Research Department
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FRBSF Weekly Letter

Options Fever

The rapidly changing financial environment of recent years has stimulated innovation in the financial markets. Market participants, for example, have sought new instruments to help them cope with volatile interest rates and asset prices.

Although much of the innovation has occurred in the money markets (that is, the cash instruments markets), there have been rapid innovations in ancillary markets as well, particularly the options market. Just in the last few months, for example, trading has begun in options on Treasury instruments on the American Stock Exchange (AMEX) and the Chicago Board Options Exchange (CBOE), and in options on futures on Treasury bonds at the Chicago Board of Trade (CBOT). Options on sugar and gold are now being traded on the commodity exchanges and the Philadelphia Stock Exchange is trading an option on the British pound with future plans for options on other currencies. There are even proposals by AMEX and the Chicago Mercantile Exchange (CME) to offer options linked to *indices* of stock prices (such as the Standard and Poor 500 Index, in the case of the CME.)

What are options?

A number of developments are responsible for the recent surge in options activity and they all relate to the special function that options perform. Like so many other financial instruments, options exist because the marketplace needs devices to facilitate the redistribution of risk among market participants.

An option, simply put, is a contract that gives a party the right (but not the obligation) to buy or sell an asset of some kind (the "underlying security"). The contract typically stipulates the price at which the underlying security is to be bought or sold (the "exercise price") and the date on which the ability to exercise the option expires (the "exercise date"). If the holder of the option contract has the right to sell the underlying security, the option is called a *put* option and if he has the right to buy, a *call* option.

Because an option entails rights without obligation, the option holder's losses are limited to the price he pays for the option with hypothetically unbounded opportunities for gain. (The option holder thus enjoys "limited downside risk.") The *seller* of the option, of course, is in the opposite position. He takes the risk of compensating the holder in return for being paid the price of the option. Thus, the option is clearly a device for transferring risk to those who wish to bear it from those who do not.

The market will determine the price at which such risk transferance occurs, and hence, the price of the option. Generally, the price of the option is low compared to the value of the securities it is written on, giving the holder an opportunity for a leveraged investment. Of course, the more volatile the potential movement in the underlying security the higher the option price in the market because the market requires compensation for leverage opportunities.

Many financial instruments perform a similar risk transference function. These include *futures* contracts which *obligate* one of the parties to the delivery of the underlying security at a future date and stipulated price. The distinguishing feature of an options contract, from the holder's point of view, is the lack of this obligation—the feature of "limited downside risk."

Option strategies

The basic uses of options follow directly from these basic risk and leverage features. One obvious use is in a hedging strategy. A business firm, for example, may be anticipating a future inflow of foreign currency and wish to protect itself against possible devaluations in that currency. If an option to sell currency at a known price could be purchased today

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(i.e. a put option in the currency), the firm could protect itself against such an eventuality. If the currency devalued during the life of the option, the firm could then exercise its right to sell the currency at the exercise price and not suffer the effects of the devaluation.

Similar protection could be obtained in a currency futures market by entering into a contract to promise delivery of the currency at the desired price. With an option, however, the firm acquires protection without committing itself to supplying the foreign currency in the eventuality that the business transaction does not materialize. The cost of achieving this flexibility, of course, is part of the price of the option, but this is known in advance.

The second major use of options is in speculation. An investor with strong views about the way the price of an underlying security is going to move can identify options he feels are "underpriced." (An underpriced option is one to which the market has attached a price inconsistent with that of the investor's calculation.) The speculation is, thus, in the movement of the options prices themselves. The speculator's presence in the market is as important as that of the hedger—he increases activity in the market and, indeed, is likely to be the "risk-taker" on the other side of a hedger's transaction.

The bad old days

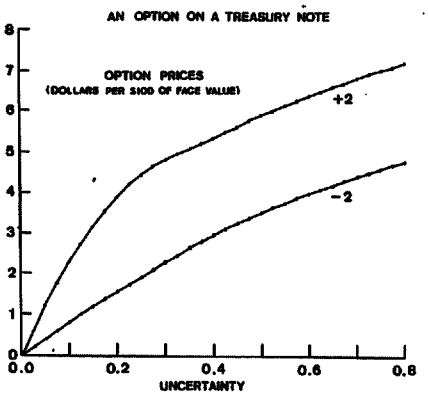
It was partly because of a misunderstanding of the role of the speculator in the options market that organized options markets have been late to develop in this country. Government regulators and, indeed, some investors themselves have been wary of the potentially destabilizing effects of "overspeculation." They feared a market occupied strictly by "gamblers" without "legitimate" participants such as the hedger in the example cited above. As recently as 1978, Congress restricted trading in commodity options. The circumstances that precipitated the restrictions involved fraud committed by U.S. dealers trading options on London commodity exchanges, not the actions of U.S. speculators or exchanges. However, the incident illustrates the sensitivity of policymakers to potential sources of market instability.

Government can provide a valuable policing function in financial markets, but until very recently, the regulatory efforts needed to oversee the options market were not well coordinated. The Commodity Futures Trading Commission (CFTC) was established in 1975 expressly to monitor the commodity futures markets, but the distinction between its powers in the options arena and those of the Securities and Exchange Commission (SEC) was unclear and applications for new option instruments were seriously backlogged.

Regulatory reform

The issue of coordination now appears on its way to being resolved with the codification of the Johnson-Shad Accord—the informal agreement between the respective directors of the CFTC and the SEC. Only part of the legislative ratification of this accord (Public Law 97-303) has been enacted as of this writing. It appears, however, that the SEC will have responsibility over options issued by organized stock exchanges (such as AMEX) and options exchanges (such as CBOE). The CFTC will have authority over options issued by the commodity futures exchanges and boards of trade (such as the CBOT and CME). Thus, issuance of options directly on Treasury securities will be overseen by the SEC, whereas an option on a *future* on a Treasury security will be under the jurisdiction of the CFTC.

In both cases, the regulatory body will review proposals by the exchanges or boards of trade for new options and evaluate the capability of the exchange and the marketplace to accommodate such an option. Considerations in their review include the likely level of activity in the market for the option, problems of defining the underlying issue in a clear manner, and the specific features (such as the life and timing of exercise dates) of the option.



The figure presents the theoretical price of a 3-month put option on a 10-year Treasury note carrying a 10.5 percent coupon. Two puts are presented, one with an exercise price $2 above the market value of the note (+2) and one $2 below (−2). The model uses a forecast of 10-year interest rate drift derived by the author. "Uncertainty" is measured as the standard error of the forecast, and illustrates the sensitivity of option prices to potential volatility in rates.

Why now?

The clarification of the regulatory functions of the CFTC and the SEC is partially responsible for the recent flurry of options activity. In fact, the CFTC has a formal 3-year pilot program in which the various exchanges have been given an opportunity to demonstrate the usefulness of new option instruments. This may help explain the creation of eight new options instruments on seven different exchanges in the last three months alone.

Other factors have also influenced options activity. The prices of virtually all of the securities that underlie the new options, for example, have been extremely volatile in recent years. Treasury bill rates, which varied little for decades, have been as high as 14.4 percent and as low as 7.4 percent in this last year alone. Similarly, the trade-weighted index of the dollar against foreign exchange rates has changed by more than 25 percent in the last two years. This volatility has created demand for options both as hedges and as speculative investments. For hedgers, options offer a unique form of protection from the new uncertainty in asset prices. From the speculators' point of view, the volatility increases the potential for market "underpricing" of options and offers them the chance to second-guess the market.

Options pricing

Interest in options has also been enhanced by new developments in the theory of options pricing. Particularly for the speculative trader, it is important to be able to derive theoretically consistent prices for options in order to determine whether an underpriced option exists. The theoretical work of Fisher Black and Myron Scholes in 1973 permitted speculators to incorporate their assumptions in a model that determines what the price of an option *should* be versus its actual trading price. The original Black-Scholes formulation was applied only to options on corporate equities, but, although it has been difficult, some progress has been made in extending pricing theory to other underlying securities. (The chart illustrates the application of a model in use at this Reserve Bank to price options on debt securities. More details on this model will be forthcoming in future Bank publications.)

Limitations

Despite the theoretical and regulatory changes, and the changes in the economic environment, the opportunities for the continued explosive development of the options market are limited by two considerations. First, the underlying security must be traded on a sufficiently active basis to generate a substantive need for hedging and other strategies. Otherwise, option market participants may find the market for the options to be too "thin" for options to be priced and traded reliably.

Second, the underlying security must be clearly definable for the participants in the market to understand its behavior and its relationship to other components of their portfolio (such as futures contracts). Such issues can usually be resolved to the satisfaction of the regulators and the marketplace, but resolution becomes more difficult as the variations in the underlying instrument become more complex. In the case of an option on a bond, for example, the coupon rate, callability and maturity features of an acceptable underlying issue must be clearly set out in the option terms.

This problem is even more difficult in the case of options written on abstract instruments, such as an index on stock prices. Although such an option may be attractive to an investor interested in protecting the value of a broad-based stock portfolio, it is complicated for most potential writers of such options to protect themselves from the opposite risk (by, say, holding a similar inventory of the underlying securities). Thus, index-based options are being offered somewhat more slowly than commodity, financial, and currency options.

Nonetheless, they, too will provide an important addition to these valuable devices for dealing with risk in the marketplace.

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT

(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 12/15/82	Change from 12/8/82	Change from year ago Dollar	Change from year ago Percent
Loans (gross, adjusted) and investments*	162,578	777	5,598	3.6
Loans (gross, adjusted) — total#	142,573	632	6,693	4.9
Commercial and industrial	45,032	108	3,020	7.2
Real estate	57,439	− 9	1,638	2.9
Loans to individuals	23,789	162	290	1.2
Securities loans	2,963	459	701	31.0
U.S. Treasury securities*	7,005	58	1,154	19.7
Other securities*	13,000	87	− 2,249	− 14.7
Demand deposits — total#	44,086	2,244	1,247	2.9
Demand deposits — adjusted	28,382	− 859	− 267	− 0.9
Savings deposits — total	37,206	4,303	7,097	23.6
Time deposits — total#	93,083	−3,840	4,073	4.6
Individuals, part. & corp.	83,145	−3,893	2,923	3.6
(Large negotiable CD's)	32,343	−1,173	− 3,194	− 9.0

Weekly Averages of Daily Figures	Week ended 12/15/82	Week ended 12/8/82	Comparable year-ago period
Member Bank Reserve Position			
Excess Reserves (+)/Deficiency (−)	113	93	− 34
Borrowings	1	2	9
Net free reserves (+)/Net borrowed(−)	112	91	− 43

* Excludes trading account securities.
\# Includes items not shown separately.

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