

THE POWER OF

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**Ten trends in quantitative analysis
may transform the investment landscape**

BY SUSAN TRAMMELL, CFA

Mathematical models for investing have evolved from their earliest days as academic research tools to become one of the main engines driving modern finance. Efficient frontiers, arbitrage, hedging, indexing — all of them are made possible by quantitative methods, because no brain, however gifted, could juggle the hundreds of thousands of bits of data that enable researchers to develop and test their hypotheses.

How will new developments change the investment landscape? Here are 10 trends to keep an eye on.

SEPARATING ALPHA FROM RANDOMNESS

Generating alpha is more difficult than many investors suspect, and in any given year, the majority of active managers underperform the market. Those who consistently beat their benchmark have extraordinary skill *and* are exploiting market inefficiencies, according to M. Barton Waring, managing director and head of the Client Advisory Group of Barclays Global Investors (BGI) in San Francisco, Calif., USA. In a presentation delivered at the CFA Institute conference *Points of Inflection* in July 2004, Waring cautioned that “generating consistent positive alphas over time is one of the hardest things to do in finance, especially after deducting fees and costs.”

Take the fragile nature of exceptional skill. In a study of 1,052 star stock analysts over an eight-year period (“The Risky Business of Hiring Stars,” *Harvard Business Review*, May 2004), a trio of Harvard Business School professors found that stellar performance was often linked to the infrastructure systems and cultural milieu in which they operated. When these changed, as when star analysts were hired away by competitors, many lost their edge. In another study, which looked at 2,086 mutual fund managers over a six-year timeframe, it was found that 70 percent of a fund’s performance could be attributed to the manager’s institution while only 30 percent was attributable to the individual. The study concluded that company-specific competencies drive stars’ performance.

But extraordinary skill is not enough to generate consistent nonzero alpha. Managers must also develop a systematic approach to exploiting market inefficiencies. Opportunities

can be created by trade barriers, policy-driven initiatives, industry regulations, and government intervention in the markets. Finding biases often means sorting through mountains of data to find the nuggets of information not yet reflected in security prices, a task made possible only by the smart application of quantitative tools. “The skillful manager will still underperform from time to time (and the unskillful manager will outperform time to time),” Waring warned. The challenge, he says, is to differentiate between randomness and skill.

SEPARATING ALPHA FROM BETA

In the framework of modern portfolio theory, investors expect to be compensated for taking on market-related risk in the form of higher expected return above the risk-free rate. Because beta risk is unconditionally rewarded, investors do not want to compensate managers for beta performance. Many managers, however, present their portfolios as bundled products and have not fully analyzed their alpha and beta components. Once alpha is separated from beta, investors can begin building portfolios that seek sources of alpha independent from beta. The pursuit of pure alpha may result in overexposure to asset-class betas, but investors can correct for this by entering into short contracts, such as swaps and futures.

“The argument of alpha versus beta is one outgrowth of the growing sophistication of clients. They are now looking closely at the factors that are driving the returns in a portfolio,” says Richard Barry, CFA, managing director of Acadian Asset Management (Singapore), which is headquartered in Boston, Mass., USA. “Clients want to make sure that they’re really getting what they thought they would get. You certainly don’t want to pay for alpha and receive beta.”

BETTER DIVERSIFICATION

Investments are evaluated not in silos but increasingly on the basis of their contribution to two things: a client’s need for diversification and his or her appetite for risk. First, the challenges of diversification. In a recent article entitled “The Diversification Puzzle” (*Financial Analysts Journal*, July/August 2004), Meir Statman points out that in the mean-variance portfolio framework, the optimal level of diversification would require an investor to hold more than 300 stocks, but the average individual holds fewer than five. He argues that investors knowingly engage in such risky behavior because they view these concentrated bets as the means by which they might possibly achieve the high levels of returns that will enable them to reach their aspirations.

According to Statman, “Investors with undiversified portfolios may be overestimating the expected returns of their undiversified portfolios or underestimating the risks of their own portfolios.” Thus, even though there is a good rationale

behind any single bet, the strategy could still be wrong.

“By investing in the optimal number of stocks, investors may be giving up their chance to make a ‘killing’ in the stock market but will be limiting their downside risk,” says Josephine Chu, CFA, a consultant to the hedge fund industry. “One can avoid the short-term setbacks of certain stock picks, but this could only be achieved with technology. A quantitative strategy calls for hundreds of bets at once.”

BETTER RISK MANAGEMENT

Building risk-efficient portfolios means first assigning risk budgets to alpha and beta exposures and then determining whether the portfolio is taking on too much risk in either component. Using quantitative techniques, investors can determine the expected standard deviation of alpha strategies and whether they are generating uncompensated risk. Quantitative research also makes it possible for investors such as pension plan sponsors to determine whether their quest for greater return above matched liabilities is leading to excess risk in their beta exposures. The optimal amount lies on the surplus-efficient frontier.

Good risk control begins at the macro level and then filters down through a portfolio’s various holdings to give investors a total picture of risk exposure. For example, a client’s position in a fund of funds may be leveraged, the underlying hedge funds may be levered, and the funds’ investing institutions may leverage their positions.

“Over time, we have developed quantitative tools for assessing true, pure alpha and the attribution of returns to a whole host of return generators, some of which have significant exposures to beta (or market) risk,” says Hilda Ochoa-Brillembourg, CFA, president and chief executive of Strategic Investment Group of Arlington, Va., USA. “Clearly, the precise measurement of the multiple sources of hedge fund risk is of increasing importance for all investors.”

LONG-ONLY CONSTRAINT

Much has been written over the past few years about the downside of confining managers to rigid investment disciplines that prohibit short selling. The long-only shackle may possibly be the most important factor contributing to inefficient portfolios. If a manager is able to generate above-average returns from insights on buying decisions, why should the manager not be able to apply these on the sell side?

Before managers jump on the bandwagon, however, they should be realistic about their level of expertise. “It is the state of the global capital markets right now that you have a large number of market makers and broker/dealers who are willing to supply you the short side of the equation,” says Ochoa-Brillembourg. “However, with increases in demand for an

investment product come newcomers’ risks. You have to be careful that when you have tools to improve the measurement and management of risks, you do indeed improve your risk profile, as opposed to unknowingly incurring risk that cannot be quantitatively assessed ahead of time.”

“The CIO [chief investment officer] of tomorrow will be paying more attention to a manager’s selling discipline,” said BGI’s Waring in his *Points of Inflection* presentation. “It is no accident; it is the future of active management.”

GREATER TRANSPARENCY IN FIXED INCOME

Look for advances in fixed-income quantitative techniques. The bond markets are becoming more transparent, and the quality and availability of data on their behavior are greatly improving. As a result, debt securities are becoming more amenable to the types of quantitative analysis that traditionally have been used only in the equity markets.

“Empirical studies and back-testing of alternative strategies are becoming increasingly important in the fixed-income world,” say Ben Golub, PhD, head of portfolio risk management for BlackRock, Inc., based in New York, NY, USA. “For example,” he continues, “the P&L of alternative fixed-income alpha strategies can be accurately measured. With the improvements in data, increasingly granular risk models can be built. I believe the trend toward empirical modeling will continue to accelerate.”

QUANTITATIVELY ENGINEERED CONSUMER PRODUCTS

Creating financial products that meet retail investors’ long-term objectives is nothing new, but quantitative tools are making it possible to guarantee the goal while minimizing the risk. Imagine a couple with a newborn baby agreeing to set aside a sufficient amount of money periodically so that in 18 years, they will have the funds to pay for four years of college at an Ivy League school. If they do not invest enough, they will miss their objective. But if they invest too much, they will have foregone discretionary spending for things such as family vacations.

Suppose they could buy a contract today that will pay for four years of college in 18 years? “We now know exactly how to engineer those products and control the risk so that somebody can really guarantee that an investor will be provided with what they seek,” says Robert Hagin, president of Hagin Investment Research, Inc., based in Haverford, Penn. USA. Increasing precision in quantitative strategies benefits not only consumers by shrinking their opportunity costs but the products’ creators, who stand to lose on the contract if they underperform. “The people who use quantitative strategies to design such products will become very valuable in the marketplace,” Hagin predicts.

Trends

Trends in quantitative analysis applications are rapidly evolving, and this list would look different five years from now.

MANAGING TRANSACTION COSTS

Generating alpha returns consistently over time is difficult enough, but commissions, market impact, bid-ask spreads, and opportunity costs can reduce gains to net losses. To see how, consider the effect of transaction costs on a passively managed fund. Researchers studying the universe of all S&P 500 index funds over a six-year period found a difference of more than 200 basis points in the performance of the best- and the worst-managed fund (“Are Investors Rational? Choices among Index Funds,” *Journal of Finance*, February 2004). Transaction costs were partly to blame.

Turnover in a market index, even when executed on a quarterly basis, can impose substantial trading fees. Given the breadth of most indexes, even a modest rebalancing of a passively managed index can involve millions of shares. Funds held in cash to meet redemptions can impose an opportunity cost, particularly in a rising market. Anticipation of the portfolio’s rebalancing date gives outsiders the chance to buy or short stocks whose weights have shifted, causing prices in the underlying shares to swing unfavorably for the index’s investors. The more popular the index, the more likely it is to be targeted by astute “frontrunners.”

Of course, transaction costs affect not only index funds but actively managed portfolios. “There are all kinds of little games that are played all the time,” Ochoa-Brillembourg acknowledges. “You have to explicitly consider transactions costs.”

“In a way,” she adds, “the job of a good portfolio manager is to think ahead of what the market index will be three to five years from now and get ahead of the existing consensus.”

ENHANCED INDEXING

Expect to see increasing interest in enhanced indexing, a hybrid of passive and active investing that gives organizations a chance to add value around the edges of an index fund. The most popular strategies for enhanced indexing are tilts, which involve increasing the weighting of securities, sectors, or geographic regions represented in the index that the manager believes will significantly outperform and deliberately under-

weighting expected laggards.

More elaborate techniques often involve the use of derivatives. For example, rather than trade the S&P 500 Index, a manager may buy S&P 500 futures contracts (a strategy that requires the investment of only a fraction of what it would cost to buy the index), invest the remaining cash in very short-term instruments that offer potentially higher returns than Treasury bills, and then hedge the risk. Assuming that the hedge does not eat up the enhanced returns from the alternatives, the strategy can add alpha to an index investment.

There is no guarantee that an enhanced-index approach will outperform the benchmark every year, and managers of enhanced index funds point out that any strategy should be evaluated over the course of a business cycle. Also, rewards from enhanced indexing do not come without a cost. Expenses are higher than for a pure index fund, and when returns are evaluated in the context of additional risk incurred, they may be suboptimal. Nevertheless, enhanced-index offerings should proliferate as managers devise new quantitatively driven strategies in the pursuit of alpha returns.

EXTREME EVENTS

Thanks to raw number-crunching, researchers can begin evaluating how markets would behave if highly unlikely events were to occur. Moving out from the hump of the statistical bell curve to the fat tails should be the next frontier in quantitative analysis, Ochoa-Brillembourg predicts. “The tools that exist today are fairly naive. They essentially assume fat tails don’t exist or, alternatively, that correlations go all to 1 when you hit a three- or four-standard-deviation event. We are doing work in that area.”

The Next Step?

Trends in quantitative analysis applications are rapidly evolving, and this list would look different five years from now. Researchers will continue to test a growing number of insights, thanks to the massive number of calculations made possible by ever-cheaper computing power. As their findings are put into practice, the amount of industry resources devoted to quantitative analysis will grow exponentially. Ultimately, opportunities may lie not only in developing quantitative algorithms but becoming the low-cost producer. “There’s a cost of running and maintaining these models, and there’s competition for providing these kinds of quantitative work,” says BlackRock’s Golub. “With scale, you can become an efficient producer of these types of analyses and their successful application to portfolios.”

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