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The Nobel prize for economics

The right option

Oct 16th 1997

From The Economist print edition

ECONOMISTS may sometimes seem about as useful as a chocolate tea-pot, but as this year's Nobel prize for economics shows, it isn't always so. On October 14th, the \$1m prize was awarded to two Americans, Robert Merton, of Harvard University, and Myron Scholes, of Stanford University. Their prize-winning work involves precisely the sort of mind-boggling mathematical formulae that usually cause non-economists either to snooze or scream. That is too bad, for it ranks among the most useful work that economics has produced.

What Mr Merton and Mr Scholes did, back in 1973, was to put a price on risk. Their work on how to price financial options, carried out with the late Fischer Black, turned risk management from a guessing game into a science. The complex Black-Scholes option pricing model ("It should probably be called the Black-Merton-Scholes paper," Mr Black once said) and its subsequent evolutions, led to explosive growth in stock options and other financial derivatives (see [chart](#)). It also opened the era of the Wall Street rocket-scientist, a strategist schooled in physics or mathematics who makes money crunching numbers rather than playing hunches.

Although derivatives often come dressed up in fancy names, among them swaptions and quantos, they really boil down to two basic sorts of financial instrument: forward contracts and options. A forward commits the user to buying or selling an asset—say a Treasury bill, or dollars—at a specific price on a specific date in the future. It is rather easy to price. The main difficulty is working out the cost of carrying the asset until it changes hands.

An option gives the buyer the right, but not the obligation, to sell or buy a particular asset at a particular price, on or before a specified date. Pricing one is a trickier affair, as it involves putting a number on the probability that a buyer will exercise his option. Until 1973 that was largely a matter of guesswork—which is why, though options first arose centuries earlier, the market for them remained tiny. But the Black-Scholes formula was published in May 1973, just after the world's first options exchange had opened in Chicago. Within a year it was being used by every trader. The rest, as they say, is history.

The economists found what mathematicians call a "closed-form solution". In essence this meant that sellers of options could bung in a number of variables and the model would churn out a price. The big advantage of the formula is that it does not require option sellers to take a view on which way the price of the underlying asset will move. It is not entirely fool-proof: some of the variables, such as the risk-free interest-rate and the volatility of the underlying asset, may change over time. Also, the formula does not deal well with very large price movements. Nonetheless, the Black-Scholes formula gave option sellers a far more precise way to work out what an option is worth.

The option-pricing work of Messrs Black, Merton and Scholes was based on a clever and fundamental insight. This was that any asset, from a government bond to a bar of gold, is essentially a mixture of forward contracts and options. By, in effect, breaking down assets into constituent parts, it is possible to get rid of precisely those risks you do not want to keep and take on precisely those that you do. Breaking assets into their core bits allows the canny investor to spot cases where—hidden in, say, an Italian bond, or an American mortgage-backed security—certain sorts of risk are over-or underpriced relative to the market average. Arbitraging these price differences away has earned Wall Street a good deal of money.

This sort of arbitrage is precisely what Mr Merton and Mr Scholes are doing through Long-Term Capital Management, a hedge fund they helped create three years ago. Typically, the fund has around 20 highly diversified active investments in place around the world at any one time, with all but the precise risks the firm wants to bear hedged. The results have been impressive: high returns, with low volatility—every investor

dream. Already, the fund is said to have earned its founders profits of \$1 billion. Thanks to the widespread use of their formula, however, such arbitrage opportunities are becoming rarer. Indeed, Long-Term Capital Management is returning to clients a large chunk of the \$6 billion it manages because it cannot find enough opportunities in which to invest. Perhaps its begetters should have kept their bright idea to themselves.

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