Back to school for derivatives traders

Business schools, aware of the need for better-qualified traders, are launching specialised masters degree courses in financial engineering. Emily Saunderson reports

In the beginning, an Ivy League or Oxbridge degree in humanities was sometimes enough to secure a highly paid job running a derivatives trading desk. But in the 1980s, Investment bank Salomon Brothers set a new standard when it started to recruit staff with PhDs in maths, physics and other science qualifications. The cutting edge of options theory was thus transplanted from the lecture theatres of Harvard to Wall Street.

Today, most firms will insist that any applicant for a quantitative analyst's job must have a PhD. And for that read any senior position in derivatives. Only these people, these firms say, are equipped to devise new products. "Masters degrees are rarely a substitute for PhDs when you're hiring quants," asserts Wendy de Monchaux, senior managing director and head of Bear Stearns' global derivatives group in New York.

The head of derivatives at another leading New York trading firm says: "We want the cleverest, most creative people working for us in quantitative analysis. By definition, these are the PhD graduates."

But while it's hard to imagine that the PhDs' grip on the top quant jobs will ever loosen, a number of colleges, mainly in the US but also in Europe and Asia, are now offering a masters qualification in financial engineering or financial mathematics. Given the increasing complexity of structured derivatives products, having a masters degree could become the new prerequisite for derivatives traders and sales staff.

"Derivatives trading is becoming increasingly quantitative as products become more complicated. So a growing number of our clients are looking for traders with strong mathematical skills," says Karin Klem, a consultant at executive search firm Exchange Consulting in London.

There are now some 12 masters courses in the US dedicated to financial engineering or financial maths, most of them only created over the past two years. There are plans for another three. In the UK, there are 20 masters courses that include elements of the same subjects, with a further six courses planned. Oxford University, for example, has recently introduced a new diploma in financial mathematics, specifically designed for traders and bankers who want to develop their technical knowledge. The course is also aimed at IT systems programmers, and there is a fund manager among the 36 students currently enrolled on the course.

Some major investment banks clearly support this trend. Merrill Lynch, for example, granted $20 million to the Massachusetts Institute of Technology (MIT)

US masters courses in financial maths

College	Course	Duration	Tuition fees
Courant Institute, New York University	Masters in mathematics in finance	Three semesters (about 15 months)	$28,500
University of Chicago	Master of science in financial mathematics	One year	$27,000
Columbia University (New York)	Master of arts in mathematics, specialising in mathematics of finance	One year	$23,700
Carnegie Mellon (Pittsburgh)	Master of science in computational finance	One year	$36,000
Oregon Graduate Institute of Science and Technology	Master of science in computational finance	One year	$23,530
University of Michigan	Master of science in financial engineering	Two–three four-month terms, depending on experience	$10,150 (per semester)
Florida State University	Master of science in financial mathematics	Upto one year	Around $2,000 (per semester)
Claremont Graduate University (California)	Master of science in financial engineering	18 months	$36,465
Illinois Institute of Technology	Master of science, financial markets and trading	16 months	$25,200
Polytechnic University (New York)	Master of science in financial engineering	One year to 18 months	$25,200
Princeton University (New Jersey)	Master of engineering in financial engineering	One year	$25,000
Stanford University (California)	Master of science in mathematics with a field designation in financial mathematics	One year	$23,058
University of Texas at Austin	Master of science in computational finance	One year	$11,000
Massachusetts Institute of Technology Sloan School	Master of science in financial engineering	na	na
Purdue University (Lafayette, Indiana)	Computational finance programme	One year	$22,000

Sloan School in March, partly to fund the launch next year of a Graduate Minor programme in financial engineering as an option for PhD and masters students in mathematics, electrical engineering, physics and computing. MIT currently offers a financial engineering option on its MBA course.

"MIT will offer a free-standing degree course in financial engineering in three to five years' time, but we want to set up and hone the Graduate Minor programme first," says Andrew Lo, the Harris & Harris professor of finance and director of the MIT laboratory for financial engineering in Cambridge.

There is an often overlooked distinction between financial mathematics and financial engineering courses, Lo believes, leading some banks to undervalue specialised masters. "Financial mathematics courses often originate in university mathematics departments and so they focus on the maths rather than the industry-specific applications. Financial engineering courses such as the one at MIT are different," he says.

Steve Allen is managing director of derivatives market risk management at Chase Manhattan in New York and also teaches on the risk management programme for the masters in mathematics in finance at the Courant Institute of Mathematical Sciences at New York University. The course will see its first graduates this year and Allen believes there is plenty of room for specialised masters degrees, because PhD graduates account for a small proportion of the number of staff employed in banks' derivatives securities and risk management divisions.

Allen also feels that specialised masters courses may even prove competitive with PhDs in providing a foundation for some jobs that require a highly quantitative approach. They prepare students for exactly the type of mathematical applications they will need at their desks, he says. "It might be wasteful for someone to do a physics PhD and then have a lot to learn about finance and how their skills are transferable.," says Allen. "People often have problems changing their mind sets to handle finance."

The Courant programme at New York University is designed to develop problem-solving and presentation skills. It has four components: practical applications of mathematical finance, financial theory and modelling, mathematical tools and computational skills.

The Courant course provides training for a broad range of derivatives and securities positions, including trading, sales, finance, support, research, risk management and systems. And it was student demand that encouraged the institute to launch the course in the first place, Allen adds. Wall Street investment banks are showing an interest: the institute has had no problems placing students with such firms for their summer work assignments.

The course is only taught in the evening, so practitioners, who account for around half of the teaching staff, do not have to take time off work to lecture. Around half of the students are working in financial institutions and attend the course part time.

But while the first masters graduates from the new financial engineering and financial maths courses are working their way on to the trading floors, there are still bankers who question whether they are a real substitute for on-the-job experience.

Bear Stearns' Wendy de Monchaux says seminars run by companies such as *Risk* are often a better way to pick up new ideas than long university courses. "Seminars provide very up-to-date information from industry practitioners, and they don't require a huge time commitment," she says. "I also expect employees to self-teach; to read all the papers on any new developments in options pricing theory, for example."

And there will always be a limit on how far a masters graduate can move up the quant curve. According to Tim Fisher at Commerzbank Global Equities in London, in general, investment banks can afford to take only the best applicants for positions in quantitative analysis, and that means PhD graduates. ■

and engineering

Comments
Four parts: practical applications of mathematical finance; financial theory and modelling; mathematical tools; computational skills
Four parts: mathematics; probability theory; economics; financial applications and simulations
Includes: modern financial markets and their basic instruments; valuation and hedging techniques; methods of computation and simulation
Includes: derivatives pricing; modelling; programming and mathematical applications
Includes: computing; applied mathematics and data mining; advanced training in finance
Includes: finance; analysis; capital markets; insurance/risk management systems; forecasting
Courses in computational and theoretical mathematics, statistics, economics, finance
Includes: probability; stochastic processes; mathematical finance; corporate finance; financial derivatives
Includes: accounting; mathematics for finance; portfolio management; quantitative methods in finance
Brings together: finance and related business disciplines; quantitative analysis; information technology; computer science
Includes: financial economics; financial engineering; stochastic calculus for engineering and finance; risk assessment and management
Includes: statistical methods in finance; mathematical finance; stochastic differential equations
Planned launch next year with focus on risk management for the energy markets
Plans to introduce degree in next three to five years
Still seeking approval for course from State of Indiana; should be launched before year-end