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The darker side of options pricing theory

By Bruce I. Jacobs

Scientific breakthroughs often give rise to unintended consequences. For example, atomic theory enabled the wonders of nuclear energy, but also gave birth to the atom bomb. I couldn't help but think of this analogy when the Nobel prize in economics was awarded this year to Myron S. Scholes and Robert C. Merton for their work on option pricing theory.

Messrs. Scholes and Merton, together with the late Fischer Black, solved the problem of option pricing by noting the equivalence, at least in theory, between options and dynamic positions in the underlying risky asset and cash. The pricing formula recognizes the arbitrage between the option instrument and this replicating portfolio.

Options per se and the pricing formula itself are valuable and benign. However, the replicating portfolios implicit in the pricing formula opened the door to the creation of synthetic options. That is, by taking and trading positions in the underlying asset and cash, investors could construct a portfo-

lio that would, in theory, replicate the behavior of the option. This outcome from Black-Scholes-Merton's central insight poses grave dangers for markets.

Demand outstrips supply

There is greater natural demand for put and call option positions than there is natural supply, because of human nature—fear and greed. Puts can provide safety by protecting against losses, just as insurance does. Calls can provide speculative enjoyment, as do lottery tickets. But sellers of puts and calls, in exchange for the option premium, risk large losses; if they're unhedged, they risk everything.

In the absence of sufficient natural counterparties to meet the demand for puts and calls, locals on options exchanges, OTC dealers and others may step in for a large enough premium. That is, they can meet the demand by selling puts and calls. In doing so, they become short the options; they can neutralize their risk exposure by synthetically replicating long option positions.

Replicating long put and call option

positions requires selling as the market falls and buying as it rises. These are trend-following trading rules that are driven only by price changes. Because other investors do not know this, however, they may misread the trades as containing information about fundamentals. They will then be encouraged to trade in the same direction as the dynamic hedgers, or discouraged from taking the other side of hedgers' trades. This can exaggerate market moves.

Market moves become exaggerated

When dynamic hedging calls for buying, it can cause prices to rise more than they otherwise would, thereby exaggerating upward market moves. Prices can rise above the levels supportable by fundamentals. The higher prices rise above fundamental values, the more fragile the market becomes. At some point, even slightly bad news can trigger a price decline. At that point, dynamic hedging programs will call for selling, which can exaggerate downward market moves.

In both cases, dynamic hedgers' trading has the potential to create a snowball

effect by pulling in other investors who will also trade in the same direction as the market. Given investors tendency to be more averse to losses than desirous of gains, however, panic selling is likely to be more pronounced than manic buying.

Dynamic hedging thus has the power to blow up the market. This is what portfolio insurance, a form of dynamic hedging, did on Oct. 19, 1987. The market fell 23% on that day, the steepest one-day percentage decline in its history. More recently, the dynamic hedging associated with OTC puts has been blamed for several bouts of market instability, notably in 1989, 1991, and, possibly, October 1997.

Market volatility today has, if anything, increased the demand for OTC options, as well as for retail products promising equity participation with a guarantee of initial investment. The threat to markets is only increased by the fact that no

one really knows the extent of dynamic hedging being undertaken in association with these instruments.

Options can be wonderful instruments for controlling risk. But risk is an unavoidable part of financial markets in the aggregate. Risk can be shifted, but it can't be eliminated. We forget this at our peril.

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