Quant master:
BGI's **Grossman**
is building a
hedge fund giant.

Barclays Global Investors commands $1.7 trillion in assets with a legion of computer-loving Ph.D.s. CEO Blake Grossman and his brainiacs have transformed the firm into one of the world's largest hedge fund managers.

Empire of the Quants

By Edward Robinson

One morning in October, a money manager named Seanna Johnson flips on her computer and watches the screen fill with numbers. In front of her is a list of 100 Japanese stocks she should buy or sell.

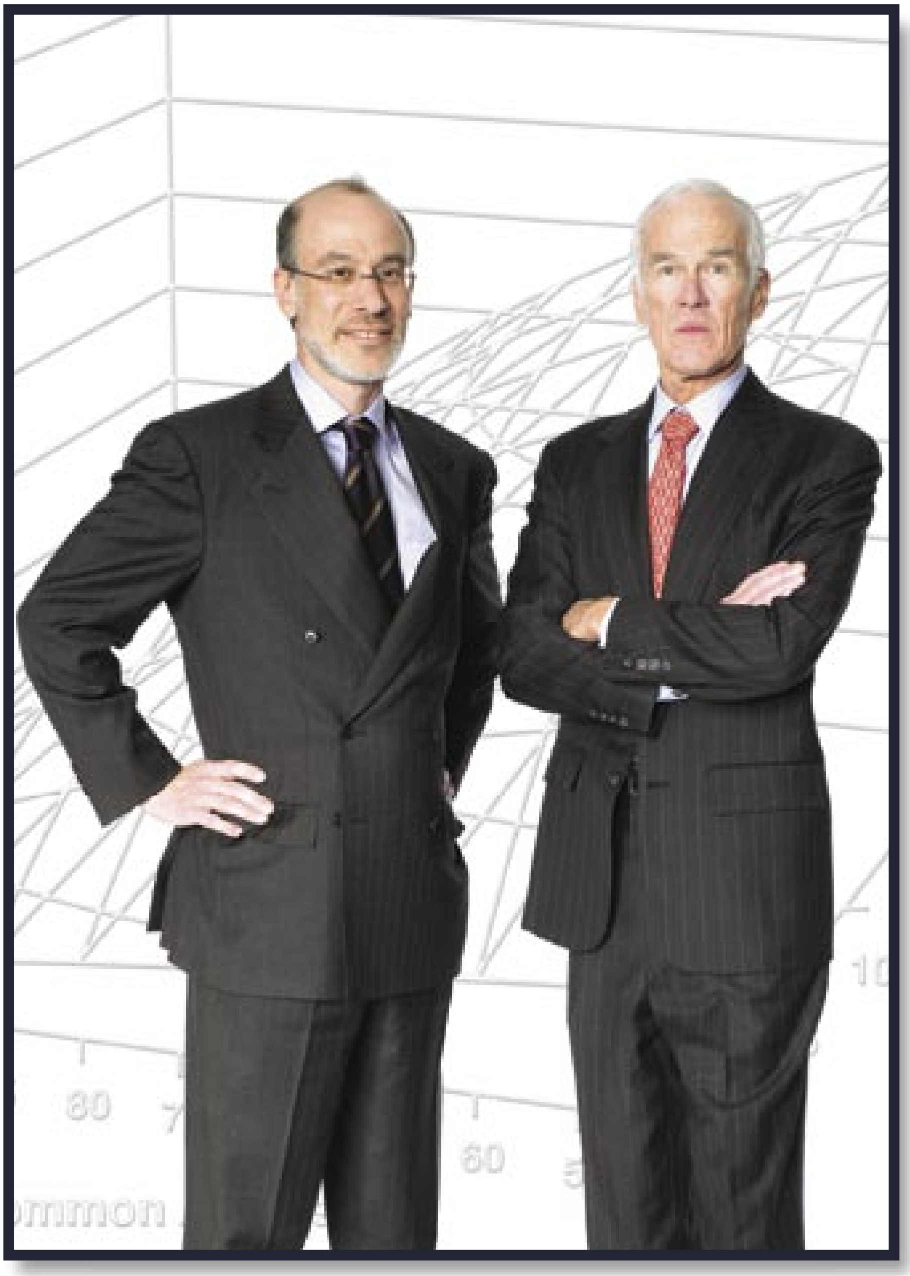
The shares had been picked overnight by computer software at San Francisco–based Barclays Global Investors, where Johnson, 39, manages three hedge funds. BGI insiders call the program the Optimizer.

“Which stocks should I hold and which should I short?” Johnson asks. To find the answer, she turns to the Optimizer, which crunches corporate earnings data and dozens of other variables for almost every stock in the world.

BGI is one of the most powerful forces in money management today. It's a den of finance Ph.D.s, mathematicians and other disciples of quantitative analysis, or quants. BGI quants design investing strategies for thousands of stocks, bonds and currencies and then use computers to pick which ones to buy and sell.

PHOTOGRAPHS BY CHARLIE NUCCI

BGI manages almost $1.7 trillion in assets and has a finger in 65 of the world's 100 largest pension plans. Its iShares exchange-traded funds, which are low-cost index trackers that can be traded like stocks, have made the firm the Wal-Mart of the $383 billion ETF world. Lately, BGI's size and reach have helped fan speculation that its parent, London-based Barclays Plc, is headed for a megamerger with a big U.S. bank. Barclays is the third-largest U.K. bank by assets.



Ronald Kahn and **Richard Grinold** are among dozens of Ph.D.s at BGI, where researchers vet each others' ideas in peer-review hearings. 'It's a non-star system,' Grinold says.

BACKGROUND GRAPHICS RENDERD BY BOB LAMBIASE

Blake Grossman, the Stanford University–educated economist who runs BGI, has used his quants to quietly transform a firm built on index investing into one of the world's largest hedge fund managers. Grossman, 44, is converting corporate and public pension funds to what BGI calls a scientific approach to these often secretive, sometimes volatile investment vehicles, which strive to make money in bull and bear markets. He's championed the idea that pension managers should not only bet on stocks, or go long, but also wager against them, or go short. This twin tactic is employed by so-called long/short hedge funds.

Sitting in a 32nd-floor conference room in BGI's headquarters, Grossman hardly comes across as a swashbuckling hedge fund manager. He's a native of the San Fernando Valley area of Los Angeles, which is known for its shopping malls and Valley Girls. In 1985, Grossman earned a master's degree in economics from Stanford, where he wrote a paper on corporate divestments with his mentor, Nobel Prize–winning economist William Sharpe. A trim man with glasses and graying hair, Grossman speaks in long, unbroken sentences peppered with terms such as "externalities" and "investment efficiency."

Institutional investing is undergoing radical change, according to Grossman. Ten or 20 years ago, money managers who'd been entrusted with people's retirement nest eggs refused to make risky investments or short stocks. Now, these managers are adopting hedge fund strategies to generate the returns they'll need to keep their promises to workers and retirees. "We think this artificial divide between long-only and long/short is one that's destined to become extinct over the next several years," Grossman says.

During the past year, BGI has pitched investment strategies that employ leverage, or borrowed money, to short stocks and boost returns. Selling short can be risky. When you buy a stock for $10, the worst thing that can happen is that the price falls to zero and you lose $10. When you short a stock, which involves borrowing shares and then selling them, the potential losses are, in theory, bottomless.

BGI exemplifies a shift that's taking place in the hedge fund industry, which, according to Chicago-based Hedge Fund Research Inc., had about $1.34 trillion in assets as of Dec. 13. During the 1980s, hedge funds catered mostly to the rich. Then, during the '90s, universities and foundations jumped into these funds, which enable their managers to participate substantially in investment gains. Now, corporate and public pension funds are turning to these loosely regulated private pools of capital.

The rush into hedge funds may end badly, says Zvi Bodie, a finance professor at Boston University who has studied pension issues for more than 25 years. If hedge fund trades go wrong, the use of short sales could leave pension funds in a hole, he says. Lately, the average hedge fund manager has struggled to beat the Standard & Poor's 500 Index. HFR's HFRX US Absolute Return Index, for example, returned 7.5 percent during the 12 months ended on Dec. 13, trailing the 12 percent return of the S&P 500. "There is very little evidence that anyone can consistently beat the market," Bodie says. "The pensions don't want to suck it up, so they're grasping at anything that might provide an answer."

Every pension manager today talks about the Greek letters alpha and beta. In Wall Street parlance, alpha is the premium an investment earns above some particular benchmark, such as the S&P 500. Beta is the volatility of that benchmark. U.S. pension funds are reaching for alpha because many of them don't have the money they'll need to meet future liabilities. In 2005, 319 of the 500 companies in the S&P 500 were carrying more than $472 billion in underfunded pensions and other post-retirement employee benefits, such as health care, according to David Zion, a New York–based analyst at Credit Suisse Group. State and local pensions in the U.S. are underfunded by as much as $380 billion, according to the National Association of State Retirement Administrators.

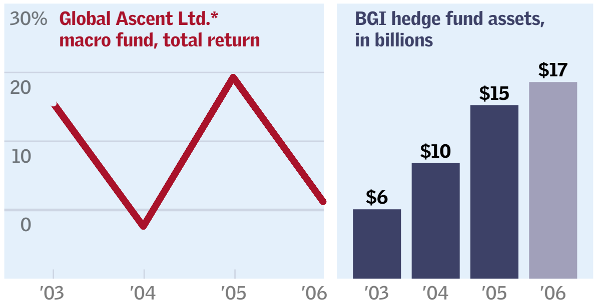
Pension funds typically need to earn 8–9 percent annually to meet their obligations, according to Daniel Celeghin, an associate director at Casey, Quirk & Associates LLC, a Darien, Connecticut–based consulting firm that advises big investors. By 2010, institutions are likely to have $1 trillion in assets invested in hedge funds, almost three times the $360 billion invested today, according to an October report by Casey Quirk and Bank of New York Co.

"They are forced to take more risk to match liabilities," says Niclas Hiller, a senior manager of the $300 billion petroleum fund at Norges Bank, the central bank of Norway. "The pressure is on."

So far, Grossman's quants have lagged rivals. Through Sept. 30, BGI's Global Ascent hedge fund, a macro fund that invests in stocks, bonds, currencies and other assets, returned 36 percent, net of fees, since its inception in July 2003, according to performance data obtained from a hedge fund consultant who asked not to be identified. The Credit Suisse Tremont Hedge Fund Global Macro Index of 3,000 hedge funds returned 39 percent during that period.

Mixed bag

Returns at BGI's flagship hedge fund have been uneven as its assets have soared.



*Net of fees. Includes stocks, bonds and currencies. Fund launched on July 15, 2003; 2006 figures are as of Sept. 30. Source: Bloomberg News

All the same, hedge fund money has flooded into BGI. As of Sept. 30, the firm had amassed $17 billion in long/short funds, according to HFR.

"We didn't set out to be a hedge fund giant," Grossman says. And yet that's precisely what BGI has become. The firm has made Barclays, which traces its history back to the 17th century, the parent of the world's fifth-largest hedge fund manager, according to HFR.

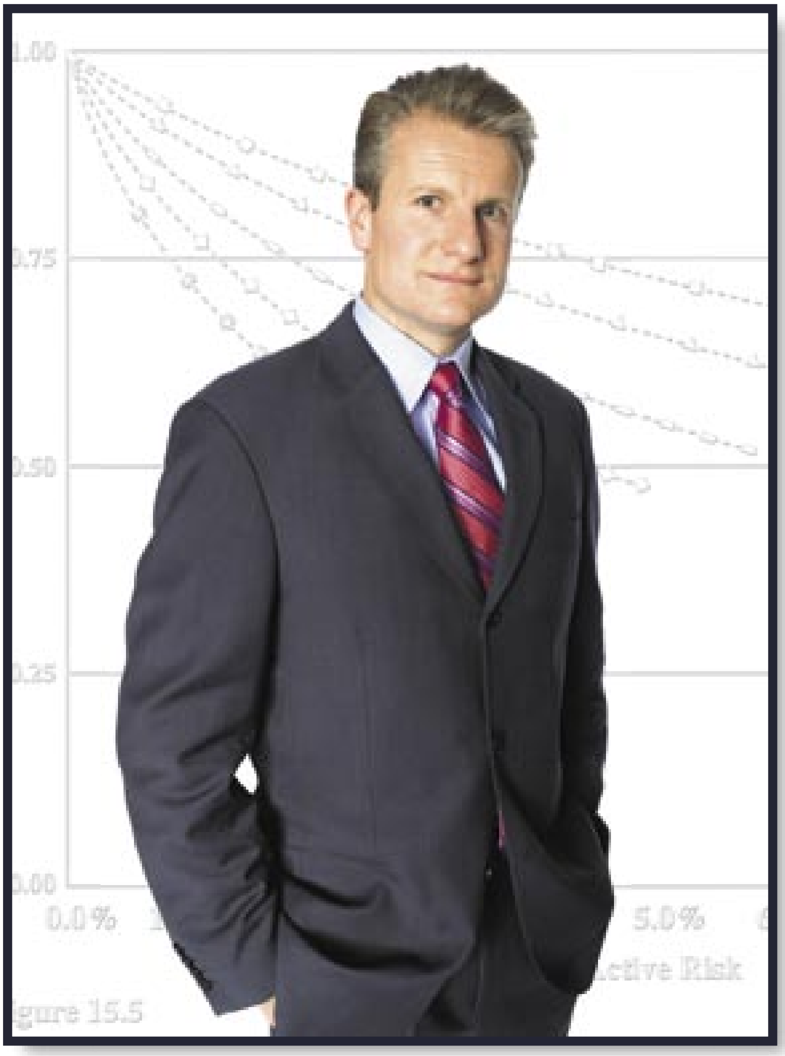
Size means money for hedge funds. BGI collects annual management fees equal to 2 percent of assets under management for some of its dozens of hedge funds, the industry standard. Like most hedge funds, BGI then takes a cut of about 20 percent of any profits on those funds, according to a record of fees that BGI has filed in Ireland. BGI's U.S.-based ETFs, by contrast, charge average annual fees of 0.32 percent.

As money has poured in, BGI has become Barclays's second-fastest-growing division, after its investment banking unit, Barclays Capital. BGI's profit before taxes rose 61 percent to 542 million pounds ($1 billion) in 2005. During the first half of 2006, the firm earned $710 million before taxes.

BGI and Barclays Capital have helped make its British parent a potential hot property. On Dec. 11, Barclays rose to a record of 746.50 pence a share after Merrill Lynch & Co. analysts Brian Bedell, John-Paul Crutchley and Edward Najarian wrote to investors that Bank of America Corp. might be interested in buying the bank. Bank of America Chief Executive Officer Kenneth Lewis later said he was in no hurry to make a European acquisition. "We never say never, but I don't think it's a strategic imperative," Lewis told journalists in New York on Dec. 13.

BGI, which originated in 1964 as part of San Francisco–based bank Wells Fargo & Co., has been a quant shop from the start. During its early years, Myron Scholes and Sharpe, who would go on to become Nobel laureates, helped the firm create

Grossman and his quants are converting pension managers to what BGI calls a scientific approach to hedge funds.



Richard Sloan, a former accounting professor at the University of Michigan, has devised a 'signal' for earnings that helps BGI pick stocks.

the world's first index fund. Today, Grossman and his quants say they've built a system that strips emotions such as fear and greed out of hedge fund investing.

"If you look at the history of this investor-as-hero-type guy over the last 20 years, you can see that they're rockets—and they burn out like rockets," says Richard Grinold, who runs BGI's advanced strategies and research group, which directs BGI's actively managed funds, as opposed to its indexed investing. "Our organization is the antithesis of that. It's a non-star system. It's really the process that's the star, if anything."

BGI money managers and researchers must run a gauntlet of peer-review hearings every time they pitch an investment idea. It can take months before a panel of as many as 25 money managers and analysts debate the idea. Senior fund managers, who get the final say, reject two of every three ideas. BGI researchers, many of them former college professors, boast that the ordeal is similar to the way academics vet each others' research.

This process sometimes prevents BGI money managers from moving fast. "It's absolutely, without any doubt, one of the shortcomings of our research process, but I would argue that's also a strength—because when we do bet on an idea, we know it's a solid idea," says Kenneth Kroner, head of the global markets research and strategy team. "It's not just a flier, a gut feeling that someone had when they woke up in the morning."

Lately, BGI, originator of the index fund, has been pushing a new type of long/short strategy designed to mimic hedge fund investing at a fraction of the cost. These funds short the equivalent of 20–30 percent of their assets and employ a tool common to hedge funds: leverage. Money managers call these investments 120/20s or 130/30s, because they borrow the equivalent of 20–30 percent of the value of their assets to finance the short sales. The funds aren't bona fide hedge funds, because they short on a limited basis and otherwise track an index such as the S&P 500. Fees for most 120/20s run closer to what index funds charge, about 0.6–0.9 percent of assets under management, according to Morgan Stanley.

BGI has marketed these funds, which were invented by Analytic Investors Inc., a Los Angeles–based quant firm. In October 2005, BGI unveiled its Alpha Advantage 500 Fund, which shorts the equivalent of 20 percent of its assets. Through Sept. 30, it had returned 18.3 percent compared with a 15.3 percent return for the S&P 500, according to performance data obtained by Bloomberg News.

Pension funds like what they see. In December, the $217.6 billion California Public Employees' Retirement System selected five asset managers, among them Analytic Investors and Goldman Sachs Group Inc., to run 135/35s as part of its U.S. domestic equity portfolio. Calpers expects these funds to beat the market, says Christianna Wood, a senior investment officer at Calpers. Calpers won't classify the 135/35s as part of the $3.6 billion in assets it already has in true hedge funds, Wood says. "This is the next extension of reducing constraints around managers that are highly skilled," she says.

Calpers, which invests $140 billion in global equity funds, eventually plans to deploy billions in this new strategy and

Grossman champions the idea that big institutions shouldn't only bet on stocks; they should also wager against them.

may move assets away from index funds and underperforming money managers.

The shift will expose Calpers to bigger risks, according to a three-page opinion on the funds written by Los Angeles–based Wilshire Consulting at Calpers' request. "There is no free lunch in this strategy," wrote Michael Schalchter, a managing director at Wilshire, before endorsing the idea.

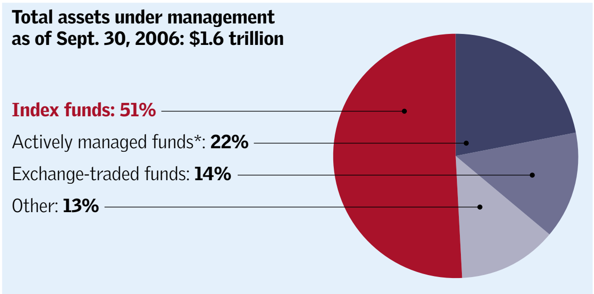
From the start, the firm now known as BGI has sought to erase wishful thinking from investing. The firm was born inside the trust department of Wells Fargo. Then called the management sciences group, the division was led by John "Mac" McQuown, a mechanical engineer with an MBA from Harvard University, who was an early evangelist for using computers and quantitative analysis to invest in stocks.

McQuown, now 72, was a devotee of the efficient markets hypothesis espoused by Eugene Fama, an economics professor at the University of Chicago. The hypothesis states that stock prices reflect all available information in the marketplace, so it's impossible to beat the market over time.

McQuown, who used to tinker with International Business Machines Corp. vacuum tube mainframe computers in his spare time, wanted to build a system that would put the theory to work in portfolios encompassing virtually the entire market, or as many as 5,000 stocks. He assembled a dream team of economists to consult with the management sciences group. In addition to Fama, Scholes and Sharpe, the team included then University of California, Berkeley, finance professor Barr Rosenberg; economist Fischer Black; and Czech mathematician Oldrich Vasicek. In 1990, Sharpe won a Nobel Memorial Prize in Economic Sciences for his work on measuring risk and return. Scholes won a Nobel in 1997 for the Black-Scholes options pricing model, which he had devised with Black. Black had died in 1995. "We created a dynamite team of brains to work on the problem, the bank's senior management was willing to foot the bill and we spent millions," says McQuown, who's co-founder of Diversified

Index leader

Index funds are BGI's dominant product.



*Includes $17 billion of hedge funds. Source: Barclays Global Investors

BGI money managers **Seanna Johnson** and **Ernest Chow** use a computer program called the Optimizer to maximize returns and minimize risk.

Credit Investments, a San Francisco–based investment firm.

The team set out to use Sharpe's capital asset pricing model, which quantified the relationship between risk and return, to build a portfolio. In those days, measuring risk was a fuzzy exercise because there was no metric. Sharpe's CAPM provided one: the model defined risk as volatility relative to the entire market and established that investors expect higher returns for greater risks. Relative volatility was measured by the beta coefficient. The S&P 500 has a beta of 1. A stock with a beta of more than 1 is more volatile than the index and thus riskier; a stock with a beta of less than 1 is safer.

McQuown and his team logged 100-hour workweeks and finally made a breakthrough: the construction of a computerized simulator that enabled researchers to create portfolios of stocks showing risk and return and then test them through history. At last, Wells Fargo's money managers had a tool that could put the theories of Fama, Sharpe and their colleagues into practice.

On their own, Black and Scholes also planted the seeds of a hedge fund approach in 1969 when they proposed creating a fund that mixed long positions in low-beta stocks and short positions in high-beta stocks.

"They didn't call it a hedge fund at the time, but this was early," says Perry Mehrling, an economics professor at Barnard College in New York and author of *Fischer Black and the Revolutionary Idea of Finance* (John Wiley, 374 pages, $29.95).

In 1971, Wells Fargo unveiled a portfolio that tracked the performance of shares listed on the New York Stock Exchange for the pension fund of luggage maker Samsonite Corp. The first index fund was born.

Over the next decade, the firm expanded its index fund offerings. By the time Grossman was hired in 1985, at age 23, the firm had $29.2 billion in assets under management and was committed to building an actively managed fund group that could deliver market-beating returns to its pension fund clients.

From the get-go, Grossman wanted to work in active management. He joined the team that launched the firm's Alpha Tilts fund, an enhanced index portfolio that sought to beat the broad market by investing more heavily in promising stocks.

In 1992, Grossman landed his dream job: founding and directing the advanced strategies group. Its mission was to pick up where McQuown had left off and develop new ways to beat the market using the firm's quantitative system.

Then, in 1996, Barclays acquired the firm for $440 million and changed its name to Barclays Global Investors. By that time, then CEO Frederick Grauer had tapped Grinold, president and former research director at Barra Inc., a Berkeley, California–based quantitative investing consulting firm, to lead the research effort. Grinold, 68, a one-time navigator on a U.S. Navy destroyer, studied physics at Tufts University in Medford, Massachusetts, and earned a doctorate in operations research at UC Berkeley. He was a finance professor at UC Berkeley's Haas School of Business for 20 years.

In 1996, Grossman and Grinold launched a long/short fund. Their reasoning was simple: If they have data on winners and losers, why not use all of it? "What attracted us to investing on a long-short basis had to do with the investment efficiency that we could gain," Grossman says.

The rush of pensions into hedge funds may end badly. No one can beat the market forever, one professor says.

In 1998, Grauer turned over the reins to Patricia Dunn, his co-CEO since 1995. She built BGI's business in ETFs. Dunn resigned as CEO in 2002 and as vice chairman this past October, after she was indicted by the state of California on fraud and conspiracy charges for her alleged role in the board leak scandal at Hewlett-Packard Co., where she was chairman. Dunn has pleaded not guilty.

That same year, Grinold recruited Ronald Kahn, a fellow physicist who taught at Harvard, as global head of advanced equity strategies. As a postdoctoral fellow at UC Berkeley in the mid-1980s, Kahn had worked with Nobel-winning physicist Luis Alvarez and his son, geologist Walter Alvarez, on research into whether the dinosaurs were wiped out by an asteroid's collision with Earth, a theory now widely accepted. "If you have any questions about the early universe, he's your man," Grinold says, pointing at Kahn.

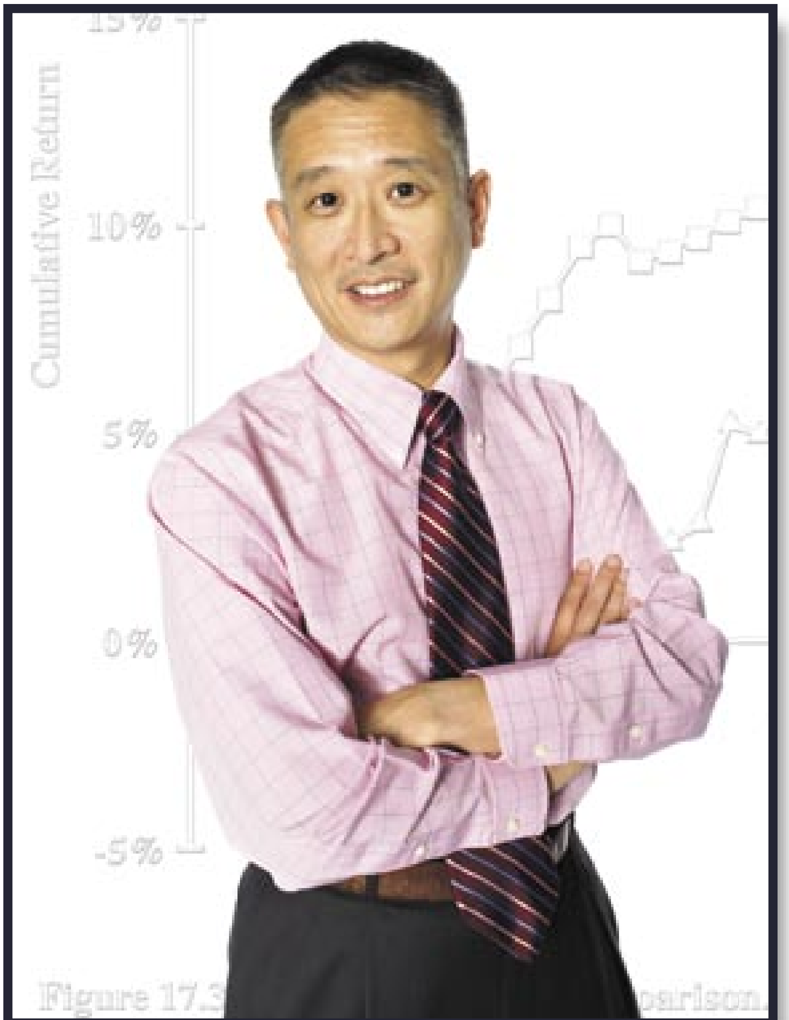
With Grossman's blessing, Grinold and Kahn cultivated an academic culture inside the research process that stoked the free exchange of ideas. "It's a quest for what we believe is truth," says Grinold, an intense man with white hair and a baritone voice. They also adopted a "no-jerk" policy. "We don't tolerate ranters and ravers," says Kahn, 50, a bespectacled man with a finely trimmed beard, who smiles when he talks.

This culture and the allure of testing theories on real billion-dollar funds has proved irresistible to academics. In 2002, Charles Lee, then a finance professor at Cornell University, was happy teaching and directing a hedge fund lab for business students that invested donated funds from the school's endowment. In five years, the lab's Cayuga MBA Fund LLC swelled from $600,000 to $11 million. Lee left academia to become BGI's global director of equity research in 2004. "If you really want to learn more and develop more, $11 million is not a lot of money," Lee, 49, says. "If you really want to push the envelope, to have the resources and challenges, I don't think you can do it from an academic post."

At the heart of BGI's investment system is an array of "signals" designed to predict how a security will behave by assigning scores to certain market forces, such as volatility, earnings expectations and market momentum. The key was creating one expandable system that could be applied to a range of strategies, from index funds to long/short portfolios.

Grinold and Kahn understood that the human element couldn't be dismissed from investing. Simply turning loose a computer program to find promising bets—a practice called data mining—could result in red herrings.

"If we look at data, we can come up with stories to justify anything you want," Kroner, 45, says. "You show me that hemlines are correlated with the rise and fall of equity markets and I could easily spin a story for you that that's the case because of consumer sentiment, and then we end up with hemlines as one of our signals." Grinold and Kahn directed



Charles Lee, global director of equity research, joined BGI from Cornell University, where he ran a hedge fund lab.

that every investment idea must first undergo a "sensibility test," during which the researcher pitches a proposed strategy to peers using no data, just the concept.

"We don't want to be totally data driven," Grinold says. "We're very focused on looking at an idea before the data, and it better make sense or we're not even going to bother looking further." In 2000, Grinold and Kahn published a hefty primer called *Active Portfolio Management* (McGraw-Hill, 596 pages, $80) that has become a must-read in quant shops.

One idea that demonstrates how BGI wed quantitative analysis with old-fashioned business sense is the "earnings quality signal," developed by Richard Sloan, a former accounting and finance professor at the University of Michigan in Ann Arbor. Perhaps no other factor influences a stock more than a company's earnings. So in the early 1990s, Sloan, a native of the London suburbs who earned his Ph.D. in accounting from the University of Rochester in New York state, began dissecting corporate income statements. Sloan, 41, wanted to determine how much net income was actual free cash flow thrown off by sales and how much was the result of aggressive accounting that padded the bottom line. If he could separate the two, then he would be able to ascertain the true health of a company's income statement. Free cash flow is the sum of cash from operations and investments.

Sizing up a company's earnings quality wasn't a new idea. In 1940, Benjamin Graham and David Dodd highlighted the subject in their classic tome on value investing, *Security Analysis*. Sloan took the idea a step further by formulating a score or signal for earnings quality that could be input into a quantitative model. By subtracting free cash flow from earnings and then dividing the difference by the average total assets of the company, Sloan came up with the so-called accruals metric. "That allows you to compare earnings quality across companies of different sizes effectively," Sloan says.

By using this measure, an investor can anticipate whether a company with conservative accounting will surpass earnings expectations or whether a company with aggressive accounting will fail to meet expectations. "With this signal, we can predict earnings surprises," Sloan says.

In 1996, Sloan published his findings in the *Accounting Review*, the quarterly journal of the American Accounting Association. Coming amid the Internet stock frenzy, when reading an income statement seemed passé, it made little impact. Peter Algert, then head of global equity research for actively managed strategies at BGI, read the paper with interest. He invited Sloan to visit BGI and discuss his work, and Sloan became a consultant. In July 2006, Sloan joined the firm as director of accounting research.

"Even today, people talk about cash flow but they only give it lip service," says Gregory Forsythe, director of equity ratings at San Francisco–based Charles Schwab Corp. and a longtime fan of Sloan's research. "Our industry is obsessed with earnings, and that's fine with me because people aren't paying attention to measures that give us an informational advantage." Forsythe says 20 percent of the inputs used to calculate Schwab's stock ratings are related to earnings quality.

For Grinold and Kahn, Sloan's work was invaluable because they could use it to find stocks to buy and stocks to

'When we do bet on an idea, we know it's a solid idea,' BGI's global markets research chief says. 'It's not just a flier, a gut feeling.'

short. In late 2003, for example, Sloan's signal flagged New York–based discount carrier JetBlue Airways Corp. as an "earnings torpedo," a highly valued stock with poor earnings quality. The stock had soared 133 percent from its initial public offering in April 2002 to June 2003. Sloan's signal showed that its accruals metric was more than 50 percent. Ten percent is alarming, Sloan says.

The issue, according to Sloan, was that JetBlue was using "decelerated depreciation" to write down an $81 million purchase of a satellite television system it uses for in-flight entertainment. Rather than take a $7 million annual hit for the duration of the system's 12-year useful life, JetBlue minimized the front-end depreciation to only $1.3 million, according to company filings. Lower depreciation expenses bolster earnings. "They based their expenses today on the assumption that they were going to be successful in the future," Sloan says.

Cued by the aggressive accounting, BGI shorted the stock, which tumbled 12.4 percent in 2004. JetBlue spokeswoman Jenny Dervin says the airline doesn't comment on stock opinions.

Now, when BGI's fund managers use the Optimizer, the earnings quality signal is one of dozens of measures that size up a stock's return potential and risks.

In her cubicle, Johnson runs through proprietary earnings signals, volatility gauges and price momentum data and, with a few clicks of her mouse, burrows into still other data gleaned from company income statements. She can input new data and then direct the program to automatically generate a list of trades. Johnson was born in Seoul and moved to Los Angeles with her family when she was 6. She has a degree in economics from the London School of Economics & Political Science and an MBA from the University of Chicago. At BGI, she oversees investments in 1,700 Japanese stocks. "I can't just go out and buy the one with the highest return forecast because it might have high volatility and be too risky," Johnson says. The Optimizer helps her strike a balance between risk and return.

"The Optimizer is at the point where we integrate the information and it sort of says, 'OK, here's where your portfolio is now, and this is the best trade list you can do based on all that information,'" says Ernest Chow, 37, co-head of the international active equities group.

Grossman is now pushing into the fixed-income markets. Using credit derivatives, the firm plans to offer clients long/short strategies this year in bonds and structured credit markets, including securitized debt like subprime mortgages. "This is a good way for us to add breadth," Grinold says.

One of BGI's biggest challenges is its size. Since 2000, the number of hedge funds worldwide has doubled to more than 9,000—and the annual return of the average fund has withered. The same could happen at BGI.

"BGI is probably the poster boy for delivering systematic, consistent quality in the investment process," Casey Quirk Chairman John Casey says. "Their challenge will be to look for new ideas, big ideas, that can actually be implemented." The quants at BGI have dreamed up winners before. It's up to them to show pension managers how smart they really are.

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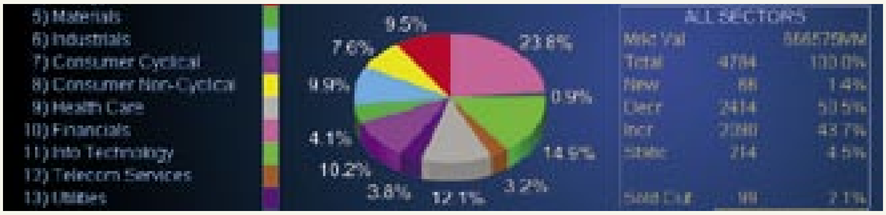
BLOOMBERG TOOLS

Analyzing Hedge Funds

To analyze the types of investments that have driven the performance of Barclays Global Investors UK, a unit of Barclays Plc that controls hedge fund assets, first type FLNG <Go> for the 13F Filing Summaries function. Enter *BARCLAYS* in the COMPANY NAME field, and press <Go>. Click on Barclays Global Investors UK for data from the money management firm's most recent 13F filing, a form that the U.S. Securities and Exchange Commission requires all institutional investment managers with at least $100 million in equities to file within 45 days of the quarter's end date.

Click on the arrow to the right of Graph View in the upper-right corner of the screen, and select Current Filing, as shown at right, or Filing Changes to toggle between the graph types. The screen displays data from the most-recent reporting period. The Filing Changes view shows how the unit's industry exposure has changed since the previous reporting period.



To find more details about the firm's holdings in the materials industry, for example, change the graph view to Current Filing and click on Materials in the list of industries. All of the reported holdings from the materials industry appear at the bottom of the screen. To change the criteria used to sort the list of holdings, click on the arrow to the right of Sort By and select another method. Click on the Filer Information tab at the bottom of the screen to find contact information for Barclays Global Investors UK and summary statistics about the fund's holdings.

THOMAS JASTRZAB

For the Hedge Fund Home Page, type HFND <Go>.