

# The Index Investor

*Why Pay More for Less?*

## **New Site Update**

This is the last issue of The Index Investor that we will put up on our old site. Starting with our next issue, we'll have a completely new look. If you haven't yet received an email from us explaining how to access your free subscription, please send us an email at [newsite@indexinvestor.com](mailto:newsite@indexinvestor.com), a fax at (401) 453-4394, or call us on (401) 453-4392. Thank you for your help with this -- we're sure you'll be happy with the result!

## **Model Portfolio Performance Update**

Last year was not a good one in terms of our model portfolio performance versus our domestic benchmarks. In short, it was a year filled with both normal factors (e.g., low growth in Europe and Japan) and abnormal ones (e.g., the flight to quality after 9/11) that caused domestic only portfolios to outperform those that were diversified internationally. Does this invalidate the logic behind international diversification? No, it does not. Before reviewing last year's results, it is helpful to put them into perspective. Over the past 31 years, domestic equities (as measured by the Wilshire 5000 Index) have outperformed international equities (as measured by the MSCI Europe, Asia and Far East Index, which has a longer data set than indexes which include emerging markets) 15 times (based on comparative annual U.S. dollar returns), or 48% of the time. During these years, the average outperformance of domestic equities was 15.64%. On the other hand, 52% of the time (the remaining 16 years), foreign equities have outperformed domestic ones, by 15.27% on average. In short, when you look at equity returns over the past 31 years, it is clear that international diversification makes sense over the long term.

Does it also make sense in the case of bonds? In this case, we only have 17 years of data. Over this period, U.S. bond returns (as measured by the Lehman Brothers Aggregate

Bond Index) were higher than non-U.S. dollar bond returns (as measured by the Salomon Non-U.S. dollar One Plus Year Maturity Government Bond Index) only 41% of the time (that is, in 7 of the 17 years). During these years, the average advantage of domestic over international bonds was 10.04%. During the remaining ten years, non-U.S. dollar bonds outperformed, by an average of 9.29% per year. Once again, when seen from a longer term perspective, international diversification seems to make sense. However, this wasn't the case last year.

Our first set of model portfolios are designed to deliver returns that are superior to their respective domestic benchmarks, while taking on the same amount of risk (that is, having the same expected standard deviation of returns). Our first portfolio is benchmarked against a mix of 80% U.S. equities (as measured by the Dow Jones Total Market iShare, IYY) and 20% U.S. bonds (as measured by the Vanguard Total Bond Market Fund, VBMFX). During 2001, this benchmark generated a return of (8.7%), while our model portfolio was down (16.5%), due to the relative underperformance of our allocations to European equities and commodities.

The second portfolio in this group is benchmarked against a mix of 60% U.S. equities and 40% U.S. bonds. Through the end of December, this benchmark portfolio was down (4.4%), while our model portfolio was down (12.6%). The third benchmark portfolio is a mix of 20% U.S. equities and 80% U.S. bonds. Through the end of December, it returned 4.1%, while our model portfolio returned between 0.1% and (2.2%), depending on the international bond fund used in the portfolio. These are not levels of underperformance that give one comfort, so we thought it important to further analyze them. To do this, we conducted a simulation analysis to see what percentage of time the benchmark and model portfolios could (on the basis of 5,000 simulations of annual returns) be expected to generate returns that were equal to or greater than the returns achieved in 2001. We found that our 80/20 domestic benchmark portfolio could (on the basis of historical data) be expected to achieve returns equal to or greater than (8.7%) 89.9 percent of the time (that is, about 9 out of every ten years). By way of comparison, we found that our model portfolio could be expected to achieve returns equal to or greater than (8.7%) 96.8

percent of the time. We found similar results for our other model portfolios and their respective benchmarks. From this we concluded in 2001 while our benchmarks had unusually bad years, our model portfolios had years that were even more unusual in statistical terms. Along with the historical analysis we presented earlier, we believe that this affirms the long term wisdom of maintaining internationally diversified model portfolios.

Our second set of model portfolios are designed to match the returns of their respective benchmarks, while taking on less risk. They also underperformed in 2001. While the 80/20 benchmark was down (8.7%) for the year, the model portfolio was down (17.4%). The 60/40 benchmark was down (4.4%) on the year, while our model portfolio was down (9.7%). Finally, the 20/80 portfolio had a 4.1% return through the end of December, while the model portfolio had returns of 0.2% to (2.3%), depending on the international bond fund used.

On a broader note, we have also compared the 2001 performance of all thirty three of the return maximization and risk minimization model portfolios that were active in 2001 (six each for U.S. dollar, Australian dollar, Canadian dollar, euro and pound sterling based investors, and three return maximization portfolios for yen based investors). Overall, these portfolios last year delivered local currency returns that were 53 basis points (.53%) above their respective domestic benchmarks. More interesting was the split between the return maximizing portfolios, which underperformed their benchmarks by an average of 14 basis points, and the risk minimizing portfolios, which outperformed their benchmarks by an average of 134 basis points (that is, 1.34%). This result further strengthens our belief that because the relative riskiness of different asset classes tends to be more stable over time than their relative returns, portfolios based on risk minimization would tend to outperform those taking a return maximizing approach.

Our last set of model portfolios are designed differently. Rather than seeking to match the performance of a specific domestic index, they assume that an investor wants to maximize the probability of achieving at least a minimum target level of return, while

taking on the least amount of risk possible. For the full year, our 12% target return portfolio was down (16.5%), our 10% target return portfolio was down (17.4%), our 8% target return portfolio was down (11.1%), and our 6% target return portfolio was down (5.9%). Clearly, these are disappointing returns, and they have led us to reformulate these target return portfolios for next year using a dynamic programming approach, as detailed in last month's issue.

Finally, our experimental actively managed portfolio, whose goal was to achieve maximum returns, finished the year down (12.3%), compared to an (8.1%) annual return by its benchmark, the Fidelity Global Balanced Fund, and domestic benchmark returns of (8.7%) for the domestic 80/20 portfolio and (4.4%) for the domestic 60/40 portfolio. Very clearly, we made some mistakes last year, as the good returns we expected in European equities and non-dollar bonds failed to materialize, while U.S. equity markets performed better than we had expected in the last quarter of the year. As we said at the outset, active management (in this case, of the market timing persuasion) is a very difficult game to play well. This year we have shown that this is true not only for us, but also for advisors at Fidelity who charge investors hefty management fees for access to their supposedly superior timing skills. From our perspective, this proves once again the wisdom of sticking to a long term asset allocation strategy (rather than trying to time different markets), and implementing it through the use of low cost index investment products.

## **Economic Scenarios for 2002**

As we begin 2002, investors confront much higher levels of uncertainty than in previous years. To help our readers with their planning, we are once again presenting two economic scenarios that describe how events might unfold during the coming year. The first of these scenarios attempts to capture what one might call the "conventional wisdom" -- that is, the scenario that many writers seem to consider the most likely one for 2002. In contrast, our second scenario describes what we consider to be the most

dangerous turns of events that could occur in the year ahead. Obviously, following this logic, there is also a third scenario one could add to this list: the "best case", or most beneficial way things could turn out. In our experience, when scenarios like this come to pass, most people find it quite easy to adapt their behavior, and work things out on the fly, as it were. In contrast, we have found that not having thought about what one would do under the most dangerous conditions can easily lead to a "deer in the headlights" condition of paralysis and inaction that often compounds the harm one suffers when dangerous scenarios actually come to pass. Given this, we believe it is far more important for our readers to think through ahead of time the most dangerous scenario, and to defer thinking about the "best case" scenario until one is quite sure that it actually is coming to pass.

So, on to the conventional wisdom. At the heart of this scenario lies the basic belief that the current recession in the United States is basically a cyclical phenomenon. As such, we can expect to see growth resume in the U.S. in 2002 due to the combined impact of aggressive monetary easing by the Federal Reserve, falling oil prices (down 40 percent from their recent peak), tax cuts, increased federal government spending, and renewed corporate investment to rebuild inventories that have been allowed to run down too far over the past year. This renewed growth will reverse recent job losses, increase consumer confidence, and keep consumer spending at levels that are adequate to maintain positive overall economic growth. This trend will be further reinforced by continued improvements in U.S. productivity, which is expected to grow at around 2.25% per year. This productivity growth will in turn be based, in part, on renewed business capital investment. The logic here is that because of the increasingly rapid rate at which capital equipment now becomes obsolete, currently low rates of capacity utilization are deceptive, and not the barrier to renewed investment that some observers believe them to be.

Continued increases in productivity will enable the U.S. economy to generate increases in both corporate profits and labor earnings while holding inflation to around 2% per year. In terms of the major markets, the U.S. equity market's current expectations for future

corporate profit growth (e.g., at year end 2001, the P/E for the S&P 500 stood at 40.26 times trailing twelve month earnings) will not be fully met, and the U.S. equity market will deliver acceptable but unspectacular returns (e.g., in the 8% range). The U.S. bond market will deliver lower returns than last year's, as interest rates will not fall by as much as they did last year. Finally, in the foreign exchange market, the dollar's value will not change greatly against the euro, while it will appreciate somewhat against the yen (see below). In short, with U.S. inflation under control, and its financial system in sound shape, investors all over the world will be content to continue to add to their stock of dollar investments as they finance the large current account deficit that is the flip side of the U.S. serving as the engine of growth for the rest of the world.

This relatively benign outlook for the United States has a knock-on effect in other countries covered by The Index Investor.

Canada's fundamentals will generally mimic those in the U.S. However, growth may be somewhat slower due to the inventory cycle taking longer to turn around in Canada, its consumers taking a more cautious approach to debt financed spending, potentially lower business productivity growth due to relatively lower investment in information and communications technologies (although this eventually could be beneficial, as discussed below), and less government fiscal stimulation due to the country's relatively high debt/GDP ratio (and its desire to keep reducing it). In terms of markets, the conventional wisdom seems to point to decent if not spectacular equity market returns, bond returns that are lower than 2001's, and perhaps some further weakening of the Canadian versus the U.S. dollar.

In the Eurozone, falling oil and food prices (after the run up caused by recent years' agricultural crises), together with increased productivity growth (one of the benefits of being slower to invest in information and communication technologies is that you make many fewer mistakes when you do) will enable the European Central Bank to further cut interest rates. At the same time, growth in the U.S. stimulates Eurozone exports, and avoids potential political conflicts over the use of government spending to stimulate

economic growth (that is, over exceeding the limits set by the Stability and Growth Pact) that otherwise could cause downward pressure on the euro exchange rate (and resulting increases in inflation and interest rates, which in turn would choke off growth). Taken together, these factors point to relatively strong demand growth in Europe in 2002, with inflation under control. This may generate returns on Eurozone equities that are greater than those on U.S. equities, bond returns close to those achieved in 2001, and perhaps some appreciation of the euro versus the U.S. dollar.

In the U.K., economic growth held up better than in most other countries in 2001, and the conventional wisdom seems to expect this to continue in 2002. Interest rate cuts, government fiscal stimulus, and a housing boom should continue to stimulate consumer spending in 2002, albeit to a lesser extent than they did last year. On the other hand, continued strong economic growth will force the government to keep a closer watch on the balance of payments situation. Renewed U.S. growth should lead to increased demand for U.K. exports, and reduce the likelihood that domestic interest rates will have to be raised to slow the U.K. economy in order to prevent further deterioration in the current account, a weakening of the pound, and a rise in domestic inflation. In market terms, the conventional wisdom seems to suggest that U.K. equities should improve on last year's performance, while bonds may deliver somewhat lower returns, and the exchange rate may weaken slightly against the dollar.

Renewed growth in the U.S. also will help maintain demand for Australian exports. Together with low interest rates, some further weakening in the A\$/US exchange rate (while Australian interest rates are quite close to those in the U.S. and Europe, its inflation rate is somewhat higher) and the continuing stimulative effects of last year's first time home owner grants, this export demand will keep the Australian economy growing nicely in 2002. Given this, the conventional wisdom seems to indicate that it will be another good year for Australian equities, while bonds may deliver somewhat lower returns than last year.

Japan remains the big wild card in this picture, even under the conventional wisdom scenario. The situation there, as they say, is not at all good. Short term interest rates have been cut to zero, and even ten year bonds yield only 1.35% (in yen terms). A series of public sector spending programs have failed to reignite sustained growth, but have left debt at a very high 141% of GDP. Prices continue to fall, at an accelerating rate as deflation appears to be worsening. The structural reform process that is critical to turning the country around is still bogged down by political and cultural resistance. The country's authorities are now attempting to eliminate deflation (that is, to get the annual rate of change in prices back up to zero), via an expansion of the money supply and depreciation of the yen/dollar exchange rate. They also hope that the latter will stimulate exports (many of which will hopefully go to a growing United States economy), get the domestic economy moving again, and thereby further delay the day of reckoning when the bitter medicine of domestic restructuring needs to be taken. In light of this, the conventional wisdom suggests that it will be another unpleasant year for Japanese equities. Once again, domestic bonds appear to offer the prospect of better returns.

As you can see from the above discussion, much of the conventional wisdom rests on the assumption that growth in the United States will resume in 2002. But what happens if this doesn't come to pass? And what might cause this dangerous scenario to develop? It is to these topics that we now turn.

As one might expect, the assumption that the United States' current problems are basically cyclical is not universally shared. There are a significant number of analysts who believe that America's problems are fundamentally structural in nature, and therefore will be more difficult and painful to resolve. Our most dangerous scenario starts with two important observations: First, the recent boom in the United States was built on a weak base. It was in large part driven by private consumption, which grew faster than private incomes, and was financed with increasing levels of household debt. However, as long as the value of household assets (in the form of equity in owner occupied homes and financial investments) rose as fast or faster than the level of borrowing, this growth dynamic was sustainable.

A second source of weakness was the very large current account deficits run by the United States, which in turn required a continued inward flow of foreign investment to finance it. In effect, the United States agreed to serve as the main engine of world growth (about half the growth in world demand between 1996 and 2000 was due to the U.S.), and the rest of the world agreed to help pay for it. As long as foreign investors were happy to continue to build up their holdings of dollar assets, this process was sustainable.

The second important observation is that the most recent slowdown in U.S. growth has been unlike any other in recent memory. Typically, a slowdown in the U.S. economy is brought about by the Federal Reserve raising interest rates in order to combat increasing levels of inflation that occur when growing demand encounters supply constraints (e.g., in the labor or commodities markets). Under such conditions, rising interest rates act to slow down demand by reducing investment in capital equipment, inventories, housing, and consumer durables (due to increased financing costs), reducing private consumption spending (via increased unemployment and reductions in the value of financial assets and real estate), and reducing demand for exports (as rising domestic rates lead to an appreciation in the exchange rate, which makes U.S. exports more expensive in foreign currency terms). The recovery from this type of recession is generally brought about via a reduction in interest rates by the Federal Reserve, coupled with the demand stimulus provided by both automatic and intentional government actions (increased unemployment payments being an example of the former, and tax cuts or public works projects an example of the latter).

The recession that started last year doesn't fit this pattern very well. To be sure, one could argue that it was in part brought on by increases in interest rates that occurred in 1999 and 2000 (monetary policy generally works with a time lag). However, the objective of those rate increases appears not to have been the reduction of inflation in the product and labor markets (where, apart from a rise in oil prices, it was not very much in evidence). Rather, the real target of the Federal Reserve's action seems to have been rapidly rising equity market values -- the result of the "irrational exuberance" Chairman

Greenspan had so colorfully worried about in December, 1996. In short, the Fed was trying to gradually deflate a bubble in U.S. equity values before it could do serious harm to the economy. The sharp drops in U.S. equity market indexes in 2000 and 2001 are clear proof that, to some extent, the bubble has deflated. But have we avoided serious damage to the U.S. economy? Recent events suggest that we have not, and that there may be worse to come.

One consequence of the bubble economy was a sharp drop in businesses' cost of capital, and an equally sharp increase in their investment spending. When the increase in U.S. interest rates triggered a slow down in economic activity, many firms were faced with substantial amounts of excess capacity that had been purchased on the basis of growth projections that were now seen to be unrealistically high. At 74.7% in November, U.S. capacity utilization is now at a level not seen since the severe recession of 1982/83. As a result, capital spending has been sharply cut back, corporate earnings have suffered their worst decline since the depression, and increasing numbers of workers have been laid off. In spite of this, consumers have kept on spending. Why haven't they cut back?

The most logical explanation comes from the housing markets. First, the sharp interest rate reductions by the Federal Reserve in 2001 have led to a refinancing boom, which has cut mortgage payments in many households and freed up funds for consumption spending. The rate cuts also caused an increase in housing values, which seems to have offset any negative impact of the fall in equity values on consumers' willingness and ability to borrow and spend (this is unsurprising, since housing accounts for a far larger portion of most household's total assets than do equities).

Given this, the downside scenario starts with the assumption that consumer spending will falter early in 2002. Why might this happen? One can envision a number of possibilities, including some or all of the following: (1) The expected stimulation from inventory restocking may be much lower than anticipated, as companies expand their use of supply chain management systems to hold down inventory levels. (2) Increased investment in inventory does not lead to increased business capital investment because of the high

current levels of surplus capacity. (3) Increasing worries about future asset values cause a cutback in consumer and mortgage lending by banks and other financial institutions. (4) The impact of the mortgage refinancing boom peters out. (5) No additional federal stimulus bill is agreed to by the U.S. Congress, and cutbacks by state and local governments (many of which face mandatory budget balancing requirements) offset much of the impact of the bills that were passed in October. (6) Consumers choose to save most of the tax cuts they receive. (7) Another terrorist incident or similar crisis (e.g., discovery of mad cow or hoof and mouth disease in the U.S. beef herd) cuts confidence. (8) An increase in oil prices further cuts business and consumer spending. (9) A crisis in the Japanese economy (e.g., a run on the banks after government deposit guarantees are partially removed in March) shocks U.S. consumer confidence, and/or a sharp increase in Japanese exports to the U.S. (due to the cheaper yen) leads to increased U.S. unemployment. (10). The U.S. equity markets suffer another sharp fall, as investors realize that current earnings growth expectations are unlikely to be realized.

As you can see, many possible causes could generate a sharp slowdown in U.S. consumer spending. When that happens, a very dangerous deflationary spiral could be set off, similar to the one we have seen slowly play out in Japan over the past five years. In the U.S., reduced consumer spending would only worsen businesses' overcapacity problems, leading to more downward pressure on prices (remember that the U.S. GDP price deflator actually turned negative -- down .3% -- in the third quarter of last year). Falling prices -- that is, deflation -- would in turn increase the real value of consumers' and businesses' debt, making them less likely to borrow and lenders less likely to lend to them. As a result, monetary policy would lose much of its ability to spur capital or housing investment, even as interest rates fell towards zero. In the face of this, consumers could be expected to sharply cutback spending as they fight to shore up their rapidly deteriorating balance sheets. Would the federal government be able to reverse this via sharply lower taxes and/or higher spending? In a deflationary environment, the former seem likely to be saved, not spent. And as for higher spending, two challenges would have to be overcome: first, the political resistance to this strategy, and second, the

tendency of revenue shortfalls to cause cutbacks in state and local spending that undermine the positive federal level effects.

Finally, one must ask how foreign investors would react under this scenario. Would they stick with the dollar, or shift their funds into Euro or pound sterling denominated investments (the yen being out of the question)? The answer here would seem to depend on whether or not Europe and/or the U.K. was in better or worse shape than the United States. On current evidence, the former seems more likely. To begin with, Europe is not faced with the same levels of private sector debt and business excess capacity as now face the United States. On top of that, it seems to have more scope for increasing its economic growth rate via productivity enhancing investments in information and communication technologies, reduction in bureaucracy, and liberalization of labor markets (and political pressures to make these changes could be expected to rise if the U.S. economy went into a serious decline).

In short, it is quite easy to envision a scenario in which Europe and the U.K. are still delivering positive growth and price stability even as the United States slips into a deflationary liquidity trap. Given this, it seems logical to assume that a flight out of dollar assets would be likely to occur under our most dangerous scenario. This would not only reinforce the downward spiral in the United States (via the further fall in financial asset prices it would cause), but might also trigger the imposition of trade controls by the European Union, in an effort to protect its domestic growth in the face of a surge in imports from the United States. An interesting question is what would then happen next. From the U.S. point of view, a falling dollar might not be all bad news, in so far as it led to a rise in import prices and domestic prices (just think: people cheering a return to inflation) which would brake the deflationary spiral.

From a markets point of view, the implications of this "most dangerous" scenario seem to be as follows: the U.S. equity and currency markets will suffer, while bond investors will do well. Careful attention would need to be paid to the consequences of a dollar crisis,

which might trigger a return to inflation which would favor real estate (as restoring housing values would be a key policy objective) and inflation protected bonds.

Canadian markets would most likely suffer the same fate as those in the United States. In Japan, the best place to be domestically would be in bonds, though the creditworthiness of the issuer would have to be considered very carefully.

Australian equities would suffer from the initial reduction of exports to the United States, but might quickly recover as trade with Europe increased. Assuming some appreciation of the exchange rate, bonds might also do well.

Finally, European equities and bonds could turn out to generate perhaps the most attractive returns under this admittedly grim scenario.

All in all, this comparison of the "conventional wisdom" and "most dangerous" scenarios leads one to a clear conclusion: absent a crystal ball to tell which of these scenarios will be closest to reality in 2002, the next best solution is to maintain a portfolio that is diversified across asset types (equities and bonds) as well as regions. As always, good asset allocation will be the key to the returns one earns in 2002.

### **In Focus: Momentum Investing**

When you buy a stock, it is usually because you expect its price to go up (people who buy a stock just for its dividend are relatively rare in an age when fewer companies are paying them).

Broadly speaking, there are only two logical reasons for believing a stock's price will rise. The first is that you believe that the fundamental value of the stock, based on your expectations for its future cash flows, and/or future changes in interest rates, is higher than its current market price. In other words, you believe its current price represents a bargain in light of what it is really worth. This is the logic used by the people we term

"value" investors. Note that this is not the same as simply buying stocks with low price/earnings ratios. While a low p/e or market/book ratio is often times an indicator of possible undervaluation, there are also many examples of low p/e or m/b stocks that seemed to be overvalued, just as there are high p/e and m/b stocks that may still seem undervalued given your expectations for the future.

The second reason you might logically believe the price of the stock will go up is because you expect a lot of other people will be buying it, or, more specifically, you believe that the future demand for the stock at the current price will exceed the amount current holders are willing to sell, leading to an increase in its price to clear the market. More technically, you expect stocks that have gone up in one period to go up again in the next one, or to exhibit "persistence" or "serial correlation" in their returns. This investment logic goes by many names, including charting, technical analysis, and momentum. It is also sometimes called "growth" investing, which causes much confusion.

Typically, growth investors buy stocks which have high market value to book value ratios. They may buy these stocks because they think they are undervalued relative to what they are really worth (e.g., "growth at a reasonable price"), because they think other people are going to be buying them (e.g., "high p/e stocks with attractive technical characteristics"), or for both reasons (e.g., "growth at a reasonable price, provided the technical factors are positive"). So let us be clear at the outset: growth investing is not synonymous with momentum investing. In fact, "growth investing" is really a catch all category that seems to indicate a preference for buying high price/earnings or market/book stocks without making clear why it makes sense to do so.

Despite this confusion over terminology, momentum investing is a fascinating area, for two main reasons. First, persistent returns is a phenomenon that has existed for quite a while -- unlike other phenomena like the small company or January effects, it does not appear to have been arbitrated away (or at the least had its potential returns sharply reduced) following its discovery. Any number of studies of investing in individual stocks seem to suggest that you can "beat the market" by systematically dumping your losers

and investing more in your winners. This raises questions about the nature of the underlying factors that generate positive returns to momentum investing.

This question becomes even more important in light of the second fascinating momentum phenomena: the returns from momentum investing tend to reverse after three to five years. In other words, momentum only seems to work in the short term, with a number of studies suggesting that one year is the optimal holding period for people using a momentum strategy. Clearly, the same factors that cause the momentum approach to apparently work well over shorter holding periods must also be causing it to fail over longer ones.

Unfortunately, the nature of these underlying factors is one of the great unsolved mysteries in finance. Let's review a number of the possible explanations for momentum that different writers have suggested.

The first set of explanations suggests that momentum is primarily caused by the unequal rate at which different investors receive new pieces of information about a stock. Essentially, people who receive good news early drive up the price in the first period, while those who receive it later drive up the price in the next period. As evidence for this point of view, it has been shown that the momentum effect is much stronger in the case of smaller stocks and those with less analyst coverage. Closely related to, and reinforcing this point of view are two other factors we covered in our August, 2000 issue. The first is the tendency of investors to herd when access to information is unequal. And the second is the difference in investors' ability to act on positive and negative information. The former is relatively easy to observe (price and volume data about purchases is almost immediately made public), and act on (most investors face few limitations on adding to their holdings of a stock when they hear good news about it).

On the other hand, negative information is much harder to observe: companies try to avoid disclosing it, the volume of short sales of a stock is only made public with a delay, and the price at which those short sales are made isn't disclosed. It is also harder to act

on negative information: many institutional investors , such as mutual funds, aren't allowed to sell short, and many individuals think doing so is either too complicated, too risky, or both. Hence, negative information about a stock can slowly build up without an equivalent amount of action being taken. Eventually though, enough people hold enough negative information and the herd reverses itself, causing prices to sometimes fall off a cliff. Taken together, these information based factors make a logical case for why stock prices seem to exhibit positive short term momentum effects that reverse themselves in the medium term.

The second set of explanations for the momentum phenomenon focuses not on the availability of information, but rather on how we make use of it. The argument goes like this. New information that confirms the opinion that we already hold about a stock makes us overconfident (e.g., reinforces in our mind that the company's growth will continue, etc.). On the other hand, we avoid actively looking for information that conflicts with our current view, and, if we come across it by accident we only absorb its meaning with a time lag (because it takes more information to change an opinion than it does to form one). This makes it more likely that the market price of a stock which attracts momentum investors will overshoot its fundamental value and then decline in price.

The third set of explanations for the momentum phenomenon suggests that it is simply a natural feature of rational, efficient markets. Three arguments fall into this category. The first says that momentum effects are caused by changes in companies' growth options over time. That is, changes in the economy cause changes in companies' expected rates of growth, which are reflected in changes in their stock prices. When these changes occur over sequential periods, we observe the momentum phenomenon in returns. The second rational argument states that stocks which exhibit momentum have higher downside risk than stocks which don't exhibit momentum. Given this, the extra momentum returns are simply the extra return that an efficient market provides investors who take on more downside risk (of course, asking what is actually causing that increased downside risk gets you right back to our first two sets of explanations, so this is a bit of a chicken and egg story). The final argument in this category basically states that the potential benefits

of momentum investing are largely illusory, because they are likely to be eaten up by extra trading costs.

Our view is that all of these explanations probably contribute to the momentum effects we observe. It seems undeniable that information isn't available to every investor at the same time, and it seems equally true that our processing of that information usually departs from perfect rationality. Also, one can easily think of companies whose prospects seemed to rise and then fall as the result of changes in the economy. Finally, it seems likely that trading costs tend to sharply reduce, and sometimes eliminate altogether the apparent benefits from momentum investing.

However, understanding the momentum phenomenon is one thing; making money from it is something else. We wondered whether momentum would work with an indexed portfolio, so we ran two experiments.

In the first experiment, we started out with ten sector funds, represented by the Dow Jones Sector ETFs, which include Basic Industries, Consumer Cyclical, Consumer Non-Cyclical, Energy, Financial Services, Health Care, Industrial, Technology, Telecommunications, and Utilities. We put a hypothetical investment of \$10,000 into each of these funds in January, 1992. At the end of each year, we sold the fund with the lowest performance, and invested the proceeds in the fund with the highest performance over the previous twelve months. No short selling was allowed (we tried look at this from the perspective of a typical individual investor rather than a hedge fund). We assumed no trading costs were incurred (see below). We also required that at all times we had to own at least three sector funds. We held our investments through November 30<sup>th</sup>, 2001. Our benchmark for comparing the effectiveness of our momentum strategy was a single \$100,000 "buy and hold" investment in the Dow Jones U.S. Total Market Fund. The results were interesting.

After almost ten years, our momentum fund was worth \$325,069, and was invested 9% in Consumer Cyclical, 26% in Financial Services, 56% in Technology, and 9% in Utilities.

In comparison, our Total Market Fund was worth \$309,288. In terms of absolute returns, the momentum strategy appeared to beat the broad market benchmark. There are, however, two very important caveats. First, even though we traded only once a year and used ETFs (which can be traded cheaply online), transaction costs would have eaten up a significant portion of the apparent \$15,781 momentum advantage. Second, on a risk adjusted basis, the momentum strategy was actually inferior. Over our ten year holding period (we annualized the 2001 data), our momentum portfolio had an average annual return of 15.2%, with a standard deviation of 26.2%, or about .58 in return per unit of risk taken on. Over the same period, our Total Market fund had an average annual return of 13.2%, with a standard deviation of 17.4%, yielding .76 of return per unit of risk. That's quite a big difference. Moreover we aren't the only ones who have come to this conclusion. A study done by Professor Edward O'Neal ("Industry Momentum and Sector Mutual Funds") used Fidelity's sector funds to examine the momentum phenomenon. (summarize findings).

We further tested the momentum approach using the same holding period and trading rules, but a different set of asset classes. In this second experiment, we used the Lehman Brothers Aggregate (U.S.) Bond Index, the Salomon Brothers Non-U.S. One Plus Years Government Bond Index, the Russell 3000 Index (U.S. Equity), and the MSCI Europe, Pacific and Emerging Markets Indexes. We started with investments of \$20,000 each in the first two funds, and \$15,000 each in the last four. Our benchmark was a portfolio comprised of 60% global equities (the MSCI All Country World Index) and global bonds which we rebalanced annually.

At the end of the ten year period, our momentum portfolio was worth \$240,480 and weighted 9% in U.S. bonds, 75% in U.S. equities, and 16% in European equities. In comparison, our 60/40 benchmark portfolio was worth only \$198,330. That \$42,150 was quite a difference, and would certainly have exceeded trading costs. But what about risk adjusted returns? The momentum portfolio delivered average annual returns of 10.2%, with a standard deviation of 15.6%, or .66 of return per unit of risk. The 60/40

benchmark portfolio delivered average returns of 7.6% per year, with a standard deviation of 11.3%, for .68 of return per unit of risk -- not that big a difference at all.

As a result of these two experiments, we reached three conclusions. First, the U.S. domestic market seems to be more efficient than the global market as a whole, at least with respect to the momentum phenomenon we looked at. Second, given our trading rules, the absolute dollar advantages delivered by the momentum approach were based not only on "jumping on winners", but also on making some pretty concentrated bets on them. As a result, taking a momentum approach undoubtedly requires quite a strong stomach. Finally, given the results we obtained from our "global" experiment, we cannot reject the momentum approach's effectiveness out of hand. Instead, we have decided to continue to track it going forward, and add it to our ongoing "active management" approach experiment, to see whether it holds up in the years ahead. In parallel, we will continue to experiment with different trading rules and asset classes (e.g., country iShares and global industry sectors), to see if we can improve the performance of our global momentum portfolio. In a future issue, we'll report back to you with our results.