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MEMORANDUM

September 17, 1982

TO: Chairman Shad

FROM: Division of Market Regulation
Directorate of Economic and Policy Analysis *JD*

SUBJECT: Relationship Between Options *RTC*
and Futures

OTHER OFFICES CONSULTED: The Office of the General Counsel
(A. Chafer, R. Stevenson) was
consulted and has submitted
comments on this memorandum

You have requested information on two matters relating to the evolving options and futures markets: (i) a discussion of possible manipulative concerns with respect to options and futures on the same underlying instrument; and (ii) a comparison of the functions and economic relationship of options on futures ("commodity options") and options on the underlying instrument ("options on physicals" or "securities options").

I. Manipulation Concerns Regarding Options and Futures

Intermarket manipulation concerns with respect to futures on securities arise in two principal contexts. First, the leverage features of futures contracts can be employed to profit from manipulation of the underlying securities market. This was the reason the SEC/CFTC Accord establishes limits on the kinds of securities index futures contracts that may be designated by the CFTC and bans futures on individual corporate and municipal securities. Manipulation concerns have been the principal focus of the Commission's comments to the CFTC on the stock index futures contracts considered to date. 1/ After reviewing those proposals, the Commission has concluded that none of them appears to raise manipulative concerns with respect to the markets for the individual securities comprising the indices. 2/

1/ In this connection, among the factors considered by the Commission have been: (i) the number of securities comprising the index; (ii) the capitalization of those securities; (iii) the depth and liquidity of the secondary market for those securities; (iv) the diversification of the index; and (v) whether the index is weighted.

2/ See letter from Douglas Scarff to James A. Culver, Director of Economics and Education, CFTC, dated February 9, April 19, April 23, May 3, and May 10, 1982 (providing comments, respectively, on the KCBT Value Line contract, the CME S&P 500 contract, the COMEX S&P 500 contract, the NYFE NYSE Composite index contract and the CBT Dow Jones Industrial Average contract).

Second, intermarket manipulation concerns can arise in the context of competing derivative contracts (either futures, options on futures or options) on the same underlying instrument. In this regard, the Commission has received proposals to trade options on a number of financial instruments (including GNMA's, Treasury securities, certificates of deposit and foreign currency) on which futures currently are traded under the CFTC's oversight. In addition, the NYSE and several other securities markets have proposed or are considering proposals to trade options on stock indices.

The staff believes that it would be extremely difficult to attempt to manipulate the cash market using either financial futures or broad-based stock index futures. We are of the view that, if anything, the presence of a second active derivative market likely would render it more difficult to manipulate prices in the underlying market through derivative market activities. This would be true even if the addition of the second derivative market did not result in greater overall trading volume. First, because of arbitrage opportunities between related options and futures markets, a person seeking to engage in manipulative activities in one derivative market effectively would need to manipulate two or more separate markets and, accordingly, would incur greater costs of carrying out his manipulation. Second, to the extent manipulative activities successfully were confined to just one derivative market, the existence of the resultant pricing disparities between markets would be a "red flag" for regulators in both industries.

The major concern you have asked us to examine is the possibility of manipulating one derivative market through activity in the other market. As a general matter, we question whether such activities, unless also accompanied by an effort to move prices in the underlying market, could succeed. Accordingly, we consider such manipulation concerns to be less serious than manipulative activity between those markets and the underlying cash market, although we do not believe those concerns should be dismissed completely, at least in the absence of actual trading experience. Current prices or values for the debt instruments and stock indices underlying financial futures are either publicly disseminated or readily ascertainable. Information on the other principal factors affecting the price of the futures and related options, current interest rates and index volatility, are readily ascertainable. As a consequence, the amount by which futures contract values and options premiums can vary from theoretical pricing levels should not be substantial. Accordingly, the ability of market participants to manipulate the derivative markets without also seeking to influence prices in the underlying market is limited.

The existence of arbitrage activities, however, makes it at least conceptually possible for transactions in one derivative market to be used to influence prices in the other. Manipulative opportunities might be greatest if both the futures and options markets on a particular underlying instrument were thinly traded. A trader might then seek to establish a position in derivative market A, and then move prices in derivative market B in the expectation that that price movement will result in a favorable price move in the first market. Even in thin markets, however, the likelihood of a successful manipulation would appear to be remote. Since the principal factors affecting the prices and premiums for futures and options on securities (see Section II. below) can be determined with considerable accuracy by market participants, it is likely that an attempted manipulation of one derivative market merely would attract arbitrageurs to that market, and would not influence greatly (if at all) prices in the other derivative market. This would appear to be particularly likely with respect to derivative products on stock indices, because participants in the options market could largely ignore the possibility that unusual price movements in the futures market were based on market or corporate information not yet available to them. Particularly because neither market is deep, participants in the second market likely would consider the aberrant price movement to be the result of illiquidity (or even manipulation) and would not modify their quotes or prices in response.

For example, assume that there were both futures and options on the S&P 500, and that the current level of the S&P 500 stock index was 111.47 (its level on July 22). Assume further that, based on futures pricing models, the level of the index in June 1983 would be predicted to increase to 115.20. 3/ A market participant seeking to manipulate the options market might attempt to do so by establishing a long June 1983 call options position and then effecting a series of transactions in the June 1983 futures contract at successively higher prices in the hope that options market participants would increase

3/ The calculation of the theoretical value of the futures contract would be relatively simple--essentially it would be the current value of the index plus the net carrying costs of holding a stock position mirroring the index (i.e., current interest rates less total dividends). A similar, but more complicated, calculation could be made of anticipated options premiums, based on the current level of the index, index volatility and current interest rates.

premiums on the June 1983 call options contracts. Since the various factors used to calculate optimal prices in both markets are known with considerable precision, it is likely that such a manipulative effort, if not also accompanied by changes in the value of the underlying index, would result in focus by arbitrageurs on the market being manipulated (the futures market) and not on the other derivative market (in this case, the options market), whose prices were more in line with the cash market and theoretically optimal prices.

An attempted manipulation would be most likely to succeed, if at all, in relatively inactive derivative markets where substantial price movements might be caused with a limited investment. Even inactive markets, however, pose a number of obstacles. First, it may be difficult to establish a pre-existing position large enough to profit from the attempted manipulation without moving the market or paying substantial premiums. Second, the market as a whole is more likely to dismiss as aberrant prices in an inactive derivative market that deviate from theoretical price levels, which therefore would be discounted by other derivative markets. Third, even if a person manipulating one derivative market was able to influence prices in the other, he might face difficulties in attempting profitably to liquidate his pre-existing position because of the lack of depth in that market.

In considering the GNMA options proposal, the Commission solicited the views of the CFTC on the issue of possible intermarket manipulation involving GNMA options and futures. 4/ In response, the CFTC indicated that, while it was difficult to evaluate the potential for intermarket manipulation, such manipulation could take a number of forms. It also concurred with a suggestion that, to the extent possible, the CFTC and the Commission should consider establishing a joint surveillance program with respect to GNMA futures and options. 5/

In several of its comment letters to the CFTC on proposed stock index futures contracts, the Commission has referred to the possibility of intermarket manipulation in the event options and futures were traded on the same index. 6/ The Commission has indicated that prevention of such manipulation would be a function of the quality of intermarket surveillance

4/ See letter from Douglas Scarff to James M. Stone, at 3, dated July 11, 1980.

5/ See letter from James A. Culver to Douglas Scarff, at 10-11, Dated February 10, 1981.

6/ See letter from Douglas Scarff to James A. Culver dated May 20, 1982.

through information sharing between the agencies and their respective regulated exchanges. 7/ In response to these concerns, the CFTC has reported that at least two boards of trade have indicated a willingness to cooperate with the relevant options markets in exchanging surveillance information in the event those markets began trading stock index options. 8/ Of course, it is clearly in the economic interest of exchanges and boards of trade to prevent manipulation in order to encourage active trading.

In sum, while we believe it is highly unlikely that efforts at inter-market manipulation could be successful, we have not completely dismissed that concern. In any event, both the CFTC and the Commission, as well as their respective regulated exchanges, have expressed a willingness to undertake the cooperative surveillance activities necessary to monitor the markets to detect and prevent intermarket manipulation. In this connection, we will make every effort to ensure that information regarding unusual price movements and substantial positions is exchanged between options SROs and boards of trade to permit effective surveillance of potential intermarket manipulations.

II. A Comparison of Commodity Options and Securities Options

As you know, the Accord contemplates that the CFTC might approve trading of commodity options on the same underlying instrument on which the SEC permitted securities options trading. 9/ The commodity options contracts currently proposed by the boards of trade and under review by the CFTC would give the purchaser the right to buy (if a call) or sell (if a put) a futures contract maturing within about a week after the options contract expired. Thus, a commodity options contract on the S&P 500 (which has been proposed by the Chicago Mercantile Exchange) expiring in June 1983 would give the purchaser the right to buy or sell a June 1983 S&P 500 futures contract.

For the most part, the proposed commodity options would strongly resemble existing and proposed securities options. Like securities options, they would have standardized expiration dates and exercise prices, clearing guarantees, and related trading characteristics. The principal difference, of course, is that a commodity options contract gives the purchaser the

7/ Id.

8/ See letter from James A. Culver to Douglas Scarff dated May 20, 1982.

9/ An exception to this general grant of authority would prohibit the CFTC from authorizing trading of futures (or options on futures) on individual corporate securities or municipal securities.

right to buy or sell a futures contract rather than the actual underlying instrument. This distinction, however, is of little economic significance and may be relatively unimportant from a regulatory perspective, particularly in the case of stock index options settled in cash.

As an economic matter, premiums for commodity options likely will be based on the current price of the futures contract to which the option relates, rather than the spot market price for the underlying instrument used for calculating security option premiums. 10/ This should not result, however, in materially different premiums. 11/ It only means that predictions of future price movements of the underlying instrument, rather than figuring directly into the options premium, will be used to determine the price of the futures contract, which in turn will be used to calculate the commodity options premium. These different methods of calculation

10/ As discussed in note 12, infra, this is the conclusion of technical literature analyzing the pricing of commodity and security options. As a practical matter, however, this may not always be the case. For example, the Chicago Board of Trade has asserted that, because of the absence of last sale reporting in the cash market, GNMA options probably would be priced off of the futures market, not the cash market. See letter from Robert K. Wilmoth, President, CBT, to George A. Fitzsimmons, at 11-13, dated August 26, 1980. Conversely, if the futures market on a stock index were inactive relative to commodity options on that index, it is quite possible that the options would be priced off of the spot value of the index, not on prices in the futures market.

11/ The fact that commodity options theoretically would be priced off of the futures contract, rather than the underlying physical instrument, essentially means that an additional step is interposed in the process of calculating options premiums. In the basic Black-Scholes security options pricing model, an important factor in determining the appropriate premium level is the risk-free rate of interest. See F. Black and M. Scholes, "The Pricing of Options and Corporate Liabilities," J. of Political Economy at 644 (May/June 1973). The price of a futures contract already reflects this factor in large part. See, e.g., F. Jones, "Pricing NYFE T-Bond Futures Contracts," Money Manager at 28-29 (August 18, 1980); and S. Figlewski and S. Kon, "Portfolio Management with Stock Index Futures," Fin. Analysts J. at 53-54 (January/February 1982). Accordingly, a variant of the Black/Scholes options pricing model has been developed for commodity options that differs from the basic Black/Scholes model primarily in its

should yield substantially similar premiums. 12/ Any material differences should be eliminated through arbitrage. 13/

(Footnote Continued)

recognition of this reflection of carrying costs in futures prices. See C. Camerer, "The Pricing and Social Value of Commodity Options," Fin. Analysts J. at 63-64 (January/February 1982). Attachment A provides a comparison of how hypothetical commodity and security option premiums could be divided based on futures prices and spot values, respectively.

Even though derivative instruments on stock indices are a relatively recent phenomenon, they have been analyzed by professional and academic economists for some time. Recognition has been made both of the inter-relatedness, and in some cases economic interchangeability, of these various instruments, and of the likelihood of arbitrage by market participants to eliminate pricing disparities between them. See, e.g., E. Moriarity, S. Phillips and P. Tosini, "A Comparison of Options and Futures in the Management of Portfolio Risk," Fin. Analysts J. at 62-63 (January/February 1981) (as well as the other articles cited above).

12/ One other distinction between the proposed commodity options contracts and securities options should result in slight differences in the premiums for commodity and security options. Commodity options are structured like so-called "European options," in that they only may be exercised at their expiration, unlike security options, which are so-called "American options" and are freely exercisable at any time until they expire. It has been demonstrated that occasionally it will be advantageous to exercise a put option before maturity. As a result, the value of an American put option should exceed the value of a European put option. R. Merton, "Theory of Rational Option Pricing," Bell J. Econ. and Management Sci. (1973). On the other hand, analyses have shown that the value of a call option virtually always is greater than the value it would have if it were exercised immediately. Thus, the premiums on commodity and security call options normally should not differ. There may be unusual events, however, such as tender offers on securities included in smaller stock indices, which could create incentives for early exercise of call options and thereby result in pricing disparities between American and European call options.

13/ See generally, S. Figlewski and S. Kon, "Portfolio Management with Stock Index Futures," Fin. Analysts J. at 53 (January/February 1982).

Regulatory differences in margin treatment between futures and options also are not likely to have any significant effect on competition between the commodities and securities markets. While margins for commodity options and for some security options (such as stock index options) have not been finalized, the margin formulae that have been proposed do not appear to differ substantially. Where margins have been established on new options products, e.g., the debt options contracts proposed by the securities exchanges, premium-based margins have been developed. For uncovered short options positions, these margins consist of a percentage of the current option premium (varying from 100 to 130 percent) plus a fixed amount roughly approximating current futures margins on the same underlying debt instruments. 14/ While formal proposals have not been submitted to the SEC or the Federal Reserve Board, the securities exchanges informally have communicated an interest in developing a similar approach for stock index option margins. The CFTC has indicated that for uncovered short positions the commodity options proposals it has received also generally call for margins equal to the options premium plus the margin on the underlying futures contract. 15/

The CFTC has asserted that a number of differences of potential regulatory significance may exist between options on futures and options on physicals in the context of its commodity options pilot. It has noted that exercise of an option on a physical can be more cumbersome than exercise of an option on a future (which could be accomplished by book entry). It also has asserted that options on physicals hold a greater potential to disrupt trading in the cash market for the underlying commodity since the exercise of options on physicals may involve transactions

14/ The fixed amounts generally have been set somewhat above futures margins. This in part is to reflect differences in the time permitted to post margin payments, seven days under Regulation T compared to only one day under board of trade rules. Purchasers of options would be required to pay the entire options premium. Reduced margins would be permitted for spread, straddle, covered and other hedged positions.

15/ See letter from Philip McBride Johnson to Timothy E. Wirth, Attachment at 30-31, dated May 20, 1982. Most of the boards of trade have proposed to require full payment of premiums by options purchasers, although certain boards of trade have discussed the possibility of allowing margining of options premiums. Like security options, reduced margins would be permitted for spread, straddle, covered and often hedged positions.

in the cash market. 16/ The CFTC has indicated, however, that where security options are settled in cash (as has been proposed for stock index options), even the differences noted above would disappear. In addition, the CFTC has acknowledged that these factors will not necessarily mean that market participants will perceive options on futures and options on physicals to be significantly different, and where the options are not exercised (as is the case in over 95 percent of all futures and options transactions today) traders may tend to view them as interchangeable. 17/

For these reasons, options on exempted securities and stock indices, and options on futures on the same instruments, should function as close economic equivalents that can be expected to compete for both hedging and speculation. 18/

16/ Letter from Philip McBride Johnson to Timothy E. Wirth, Attachment at 5, dated May 20, 1982.

17/ Id. at 4-5. In establishing its commodity options pilot, the CFTC has been careful to avoid reaching any determinations on either the economic interchangeability of options on futures and options on physicals or the relative surveillance, manipulation or other problems they may raise.

18/ See letter from Edward F. Greene to Timothy E. Wirth, Attachment at 19, dated May 12, 1982.

Calculation of Commodity and Security Option Premiums

Set forth below are examples of the manner in which premiums might be derived for options on a stock index futures contract, using the underlying futures contract to calculate the options premium, and for options on the index itself, using the spot value of the index to determine the premium. The examples involve call options on the S&P 500 index expiring in June 1983 with an exercise price of 110. They assume that the current value of the S&P 500 is 111.47 (the level at which it closed on July 22) and that the current value of a June 1983 S&P 500 futures contract is 115.20 (its closing price on July 22). ^{1/} The values assigned to the options below are not actual premiums; they are intended only to be illustrative of the basic process by which commodity and security options might be calculated.

Options premiums have two components, an "in-the-money" value and a time value. In the circumstances described above, the commodity option is slightly over 5 points in-the-money (i.e., a holder of the option would be able to pay 110 for a futures contract valued at 115.20), so the first component of the premium would be at least 5 points. The holder also would be willing to pay an additional premium for having the opportunity, but not the obligation, to exercise the option, thus allowing him to recap any gain in the value of the S&P 500 beyond the contract price (115.20) or to avoid any loss in that value when the contract expired in June 1983. This portion of the premium, the so-called "time value" of the option, is based primarily on the volatility of the index. In this case, assume this component of the premium is around 3 points. As a result, the total premium for the commodity option would be approximately 8 points.

An option on the stock index itself would be priced off of the current value of the index. Thus, in this case, the in-the-money component of the option would be 1.47 points, since the exercise price is that much less than the current level of the index. The second component of the securities options premium, the time value, would be based on the possibility that the value of the index would increase between now and June 1983. For a securities option, the time value

^{1/} The value of the June 1983 futures contract is almost 4 points above the current value of the index, 115.20 compared to 111.47. This difference reflects the market's estimation of the likely increase in the value of the index over the next year, which in turn is based on the net cost of carrying a cash position in the securities comprising the index. It is essentially the product of the carrying costs of holding a position in the securities comprising the index less the return that can be expected from that position in the form of dividends.

component would reflect both the volatility of the index and the risk-free interest rate. For a securities option with a year to expiration, this component might be as much as 6-1/2 points, so that the total premium would be approximately 8 points.

Thus, using theoretical options pricing models, options on futures and options on the securities underlying the futures with similar exercise prices and expiration dates can be expected to have basically equivalent premiums. While the two components of the premium, the "in-the-money value" and the "time value," differ for the two options, that is principally because the portion of the premium reflecting interest rates (or carrying costs), which is included in the in-the-money portion of the commodity option premium, is incorporated in the time value component of a securities option. In general, arbitrage activity can be expected to limit any difference in premiums to the transaction cost associated with the activity.