4%	10%	**2.4%**
		100%	**6.2%**

.

	YTD 30Nov05	**Weight**	**Weighted Return**
	In US$		In US$
6% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	1.5%	0%	**0.0%**
U.S. Bonds	1.4%	0%	**0.0%**
Non-U.S. Bonds	-9.4%	20%	**-1.9%**
Commercial Property	12.0%	10%	**1.2%**
Commodities	15.3%	10%	**1.5%**
U.S. Equity	5.8%	45%	**2.6%**
Foreign Equity (EAFE)	8.0%	5%	**0.4%**
Emerging Mkt. Equity	24.4%	10%	**2.4%**
		100%	**6.3%**

.

©2005 by Index Investors Inc.
ISSN 1554-5067

	YTD 30Nov05	Weight	Weighted Return
	In US$		In US$
5% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	1.5%	0%	**0.0%**
U.S. Bonds	1.4%	0%	**0.0%**
Non-U.S. Bonds	-9.4%	20%	**-1.9%**
Commercial Property	12.0%	10%	**1.2%**
Commodities	15.3%	10%	**1.5%**
U.S. Equity	5.8%	30%	**1.7%**
Foreign Equity (EAFE)	8.0%	20%	**1.6%**
Emerging Mkt. Equity	24.4%	10%	**2.4%**
		100%	**6.6%**

.

	YTD 30Nov05	Weight	Weighted Return
	In US$		In US$
4% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	1.5%	5%	**0.1%**
U.S. Bonds	1.4%	35%	**0.5%**
Non-U.S. Bonds	-9.4%	20%	**-1.9%**
Commercial Property	12.0%	10%	**1.2%**
Commodities	15.3%	10%	**1.5%**
U.S. Equity	5.8%	5%	**0.3%**
Foreign Equity (EAFE)	8.0%	10%	**0.8%**
Emerging Mkt. Equity	24.4%	5%	**1.2%**
		100%	**3.7%**

.

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

	YTD 30Nov05	Weight	Weighted Return
	In US$		In US$
3% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	1.5%	75%	**1.1%**
U.S. Bonds	1.4%	0%	**0.0%**
Non-U.S. Bonds	-9.4%	10%	**-0.9%**
Commercial Property	12.0%	10%	**1.2%**
Commodities	15.3%	5%	**0.8%**
U.S. Equity	5.8%	0%	**0.0%**
Foreign Equity (EAFE)	8.0%	0%	**0.0%**
Emerging Mkt. Equity	24.4%	0%	**0.0%**
		100%	**2.2%**

.

	YTD 30Nov05	Weight	Weighted Return
	In US$		In US$
2% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	1.5%	85%	**1.3%**
U.S. Bonds	1.4%	0%	**0.0%**
Non-U.S. Bonds	-9.4%	10%	**-0.9%**
Commercial Property	12.0%	5%	**0.6%**
Commodities	15.3%	0%	**0.0%**
U.S. Equity	5.8%	0%	**0.0%**
Foreign Equity (EAFE)	8.0%	0%	**0.0%**
Emerging Mkt. Equity	24.4%	0%	**0.0%**
		100%	**0.9%**

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067

This year, we are also introducing two new benchmarks that can be used to evaluate the returns on our model portfolios. The first is the return on holding all of one's assets in cash. We define this return as the yield to maturity on a one-year government security purchased at the end of the previous year. For 2005, the U.S. cash benchmark return is 2.75% (nominal).

The second benchmark is a portfolio that is equally allocated to all of the asset classes we use in our other model portfolios. This benchmark portfolio implicitly assumes that it is impossible to accurately forecast future asset class risk and return. Consequently, the best approach is to equally divide one's exposure to different sources of return (and risk). While we disagree with this assumption, intellectual honesty compels us to include this "couch potato" portfolio as one of our benchmarks.

	YTD 30Nov05	**Weight**	**Weighted Return**
	In US$		In US$
Equally Weighted	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	1.5%	12.5%	**0.2%**
U.S. Bonds	1.4%	12.5%	**0.2%**
Non-U.S. Bonds	-9.4%	12.5%	**-1.2%**
Commercial Property	12.0%	12.5%	**1.5%**
Commodities	15.3%	12.5%	**1.9%**
U.S. Equity	5.8%	12.5%	**0.7%**
Foreign Equity (EAFE)	8.0%	12.5%	**1.0%**
Emerging Mkt. Equity	24.4%	12.5%	**3.1%**
		100%	**7.4%**

©2005 by Index Investors Inc.
If this isn't your copy, please subscribe. Twelve monthly issues cost only US $59

ISSN 1554-5067