THE *BEDER APPROACH*

WITH A CAREER ARC THAT RIVALS ANY ON WALL STREET, **TANYA STYBLO BEDER** WENT FROM BIG-BANK DERIVATIVES ACE TO QUANT-FUND ALL-STAR. NOW ON HER OWN AS A CONSULTANT, BEDER IS FIRMLY FIXATED ON THE FUTURE. LET'S PICK THAT BIG BRAIN CLEAN, SHALL WE? BY RICH BLAKE

WOMEN IN TRADING 2007

When Tanya Styblo Beder was a teenager growing up in Saratoga, California, not far from Palo Alto and that hothouse of brainpower known as Stanford University, she unwittingly played a tiny part in the history of mathematics. Beder was one of a handful of students selected by her Prospect High School teachers to take part in a test run of some of the first handheld calculators being rolled out by nearby Hewlett-Packard.

"I've always loved math," Beder says. "I still have my first HP-12C."

In 1977, when she started on Wall Street, some of her colleagues actually still used slide rules, Beder explains with a humorous sigh. "Of course," she adds, "at that time there weren't a lot of math geeks in the business."

Nor were there many women. But neither reality ever ruffled Beder, a Yale math major and Harvard MBA who comes from a family of overachievers — one of her sisters is a surgeon; another has worked as a NASA engineer. Beder's achievements on Wall Street trace back to First Boston in the 1980s. There, she was part of a team that pioneered some of the earliest interest-rate swaps.

Following a stint founding and running a risk-management firm (Capital Market Risk Advisors), Beder, in May 1999, joined Bruce Kovner's Caxton. Her task: head up a quantitative trading division. Five years later, she was named CEO of Tribeca Global Management, Citigroup's beachhead in the hedge-fund space.

During her roughly two-year tenure at the multi-strategy vehicle, Tribeca aggressively added to its trad-

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STREET SMART:
When Tanya Beder speaks, people listen.

ing team, planting offices in Singapore and London while opening up to outside investors; assets reached $2.6 billion, much of it Citi's own dough. Some people were surprised when Beder left the lucrative, more entrepreneurial world of hedge funds to go work for the largest bank in the world. Beder saw it as a challenge. In the end, the $600 million Tribeca raised under her stewardship, while on par with multi-strategy hedge-fund competitors, was perceived within Citi as a letdown. Tribeca was shuttered in September.

Beder has no regrets. "What I learned at Citi in a rather short period of time could probably not have been achieved anywhere else," she says.

"Tanya is well-versed in financial engineering and quantitative techniques in general, but more importantly, she has a clear understanding of how to actually use these tools," says Myron Scholes, the options-pricing pioneer and a Nobel Laureate in economics.

With the markets teetering and terror-filled this past summer and early autumn, Beder sat down with *Trader Monthly* for a series of conversations covering more than a few of her favorite things — among them math, the markets and her true love, risk management.

ONE-WOMAN SHOW: These days, Beder advises hedge funds on navigating perilous territory.

HOW DID YOU GET STARTED IN THE BUSINESS?

My first job on Wall Street was working in investment banking at First Boston for Joe Perella, then a young V.P. Eventually I was transferred to London. First Boston had just begun a joint venture there with Credit Suisse; it was in a separate building on Bishop's Gate. My role was to work on cross-border M&A.

HOW DID YOU GET INTO TRADING?

After my time in London, I took a leave and did graduate work at Yale in operations research; after that, I got my MBA in finance from Harvard. During my second year at Harvard, I'd started working part-time for First Boston, in the New York office. I used to fly back and forth. I worked on a project to evaluate the then-nascent interest-rate-swap business.

WERE THERE MANY DERIVATIVES THEN?

No, they were just beginning. We called them "synthetics" in those days. After I finished my MBA, I spent the next five years at First Boston in the derivatives and fixed-income trading areas. We launched interest-rate and currency swaps, then caps, collars and floors, and derivatives really took off from there.

I wrote an article for the twenty-fifth anniversary issue of *The Journal of Portfolio Management* called "The Great Risk Hunt" that was a retrospective on financial engineering and the modernization of the industry. This was in 1999, after LTCM. One of the points I made in the article was that while financial firms, including banks and insurance companies, were essentially formed in the 1700s, from the 1700s to 1970, you could argue that little had changed. It was only after 1970 that financial deregulation altered the business of financial institutions dramatically and irreversibly. So while financial institutions have a 300-year history, our financial world today, with volatility in interest rates, exchange rates, commodities and currencies — plus derivatives and risk management — came about only in the past 30 years. In the grand scheme of things, everything we're dealing with is relatively new.

WHERE WERE YOU ON BLACK MONDAY?

I left First Boston at the start of 1987 to start my own firm, SBC, which did private equity and risk management. There were no risk-management firms in 1987.

DID YOU SEE THE CRASH COMING?

No — had I seen the crash coming, I would have become a very rich young lady! My main focus in 1987 was on the travails in the mortgage markets — how to model mort-

gage prepayments better and how to apply derivatives to manage their risk. I'd spent significant time at First Boston working on some of the first CMOs and the asset/liability problems of savings-and-loans.

AFTER '87, DID MORE PEOPLE PAY CLOSER ATTENTION TO RISK MANAGEMENT?

Yes. From 1987 to the beginning of 1999, risk management was one of *the* most interesting businesses on the planet. We were beginning to apply a lot of financial theory to practice. The backdrop was stunning: In 1992, losses from derivatives totaled around $200 million. Two years later, total losses grew to $10 billion. That included Orange County, at $1.5 billion, and Piper Jaffray, at three-quarters of a billion, and David Askin's Granite Fund losses, at $600 million . . . important names were taking losses. You had Bankers Trust and BofA and Mellon and Kidder. People all over the industry began to sit up and say, "let's really pay attention to this." By 1998 — the year of LTCM — I'd say risk was at center stage.

names experiencing problems: the Bear Stearns funds, Countrywide, BNP. It's created a liquidity crisis for some who have too much dependence on single sources of capital — for example, the commercial-paper market. The big question right now is whether this will spill over to a crisis in consumer confidence or a fear-driven breakdown of credit flows. Only time will tell whether the Fed's shift from fighting inflation to preventing panic was the right call.

WOULD YOU ELABORATE A BIT ON WHAT, EXACTLY, YOU MEAN WHEN YOU SAY "VALUATION CRISIS"?

Subprime is widely dispersed throughout the system as a part of financially engineered securities. While there are some large individual losses, as I just mentioned — by those who had too many eggs in one basket or those who will lose their homes — the problem for most investors is not that their investment has gone to zero. Rather, market participants, whether investors or

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"I view today's credit-market situation as a crisis in valuation, not an economic crisis."

WHAT DID YOU THINK OF BEN BERNANKE'S MOVE [ON FRIDAY, AUGUST 17] TO INJECT LIQUIDITY INTO THE BANKING SYSTEM?

It was a very targeted move, and it was exactly what was needed at the time. It provided a lot of information about the Fed's ability to provide liquidity for a troubled sector of the market.

WHAT ABOUT THE HALF-POINT CUT [ON TUESDAY, SEPTEMBER 18]? IT WAS CERTAINLY THE FOLLOW-UP MOVE THAT THE MARKET WANTED. BUT ARE THESE NOT MERELY BAND-AIDS APPLIED TO A MASSIVE HEAD WOUND?

No. I view today's situation as a crisis in valuation, not an economic crisis of systemic proportions. The market stopped trading instruments whose values seemed unclear. Certainly it's an individual crisis for the people who may lose their homes, and for some investors who put too many eggs in one basket. We've seen some big

lenders, who have subprime-linked instruments finally reached a point where they had to ask themselves, "What is this worth?" They have to wait for that answer as the system works itself out. While they wait, they've been running to a safety in valuation. They have revamped their activities to include a higher proportion of highly liquid, easy-to-value instruments.

HOW DOES THIS RECENT "MELTDOWN" SCARE ON WALL STREET COMPARE TO THE SUMMER OF LTCM?

When LTCM happened, you pretty much could put in a room all the people it touched. The regulators could call together the firms that had LTCM-type positions. Here, to call together all the people who had some kind of exposure to subprime — because it has been so well dispersed into financially engineered instruments such as CMOs, CDOs, CLOs and whatnot — would be extremely difficult. So in this way, the current situation varies from the past. In other ways, it's history repeating itself. In the

late '80s, we had a valuation and liquidity crisis with highly leveraged transactions, lesser-developed-country debt and the overhang of the commercial real-estate market. At the time, there were glitches in the commercial-paper and in the repo markets much like what we're seeing now.

There are similarities to the early 1990s as well, when the bull market on interest rates drove people to figure out ways to get more yield. Investors bought instruments that had high internal leverage, or they leveraged a lot by borrowing money. The financially engineered instruments of the time were inverse floaters, kitchen-sink bonds and LIBOR-cubed kinds of transactions. Many investors went into them, and lo and behold, when the Federal Reserve started raising rates in 1994, people discovered that their inverse floaters, while meeting classic risk guidelines such as "two years in maturity and triple-A in credit rating," were triple-D on the volatility scale. Investors learned painfully that the extra yield they'd enjoyed was not without extra risks.

This is much the same as the case today. We have CDOs squared and cubed and other instruments that are highly levered and created to flourish in a high-liquidity, low-rate environment. However, the highly rated paper linked to subprime is showing that its extra return was not without extra risks.

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CAN WE TALK ABOUT QUANT TRADING? SOME PEOPLE HAVE BLAMED COMPUTER MODELS FOR THE RECENT VOLATILITY. WHAT'S YOUR TAKE?

Quant trading certainly has played a part in the summer's volatility. Estimates are that there is $1.5 trillion in quant trading that is non-passive-index-based. This is across both traditional and alternative styles. Leverage makes this two to eight times higher, depending upon market conditions.

Higher leverage tends to be used in periods of low volatility, such as the environment we've seen during the past few years. The reason was simple: There was less movement in prices, so more leverage was required to create returns. In a higher-volatility environment, such as we have now, the natural course is to deleverage trading books at a time of lower liquidity. So instead of being five times levered, portfolio managers may voluntarily or involuntarily reduce to two or three times. This results in a lot of buying and selling volume to cover shorts and longs. This is not computers running amok. It's massive unwinding. It's traders reducing positions.

The thing to remember about quant trading is that nothing works in all markets, and nothing lasts forever. During transitions, quant books notoriously stumble. When markets switched from growth to value in 2000, quant models suffered. In Europe last year, when markets reversed from mid-cap to large-cap being in favor, same thing. At such times, every trading strategy must make a difficult call: Is this a temporary phenomenon or a paradigm shift? During early August, quant books faced yet another challenge: unprecedented losses for many that may have been driven by the massive liquidation of a large trading book. For quant books that did not liquidate during the painful days, August 10 brought a huge rebound in net asset value. This suggests a high correlation among certain quant-trading styles.

> "I've always believed the best trading strategies are a marriage of humans and technology."

I'm a heavy-duty quant fan. But I believe the best trading strategies are a marriage of humans and technology. I would never go totally to computers. I love how computers can leverage good trading. But I don't think they can take over for humans completely.

The question for quant books prior to the August rout was this: Are there events or pieces of information driving the market that my system doesn't incorporate, that can't be quantified the way the data can be in a "normal trading environment"? After the events of early August, we add the question: Does the high correlation of certain quant trading styles drive greater systemic risk?

DO WE NEED TO BE CONCERNED?

Yes and no. For example, price data behavior for a target's stock in a tender offer is not normal. The stock

price may rise when the fundamentals say it's a short. So we should not be concerned that price behavior can be erratic and irrational during market deleveraging or in a market where people say, "I don't care that you have a very high-quality portfolio of loans; it's a mortgage, maybe a subprime mortgage, and I don't want it."

It doesn't matter how much you've analyzed historical data, a supply-demand imbalance or a behavioral-finance issue can blow up historical relationships. Most quant systems and most discretionary traders need to readjust to trade through the turmoil. So often portfolio managers — quant and non-quant alike — get much lighter until it settles down. However, we should be concerned that in early August some quant books appeared to have much wilder swings than expected.

WHO IS YOUR FAVORITE MATHEMATICIAN OF ALL TIME?

Georg Cantor. He was a Russian who revolutionized mathematics during the latter part of the nineteenth century. He's best known as the creator of set theory and for his contributions to the foundations of math. He proved a theorem that implies the existence of higher orders of infinity. A lot of his contemporaries attacked him, but today his theories are widely used and accepted. I have always been quite fascinated with the concept of an infinity of infinities, but then again, there are probably about 10 people in the entire world who care about it.

AN INFINITY OF INFINITIES? YOU'RE BLOWING OUR MIND.

Yes, there are different kinds of infinity. As children we learn to count zero, one, two, three . . . and we learn that there is no end to counting. Cantor proved that this counting infinity has a certain size but that the real numbers between zero and one — what we study as fractions, square roots, repeating decimals — are more numerous than this counting infinity. It's all about "alephs." That's a whole other conversation!

ONE THAT COULD GO ON FOREVER. DO YOU SPEAK WITH OTHER QUANTS?

One of the first quant groups on Wall Street that we put together was the International Association of Financial Engineers, the IAFE. This organization still exists, and its early mission was to foster the interaction between academia and the practitioner world as we started using computers, financial engineering, derivatives and risk management in finance.

The organization was devoted to fostering that interaction, and boasts many luminaries as senior fellows. [IAFE senior fellows include Phelim Boyle, Jon Cox, Emanuel Derman, Darrell Durrie, John Hull, Jonathan Ingersoll, Robert Jarrow, Andrew Lo, Harry Markowitz, Leo Melamed, Robert Merton, Stephen Ross, Mark Rubinstein, Paul Samuelson, Myron Scholes, William Sharpe and Oldrich Vasicek.] Before they passed away, Fischer Black, Merton Miller and Franco Modigliani were also senior fellows of the IAFE. There are several other groups with a quant focus in which I've been active, such as the Chicago Quantitative Alliance, the National Science Foundation and the National Board of Mathematics.

WHAT ARE SOME UNSOLVED MATH PROBLEMS THAT THE WORLD'S BEST MATHEMATICIANS ARE STILL FURIOUSLY TRYING TO SOLVE?

Leaving aside some of the unsolved problems in theoretical mathematics — some in higher orders of infinity and a few that, if you solve, there are millions of dollars in prizes waiting for you — I'll pick some problems in everyday finance: options pricing and mortgages. We trade trillions of dollars of options every day, and we have lots of options models, but none of them work perfectly. We've been trying to model mortgages since they started as a marketplace, and the one rule about mortgages is that whatever you expect the cash flow to be from that instrument on the day you buy it is probably the one thing that won't happen.

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"With the mortgage market, whatever you expect the cash flow to be is probably not going to happen."

IT ALMOST SOUNDS LIKE A VARIATION OF MURPHY'S LAW.
No doubt there are a few subprime holders who agree with your sentiment!

WELL, THERE ARE MATHEMATICAL CERTAINTIES, AND THEN THERE ARE THINGS THAT INVOLVE ASSUMPTIONS. ONCE YOU INCLUDE THE LATTER, YOU CAN'T GET THE CERTAINTY FROM SAID ASSUMPTIONS.
Correct. And not to go too far off into math . . .

WE'RE ALREADY THERE.
Then allow me to set down four things that are important about mathematics and finance. One: The mathematics we use in finance is based on something called rational expectations. But the markets are not rational. Two: Math knows how to get to only one answer at a time. Yet we know that instruments trade at two different prices simultaneously all the time.

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RIGHT — WE CAN BOTH GO TO A HOT-DOG VENDOR ON THE SAME CORNER AND GET A DIFFERENT PRICE FOR THE SAME HOT DOG.
Yes. But theoretical math doesn't know how to have two answers given the same set of inputs. So to continue, the third thing is that most math assumes that price movements are continuous, meaning that if the price goes from 100 to 90 or 100 to 105, it actually moves through the prices in between. In the real world, this is not the case.

THE MARKETS CAN JUST JUMP STRAIGHT THROUGH.
Yes, prices "gap" all the time. What we're trying to do is wrap practical math around a mercurial beast.

AND WHAT IS THE FOURTH THING?
Most math has a need for equilibrium pricing, that there is an equilibrium price at which the market will settle. As we see right now with subprime, this is not always the case in the short run. Nevertheless, we've got to use the tools that are available. So to be a good quant on Wall Street requires understanding both what the numbers do and what they *don't* do.

CAN YOU TAKE US THROUGH YOUR EXPERIENCE AT TRIBECA?
It was terrific. It's not often that the world's largest bank commits up to $2 billion for a new hedge-fund initiative. There were two funds. One was convertible arbitrage, distressed debt and merger arbitrage; that fund was there when I joined in 2004. The second fund, a global multi-strategy fund, we started after I arrived.

TRIBECA RECRUITED A LOT OF TRADERS.
Yes, many of them came from well-known hedge funds, having left large Wall Street firms. They traded across the global equity, commodity, interest-rate, currency and credit markets, and added more than 100 professionals to the team.

"Tribeca was terrific. But life changes in large corporations. It wasn't for me anymore."

WHY DID YOU LEAVE?
Life changes in large corporations — they may change their mind about what they want to do. I resigned toward the end of 2006. It wasn't for me anymore. I decided it was time to move on to the next challenge.

WHAT WERE YOUR THOUGHTS ON TRIBECA'S RECENT CLOSURE?
It was a shame, because it was terrific team. I'm very proud of what we accomplished at Tribeca. In 2006, after Tribeca opened to outside investors, Citi received the institutional-investment manager of the year award.

I was grateful for what I learned in such a short time at Citi. My career has progressed from mergers and acquisitions to derivatives to risk to quant trading to investment management and hedge funds. Each step was driven by opportunities given the cycle in the marketplace. I believe that risk again will be interesting, as will the evolution of the next round of business models in asset management. So I'm focused on these areas. ■