The Index Investor

Invest Wisely…Get an Impartial Second Opinion.

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This Month's Issue: Key Points

February is the month when we review the latest thinking from the world of academic finance and investing. Because it is such a popular topic, we focus on an in-depth review of momentum investing. While there are more technical definitions, in practical terms momentum is all about buying an asset today expecting its price will rise because others will also be buying it, without regard to whether or not it is under or overvalued based on objective, fundamental factors. Put slightly differently, the total returns on an asset result from changes in both fundamental factors (e.g., dividend levels and expected future growth) and the behavior of other investors. The focus of momentum investing is clearly on the latter. The historical data suggest that momentum profits exist, and are a continuing characteristic of many financial markets. We first explore their possible causes, including limited investor attention and cognitive resources (which cause under and over-reaction to information, as well as excessive co-variance in returns relative to underlying cash flows), tax-loss selling and liquidity risk, and changes over time in firms' riskiness and expected growth, as a result of the investment decisions made by their managers. We conclude that all of these factors are probably at work. But are momentum strategies as profitable in practice as they seem in theory? A number of papers suggest that the answer is no, because their transaction costs are also very high. Still, some researchers have concluded that, in certain

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circumstances, they can still be profitable even after transaction costs are taken into account. Is momentum a strategy you could use? We backtest the risk adjusted returns from asset class momentum strategies in the U.S. and U.K. over 1989 to 2004. We find that the incremental returns (alphas) over an equally weighted strategy are relatively low. Moreover, to earn them, one must take on considerable additional risk (tracking error). Consequently, the incremental return per unit of incremental risk (information ratio) is also quite low, and not statistically different from zero. We then test a momentum strategy that uses ten different U.S. equity sector indexes. It earns a more significant alpha versus the market capitalization weighted portfolio, but also involves significant incremental risk. Once again, its information ratio is not statistically different from zero. We conclude that momentum strategies aren't very attractive for index-oriented investors.

Our second feature article is an extended response to a recent article on choosing actively managed mutual funds that was published in a leading U.S. consumer magazine. The article's apparent conclusion was that by using its system, one could easily outperform index funds. To say we found it frustrating is a vast understatement. We critique each of its arguments, and find them wanting. Finally, we subject their mutual fund choices to our own statistical analysis, using the right benchmark mutual funds. We find that most alphas are negative are low, tracking errors are quite high, and none of the information ratios are statistically different from zero. In short, the case for indexing remains intact.

This Month's Letter to the Editor

Did you see a recent report from Professors Dimson, Marsh and Staunton of the London Business School examining the correlation - or lack as it happens - of investment returns to GDP of individual countries? What do you think about this issue?

This is, indeed, a fascinating topic. As we have written, our equity valuation model is based on a number of apparently simple assumptions: (1) markets are attracted to equilibrium, but are rarely exactly at it; (2) over or undervaluation reflects an imbalance between the rate of return investors require to induce them to hold equities and the return on equities the market is expected to supply; (3) the return investors demand is equal to the real yield on long-term

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bonds plus a long-term equity risk premium; and (4) the return the market is expected to supply is equal to the current dividend yield, plus the expected rate at which dividends will grow in the future (arguably, we should also increase dividend yield by an additional amount to reflect buybacks. However, because these seem less certain than dividends, we don't make this adjustment). There is another source of return, which is a change in P/E multiples. However, since this seems to be driven by psychological factors, our simple model assumes no change from the current level.

Unfortunately, while two of the elements in this valuation model are readily obtained in the paper each day (the yield on real return government bonds and the current equity market dividend yield), the other two are among the most contentious issues in finance. Indeed, as someone once put it, they are where finance as science ends, and finance as theology begins.

Every two years, we undertake our asset allocation review, which includes identifying the asset classes to include, developing assumptions about their expected returns, risks, and correlations, and deciding on the optimisation model to use to combine them into portfolios that will maximize the probability of achieving one or more goals. Our last review was in 2003, and our next one will kick-off later this year. Our 2003 discussion of the "future dividend growth rate" issue can be found by clicking on the button labeled "domestic equity" in the members' section of our home page. Two years ago, Arnott and Bernstein had just published their paper on the weak link between dividend growth and GDP growth in the U.S. Now Dimson, Marsh, and Staunton have confirmed that finding with a broader set of data.

There is no doubt that we will be revisiting this subject again later this year in our asset allocation review. For example, it appears that real per capita GDP growth is a better (albeit still weak) measure of dividend growth than overall GDP growth. While this raises some interesting issues about the difference between population and labor force growth (e.g., increasing participation and/or immigration rates can cause the latter to temporarily exceed the former), the relative predictability of labor force growth focuses us on future productivity growth in different economies (yet another semi-theological issue). Also, the question of why dividend growth lags GDP growth is also critical. If it is because dividend payouts have declined and managers have inefficiently invested these cash flows, then presumably the global trend toward improved corporate governance structures should have some beneficial

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impact. On the other hand, if the weak relationship between dividend and GDP growth is due to the fact that much of the latter occurs at smaller and/or privately owned firms, then changes such as the enactment of Sarbanes-Oxley could exacerbate the problem, because the higher costs these regulations impose on public companies further inhibits smaller private companies from going public. Indeed, the rising amounts of money being invested in private equity funds suggests that this may be happening.

In the meantime, I should also point out in our valuation model's defense that, in addition to receiving some criticism for using GDP growth rates as proxies for dividend growth (despite using both high and low productivity scenarios), we have also received some for using an equity market risk premium of 4% (like I said, this verges on a theological discussion at times). However, from a valuation point of view, we note that this higher ERP to some extent offsets a dividend growth assumption that may also be too high. While (to extend the theological metaphor) two wrongs usually don't make a right, in this case one can argue that is the result! On the other hand, Dimson's paper found that, on a global basis, the long-term (i.e., geometric average) equity risk premium was -- 4%. Therefore, if we are right about the equity risk premium, but have overestimated dividend growth, then our "high growth scenario" valuation estimates may be too optimistic, and our "low growth scenario" a better estimate of equity market valuations.

As I said, since our last asset allocation analysis in 2003, a lot of excellent new research has been published. We'll definitely be writing more about it later this year.

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Global Asset Class Returns

YTD 28Feb05	In USD	In AUD	In CAD	In EURO	In JPY	In GBP
Asset Held						
US Bonds	0.00%	-1.27%	2.52%	2.35%	1.74%	-0.30%
US Prop.	-5.90%	-7.17%	-3.38%	-3.55%	-4.16%	-6.20%
US Equity	-0.70%	-1.97%	1.82%	1.65%	1.04%	-1.00%
AUS Bonds	-1.72%	-2.99%	0.80%	0.63%	0.02%	-2.02%
AUS Prop.	-2.31%	-3.58%	0.21%	0.03%	-0.57%	-2.62%
AUS Equity	6.23%	4.96%	8.75%	8.57%	7.97%	5.93%
CAN Bonds	-1.55%	-2.82%	0.97%	0.80%	0.19%	-1.85%
CAN Prop.	1.67%	0.40%	4.19%	4.01%	3.41%	1.36%
CAN Equity	1.79%	0.52%	4.31%	4.14%	3.53%	1.49%
Euro Bonds	-1.70%	-2.97%	0.82%	0.65%	0.04%	-2.00%
Euro Prop.	-1.85%	-3.12%	0.67%	0.49%	-0.11%	-2.15%
Euro Equity	2.05%	0.78%	4.57%	4.40%	3.79%	1.75%
Japan Bonds	-1.74%	-3.01%	0.78%	0.61%	0.00%	-2.04%
Japan Prop.	1.39%	0.12%	3.91%	3.73%	3.13%	1.08%
Japan Equity	-1.01%	-2.28%	1.51%	1.34%	0.73%	-1.31%
UK Bonds	0.06%	-1.21%	2.58%	2.41%	1.80%	-0.24%
UK Prop.	-1.37%	-2.64%	1.15%	0.98%	0.37%	-1.67%
UK Equity	2.71%	1.44%	5.23%	5.06%	4.45%	2.41%
World Bonds	-0.60%	-1.87%	1.92%	1.75%	1.14%	-0.90%
World Prop.	-1.90%	-3.17%	0.62%	0.45%	-0.16%	-2.20%
World Equity	1.10%	-0.17%	3.62%	3.45%	2.84%	0.80%
Commodities	7.40%	6.13%	9.92%	9.75%	9.14%	7.10%
Hedge Funds	0.36%	-0.91%	2.88%	2.71%	2.10%	0.06%
A$	1.27%	0.00%	3.79%	3.62%	3.01%	0.97%
C$	-2.52%	-3.79%	0.00%	-0.18%	-0.78%	-2.82%
Euro	-2.35%	-3.62%	0.18%	0.00%	-0.61%	-2.65%
Yen	-1.74%	-3.01%	0.78%	0.61%	0.00%	-2.04%
UK£	0.30%	-0.97%	2.82%	2.65%	2.04%	0.00%
US$	0.00%	-1.27%	2.52%	2.35%	1.74%	-0.30%

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Equity and Bond Market Valuation Update

Our equity market 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 average rate of productivity growth an economy will achieve in the future. Because future growth rates are uncertain, we use both high and a low productivity growth assumptions for each region. Given these assumptions, here is our updated market valuation analysis at the end of last month:

Country	Real Risk Free Rate Plus	Equity Risk Premium Equals	Required Real Return on Equities	Expected Real Growth Rate* plus	Dividend Yield Equals	Expected Real Equity Return**
Australia	2.87%	4.00%	6.87%	4.90%	3.60%	8.50%
Canada	2.07%	4.00%	6.07%	2.10%	1.77%	3.87%
Eurozone	1.66%	4.00%	5.66%	2.50%	2.60%	5.10%
Japan	0.63%	4.00%	4.63%	2.70%	0.95%	3.75%
U.K.	1.76%	4.00%	5.76%	2.50%	3.15%	5.65%
U.S.A.	1.70%	4.00%	5.70%	4.50%	1.68%	6.18%

**High Productivity Growth Scenario..*
*** When required real equity return is greater than expected real equity return, theoretical index value will be less than actual index value – i.e., the market will appear to be overvalued.*

Country	Implied Index Value[1]	Current Index Value	Current to Implied Value Under High Growth Scenario[2]	Current to Implied Value Under Low Growth Scenario
Australia	182.74	100.00	55%	83%
Canada	44.54	100.00	225%	281%
Eurozone	82.28	100.00	122%	179%
Japan	51.83	100.00	193%	298%
U.K.	96.57	100.00	104%	151%
U.S.A.	139.53	100.00	72%	131%

[1]High productivity growth scenario. *[2]Values below 100% indicate undervaluation; more than 100% indicates overvaluation*

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Our valuation estimate is based on the relationship between the returns an equity market is expected to supply, and those investors are likely to demand. The rate of return the equity market is expected to supply in the future equals current dividend yield plus the expected rate of real long-term economic growth. To be sure, changes in the market price/dividend (or price/earnings) ratio also affect the returns supplied. However, because this is driven by psychological factors which we have no basis for predicting, we do not include future price/dividend ratio changes in our analysis.

We define the future equity market return that investors demand to be equal to the current yield on long term real return bonds, plus a four percent long term equity market risk premium. As you can see, the good news is that two of the factors in our model -- current dividend yields and the real bond return -- are easily obtained from the daily paper. The bad news is that the other two -- the expected rate of dividend growth and the "correct" equity market risk premium -- are two of the most contentious issues in finance. However, if you assume that an equity market is currently in equilibrium (that is, neither under or overvalued), by assuming a value for one of these variables, you can derive an estimate of the market's current expectation for the other. Specifically, the market's current implied rate of future dividend growth equals the current real bond yield plus the four percent equity market risk premium less the current dividend yield. Similarly, the market's current implied equity market risk premium equals the current dividend yield plus our estimated future growth rate less the current real bond yield. These estimates are shown in the following table:

	Current Dividend Yield	**Current Real Bond Yield**	**Implied Future Real Growth Rate, Assuming 4% ERP**	**Implied ERP, Assuming Low Future Growth Scenario**	**Implied ERP, Assuming High Future Growth Scenario**
Australia	3.60%	2.87%	3.27%	4.63%	5.63%
Canada	1.77%	2.07%	4.30%	0.80%	1.80%
Eurozone	2.60%	1.66%	3.06%	1.94%	3.44%
Japan	0.95%	0.63%	3.68%	2.12%	3.12%
United Kingdom	3.15%	1.76%	2.61%	2.39%	3.89%
United States	1.68%	1.70%	4.02%	3.48%	4.48%

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Our bond market valuation update is based on the same supply and demand methodology we use for our equity market valuation update. In this case, the supply of future fixed income returns is equal to the current nominal yield on ten-year government bonds. The demand for future returns is equal to the current real bond yield plus the historical average inflation premium (the difference between nominal and real bond yields) between 1989 and 2003. To estimate of the degree of over or undervaluation for a bond market, we use the rate of return supplied and the rate of return demanded to calculate the present values of a ten year zero coupon government bond, and then compare them. If the rate supplied is higher than the rate demanded, the market will appear to be undervalued. This information is contained in the following table:

	Current Real Rate	**Average Inflation Premium (89-03)**	**Required Nominal Return**	**Nominal Return Supplied (10 year Govt)**	**Return Gap**	**Asset Class Over or (Under) Valuation, based on 10 year zero**
Australia	2.87%	2.96%	5.83%	5.65%	-0.18%	1.72%
Canada	2.07%	2.40%	4.47%	4.28%	-0.19%	1.88%
Eurozone	1.66%	2.37%	4.03%	3.74%	-0.29%	2.83%
Japan	0.63%	0.77%	1.40%	1.48%	0.08%	-0.76%
UK	1.76%	3.17%	4.93%	4.78%	-0.15%	1.46%
USA	1.70%	2.93%	4.63%	4.37%	-0.26%	2.56%

It is important to note that this analysis looks only at ten year government bonds. The relative valuation of non-government bond markets is also affected by the extent to which their respective credit spreads (that is, the difference in yield between an investment grade or high yield corporate bond and a government bond of comparable maturity) are above or below their historical averages (with below average credit spreads indicating potential overvaluation).

Finally, for an investor contemplating the purchase of foreign bonds or equities, the expected future annual percentage change in the exchange rate is also important. Study after

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study has shown that there is no reliable way to forecast this. At best, you can make an estimate that is justified in theory, knowing that in practice it will not turn out to be accurate. That is what we have chosen to do here. Specifically, we have taken the difference between the yields on ten- year government bonds as our estimate of the likely future annual change in exchange rates between two regions. This information is summarized in the following table:

Annual Exchange Rate Changes Implied by Bond Market Yields

	To A$	To C$	To EU	To YEN	To GBP	To US$
From						
A$	0.00%	-1.37%	-1.91%	-4.17%	-0.87%	-1.28%
C$	1.37%	0.00%	-0.54%	-2.80%	0.50%	0.09%
EU	1.91%	0.54%	0.00%	-2.26%	1.04%	0.63%
YEN	4.17%	2.80%	2.26%	0.00%	3.30%	2.89%
GBP	0.87%	-0.50%	-1.04%	-3.30%	0.00%	-0.41%
US$	1.28%	-0.09%	-0.63%	-2.89%	0.41%	0.00%

Sector and Style Rotation Watch

The following table shows a number of classic style and sector rotation strategies that attempt to generate above index returns by correctly forecasting turning points in the economy. This table assumes that active investors are trying to earn high returns by investing today in the styles and sectors that will perform best in the next stage of the economic cycle. The logic behind this is as follows: Theoretically, the fair price of an asset (also known as its fundamental value) is equal to the present value of the future cash flows it is expected to produce, discounted at a rate that reflects their relative riskiness. Current economic conditions affect the current cash flow an asset produces. Future economic conditions affect future cash flows and discount rates. Because they are more numerous, expected future cash flows have a much bigger impact on the fundamental value of an asset than do current cash flows. Hence, if an investor is attempting to earn a positive return by purchasing today an asset whose value (and price) will increase in the future, he or she needs to accurately forecast the future value of that asset. To do this, he or she needs to forecast future economic

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conditions, and their impact on future cash flows and the future discount rate. Moreover, an investor also needs to do this before the majority of other investors reach the same conclusion about the asset's fair value, and through their buying and selling cause its price to adjust to that level (and eliminate the potential excess return).

We publish this table to make an important point: there is nothing unique about the various rotation strategies we describe, which are widely known by many investors. Rather, whatever active management returns (also known as "alpha") they are able to generate is directly related to how accurately (and consistently) one can forecast the turning points in the economic cycle. Regularly getting this right is beyond the skills of most investors. In other words, most of us are better off just getting our asset allocations right, and implementing them via index funds rather than trying to earn extra returns by accurately forecasting the ups and downs of different sub-segments of the U.S. equity and debt markets. That being said, the highest year-to-date returns in the table give a rough indication of how investors employing different strategies expect the economy to perform in the near future. The highest returns in a given row indicate that most investors are anticipating the economic and interest rate conditions noted at the top of the next column. Similar returns in multiple columns (within the same strategy) indicate a relative lack of agreement between investors about the most likely future state of the economy.

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

Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
Style Rotation	Growth (IWZ) **-2.11%**	Value (IWW) **1.07%**	Value (IWW) **1.07%**	Growth (IWZ) **-2.11%**
Size Rotation	Small (IWM) **-2.49%**	Small (IWM) **-2.49%**	Large (IWB) **-0.09%**	Large (IWB) **-0.09%**
Style and Size Rotation	Small Growth (DSG) **-0.48%**	Small Value (DSV) **-3.53%**	Large Value (ELV) **0.65%**	Large Growth (ELG) **-3.08%**

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Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
Sector Rotation	Cyclicals (IYC) **-3.60%**	Basic Materials (IYM) **5.22%**	Energy (IYE) **20.68%**	Utilities (IDU) **3.62%**
	Technology (IYW) **-5.37%**	Industrials (IYJ) **-1.84%**	Staples (IYK) **1.18%**	Financials (IYF) **-3.33%**
Bond Market Rotation	High Risk (VWEHX) **1.00%**	Short Maturity (VBISX) **-0.50%**	Low Risk (VIPSX) **-0.50%**	Long Maturity (VBLTX) **1.50%**

Academic Research Review: Should You Be a Momentum Investor?

At some point, every argument about whether or not financial markets are reasonably efficient comes to the subject of momentum. Technically, this refers to two separate phenomena. First, in a given period, a portfolio that is long assets with the highest returns in the previous period (i.e., "winners") and short those with the lowest performance (i.e., "losers") will usually generate positive returns that cannot be explained by varying exposure to different risk factors (e.g., the overall market, value, or small size). Second, from period to period, there is a tendency for the past price of an asset to predict its future price. In other words, these returns are not independent of each other (technically, they have a positive correlation). In both cases, however, the bottom line is the same: investors want to know if they can "beat the market" by using momentum-based trading strategies.

At first, the answer appears to be "yes". Wherever you seem to look, you find studies that show that momentum strategies yield market-beating returns. These include investments in different countries (see, for example, "The Speculative Dynamics of World Equity Markets" by De Bondt, Fung, and Lam, or "International Momentum" by Geert Rouwenhorst); across industries, and style categories ("Momentum and Autocorrelation in Stock Returns" by Jonathan Lewellen, or "Cross-Industry Momentum" by Menzly and Ozbas), and even across asset classes (see "Passive Momentum Asset Allocation" by King,

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Silver, and Guo). Not that market-beating returns are guaranteed, mind you. As Griffin, Ji, and Martin note in "Global Momentum Strategies: A Portfolio Perspective", the momentum approach has generated negative returns for extended periods of time. Still, you have to wonder: should I be doing this with my portfolio?

To answer this question, let's begin with two important questions. First, what factors cause momentum? Is there a reason to expect these factors to continue to operate in the future? And second, how much evidence is there that momentum is a profitable strategy?

As befits an issue that has caused so much consternation to so many professors, there is no shortage of explanations for what may be causing the momentum effects everyone sees in the historical returns data. Broadly speaking, these fall into three classes: the cognitive limitations of some investors; information and liquidity factors, and rational, risk-based factors.

Perhaps the most common school of thought about momentum locates the cause of this phenomenon in the tendency of some investors to under and over-react to information. For example, in "Investor Psychology and Security Market Under and Over-Reactions", Daniel, Hirshliefer and Subrahmanyam describe a model in which investors use information they believe is not available to all investors ("private information") to form their initial view about the value of a stock. They will subsequently pay more attention, and give more weight to information they later receive that supports their initial view, and pay less attention (and give less weight) to information which contradicts it. For example, if a firm has previously reported 11 quarters of rising earnings, investors will probably under-react if it reports flat earnings this quarter. This is formally known as the "confirmation bias", and it affects many areas of human thinking. For example, it was the underlying problem identified by the investigations into the 911 attack, and the missing WMDs in Iraq.

Back in the world of investing, the confirmation bias can cause investors to become overconfident about the accuracy of their views, and to keep buying a stock and driving its price higher. In "Short Term Momentum and Long-Term Reversal: An Experimental Investigation", Bloomfield Taylor and Zhou show how some investors' reluctance to realize their losses (the so-called "disposition effect") can further contribute to the under-reaction of stock prices to new information. Together, these factors sometimes cause a stock price to rise above its fundamental value. However, it will not fall until sufficient "disconfirming"

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evidence accumulates in the minds of enough investors (there is an old saying that it takes twice as much information to change an opinion than it does to form it in the first place).

In "The Role of Delisted Firms in the Momentum Puzzle", Assaf Eisdorfer looks for evidence of under and over-reaction. He shows how roughly ten percent of the stocks in the "winner" and "loser" portfolios used in many U.S. momentum studies are delisted during the holding period, but account for 40 percent of reported momentum profits. De-listed winners are firms that are acquired; de-listed losers are those that go bankrupt. Eisdorfer concludes that under-reaction to bad news seems more important to momentum profits than over-reaction to good news, with the shares of merged firms being more accurately priced than those that eventually go bankrupt. However, in "The 52 Week High and Momentum Investing", George and Hwang find evidence for over-reaction, and show how nearness of a stock's price to its 52 week high is a better predictor of future momentum profits than even its past returns.

In "Simple Forecasts and Paradigm Shifts", Hong and Stein note that while the actual process generating stock returns is a very complex one (involving both firm level variables and the actions of other investors), our cognitive limitations force us to think about it using relatively simple models, which we only slowly update. Hong and Stein show how these "learning effects" generate momentum effects very similar to those produced by the confirmation bias. In another paper ("A Unified Theory of Underreaction, Momentum Trading and Overreaction in Asset Markets"), the same two authors assume a market populated by two different types of investors. "Newswatchers" essentially trade on the fundamentals, based on the information they receive. "Momentum traders" trade on the basis of changes they observe in the price of a stock. If information diffuses to the newswatchers with some delay (i.e., some get it before others), this will initially cause returns (or price changes) in successive periods to be the same. In turn, this will attract the attention of the momentum traders, who will push the price of the stock still higher (or lower, as the case may be). This process can easily send a stock price to levels above or below its fundamental value. The key question is the percentage of newswatchers relative to momentum traders in the market (or, more accurately, the amount of capital each group controls). If there is a relatively high percentage of newswatchers (or "fundamental traders" as they are called in similar studies), any overpricing caused by the momentum traders is quickly corrected (and

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momentum profits are small). On the other hand, if there is a relatively high percentage of momentum traders, the process can go on for quite some time before it is reversed.

A number of papers focus in on the issue of when there will be relatively more momentum traders active in a market. In "Market States and Momentum", Cooper, Gutierrez and Hameed show how the profitability of a momentum strategy critically depends on the state of the market. They define a positive state as one where the past three years' returns have been positive, and a negative state as one when they have not. In the United States, they find that between 1929 and 1995 all momentum profits have come during positive market states. In "Market States and International Momentum Strategies," Dayong Huang finds qualified support for this conclusion in markets outside the United States.

Even if the percentage of fundamental traders is reasonably high, prices can still become substantially overvalued if there are barriers that prevent them from completely arbitraging away the excesses created by the momentum traders. For example, Bloomfield, Taylor and Zhou also found in their experimental market that the existence of potential margin calls reduced fundamental traders' willingness to take risk to earn arbitrage profits by shorting the shares momentum trading had overvalued. In their market, you could sell short a stock that you believed overvalued; however, to keep your position open you had to keep putting up more money if the stock price kept going higher. If you didn't have enough cash to meet a margin call, your position could be closed out at a big loss. This limited the amount of arbitrage that took place, resulting in more volatile stock prices. Here's another example of this phenomenon: how many people do you know who believed U.S. equities were overvalued in 1998 and 1999, and spent a lot of money buying put options that always expired out of the money as the market kept rising? By 2000, a lot of them had stopped buying the puts, only to find out (painfully) that they had been right in their fundamental view, just off on their estimate of how long it would take a critical mass of investors to share it.

These examples raise another critical point. Momentum profits may also be due in part to the actions of rational fundamental investors who choose to "join the bandwagon" in the belief that they will be able to get off before it goes over the cliff. Indeed, in "Hedge Funds and the Technology Bubble", Nagel and Brunnermeier show that a number of hedge funds took exactly this view between 1998 and 2000.

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An altogether different cognitive explanation of momentum is put forth by Jonathan Lewellen in his paper "Momentum and Autocorrelation in Stock Returns." He finds that rather than under and overreaction, momentum is a result of the excessive correlation between returns caused by investors incorrect belief that information they receive about one company provides valuable information about another one. This is reflected in levels of correlation between stock returns that are higher than the correlations between their dividends and cash flows. In their paper "Limited Attention and Asset Prices", Peng and Xiong provide a more elaborate explanation of this phenomenon, showing how limited investor attention causes people to group companies into aggregate categories (e.g., growth vs. value, sectors, small cap, etc.) that cause equity returns to covary more than is justified by their underlying fundamentals. Two other papers, "Style Investing" by Barberis and Shleifer and "Style Effects" by Teo and Woo find evidence for this in the historical data, in the form of style-level momentum effects.

The second major explanation for momentum profits looks to information and liquidity factors rather than limited investor attention and cognitive resources. In "Information Uncertainty and Stock Returns", Frank Zhang defines "information uncertainty" as ambiguity about the valuation implications of information received by an investor. He employes different proxies to measure this (e.g., the dispersion in analyst earnings estimates for a stock), and finds that under-reaction is linked to information uncertainty. In other words, even when all investors receive a piece of information at the same time, to the extent that its meaning is uncertain, its impact on stock prices will only take place gradually, giving rise to momentum.

Another take on the information issue is found in "Predicting Stock Price Movements from Past Returns: The Role of Consistency and Tax Loss Selling" by Grinblatt and Moskowitz. They find that returns are strongly negative in December for losing firms in the U.S., which implies that "tax loss trading accounts for a good portion of the profitability of momentum strategies." Information is also closely related to the extent to which investors and market makers will provide liquidity to the market as a whole, and to the individual markets for different stocks. In "Liquidity Risk and Asset Pricing", Ronnie Sadka shows how liquidity varies over time, which causes investors to demand a return premium for bearing liquidity risk. Moreover, this risk is associated with both changes in information, as well as

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the extent of momentum traders' activity in the market. The paper finds that momentum profits are in good measure compensation for bearing higher levels of liquidity risk. In "Liquidity, Market Sentiment and Momentum", Akiko Fujimoto ties a number of strands of research together and finds that momentum profits are highest when the market is in a positive state (following successive positive returns) and liquidity is high (implying a high level of activity by momentum traders).

In addition to liquidity, there are two other possible risk-based explanations for momentum profits. The first is that they are related to varying levels of macroeconomic risks. However, in "Momentum Investing and Business Cycle Risk", Griffin, Ji, and Martin present substantial evidence from around the world that this is not the case. The second risk-based explanation for momentum profits shows much more promise. Beginning with a critical paper by Berk, Green, and Naik ("Optimal Investment, Growth Options, and Security Returns"), a number of writers have explored the (common sense, but long overlooked) idea that what goes on inside companies has something to do with the equity returns we observe. The key to their argument is that firms change over time, in terms of their riskiness and the percentage of their market value that reflects cash flows from current assets versus as yet unrealized future growth options.

For example, managers seek new investments with low risk and high expected returns; when they make them, they reduce the overall riskiness of their firm's cash flows. This causes investors to perceive the firm as less risky, and require a lower rate of return to hold its stock. This lower rate of return increases the net present value of the firm's future cash flows, and hence its market value. And the increase in its market value lowers the expected future return on its stock. This process also works the other way, when low risk investments either wear out or become obsolete (perhaps due to changes in technology, customer needs, or the competitive environment) and must be replaced with higher risk investments. Berk, Green and Naik show how these normal processes in the life of a firm give rise to many of the effects we observe in equity prices, including value (book to market) and small cap return premiums, and momentum profits.

In a closely related paper ("Rational Momentum Effects"), Timothy Johnson shows how momentum profits are a logical result of variation in firms' expected rates of growth. Liu, Warner and Zhang confirm Johnson's findings in their paper, "Economic Fundamentals,

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Risk and Momentum Profits", as do Yeh and Vos from the Reserve Bank of New Zealand in their paper "A Proposal to Reach a Middle Ground." All of these papers find that a shift to higher growth is risky (something any corporate manager could confirm!), and hence investors initially demand a higher rate of return for holding these stocks. As an aside, in their paper "The Level and Persistence of Growth Rates", Chen, Karceski and Lakonishok show that investor uncertainty about future growth rates is not misplaced; in fact, future growth is almost always overestimated. (For other papers that further build on Berk, Green, and Naik, see "Anomalies" by Lu Zhang, "When Good News Means Higher Risk" by Sagi and Seasholes, and "Dynamic Beta, Time-Varying Risk Premium, and Momentum" by Hong Zhang).

Last but not least, a different set of research papers show how investment managers, also acting rationally in their own self-interest, could contribute to the momentum phenomenon. In "Momentum, Reversal, and the Trading Behavior of Money Managers," Gutierrez and Pirinsky show how professional investment managers have a strong incentive invest in stocks with high recent returns if it will help them outperform the index to which their performance is compared. Russ Wermers reached a similar conclusion in his paper "Is Money Really Smart?" where he showed how mutual fund managers tend to buy past winners and sell past losers. Of course, these active managers are also making an assumption that, due to some combination of superior information or a superior model, they will be able to sell these high momentum shares before their price eventually drops. However, as we have repeatedly noted, as with any other active management approach, this one is also exceedingly hard to apply with consistent success.

So what causes momentum? The most likely conclusion is that all of these factors, cognitive, information and liquidity related, and rational, contribute to the momentum effect we observe in the historical data. However, this begs the question, "but can I make money using this strategy?"

Lots of research papers give us plenty of reason to suspect that in practice, momentum strategies are much less profitable than they first appear. In "The Illusory Nature of Momentum Profits", Lesmond, Schill and Zhou find that "those stocks which generate large momentum returns are precisely those with high trading costs." As a result, he infers that the profitability of many theoretically attractive momentum strategies is probably overstated. In

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"The Cost of Trend Chasing and the Illusion of Momentum Profits", Donald Keim documents the actual costs for an institutional investor implementing a momentum strategy. He finds that "the actual costs [e.g., commission, spread, and price impact] of momentum based trades indicates that the returns reported in previous studies of simulated momentum strategies are not sufficient to cover the costs of implementing those strategies."

On the other hand, two other papers are somewhat more optimistic. In "Are Momentum Profits Robust to Trading Costs?", Korajczyk and Sadka show that while profits decline with portfolio size, momentum strategies may still be viable below a certain maximum level of deployed capital. Similarly, in "Feasible Momentum Strategies", Rey and Schmid describe a profitable strategy that was implemented using only the shares of large, liquid Swiss firms.

Last but not least, we also took a look ourselves at the potential returns and risks from possible momentum strategies. The results were instructive about the practical limits of a momentum strategy for an index-oriented investor.

Our first analysis was based on the real annual returns for eight U.S. dollar asset classes between 1989 and 2004. They included real return bonds (using estimated returns for 1989 to 1997), investment grade bonds, foreign currency bonds, commercial property, commodities, domestic equity, foreign developed market equity and emerging markets equity. Using different strategies, we formed our first momentum portfolio in 1990 (using the 1989 returns) and then updated it annually. We tested alternate portfolio decision rules, including increasing the portfolio weight (by different amounts) of the best performing asset class from the previous year; increasing the best performer's weight and decreasing the worst performer's weight by different amounts, and simply allocating equal amounts of the portfolio to a limited number of asset classes (e.g., the three or four best performing from the previous year). We did not include the possibility of taking short positions in any asset class, and we did not include transaction costs. After calculating the annual returns for the different strategies, we compared them to the returns from simply allocating a constant 12.5% of the portfolio to each asset class every year. Specifically we calculated the average excess return (alpha) of the momentum strategy, its incremental risk (i.e., its "tracking error", which equals the standard deviation of the annual alphas), and its Information Ratio (alpha divided by tracking error, a measure of incremental return per unit of incremental risk). Finally, we ran a statistical test to

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see if we could be 95% confident that the true Information Ratio for the strategy was different from zero.

We could not identify a momentum strategy that delivered an Information Ratio that was statistically different from zero. For example, our highest alpha strategy was to allocate 33.3% of the portfolio to the three best performing asset classes from the previous year. This generated an alpha of 1.50%, but with a tracking error of 7.38%. In other words, we generated higher returns than our equally allocated benchmark, but took on a lot of additional risk to get them. The Information Ratio for this strategy was only .203, and it was not statistically different from zero. And don't forget, in the real world transaction costs would have eaten up a good chunk of that 1.50% alpha.

We then repeated the same analysis using historical returns for 1989 to 2004 for the same eight asset classes in the U.K. (i.e., we used UK real return bonds, property, equity, etc.). Again, our highest alpha momentum strategy was to allocate 33.3% of the portfolio each year to the previous year's top three performing asset classes. In this case, the alpha was .76%, with a tracking error of 6.93% and a statistically insignificant Information Ratio of .109.

Finally, we looked at a momentum strategy applied to ten different sectors within the U.S. equity asset class. Once again, the 33.3% strategy produced the highest alpha, of 3.04% (versus the Dow Jones Total Market Index, not including transaction costs) over the 1992 to 2004 period. This strategy had a 6.46% tracking error, and an IR of .47, which was not statistically significant.

So where does this leave us? Most people will look at the above results and focus on that 3.04% alpha from the industry sector momentum strategy. Tempting, isn't it? That's the way human nature works. However, before anybody over-reacts to it, we emphasize the following points. First, it is not statistically different from zero. Second, transaction costs will undoubtedly reduce it. Third, as markets for sector based exchange traded funds become more liquid, there is every reason to believe that this alpha will be much smaller in the future, and closer to the alphas in the two broad asset class momentum strategies. Think of it this way: if we can identify this strategy, so can a lot of hedge fund managers. Finally, let's not forget that it took a significant amount of additional risk to produce this alpha. In sum, we

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can't help but thinking that big, long-term momentum profits are like anything else in life that seems too good to be true -- they're probably not.

Consumer Reports is Wrong

Consumer Reports is a U.S. magazine that is widely respected for the advice it provides to people who are facing difficult purchasing decisions for expensive items like autos, cameras, computers, televisions and washers. Their typical approach is to define the best product evaluation criteria to use (as well as their respective weights), and then use them to rate different options. Technically, this is known as "multi-attribute utility analysis" and in general it is a solid approach to making complex decisions. However, there are situations where it is not appropriate, at least in its traditional form. In these cases, the use of multi-attribute utility analysis runs the risk of producing answers that are at best misleading and sometimes flat-out wrong. Unfortunately, in its recent issue on choosing mutual funds, *Consumer Reports* appears to have made just this mistake.

The article starts out on a promising tack: "It happens all the time. While reading the newspaper or watching a finance program on TV, you learn about a mutual fund whose returns are zooming upward. You check it out and learn that it outpaced the Standard and Poor's 500 Index not only in the last year, but also for the last three years and five years. Congratulating yourself on finding a solid investment, you write out a check. Almost immediately, however, the fund plunges, and it stays in a performance trough for what seems like years. Why is it, you ask yourself, that every mutual fund you buy drops like a rock in a well the moment you invest? Don't think for a moment that your experience is unique. Millions of [investors] wind up buying high and selling low. There's an explanation: A mutual fund, like most other investments, may hit highs once in a while but perform listlessly most of the time. And the highs may be high enough to make the fund's long-term returns look respectable…"

The article goes on to quote an analyst from Morningstar, who notes that "most funds that end up leading or lagging the pack for short periods are very concentrated in certain areas." Consumer Reports notes that "as soon as these funds cool off, their performance

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chills. That's why funds at the top of the annual performance charts seldom repeat from one year to next."

So far, so good. The article even goes on to note the potential advantages of investing in index funds: "There are ways to avoid this investment roller coaster. One is to invest in index funds or exchange traded funds (ETFs). Both mirror the performance of a broad market index…You earn exactly what the market earns, minus expenses." Unfortunately, in the next sentence, Consumer Reports begins to go off the tracks: "[But there is a] downside [to index funds]: You can never do better than the index, and when it drops, you're stuck with losses."

Consumer Reports then proposes an alternative: "Choose funds that outperform the market -- not just once or twice a decade, but repeatedly. With such funds, you would not have to try to time market swings, a pursuit that baffles even professionals." The article then describes the approach Consumer Reports used to identify the actively managed mutual funds it recommends to investors: Starting with the 1,327 actively managed U.S. equity mutual funds that had at least a ten-year performance history, it applied the following screening criteria and weights: (1) The standard deviation of the fund's monthly returns over five and ten years (40% weighting); (2) The fund's excess return versus either the Standard and Poor's 500 Index (for large cap, mid-cap, asset-allocation, and specialty funds) or the Russell 2000 Index (for small cap funds), weighted 40%; (3) The fund's worst one and two year results, weighted 15%, and (4) The length of time the current manager has been managing the fund, weighted 5%. From the funds that passed this screen, Consumer Reports eliminated those with annual expenses of more than 1.6%, and those that received a failing fiduciary grade from Morningstar.

What does this mean in practical terms? Consumer Reports appears to making the assumption that people making investments are pursuing multiple objectives, including (a) beating the annual performance of a benchmark index; (b) minimizing the variability of annual returns; and (c) avoiding significant losses. Furthermore, it would appear that Consumer Reports assumes that most investors believe that low expenses, long manager tenure, and passing fiduciary grades are associated with the achievement of some or all of these objectives.

After applying these screening criteria, Consumer Reports was left with 70 funds (or 5.28% of the 1,327 it started with). Of these 70 funds, 18 were large cap (1 growth, 5 blend,

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and 12 value), 19 were mid-cap (7 blend, 12 value), 15 were small cap (6 blend and 9 value), 11 were asset allocation funds (that switch between bonds and equities), 4 were real estate investment trusts (REITS), and three were industry sector funds (one each in health care, defense, and natural resources).

Saying that we disagree with Consumer Reports' analytical methodology and conclusions is, to put it mildly, a vast understatement.

Let us start with the nature of the investor objectives assumed by Consumer Reports. As we have repeatedly written, we do not believe that beating the annual performance of a benchmark index should be the primary goal of prudent investors. Rather, these investors would be much better off if they focused on achieving a long-term (i.e., a compound annual, or, to put it differently, a geometric average) rate of return that is sufficient to achieve their goals over their target time horizon. This is equivalent to saying that a pension fund should focus on adequately funding its long-term liabilities (at the lowest possible risk) rather than beating a market index.

We have noted many times that the reference point you use to measure your investment performance is critical. Daniel Kahneman won the 2002 Nobel Prize in Economics for his writing on this subject. To oversimplify, a key insight is that for most people, "losing hurts twice as much as winning feels good." If you use the annual performance of an index as your benchmark, you will regularly be tempted to bail out of investments that have had a bad year, and move them into investments that have just had a good one. More often than not, this leads to the dreaded "buy high, sell low" outcome.

The alternative is to focus not on the performance of individual asset classes versus a benchmark (or benchmarks), but rather on the overall performance of your portfolio compared to your long-term goals. This forces you evaluate your performance over longer periods of time than one year, and substantially reduces the temptation to act precipitously (and often harmfully) on the basis of relatively little information.

However, if we take Consumer Reports' "annually beat the index" goal as a given, we have another problem with their choice of minimizing the total standard deviation of a fund's returns as an objective. In point of fact, the returns on the actively managed funds cited by Consumer Reports are a function of two factors: the style tilt they take away from the broad equity market index (e.g., toward small caps , and/or value), and manager skill. I can obtain

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the benefits of the style tilt quite cheaply by investing in a fund that tracks an appropriate index (e.g., a small cap value index fund). Therefore, the real issue is how much additional return the actively managed fund provides relative to the additional risks it takes to obtain it. What counts is not the overall volatility (standard deviation) of the actively managed fund, but rather the volatility of its returns compared to those on the index fund. In technical terms, returns relative to the index fund are called "alpha", and the additional risk relative to the index fund is called "tracking error" (which is the standard deviation of the alphas). Consumer Reports made a major error in using the alphas of its actively managed funds and their total volatility. The correct approach would have been to relate their alphas to their tracking errors. This is called the "Information Ratio," and it is quite well known. We don't understand why Consumer Reports did not use it.

We also question the other two screening criteria used by Consumer Reports. What does the fact that a manager has been with a mutual fund for a long time really tell you? That he or she has yet to get a high enough offer from a hedge fund? Or that he or she doesn't want to go to a hedge fund because -- why? Fear that he or she is losing his or her edge? Or something else? Who really knows? On the other hand, we agree with Consumer Reports' implicit assumption that investors' risk preferences encompass more than volatility (standard deviation). Kahneman's work showed that they also prefer to avoid large "drawdowns", or negative returns (technically, this is a function of skewness and kurtosis). However, we disagree with Consumer Reports apparent view that this preference should be taken into account at the fund level. Rather, it should apply to portfolio returns, which include the beneficial impact of diversification across asset classes.

Another major problem we have with the Consumer Reports article is its unstated assumption that successful active management is possible for great numbers of people (if only they had the sense to use the Consumer Reports funds screening process). We have written at length about the many challenges that make consistent active management success such a rarity (see, for example, the button on our home page labeled "The Case for Active Management"). Let me briefly summarize them. First, successful active management ultimately rests on successful forecasting. In turn, this must rest on some combination of superior information and/or a superior model for making sense of it. Active managers' ability to consistently obtain superior information has been dramatically reduced due to both

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technological changes (e.g., the internet) and regulatory changes (e.g., Securities and Exchange Commission Regulation FD in the United States). As for superior models, most are eventually made obsolete by some combination of copying by competitors and/or changes in the underlying economy that invalidate their key assumptions.

Second, even those managers in possession of superior information or a superior model often find themselves unable to fully act on it. For example, most mutual fund managers are prevented from taking short positions in a security, or from adding leverage to maximize the benefits from their insights. Other active managers face constraints on the maximum amount of active risk they can take in pursuit of "better than index fund" returns. Finally, as people pour more money into high performing mutual funds, their managers typically find it exponentially more difficult to find ever larger, but still highly profitable investment opportunities.

Of course, many of these limitations do not apply to hedge funds (though the challenge of managing a larger fund certainly does). However, even if you have sufficient wealth to qualify as a hedge fund investor, you are still left with the challenge of identifying truly skilled active managers. Unfortunately, research has shown that impressive track records aren't any help. Many of them are not statistically different from what would expect from luck alone, and even those that are have been shown to be poor predictors of future performance (like we said, advantages based on superior information and superior models have increasingly short half-lives). The inescapable reality is that it is much easier to identify Warren Buffet than it is his successor.

But suppose you think you have. You are still left with the fourth challenge: negotiating a compensation arrangement with this superstar active manager that will leave you feeling confident that you will be better off than you would have been had you invested in an index fund. Given that many hedge fund managers charge fees equal to 2% of their assets under management, plus 20% of the profits they generate, this is no easy task (though it certainly explains why so many mutual fund managers have left to run hedge funds!).

In short, one reaction to the Consumer Reports article is "so what?" They have identified a small number of funds that, by their standards, have "outperformed" over the past ten years. Our response is that plenty of research shows that this provides no statistically significant insight about whether they will outperform over the next ten years.

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But let's go a step further and ask whether Consumer Reports' 70 star mutual funds have actually "outperformed." The first thing we insist on is a fair, "apples to apples" comparison. Unfortunately, Consumer Reports mostly doesn't provide one. For example, included in the 70 funds are 11 "asset allocation" funds that switch between stocks and bonds. That they have "outperformed" the S&P 500 Index tells us very little. It may well have been the case that all of them would have been outperformed by a mix of stock and bond index funds. The only fair way to make this comparison would have been to (1) identify each of these fund's basic stock/bond asset allocation (also known as its "policy mix"), (2) construct an index based on this mix, and then (3) see if its active management (i.e., departures from its policy mix) caused the fund to outperform the index fund benchmark. Unfortunately, Consumer Reports did not do this analysis, so we will eliminate the asset allocation funds from out analysis.

We will also eliminate the REIT funds, as they are, in our view, a separate asset class from the domestic equity funds. We will also eliminate the three narrowly focused sector funds, as their performance was not compared to an equally narrow index.

This leaves us with 52 general equity funds. As we already noted, Consumer Reports measured these funds' "excess returns" (i.e., their "alpha") using either the Standard and Poors 500 or the Russell 2000 Index. We believe this is an incorrect methodology. Specifically, it conflates true active management skill with the benefits of style tilts that could have been taken, at much lower cost, via index funds. For example, the proper benchmark for an actively managed, large cap value fund is not the S&P 500 (which includes a mix of "growth" and "value" companies); rather, it is a fund that tracks a large cap value index. In our analysis, we used the following funds as benchmarks:

Equity Style Tilt	**Benchmark Fund**
Large Cap Growth	Vanguard Large Cap Growth (VIGRX)
Large Cap Blend	Vanguard S&P 500 (VFINX)
Large Cap Value	Vanguard Large Cap Value (VIVAX)
Mid Cap Blend	Dreyfus Mid-Cap Index[1]
Mid Cap Value	S&P Mid-Cap 400 Value ETF (IJJ)[2]
Small Cap Blend	Vanguard Small Cap (NAESX)
Small Cap Value	Vanguard Small Cap Value (VISVX) [3]

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- Other mid-cap index funds have lower expense ratios, but this one had the longest track record
- We extended IJJ's returns backward by subtracting its expense ratio (.25) from the index return
- This fund started in 1998; we extended its track record back to 1995 by taking the S&P/Barra 600 Value Index return and subtracting its expense ratio (.27) from the index return.

Before reviewing the result of our fund alpha, tracking error, and information ratio calculations, we should also briefly note two other issues that were not covered in the Consumer Reports article. First, why should an investor even bother to take a tilt away from a broad market equity fund (e.g., the Vanguard Total Market Fund -- VTSMX for the mutual fund shares, and VTI for the exchange traded shares)? There are two conflicting schools of thought on this issue. Those who assume that markets are reasonably efficient, expect a tilt away from the broad market index to produce either a higher return with higher risk, or lower return with lower risk. This school of thought sees the so-called "value" and "small stock" return premiums as compensation for taking on higher levels of risk relative to the broad market index.

In contrast, the behavioral finance school believes that it is possible for a tilt to produce higher returns with lower risk. However, this belief rests on two critical assumptions: first, that some investors will regularly make predictable mistakes, and second, that there are significant barriers to other investors exploiting them, and arbitraging away the potentially higher returns that results from the actions of irrational investors. While we recognize that there is plenty of evidence for the existence of systematic mistakes, evidence for the existence of substantial and persistent barriers to arbitrage is much less impressive. We therefore take the position that, while markets are not perfectly efficient, they are strongly attracted to it. Hence we believe that the most reasonable expectation for the result of taking a tilt is either higher returns with higher risk, or lower returns with lower risk, but not a free lunch.

The second issue relates to the "right" index to use when calculating an actively managed fund's alpha. Reasonable people can and do disagree on this question. For example, in previous articles, we have extensively reviewed the impact of taking mid and small cap tilts using funds based on different indexes. Particularly in the area of small caps, different indexes can produce significantly different results.

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With these important caveats in mind, let us now turn to our analysis of the 52 actively managed large, mid and small cap funds that passed the Consumer Reports screening criteria. We used the following methodology: (a) for each year between 1995 and 2004, we subtracted the return on the appropriate index fund from the return on the actively managed fund. (b) We calculated the average of these differences to determine each fund's alpha. (c) We calculated the standard deviation of these differences to determine each fund's tracking error. (d) We divided each fund's alpha by its tracking error to determine its Information Ratio, or IR. (e) We tested to see if the fund's IR was statistically different from zero. (For the technically inclined, we did this by comparing the t-statistics for the distribution of each fund's alpha to the 2.262 needed to achieve a 95% confidence level with 9 degrees of freedom). To put this last step in plain English, we tested to see if we could be 95% sure that a fund's IR was not due to luck.

We found the following: (1) When calculated using appropriate index benchmarks, many of the 52 Consumer Reports funds actually had negative alphas. For the whole sample, the average alpha was only 0.17%. (2) Many of the funds also had quite high tracking errors. In other words, to generate alpha they were taking substantially more risk than the comparable index fund. Across the 52 funds, tracking error averaged 9.66%. (3) Not one of the 52 actively managed equity funds selected by Consumer Reports had an Information Ratio that was significantly different from zero. The two funds that came the closest to passing this test were the Dodge and Cox Stock Fund (DODGX) and the Meridian Value Fund (MVALX), but even their Information Ratios fell well short of statistical significance.

In sum, Consumer Reports is recommending actively managed mutual funds, whose expense levels and tax costs are demonstrably higher than those on comparable index funds, without any statistically significant evidence that the active funds' risk/return trade-off is superior. This is a big and unusual mistake by an organization that is generally extremely reliable. Our fundamental conclusion therefore remains unchanged: While some degree of active management is necessary to maintain reasonably efficient markets, the great majority of investors are (still) best advised to invest their hard-earned savings in a well-diversified portfolio of index funds.

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Model Portfolios Update

We produce three different types of model portfolios. Each of these is based on a different portfolio construction methodology.

We use a "rule of thumb" approach (or, to use the more formal term, a "heuristic approach") to construct our benchmark portfolios. More specifically, we use three "rules of thumb" that are often cited in news stories a mix of 80% equities and 20% debt (for our high risk/high return portfolios); a mix of 60% equities and 40% debt (for our moderate risk/moderate return portfolios); and a mix of 20% equities and 80% debt (for our low risk/low return portfolios). Using different terminology, somebody else might call these three portfolios aggressive, balanced, and conservative. We implement these three rules of thumb in two different ways (to construct six different benchmark portfolios). The first uses just two asset classes: domestic investment grade bonds and domestic equity. The second uses a broader mix of asset classes: domestic and foreign investment grade bonds, and domestic and foreign (including emerging market) equity. In addition to these 80/20, 60/40, and 20/80 portfolios, we also provide our "couch potato" portfolio. This portfolio is equally allocated to all of the asset classes we use. More formally, this is known as the "1/N heuristic," which research has shown is an approach used by a significant proportion of retirement plan investors. This portfolio implicitly assumes that it is impossible to accurately forecast future asset class risk and return; consequently, the best approach is to equally divide one's exposure to different sources of return (and risk). While we disagree with this assumption, intellectual honesty compels us to include the "couch potato" portfolio as one of our benchmarks. Finally, each year we also benchmark all our portfolios against the return from holding cash. We define this return as the yield to maturity on a one-year government security purchased at the end of the previous year. For 2005, the U.S. cash benchmark return is 2.75% (nominal).

The goal of our second set of model portfolios is to either deliver more return than the domestic benchmark portfolios, while taking on no more risk, or to deliver the same level of return while taking on less risk. To develop these model portfolios, we use a methodology known as "mean/variance optimization" or MVO. This approach uses three variables for each asset class (its expected return, standard deviation of returns, and correlation of returns with other asset classes) to construct different combinations of portfolios which maximize return

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per unit of risk (another way of looking at this is that they minimize risk per unit of return). The MVO technique has some significant limitations. While it is a good approach to single year portfolio optimization problems, in multiyear settings it fails to adequately take into account the fact that poor portfolio performance in early years can substantially reduce the probability of achieving long term goals. It also fails to adequately account for most people's intuitive understanding of risk: what's important isn't standard deviation (the dispersion of annual returns around their mean), but rather the chance that I will fall short of my long-term goals. Given these limitations, our MVO portfolios are most appropriate for managers whose performance is evaluated on an annual basis in comparison to one of our benchmarks.

Our third set of model portfolios uses a simulation optimization methodology. It assumes that an investor understands the long-term compound real rate of return he or she needs to earn on his or her portfolio to achieve his or her long-term financial goals. We use SO to develop a multi-period asset allocation solutions that are “robust”. They are intended to maximize the probability of achieving an investor’s compound annual return target under a wide range of possible future asset class return scenarios. More information about the SO methodology is available on our website. Using this approach, we produce model portfolios for three different compound annual real return targets: 7%, 5%, and 3%. We produce two sets of these portfolios: one includes hedge funds as a possible asset class, and one does not.

The year-to-date results for all these model portfolios are shown in the tables on the following pages.

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Model Portfolios Year-to-Date Performance

These portfolios seek to maximize return while matching their benchmark's risk (standard deviation)			
	YTD 28Feb05	**Weight**	**Weighted Return**
	In U.S. $		In U.S. $
High Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-0.7%	**80%**	**-0.56%**
U.S.Bonds	0.0%	**20%**	**0.00%**
		100%	**-0.56%**
Global Benchmark			
U.S. Equity	-0.7%	**40%**	**-0.28%**
Non-U.S. Equity	2.9%	**40%**	**1.16%**
U.S. Bonds	0.0%	**10%**	**0.00%**
Non-U.S. Bonds	-1.2%	**10%**	**-0.12%**
		100%	**0.76%**
Recommended			
U.S. Equity	-0.7%	**55%**	**-0.39%**
Foreign Equity (EAFE)	2.3%	**25%**	**0.58%**
Emerging Mkts Equity	8.7%	**7%**	**0.61%**
Commercial Property	-5.9%	**3%**	**-0.18%**
Commodities	7.4%	**10%**	**0.74%**
		100%	**1.36%**

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These portfolios seek to maximize return while matching their benchmark's risk (standard deviation)			
Medium Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-0.7%	**60%**	**-0.420%**
U.S.Bonds	0.0%	**40%**	**0.000%**
		100%	**-0.420%**
Global Benchmark			
U.S. Equity	-0.7%	**30%**	**-0.21%**
Non-U.S. Equity	2.9%	**30%**	**0.87%**
U.S. Bonds	0.0%	**20%**	**0.00%**
Non-U.S. Bonds	-1.2%	**20%**	**-0.24%**
		100%	**0.42%**
Recommended			
U.S. Equity	-0.7%	**47%**	**-0.33%**
Foreign Equity (EAFE)	2.3%	**10%**	**0.23%**
U.S.Bonds	0.0%	**12%**	**0.00%**
U.S. High Yield Bonds	1.0%	**5%**	**0.05%**
Non-U.S. Bonds	-1.2%	**5%**	**-0.06%**
Commercial Property	-5.9%	**6%**	**-0.35%**
Emerging Mkts Equity	8.7%	**5%**	**0.44%**
Commodities	7.4%	**10%**	**0.74%**
		100%	**0.71%**

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These portfolios seek to maximize return while matching their benchmark's risk (standard deviation)			
Low Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-0.7%	**20%**	**-0.14%**
U.S.Bonds	0.0%	**80%**	**0.00%**
		100%	**-0.14%**
Global Benchmark			
U.S. Equity	-0.7%	**10%**	**-0.07%**
Non-U.S. Equity	2.9%	**10%**	**0.29%**
U.S. Bonds	0.0%	**40%**	**0.00%**
Non-U.S. Bonds	-1.2%	**40%**	**-0.48%**
		100%	**-0.26%**
Recommended			
U.S. Equity	-0.7%	**16%**	**-0.11%**
U.S. Bonds	0.0%	**55%**	**0.00%**
U.S. High Yield Bonds	1.0%	**3%**	**0.03%**
Real Return Bonds	-0.5%	**10%**	**-0.05%**
Commercial Property	-5.9%	**5%**	**-0.30%**
Foreign Equity (EAFE)	2.3%	**6%**	**0.14%**
Commodities	7.4%	**5%**	**0.37%**
		100%	**0.08%**

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These portfolios seek to minimize risk while matching their benchmark's returns.			
	YTD 28Feb05	**Weight**	**Weighted Return**
	In U.S. $		In U.S. $
High Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-0.7%	**80%**	**-0.56%**
U.S.Bonds	0.0%	**20%**	**0.00%**
		100%	**-0.56%**
Global Benchmark			
U.S. Equity	-0.7%	**40%**	**-0.28%**
Non-U.S. Equity	2.9%	**40%**	**1.16%**
U.S. Bonds	0.0%	**10%**	**0.00%**
Non-U.S. Bonds	-1.2%	**10%**	**-0.12%**
		100%	**0.76%**
Recommended			
U.S. Bonds	0.0%	**5%**	**0.00%**
Commercial Property	-5.9%	**10%**	**-0.59%**
U.S. Equity	-0.7%	**58%**	**-0.41%**
Foreign Equity (EAFE)	2.3%	**17%**	**0.39%**
Commodities	7.4%	**10%**	**0.74%**
		100%	**0.14%**

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These portfolios seek to minimize risk while matching their benchmark's returns.			
Medium Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-0.7%	**60%**	**-0.42%**
U.S.Bonds	0.0%	**40%**	**0.00%**
		100%	**-0.42%**
Global Benchmark			
U.S. Equity	-0.7%	**30%**	**-0.21%**
Non-U.S. Equity	2.9%	**30%**	**0.87%**
U.S. Bonds	0.0%	**20%**	**0.00%**
Non-U.S. Bonds	-1.2%	**20%**	**-0.24%**
		100%	**0.42%**
Recommended			
U.S. Equity	-0.7%	**45%**	**-0.32%**
Foreign Equity (EAFE)	2.3%	**10%**	**0.23%**
U.S. Bonds	0.0%	**29%**	**0.00%**
U.S. High Yield Bonds	1.0%	**5%**	**0.05%**
Commercial Property	-5.9%	**6%**	**-0.35%**
Commodities	7.4%	**5%**	**0.37%**
		100%	**-0.02%**

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Low Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-0.7%	**20%**	**-0.14%**
U.S.Bonds	0.0%	**80%**	**0.00%**
		100%	**-0.14%**
Global Benchmark			
U.S. Equity	-0.7%	**10%**	**-0.07%**
Non-U.S. Equity	2.9%	**10%**	**0.29%**
U.S. Bonds	0.0%	**40%**	**0.00%**
Non-U.S. Bonds	-1.2%	**40%**	**-0.48%**
		100%	**-0.26%**
Recommended			
U.S. Equity	-0.7%	**10%**	**-0.07%**
Foreign Equity (EAFE)	2.3%	**8%**	**0.18%**
Commercial Property	-5.9%	**4%**	**-0.24%**
U.S.Bonds	0.0%	**40%**	**0.00%**
Real Return Bonds	-0.5%	**25%**	**-0.13%**
U.S. High Yield Bonds	1.0%	**8%**	**0.08%**
Commodities	7.4%	**5%**	**0.37%**
		100%	**0.20%**

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These portfolios seek to maximize the probability of achieving at least the target real return over twenty years, at the lowest possible risk.			
	YTD 28Feb05	**Weight**	**Weighted Return**
	In US$		In US$
7% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	-0.5%	3%	**-0.02%**
U.S. Bonds	0.0%	3%	**0.00%**
Non-U.S. Bonds	-1.2%	29%	**-0.35%**
Commercial Property	-5.9%	10%	**-0.59%**
Commodities	7.4%	13%	**0.96%**
U.S. Equity	-0.7%	25%	**-0.18%**
Foreign Equity (EAFE)	2.3%	0%	**0.00%**
Emerging Mkt. Equity	8.7%	17%	**1.48%**
Hedge Funds	0.4%	0%	**0.00%**
		100%	**1.31%**
	YTD 28Feb05	**Weight**	**Weighted Return**
	In US$		In US$
5% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	-0.5%	2%	**-0.01%**
U.S. Bonds	0.0%	15%	**0.00%**
Non-U.S. Bonds	-1.2%	22%	**-0.26%**
Commercial Property	-5.9%	13%	**-0.77%**
Commodities	7.4%	6%	**0.44%**
U.S. Equity	-0.7%	27%	**-0.19%**
Foreign Equity (EAFE)	2.3%	5%	**0.12%**
Emerging Mkt. Equity	8.7%	10%	**0.87%**
Hedge Funds	0.4%	0%	**0.00%**
		100%	**0.20%**

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	YTD 28Feb05	Weight	Weighted Return
	In US$		In US$
3% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	-0.5%	40%	**-0.20%**
U.S. Bonds	0.0%	25%	**0.00%**
Non-U.S. Bonds	-1.2%	8%	**-0.10%**
Commercial Property	-5.9%	8%	**-0.47%**
Commodities	7.4%	7%	**0.52%**
U.S. Equity	-0.7%	7%	**-0.05%**
Foreign Equity (EAFE)	2.3%	3%	**0.07%**
Emerging Mkt. Equity	8.7%	2%	**0.17%**
Hedge Funds	0.4%	0%	**0.00%**
		100%	**-0.06%**

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These portfolios seek to maximize the probability of achieving at least the target real return over twenty years, at the lowest possible risk.		***These portfolios are the same as our other target real return portfolios, except that they can also invest in hedge fund index products.***	
	YTD 28Feb05	**Weight**	**Weighted Return**
	In US$		In US$
7% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	-0.5%	3%	**-0.02%**
U.S. Bonds	0.0%	0%	**0.00%**
Non-U.S. Bonds	-1.2%	27%	**-0.32%**
Commercial Property	-5.9%	13%	**-0.77%**
Commodities	7.4%	10%	**0.74%**
U.S. Equity	-0.7%	20%	**-0.14%**
Foreign Equity (EAFE)	2.3%	0%	**0.00%**
Emerging Mkt. Equity	8.7%	12%	**1.04%**
Hedge Funds	0.4%	15%	**0.05%**
		100%	**0.59%**

	YTD 28Feb05	**Weight**	**Weighted Return**
	In US$		In US$
5% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	-0.5%	5%	**-0.03%**
U.S. Bonds	0.0%	20%	**0.00%**
Non-U.S. Bonds	-1.2%	22%	**-0.26%**
Commercial Property	-5.9%	7%	**-0.41%**
Commodities	7.4%	10%	**0.74%**
U.S. Equity	-0.7%	20%	**-0.14%**
Foreign Equity (EAFE)	2.3%	0%	**0.00%**
Emerging Mkt. Equity	8.7%	6%	**0.52%**
Hedge Funds	0.4%	10%	**0.04%**
		100%	**0.46%**

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	YTD 28Feb05	Weight	Weighted Return
	In US$		In US$
3% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	-0.5%	42%	**-0.21%**
U.S. Bonds	0.0%	16%	**0.00%**
Non-U.S. Bonds	-1.2%	11%	**-0.13%**
Commercial Property	-5.9%	10%	**-0.59%**
Commodities	7.4%	7%	**0.52%**
U.S. Equity	-0.7%	7%	**-0.05%**
Foreign Equity (EAFE)	2.3%	2%	**0.05%**
Emerging Mkt. Equity	8.7%	2%	**0.17%**
Hedge Funds	0.4%	3%	**0.01%**
		100%	**-0.23%**

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	YTD 28Feb05	Weight	Weighted Return
	In US$		In US$
Equally Weighted Portfolio	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	-0.5%	12.5%	**-0.06%**
U.S. Bonds	0.0%	12.5%	**0.00%**
Non-U.S. Bonds	-1.2%	12.5%	**-0.15%**
Commercial Property	-5.9%	12.5%	**-0.74%**
Commodities	7.4%	12.5%	**0.93%**
U.S. Equity	-0.7%	12.5%	**-0.09%**
Foreign Equity (EAFE)	2.3%	12.5%	**0.29%**
Emerging Mkt. Equity	8.7%	12.5%	**1.09%**
		100.0%	**1.26%**

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