Portfolio Management

Reverse Style Analysis Optimized Portfolios

***Synopsis*: Here's an investment process that rethinks every step of building a client portfolio.**

***Takeaways*: Using style analysis to identify two sources of fund outperformance, groping for the "actual" efficient frontier, and then creating the actual portfolios using the highest performing of "zillions" of combinations of funds.**

Within the next week, you're going to start hearing about a startling article in Financial Advisor magazine which (I think convincingly) debunks a key piece of the hallowed Fama/French research. Gary Miller, of Frontier Asset Management, has run a lot of numbers and called into serious question whether small cap stocks have outperformed large caps, on a risk-adjusted basis, over the time periods covered in the research--or time periods before or since. A more detailed (and mathematical) article is being prepared for the professional literature.

If this debate goes on as others have (Bill Jahnke's devastating rebuttal to the Brinson research comes to mind), you're going to hear a growing amount of noise and discussion about whether or not there's a free lunch in small cap investing. You'll also be hearing more about Miller, who may become known as "the guy who refuted half of Fama/French's famous conclusions."

I happen to think there's a lot more to Miller than that. He has quietly become one of the most creative asset managers in the profession.

Readers with gray hair may recall Miller's name from a company called Optima Funds Management in Atlanta, which was later subsumed into the Adam Network, which was then bought by Portfolio Management Consultants in Denver. (Scott MacKillop was the face of the company at the time, and is the current president of Frontier; Miller is founder/owner of Frontier.) And you may remember a flurry of articles that came out in the 1990s about Miller's invention (along with Nobel Laureate Bill Sharpe) of a novel way of evaluating a mutual fund's track record called Factor Analysis, which was sometimes also called "style attribution analysis." Then, as now, Miller served as an outsource manager of client portfolios for advisors; today, he manages five different portfolio options with a little under $1 billion under management.

Since those days when he was in the public eye, Miller has been refining his new tools and inventing new ones. His portfolio management process uses actively-managed mutual funds in ways that are quite different from the traditional mean-variance process. The cliff notes version is that Miller has been working on a 3-step way to punch through the efficient frontier into the risk-adjusted return territory above it--return territory which is not supposed to be accessible under prevailing theories of asset management.

How? In step one, he winnows the mutual fund universe down to 120 actively-managed funds that appear to have some kind of performance edge over the rest of the field. Frontier's style analysis process is mathematically complex but not too hard to explain: you regress the daily price movements of many different mutual funds against the daily price movements of thousands of combinations of 16 different asset class indices, until you arrive at the closest possible match. That helps you understand the precise mix of assets that the portfolio is invested in; instead of labeling somebody a "small cap blend" manager, you would have reasonably precise allocations to small cap, EAFE, emerging markets, REITs and various flavors of bonds.

"We also cheat and look at the holdings that are disclosed, and see what the managers say they're doing, to get an idea of what factors may be important," Miller admits. This helps avoid the occasional false positive reading where you

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think a fund has a position in an asset class that the manager has never invested in.

The goal of style analysis is to identify a customized benchmark for each fund that is far more precise than benchmarking it against a broader measure like, say, the S&P 500 or the Russell 2000.

Then, to find the funds with an edge, Miller measures each fund's performance against its custom benchmark--in two dimensions.

Dimension one is designed to capture the manager's stock-picking ability. Does a manager's returns consistently beat the returns of the asset classes that he/she invests in? Having a more precise benchmark tells you, for instance, that the fund manager who is killing the S&P 500 actually has 30% of the portfolio invested in midcaps (which were doing really well compared with large caps) and another 15% in gold, which is also doing really well in a down market for stocks. When you get the benchmark right, you discover that this manager is actually trailing a portfolio made up of index funds in the same asset blend.

Another fund may be lagging behind the S&P 500, but your factor analysis "X-ray" shows that the manager has consistently been 15% invested in foreign large caps and tends to carry a significant stake in REITs, which have not kept up with domestic large caps. "Funds that are outside the normal boxes will look like their managers are going through cycles of good and bad performance, as the asset classes go in and out of favor," Miller explains. "If you do the analysis properly, you discover that some of those managers were doing a consistently great job."

The second dimension of fund performance that Miller is analyzing is what he calls "dynamic style analysis." This is the fund manager's ability to add value by adjusting the portfolio mix to changing market conditions.

"We look at how a fund changes its asset allocation mix," says Miller; "so we can see whether it is raising cash, over- or underweighting based on the valuation levels of the different markets." This requires a bit more interpretation, since a fund might alter its mix for a variety of reasons. "Is a small cap fund buying larger stocks because it's bigger, or because it thinks they're better value?" says Miller. "Is a fund loading up on cash because the manager has lost his nerve, or because he thinks the market is overvalued right now?"

A classic example is PIMCO, the world's largest bond management shop. Miller says that he admires the company, and his portfolios are invested in PIMCO funds. But the company's portfolios have gotten so large that the firm can no longer take advantage of smaller corporate issues the way it did 20 years ago, and the investor needs to recognize that. "They need to stay in mortgages and governments, where the most liquidity is, because of their size," he says. An example on the other side is the PrimeCap Odyssey Aggressive Growth fund, an all-cap portfolio that has elements of small cap, midcap and international, and has shifted among them with some effectiveness.

One of the ancient objections to the regression technology is that if you are using daily data going back more than three years, some of the (older) returns may reflect a very different portfolio mix than the current one. Assuming a fund is outperforming, Miller is willing to loosen up on the reins and allow portfolio managers to have an X factor in their return pattern that he cannot explain and doesn't really have to.

"If they're providing good performance," he says, "we're really not that concerned with knowing exactly how they get their added value. We just want them to get it somehow. People are always worrying about their fund manager doing something different," he adds. "If that worries you, then our answer is: don't use them. But if you think they're smart, then let them do what they need to do to add value."

Of course, these attribution analyses come on top of more basic research and criteria. "We like independent managers, independent thinkers, firms that are not publicly-owned, where the owner's name is on the door, things like that," Miller says. "Those are the funds that tend to be more all-cap, tend to be global, tend not to worry about whether the market is going against them for a while, staying with their convictions. And," he says, "we tend to favor lower-expense funds, although if there is a fund we like with higher expenses, we won't automatically toss it out."

That's step one, which results in the selection of 120 managers

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who seem to be either superior stock pickers, or have the ability to navigate the up and down swings of market valuations, or both.

Why so many? You'll see in step three.

Now that you've identified some managers, you have to decide what the asset class proportions are going to be in the client portfolios--and, if possible, add value here as well. Miller offers different portfolio mixes appropriate to people with risk tolerances ranging from "swing for the fences" to "hide under the bed." But the process is essentially the same for each.

In step two Miller begins with a generic asset allocation mix that, based on the historical numbers, would be the best overall combination of assets for people who happen to have a 50-year time horizon. Since not all real-world clients have time horizons measured in half-centuries, he then tweaks these allocations, in essence groping for the actual efficient frontier over shorter periods.

Actual? Have you ever seen one of those presentations where the speaker created the risk/return efficient frontier graphs using retrospective data over various different individual decades? In one decade, the efficient frontier turned out to be the classic inverted fishhook shape; in another, the curve ended up being almost a straight line. One decade, the line is higher, another it is lower on the graph. The point is that the frontiers you got from the actual returns and volatility always turned out to be very different from the historical one you expected. If you invested based on the long-term data, you put your client on a place in the graph which, in retrospect, was inefficiently far from the "this-decade" line that was being written as you invested.

To construct a more realistic efficient frontier, Miller uses forward-looking return, risk and correlation coefficient assumptions. Then he evaluates the data each month, and changes allocations accordingly, refining toward an asset allocation mix that seems to fit the best combinations of risk and reward available in the moment. You might call it "groping" for today's efficient frontier.

But where do you get forward-looking assumptions on 16 different asset classes? Let's start with domestic equities. "I went back to the CFA conferences and read some of the white papers," says Miller, "and one of the things that struck me was the idea that the earnings yield, the 1/PE number, is THE best theoretically sound estimator of future real equity returns over inflation. If you had a mathematician, an accountant and a financial analyst all looking at the dividend discount model," he continues, "they would all come up with the same answer: that the return expectation over inflation is the earnings yield. The growth rate of earnings, the inflation rate itself, the payout ratios, all of that other stuff drops out of the equation."

How does that work in the real world? Surprisingly well. The gold line in the chart on the following page shows the projected 15-year return of the S&P 500 based on the earnings yield since 1926. The black line is the actual 15-year real return delivered by the index. You can see that the fit is not perfect, but it's considerably better than using any kind of historic number. To emphasize that point, Miller drew the blue line going through the middle--an annualized 7% return, which is the Jeremy Siegel long-term real return that has become the default plug-in to many optimizers. If you're searching around for the actual efficient frontier, which would you rather use in your inputs: the blue line or the gold one?

In June, when my initial interview was conducted, Miller was projecting a 4.4% 15-year annualized real return for large-cap U.S. equities, and less for small cap stocks. Since that's well below the long-term averages, the Frontier portfolios slightly underweight U.S. large caps and small caps. "We're getting higher readings on the EAFE index; just under 6% real return projections," says Miller. "But there, the correlation numbers we're getting are up around 90%, between large cap U.S. and large international."

Why so high? "We only use correlations taken from periods of major market movements," Miller explains. "As a result, our correlation assumptions tend to be higher for all the equity classes." This also explains why Frontier has added longer-term Treasuries to client portfolios, despite their less-than-impressive current yields. "The return expectation is 1.95% and the standard deviation is 9," says Miller. "You look at those numbers and ask yourself, why would I prefer that in my portfolio

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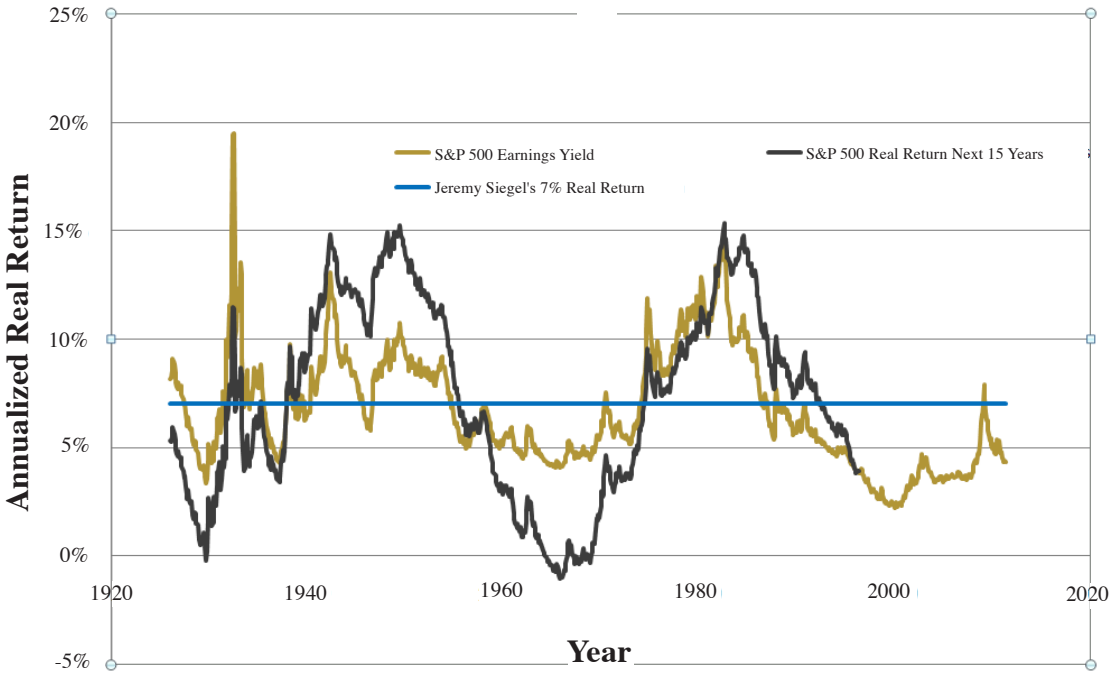

the portfolio can hold more risk assets and still meet the downside criteria.

As a result, Miller was taking on more risk in the end of 2008 and the early months of 2009, when most people were still reeling. "We have funds that we bought at the end of 2008 that are up over 100% since we bought them," says Miller. "The biggest thing we added was the PrimeCap Odyssey Aggressive Growth Portfolio, and we bought some REITs that have been through the roof since then."

to high-quality bonds, where the expected return is 2.20% and the deviation is 4.71? Because," he says, answering his own question, "Treasuries' correlation with stocks is so much lower. Go back and look at the last two years," he adds. "Every time stocks went down 5%, Treasuries were up at least one percent, every time. Meanwhile, the Barclays Capital Aggregate Bond Index would hardly move at all.

"Of course," Miller adds, "in our more conservative portfolios, which don't have a lot of equities, we don't own Treasuries. You have to have a portfolio that has equities in it for that to make sense."

What about the return expectations of other asset classes? The expected returns for various fixed income investments are also defined by the current yield, with a yield curve adjustment. "The tricky part with bonds is, who knows what inflation is going to be?" says Miller. Frontier uses a time-weighted forecast that turns out to be similar to the spread between TIPS and comparable Treasuries. Real estate is treated roughly the same as equities, with the yields as the defining predictor.

Meanwhile, Frontier defines risk not by the standard deviation, but as the downside return that the optimizer delivers at the 95th percentile. "When we talk about our 5% downside," says Miller, "that means that we want to create portfolios so that only 5% of our 1-year returns will be as low as, in the case of our most aggressive portfolio, minus 10%."

This number actually has an influence on the asset class mix each month. "When equities are trading at lower multiples, then you have a higher return expectation, and the standard deviation band around the higher number will take you to a less low place," Miller explains. Translated, that means

These return expectations--and Miller's customized measure of risk, and the somewhat exaggerated correlation coefficients between asset classes--are all recalculated at least once a month, and the portfolio may be readjusted each month--or, in the case of the recent downgrade fiasco, several times a month, although there are constraints to avoid running up a lot of trading costs.

There's actually a lot more to this, but let's look at one other aspect of the efficient frontier and move on. Miller pays close attention to the slope of the efficient frontier curve. His calculations today are giving him a long, flat curve, almost a horizontal line on the page. With this almost nonexistent slope, you have to take a lot more risk (you have to move pretty far horizontally to the right) to get

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Reverse Style Analysis

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an incremental amount of return (a move toward the top). "If you aren't getting much more return for that extra risk, why do it?" Miller asks. He points out that there are two ways to increase your risk-adjusted return: to get more return per unit of risk (which makes more sense when the yield curve has a steeper slope) or you can take less risk per unit of return (the preferred strategy when the yield curve slope is relatively flat). "The idea," Miller adds, "is that there are times when you are not losing much return when you scale back the risk and take on a lot less volatility. So today we are opportunistically buying lower volatility and giving up what we believe will be incremental declines in return."

The bottom line here is that in step two, Miller is trying to find an efficient frontier that is at least slightly more accurate than the one that you would create using historical returns. He does this by creating more effective inputs for projected returns and correlations. The portfolio mix will tend to underweight higher-priced asset classes and overweight those that are out of favor, in a mix that is constantly being adjusted throughout the year. In addition, Miller will take into account the steepness of the yield curve, moving portfolios leftward on the frontier when there isn't much of a slope. The goal of all this is to add incremental value purely in the allocation process.

Step three is the actual manufacture of portfolios. "We start by taking that asset allocation mix that we come up with," says Miller, "and we determine what the monthly return of that mix would have been, going back to 1998."

Remember those 120 funds that were identified in step one? Miller lets his computer test different combinations of managers, looking for groupings that outperform the asset allocation mix over rolling three month and 12 month periods.

Come again? Using the historical returns of the funds (with adjustments that will be described in a minute), the computer runs what Miller describes as "zillions" of portfolio combinations, looking first for a return profile that reasonably matches the return profile of the asset allocation mix that he's identified. Miller calls this "reverse style analysis." "In style analysis," he explains, "we compare the monthly returns of a fund to the monthly returns of a set of indices to see what set of indices in what weights the fund "acts" like--what Sharpe called 'tracks in the sand.' In our optimization process," he says, "we start with the returns of a set of indices--our desired asset allocation mix--and find the sets of funds that give us the same return history."

This produces many combinations of the individual funds, which are then examined to see which provide the highest return and the best downside. "We want all or nearly all 3-month rolling and 12-month rolling periods of the portfolio to be better than the asset allocation mix returns," says Miller. "This ensures that we don't get into a period where we underperform month after month; that would indicate that our managers are all doing something that is tilted in the same direction, which is exactly what we don't want. We also," he adds, "tend to overweight periods in the past that are most like today's investment environment, and we time-weight so that the most recent month comes out to be about twice as important as the January 1998 performance."

The result is often surprising. "In the first run, we may identify what we believe are really great managers," says Miller, "but the optimizer never picks them. I believe that is because whatever that fund manager is doing, other funds that are in the portfolio are doing it better.

"Theoretically, this optimization process is the last resort of, are you really a good manager or not?" Miller adds. "If we end up picking you in our portfolios, that tells us you are doing something better than anybody else. We are not always quite sure that that is. But the thing I think is the coolest about this whole deal is that we let the managers, in effect, be part of our team. We don't rebalance in the traditional sense, but we find that the portfolio managers that we select do their own rebalancing for us. We don't have an opinion on value and growth; we let the managers have their opinion, and sure enough the portfolio will move from value to growth without our intervention. It gets back to this whole idea of outsourcing: do what you really do well. We don't pick stocks or bonds, we don't try

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to evaluate the market's short-term movements. We think that our asset allocation work is where we add value, and we think we are really good at picking fund managers and figuring out how to put them together. But experience is a good humbler. Once we have identified smart people, we say, hey, you tell us. What should our growth/value orientation be? You tell us."

No doubt the reader has a few questions. First, is past performance an indicator of future results? This question is actually fundamental to the Frontier approach. "We believe that if the qualitative factors of a fund--like passion, ethics, intelligence, discipline and ownership--are what make a good investment manager," says Miller, "then that manager will continue to invest in the future generally the same way he or she invested in the past, and will do it well. Each manager may react in different ways to different economic and market environments, and look at the world differently. But that's what we want; good managers as a group who don't always zig or zag at the same time."

Second, what if a fund doesn't have a track record going back almost 14 years? "We backfill their past history by looking at the manager's separate account histories, or similar products by the same manager at different firms, and style returns with appropriate adjustments to each," says Miller. "We have a lot of money with several funds with short histories. PRIMECAP Aggressive Growth and Walthausen Small Cap Value are two funds with fabulous experienced managers."

Miller's only frustration with his quixotic investment process is that he doesn't have the computer power to evaluate 200, or 500, or 1,000 different funds in different combinations via his step three process. "Our optimization process is pretty robust," he says, "and it has a zillion variables, and we have done some integer programming and all that. But if we could, we would pick 1,000 funds. As long as they had the same management team and we thought they were employing the same strategy, whatever that might be, we would put them all in there."

I said earlier that there are some things I left out here. One of them is rebalancing, which happens at two levels. The fund managers who move around among asset classes will do their own rebalancing and shifting of portfolios. On top of that, Frontier's rebalancing is actually handled by the process of constantly recalculating the efficient frontier and portfolio mixes, and reoptimizing to see if any fund managers drop out or into the rejiggered portfolios.

Another, related subject is tax loss harvesting. In both cases (reoptimizing and rebalancing), Frontier evaluates the cost of the sale or the cost of the transactions against the expected gain. If Miller sells a fund and harvests a loss, that adds to the expected return of the portfolio by lowering future tax costs. But the expected return on both reoptimizing and tax loss harvesting has to outweigh the transaction costs.

Has he ever calculated whether the tax loss harvesting adds value? "Yes, it does," says Miller. "It depends on the year and that is going on in the markets, and how much return they generate." He plans to write a study, noting that there haven't been a lot of papers on the subject.

Which brings us full circle to the rebuttal of the Fama/French research. I didn't want Miller to get away without talking a little bit about the controversy that is about to erupt in the planning world. For instance, what prompted him to reexamine the data?

"I thought I was doing a study on, here is an anomaly that was discovered in the 1970s," Miller explains, "and then the DFA funds implemented it with their 9-10 portfolio, and since then, it hasn't worked. Why would that be?

"But," he adds, "when I looked at the data, I saw that the prior time periods, using the current CRSP data, shows that small didn't do better than large even in the old days. You discover that even in those prior time periods, large was better than small, adjusted for risk. The returns for large caps were lower, but adjusted for risk, large actually outperforms small for all of those prior time periods. The data is very easy to replicate. We have the CRSP 9-10 index, which is easy to get, and the S&P 500 back to 1926, and away you go. We didn't do anything fancy."

Let the debate begin. And as you participate, perhaps this will help you understand the person who has generated all the controversy, and all the other things he's thinking about. ■

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