The Index Investor

Why Pay More for Less?

Global Asset Class Returns

Year to Date	In USD	In AUD	In CAD	In EURO	In JPY	In GBP
US Equity	14.00%	(1.54%)	2.07%	6.92%	15.51%	13.99%
US Bonds	0.40%	(15.14%)	(11.53%)	(6.68%)	1.91%	0.39%
AUS Equity	20.70%	5.16%	8.77%	13.62%	22.21%	20.69%
AUS Bonds	12.00%	(3.54%)	0.07%	4.92%	13.51%	11.99%
CAN Equity	23.50%	7.96%	11.57%	16.42%	25.01%	23.49%
CAN Bonds	14.86%	(0.68%)	2.93%	7.78%	16.37%	14.85%
Euroland Equity	14.70%	(0.84%)	2.77%	7.62%	16.21%	14.69%
Euroland Bonds	9.76%	(5.78%)	(2.17%)	2.68%	11.27%	9.75%
Japan Equity	9.40%	(6.14%)	(2.53%)	2.32%	10.91%	9.39%
Japan Bonds	(1.14%)	(16.68%)	(13.07%)	(8.22%)	0.37%	(1.15%)
UK Equity	6.90%	(8.64%)	(5.03%)	(0.18%)	8.41%	6.89%
UK Bonds	0.88%	(14.66%)	(11.05%)	(6.20%)	2.39%	0.87%
World Equity	13.80%	(1.74%)	1.87%	6.72%	15.31%	13.79%
World Bonds	3.00%	(12.54%)	(8.93%)	(4.08%)	4.51%	2.99%
Commodities	10.00%	(5.54%)	(1.93%)	2.92%	11.51%	9.99%
XR Chng v. USD	0.00%	15.54%	11.93%	7.08%	-1.51%	0.01%

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 July, this benchmark had returned 11.3%, while our model portfolio had returned

14.2%. 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 11.6%.

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 8.6%, while our model portfolio had returned 12.0%, and the global benchmark had returned 9.5%.

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 3.1%, while our model portfolio had returned 5.1% and the global benchmark 5.2%.

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 11.3%, while our model portfolio had returned 13.3%. 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 11.6%.

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 8.6%, while our model portfolio had returned 9.8%, and the global benchmark had returned 9.5%.

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 3.1%, while our model portfolio had returned 4.9% and the global benchmark 5.2%.

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 nominal return over a ten-year period. Through last month, our 12% target return portfolio has returned 14.4% year-to-date, our 10%

target return portfolio has returned 11.2% our 8% target return portfolio has returned 8.7%, and our 6% target return portfolio has returned 4.4%.

Last month, the active portfolio was allocated as follows: 60% to the Vanguard Inflation Protected Securities Fund, 15% each to the Oppenheimer Real Assets Fund and the T. Rowe Price International Bond Fund, and 10% to the U.K. Equity Market iShare. These will not change next month. Year-to-date, our actively managed portfolio has returned 4.0%.

Equity Market Valuation Update

Our valuation analysis rests on two fundamental assumptions. The first is that the long term real equity risk premium is 4.0% per year. The second is the rate of productivity growth the economy will achieve. As described in our June, 2003 issues, we use both high and a low productivity growth assumptions. Given these assumptions, here is our updated market valuation analysis at the end of last month:

Country	Real Risk Free Rate	Equity Risk Premium	Required Real Return on Equities	Expected Real Growth Rate*	Div Yield	Expected Real Equity Return**
Australia	3.12%	4.00%	7.12%	4.90%	3.80%	8.70%
Canada	3.09%	4.00%	7.09%	2.10%	1.90%	4.00%
Eurozone	2.15%	4.00%	6.15%	2.50%	2.80%	5.30%
Japan	1.49%	4.00%	5.49%	2.80%	1.00%	3.80%
U.K.	2.13%	4.00%	6.13%	2.50%	3.40%	5.90%
U.S.A.	2.82%	4.00%	6.82%	4.50%	1.70%	6.20%

**High Productivity Growth Scenario. See Asset Class Review, in our June 2003 Issue.*

*** Expected real growth rate plus current dividend yield*

Country	Implied Index Value*	Current Index Value	Current/Implied (high productivity growth)	Current/Implied (low productivity growth)
Australia	416.24	243.17	58%	85%
Canada	95.44	250.65	263%	315%
Eurozone	100.36	130.82	130%	184%
Japan	30.43	81.85	269%	369%
U.K.	253.33	270.47	107%	151%
U.S.A.	296.53	404.67	136%	195%

* *High productivity growth scenario.*

Product and Strategy Notes

New GAO Report on Mutual Fund Fees

In June, the United States General Accounting Office (the investigative arm of the U.S. Congress) released its long awaited report, titled "Mutual Funds: Greater Transparency Needed in Disclosures to Investors." Three of the report's conclusions stand out, and echo previous articles in The Index Investor: (1) "Unlike other financial products, mutual funds do not disclose the actual dollar amount of fees paid by individual investors." (2) "Although the complete extent of soft dollar use is unknown, they could represent a significant portion of trading commissions." And (3), "Trading and other costs impact mutual fund investor returns, but are not prominently disclosed." The full report makes interesting reading. It will soon be available in our Research Library.

Vanguard Launches New Mutual and Exchange Traded Index Funds

On July 31st, Vanguard announced plans to launch a new range of index funds. Ten new U.S. sector index funds will be offered as both mutual and exchange traded funds. They will track discrete sectors of the Morgan Stanley Capital International Investable Market 2500 Index, which is a broad measure of the U.S. market. The new sector funds will cover energy, basic

materials, industrials, consumer discretionary items, consumer staples, health care, financial services, information technology, telecommunications and utilities. With the launch of these products, investors will have a choice of three different sector fund families, including funds based on the S&P 500, Dow Jones Total Market, and MSCI 2500 indexes. Of these three groups, we prefer the latter two, because their market coverage is broader.

In a related move, Vanguard also recently announced that it would be switching from S&P to MSCI indexes for seven of its domestic funds, including the (large cap) Value and Growth, Mid-Cap, Small-Cap, and Small-Cap Value and Growth funds. For Vanguard investors, this appears to be a move that makes sense. First, the MSCI indexes have lower turnover than the S&P indexes, which will lower Vanguard's transaction costs. Second, MSCI uses eight factors to divide stocks between their growth and value indexes, while S&P uses only one, the market/book ratio. Vanguard believes that the MSCI approach will better reflect the relative performance of these two style tilts.

Vanguard also announced plans to offer a new large cap index fund, based on the MSCI U.S. Prime Market 750 index, which represent the largest 88% of the U.S. equity market's capitalization. This is roughly equal to the capitalizations of the S&P 500 and S&P 400 indexes.

Finally, Vanguard also announced that it will be offering exchange traded shares ("VIPERS") on nine existing index mutual funds, including the (large cap) Value and Growth Index Funds, the Mid-Cap Fund, the Small Cap Fund, the Small Cap Growth and Value Funds, and the European, Pacific, and Emerging Markets funds.

The Economist on Asset Management

For those who missed it, The Economist had a very interesting special survey of asset management in its July 5th issue. For regular readers of The Index Investor, its findings were depressingly familiar: "If there is a scandal in the fund management business, as some people believe, it is of a subtle kind. As the fund management business grew, it concentrated

increasingly on relative performance. Although the law of averages means that only some people can beat the market -- the market being simply the sum of everybody's investment decisions -- most fund managers sell the idea that they can outperform the rest. The financial media benefit too, because the get money from advertising and free content from portfolio managers talking about their stock picks…In return for the promise to outperform, which mostly turns out to be false, active managers earn a generous fee. Most fund managers actively try to beat indices. Passive managers who simply track the market have captured only a small portion of retail investors' assets. Undoubtedly, a few active managers do beat the market, and these are worth paying for. The impossible part is knowing which ones will pull it off."

"Most fund managers try to convince investors that they will outperform the market by boasting about how well they have done in the past. This seems reasonable enough: in most areas of endeavour, human beings are judged on their track record. But fund managers themselves know quite well that in their industry past performance is no guide to the future…However, few managers would say as much in public, because it would undermine the way in which the industry sells its products. Numerous empirical studies have confirmed that strong performance by a fund manager seldom lasts…For fund managers…much of their performance comes down to luck, not skill, and luck rarely lasts…As fund manager can use a short period of strong returns to suck in lots of new assets to manage, but that can make it even more difficult for him to outperform his peers. The larger the value of a trade in the stockmarket, the more likely he is to move the market against his fund and his investors. The bigger the fund gets, therefore, the worse its performance is likely to be…"

"If anyone were able to find active managers who could beat the market year in, year out, it would be institutional investors. After all, they have teams of people to work on the problem. But the professionals put more money in passive [index] funds and less in active funds than do retail investors. In America, institutions have 25% of their money in index trackers, against 12% for individual investors. In Britain, the numbers are 20% and 10%, and in continental Europe 5% and 2%."

S&P Study Shows Low Cost Funds Outperform

In June, Standard and Poor's published a report that compared the total returns delivered by mutual funds with low expense ratios to funds with high expense ratios. All index funds are in the low cost category. S&P's analysis covered nine different types of fund, based on the market capitalization of the companies they invest in (large, mid and small cap) and their investment style (growth, balanced, and value). S&P looked at performance over one, three, five and ten years. Unsurprisingly, they found that in eight of the nine categories, funds with below average operating expenses delivered higher returns. The table below shows the average annualized performance advantage of low cost funds over ten years , along with the average expense ratio for the category (in parentheses):

	Growth	**Balanced**	**Value**
Large Cap	1.54% (1.60%)	2.07% (1.26%)	1.50% (1.41%)
Mid Cap	3.00% (1.69%)	(1.04%) (1.26%)	1.73% (1.48%)
Small Cap	5.05% (1.78%)	3.45% (1.44%)	3.76% (1.60%)

Why Do Different S&P 500 Index Funds Have Different Expense Ratios?

An interesting April, 2003 study by Professors Ali Hortacsu and Chad Syverson of the University of Chicago examined the question of why the 85 S&P 500 index funds that were available to U.S. retail investors in 2000 had such a wide range of expense ratios, and why those with higher ratios were gaining market share when compared to those with lower expense ratios. For example, funds in the 25th percentile (ranked by operating expense ratios) charged average annual fees of .47%, while those in the 75th percentile charged 1.45%. Hortacsu and Syverson tested two plausible explanations for this gap: investors' differing desires for different product attributes other than a fund's portfolio composition and expected returns. Examples of these attributes could include a fund company's brand, online account access, provision of investment advice bundled with the fund (e.g., when it is sold by a broker), the size of fund family, etc. The second explanation that was explored was investors' ignorance of the existence of lower cost options (technically known as "information

frictions"). They concluded that the latter explanation was significantly more important than the former, and was probably caused by many relatively novice investors choosing to invest in S&P 500 index funds during the 1990s. The full name of the study is "Product Differentiation, Search Costs and Competition in the Mutual Fund Industry: A Case Study of S&P 500 Index Funds".

Painful Findings From Latest Dalbar Investor Behavior Study

The latest installment of an ongoing study called "Quantitative Analysis of Investor Behavior" was released in July by Dalbar, Inc. (a Boston based research firm). It analyzed the impact of the well-known tendency of retail investors to buy mutual funds when the market is rising, and to sell them when the market is falling. According to Dalbar, the usual result of these attempts at market timing is nothing short of disastrous. The average investor held a stock fund for an average of just two years, and earned just fund 2.57% annually for the last 19 years, compared to an average gain of 12.2% per year by the S&P 500 index.

Index-Based 529 College Savings Plan Now Available

In partnership with Vanguard, the State of Nevada has launched a 529 college savings plan that includes index fund investment options. We will be writing about this in more detail later this year. In the meantime, more information is available at www.vanguard.com

Decimalization: Another Drag on Active Funds' Performance

In 2001, both the New York Stock Exchange and NASDAQ markets switched from quoting stock prices in terms of sixteenths of a dollar to a system based on decimals -- that is, one hundredths of a dollar. Supporters of this change (which was made under considerable pressure from the U.S. Congress) argued that this reduction in "tick" size would generate substantial savings for investors. Opponents argued that this benefit would be offset by a decrease in market liquidity, because it would reduce the compensation available to market makers. A recent academic study has shed more light on this controversy. In "Common

Cents? Tick Size, Trading Costs, and Mutual Fund Performance", professors Nicholas Bollen and Jeffrey Busse note that "small, retail [trading] orders that can be executed at quoted prices unambiguously benefit from the tighter spreads caused by smaller tick sizes. However, recent studies by the NYSE and NASDAQ [have found] that depth [liquidity] declined significantly following the switch to decimal pricing, suggesting that large institutional orders from pension funds, mutual funds, and hedge funds may actually suffer from reductions in tick size. For these large orders, tighter bid-ask spreads do not necessarily imply lower trading costs since their size often far exceeds the quoted depth [that is, the number of shares a market maker says it will buy or sell at the quoted price]. What matters are the prices at which institutional orders are executed: lower depth suggests that these orders may suffer greater price concessions following [the move to decimalization]." To test this proposition, the authors estimate mutual fund trading costs before and after decimalization. They "find no significant change in index fund trading costs finding decimalization. In contrast, [they find] that the trading costs of actively managed funds increased by an average of more than one percent of fund assets per year following the switch to decimals."

Answers to Recent Subscriber Questions

We regularly receive thought provoking questions from many of our readers. Based on our belief that if one person is asking, more are thinking about these issues, this month we are publishing a number of these questions and our responses to them. If you like this feature, we can make it a permanent part of our site.

Question: Now that Vanguard has closed its high yield bond fund (VWEHX) to new investors, what alternative do you suggest?

Answer: We've looked at a lot of alternatives, and think that the TIAA-CREF High Yield Bond Fund (TCHYX) is a good substitute. At only .34%, its expense ratio is almost as low as Vanguard's (.27%), and its performance record is comparable.

Question: Could you please explain your publishing schedule?

Answer: When we first started The Index Investor, we published each issue at the beginning of the month -- that is, the July issue was published at the beginning of July, and contained model portfolio results through the end of the preceding month. Unfortunately, this met some resistance from our subscribers, who preferred to have an issue's title month correspond to the month through which the model portfolios had been updated. Hence our current (somewhat confusing) publication schedule: the August issue will be published the first week of September, and will contain model portfolio results through the end of August. We apologize for the confusion this causes.

Question: Why don't you include cash in your model portfolios?

Answer: Broadly speaking, there are two reasons to hold cash. The first is precautionary, to hedge known or unknown liquidity needs. Our model portfolios do not reflect this need, as the cash required will differ according to each investor's individual circumstances.

Given that, the second reason to hold cash is because one is engaging in market timing -- that is, departing, for different periods of time, from one's basic asset allocation policy (also known as one's "strategic asset allocation") in the hopes of earning additional returns from superior insights into the relative valuation levels of different asset classes (i.e., temporarily reducing the weight of one asset class below its "strategic" level, while increasing the weight of another asset class above its strategic level). This is sometimes called "tactical asset allocation", and sometimes "market timing". I should say at the outset that our view on this matter is not ideologically pure. In general, we agree with many theoretical studies which suggest that market timing, like other forms of active management, is ultimately not as profitable an approach as index investing. On the other hand, experience has taught us that, on rare occasions (and the risk here is not recognizing just how rare these are in practice) an asset class can become so clearly overvalued that a departure from one's strategic asset allocation is warranted. The departure of the British pound from the European monetary system in September, 1992 (and its subsequent devaluation) is one example of this. The

overvaluation of the U.S. equity market in 2000 is arguably another. In fact, in the case of the latter, in March, 2000 we wrote about different approaches an investor could take to hedge their downside exposure to falls in the value of the U.S. equity market. On the other hand, we also believe that extreme under-valuation situations are much harder to spot. Our model portfolios are strategic asset allocations; they are not meant to be tactical recommendations. For people interested in this latter subject, we publish our equity market valuation comparisons each month to provide information that may be useful in making tactical asset allocation decisions if one is so inclined.

Question: Can an investor buy and sell options on Exchange Traded Funds?

Answer: Yes. It is now possible to buy and sell options on a wide range of ETFs. The Chicago Board Options Exchange (CBOE) website (www.cboe.com/OptProd/OptionsOnETFs.asp). provides details on the options contracts that are available. That being said, as buying and selling options are usually a form of market timing, we would encourage any investor contemplating this to carefully consider the potential risks and returns involved. To be sure (as we wrote in our March, 2000 issue), there are times when one might want to purchase put options to hedge one's exposure to an asset class one believed to be substantially overvalued. However, there are also other option strategies that are far riskier. In short, most investors should proceed with caution in this area.

Question: What is your view on gold as an asset class?

Answer: Up to now, we have not treated gold as a separate asset class, and have instead included it as part of the broader commodities asset class. Our reasoning is as follows. Let's start with some data. Between 1976 and 2000, the total return on gold, in U.S. dollars, had a very low correlation to the total return on other asset classes, including commodities (as measured by the Goldman Sachs Commodities Index, in which gold has a very low weighting). The specific correlations are as follows: U.S. Investment Grade Bonds (-.01); U.S. High Yield Bonds (.03); U.S. Commercial Real Estate Investment Trusts (.05); Goldman Sachs Commodities Index (.25); U.S. Equities (.04); Foreign Equities (EAFE) (.22). It also

had a surprisingly low correlation with U.S. inflation (.18). These low correlations suggest that a strong argument can be made for gold as a separate asset class.

On the other hand, over the same period, the average annual return on gold was much lower, and the standard deviation of returns was much higher, than it was for these other asset classes. On balance, this more than offset the advantages of gold's low correlations, and caused most asset allocation software programs (including ours) to reject an allocation to gold.

Still, this leaves unanswered the question of whether there exists a set of circumstances under which an allocation to gold would make sense. As we have written, we like to think of the economy as being in one of three states: normal (cyclically varying real growth with low to moderate inflation), high inflation, and deflation. Traditionally, people looked at gold as a hedge against inflation. However, as you can see in the data above, in recent years the total returns on gold have not been closely correlated with inflation. Broadly speaking, this has weakened the argument for investing in gold, and led people to look to commodities and real bonds as hedges against inflation risk.

The remaining question is therefore how gold would perform under a period of extended deflation. The traditional asset of choice for hedging against this risk is investment grade bonds. Moreover, as a commodity, one would expect to see the price of gold (and the returns on holding it) decline during a period of inflation. However, this argument neglects gold's other historical role as a store of value and unit of exchange. One could envision a scenario in which prolonged deflation (and/or expectations of a sharp reflation) led people to lose faith in the long term value of a currency (and/or government debt), if the deflation had severely weakened (e.g., through a debt implosion) the underlying economy and/or the government's fiscal position (through a sharp rise in deficit spending). Under these circumstances, in its role as a monetary unit, gold's attractiveness (and the returns earned by holding it) might sharply increase.

Unfortunately, the world's recent experience with deflation has, thankfully, been so limited that very little data is available to support or contradict this scenario. Still, we believe it is one that people should at least consider.

Question: What do you think about the new ETFs that track investment grade corporate bonds?

Answer: Unfortunately, this is a bit of a sore point with us; we were very frustrated that the new iBoxx ETF tracks the euro liquid corporates rather than one of the excellent broad bond market indexes that iBoxx publishes. The same issue has come up in the U.S. market with respect to a new ETF that tracks the GS InvesTop Corporate Index rather than a broader index of investment grade U.S. bonds (e.g., such as the Lehman Brothers Aggregate Bond Market Index).

The underlying source of the problem appears to be that the target market for these new ETFs is not retail investors; rather, they are basically designed for the institutional fixed income derivatives markets. In the U.S., there is currently in registration (but not yet offered) an ETF that will track the Lehman Brothers Aggregate Bond Market Index. Hopefully, equally broad eurozone and U.K. pound bond market ETFs will be introduced soon.

In the interim, our basic view is that the additional return one might earn by tilting a bond market allocation toward one of these corporate sector products probably would not offset the additional risk one would be taking on. In other words, we believe that, on a risk adjusted basis, and in the absence of a broad bond market index, one would probably end up better off by sticking with a government bond market index. Of course this assumes that historical results are a valid guide to the future, which, as we all know, they sometimes are not.

Question: What do you think about municipal bonds as an asset class?

Answer: As we have written in The Index Investor, we draw a distinction between asset classes and various tilts within them. For example, from our perspective, U.S. equities, U.S.

nominal return investment grade bonds, U.S. high yield bonds, U.S. real return bonds, and commodities are all different asset classes. Statistically, the correlation between their respective real rates of return has been below our threshold level of .6. Defining asset classes broadly (so that they have low correlations of returns with each other) maximizes diversification benefits, and makes our optimization solutions much more stable. When asset classes are defined more narrowly (that is, when their returns have higher correlations with each other), a slight change in the expected return or risk for one or more asset classes will often lead to substantial changes in the recommended asset class weights (this is particularly a problem with mean/variance optimizers, and less so with simulation based optimizers). By defining asset classes broadly, this doesn't happen as much with our model portfolios (that is, they are more stable in the face of changes in expected asset class returns and risks).

That being said, we do recognize that some investors may believe that one or more subsets of a different asset class may offer a risk/return tradeoff that is superior to the asset class as a whole. For example, within the U.S. nominal return investment grade bonds asset class, one could take different tilts based on maturity (duration for the more technically inclined), credit risk (e.g., governments versus corporate issuers), tax status (municipal versus taxable bonds).

With respect to municipal bonds, your question about the lack of an investable index fund product was right on target. Unlike other sub-classes in the investment grade bonds asset class, municipal issues are often relatively small in aggregate size, which makes it difficult to construct an index fund. A further problem is the preference by many municipal investors for bonds offered by issuers located in the state in which they live, which usually maximizes the tax benefits from owning such bonds. From and index fund point of view, this further shrinks the pool of bonds from which one could construct an investable product. As a result of these considerations, asset management firms have chosen to structure their municipal bond mutual funds as actively managed rather than as index products. As a practical matter, we believe that the general impact of this difference on the returns that are actually realized by investors is quite small relative to the difference in returns between actively managed versus indexed products in other asset classes.

Question: Is there another fund, besides the DFA Microcap Fund (DFSCX) that enables an investor to tilt their U.S. equity allocation toward this sub-class?

Answer: Yes, there is. The Bridgeway Ultra Small Cap Company Tax Advantage Fund (BRSIX) has an expense ratio of only .75% and tracks the same very small company index.

Question: Are there international growth and value index funds that would enable me to make these tilts in my allocation to international equity?

Answer: Not officially. However, the Vanguard International Growth (VWIGX) and International Value (VTRIX) funds invest in stocks included in the MSCI Europe, Asia, and Far East Index (EAFE), and have very low expense ratios (respectively, .67% and .65%).

Question: How do your "three states of the economy" correspond to Kondratiev Waves?

Answer: Nikolai Kondratiev was a Russian economist who was an advisor to the Soviet Ministry of Finance in the 1920s. He is best remembered for his path-breaking studies of turning points in historical price index data. He described a four stage, fifty year process of expansion, inflation, contraction and renewal that he believed characterized capitalist countries' economies. This process is also known as a "Kondratiev Wave." The first stage of the wave is an "upwave" during which output expands and inflation increases only gradually. By the end of the upwave, high inflation leads to a deep recession. Eventually the economy recovers, and begins another period of "selective" expansion which is weaker than the initial upwave. This stage ends with a sudden shock, which sets off debt-implosion, deflation, and a depression which painfully eliminates the economy's excesses (e.g., excess capacity and debt) and in so doing sets the stage for the start of the next upwave. Unfortunately, Kondratiev's views conflicted with those of Josef Stalin, who was more interested in theories which described capitalism's inevitable demise. Kondratiev was exiled to Siberia and executed in 1938.

In our economic outlook section we discussed how the fourth stage of a Kondratiev cycle might play out. From our perspective, what is different this time (in contrast to previous examples from history) is that today policymakers (and some investors) are much more aware of where we are in the K-cycle. The interesting question is whether and how this very awareness (and the policy actions it triggers) will cause this down-cycle to play out differently from past ones. As for how best to position one's portfolio at different stages in the cycle, we are addressing that in our asset allocation article by showing how different asset classes behave in "normal" times (like the first and third stages of the K cycle), inflationary times (the late first/early second stage), and deflation (the fourth stage). In the short term, we believe the key question is the extent to which policymakers will be able to avoid an outright period of deflation in Europe and North America (which would favor investment grade nominal return bonds) via aggressive reflation and fiscal stimulus, which would favor real return bonds, commodities, real estate leveraged with fixed rate debt, and, depending on differences in global inflation rates, perhaps foreign currency bonds from areas with relatively low inflation, and relatively appreciating currencies.

Model Portfolios Based on Expected Future Returns

Over the past two months, we have reviewed different asset classes, including their historical and estimated future real (inflation adjusted) returns and standard deviations. This month, to stimulate our thinking on the critical subject of asset allocation, we are using the estimated future returns as inputs, and using them to develop model target return portfolios. Specifically, we will use them to develop model portfolios whose objective is to achieve compound annual real returns of 3%, 5%, or 7% over a twenty-year period.

Are these our new recommended model portfolios? No, they are not. We try not to adjust our model portfolios too often, lest we simply chase performance, and in effect become inadvertent market timers. Rather, we see this month's analytical effort as one of a number of different inputs into a decision making process that will conclude with our "official" model portfolio update in November.

We should also note, yet again, the limitations of our approach. As we noted last December, "many investors don't fully appreciate that the historical inputs used in asset allocation models are themselves only statistical estimates of the "true" values for these variables…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." On top of this, we have introduced another layer of uncertainty through our estimation of the future average annual real returns for different asset classes.

Moreover, while most asset allocation models (including the ones we use) assume that the returns on different asset classes are normally distributed (i.e., when plotted on a graph they form a "bell curve"), strictly speaking this is usually not true. In fact, the return distributions for many asset classes 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. However, most investors don't realize that as a result of this assumption, a model may provide a false sense of confidence about the maximum percent of value that their portfolios could lose over any period of time. Practically, this means that there is more risk inherent in high standard deviation asset classes (like equities) than most people realize, and that 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).

A final 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 stable (or, as they say in statistics, they aren't "stationary"). The evidence in support of this observation is quite

strong: for example, standard deviations (also known as volatility) are not stable across time; rather, they tend 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.

When you take all these issues into consideration, it becomes clear that, at best, the asset allocations in our model portfolios are rough estimates rather than exact conclusions about the "best" way to achieve a given target return over a given period of time.

We should also say a few words about the modeling approach we used to develop these model portfolios. We start with initial portfolio weights for each asset class (i.e., with an initial asset allocation). We also start with our estimates for the average annual real annual returns for each asset class, the standard deviation of historical real returns between 1971 and 2002, and the correlation of returns between different asset classes. The latter are also based on the71-02 data, except where that data is missing (e.g., in the case of returns on commercial property). Where that is the case we substitute the correlation from the U.S. market. We begin our calculations by randomly sampling from the distributions of returns for each asset class to generate twenty different annual returns for each asset class. Each year, we use the asset class weights (which we rebalance to their target weights each year) and asset class returns to calculate the annual return for the portfolio. We then use the twenty annual portfolio returns to calculate the compound annual return for the portfolio. This simulation (that is, the random generation of returns and calculation of the portfolio return) is repeated 1,000 times for the initial asset allocation. This gives us a distribution of returns for the given asset allocation. We then use this distribution of returns to calculate the probability of achieving the target return. For example, assume our target return is 5%. If the average of our distribution of returns is also 5%, then the probability of achieving our target rate of return would be 50%. If the average of our distribution of returns is greater than 5%, then the probability of achieving our target return would be more than 50%.

We then go back and generate a new asset allocation, repeat the above simulation process, and compare the resulting probabilities of achieving our target rate of return. Unfortunately,

we cannot, due to computational constraints, consider all possible combinations of asset weights. To limit our search, we use non-linear optimization software (technically, it uses a combination of scatter and tabu search, with a neural network accelerator). In those cases where two or more different asset allocations both produce the highest probability of achieving the target return, we further compare them on the basis of their respective standard deviations (preferring the allocation that produces less volatile portfolio returns over the twenty year period). Strictly speaking, because we do not (and cannot) evaluate every possible combination of weights, we cannot be sure that this approach will produce "the single best" asset allocation (that is, the one with the highest probability of achieving our target return, at the lowest standard deviation, given the input assumptions we've used). What we can say with confidence is that the solutions this procedure identifies are almost certainly among the best that exist. Given the possible estimation errors attached to the input assumptions we use, and the complexity of the calculations involved, this is practically the best one can hope to achieve.

With respect to the relative importance of those estimation errors, an important point was made by Chopra and Ziemba in their 1993 Journal of Portfolio Management article entitled "The Effect of Errors in Means, Variances, and Covariances on Optimal Portfolio Choice." These authors' key finding was that the estimation error of the average return is ten times as important as the estimation error of the [standard deviation], which in turn is twice as important as the estimation error of the [correlation]. There are a number of steps one can take to limit the potential impact of these estimation errors. The one we have chosen to use is to limit the maximum weight that can be given to some asset classes in our model portfolios. These include limits on foreign bonds (40% maximum), property (20%), commodities (20%), foreign equity (40%), and emerging markets equity (20%). We believe that this leaves sufficient room for effective portfolio diversification, while limiting the potential impact of estimation errors.

With all these considerations in mind, let's take a look at the model portfolios that result. The following table shows the weights for different asset classes in portfolios whose objective is to achieve a compound annual real rate of return of 3%, 5%, or 7% over twenty years.

Assuming future inflation of 3% per year, these portfolios correspond to our current 6%, 8% and 10% (nominal) target return portfolios. We have not shown the 9% target real rate of return portfolio, as it is essentially the same as the 7% portfolio (though with a lower probability of achieving its goal). Along with the asset weights, the following table also shows the expected average annual rate of return on each portfolio, the standard deviation of expected returns, and the probability of achieving its target compound annual rate of return over twenty years.

Model Portfolios Based on Forecast Future Returns

	3% Real Target Return	5% Real Target Return	7% Real Target Return
Real Return Bonds	25%	5%	0%
Domestic Investment Grade Bonds	30%	15%	0%
Foreign Bonds	25%	25%	40%
Commercial Property	5%	0%	0%
Commodities	10%	15%	20%
Domestic Equities	5%	25%	20%
Foreign Equities	0%	0%	0%
Emerging Market Equities	0%	15%	20%
Expected Average Annual Return	4.8%	6.1%	6.8%
Standard Deviation of Expected Returns	1.0%	1.9%	2.1%
Probability of Achieving Target	97%	71%	46%

This table makes a sobering point: given our expectations for future asset class returns, high rates of portfolio return look like they are going to be much harder to achieve in the future than they were in the past. This could force many people to either scale back their goals, or reduce their consumption spending (and increase savings) to achieve them.

Of the three model portfolios in this table, it is the 7% target return one that we find most interesting. Our input assumptions assume that the highest average annual real returns will be realized on commodities (8.1%), emerging markets equities (7.5%), and foreign bonds (7.0%). These are also the only asset classes whose expected annual returns exceed the portfolio's target return of 7%. It is therefore no surprise that in all three cases, we see allocations that are equal to the maximum limits we have set for each asset class. While relaxing these limits would enable higher allocations to these asset classes, and a higher probability of achieving the 7% target rate of return, we hesitate to do so because we strongly suspect that the higher the level of expected return, the higher the likelihood that estimation error may be involved. This reinforces a point we have already made: these portfolios are suggestive, but certainly not definitive answers when it comes to our asset allocation decision. Over the next couple of months we will be presenting additional analyses to you, to ensure that our final model portfolio recommendations are based on a number of different perspectives.