



MICHAEL SLAUGHTER

From a cozy safety net to the chaos of the pit: Brown on the floor of the options exchange

Professors in the Pits

Testing theories in the commodities game

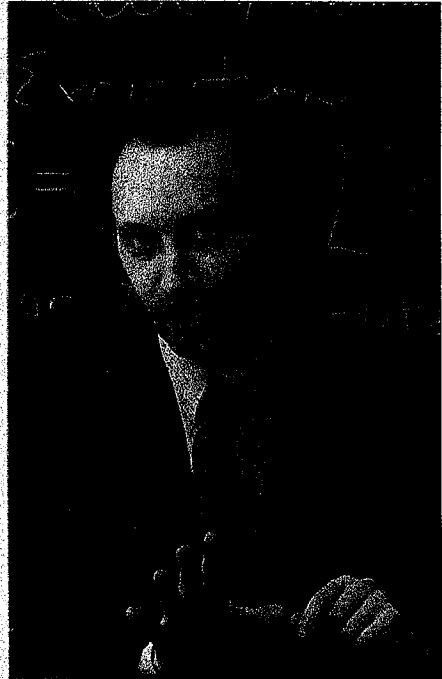
Most traders on the Chicago Board Options Exchange haven't a clue to the meaning of "Brown's Method." Most couldn't care less. What use, after all, is an algorithm for solving simultaneous nonlinear equations? Most aren't even aware that standing amidst the CBOE's chaos, trading elbows and contracts, is Professor Brown himself. Wearing a green trading smock over a dark suit, Kenneth Brown is distinguishable only because, at 49, he is relatively old in what is a young man's game. Now and then, though, he scurries back to an office, where he studies an elaborate set of mathematical computer models. The models not only help dictate his trading strategies, they reveal his past. Six years ago, Ken Brown came home and announced he was giving up his math and computer science teaching position at the University of Minnesota to become a CBOE trader. "Why," his wife, Sandy, asked incredulously, "would you give up tenure to be a riverboat gambler?"

Why indeed? Today's financial markets are more volatile than ever—and life in the trading pits is Wall Street's version of a contact sport. Bumping and grinding and screaming for six hours a day is physical punishment unlike any endured on campus squash courts. And professor/traders often must sit through weeks of basic training—learning, among other things, how not to lose their voices while trading, a course taught in New York by a free-lance opera singer. Still, the number of Ph.D.'s in

the pits is growing, and for some the allure is the chaos; they are anxious to find order in the frenzy, to test elegant theoretical models in the messy real world—and then share their experience with students. For a few, the motivation isn't so high-minded: they are out to make a quick buck.

Ken Brown was nestled in a cozy safety net in 1979: he had his tenured position, an income of around \$50,000 a year and an algorithm named after him. He also had an

Getting a real-world education: NYU's Silber
TOBEY SANFORD



abiding interest in the workings of financial markets, some confidence in his own abilities as an investor and a growing fear of becoming "just another piece of academic deadwood." He leased a seat on the CBOE for \$2,500 per month. There would be no salary, no retirement fund, no paid vacations—just Brown with his money, trying to outguess the market. The riverboat gamble, in his case, paid off. Brown now makes considerably more than he did as a professor, and he is convinced the complex models that purport to describe how markets behave are central to his success.

Puts and calls: Brown is a "spreader" in the stock-index options pit. Stock indexes are proxies for the value of a basket of stocks—in this case 100 blue-chip companies. Options provide the right to buy or sell a financial instrument, such as a stock index, at a fixed price within a certain time period. In a typical day, Brown will buy "put" options—a bet the index is going down. To "spread" his risk, however, he will also buy some "calls"—a bet the index is headed up. He will rarely take either position unless the prices of the options vary from what he thinks they ought to be—or rather, from what his models tell him they ought to be.

Recent, highly theoretical economic research holds that there are fairly predictable relationships between option prices and their underlying financial instrument or asset—predictable, that is, if investors behave in a coldly rational fashion. That research has produced complex models describing those relationships mathematically. The most well known among them is called "Black-Scholes," and one of its creators, Fischer Black, is an MIT professor now working at Goldman Sachs & Co. as a trading strategist. The models try to quantify how factors such as the historical volatility of a stock's price, its dividend payout and current interest rates influence option prices. By running such data through a series of calculations, Ken Brown cranks out "theoretical values" for options on which he bases his trading strategy. In essence, he looks for situations in which the spread between an option price and its theoretical value is out of whack—and then trades believing the prices will eventually move the way the models dictate.

But the world is not always that simple. "I've learned how far the market can deviate from the theories," says Stephen Figlewski, professor of finance at New York University's Graduate School of Business and a part-time trader on the New York Futures Exchange. Most academics turned traders, in fact, become thoroughly acquainted with what John Maynard Keynes once called the "animal spirits": the emotional, irrational behavior that often drives financial markets, and which can make a mockery of rational pricing models. The academics learn firsthand

that it doesn't take familiarity with multi-equation models to make money. Figlewski got hooked on trading at the age of 15 when he and a friend played a hunch and made \$150 selling a wheat contract on the Chicago Board of Trade. Today, Figlewski and NYU colleague William Silber, who trades gold options on New York's COMEX exchange, both rely heavily on modifications of the Black-Scholes pricing model. And Silber believes that "all other things being equal," knowing the models is an advantage. He quickly concedes, however, that "all other things" are rarely equal.

Art Smith, a Ph.D. economist turned oil trader, knows that for a fact. Smith trades oil on the New York Mercantile Exchange and, like Silber, believes his economics training helps him "think rationally" about the market. He does what he calls "time, form and space" matrix analysis: he believes oil-contract prices are influenced not only by supply and demand, but by the scheduled time of delivery, the form in which it will arrive (gasoline, heating oil, etc.) and the geographic location at which it will arrive. Although he still consults his matrix, he also watches people around him who "just have a feel for the market."

Risk averse: Few formally trained economists or mathematicians take a shot at floor trading. The University of Chicago is the wellspring of rational market theory, but its academics shun the LaSalle Street exchanges. Critics of the Chicago school say that's because, having seen how markets really work, the theoreticians could never go back and, as one trader puts it, "teach that crap again." Silber disagrees, saying traders and teachers simply have very different character traits. "Most academics are risk averse and aren't driven by the profit motive," he explains. Moreover, they are incessantly "searching for 'the answer'"—the ironclad explanation for how the world works. "And in the markets they are likely to be frustrated," Silber believes, "because there just isn't one."

Not yet, anyway. Silber and Figlewski, neither of whom is averse to risk or the profit motive, are designing a software program to sell to portfolio managers. They call it "Hedgemate," and they hope it will mix science and street smarts: a "user friendly" combination of the pricing models and real-world lessons they've learned. What sort of lessons? "Well," says Silber, "if the models are telling you to sell, sell, sell, but if there are nothing but buyers out there, don't be a jerk. Buy." The package, the professors say, will provide "optimal rules of thumb" for "hedging" strategies—that is, minimizing an investor's risk. Traders who fear losing their jobs to a computer needn't worry. It will be a long time before computers can be programmed to pay attention to "animal spirits."

BILL POWELL

The 'Quants' Are Coming!

Stock prices plunge as computer traders take over

Shell-shocked traders on the New York Stock Exchange weren't muttering, "The 'Quants' are coming, the 'Quants' are coming!" when the market plunged nearly 40 points last Wednesday—but next time they might be. "Quants" is the term brokers use for "techies": numbers-crunching engineers who quantify everything and are bringing new computer technology to the financial-services industry. And the changes the Quants have wrought clearly accelerated the stock market's dramatic downturn last week.

The culprit, specifically, was "program trading," a fairly new phenomenon linked directly to the automated trading systems that are increasingly being used by major brokerages and banks. They permit the institutions to make thousands of trades in hundreds of stocks simultaneously. The computers are programmed to alert traders to conditions that make the time ripe for mass selling or buying—and then to execute the transactions in minutes. The program trading last week involved extremely complicated arbitrage transactions in which brokers buy one security while selling another. In this case they were selling stocks and buying the S&P 500-stock-index futures contract. With the market already headed down in the morning, a huge "window of opportunity" opened. The price of futures contracts on the S&P 500

index dropped below the "cash" price of the index—which is a proxy for the value of a basket of stocks. This rarely occurs, but when it does, the smart strategy involves a series of transactions that essentially comes down to selling stocks and buying into the futures market (table).

Machines that think: But program trading is Model T stuff compared to other computerized systems in place or currently under development. Of most interest to the financial community are artificial intelligence applications—computers that have the ability to make trading decisions usually left to fallible humans. John L. Mason, founder of BetaSoft Inc. and a professor at the University of Chicago, recently developed programs for futures and currency trading that "use the same strategy that traders do intuitively." And already he claims, "we can beat 50 to 60 percent of the traders out there." At Batterymarch Financial Management in Boston, the typical roles of man and machine have been reversed: a computer sifts through reams of stock-price data and spits out buy and sell orders to a cadre of brokers who, robotlike, execute them. The system operates 24 hours a day and keeps commission costs down to two cents per transaction. It also seems to be working quite well: Batterymarch is managing \$12 billion worth of assets.

Ingenious engineers are quick to respond to what's on Wall Street. Witness "SI Watch," a program developed by a Ph.D. mathematician at McCormick & Pryor Ltd., a 10 percent Wall Street start-up that identifies potential takeover targets by monitoring stock-cumulation patterns in hundreds of public companies. Information that could be valuable to brokers as potential takeover targets—alluring as such technical sounds, it will be a while before it becomes common on Wall Street. Many financial service companies still don't understand it and are slow to buy. But if you need a reminder that the Quants are here to stay, they got it last week.

BILL POWELL
PENELOPE WANG in New York

WMB	GP	RDC	BKO	HRSA
22 1/2	28 1/2	10 1/2	25 1/2	4 1/2

A Rout in the Market

Last week stock-index futures were at a discount to stocks, fueling program trades.

Buying the index: The first step dictated by the program trade was to buy futures contracts on the S&P 500 stock index—contracts worth, to use a hypothetical example, \$1 million.

Selling stocks: Step two was to sell stocks representative of those in the index for \$1.1 million. These sales helped send the market to its 40-point decline last Wednesday.

Closing out: The arbitrageur reverses the earlier trades when the futures contracts expire and the price of stocks and the index converge. He has now locked in a \$100,000 profit.

PHOTO BY DAVID H. WELLS