

# Volatility and futures: Message versus messenger

*The messenger may require minor surgery, but we do not want to do him in.*

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**P**ress descriptions of major swings in the stock market are accompanied invariably by discussions of the role of index futures and program trading. This leaves the impression of a cause and effect relation. Whether recent stock market volatility is abnormal when judged by historical standards remains very much an open question, but, whatever one's view on that question, we must distinguish between message and messenger.

Financial markets are the economy's messenger. If markets convey the message that economic conditions are more volatile because of greater uncertainty about interest rates, exchange rates, or other factors, we do not blame the messenger for that message. Competing markets play an important role in determining that the messenger does not manipulate, distort, or delay the message. Index futures and other recent financial innovations expand the number of routes over which messages may travel, which increases the likelihood that the correct message gets through.

Index futures and options were introduced only in 1982 and 1983. These instruments provide portfolio managers low-cost ways of dealing with the risk that affects all stocks. For example, a money manager concerned about the possibility of a stock market decline can sell index futures or buy an index put

option. Such transactions can be made at significantly lower cost and with greater speed than selling the underlying stocks. If we measure the usefulness of a product by its sales, index futures and options have proved to be extremely beneficial. Volume in these derivative instruments, measured in terms of the value of the underlying stocks, exceeds volume on the stock market by a substantial margin.

#### INDEX ARBITRAGE

Prices of index futures and options cannot behave independently of the stock market. They are linked to the prices of underlying stocks by index arbitrage. Efficient index arbitrage assures investors that index futures are conveying the same message that the stock market is conveying. If index futures or option prices are too high relative to stock prices, arbitrageurs sell futures or options and buy the underlying index stocks, thereby locking in a riskless profit. They follow the reverse procedure if futures or option prices are too low relative to stock prices. Fundamentally, the economics of index arbitrage is identical to the arbitrage that links wheat futures to wheat spot prices or currency futures to currency spot prices. All these forms of arbitrage are not perfectly efficient, because transaction costs impede them, so index futures and options sometimes trade above or

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below their theoretical values — but not by very much.

Index arbitrage requires the purchase or sale of a portfolio of stocks, usually called “program trading.” The idea that an investor can buy or sell a portfolio of 500 stocks on command may be a bit scary, but as diversification reduces risk, this is actually a less risky way for everyone concerned to trade. Portfolio trading is the trading innovation of the 1980s as block trading was of the late 1960s.

In index arbitrage, technical problems also arise on quarterly expiration days — the triple witching hour — when index futures, index options, and individual stock options all expire. At these times, the messenger can garble the message. The cash settlement feature of index futures contracts requires arbitrageurs to unwind positions in underlying index stocks by trading the stocks rather than by delivery. Large order imbalances resulting from the simultaneous unwinding of many arbitrage positions can cause temporary stock price changes. We estimate that the effect has averaged about 0.004 of the index value. This effect is smaller than the price effect associated with large block transactions in individual stocks and is less than transaction costs for many investors. Furthermore, the expiration day price effect is a technical problem that, at this writing, is in the process of being corrected by technical modifications in trading procedures, such as settling index futures at the stock market opening price rather than the closing price.

#### SEC STUDY

Stock price changes significantly greater in magnitude than those observed on expiration days have been observed on non-expiration days. On September 11, 1986, the Dow Jones Industrial Average fell by 86.61 points, a drop of 4.61%, followed by a further drop of 34.17 points, or 1.91%, on September 12. On January 23, 1987, the Dow fluctuated by 115 points, or 5.2%, and ended the day with a loss of 44.15 points, or 2.06%.

The Securities and Exchange Commission’s Division of Market Regulation report on the two days in September, “The Role of Index-Related Trading in the Market Decline of September 11 and 12, 1986,” is restricted to those two days and does not give a complete analysis of the price behavior of index futures in relation to underlying stock prices over a longer period of time, but the study provides important new information on the nature of index-related stock trading, while offering some reassuring conclusions.

The SEC’s conclusion with respect to the September decline is that the message got through — the

messenger did his job: “the magnitude of the September decline was a result of changes in investors’ perceptions of fundamental economic conditions, rather than artificial forces arising from index-related trading strategies.” Index futures and program trading helped convey the message with greater speed than would have been the case in the absence of these financial innovations: “index-related futures trading was instrumental in the rapid transmission of these changed investor perceptions to individual stock prices, and may have condensed the time period in which the decline occurred.”

For believers in competitive markets, these conclusions are not too surprising. The new index futures and option markets reduce the cost of trading and increase the number of channels through which investor opinions about the stock market can be registered. That ought to increase the reliability of messages and the speed with which they are conveyed. As with most innovations, however, these new markets produce some initial disruption in accepted procedures as well as anxiety on the part of certain segments of existing markets.

The SEC study notes that these markets ought to be monitored to assure their proper operation, particularly in this period of growth and development. The study raises concerns about the “cascade” effect of dynamic hedging strategies that generate sales of index futures in declining markets and purchases in rising markets and about the possible manipulative uses of index futures. Nevertheless, the SEC study observes that economic forces exist to counteract a “cascade” effect, and manipulation of stock indexes, in which volume is large, is likely to be more costly and risky than other potential manipulation targets. At any rate, the SEC found no evidence of a “cascade” effect or of manipulation on September 11 and 12, 1986.

The SEC study also provides important information on the trading process in futures and stocks through which investors’ opinions about underlying economic activity are registered. As a result, the study has broader application than to two days in September.

When expectations about the stock market change, investors today can either trade portfolios of stocks or index futures contracts, which are claims on portfolios of stocks. Index futures contracts may often be traded more cheaply and more quickly than portfolios of stocks, which means that futures prices tend to change before underlying stock prices. As index futures prices change in relation to stock prices, profitable index arbitrage opportunities arise.<sup>1</sup> On September 11 and 12, when index futures fell, index arbitrage

took the form of purchases of futures contracts and sales of underlying stocks. A good part of this activity, incidentally, reflected the unwinding of previously established arbitrage positions. Price changes first reflected in futures markets were transmitted to the stock market via index arbitrage.

Sales of the underlying index stocks take the form of program trades. The SEC surveyed seven brokerage firms that carried out 244 program trades on September 11 and 12. Of these program trades, 206 or 84% represented index arbitrage. We do not know what proportion of stock market volume was index-related, but the index-related trading of the seven surveyed firms constituted about 18% of stock market share volume. It accounted for 40% of the share volume of these seven firms. Obviously, a lot of share volume was not index-related. Non-index stocks declined by amounts equivalent to index stocks, which substantiates the view that the market decline on September 11 and 12 reflected fundamental forces.

In fact, the relatively small size of program trades was a surprise. The largest program trades tended to arise in the S&P 500 index. Of the 244 programs, 131 were carried out in the S&P 500 index, and these averaged \$24 million in size. A program of this size implies a transaction of about 7400 shares (\$1,065,000) in IBM, the largest company in the index, of about 3000 shares (\$103,000) in Pepsico, approximately the fiftieth largest company, and of about 1300 shares (\$63,000) in American Brands, approximately the one hundredth largest company. Transactions of this magnitude are easily carried out in today's market, most of them through DOT, the computerized order transmission system of the NYSE. Only one program trade exceeded \$100 million in value.

Of course, a tremendous flow of orders of this size all on one side of the market, whether emanating from program trading or other sources, can result in temporary market congestion and temporary price effects, as on certain expiration days. Except for expiration days, however, index futures and program trading in and of themselves do not cause trading to be bunched at particular times.

We find it reassuring that the message got through on September 11 and 12, 1986, and that the transmission process is one in which futures and stock prices are linked to each other and to fundamental factors. The SEC finds that its "analysis of this particular market decline does not provide an independent basis to conclude that radical regulatory or structural changes are necessary at this time. . . . However, close monitoring should be maintained."

That is a sensible conclusion. Index futures are a valuable addition to the portfolio manager's tool kit, and program trading is an important new trading technology. These innovations speed up the process by which information about the economy is reflected in stock prices. There are some problem areas — particularly on certain expiration days, but these are correctable.

The messenger may require minor surgery, but we do not want to do him in.

<sup>1</sup> In rapidly moving markets, some of these apparent opportunities will prove to be spurious, because it takes time for individual stock prices, and thus cash index values, to reflect current conditions that are reflected more quickly in futures prices.