The Index Investor

Why Pay More for Less?

Model Portfolio Update

The objective of our first set of model portfolios is to deliver higher returns than their respective benchmarks, while taking on no more risk. The benchmark for the first portfolio in this group is an aggressive mix of 80% domestic equities, and 20% domestic bonds. Through the end of December, this benchmark had returned (17.1%), while our model portfolio had returned (15.0%). For the sake of comparison, we have also compared our model portfolios to a set of global benchmarks. In this case, the global benchmark is a mix of 80% global equities, and 20% global bonds. Through the end of December, it had returned (11.7%).

The benchmark for the second portfolio in this group is a mix of 60% domestic equities and 40% domestic bonds. Through the end of last month, it had returned (10.8%), while our model portfolio had returned (8.0%), and the global benchmark had returned (4.2%).

The benchmark for the third portfolio in this group is a conservative mix of 20% domestic equities and 80% domestic bonds. Through the end of last month, it had returned 1.9%, while our model portfolio had returned 3.0% and the global benchmark 10.9%.

The objective of our second set of model portfolios is to deliver less risk than their respective benchmarks, while delivering at least as much return. The benchmark for the first portfolio in this group is an aggressive mix of 80% domestic equities, and 20% domestic bonds. Through the end of last month, this benchmark had returned (17.1%), while our model portfolio had returned (13.1%). For the sake of comparison, we have also compared our model portfolios to a set of global benchmarks. In this case, the global

benchmark is a mix of 80% global equities, and 20% global bonds. Through the end of last month, it had returned (11.7%).

The benchmark for the second portfolio in this group is a mix of 60% domestic equities and 40% domestic bonds. Through the end of last month, it had returned (10.8%), while our model portfolio had returned (8.3%), and the global benchmark had returned (4.2%).

The benchmark for the third portfolio in this group is a conservative mix of 20% domestic equities and 80% domestic bonds. Through the end of last month, it had returned 1.9%, while our model portfolio had returned 5.3% and the global benchmark 10.9%.

The objective of our third set of model portfolios is not to outperform a benchmark index, but rather to deliver a minimum level of compound annual return over a ten-year period. During 2002, our 12% target return portfolio has returned (13.4%), our 10% target return portfolio has returned (7.0%) our 8% target return portfolio has returned 4.8%, and our 6% target return portfolio has returned 9.2%.

Finally, on the active management front, our benchmark, the Fidelity Global Balanced Fund, finished the year down (6.1%), while our active model portfolio (which we initially kept in Vanguard Total Bond Market Index, but switched at the end of June to the Vanguard Inflation Protected Securities Fund) finished up 12.5%.

We have a few observations on this year's performance. First, our portfolios whose objective is to minimize risk while matching their benchmarks' returns generally outperformed our portfolios whose objective is to maximize return while matching their benchmarks' risk. As we have previously noted, this is due to the fact that different asset classes' relative riskiness tends to be more stable from year to year than their relative returns; for this reason, seeking to minimize risk is likely to more often produce a superior performance (versus the benchmark) than seeking to maximize return.

That being said, regardless of their objective, most of our portfolios outperformed their respective domestic benchmarks this year, demonstrating the advantages of diversifying beyond the domestic bonds and domestic equity asset classes.

Our target portfolios also seem to be performing as intended. Even the one with the most aggressive target (12 percent compound return over ten years) managed to avoid the worst of the downturn, and is still well positioned to meet its long term return goal. Again, this demonstrates the advantages of diversifying across multiple asset classes whose annual returns are have relatively low correlations with each other.

Finally, we admit to being somewhat embarrassed by the fact that our experimental actively managed portfolio has beaten its actively managed benchmark by 18.6% (versus a more humbling .5% last year). We would caution, however, against confusing luck with skill. Statistically, it takes a lot more than two years' results to distinguish between the two, and we still remain very strongly committed to index investing!

Equity Market Valuation Update

As we have previously noted, our valuation analysis rests on two fundamental assumptions: that over the long term, labor productivity growth in our six major regions will converge at between 2.5% and 3.5% per year, and that the long term real equity risk premium is 4.0% per year. Given those assumptions, here is our updated analysis at 31 December, 2002:

Country	Real Risk Free Rate	Equity Risk Premium	Required Real Rate of Return on Equities	Expected Real Growth Rate*	Current Dividend Yield
Australia	3.09%	4.0%	7.09%	4.3%	3.8%
Canada	3.27%	4.0%	7.27%	4.1%	2.1%
Eurozone	2.49%	4.0%	6.49%	3.5%	3.6%

Country	Real Risk Free Rate	Equity Risk Premium	Required Real Rate of Return on Equities	Expected Real Growth Rate*	Current Dividend Yield
Japan	2.31%	4.0%	6.31%	3.2%	1.1%
U.K.	2.13%	4.0%	6.13%	3.5%	3.6%
U.S.A.	2.73%	4.0%	6.73%	4.4%	1.8%

**This reflects not only 3.5% productivity growth, but also expected labor force growth.*

Country	Implied Index Value*	Current Index Value at 12/31/02	Current/Implied (productivity growth @3.5%	Current/Implied (productivity growth at 2.5%)
Australia	279.48	205.20	73%	100%
Canada	134.17	202.54	151%	199%
Eurozone	137.61	114.29	83%	111%
Japan	27.02	76.39	283%	374%
U.K.	349.24	255.14	73%	101%
U.S.A.	277.96	359.81	129%	185%

** Assuming 3.5% future productivity growth*

As you can see, depending on your view of future productivity growth, three of our six key equity markets still may be in undervalued territory, while Japan, despite its many falls, still seems overvalued, given its low dividend yield and expected growth rate. In order to justify its current valuation, one would have to assume that Japan's labor force or its productivity is going to grow much faster than expected in the future. While the former seems unlikely, there is a case to be made for the latter. The challenge in analyzing Japan is that you are actually dealing with two parallel systems. The first one is composed of a small number of companies (e.g., Sony, Honda, Toyota, etc.), that are quite productive and competitive internationally, even at higher yen/U.S. dollar exchange rates than exist today. The second is a much larger, much less efficient, and, so far, much more resistant to change. At some point, the economic pressure will cause the current forces holding back reform in Japan to give way, after which the productivity of this

"second economy" will sharply improve. It is certainly within the realm of historical experience that this could generate rates of productivity growth at least equal to the 5.5% per year that would be needed (given our assumptions) to make the Japanese equity market appear fully and fairly valued today. However, it would be quite a stretch to carry this argument farther, and attempt to support the view that the Japanese equity market is undervalued today.

Historical Asset Class Returns

At the end of each year, we take a look at the asset allocations in our model portfolios, and how they have performed. This year, our discussion will take place across three separate articles. This one will attempt to put 2002's asset class returns in perspective, by comparing them both across countries and over time. The next article will take a look at the returns different asset classes may generate in the future. The last article in this series will then review why asset allocation is still a (very) imperfect science.

Let's start with how the returns delivered by the major asset classes in 2002, from the perspective of investors whose functional currencies include the Australian, Canadian, and U.S. dollar, the Euro, the Yen, and the British Pound. The following table summarizes this data. Asset classes are located along the left-most column, with currencies located along the top row. The intersection of any column and row represents the 2002 return on the given asset class in the given currency.

	In USD	In AUD	In CAD	In EURO	In JPY	In GBP
US Equity	(23.4%)	(33.3%)	(24.7%)	(41.3%)	(34.1%)	(34.1%)
US Bonds	8.2%	(1.7%)	6.9%	(9.7%)	(2.5%)	(2.5%)
AUS Equity	(3.9%)	(13.8%)	(5.2%)	(21.8%)	(14.6%)	(14.6%)
AUS Bonds	21.4%	11.5%	20.0%	3.4%	10.6%	10.6%
CAN Equity	(11.1%)	(21.0%)	(12.4%)	(29.0%)	(21.8%)	(21.8%)
CAN Bonds	9.4%	(0.4%)	8.1%	(8.5%)	(1.3%)	(1.3%)

	In USD	In AUD	In CAD	In EURO	In JPY	In GBP
Euroland Equity	(22.3%)	(32.2%)	(23.6%)	(40.2%)	(33.0%)	(33.0%)
Euroland Bonds	28.8%	18.9%	27.5%	10.9%	18.1%	18.1%
Japan Equity	(9.9%)	(19.8%)	(11.2%)	(27.8%)	(20.6%)	(20.6%)
Japan Bonds	14.2%	4.3%	12.9%	(3.8%)	3.4%	3.5%
UK Equity	(17.3%)	(27.2%)	(18.6%)	(35.2%)	(28.0%)	(28.0%)
UK Bonds	20.7%	10.8%	19.4%	2.8%	9.9%	10.0%
World Equity	(19.3%)	(29.1%)	(20.6%)	(37.2%)	(30.0%)	(30.0%)
World Bonds	18.4%	8.5%	17.1%	0.5%	7.7%	7.7%
Commodities	27.4%	17.5%	26.1%	9.5%	16.7%	16.7%

· *Results are derived from the performance of Exchange Traded Funds for each country, the Oppenheimer Real Assets Fund for commodities, published indexes for country bonds, and exchange rates, and, for world equity and bonds, the performance of a mix of different index funds held in constant proportions. This methodology reflects the pre-tax returns to retail investors in actual index funds, and therefore will differ somewhat from the results published for the underlying indexes.*

Three important points are immediately apparent from this table. The first point is that diversification across broadly different types of assets – that is, equity, bonds, and commodities – worked quite well. The second point is that it was a bad year for equities regardless of your functional currency, and geographical diversification across different equity asset classes was of only minimal benefit. We will discuss the underlying cause for this in more detail later in this series of articles. The final point is that the depreciation of the U.S. dollar versus many other currencies toward the end of the year had a major impact on many investors.

It is also useful to put this year's results in their historical context. The following table presents more detailed results for different asset classes, assuming that the original investment was made at the end of 1987 (that is, after the last big downturn in global equity markets). It shows the annual return (expressed in current dollars) each year, as well as some interesting summary data for each asset class. This includes not only the average annual return and the standard deviation of those returns (which measures how widely they are distributed around the annual average), but also the compound annual

return that would have been earned on that asset class over the last fifteen years on an investment made in it at the end of 1987. Finally, we have also included the correlation coefficients for the annual returns (which measures the extent to which they vary with each other; positive correlations mean they vary in the same direction, negative correlations mean they tend to move in opposite directions, and correlations near zero mean that returns move independently of each other).

In USD	US Equity	TIPS	US Bonds	HiYld Bonds	REITs	Commod	Intl Equity	Intl Bonds
1988	**17.9**	N/A	**7.9**	**12.5**	**13.5**	**27.9**	**28.7**	**2.3**
1989	**29.2**	N/A	**14.5**	**0.8**	**8.8**	**38.3**	**11.5**	**(3.4)**
1990	**(6.2)**	N/A	**9.0**	**(9.6)**	**(15.4)**	**29.1**	**(23.0)**	**15.3**
1991	**34.2**	N/A	**16.0**	**46.2**	**35.7**	**(6.1)**	**14.0**	**16.2**
1992	**9.0**	N/A	**7.4**	**15.8**	**14.6**	**4.4**	**(10.8)**	**4.8**
1993	**11.3**	N/A	**9.8**	**17.1**	**19.7**	**(12.3)**	**35.2**	**15.1**
1994	**(0.1)**	N/A	**(2.9)**	**(1.0)**	**3.2**	**5.3**	**7.1**	**6.0**
1995	**36.5**	N/A	**18.5**	**19.2**	**15.3**	**20.3**	**9.6**	**19.6**
1996	**21.2**	N/A	**3.6**	**11.4**	**35.3**	**33.9**	**5.8**	**4.1**
1997	**31.3**	N/A	**9.7**	**12.8**	**20.3**	**(14.1)**	**1.8**	**(4.3)**
1998	**23.4**	**3.9**	**8.7**	**1.9**	**(17.5)**	**(35.8)**	**15.3**	**17.8**
1999	**23.6**	**2.5**	**(0.8)**	**2.4**	**(4.6)**	**40.9**	**30.3**	**(5.1)**
2000	**(10.9)**	**13.2**	**11.6**	**(5.9)**	**26.4**	**49.7**	**(15.9)**	**(2.6)**
2001	**(12.9)**	**7.7**	**8.3**	**3.0**	**11.9**	**(31.4)**	**(20.2)**	**(3.4)**
2002	**(23.4)**	**16.6**	**8.2**	**1.7**	**3.8**	**27.4**	**(15.1)**	**21.8**
Compound Annual Return	**10.7**	**8.6**	**8.5**	**7.8**	**10.3**	**8.5**	**3.4**	**6.5**
Average Annual Return	**12.3**	**8.8**	**8.6**	**8.5**	**11.4**	**11.8**	**5.0**	**6.9**
Std Dev of Annual Returns	**18.9**	**6.0**	**5.7**	**13.5**	**15.8**	**26.9**	**18.7**	**9.7**

	US Equity	***US Bonds***	***HiYld Bonds***	***REITs***	***Comm odities***	***Intl Equity***	***Intl Bonds***
US Equity	1.00						
US Bonds	0.31	1.00					
HiYld Bonds	0.58	0.42	1.00				
REITs	0.23	0.30	0.63	1.00			
Commodities	-0.10	-0.06	-0.31	0.09	1.00		
Intl Equity	0.66	-0.09	0.40	0.08	-0.05	1.00	
Intl Bonds	-0.05	0.32	0.27	-0.19	-0.21	0.01	1.00

* *TIPS are Treasury Inflation Protected Securities. They are not included in the correlation table because they were only introduced in 1997, and data is limited.*

The data in this table reinforces some important points about asset allocation. First, notice the difference in the standard deviations between asset classes. On a stand-alone basis, asset classes lie along a continuum of riskiness, with domestic bonds (both nominal bonds and TIPS) lying at the safest end of the scale, followed next by international bonds, then by high yield bonds and Real Estate Investment Trusts, with domestic and international equities and then commodities at the riskier end of the scale.

When constructing a portfolio, however, the extent to which the returns on different asset classes vary together is also important. The best example of this is commodities, whose returns either move independently from other asset classes, or tend to go up when those other asset classes' returns go down. This is why an investor may want to include commodities in a portfolio, despite its high level of "stand-alone" risk.

The table also reinforces the very important point that the relative returns that investors actually earn don't always match up with the relative riskiness of different asset classes. This is what that phrase, "past performance is no guarantee of future performance" means in practice. In other words, you can, based on solid theoretical grounding, make asset allocation decisions today that won't turn out as well as you expect them to in the future. And of course, the opposite can also be true. Consider what has happened over the past fifteen years to generate the compound annual rates of return shown in the table.

Nominal interest rates have been declining throughout most of the period in question, which helped to generate the returns you see for U.S. Bonds, Hi Yield Bonds, and REITS. TIPS are a bit more complicated, because they guarantee a real return above the rate of inflation. They do this by paying a coupon rate and adjusting the size of the bond principal in line with changes in the Consumer Price Index (which is takes place with a delay that creates capital gain opportunities). When inflation goes up, the principal increases, and when inflation goes down, it shrinks. However (and this is an important however), the principal cannot shrink below less than the amount you paid for the bond. So, with the chance of deflation looming on the horizon, TIPS actually offer the prospect of a capital gain. For this reason (and because of growing demand for them relative to

still scarce supply), the returns on them have been very attractive, and TIPS based index funds have been growing in popularity.

Returns on international bonds have suffered because of the growing appreciation of the U.S. dollar versus other currencies over the past fifteen years. This has largely been caused by the fact that other economies have not grown as fast as the U.S., nor have their interest rates fallen as fast. Both of these trends drew foreign investment capital into the U.S. and drove up the value of the dollar. The bubble that developed in the U.S. equity market at the end of the 1990s added further impetus to this process. Slow growth outside the U.S. and dollar appreciation were particularly damaging to returns on international equity, which lagged far behind compound U.S. equity returns over the past fifteen years. Finally, commodity returns have been driven by a unique confluence of factors, including wars and the threat of wars, population growth, economic growth, and changes in consumer tastes and production technologies. This naturally leads to the question of whether or not the next fifteen years will resemble the period described in this table. It is to that question that we will now turn.

Future Asset Class Returns

We should say up front that the following discussion is inherently and unavoidably speculative, and, as such, very likely to turn out to be wrong. Nevertheless, it is interesting to consider what current financial market data imply about future returns on different asset classes.

Let's start with the world's bond markets. At the end of December, 2002, real yields on inflation protected government bonds were as follows: Australia, 3.09%; Canada, 3.27%; Eurozone, 2.49%; Japan, 2.31% (derived from the nominal yield on ten year government bonds, less expected deflation); United Kingdom, 2.13%; and United States, 2.73%.

To estimate future real equity market returns, we use the same methodology we use in our market valuation section. We start with the current dividend yield, and add to it the

expected future rate of economic growth, which is a function of both future labor force growth and future productivity growth. The results are shown in the following table:

Region	Dividend Yield	Labor Force Growth	Productivity Growth	Real Equity Returns
Australia	3.8%	0.8%	2.5% to 3.5%	7.1% to 8.1%
Canada	2.1%	0.6%	2.5% to 3.5%	5.2% to 6.2%
Eurozone	3.6%	0.0%	2.5% to 3.5%	6.1% to 7.1%
Japan	1.1%	(0.3%)	2.5% to 3.5%	3.3% to 4.3%
U.K.	3.6%	0.0%	2.5% to 3.5%	6.1% to 7.1%
U.S.A.	1.8%	0.9%	2.5% to 3.5%	5.2% to 6.2%
Emerging Mkts	2.5%	1.3%	2.5% to 3.5%	6.3% to 7.3%

· *Emerging Mkts data are for 14 leading markets, combined using current equity market capitalization weights.*

The aggregated Emerging Markets data is interesting more for what it hides than for what it reveals. Specifically, IMF data on growth in per capita gross domestic product suggests that productivity has been growing much more slowly in Latin America (the IMF forecasts .9% per year between 1994 and 2003) than in the developing countries of Asia. Taking the IMF's projection for growth in GDP per capita as a low-end estimate of future labor force productivity growth in the different emerging markets yields the following estimates of future real equity returns:

Region	Dividend Yield	Labor Force Growth	Productivity Growth	Real Equity Returns
Latin America	3.3%	1.8%	0.9%	6.0%
China	4.3%	0.8%	8.6%	13.7%
India	2.1%	1.9%	5.9%	9.9%
Other Asia	2.4%	1.2%	2.5%	6.1%

Finally, what can we say about future real returns on real estate and commodities? Both historical returns and relative risk suggest that the return on property will lie between the return on bonds and that on equity, and, in the case of Real Estate Investment Trusts,

probably lie closer to the latter. With respect to commodities, over the past thirty years, the compound annual return on property has been quite close to that on U.S. equities. Granted, this could just be a statistical fluke; for now, however, it is the best we can do.

Of course, up to now we have not mentioned two factors that are critical to translating our estimated future real returns into future nominal returns: inflation rates and exchange rates. One way to estimate the former is to look at the difference between the yields on real (inflation protected) versus nominal bonds. This leads to the following expected inflation rates: Australia, 2.1%; Canada, 1.5%; Eurozone, 1.7%; Japan, (1.4%); U.K., 2.3%; and U.S.A., 1.1%. Adding these expected inflation rates to our previous real returns forecasts yields the following table of estimated future nominal returns:

Region	**Nominal Bond Returns**	**Nominal Equity Returns**
Australia	5.2%	9.2% to 10.2%
Canada	4.8%	6.7% to 7.7%
Eurozone	4.2%	7.8% to 8.8%
Japan	0.9%	1.9% to 2.9%
U.K.	4.4%	7.5% to 8.5%
U.S.A.	3.8%	6.3% to 7.3%

Theoretically, the difference in nominal bond rates (particularly when it is matched by a similar difference in expected nominal equity returns) should forecast future exchange rate changes (although in practice, this method has been shown to work only with a varying and often substantial time lag). If this theory turns out to be correct, the following table shows the future exchange rate changes implicit in today's interest rate differentials:

From->	AUS	CAN	EUR	JPN	UK	USA
To						
AUS	0.0%	-0.4%	-1.0%	-4.3%	-0.8%	-1.3%
CAN	0.4%	0.0%	-0.6%	-3.9%	-0.4%	-1.0%
EUR	1.0%	0.6%	0.0%	-3.2%	0.2%	-0.3%
JPN	4.3%	3.9%	3.2%	0.0%	3.5%	2.9%
UK	0.8%	0.4%	-0.2%	-3.5%	0.0%	-0.6%
USA	1.3%	1.0%	0.3%	-2.9%	0.6%	0.0%

* *For example, an investor located in the U.S.A. could expect to receive an extra 1.3% return to due the appreciation of the Australian dollar versus the U.S. dollar.*

Does the existence of these real return forecasts mean that we should all go out and become market timers, switching our investments each year in line with different asset classes' forecast returns? Frankly, that's not for us, for two reasons. First, the forecasts could very well be wrong, perhaps seriously so. We're not at all convinced the potential returns would offset the very definite transaction costs that are involved in playing the market timing game.

Second, even when you're right, you can still be wrong. How many people do you know who (accurately, it turns out), believed the U.S. equity market was overvalued in 1998? And how many of them tried to act on their views, either by buying put options or (more painfully), shorting stocks? A lot of them ran out of money before their insights were proved correct (except for their forecast of when the crash would occur). So for now, at least, we'll just regard these forecasts as interesting, but not really action oriented, except, perhaps, for making tilts within our emerging markets allocation. We'll keep working on this, and write about it again if it looks like it might be useful.

Why Asset Allocation is Still A Challenge

So where does all this leave us? For many reasons, asset allocation still remains at best an imperfect (and imperfectly understood) science, if not an art. In this section, we'll highlight four issues that lead to this conclusion.

First of all, the benefits of diversification are not infinite. Statistically, they begin to fall off sharply after relatively few different assets have been included in a portfolio. For example, where the average correlation between assets is .6, the benefits fall off after five assets; with an average correlation of .4, that number only rises to eight. After these points have been reached, the way to achieve further risk reduction is by taking short positions in certain assets, which is a game far beyond the skills of most retail investors. Despite this, too many investors insist on "diversifying" their portfolio across too many highly correlated assets. For example, you get many more diversification benefits from investing in bonds and equities than you do from investing, for example, in small capitalization value stocks and large capitalization growth stocks. Unfortunately, this is still a mistake that too many investors continue to make.

The second major issue that many people don't fully appreciate is that the inputs used in asset allocation processes are themselves only statistical estimates of the "true" values for these variables. Techniques such as resampling (essentially, using Monte Carlo simulation to make these statistical estimates explicit) show that, because of the possibility of estimation error, many portfolios with different asset allocations are statistically indistinguishable from one another in terms of their expected risk and return. Practically, the lesson here is that rebalancing a portfolio should only be done when the asset weights get significantly out of line with the long run asset allocation (e.g., say 7 to 10 percent or more).

The third issue that affects asset allocation models is the fact that the historical returns for many asset classes are not normally distributed, and have "fatter tails" than would be the case in a normal distribution. Statistically, this means extreme events are more likely to

happen than would be the case if the returns were normally distributed. How much more likely? Fortunately, a 19th century Russian mathematician named Pafnuty Chebyshev worked this out. In the case of a normal distribution, the range defined as the mean (average) plus or minus two deviations is supposed to cover about 95 percent of possible outcomes, while the three standard deviations are supposed to cover 99 percent. Chebyshev showed that if the distribution isn't normal, you would need about four standard deviations to cover 95 percent of the possible outcomes, and about seven standard deviations to capture 99 percent. Unfortunately, the assumption of normality is practically necessary to make many asset allocation models computationally feasible, and most investors aren't told that as a result they often provide a false sense of confidence about the limits of "the worst" outcomes that could occur. Practically, this means that there is more risk inherent in high standard deviation asset classes (like equities) than people may realize, and that a more conservative asset allocations are probably more effective in the long term (a point we've taken to heart in the construction of our target return model portfolios).

The fourth issue that affects asset allocation models is the fact that the underlying economic processes that generate the return distributions they use as inputs are not themselves stable (or, as they say in statistics, it isn't "stationary"). The evidence in support of this observation is quite strong: for example, standard deviations (also known as volatility) is not stable across time; rather, it tends to cluster in "regimes" of high and low values for this variable. The same is true for the correlations of returns between asset classes: there is a lot of data that says that correlations tend to increase during bad times, and then move apart during good times. Anyone looking for an example of this need look no further than the almost uniformly dismal performance of the world's major equity markets over the past year. Equally as important (as described in the book Iceberg Risk by Kent Osband), correlation itself does not capture the risk posed by the fact that returns across many asset classes could be driven, to an important degree, by exposure to a common factor or factors. We have undoubtedly seen this with respect to the performance of the world's equity markets in 2002, with their collective exposure to the U.S. economy as the engine of the world's economic growth. And we may see it again

next year if deflationary conditions cause the wheels to come off the world's derivative markets. Developing new ways to deal with this "non-stationarity" risk has become quite a hot topic in the financial world. Practically, there are relatively few results so far, apart from "stress testing" one's portfolio by setting all the correlation coefficients equal to one and seeing if one could live with the result. Going forward, this is an approach we will be incorporating into our modeling efforts in 2003.

So Where Does This Leave Us?

We hope these end-of-the-year musings haven't left you feeling frustrated or confused. The very fact that you subscribe to The Index Investor suggests that you have already taken the most important lessons to heart, and have diversified across a limited number of asset classes, and implemented your strategy using low cost, tax-efficient index mutual or exchange traded funds. Still, we think it is equally important that you also have an understanding of the limits to the effectiveness of any and all approaches to asset allocation. While diversification across assets with low return correlations certainly raises the odds that you will achieve your investment goals, as you can see, there are good reasons why this approach cannot guarantee success. On the other hand, we also hope that by helping you incorporate these issues into your thinking, and using them in the construction of our own model portfolios, we will be able to nudge those odds of success up just a bit higher in the new year!

How Large is the Indexing Market in the United States?

Two months ago, we asked ourselves what we thought was this relatively simple question. We now know that the answer to it is anything but simple, or easy to determine. At the end of this article, we'll offer our opinion as to why this is the case. But first, we'll answer the question that we asked.

The first challenge you face when attempting to discover the size of the indexing market in the United States is collecting the data you need. Suffice it to say, it doesn't exist in one location, and is far from neatly organized. Specifically, we found that the raw data we had to work with was divided between information about the type of investors who indexed their funds, and the type of instruments they used.

Broadly speaking, there are two general types of investor: individuals, and institutions such as pension plans, bank trust departments, and life insurance companies. To index their investments, these investors use a variety of instruments, including index mutual funds, and the direct holding of the bonds or equities (including exchange traded index funds) that comprise the index whose performance they are trying to track.

Given this, to estimate the size of the U.S. indexing market, we have tried to fill in all the cells in a 2 x 2 matrix that looks like this:

The U.S. Indexing Market in 2001	*Mutual Fund Assets*	*Directly Held Assets (including ETFs)*
Institutional Investors	?	?
Individual Investors	?	?

Let's start with the upper right cell, direct holdings by institutional investors. Every year, Pensions and Investments Magazine surveys the top 1000 pension plans in the United States, ranked by the size of the assets they have under management. Broadly speaking, pension plans fall into two main categories. Defined benefit plans pool all employees' retirement savings, and in return guarantee a certain level of retirement income. These savings are allocated to different asset classes, and investments within each asset class are generally managed by professional investment managers, under the supervision of the plan trustee. Defined benefit plans place quite a bit of risk on the shoulders of the

companies that sponsor them. If their investment performance does not generate sufficient funds to pay the anticipated benefits to plan participants, the company has to increase the size of the contributions it makes to the plan, which reduces the funds it has available to distribute to its shareholders, and/or invest in new projects. Because of this, defined benefit plans have increasingly been replaced by defined contribution plans, where the company only guarantees that it will contribute certain amounts to the plan, but does not guarantee a minimum level of income to retirees. Moreover, under defined contribution plans (which are often known by the chapter of the regulations they are structured under, such as 401 (k) or 403 (b)), employees themselves (rather than professional money managers) are largely responsible for deciding how to invest their retirement savings.

At the end of 2001 (the year we will use for all our estimates), the top 1000 retirement plans were estimated to have $3.6 trillion in defined benefit assets. A survey of the top 200 plans, which represent approximately 75 percent of the assets controlled by the top 1000 plans, showed that 30% of their assets were explicitly invested using an indexing approach. We say "explicitly", because their has been much discussion in recent years of "de jure" versus "de facto" (also known as "closet") indexing. The latter case is when an active manager, to avoid losing an investment management account, structures his or her portfolio to closely track the benchmark index that is used to measure his or her performance. As evidence of the growth of "closet indexing", analysts frequently cite the sharp decline in active funds' "tracking errors" versus their performance benchmarks in recent years. Given that there is no way to estimate the extent of "closet indexing" (except by a wild guess), we have elected to include in our estimate only those funds that are explicitly indexed. However, given the widespread practice of "closet indexing" our estimate should be regarded as on the low side of what is probably the case in practice. That being said, to calculate our estimate, we assumed that the 30% indexing figure for the top 200 defined benefit plans also applied to the other 800 plans. Given that the total assets under management at the top 1000 defined benefit plans amounted to $3.6 trillion at the end of 2001, approximately $1.08 trillion (30% times $3.6 trillion) in assets were managed using an index approach. We should also note that our 30% estimate falls

roughly in the middle of two similar estimates that were recently made. Goldman Sachs also studied a sample of 200 top defined benefit plans, and estimated that 25% of their assets were indexed. At the other end of the spectrum, the Sandler Review published by the U.K. Treasury in July, 2002 estimated that 40% of U.S. institutional assets were indexed.

The second type of institutional investor with significant direct security holdings are life insurance companies. According to the Federal Reserve's Flow of Funds data, at the end of 2001, life companies directly held $855 billion in corporate equities, and $2,075 billion (that is, $2.1 trillion) in credit market instruments (government and corporate bonds, mortgages, and loans). We could find no estimate about how, in aggregate, these funds are managed. Given that, we elected to focus on a subset of the life industry where data was available: the annuity market. In recent years, variable annuities have become quite popular. In simplified terms, they are a bundle of mutual funds (called subaccounts), wrapped up in an insurance product (which has some tax advantages). As in the mutual fund business, life companies have also found some of their annuity customers asking for indexed products. They have responded by offering index subaccounts, and products known as indexed annuities. In 2001, the total value of variable annuity sales was $113 billion. Of this amount, approximately $7 billion (or 6.2%) were indexed annuities. At the end of the year, the value of annuity assets (that is, the value of the funds received from the sale of annuity products in previous years, plus the appreciation of those funds) was $883 billion. We estimated that 6.2% of this (or about $55 billion) represented indexed annuity assets. Given that indexed annuities have been rapidly rising in popularity only in recent years, this estimate may be on the high side; however, given the growing relative market share of indexed products, we don't think it is too far off the mark. (We should also note that we have not included in this calculation the value of assets supporting the approximately $60 million in premiums that are received each year from the sale of equity indexed life insurance, as opposed to annuity products.).

The third major type of institutional investor is bank trust departments. Federal Reserve Flow of Funds data showed that they directly held $33 billion in corporate equities and $229 billion in credit market instruments at the end of 2001. Our sense is that, like life insurance companies, bank trust departments are more likely to manage their investment portfolios internally than they are to use outside money managers. Given this, we assume that they are also more likely to employ active management. For this reason, we have used the lower estimate of 6.2% of assets managed using indexing. Given directly owned securities of $262 billion, this yields an estimate of $16 billion in indexed assets.

Institutional investors not only own securities directly, they also own mutual funds. The largest institutional owners of mutual funds are direct contribution retirement plans. Pensions and Investments estimated that the top 1000 retirement plans owned $1.2 billion in defined contribution assets at the end of 2001. The top 200 defined contribution plans had assets of about $706 billion. Of this amount, approximately 55 percent ($385 billion) was in corporate 401(k) plans. On average, these corporate plans had 32% of their assets invested in their own company's stock, leaving about $262 billion ($385 x 68%) for other investments. The remaining defined contribution plans in the top 200, with assets of $321 billion, were sponsored by public sector entities and unions, and did not invest in company stock. Of the total amount of defined contribution assets not invested in company stock ($262 +$321 = $583, or 83% of $706), 17% was indexed.

At the end of 2001, the Investment Company Institute (the main trade association for mutual funds) said that it recorded $1,200 billion in mutual fund assets that were held by defined contribution plans. Assuming 17% of these represented investments in index funds, the total amount of indexed defined contribution assets was $204 billion. At the same time, bank trust departments were reported (in Federal Reserve Flow of Funds data) as holding $359 billion in mutual fund assets. Assuming the same previously estimated 6.2% indexing to total assets ratio applies to these holdings, we estimate that bank trust departments held a further $22 billion in indexed assets.

The Investment Company Institute also reported that, at the end of 2001, of $4,689 billion in long term (basically debt and equity, but not money market) mutual fund assets, $366 billion was invested in index mutual funds. Given that we have estimate that $226 billion in indexed mutual fund assets were held by institutional investors, this leaves $140 billion in indexed mutual fund assets that were held by individuals, in either taxable or tax-exempt (IRA) accounts. We also know that of the $4,689 in long term mutual fund assets, $1,200 billion was held by direct contribution pension plans, $359 billion was held by bank trust departments, $108 billion was held by non-financial corporations, and $44 billion was held by life insurance companies. This leaves $2,978 in mutual fund assets that were held by individuals. Our estimated indexed assets of $140 billion therefore represents only 4.7% of the mutual fund assets held by individuals.

This brings us to individuals' direct holdings of debt and equity securities (the lower right hand box in our matrix). While individuals directly owned substantial amounts of debt and equity securities at the end of 2001 (respectively, $2.4 billion and $6.0 billion, according to the Federal Reserve Flow of Funds data), we think it is highly unlikely that much of this money was indexed. There are, however, two exceptions to this. The first is the $416 billion that was held in separately managed accounts (basically, direct holdings managed by a money manager hired by the owner of the securities). Because virtually all of these assets were owned by high net worth individuals (due to the high minimum investments required to establish a separate account), and because these investors tend to be more sophisticated, we have estimated that 25% of these funds were indexed, or $104 billion. Our basis for this estimate was the Sandler Report's finding that "for funds sold direct to consumers, the proportion of passive management was 25%, which is essentially the same proportion as in the [U.K.] institutional world. This is consistent with a situation in which the more knowledgeable consumers, who feel able to buy direct, are aware of the difficulty of identifying superior managers", [and are thus more likely to prefer indexing.]

To this amount, we also need to add the assets of exchange traded index funds that are directly owned by individuals. At the end of 2001, ETF assets amounted to $83 billion.

However, while we could not find an exact estimate, there were multiple reports that institutional investors were by far the heaviest users of ETFs. We have assumed that individuals held only 30% of ETF assets at the end of 2001, or about $25 billion. To avoid double counting, we assume that the remaining ETF assets were included in the direct holdings of institutional investors, and separately managed individual accounts.

We have now completely filled in our matrix. Here is what it looks like:

The U.S. Indexing Market in 2001	*Mutual Fund Assets*	*Directly Held Assets (including ETFs)*
Institutional Investors	$226 billion	$1,151 billion
Individual Investors	$140 billion	$129 billion

Three conclusions immediately emerge from this matrix: first, we estimate that at least $1.6 trillion in assets were indexed in the United States at the end of 2001. Second, most indexed assets are held outside of mutual funds. Finally, institutional investors are, relative to the assets they manage, much bigger users of indexing than are individual investors. This last observation brings us full circle to the question we asked at the beginning of this article: why was it so hard for us to get an accurate picture of the extent of index investing in the United States?

The Sandler Review raised some interesting points in this regard. It noted that "one of the key decisions an investor must make is whether his or her investments should be managed actively or passively [that is, indexed]. Active management is only appropriate where the investor believes that (a) there are systematic inefficiencies in the market that can be exploited; (b) he or she can identify in advance those investment managers capable of doing so; and (c) the potential benefits outweigh the additional costs involved [beyond those charged by passive managers]…One would [therefore] logically expect to find that institutional investors as a group made greater use of active management than individual investors, since institutions typically have greater resources and

professionalism to bear in the investigation and selection of active managers. In fact, the reverse is the case…Large numbers of individual investors, who are not in a position to identify superior managers [in advance] are nonetheless investing in actively managed funds…Data from a mystery shopping exercise analyzed by the Review suggested that consumers' preference for active funds is shared by their advisers [note that in the United States, only 15% of mutual funds are sold direct to individual investors]. Ninety two percent of advisers' fund recommendations were for active funds. Subsequent interviews with advisers confirmed the existence of this preference." Then in a great bit of British understatement, the Review concluded that "it would be implausible to attribute this preference for active management, which is materially greater than that demonstrated by institutional investors, to superior expertise on the part of the advisers to individual investors."

We think the challenges we faced in putting together this data on indexing reinforces the Sandler Review's conclusion that the investment management industry, and those who sell its products to individual investors, have a very strong disincentive to fully informing the investing public about the benefits of indexing. When you are earning high incomes from sales commissions and high management fees on actively managed products, it is not in your self-interest to tell your customers about a different approach that costs less and delivers better results over the long term. Critically, undoubtedly includes a resistance to showing individual investors the extent to which the most sophisticated institutional investors have chosen to index their investments. Sadly, we think that is why our task has been so difficult.

On the other hand, now that it is done, we hope that the estimates we have developed will inspire more individual investors to reconsider their use of active management, and focus instead on the long-term benefits of index investing.