

ACCORDING TO

THE WORLD

BRUCE JACOBS

Bruce Jacobs is a cofounder and principal of Jacobs Levy Equity Management, a \$7 billion asset manager that specializes in quantitative equity strategies for various U.S. benchmarks. Author of the recently published *Capital Ideas and Market Realities: Option Replication, Investor Behavior, and Stock Market Crashes*, he holds a Ph.D. in finance from the Wharton School at the University of Pennsylvania. He spoke with editor Joe Kolman in December.

Derivatives Strategy: One of the principal arguments in your book is that we haven't learned the lessons of the 1987 crash. Why is that?

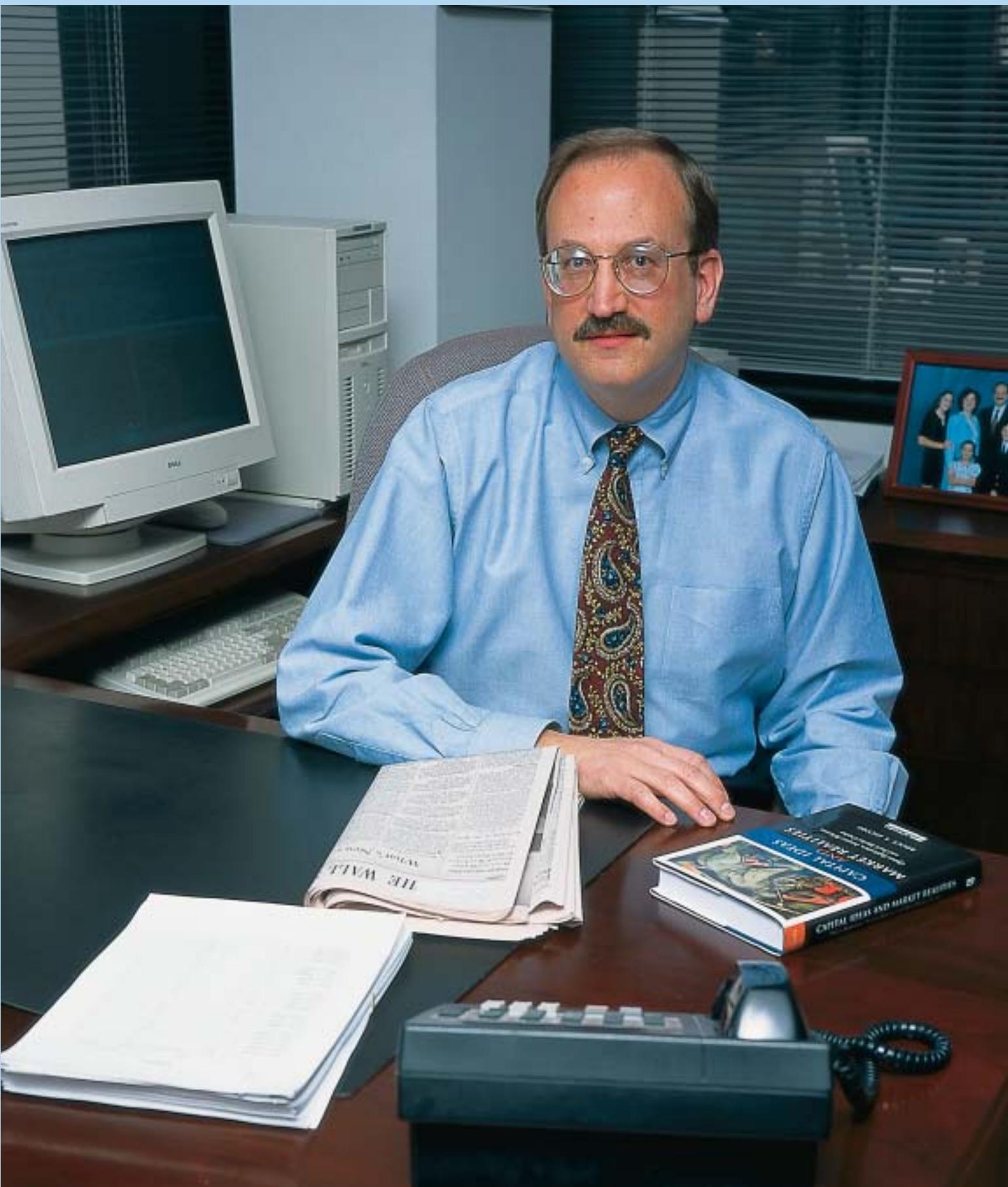
Bruce Jacobs: One of the biggest problems is the alibis of those who were vendors of portfolio insurance. If they had owned up to the problems that option replication gave rise to in the 1980s, we might have been more cognizant of the potential problems in the 1990s and the markets might not have suffered as much as they did recently.

Portfolio insurance is a form of option replication. Option replication requires trend-following, positive-feedback trading, which can whip up its own storm, causing the markets to cascade downward. It's like a household thermostat that's gone berserk. The hotter the room gets, the more it calls for heating; the colder the room, the more it calls for cooling. It raises the temperature of the market to extremes—high or low—based on its trend-following trading.

Unfortunately, those who were

involved in the creation of the option-pricing formula and in offering portfolio insurance strategies didn't really own up to the severity of the effects of portfolio insurance for the crash of 1987. They created a number of excuses to avoid blame.

Hayne Leland offered the alibi that there was no portfolio insurance in 1929 and yet the markets crashed then, so how could portfolio insurance be the cause of the crash in 1987? He ignores the tremendous margining of stock in the 1920s, which led to levered positions in eq-



uities and massive amounts of forced selling because of the margin calls of 1929. In fact, I find that the forced selling in 1987 required by those using portfolio insurance was of the same magnitude as the forced selling back in 1929.

Mark Rubinstein and Richard Roll argued that the crash was international in scope, while portfolio insurance was strictly a U.S. phenomenon—so how could a U.S. phenomenon cause a global crash? Roll added that the crash on Monday, October 19, 1987, began overseas—and not in the United States.

Well, the markets always open overseas first. On that Monday, overseas markets were responding to three days of dramatic downward declines in the U.S. market. Most people forget that the U.S. decline over the previous Wednesday, Thursday and Friday was larger than any three-day decline since the fall of continental Europe in World War II. The crash became global because panicky investors across the world sold positions on the assumption that something fundamental must have gone awry. Yet there was never any evidence of fundamental problems.

Another alibi that Merton Miller, Myron Scholes and others used was that portfolio insurance sales were just a small fraction of sales on Monday, October 19, so how could they be a cause of the crash?

But portfolio insurers alone accounted for about 40 percent of futures volume on the day of the crash. The percentage of large-trader stock sales related to portfolio insurance was about 20 percent. But what really matters is the net selling: Portfolio insurers sold 16 times as much as they bought in the futures markets, and they sold four times as much as they bought in the stock market. They were the only category of investor doing a tremendous amount of selling in both markets. The liquidity they would have needed to pull off the sales required by



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their portfolio insurance programs would have equaled at least four days' worth of trading volume. Of course, there were not enough buyers to support their needs.

DS: And portfolio insurance never really died.

BJ: The portfolio insurance strategy came to a close after the crash of 1987, but its spirit lives on. Today you can purchase the same put protection with over-the-counter options. And OTC option dealers need to hedge their positions dynamically, because there is far more demand for puts and calls than there are natural suppliers. This dynamic hedging results in a series of trend-following trades, which can have explosive impacts on markets. Given the connections between different markets and countries these days, it can lead to tremendous systemic risk.

DS: Why is there such a shortage of natural counterparties?

BJ: It's difficult to find risk-takers

or speculators willing to be on the short side of options trades, because those are naked positions that could entail unlimited losses. Investors tend to be driven by fear of loss and greed for gain. As a result, they prefer either the protection of puts or the upside opportunity offered by calls. In the United States, where investors have traditionally participated in equities, they think in terms of puts. Overseas, especially in Europe, where investors have preferred bonds, they often buy call options on equity to provide the upside. In Europe, in fact, there is growing interest in guaranteed equity products that offer the same features as the portfolio insurance product—downside protection with the upside. But when brokers sell guaranteed equity products to the community of retail investors, they need to hedge the market risk they've taken on. They typically purchase equity call options from OTC houses, and those OTC houses in turn do the same dynamic hedging that portfolio insurers did in the 1980s.

DS: Do you have a sense of how big

this new population is relative to its predecessors in the 1980s?

BJ: In 1987, portfolio insurance amounted to about \$100 billion in underlying equity. The notional value of OTC equity options globally, as last reported, was more than \$1.3 trillion; in the United States alone, it was almost \$260 billion. The notional value of exchange-traded stock index options is nearing \$3 trillion globally, with most in the United States. Exchange-traded options can also have a big impact on the market, because the locals on the floor of the exchange act as suppliers of options and often need to hedge their positions dynamically.

DS: Not to mention the population of trend-following futures trading firms.

BJ: It doesn't take too many players to have a dramatic impact on markets, as we saw in 1987 and as we saw more recently with Long-Term Capital Management, because of the potential illiquidity of their positions. What we're finding increasingly is that these sorts of strategies whip up their own storms, giving rise to more volatility and becoming the seeds of their own destruction.

DS: In 1987, there was tremendous selling before the crash. What scenarios would be likely now? Would there be different scenarios as a result of different market phenomena?

BJ: All it takes is a minor trigger to give rise to an informational cascade. In 1987, there were some minor triggers but no fundamental economic problems. In 1997, the Asian flu was the trig-

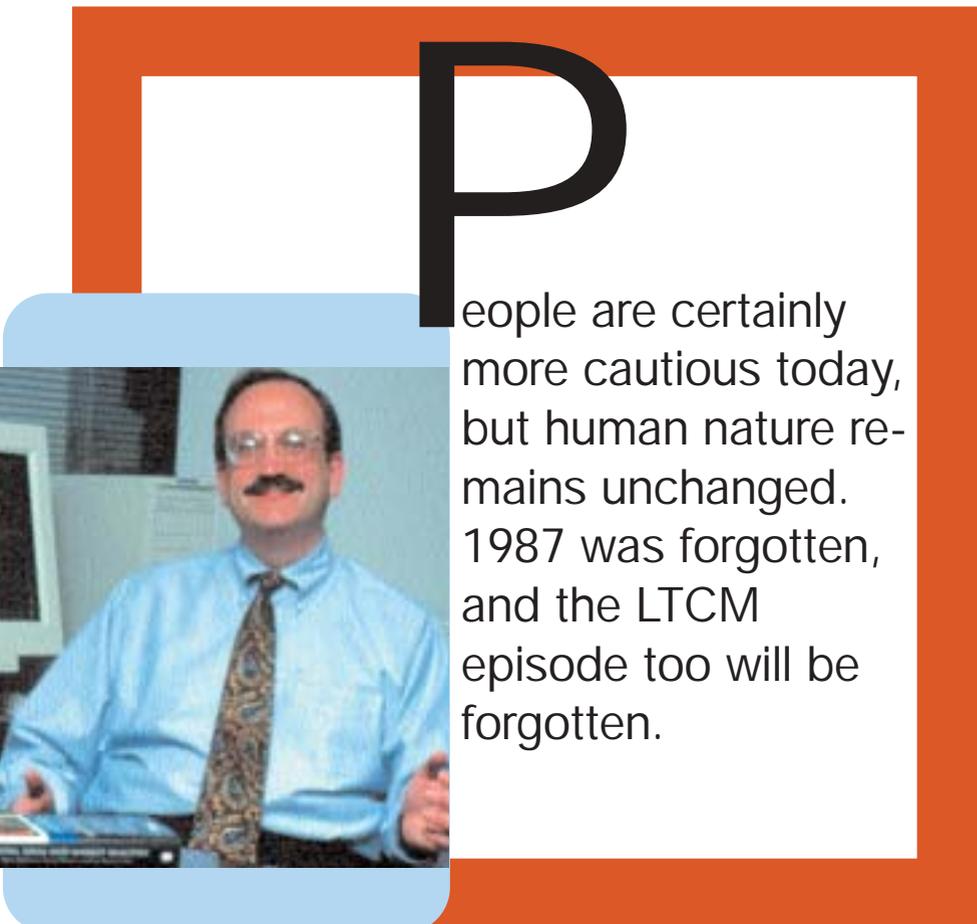
ger. In 1998, it was the Russian default.

When substantial selling is forced by the nature of a strategy's stop-loss rules—either a portfolio insurance strategy's selling in falling markets or an unwinding of existing positions such as what happened with LTCM—the result is illiquidity. The markets dry up and investors panic. Front-runners come into play. Prices begin cascading down, and gaps in prices occur. We saw big gaps in 1987, when the markets declined by 23 percent in a single day. This is the same order of magnitude as the 1929 decline, but that decline occurred in two days. We saw dramatic declines in the markets globally and in the United States, precipitated by the Russian default in 1998. Yet there were no fundamental economic problems in the United States. These strategies tend to concentrate the number of investors and the size of assets that are subject to selling on demand, consuming market liquidity and causing market crashes.

DS: The fixed-income markets were completely out of whack, but the equity markets didn't fall apart as badly. Why?

BJ: In 1998, the primary trigger, the Russian default, occurred in the bond market, and the primary effects were felt in that market. Among these were the large losses on LTCM's bond arbitrage positions. But LTCM's second-largest loss occurred on the equity options it had sold in Europe. The Russian default and the ensuing flight to quality and liquidity had a huge secondary effect on equity markets worldwide. Selling by LTCM and similarly positioned hedge funds and proprietary trading desks intensified this effect. The equity markets gyrated in 1997 and in 1998 far more than one would normally have expected in the absence of big changes in economic fundamentals.

DS: In your mind, are we poised



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for a repeat of the phenomena of 1929, 1987, 1997 and 1998?

BJ: We're at risk that minor triggers will give rise to cascading selling, because of the nature of these strategies and their unknown demands for liquidity.

DS: How do you reconcile the ongoing bull market with your views?

BJ: In the last dozen years, we've seen an extremely different type of pricing environment. We used to see severe market declines during periods of economic depression or in bank panics. What we tend to see now is broad, trend-following behavior. The substantial and almost continual economic growth over the last couple of decades has pushed the market to much higher levels. The option strategies, which follow trend-following rules, will inevitably cause markets to continue to rise as long as they are on an uptrend. People tend to base their decisions on pricing signals and everyone then becomes more momentum-based.

The bear, however, is lurking in the background. All it takes is a minor trigger to give rise to a dramatic fall. While we have this broad upward-trending behavior, we've also had quite severe and frequent market breaks. We saw this in the precursors to the October 1987 crash—in September 1986 and in January 1987. We saw this in 1989, 1991, 1997 and 1998.

DS: Why do the types of strategies that cause this disruptive behavior persist?

BJ: There has been a proliferation of what I call "something for nothing" strategies. These are strategies that present the notion that you can divorce risk from return, and—having immunized risk—lever your positions almost infinitely. Portfolio insurance was certainly that sort of strategy. It was of-

fered as a panacea for all investment problems. It promised downside protection and upside capture. It suggested that you could lever your holdings to increase your investment return without incurring any additional risk, because the put protection floor would be in place.

The same sort of notion was the basis of the allure of LTCM. The notion that you can totally immunize your risk stems from the same arbitrage pricing theory that the Black-Scholes-Merton model is based on. Given an arbitrage of related instruments, risk is, theoretically, almost nonexistent, and hence you can lever as much as you want to achieve any return you want. The belief there is that you can turn the normal relationships between risk and return upside down.

DS: Since the LTCM debacle, the market has a better sense of the limitations of those strategies, particularly the dangers of illiquidity. We've moved a bit further in our understanding, but perhaps you don't think it's far enough.

BJ: People are certainly more cautious today, but human nature remains unchanged. 1987 was forgotten, and the LTCM episode too will be forgotten. It's just a matter of time before another strategy is successful enough to attract enough dollars to lead to illiquid positions that require unwinding—which will devastate the markets again. Meanwhile, investment banks and OTC dealers are engaging in lots of trend-following option replication.

DS: It seems inevitable that OTC dealers, prop desks, hedge funds and others will always take positions that are relatively illiquid. They'll do it to take on more risk or to get ahead of their rivals. That's how they make money. So it also seems inevitable that things aren't going to change.

BJ: What can lead to change is more disclosure of positions, more transparency, and a greater understanding of these strategies and their impacts on markets. In MBA programs, we learn that options are used to control risk and that they're similar to insurance. But options are quite different from insurance. Options entail risk-shifting, not risk-sharing. The risk ends up being shifted to unwitting participants and to the markets themselves when there is no natural counterparty willing to take on the other side. ■