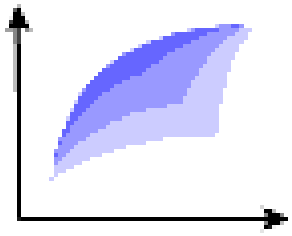
Efficient Frontier



An Online Journal of Practical Asset Allocation

Edited by William J. Bernstein

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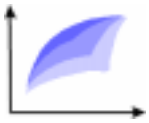


William J. Bernstein

The Best of the Behavioralists

I find myself getting asked with increasing regularity about the Dick Thaler-inspired Undiscovered Managers family of funds. For those unfamiliar with the good professor, Dr. Thaler is probably the best-known practitioner of the "behavioral finance" (BF) school of market analysis.

The BFers and the efficient marketeers (EMHers) can be loosely thought of as the Hatfields and McCoys of financial thought. The EMHers believe that the market price of a security is an unerring reflection of all available public information about it; the market is always right. Contrariwise, the BFers believe that since prices are set by human beings, they are heir to all of the sins of the flesh. Except that instead of the really juicy stuff they like to think about things like recency, overconfidence, and risk-aversion myopia. (Shakespeare would have had a tough time with this crowd.)

At first glance, the EMHers would seem to have a very tough row to hoe. After all, viewed through the long lens the history of finance is one long tale of excess and folly, from the prices of tulip futures in 17th century Holland right on through to the valuations of internet companies. Surely these mispricings can be taken advantage of. In fact, over the past few decades the BFers have uncovered a bumper crop of these excesses, called "anomalies."

And here is where the EMHers throw down the gauntlet. OK, they say, so there are all these anomalies just lying around, waiting to be picked up like so many $10 bills. Show us the yachts, please. Where are all the managers who use these anomalies to achieve persistent superior long-term returns?

Which gets us back to our undiscovered managers. Undiscovered Managers purports to direct investors to fund managers who can wield these anomalies to their benefit. Best of all, because these managers are unknown they manage only small pools of capital, and thus are not burdened with undue impact costs.

How likely is this approach to succeed? Well, it turns out that one of the most illustrious BFers has run a highly acclaimed fund for over 11 years. In order to answer this question, let's examine his performance.

David Dreman is no slouch. For starters, his intellectual credentials are impeccable. He has contributed generously to the academic literature, most notably a classic piece, "Overreaction, Underreaction, and the Low P/E Effect," (Financial Analysts Journal, July/August 1995), in which he demonstrated that value and growth stocks behaved very differently to both positive and negative earnings surprises. More importantly, in the late 1980s he founded the Dreman Fund Group, which managed stocks using his favorite anomalies.

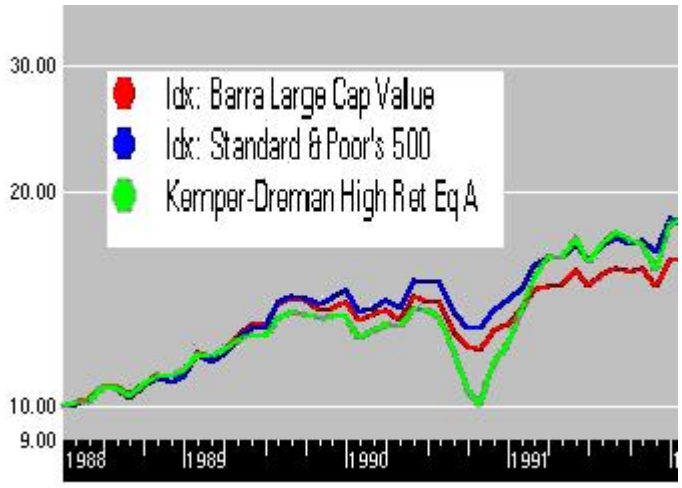
How has he done? Not too badly, but not great. His flagship offering, the Dreman High Return (later the Kemper-Dreman High Return) Fund has been continuously managed by him since April 1988. Its annualized return as of October 31, 1999 was 16.58%, almost a full 2 percent less than the S&P 500's 18.51%. On the plus side, this has been a difficult patch for value

investors, but even then he just noses out the Barra Large Value Index, which returned "only" 16.20%.

As most of you are aware, the best way to sort all this out is to run his monthly returns through the Fama/French 3-factor grinder. The result is an alpha of precisely zero. In other words, net of expenses Mr. Dreman added zero value to simply indexing his style loadings.

That's no mean feat, of course. At least Mr. Dreman's alpha covered his costs. Most managers don't get even this far, and consequently sport negative alphas. Remember that we are talking about both overt (commissions and fees) and covert (impact cost and spread) expenses here.

But from here on, no more Mr. Nice Guy. First, Mr. Dreman's approach carried considerable nonsystematic risk. Take a gander at the lower left corner of the Morningstar mountain graph:



Note how the Dreman Fund took a tremendous wallop in 1990 because of its high exposure to bank stocks. Based on the 1990 experience it seems that his approach was considerably riskier than either an indexed market or an

indexed value approach.

Worse, our focus on Mr. Dreman is the result of the most egregious sort of data mining. After all, we chose him because he has the longest and most distinguished record of all the BFers. 11 years ago, how could have one known that Mr. Dreman was the pick of the litter?

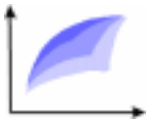
The point of the exercise is this: If you pick the best undiscovered anomaly-wielding manager you can find, and if you are very lucky, you will more or less match an indexed approach. It is much more likely that you will do far worse. For example, consider the performance of poor Jim O'Shaughnessey, who sliced and diced historical stock returns in a dizzying variety of ways, coming up with impressive excess returns. How well have his funds done as a group in real time? Don't ask.

So why do the BFers do so well on paper, but so poorly in the real world? As discussed in September's EF, data mining and expenses (Or, if you're fond of buzzwords, "implementation shortfall"). Let's say that you examine portfolios formed on 20 different stock characteristics, and come up with one whose portfolio beats the market by 4% per year. It's likely that a significant amount of that margin was an artifact of your data mining, and that the other half will get eaten by your costs. If you are lucky, then, you break even with the market. And if you are unlucky, like Mr. O'Shaughnessey, you and your investors wind up an odiferous creek.

Late last year UM began offering a dizzying array of funds in all style categories, including REIT and foreign funds, but the record is too short to draw any conclusions. Most of the funds do seem a bit ahead of their benchmarks, but some are not. It's simply too early to tell. I wish them well, but if the history of money management is any guide, their road is long and

dangerous.

Efficient Frontier



William J. Bernstein

The Slippery Slope of Fund Expenses, Part II

In July's EF we looked at the relationship between fund expense and return and came to a remarkable conclusion; that for every dollar paid in fees, 2 dollars were lost. Further, it appeared that while fund turnover hurt value stock funds, it actually seemed to help growth mutual funds. I began to wonder if growth fund managers were not successfully purchasing momentum-related excess return with their turnover expense.

Both of these issues were important enough that I decided to look at the issue "out-of-sample" in order to make sure that I wasn't "data mining"—in other words, being fooled by random variations in the data. Fortunately, sitting in the Efficient Frontier Museum of Investment Technology (my wife's old PC in our basement) is the January 1994 version of Morningstar's "Onfloppy for Mutual Funds," which contains the 5-year returns data for 1989-93. Morningstar's data wasn't yet sorted by their handy-dandy style boxes, so I devised my own sorts. The breakpoints for value/blend and blend/growth were at a P/B ratio of 3 and 4, respectively. The breakpoints for small/medium and medium/big were placed at $1.8 billion and $5.5 billion. Regressing 5-year return versus fund expenses and turnover, here's what I found:

Fund Category	Return/Expense Slope	Return/Turnover Slope
Large Growth	-2.02	-0.25
Large Blend	-2.15	+0.15
Large Value	-2.23	-1.30
Medium Growth	-2.47	+1.27
Medium Blend	-3.15	-0.25
Medium Value	-1.50	-1.05
Small Growth	+0.06	-0.02
Small Blend	-2.81	+1.86
Small Value	-1.86	+1.27

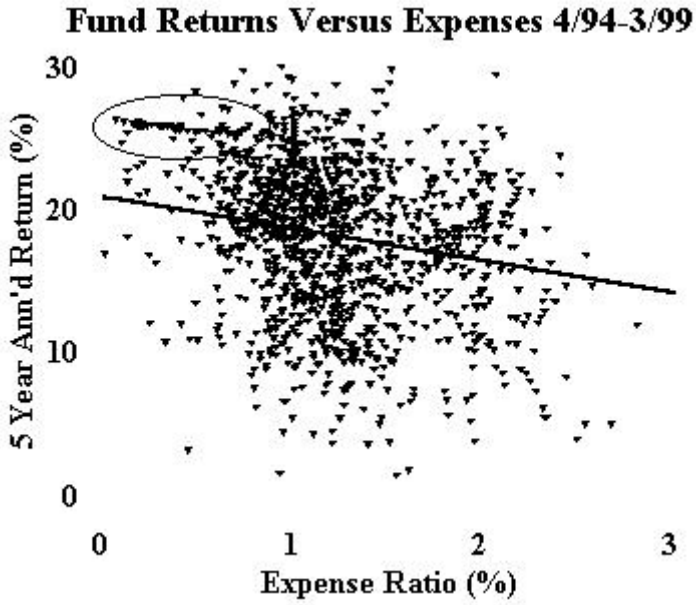
For starters, the -2 slope between expense and return seems to hold up nicely. We just don't have an explanation. Further, for large and medium cap funds it seems that value funds are more badly hurt by turnover than growth funds, as was found in 1994-8. But the small cap category shows the opposite.

Let's discuss the turnover issue first. Although I continue to suspect that growth fund managers can mitigate the effects of turnover with the benefits of momentum investing, the data are not entirely convincing. One problem is that I'm using the "spot" turnover figure, taken at the end of the 5-year period. Since turnover can

change dramatically for a given fund from year to year, a more accurate picture could be obtained using average turnover for the whole period, but I don't have this data. Mark Carhart, in his landmark 1997 *Journal of Finance* article on mutual fund persistence, found an overall return/turnover slope of -.97 with a modestly impressive -2.36 t-stat. Combining my data for the two time periods, I think that it's clear that value funds are hurt by turnover, but not much can be said about growth funds. But the turnover data are weak, and there's no way that it can account for the 2-to-1 effect of fund expenses on return.

A stronger statement can be made about fund expenses; they are an extraordinarily corrosive drag on investment return, costing twice as much as you'd guess at first blush. I don't have a good explanation for the fact that fund expenses seem to subtracted not once, but twice, from returns. In fact, the closer that one examines this problem, the more mysterious it gets. In the July issue I postulated an explanation based on moral turpitude—fund families which saw nothing wrong with high expenses would also tolerate other activities which were not beneficial to the shareholders. So I looked at the 15 year (7/84-6/99) R/E slopes for load and no-load funds and was flabbergasted to find that the slope was only -1.25 for load funds (95% CI -1.45 to -1.05, R squared 0.46) versus -2.76 for no-loads (95% CI -3.76 to -1.76, R^2 0.195). Thus, with a huge degree of statistical confidence (completely separated 95% CI) load funds have less of an expense penalty than no-load funds. Don't ask me why.

I've got a warning for anybody who wants to play this game—it's a fascinating and somewhat addicting labyrinth. For example, take a look at the 5-year R/E plot from the July article:



Notice the rather straight line of data points in the upper left corner of the graph (circled). What are these? If you guessed S&P 500 index funds, then go to the head of the class. The slope for these index funds, by the way, is only -1.28 (95% CI -1.41 to -1.15 with an amazing R^2 of .93). On the other hand, the R/E slope for foreign funds is in the -4 to -5 range. Again, surprisingly, there is no contribution from turnover.

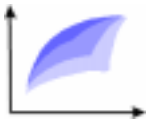
So, to summarize:

- There is robust evidence that a dollar of fund expense costs much more than a dollar of fund return.
- This is not due to turnover or moral turpitude.
- Turnover may cause minor changes in return, most noticeable for value funds. There may or may not be a positive effect of turnover for growth funds.

I'd be delighted to hear from or share my data with anybody who can come up with a rational explanation for the above observations. To paraphrase Jack Bogle, costs matter much more than you'd expect. It's just not clear

why.

Efficient Frontier



William J. Bernstein

Dow 36,000!

The market can be thought of as a giant tug-of-war between two teams, one of which thinks that the market is too high, the other too low. Straining at the very far right end of the rope are two fellows named James Glassman and Kevin Hassett (GH). Writing in the op-ed section of the ***Wall Street Journal***, the ***Atlantic Monthly***, and finally in their best-selling above-titled book, they contend that the market, far from being historically overvalued, is actually ridiculously undervalued. Nervous at Dow 11,000? Get over it. This fearless duo sees fair value at about 36,000.

The problem, as we shall see, is that they arrive at this number by using a model which is exquisitely sensitive to its inputs. Then they diddle those inputs to arrive at their highly agreeable conclusions.

Their chosen vehicle is the venerable dividend discount model (DDM). Formulated in 1938 by John Burr Williams, it rests on a deceptively simple premise: Since all companies eventually go bankrupt, the value of a stock, bond, or of an entire market is simply the value of all its future dividends *discounted to the present*. (In GHspeak, this is referred to as the "perfectly reasonable price," or PRP.) Since a dollar of future dividends is worth less than a dollar today, its value must be reduced, or *discounted*, to reflect the fact that you will not receive

it immediately. This amount of reduction is called the "discount rate" (DR). And as we shall soon see, fiddling even a little bit with the DR opens the door to all kinds of mischief.

If this model looks complicated, it is. For each future year you take the present dividend, multiply it by $(1+r)^n$, where r is the rate of dividend increase and n is the number of years in the future, and then divide by $(1+DR)^n$. Plus, you have to compute this for an infinite number of years. And it can get worse, with two- and three-stage models with varying growth rates over time.

Fortunately, with a constant growth rate the whole infinite sequence simplifies to:

$$PRP = (div)/(DR-g)$$

where PRP = "perfectly reasonable price," div = annual dividend amount, DR = discount rate, and g = dividend growth rate

If the Dow throws off about $150 per year in dividends, and the dividends are growing at 6% per year, then the only other number left to toss into the above equation is that pesky DR. And amazingly, throughout most of the article GH maintain that the appropriate DR is the treasury bond rate, which at the time they wrote the piece was 5.5%. Because the DR is less than the growth rate, an infinite value for the market results (you don't want to know), which even they find hard to swallow. (What the authors missed is that 6% rate covers a period when inflation was around 4%-5%, while the recent 5.5% rate for T bonds presumably reflects a considerably lower future inflation rate.) So lower the dividend growth to 5.1%, keep the DR at 5.5%, and abracadabra, the above equation yields Dow 37,500.

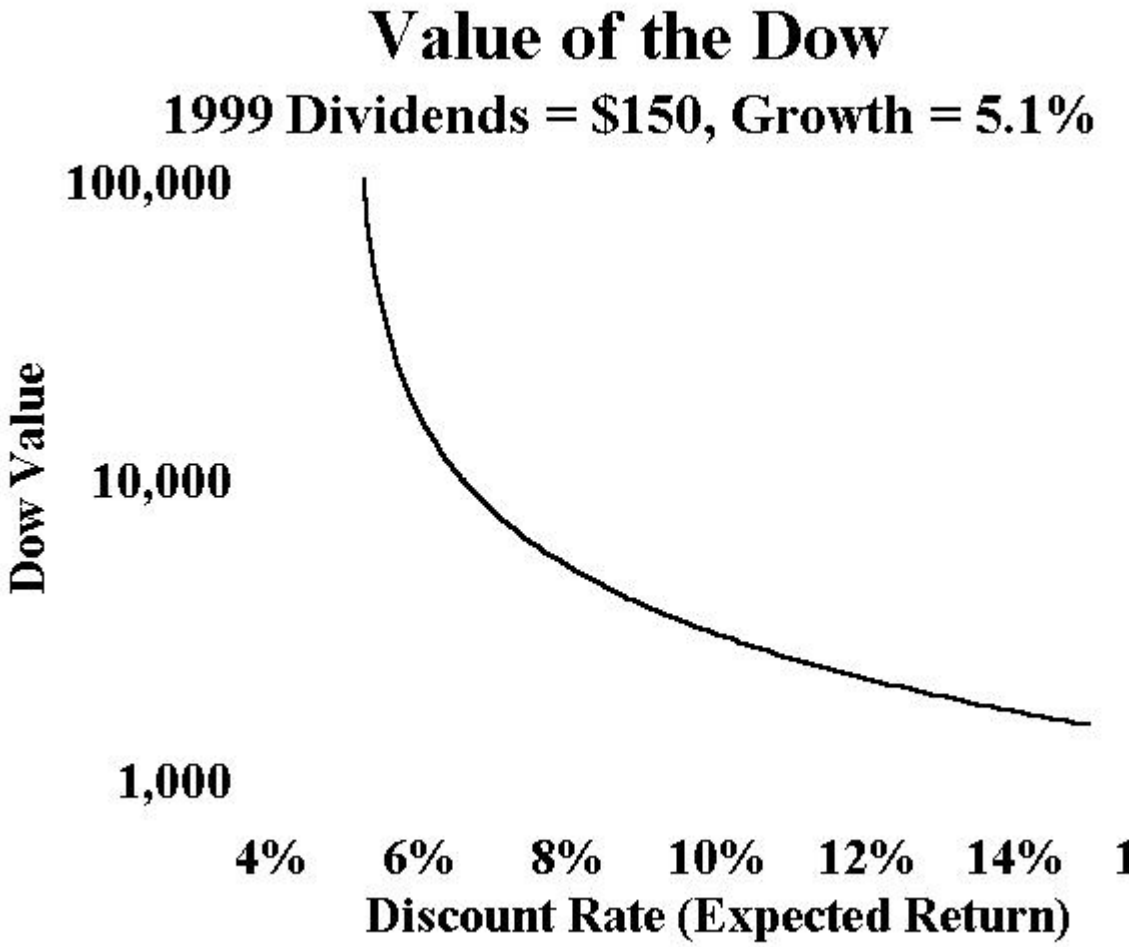
To demonstrate just how squirrely this model is, I've plugged the above numbers into the simplified DDM equation:

$$PRP = 150/(0.055 - 0.051) = 150/0.004 = 37,500$$

Per finance convention, the numbers on the bottom are expressed as decimals, where .055 refers to the DR of 5.5%, and 0.051 to the dividend growth rate of 5.1%. Notice how tiny the denominator of 0.004 is relative to the input numbers. Move both of the numbers in the denominator the wrong way by just 1% (.01) and you have a Dow PRP of 6250. And if that displeases you make your estimates just a hair more optimistic, and you get a Dow PRP of infinity.

The odor of a small furry rodent begins to waft. For starters, note the proximity of the growth rate and DR, and how that proximity makes the denominator in the discount-rate calculation a teeny-tiny 0.4%. This is akin to balancing an elephant on fence post: One small wobble in the post, and several thousand pounds will lurch in an unexpected direction. This is evidenced by the following graph, which shows the DJIA’s value using the Glassman/Hassett growth assumptions over a range of discount rates.

For clarity I've plotted this relationship between DR and Dow PRP:



Once again, the value of the DR is critical. For example, if the actual DR is 8% instead of 5.5%, then fair value for the Dow falls to 5,172. Oops. The same thing happens if the dividend growth estimate is off. As already mentioned, the dividend 6.1% growth of the past decades included over 4% of inflation. In other words, real growth was less than 2%. So the dividend growth rate going forward may be quite a bit lower than it has been in the past. Decreasing dividend growth by 2.5% has the same effect as increasing the DR by the same amount—Dow 5,172.

So what determines the appropriate DR? It is very simply

the cost of money (or the risk free rate), plus an additional amount to compensate for risk.

Think of the DR as the interest rate a reasonable lender would charge a given loan applicant. The world's safest borrower is the US Treasury. If Uncle Sam comes my way and wants a long-term loan I'll charge him just 6%. At that DR the DDM predicts that a perpetual $1.00 annual loan repayment, or coupon, is worth a $16.67 loan.

Next through the door is General Motors. Still pretty safe, but not as riskless as Uncle Sam. I'll charge them 7.5%. At that DR a perpetual $1.00 repayment/coupon is worth a $13.33 loan.

Finally, in struts Trump Casinos. Phew! For the risk of lending these clowns my money I'll have to charge 12.5%, which means that The Donald's perpetual $1.00 repayment/coupon is worth only an $8 loan.

So the DR we apply to the market's dividend stream hinges on just how risky we think the market is. And here things get really sticky. Relying on long-term data, GH observe that the stock market is actually less risky than the long treasury bond. For example, since 1926 the worst 30-year annualized return for common stocks was 8.47%, versus 1.53% for treasuries.

Of course, a very different picture emerges when one looks at shorter periods. For example, the worst 1-year returns are –43.35% for stocks, and –7.78% for bonds. And at a gut level, no matter how much of a long-term investor you think you are, the market still probably got your attention on October 19, 1987.

So the GH-Dow controversy depends on whether you think that investors experience risk as a short-term or a long-term phenomenon. What the authors are saying is

that US investors have abruptly lengthened their risk time-horizon:

> Seventy years ago few investors understood that excessive trading undermines profits, that stock-price fluctuations tend to cancel themselves out over time, making stocks less risky than they might appear at first glance, and that it is extremely difficult to outperform the market averages. Americans have learned to buy and hold.

One wonders what planet GH inhabit. Are they unaware that trading volume has been steadily increasing for decades, not decreasing? That average domestic mutual fund turnover has increased from 30% to over 90% in the past 25 years? That a recent survey of over 66,000 accounts at a "large west coast discount brokerage" showed an average annual portfolio turnover of 75%? That only 7% of mutual fund investments are indexed? That the historically modest market declines of 1987, 1990, and 1997, far from resulting in inflows from legions of long-termers buying cheap, produced dramatic mutual fund outflows? Most authoritatively of all, in an elegant study published in the ***Quarterly Journal of Economics*** in 1993 Shlomo Benzarti and Richard Thaler calculated that the risk-horizon of the average investor was just *one year*.

The easiest way of thinking about the interplay of short- and long-term risk is to imagine a new kind of 30-year treasury bond, similar to the conventional bond, *except that the government stands ready at all times to redeem it at par*. Clearly, the redeemable bond would carry a considerably higher price/lower yield because of its lower short-term volatility. And yet on the GH planet,

where investors only care about long-term return, it would be priced identically to the conventional 30-year bond, since both have the same return to maturity.

Even conceding GH's point that investors are increasingly focused on stocks for the long run and will manage to push the Dow up past 36,000, one has to ask just how risk free stocks would be at that point. The authors ignore a rather inconvenient fact: that recent market history has dramatic effects on DR. In 1928, just as today, everybody was a "long-term investor," and the DR for stocks was quite low (although probably not as low as it is today). Five years later, with the attrition rate of buy-and-holders approaching 100%, the DR was dramatically higher. And at Dow 36,000, it wouldn't take much of a change in the DR in order for the risk free world of stocks to come to an abrupt end. If investors decided that they demanded even a measly 1% risk premium, the Dow would decline by about two thirds. The irony being that to the extent GH are right about a near term "correction" of stock prices past 36,000, the risks of subsequent stock ownership increase dramatically.

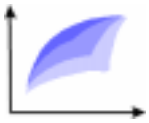
Ignoring the crash scenario still does not make the GH planet look very appetizing. If the true discount rate is 5.5% and the Dow "correctly" priced at 36,000, then the future return of stocks is also 5.5%. Assuming inflation averages 2.5% over the next 30 years, that's a real return of just 3.0%. Why would any rational investor invest in stocks with treasury inflation protected securities (TIPSs) priced to produce a guaranteed 4.35% real return?

There are other, more fundamental problems with Dow 36,000. For starters, consider the significance of a 5.5% long-term stock return. The "cost of capital" for corporations is necessarily the same as this long-term return. At a dirt-cheap capital cost of 5.5% do you think

that corporations are going to be particularly careful with how they spend it? The free-spending behavior of the dot.coms, whose capital comes even cheaper, is not encouraging. (Or, on a grander scale, just how careful is Uncle Sam with his 5.5% capital?)

In essence, the authors have improved on Professor Irving Fisher's famous 1928 *faux pas:* "Stock prices will soon reach a permanently high plateau. Although the destination will be deadly dull, the ride there will be a real barn burner."

Efficient Frontier



William J. Bernstein

Premium Investing

The complexities of the financial markets are such that economists often resort to models—analogies from simpler walks of life. And when considering equities, none is more useful than the insurance business.

When most folks think about insurance, it's from the consumer's perspective. The very act of living in our complex, technologically advanced, and highly litigious Western society exposes us to a number of financial risks, and we often find ourselves willing to pay someone else to take this risk off our hands. This payment is known as a *premium*.

Investment insight is gained by turning the tables around, and pretending that you're an insurance company. Instead of paying others to handle your risk, others are paying you to bear theirs.

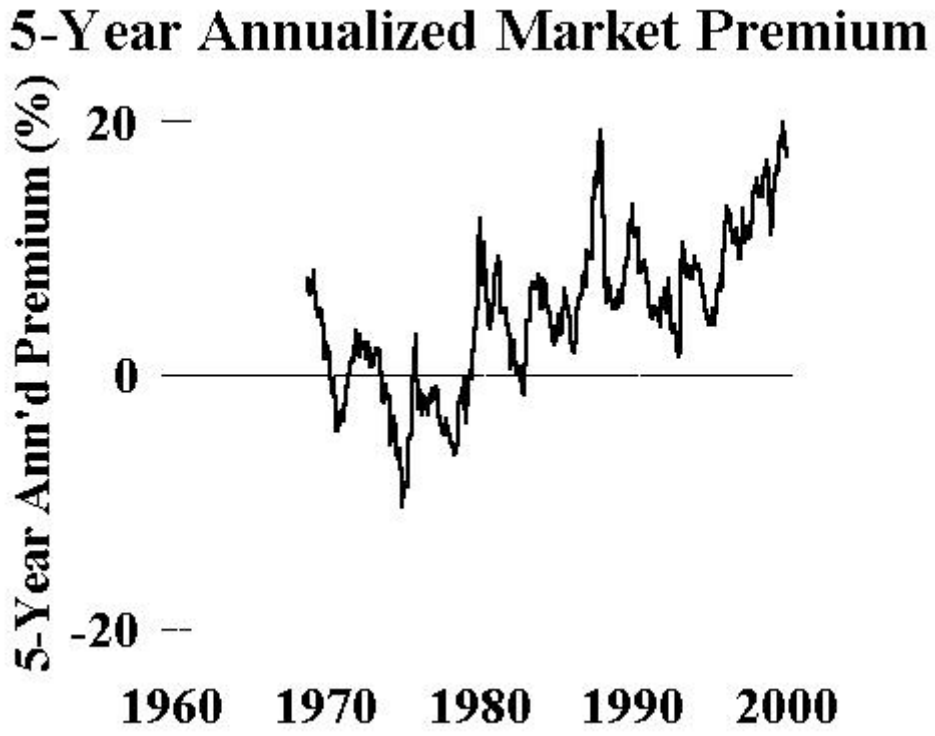
Assume for a moment for that you are "writing a put" on Microsoft for your friend Susan at a striking price of 80. In other words, you are providing her the privilege of selling the stock to you at $80 per share at her discretion, no matter what the actual market price. This is quite worthwhile to her if the price drops below 80, and can be thought of as insurance against at large drop in price of MSFT (as this is written, it's trading at 93). So if the price actually falls to 70, you are out $10 per share. For bearing this risk for her for the next 2 months, Susan

pays you the market price of the put, which is $1.75 per share.

In this instance, you are operating in *exactly* the same manner as an insurance company—collecting a precise and well-defined (By the Black-Scholes equation. You don't wanna know.) premium for bearing an equally well defined risk.

Most investment activities are not this well defined. With garden variety stock ownership, the premium is neither regular nor dependable. Instead you are insuring owners of large corporations against catastrophic loss of their capital by providing your own to them. The premium you collect is in the form of ownership; the price to the company is known as the "cost of capital." Again, we are simply turning the tables around. Instead of buying a stock for a price defined as dollars-per-share, we are providing insurance for shares-per-dollar. In the case of a sick company, such as Kmart, that price is very expensive in the sense that the company is obligated to give away a larger than normal percentage of its equity stake to raise a given amount of capital. And for a dot.com, capital is cheap; only a small portion of the company has to be given away to raise the same amount of capital. In financespeak, the huge risks associated with corporate ownership are thus *syndicated* among thousands of shareholders.

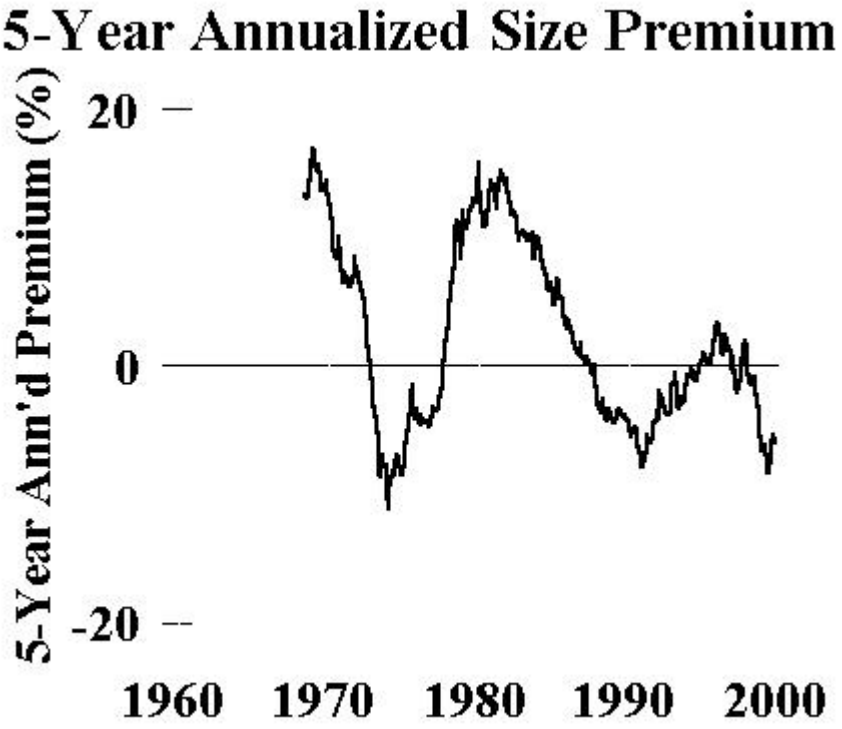
The most obvious difference with the insurance analogy is that the premium you actually realize is quite irregular, and may even be negative at times. How much premium are you collecting? It is simply the return of the risky security minus the return you'd have gotten by parking your money in a riskless investment (by convention, t bills). I've plotted the trailing 5-year annualized "market premium" for the past 36 years:



Source = Ken French/DFA

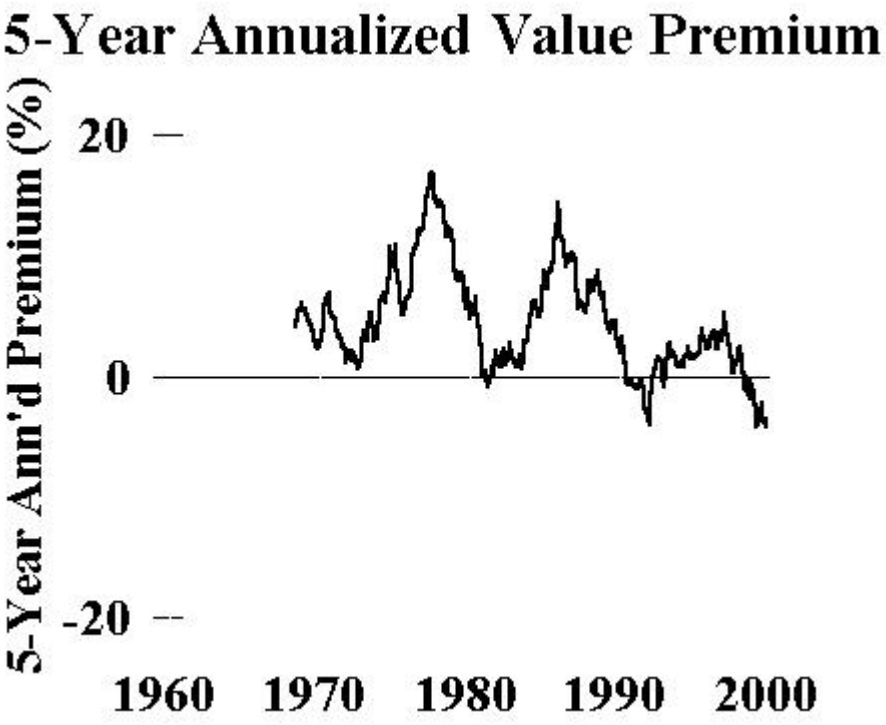
Notice that while it's been persistently positive for the past few decades, things were a good deal rockier in the 60s and 70s. Over the entire period the premium was 5.65% annualized. It certainly wasn't a sure thing, being positive in 78% of the rolling 5-year periods.

Is it possible to bear more risk, and thus earn still higher premiums? Yes. You can decide to invest in smaller companies, which are more likely to go *poof* than large ones. For the past 36 years the "small stock premium" (defined loosely as the return of the smallest half of companies on the NYSE minus the largest half) has been 1.71%. Its rolling 5-year return has been positive only 53% of the time:



Source = Ken French/DFA

There is a third, and much more controversial, premium. According to efficient marketeers Eugene Fama and Kenneth French, if you are a real risk junkie and want to increase your premium payments even further, you can invest in value companies. These are the sickest puppies in the litter. Think Harvester, Kmart, Nissan. They are identified by their low valuations, such as price/book ratio. The 36-year premium for investing here (defined as the return of the stocks with the lowest P/B ratios minus the returns of the stocks with the highest P/Bs) has been 3.77% annualized. Surprisingly, this premium has been fairly consistent, being positive 87% of the time:



Source = Ken French/DFA

In fact, the reliability of the value premium has caused some to question whether this not really a free lunch, as opposed to a real "risk story." But that's another column.

These 3 risk premiums—market, size, and value—have been researched extensively by Fama and French. They, and others, have shown all 3 to exist in the US market over a very long time period, as well as in many other countries. Are there other premia? Probably. There is likely a premium for investing in momentum stocks. The nature of the risk associated with momentum—if any—has yet to be determined.

The insurance analogy is also useful in other ways. For example, just as it would be unwise to provide fire insurance only to houses in the same block, or earthquake insurance only in San Francisco, so too is it unwise to invest only in one stock or industry. This kind of concentrated risk, easily avoided by diversifying your

portfolio, is called "nonsystematic risk," and you are not rewarded for taking it. (Or, in the words of Paul Samuelson, you are not rewarded merely for going to Las Vegas.) Employees who own substantial amounts of their employer's stock expose themselves to industrial grade nonsystematic risk, for if their company suffers they may lose both their equity stake and their jobs at the same time.

Finally, the insurance analogy is useful when considering the dizzying array of options strategies employed by our largest institutions to "insure" their portfolios against a market meltdown. Think of a market crash as the financial equivalent of as a fire in which everybody has the same insurance company, and everybody's house gets burned down. Such a situation is guaranteed to be highly disagreeable for both insurer and insured alike.

Ultimately, the rewards of the capital marketplace go to those who can most intelligently underwrite risk. A small example. Employees of cyclical, "value" companies should be particularly wary of value portfolios, as in the event of a severe recession both their job prospects and portfolios will suffer disproportionately. Letter carriers are in a better position to own value stocks.

If you do not diversify your risks appropriately, or if you cut and run at the first lash of risk's fiery tongue, then you should be very wary of equities.

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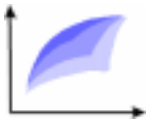


William J. Bernstein

Case Studies in Rebalancing

I'm often asked about the optimal portfolio rebalancing frequency. In previous pieces I showed that the benefit from rebalancing is contingent upon 3 factors:

- The volatility of the portfolio assets. The more volatile, the better.
- The correlations of the portfolio assets. Lower correlations mean higher rebalancing returns.
- The differences in returns among the assets. The lower, the better. If asset returns are very different, then you in fact may be better off not rebalancing.

I've intentionally left out the tax and transactional costs of rebalancing. It's assumed that the portfolio is sheltered. (With taxable accounts, beyond the use of net investment/withdrawal and the reallocation of mandatory distributions, active rebalancing is generally not a good idea. In order to get a closer look at the problem I've taken a fairly conventional portfolio:

- 40% S&P 500
- 15% US Small Stocks
- 15% Foreign Stocks
- 30% 5-Year Government Bonds

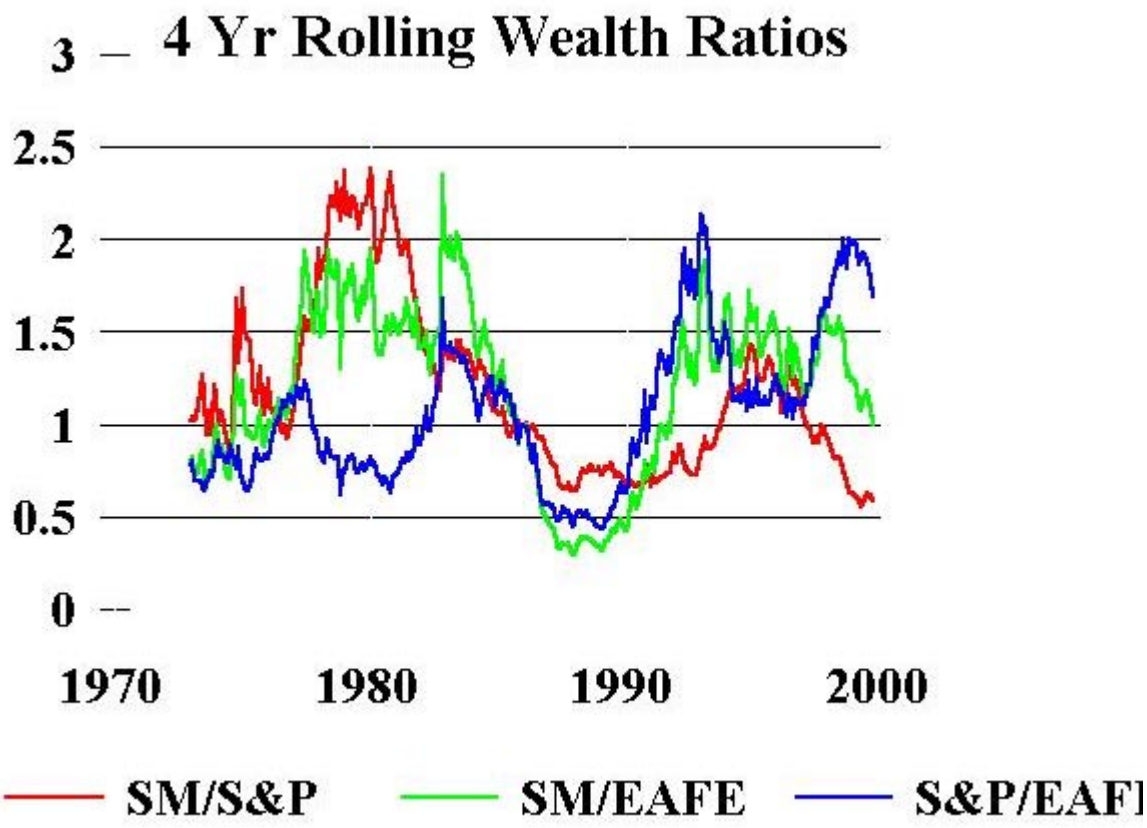
All four of these assets are available in the DFA returns program, and it is a relatively easy matter to crank out the returns for portfolios rebalanced monthly, quarterly, annually, biannually, and every 4 years. In order to smooth things out I used 24 28-year periods, staggered by one month:

From	To	Monthly	Quarterly	Annual	2 Years	4 Years
Jan-69	Dec-96	11.01%	11.10%	11.11%	11.52%	11.37%
Feb-69	Jan-97	11.09%	11.10%	11.10%	11.40%	11.46%
Mar-69	Feb-97	11.27%	11.34%	11.27%	11.54%	11.69%
Apr-69	Mar-97	11.06%	11.15%	11.03%	11.23%	11.40%
May-69	Apr-97	11.10%	11.12%	11.14%	11.28%	11.48%
Jun-69	May-97	11.31%	11.37%	11.41%	11.49%	11.68%
Jul-69	Jun-97	11.66%	11.76%	11.76%	11.81%	12.01%
Aug-69	Jul-97	12.04%	12.05%	12.15%	12.14%	12.35%
Sep-69	Aug-97	11.81%	11.87%	11.91%	11.90%	12.04%
Oct-69	Sep-97	12.09%	12.19%	12.24%	12.15%	12.23%
Nov-69	Oct-97	11.81%	11.87%	11.82%	11.81%	11.94%
Dec-69	Nov-97	11.94%	12.01%	12.06%	11.98%	12.12%

Jan-70	Dec-97	12.07%	12.17%	12.16%	12.09%	12.26%
Feb-70	Jan-98	12.27%	12.28%	12.26%	12.23%	12.38%
Mar-70	Feb-98	12.31%	12.38%	12.31%	12.29%	12.39%
Apr-70	Mar-98	12.44%	12.54%	12.42%	12.38%	12.47%
May-70	Apr-98	12.82%	12.83%	12.84%	12.77%	12.85%
Jun-70	May-98	12.93%	12.99%	12.97%	12.95%	13.02%
Jul-70	Jun-98	13.10%	13.19%	13.14%	13.13%	13.21%
Aug-70	Jul-98	12.86%	12.88%	12.95%	12.96%	13.00%
Sep-70	Aug-98	12.30%	12.37%	12.38%	12.43%	12.48%
Oct-70	Sep-98	12.28%	12.36%	12.44%	12.58%	12.65%
Nov-70	Oct-98	12.54%	12.55%	12.62%	12.88%	12.92%
Dec-70	Nov-98	12.61%	12.68%	12.70%	13.04%	13.00%
Average		12.030%	12.090%	12.091%	12.166%	12.267%

This is a fairly tedious table, but cursory examination shows that for almost all periods studied there is a monotonous improvement as one increases rebalancing period, except that there seems to be little difference between annual and quarterly rebalancing. (And for those of you who are hard core stat nuts, except for annual/quarterly pairwise t tests between all of the

periods are highly significant.) The reason for this is fairly obvious. Asset class returns are not a perfect random walk. If they were, then there would be no profit to rebalancing. After all, rebalancing amounts to a bet that last year's above/below average return will reverse next year. If this is not the case, then there is no sense in rebalancing. There is overwhelming evidence that there is short-term persistence in asset class returns, so it is a good idea not to be too hasty pulling the trigger. To illustrate this point I've plotted the ratios between the 4 year end-wealth of the 3 equity assets studied.



Notice how a 4 year end-wealth ratio of 2.0 (or 0.5, which has the same meaning) is not at all unusual. In other words, start out with a buck of each asset and four years later it is entirely possible that one will be worth twice the other. If you rebalance the pair frequently along the way, you're liable to get the short end of the stick.

So, at first blush the answer to the rebalancing frequency problem would seem to be "not very often." But appearances are deceiving. Take a look at the bottom row of the above table. The average difference between quarterly and 4-yearly rebalancing is only 18 basis points. This comes at a cost—namely, that over a 4-year period your allocation will get seriously out of wack, incurring higher risk. For example, the above 40/15/15/30 S&P/SM/EAFE/bond portfolio, started at policy in January 1995 would have wound up at 56/13/10/21 if not rebalanced over the next 4 years.

The alternative to calendar rebalancing is threshold rebalancing. In other words, instead of regularly rebalancing, instead waiting until an asset's portfolio contribution gets x percent out of wack before adjusting it back to policy. Unfortunately, I know of no good way of evaluating this method, since tiny changes in the threshold are critical. In other words, whether your threshold for large or small stocks was barely reached, or barely missed, on October 19, 1987 makes a whopping difference. And in any case, it ain't gonna happen the same way next time.

So, what can we conclude from all this?

- Monthly rebalancing is too frequent.
- There are small rewards to increasing one's rebalancing frequency from quarterly up to several years, but this comes at the price of increased portfolio risk.

You makes your choice and you takes your chances, but don't sweat this one too much. The returns differences among various rebalancing strategies are quite small in the long run.

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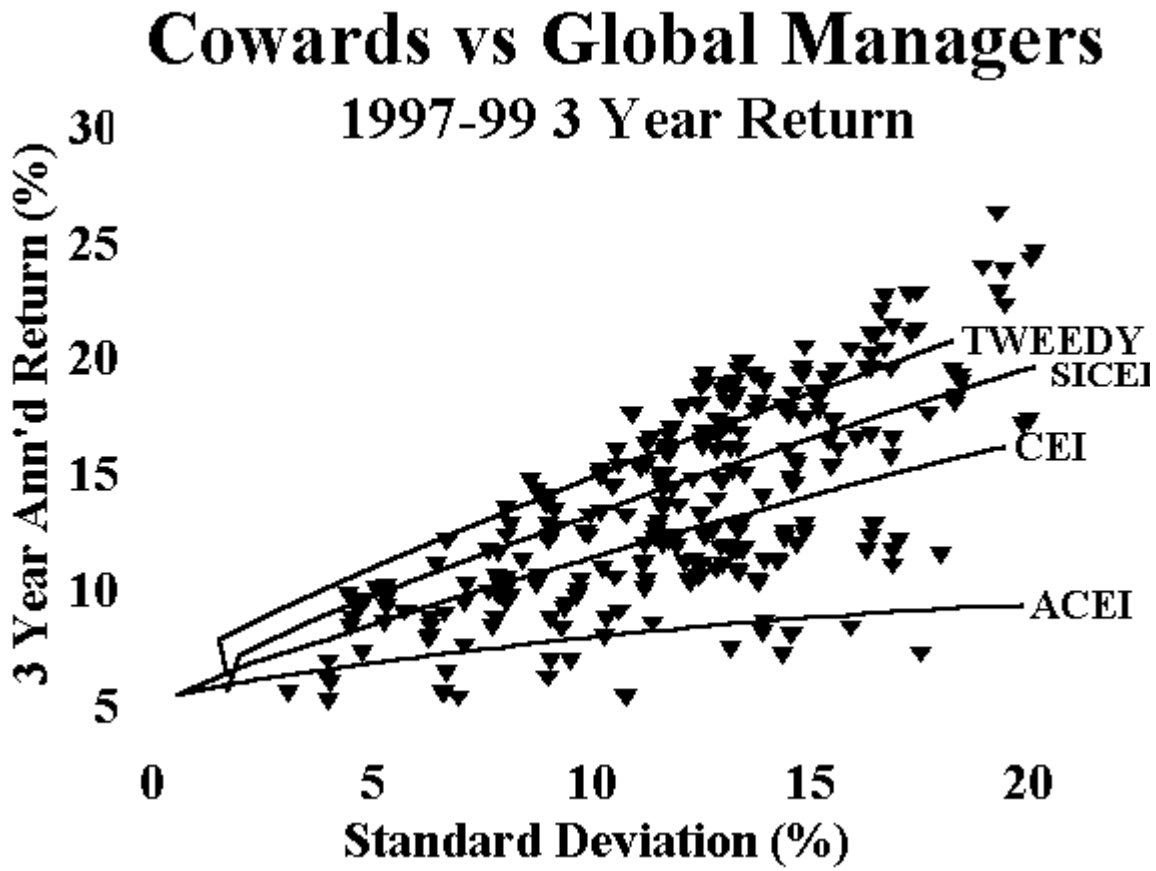
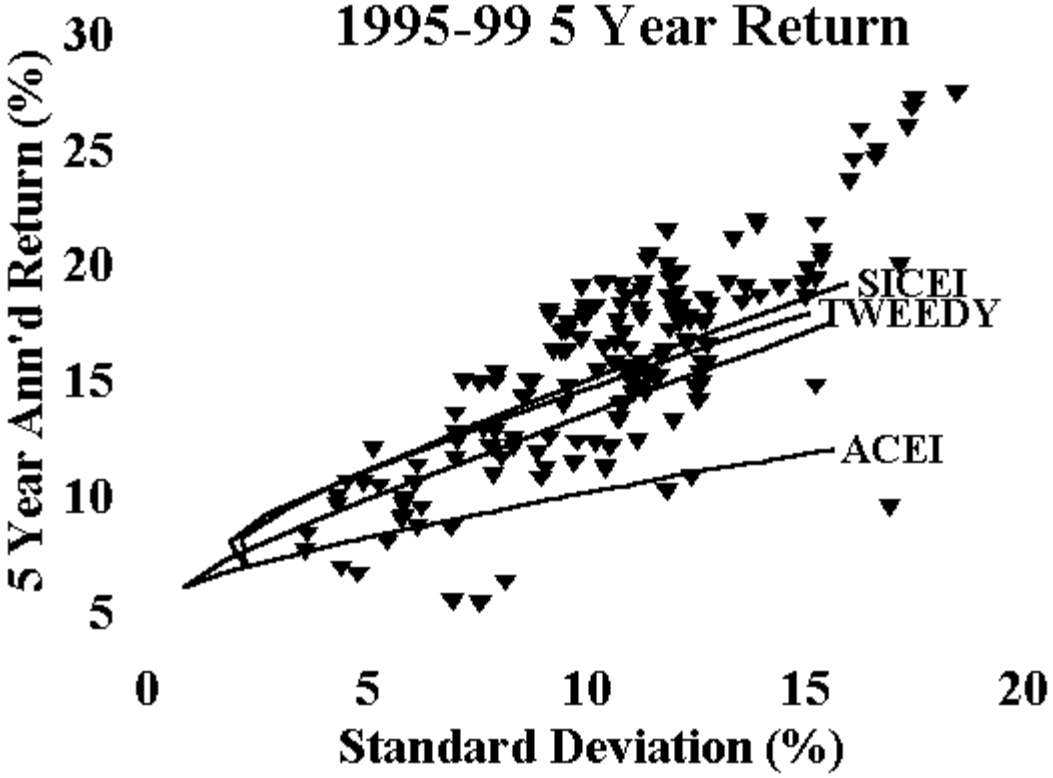
The Coward's Update

In last year's Coward's Update we surveyed the rapidly worsening condition of the cowards, who were battered by yet another year of S&P 500 dominance. While still critically ill, their condition stabilized somewhat this year as multiple other asset classes finally joined the party. Here's the situation for 3, 5, and 10 years:



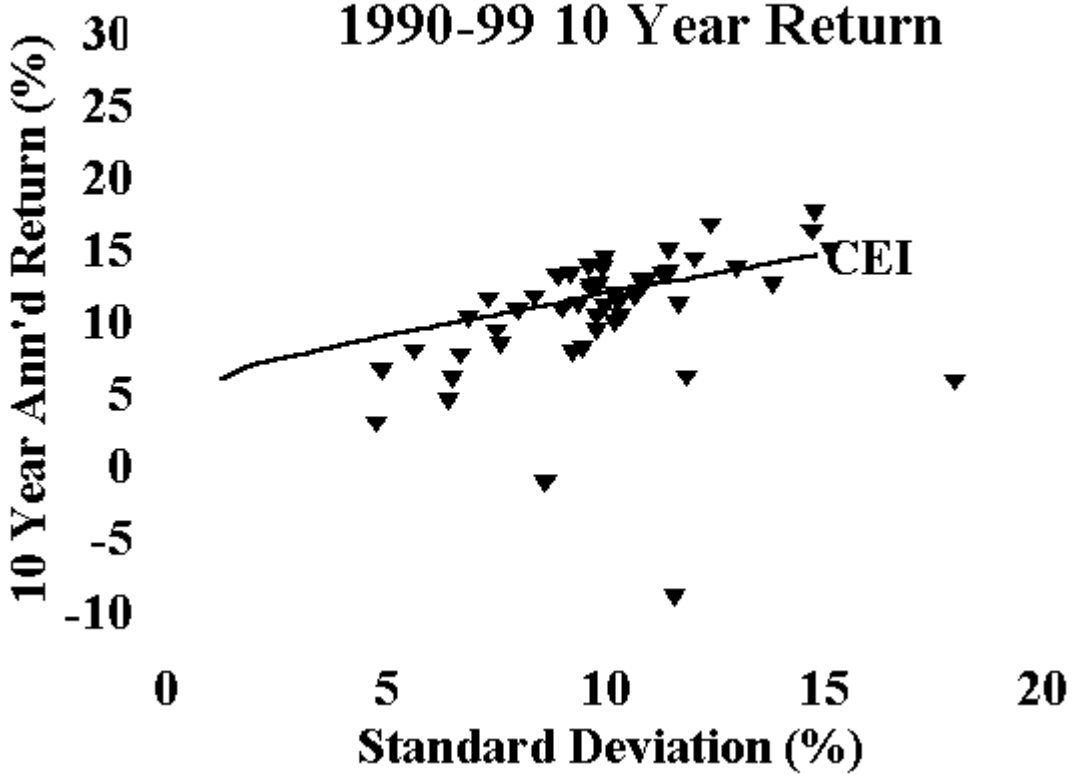
Cowards vs Global Managers

1995-99 5 Year Return



Cowards vs Global Managers

1990-99 10 Year Return



The CEI in the 5-year graph is sanwiched between the Tweedy portfolio and the SICEI. For those of you unfamiliar with the cowards, take a look at the July 1997 update for a detailed description.

Again, over the past 5 years most of the professional global fund managers have bested the portfolio robots, whereas over the 3 and 10-year periods it's about a dead heat. I expanded the vertical scale on the 10-year graph, exposing the downside outliers so as to demonstrate the nature of "active manager risk" in the global asset allocation game. Those outliers are also there for 3 and 5 years, but at the compressed scale the 4 cowards would have been difficult to separate. There are no upside outliers.

Even though 1999 was a superb year for the global investor, this in no way made up for the carnage in the preceding 2, 4, and 9 years. Consider the following 3-year and 5-year returns for the index funds tabulated below:

Index	(Index Fund Sampled)	3 Yr. Return	5 Yr. Return
Continental Small Companies	DFA Continental Small Company	9.13	8.25
Emerging Markets (Equally Weighted)	DFA Emerging Markets	8.04	7.49
Small Japanese Stocks	DFA Japanese Small Company	-18.56	-14.82
	DFA Large Cap		

EAFE Index	DFA Large Cap International	17.03	14.02
Pacific Rim Small Companies	DFA Pacific Rim Small Company	-7.26	-2.39
US Small-Medium Companies	DFA U.S. 6-10 Small Company	13.76	17.66
US Small Companies	DFA U.S. 9-10 Small Company	13.88	18.50
UK Small Companies	DFA United Kingdom Small Co	9.26	13.40
REITs	DFA/AEW Real Estate Secs	-0.34	8.24
S&P 500	Vanguard 500 Index	27.53	28.49
Emerging Markets (Cap Weighted)	Vanguard Emerg Mkt Stk Idx	3.24	5.09
EAFE-Europe	Vanguard European Stock Idx	23.115	22.59
Precious Metals Stocks	Vanguard Gold & Precious Met	-8.40	-6.44
US Growth Stocks	Vanguard Growth Index	33.87	27.79
EAFE Pacific	Vanguard Pacific Stock Idx	-11.14	-4.01
US Value Stocks	Vanguard Value Index	21.91	19.79

This table speaks for itself. The worst performing automaton continues to be the academic coward, with its heavy exposure to Japan, value, and very small stocks. The best conitnues to be the the Tweedy Browne coward, with its worldwide Graham-and-Dodd approach. Perversely, the more passively managed the coward, the worse it performed.

It's well to step back and consider some market history. Ten years ago the Japanese were buying up the crown jewels of American real estate and industry, fatuous novels were being written about a world controlled from Tokyo, and the Nikkei was the place to be. Twenty years ago? Real estate and gold. And thirty years ago? The one-decision big growthies of the Nifty Fifty. Sound familiar? In each case, capitulating to the era's asset class zeitgeist would have been a disaster.

On a more prosaic note, the last 5-year period the S&P 500 outperformed foreign stocks was 1979-84, with five year annualized returns of 17.27% and 10.06% (EAFE), respectively. The annualized return for the following five years was 20.41% for the S&P and 36.52% for the EAFE.

So, patience. The cowards will soldier on. You'll see them again next year.

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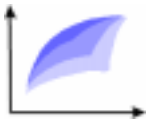

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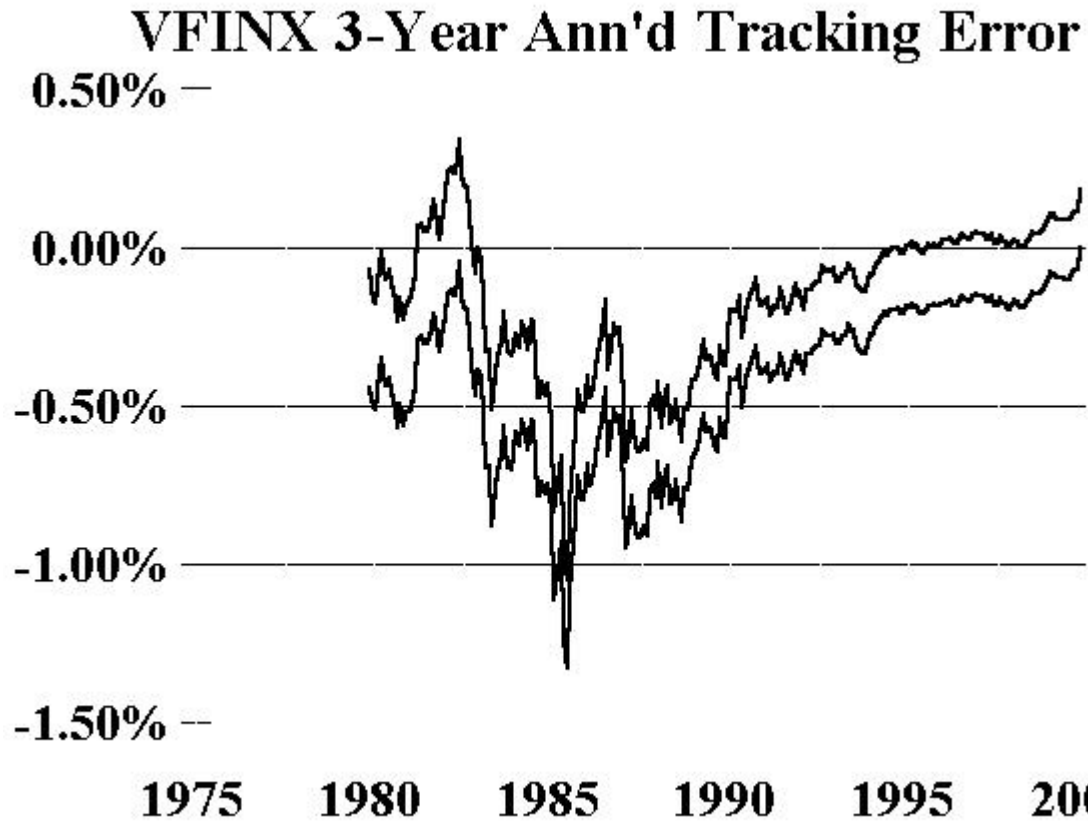
Chart of the Month—Vanguard 500 Index Fund Tracking Error

In a previous article I documented the positive tracking error (TE) of the medium- and small-cap passively-managed funds from DFA and Vanguard. At least in the case of DFA, it's due to a so-called "patient buyer" strategy.

Heeding the old adage that "those that talk don't know, and those that know don't talk," Vanguard's Gus Sauter doesn't advertise his methods. It turns out that of late Mr. Sauter has turned an even neater trick—he's accomplished a positive TE for that most efficient of all indexes, the S&P 500. Below are the 3-year trailing annualized TEs (the top plot is before expenses, the bottom plot after expenses) for the fund. The pre-1990 data is much wilder, and quite negative at points. But remember that the fund did not pass the $1 billion mark until 1989. And the trend over the past 15 years seems to be of ever-increasing relative performance:



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