

# Bloomberg

## The Quants on the Left Bank: How Paris-Based Physicists Used Algorithms to Get Big Returns

*By Jeremy Kahn and Lindsay Fortado - Jan 7, 2015*

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Paris is famous as the home of philosophers, scientists and mathematicians. Today, thousands of students traipse through the city's Left Bank on their way to classes at the Universite Pierre et Marie Curie and the [Ecole Normale Superieure](#).

Those schools are one reason Capital Fund Management has its offices there, in a modernized 17th-century building. CFM, a quantitative hedge-fund firm, has always plucked its staff from the ranks of the local schools' math and physics departments, Bloomberg Markets magazine will report in its February issue.

"This helped establish and reinforce the academic and research-driven culture which is the DNA of the firm," says Jean-Philippe Bouchaud, CFM's chairman. "At the same time, it reinforces its French character."

CFM's algorithms had a banner 2014. The firm's flagship Stratus fund boasted a total return of 17.7 percent for the year through October, making it the second-best-performing large hedge fund in Europe, according to the Bloomberg Markets annual ranking.

Stratus was one of many quant funds that made a comeback in 2014. AHL Diversified, part of London-based hedge-fund firm [Man Group Plc \(EMG\)](#), was the best-performing fund in Europe with assets of \$1 billion or more. The \$4.4 billion fund relies on algorithms to trade interest rates, bonds, stocks, currencies, commodities and credit. It rang up a 21 percent return from the start of the year through October after three years of annual losses.

### **AHL Dominates**

There are seven quantitative funds in the top 25 of the ranking, four of them operated by Man Group's family of quantitative funds, AHL Partners. AHL Diversified's investors profited from the rise in the value of the U.S. dollar, from weakness in grain and oil prices and from a rally in bond markets, according to a person familiar with the fund's performance.

Publicly listed [Man Group's stock](#) rose 74.6 percent in 2014 as of Dec. 5. Although the family of AHL funds made up only 20 percent of Man's total assets under management in the six months ended on June 30, it took in 70 percent of the company's [performance fees](#).

From 2010 through 2013, many hedge funds that rely on computer-driven trading posted minuscule returns or losses, which the funds blamed on the massive central bank bond purchases known as quantitative easing.

The period also saw commodities, stocks and bonds moving in sync amid historically low volatility, says Carol Alexander, a professor of finance at England's University of Sussex. Such conditions can confound quant trading models, which often follow the up or down momentum of particular securities.

### **Volatility Returns**

The return of volatility in many markets since August has been a boon for quants, who outperformed fundamental stock pickers throughout the autumn, says Peter Laurelli, the head of research at eVestment LLC, a Marietta, [Georgia](#)-based firm that provides data on investments to institutional investors.

For many European institutions, quant funds are still a tough sell, says Jerome Lussan, the Frenchman who founded and runs Laven Partners, a London-based hedge-fund consulting firm.

"It's very difficult to appreciate the black-box element," he says. "To carry out due diligence on those sorts of firms, you have to understand how the software is being made to evolve and how robustly it is being tested."

And it hasn't helped that quants' performance has been poor in recent years.

### **Non-Fatal Blows**

CFM has survived, and now thrives, despite blows that would have finished off other firms. The company was founded in 1991 by the late Jean-Pierre Aguilar, a French trader with a background in engineering and computer science and a passion for piloting gliders. (He named many of CFM's funds, including Stratus, after glider models.)

"Jean-Pierre was a very, very charismatic person," says Arthur Berd, who worked for CFM from 2008 to 2011 and now runs General Quantitative, an investment management and consulting business in New York. "Everyone loved him."

In the mid-1990s, Aguilar teamed up with two theoretical physicists, Bouchaud and Marc Potters, who recognized that their formulas could be applied to options pricing.

Still, CFM's funds suffered a 2.5 percent loss in 1994 followed by a decline of almost 20 percent in 1995. As a result, assets under management dwindled to what the firm now calls "negligible levels."

During the lean years, CFM focused on quantitative research.

### **White Paper Years**

"These are what I like to call the firm's white paper years," says Philippe Jordan, a French Canadian who runs CFM's New York office and serves as the firm's chief fundraiser and spokesman.

The theories expounded in those [papers](#) -- some of them published in journals such as "Applied Mathematical Finance" -- became the basis for much of CFM's current success. CFM's funds boasted an average annual return of 11.3 percent from 2002 to 2005, helped by the growth in the speed and sophistication of new computer models.

As performance improved, the firm went from managing \$92 million to close to \$1 billion over the period. CFM also began to trade electronically, allowing it to execute transactions instantly and take advantage of short-lived opportunities. Its managers expanded from trading commodities futures into equities and, eventually, volatility arbitrage.

That's a strategy that tries to exploit differences between forecasts of a security's volatility, based on past performance, and options prices for that asset. By 2007, CFM was managing more than \$4 billion in two funds.

### **Fraud Victim**

Then came disaster: In August 2007, Sentinel Management Group Inc., a Northbrook, [Illinois](#)-based firm that invested CFM's idle cash, froze client withdrawals and then filed for bankruptcy while holding \$410 million of CFM's money.

Sentinel's chief executive officer, Eric Bloom, was later convicted in a fraud that cost clients more than \$500 million.

The Sentinel bankruptcy and that year's credit crunch, which battered many quant funds, spooked investors, who pulled \$800 million from CFM. The firm was the lead creditor in Sentinel's bankruptcy proceedings and has so far recovered about 40 cents on the dollar, Jordan says.

A year after Sentinel's bankruptcy, CFM narrowly averted another calamity: Sensing trouble at Lehman Brothers Holdings Inc., its prime broker, CFM began closing accounts there, pulling its last funds out of the investment bank just days ahead of its September 2008 collapse.

### **More Misfortune**

No sooner had CFM regained its footing than misfortune struck again. In July 2009, Aguilar, the firm's founder, was killed in a glider crash in the French Alps at the age of 49.

"It was devastating personally," Jordan says. "But we quickly had to put the personal behind us and come to terms with the world as it was."

Because CFM's trades are computer driven, not based on the instincts of a single star trader, returns were not affected. The firm suffered minimal withdrawals -- about \$60 million.

The biggest practical problem presented by Aguilar's death was that his estate owned 57 percent of the equity in the firm. After two years of negotiations with his heirs, the remaining partners joined with [Dyal Capital Partners](#), a private-equity fund managed by New York asset manager Neuberger Berman Group, to purchase Aguilar's shares.

Dyal, which specializes in buying minority stakes in hedge-fund firms, now owns 25 percent of CFM. The firm's top executives and about 35 other senior employees own the rest. Bouchaud took over as chairman, while Potters and Jacques Sauliere, who had handled the firm's back-office operations, were named co-CEOs. Jordan is president.

### **Quirky Group**

The four partners make for a quirky, if complementary, quartet. Bouchaud, 52, who sports a mop of dark hair and thick-framed designer glasses, holds a Ph.D. in physics from the Ecole Normale Supérieure and looks the part. In addition to his duties at CFM, he teaches physics and "complex systems" at the Ecole Polytechnique in the Paris suburbs.

During an interview in CFM's Paris office, he bickers politely with Jordan. When Jordan says, "Sometimes we reinvent some wheels; we try and avoid that," Bouchaud jumps in. "No, it's OK to reinvent wheels," he says. "Because if you reinvent wheels, you understand better the wheel."

Jordan, 50, joined CFM in 2005 after helping run hedge funds for Credit Suisse First Boston and Daiwa Securities Group Inc. Dressed in a tweed jacket and round tortoiseshell glasses and speaking in a suave baritone, he is the salesman of the group.

### **Delivering Alpha**

“We are delivering alpha,” he says. “There is no [beta](#) you can extract from Stratus, and I don’t think the same can be said of the industry as a whole.”

Potters, 45, in an open-necked shirt, beige sports coat, long sandy-blond hair and fashionable stubble, looks like an aging rocker. But he is a physicist, too, with a Ph.D. from Princeton University. Born in Canada and a naturalized citizen of [Belgium](#), he, along with Bouchaud, supervises CFM’s team of researchers.

Sauliere, 52, is dressed in a blue suit and white shirt, open at the collar. An engineer with an MBA from [France](#)’s INSEAD, he handles the firm’s risk management functions and manages its back office, playing Mr. Inside to Jordan’s Mr. Outside.

CFM now runs four funds: Stratus, Discus and the new Institutional Systematic Futures and Institutional Systematic Diversified. Stratus’s trading model alone tracks some 7,000 equities, including 50 U.S. sector-focused exchange-traded funds, plus more than 1,000 equity options, 230 futures contracts, 20 foreign-exchange pairings and a variety of other securities.

### **Data Crunching**

Crunching all of that data takes serious processing muscle: CFM uses 1,500 servers to analyze 2.5 terabytes of information -- the equivalent of a fair-sized academic research library -- every day. Of CFM’s 130 employees, close to half are technologists and programmers who keep those systems and databases humming.

CFM generally doesn’t take on people with backgrounds in business or finance. The physicists and mathematicians it hires from academia bring along few preconceived notions about how finance is supposed to work.

“There are a lot of prejudices in this business,” Bouchaud says.

Academics also adjust better to CFM’s compensation structure. Most financial firms pay portfolio managers and research analysts based on how much money they make or lose for the firm. CFM, whose Stratus fund alone earned \$139.5 million in the first 10 months of 2014, operates with a single, firmwide profit-and-loss ledger.

### **Rewarding Collaboration**

Its researchers are rewarded as much for how well they collaborate as for how many winning strategies they develop on their own, Jordan says. It is difficult, he adds, to take people from a culture of individual performance and drop them into CFM’s more communitarian atmosphere -- which is why the firm rarely does it.

“When people have been paid very high amounts, it is very hard for them to realize that maybe it is not because of them; maybe it is because of luck,” Bouchaud says. “And that can create a lot of tension internally.”

To find the best brains, CFM grows its own. Over the years, the firm has provided financial help to two dozen students studying for doctorates in physics or math at top French universities and then sometimes hired them. In February 2014, it started a similar program at Imperial College in London.

### **Radical Transparency**

Unlike their secretive hedge-fund comrades, CFM's bosses encourage their staff to explain in academic journals some of the ways they make money.

"People are too paranoid about what a secret is," Bouchaud says.

Often, those papers deal with obscure mathematical topics, such as eigenvalues and correlation matrices. One more-accessible CFM [paper](#) was recently published in "The Journal of Investment Strategies." It analyzed market data for stock indexes, commodities, currencies and bonds as far back as 1693 for U.K. stocks and 1784 for sugar.

The conclusion: If investors went long on assets that were above their trailing five-month average price while simultaneously shorting assets that were below their five-month average, they would have made money over any decade from 1800 to today.

Bouchaud, true to his Left Bank proclivities, revels in such findings.

### **Intensive Research**

"We strongly believe in the fact that you don't do research in a week," the former physicist says. "It can take a few months, a few years; it can take 20 years."

The only ideas that can be implemented quickly, he says dismissively, are "stupid ideas" -- those that might make a little money but won't change the world.

And Bouchaud makes clear that he thinks he and his colleagues can change the world -- or at least the world of finance. It is a fitting goal for a firm rooted in the country that produced deep thinkers such as [Descartes](#) and [Pascal](#).

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