

## Chapter Eight

### PERFORMANCE OF THE OPTIONS MARKETS

#### A. Introduction

Five securities exchanges currently trade options in the United States: the American ("Amex"), New York ("NYSE"), Philadelphia ("Phlx"), and Pacific ("PSE") Stock Exchanges, and the Chicago Board Options Exchange ("CBOE"). Each of these exchanges trades options on individual equity securities and on stock indexes. <sup>1/</sup> The NYSE and PSE each trade one stock index option, the New York Composite ("NYA") and the Financial News Composite ("FNCI") indexes, respectively. The Amex, CBOE and Phlx each trade several stock index options: the Major Market ("XMI"), Institutional ("XII"), Computer Technology ("XOC") and Oil ("XOI") indexes on the Amex; the Standard & Poor's 100 ("OEX") and 500 ("SPX") indexes on the CBOE; and the Value Line ("XVL"), Gold and Silver ("XAU"), Utility ("UTY") and Over-the-Counter ("XOC") indexes on the Phlx. <sup>2/</sup> In addition, the Amex and CBOE list several interest rate options, and the Phlx trades options on eight foreign currencies.

The total combined volume of the options exchanges exceeded 287 million contracts in 1986. The CBOE, by volume the largest options exchange, accounted for approximately 62% of the total combined volume. The largest index option contract by volume, the OEX, traded more than 113 million contracts in 1986. In comparison, the XMI, NYA, and XVL indexes had volumes of 17.6, 2.7, and 1.2 million contracts, respectively.

The Amex, NYSE, and Phlx employ modified specialist systems for options trading. Each option is assigned to a specialist, who is responsible for maintaining a fair and orderly market and for handling orders placed in the limit order book. Additional market making is provided by registered options traders ("ROTs"), who trade on the floor for their own accounts. <sup>3/</sup> In contrast, the CBOE and PSE do not use specialists.

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- <sup>1/</sup> The ability to trade options on an individual eligible exchange-listed stock is assigned to a particular options exchange pursuant to an allocation plan adopted by the options exchanges in 1980. With a limited number of exceptions, standardized options on exchange-listed stocks are traded on one exchange only.
  - <sup>2/</sup> Stock indexes on which options are traded are subject to classification by the Commission as either "broad" or "narrow" based. In 1982, when the Commission originally approved exchange proposals to trade options on groups of securities, it distinguished between securities groups composed of a relatively large number of well-capitalized stocks representing diverse industry sectors, and smaller indexes composed of stocks representing a particular industry group. Options on these latter indexes, referred to as narrow-based or "industry" stock index options, are subject to lower position limits and higher margin levels than are broad-based index options.
  - <sup>3/</sup> ROTs generally are assigned by an exchange to make markets in one or more particular classes of options. Exchange rules require ROTs to engage in a course of dealings reasonably calculated to contribute to the maintenance of a fair and orderly market. See, e.g., Amex Rule 958. Throughout this Chapter use of the word "market maker" includes ROTs except where the context indicates otherwise.

Instead, each option has a crowd of market makers trading for their own accounts, with an exchange official, called an Order Book Official ("OBO"), handling the limit order book. The size of the crowd varies depending upon the activity in the option, with more actively traded options attracting a greater number of market makers. In both systems, floor brokers represent public customer orders on the options floor. Regardless of whether an options exchange employs a specialist or market-making system, all exchanges seek to provide continuous two-sided markets in their listed options.

During the week of October 19, 1987, the turbulence experienced in the markets for the underlying securities had a substantial negative effect on the order execution facilities of the options exchanges, the exchanges' ability to provide continuous markets, and the performance of market makers. Problems experienced at the options exchanges, however, were not related primarily to increased volume during the week. Options volume on October 19, while heavy, did not approach the record volume experienced on October 16, when a number of stock index and equity option contracts expired. In fact, during the week of October 19, options volume declined, especially in the stock index options. <sup>4/</sup> Rather, problems experienced at the options exchanges stemmed from a variety of factors, including price volatility in the equity marketplace, the inability of options market makers to obtain reliable information concerning the prices of underlying stocks, <sup>5/</sup> their inability to hedge options positions in the futures and equity markets,

<sup>4/</sup> Contract volume on the options exchanges on October 16 and 19-23 was as follows:

<u>DATE</u>	<u>CBOE OEX</u>	<u>CBOE Other Products</u>	<u>CBOE Total</u>		
10/16	1,162,410	771,994	1,934,404		
10/19	405,128	640,665	1,045,793		
10/20	284,640	523,905	808,545		
10/21	335,758	593,749	929,507		
10/22	196,171	352,148	548,319		
10/23	153,701	273,649	427,350		
	<u>Amex XMI</u>	<u>Amex Total</u>	<u>Phlx Total</u>	<u>PSE Total</u>	<u>NYSE Total</u>
10/16	144,336	653,132	184,896	202,257	19,500
10/19	63,576	518,826	142,816	140,138	15,239
10/20	27,147	426,192	149,543	118,589	14,871
10/21	30,154	417,993	130,853	128,548	16,111
10/22	13,401	261,489	85,157	88,370	11,700
10/23	11,553	190,490	56,832	67,805	9,255

<sup>5/</sup> The question of the reliability of NYSE quotations during the market break is discussed in Chapter Seven of this report. The importance of these quotations to market makers trading in a derivative product is twofold: the quotes must be technically reliable (i.e., they should be rapidly disseminated from the primary underlying market to securities information vendors), and they must be useful in predicting whether an offsetting stock order to balance an options position

and the proliferation of strike prices as the market value of all equity securities declined.

Between October 19-23, the options exchanges responded to conditions in the underlying primary markets with a number of actions that affected the ability of public customers to transact business in the options markets and influenced options pricing. These actions included adding a substantial number of new options series, allowing protracted opening rotations in some stock index options, and restricting the availability of exchange automatic execution systems. Each of these conditions is discussed in detail below. These discussions are followed by a review of market maker performance.

## **B. Exchange Operations**

### **1. Trading Halts**

Options floor officials on each of the options exchanges have discretion to halt trading in any option contract in the interest of maintaining a fair and orderly market.<sup>6/</sup> On the CBOE, for example, in deciding whether to halt trading, floor officials may consider whether (1) trading in the underlying security has been halted or suspended; (2) the opening of the underlying security has been delayed; or (3) other unusual conditions or circumstances are present. During the week of October 19, the options exchanges called trading halts in nearly 100 different options at various times as a result of volatility, order imbalances, and trading halts in the primary markets for the underlying securities.

On October 19, CBOE officials called short trading halts in three equity options and halts lasting several hours in three other classes following trading halts in the primary markets for these securities. Similarly, the Amex, PSE, and Phlx each halted trading in one exchange-listed equity option. In addition, the Phlx called several trading halts in its XVL index option because the exchange was unable to obtain accurate index prices from the vendor that calculates and disseminates the index value. Because of the volatility in the prices of the stocks that comprise the XVL, the vendor was unable to calculate the index for 2 1/2 hours on October 19, from approximately 10:30 a.m. <sup>7/</sup> to 1:00 p.m., and then for short periods from 2:15-2:22 p.m. and from 3:22-

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reasonably can be expected to be executed at the quoted prices when a stock order arrives at the NYSE floor. For example, assume that the NYSE quote for XYZ is 110 bid to 111 ask at 10:00 a.m. Even if that quote is an accurate representation of the NYSE market in XYZ as of 10:00 a.m., if an options market maker, when seeking to effect an offsetting stock transaction, is concerned either that (1) there will be delays in sending a stock order to the NYSE or, even absent abnormal delays, (2) the quote may change drastically (e.g., 103 bid to 104 ask) before the stock transaction is executed, the market maker may conclude that the quotes are "useless" for his purposes. As discussed at length *infra*, on October 19 and 20 index options traders also faced problems in pricing stocks in which trading was halted.

<sup>6/</sup> See CBOE Rule 6.3; PSE Rule VI, Section 37(a); Amex Rule 918(b); Phlx Rule 1047(b); and NYSE Rule 717.

<sup>7/</sup> All times are Eastern Standard Time ("EST").

3:25 p.m. Because of the unavailability of the index value, XVL trading halted at 11:04 a.m. after opening at 10:09 a.m., re-opened at 1:45 p.m., and halted again at 2:30 p.m. for a 15 minute period. <sup>8/</sup> Although no trading halts were called in the Phlx's XAU index option on October 19, the option did not open until 11:50 a.m. because Newmont Mining, which alone accounts for more than 10% of the index's weighted value, did not open on the NYSE until 11:22 a.m. <sup>9/</sup>

Trading halts on all exchanges increased dramatically on October 20. At the CBOE, trading was halted in 22 equity options and in the OEX and SPX index options for periods ranging from 1/2 hour to approximately 3 hours. Equity option trading halts generally were called in response to indications from the primary market that trading had halted in the underlying security or was otherwise impaired due to order imbalances. <sup>10/</sup> In the case of OEX and SPX, trading on the CBOE was halted at approximately 11:54 a.m. because it appeared that trading in more than 20% of the indexes' underlying stocks had halted, <sup>11/</sup> and that the NYSE might call a floor-wide trading halt. The OEX and SPX halts lasted until approximately 1:00 p.m., at which time both indexes went through re-opening rotations. <sup>12/</sup> Similarly, the Amex and NYSE halted trading in their broad-based index options on the morning of October 20. Trading in the XMI and NYA index options halted at 11:33 a.m. and 12:29 p.m., respectively, because of trading halts in more than 20% of the underlying equity issues. <sup>13/</sup> A re-opening rotation in XMI began at approximately 1:15 p.m., lasted ten minutes, and free trading resumed at approximately 1:25 p.m. Trading in the NYA resumed at 1:16 p.m. The Amex also halted trading at 11:46 a.m. in its XII and XOI index options. Both options re-opened at 1:15 p.m. In addition, the Amex delayed the opening of one equity option and called trading halts in 22 others.

The other options exchanges experienced the same difficulties on October 20. On the PSE, trading halted in the FNCI index option from 12:11 p.m. to 3:50 p.m. because stocks that accounted for more than 20% of the FNCI's index value were not trading.

<sup>8/</sup> The vendor that calculates the XVL index value for the Phlx also provides an index calculation to the Kansas City Board of Trade ("KCBT"), which trades a futures contract on the XVL. The KCBT, however, did not stop trading in the XVL contract on October 19, apparently using the last disseminated value from the vendor during these time periods to price its futures contract. See KCBT spread-premium discount chart in Appendix D.

<sup>9/</sup> As a narrow-based industry index, the XAU is prohibited from trading if stocks accounting for more than 10% of the index's current value are not trading. See Phlx Rule 1047A.

<sup>10/</sup> Although in almost all instances trading halts were called on the CBOE for these reasons, in one case a halt was called because the market quote disseminated in the primary market was questionable in the opinion of CBOE officials.

<sup>11/</sup> CBOE Rule 24.7 requires the exchange to halt or suspend trading in a broad-based market index under these circumstances.

<sup>12/</sup> See discussion of trading rotations at 8-5, *infra*.

<sup>13/</sup> See Amex Rule 918C.

The PSE also halted trading in 23 equity options because of halts or other problems in the markets for the underlying securities. <sup>14/</sup> Trading in the XVL index option on the Phlx did not begin until 10:30 a.m. because of delayed openings in the stocks that comprise the index. XVL trading then was halted for the rest of the day at 12:01 p.m. because trading in more than 20% of the index's underlying stocks by weighted value was halted or suspended <sup>15/</sup> and, even after the underlying securities had commenced trading again, the vendor of the index value was unable to calculate the index value accurately. The Phlx also halted trading in Newmont Mining from 12:00 p.m. to 2:30 p.m., and delayed the opening of Honda until 11:30 a.m., because of delayed openings and pricing problems on the NYSE. <sup>16/</sup> Trading in Phlx's XAU index did not begin until 3:30 p.m. because Newmont Mining stock did not open for trading until late afternoon.

After October 20, the number and length of trading halts declined. By Friday all exchange-listed index options were open for trading the entire day following the completion of opening rotations.

## 2. Trading Rotations

As stated previously, an equity option may not open for trading until there has been an opening transaction in the underlying security on the principal exchange where it is traded. <sup>17/</sup> Opening rotations in index options, however, may commence as soon as practicable after 9:30 a.m., regardless of conditions in the underlying markets. <sup>18/</sup> Equity and index options are opened by means of trading rotations held at the opening of trading each business day in order to achieve a uniform opening price in each series

<sup>14/</sup> Of these 23 trading halts, three lasted less than 40 minutes, two between 40 minutes and one hour, eight between 1-2 hours, five between 2-3 hours, two between 3-4 hours and three longer than four hours.

<sup>15/</sup> As a broad-based market index, the XVL is prohibited from trading under these circumstances. See Phlx Rule 1047A. The KCBT halted trading in its XVL futures contract from 12:35 p.m. to 1:15 p.m. on October 20 when the CME halted trading in its SPZ futures contract.

<sup>16/</sup> On October 20 Honda's opening on the NYSE was delayed until 10:27 a.m. and then opened four points down. Pricing problems on the NYSE in Newmont Mining were related to a proposed takeover of the corporation pending at the time of the market break.

<sup>17/</sup> Exchange officials may elect to proceed with an opening rotation despite conditions in the primary market if they determine it is in the best interest of a fair and orderly market to do so. See, e.g., CBOE Rule 6.2: Trading Rotations.

<sup>18/</sup> Exchange rules provide for 9:30 a.m. openings of index options in order to coincide with index trading in the futures markets. Options exchanges may continue trading in index options for a one and one-half hour period after opening rotations before exchange rules requiring trading halts become applicable. See CBOE Rule 24.13; Amex Rule 918C(a); PSE Rule XXI, Section 10; NYSE Rule 717(b)(iii)(A); and Phlx Rule 1047A(b).

of an option class. <sup>19/</sup> During a trading rotation, bids, offers, and transactions may occur only in one or a few specified option series at a time, and trading may not occur in any series until it has been reached in the rotation. All exchanges attempt to complete opening rotations as quickly as possible in order that free trading may commence shortly after the opening of an exchange. As discussed later in this chapter, free trading may be viewed as critical to the effectuation of certain options strategies, including hedging.

Trading rotations at the CBOE were delayed and in some instances significantly lengthened on October 19 and 20. Because of delayed stock openings, opening rotations were delayed in 15 equity options classes on October 19 and in one option, IBM, on October 20. In contrast, opening rotations began on time in OEX and SPX, even though a number of the indexes' component securities were not yet open on the NYSE. Rotations in OEX and SPX took substantially longer to complete, however, owing in part to the proliferation of new strike prices. On the morning of October 20, the CBOE made an additional 112 OEX series eligible for trading (bringing the total number of OEX series to 272), in order to accommodate trading interest at prices which mirrored the decline in the cash value of the index. The CBOE also modified its trading rotation procedures in OEX and SPX beginning on October 19, so that calls and puts in each series could be opened separately, thereby concentrating market maker participation in one options series at a time. <sup>20/</sup> On October 19 and 20, opening rotations in OEX took approximately one hour and 32 minutes and two hours and 24 minutes to complete, respectively, as compared to the average completion time of 12-15 minutes. CBOE officials have stated that OEX rotations were unusually long because of the number of orders in each series that had to be executed, the difficulty market makers had in pricing certain option series, and the number of series which had to be called for opening. In addition, on October 20 it appears that the lack of market maker participation in the opening rotation in OEX made it more difficult to attract bids and offers. <sup>21/</sup>

A number of "second" rotations were called in the CBOE's stock index options and in several of its individual equity options on October 19 and 20 because of extreme volatility in the prices of the underlying securities. <sup>22/</sup> As a result, periods of free

<sup>19/</sup> Rotations may be used at other times as well, but usually are employed only at the opening of trading, and at the close in expiring option contracts.

<sup>20/</sup> At the CBOE under normal market conditions, put and call contracts in near-term OEX contracts are opened simultaneously with the far-term contracts, thereby allowing market makers to hedge the risk they assume in establishing near-term positions with offsetting transactions in further-out series and shortening the time necessary to complete the rotation.

<sup>21/</sup> See discussion of market maker participation *infra* at 8-17.

<sup>22/</sup> On October 19 second rotations occurred in four equity options, OEX, and SPX. On October 20 second rotations were called in OEX, SPX and thirteen of the 40 most active CBOE-listed equity options. Many of these second rotations were actually "re-opening" rotations necessitated by trading halts on the primary markets and the need in the derivative market to conduct additional opening rotations as trading halts in the underlying securities were lifted.

trading were reduced significantly in some options classes, most notably OEX and SPX. For example, on October 19, after completing the initial opening rotation at approximately 11:00 a.m., a second OEX rotation was held which did not conclude until 12:36 p.m., approximately three hours after the opening of the exchange. On October 20, the OEX opening rotation was completed shortly before 12:00 p.m., but trading in the option was then halted as a result of trading halts in the underlying securities on the NYSE. At 1:22 p.m. OEX entered a "re-opening" rotation which was not completed until 3:23 p.m. As a consequence, free trading in OEX on October 20 was limited to 40 minutes at the end of the day. <sup>23/</sup> Similarly, SPX went through two consecutive rotations on the morning of October 19, and one on the morning of October 20, that were comparable in length to those occurring in OEX.

The problems the CBOE encountered in opening options for free trading were not unique but appear to have been more severe than those experienced by other exchanges. Throughout the week of October 19 opening rotations in XMI were longer than usual, but, with the exception of the rotation occurring on October 22, no opening rotation took more than one hour to complete. <sup>24/</sup> The re-opening rotation of XMI after the trading halt on October 20 took only 10 minutes, compared to two hours for OEX. At the Phlx, opening rotations in its index options took only slightly longer to complete throughout the week of October 19. At the PSE, the FNCL opening rotation on October 19 took approximately one hour to complete. For the remainder of the week, however, the FNCL opening rotation was completed in 15-30 minutes. <sup>25/</sup>

### 3. Vendor Capacity Problems

Pricing information for all options series is supplied to market makers and broker-dealers by independent purveyors or "vendors" of market information. <sup>26/</sup> Prior to October 19, an individual vendor may have had the data base capacity to store and disseminate pricing information for approximately 30,000 series of option contracts. This capacity was outstripped during the week of October 19 as security prices on the primary markets declined and the exchanges elected to make thousands of new strike prices eligible for trading. <sup>27/</sup> One vendor contacted by the Division stated that between October 19-23 it added a total of 10,244 new series to its service. In order to

<sup>23/</sup> OEX opening rotations for the remainder of the week also were unusually long. On October 21 and 23 opening rotations took one hour to complete; on October 22 the rotation lasted more than two hours.

<sup>24/</sup> On October 22 the XMI rotation was not completed until 11:48 a.m.

<sup>25/</sup> The disparity between the length of opening index option rotations on the CBOE and those of the other options exchanges is attributable in part to the higher volume in OEX than in the other index options. Opening rotations in SPX, however, which has much less volume than either OEX or XMI, still were substantially longer than normal despite only moderate order flow.

<sup>26/</sup> See Chapter Seven for a description of the operations and services provided by options vendors.

<sup>27/</sup> Between October 19-23, the CBOE, Amex, PSE and Phlx made 4,390, 4,444, 1,500 and 952 new series eligible for trading, respectively.

accommodate these new listings, at least one vendor elected to delete May, June, and September series options, foreign currency options, and dually traded options from its service. <sup>28/</sup> Some series were relisted as early as October 30, but not all series were relisted until mid-November. The vendor that provides pricing information for CBOE and Amex market makers stated that it was able to list all new OEX and XMI series prior to the introduction of these series for trading. CBOE officials, however, reported to the Division that they believe that not all new CBOE series were listed on a timely basis. <sup>29/</sup>

#### 4. Order Execution Systems

Both the CBOE and the Amex employ automatic order execution systems to aid in the execution of small customer orders in a selected group of option classes. <sup>30/</sup> The CBOE's Retail Automatic Execution System ("RAES") currently is available during periods of free trading in OEX and SPX, and in a limited number of active equity options, including IBM, Eastman Kodak and General Motors. The Amex's AUTO-EX system is operational in XMI and one competitively traded equity option. Both systems afford public customers the opportunity to obtain a guaranteed execution at the market quote for orders up to ten contracts. Customer orders routed through RAES are executed against market makers who elect voluntarily to participate as contra-brokers to system orders, while orders sent through AUTO-EX are executed at the displayed quotations against either the specialist in the option or a registered options trader ("ROT") in the crowd. <sup>31/</sup>

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<sup>28/</sup> In all, this vendor deleted a total of 3,717 series between October 19-23. Where multiply traded options were involved, the vendor continued to list each option as trading on one exchange only, and deleted listings for the other markets where it was traded. Efforts were made by the vendor to quickly relist those foreign currency options which had been deleted, because of substantial trading activity and interest in these options.

<sup>29/</sup> During this period securities information processors also were unable to report accurately prices in those option series that had three digit premiums. This problem affected OEX, SPX, XMI and a small number of equity options. As the cash value of these indexes and the underlying stock prices of these options declined swiftly, some series became very deep-in-the-money, and some had huge time value premium increases. Although market professionals have indicated that the problem did not cause confusion for them, it did cause difficulties for options market maker clearing firms attempting to calculate margins.

<sup>30/</sup> Neither the PSE nor Phlx has an automated order execution system for options trades. The PSE's SCOREX and Phlx's PACE systems provide automatic routing and execution services for equity orders only. Both exchanges, however, by rule require their market makers to fill public customer orders in certain option series to a minimum depth of 10 contracts. See PSE Rule VI, Secs. 48 and 79; Phlx Rule 1033(A).

<sup>31/</sup> Limit orders on the book which are at the same price as incoming system orders are guaranteed executions at the same price as system orders in all options in which AUTO-EX is available, and in all equity options (excluding IBM) in which RAES operates. RAES does not protect public customer limit orders on the OEX



Both the CBOE and the Amex impose certain obligations on participating market makers in order to ensure executions on a continuous basis. The CBOE requires that market makers who sign onto RAES in groups participate in the system on a continuous basis for the duration of the week in which they sign on, and throughout the following expiration week. The Amex imposes somewhat less stringent obligations, requiring ROTs to remain in the trading crowd for the majority of any business day in which they sign onto the system and on the following expiration if the ROT has participated in AUTO-EX on any day that week.

During the week of October 19, neither AUTO-EX nor RAES was operated to its fullest capacity, and both systems experienced a downturn in the number of market makers who were willing to participate in system trades. Prior to October 19, RAES and AUTO-EX execution facilities were available in near term, at-the-money series, which generally are the most actively traded options series. Orders executed through these systems accounted for a significant percentage of total customer volume in the selected classes. For example, from January through September 1987, OEX customer orders executed through RAES constituted an average of 26.6% of all public customer OEX orders, and XMI orders executed through AUTO-EX were 5.6% of total customer XMI volume. Throughout the week of October 19, however, the number of contracts executed through these systems declined dramatically as volume on the options exchanges dropped and the CBOE and Amex elected not to make at-the-money or in-the-money series available for automatic execution. <sup>32/</sup> On the CBOE, no OEX or OEZ puts <sup>33/</sup> were available on RAES from October 19-21, and the only series which were eligible for automatic execution at any time during that week were far out-of-the-money. Both exchanges deleted from their systems contracts with large premiums, <sup>34/</sup> and thereby declined to require their market makers to assume large risk positions by buying or selling deep-in-the-money contracts. For the period October 1-16, approximately 20% of all customer OEX orders were executed through RAES, as compared to 6.6% during the week of October 19.

In addition, both exchanges had difficulty in attracting market makers to participate in these systems. Before the opening of the options market on October 19,

book, however.

<sup>32/</sup> Contracts executed through AUTO-EX during the week of October 19 were as follows: October 19- 3,760; October 20- 693; October 21- 1,145; October 22- 111; and October 23- 37. In comparison, during September 1987 AUTO-EX executed an average of 5,881 contracts per day. RAES OEX volume figures for the week show a similar decline: between October 19 and 23, 5,692, 1,148, 8,061, 2,566, and 2,430 contracts were executed, respectively. In comparison, the average daily number of OEX contracts executed through RAES from October 1 through October 16, 1987, was 34,114.

<sup>33/</sup> The CBOE designated all new series added to OEX during the week of October 19 "OEZ" in order to facilitate their listing in the Options Price Reporting Authority ("OPRA"), an independent vendor of options pricing information.

<sup>34/</sup> At the CBOE, series having premiums greater than \$10.00 were in almost all instances removed from the system.

CBOE officials were informed that their market makers would not voluntarily participate in RAES unless they were released from their obligation to remain on RAES for the duration of the week and throughout the next expiration week. Based on this information, the CBOE decided to waive the customary participation requirements. Despite this relaxation, the level of market maker participation in RAES for OEX dropped by 75% between October 19-23.<sup>35/</sup> Market maker participation in RAES in the fifteen equity options using RAES also declined, from an average of 57 market makers participating per day from October 1-16, to 14 market makers per day from October 19-23. The Amex experienced a similar decline in ROT participation. During the week of October 19, between two to four ROTS, in addition to the specialist, participated in AUTO-EX each day. By comparison, six ROTS were on AUTO-EX each day in addition to the specialist during the week of October 12.

Finally, because neither system can be used while the option is in a trading rotation, small customer orders could not be routed automatically to the exchanges and executed through RAES and AUTO-EX for extended periods of time during the week of October 19. Rather, they had to be delivered to the exchanges via the order routing systems of retail brokers and handled by these firms' floor brokers. In sum, during most, if not all, of October 19 and 20, the options small order execution systems were functionally closed because of trading rotations and because those series with the greatest public customer interest were removed from these systems. In addition, many market makers and ROTs ceased to participate in system trades.

### C. Market Maker Performance

#### 1. Introduction

Market maker performance on the options exchanges can be measured by a number of factors, such as the price or "premium" charged for any given option contract, the spread between the bid and the ask, the number of market makers trading in a particular options class and their willingness to assume positions of size. Options market making performance, in turn, is influenced by an equally wide range of factors, including the volatility and price of the underlying security, the availability of accurate, timely information concerning prices and conditions in the primary market, volume and order flow, institutional and customer participation, and the availability of efficiently priced hedging vehicles. Under normal market conditions, i.e., when there is relatively little or no price instability in the underlying market and reliable information is disseminated quickly across markets, market maker performance in the options markets generally is characterized by low premiums, narrow spreads and a high level of market maker participation at least in the more active options.

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<sup>35/</sup> The CBOE estimates that prior to October 19, over 400 market makers participated in RAES in OEX on any given day. During the week of October 19 market maker participation in RAES steadily declined. On October 19, 178 market makers were signed onto RAES at the opening of the exchange. This number fell to 154 by the close of trading. On October 20, 21, 22 and 23, approximately 114, 95, 92 and 46 market makers were participating in RAES at the close of trading, respectively. In comparison, on January 23, 1987, a day in which the stock market also experienced extreme price volatility, 422 market makers were signed onto RAES. This number declined on January 26 (the following Monday), dropping to 183.

During the week of October 19, market making performance on the options exchanges was reduced considerably in reaction to volatility in the underlying markets and conditions in the futures markets. The quality of executions, particularly on October 20, varied dramatically and was substantially inferior to pre-market break performance.

## 2. Premiums

Options premiums, or the price that the buyer of an option pays and the writer of an option receives for the rights conveyed by the option contract, are established by competitive buying and selling pressure on the trading floor of each exchange. Premiums are based on a number of factors, including the value of the underlying stock or index, time to expiration, interest rates, anticipated dividends, supply and demand for the option, and the volatility of the underlying stock or index. The Division's review of options pricing for October 19 and 20 indicates that the time value premiums of certain options, particularly stock index options, increased significantly above historical levels. <sup>36/</sup> Commission staff have reviewed the premiums charged in four stock index options (OEX, XMI, FNCI and XVL) and also have compared average premiums for a random sample of equity options. Attention was focused on actual premiums charged for certain index options because of the relatively large public customer participation in these contracts, their function as barometers of the stock market as a whole or of a particular market sector, and their unique exercise feature, whereby the exercise of an option is settled by the payment of cash, not by the delivery of securities. These options also were selected because of the increased number of customer complaints concerning pricing in certain of these indexes during the market break.

### a. The OEX Option <sup>37/</sup>

During the week of October 19, premiums charged for OEX options increased substantially in response to price volatility in the markets for the underlying securities, with the most significant increases occurring in put options. Although put option premium increases can reasonably be attributed in part to the increasing intrinsic value of these options as the market declined, the huge increases in premiums cannot be explained entirely by this factor. Commission staff calculated time value premiums for October 19

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<sup>36/</sup> The value of an option consists of two components, intrinsic value and time value. Intrinsic value reflects the amount, if any, by which the value of the underlying security or index exceeds, in the case of a call, or is less than, in the case of a put, the strike price of the option. An option which has intrinsic value is said to be "in-the-money." For example, a call with a strike price of 100 and an underlying value of 120 has an intrinsic value of 20. Conversely, an option is said to be "out-of-the-money" to the extent that the strike price is greater than the underlying value, in the case of a call, or less than the underlying value, in the case of a put. An "at-the-money" option is one where the strike price equals the underlying value. The time value premium refers to the amount by which the option's premium exceeds the intrinsic value of the option.

<sup>37/</sup> Some data cited in this subsection and subsections b, c, and d was generated by the Commission's Directorate of Economic and Policy Analysis ("DEPA").

and 20 and compared these values with a September average, 38/ in order to determine the degree to which premium increases could be attributable to factors other than intrinsic value. The average OEX put time value premium for September 1987 was \$8.46. On October 19 this rose to \$20.65, and on October 20 to \$46.62. Commission staff analysis of OEX premiums charged on October 20 reveals that time value premiums on that day varied substantially depending upon the time of execution of particular orders and the series involved.

On the morning of October 20, the opening rotation in OEX began at 9:30 a.m. and markets were called for in 272 series. As stated previously, the number of series eligible for trading had increased dramatically overnight, rising from a total of 160 series listed the previous day. The opening rotation took approximately 2 hours and 20 minutes to complete, concluding shortly before 12:00 p.m., and was immediately followed by a trading halt. Premiums charged during this rotation in OEX series that were made eligible for trading for the first time that morning ("OEZ" series options), as well as in several OEX series, appear to have been unusually high. The chart below shows the opening price of certain OEX and OEZ puts on October 20.

<u>SERIES</u>	<u>TIME</u>	<u>PRICE</u>	<u>INDEX VALUE 39/</u>	<u>TIME PREMIUM 40/</u>
DEC 255	9:32	55	216	16
DEC 310	9:55	89	229	8
DEC 190	10:26	30	236	30
NOV 240	11:35	80	220	60
NOV 225	11:42	73	219	67
NOV 195	11:53	85	218	85

As illustrated in the table above, the time value premiums of series which were opened late in the rotation are noticeably higher than those for series opened one hour earlier, when the value of the index was approximately 12-15 points higher. 41/

38/ Data for September 21, 22, and 28, 1987, were used for this calculation. These days were selected because they represent a time period comparable to the market break days, i.e., September 21 was the Monday following an expiration. For both the September and October figures, the staff averaged the time value premiums in the November at-the-money series at the opening and at the close of trading. In the case of the October 19 figure, an in-the-money series was used for the close of trading calculation because no at-the-money series had been listed and made available for trading at that time.

39/ This value was provided by the CBOE and incorporates last sale data for those stocks which either opened late or had halted trading some time during the rotation. Accordingly, the index value available to market makers may not have reflected the actual value of all component securities.

40/ Each point of premium equals \$100, making a 16 point premium worth \$1,600.

41/ Data supplied by the NYSE shows that as of 10:00 a.m. on October 20, 24 of the component securities of the S&P 100 index had halted trading, representing 48% of the market value of the index. This figure decreased to 10% by 11:00 a.m., but by

Expressed in dollar terms, an investor who entered an order to buy a November 195 put at the opening price paid \$8,500 for an option that was 11% out-of-the-money. In comparison, if the same order had been executed one hour earlier, it would have been out-of-the-money by 18% and may as a consequence have been executed at a lower price. More importantly, in order for the investor who purchased the November 195 put to break even, the market would have had to drop an additional 50% (bringing the DJIA to 880) by November 20, when the contract expired. While some of the contracts in the put series above involved customers on both sides of the transaction, a majority of the contracts were market makers selling to public customers. In addition, some of the large premiums may have been charged to market makers who were forced to buy puts to close out positions due to margin calls. 42/

#### b. The XMI Option

XMI time value premiums also rose significantly during the week of October 19. On October 19, the average time value premium for near term, at-the-money puts rose to \$20.08, compared to an average of \$13.68 for September 1987. 43/ On October 20, the average put premium was \$83.92. The table below provides data on trades effected in certain series executed during the morning of October 20. 44/

12:00 p.m. had climbed again, to slightly over 30%. Although the index had reported cash values of 230.57, 231.72, and 216.01, at 10, 11, and 12 o'clock, respectively, Commission staff estimate that the value of the index would have been 244.38, 230.27, and 214.80 at these times if those stocks which had halted moved by the same percentage as non-halted stocks, and would have equaled 241.99, 230.11, and 214.13 if adjusted to include the price at which trading halt stocks first traded upon the lifting of the halt.

- 42/ In interviews with Commission staff, OEX market makers and CBOE officials identified a number of factors, some of which are discussed below, which they believe were unique to trading on October 20 and influenced the pricing of OEX/OEZ contracts. These factors include the unprecedented volatility in the cash values of the major market indexes and in the stock index futures markets; the extreme discounts in the S&P 500 future during the 2 hour and 20 minute period of the first OEX/OEZ rotation; the significant increase in the total number of OEX series that were eligible for trading for the first time on October 20 and the fact that there was no prior pricing history in the OEZ series; order flow which was substantially one-sided on the buy side; and widely-believed rumors that trading had halted in numerous stocks and might be halted altogether on the CME and NYSE. For a discussion of discounts in the S&P 500 future, see generally Chapter Two. See also "Factors Affecting Market Maker Performance", infra, at 8-18.
- 43/ Values from selected trading days in September 1987 were used for this computation. See note 38, supra.
- 44/ With the exception of the third transaction listed in the table, all transactions involved customer purchases with the XMI specialist as the contra party to the trade. In the third transaction, the XMI specialist purchased 15 contracts from a customer closing out a position. The second transaction involved a customer purchasing 100 contracts, of which the XMI specialist sold 90.

<u>SERIES 45/</u>	<u>TIME 46/</u>	<u>PRICE</u>	<u>XMI INDEX</u> <u>VALUE 47/</u>	<u>TIME</u> <u>PREMIUM</u>
XMY NOV 340	10:26	45	382.84	45
XMY NOV 340	10:54	70	369.38	70
XMY NOV 340	11:17	110	362.59	110
XMZ NOV 430	11:32	200	351.49	121.49
XMY NOV 350	11:41	200	349.85	199.85

Expressed in dollar terms, an investor purchasing one at-the-money November 350 put at 11:41 a.m. on October 20 paid \$20,000. 48/ In order for the investor to break even, the DJIA would have had to drop to 760 (approximately 1,000 points) by November 20.

In addition to the extremely high and variable premiums charged, XMI quote spreads were particularly wide. For example, in the November 350 put series, the following quotations were posted between 11:07 a.m. and 11:34 a.m.

<u>TIME</u>	<u>BID</u>	<u>ASK</u>	<u>XMI INDEX</u> <u>VALUE</u>
11:07	100	150	367.87
11:18	100	180	361.66
11:21	100	200	360.42
11:26	100	150	355.34
11:31	100	190	351.57
11:33	100	200	351.37
11:34	100	190	350.84

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45/ XMY and XMZ denote series which became eligible for trading for the first time during the week of October 19.

46/ The XMI opening rotation ended at 10:05 a.m. on October 20. Accordingly, the transactions listed above occurred during a period of free trading.

47/ As of 10:00 a.m. on October 20, 13 of the 20 stocks comprising the XMI index had halted trading on the NYSE, representing 69% of the value of the index. By 11:00 a.m. only 2 XMI stocks were still halted, but they accounted for 21% of the index value. By noon, 8 component stocks were halted, representing almost 57% of the index value. At these hours the reported XMI value ranged from 368.74 (10:00 a.m.), to 369.79 (11:00 a.m.), to 346.29 (12:00 p.m.). Commission staff estimate that these index values would have been 413.85, 359.76, and 334.31, respectively, if those stocks which had halted moved by the same percentage as non-halted stocks, and would have equaled 384.80, 361.62, and 339.77 if adjusted to include the price at which trading halt stocks first traded upon the lifting of the halt.

48/ In this transaction a customer bought five November 350 puts from the XMI specialist.

c. **FNCI and XVL Options**

The table below shows the premiums charged for various FNCI and XVL series on the morning of October 20. Although premiums in FNCI and XVL index options were higher than historical values, they did not approach the levels charged for OEX and XMI contracts. <sup>49/</sup>

<u>SERIES</u>	<u>TIME</u>	<u>PRICE</u>	<u>INDEX VALUE</u>	<u>TIME PREMIUM</u>
XVL Nov 245	10:44	46	214	15
XVL Nov 270	11:39	86	204	20
XVL Dec 260	11:28	67	206	13
FNCI Nov 205	10:31	48	170	13
FNCI Nov 160	11:42	23	160	23
FNCI Dec 225	3:08	85	172	32 <sup>50/</sup>

d. **Equity Options**

To date, Commission staff have reviewed the average premiums charged in 11 moderately to heavily traded equity options: Coleco, Dayton Hudson, Eastman Kodak, Exxon, General Electric, General Motors, GTE, IBM, Merck, Philip Morris and Shell. For the period September 21-23, 1987, the average price of the stocks underlying these options was \$90.87 (based on the average of the daily high and low for each stock). The average call and put premiums (all series) for this period were \$6.51 and \$5.62, respectively. On October 19 the average stock price declined by 21.16%, to \$71.64, and the average call premium decreased approximately 68%, to \$2.10. The average put price increased dramatically, however, by 277%, to \$21.18, or 26.9% of the average stock price. <sup>51/</sup> On October 20 the average stock price declined an additional 9.24%, to \$65.02. Despite this additional decline, the average call premium on October 20 increased 130% to \$4.83. The average put premium increased 1.98%, from \$21.18 on the 19th to \$21.60. Call and put premiums expressed as a percentage of the average stock price increased

<sup>49/</sup> This may be attributable to limited trading interest in these contracts. At the Phlx, trading volume in its four index options for the week of October 19 was relatively light. A total of 1,656 XVL contracts were traded between October 19-23, compared to 4,864 contracts traded the previous week. Similarly, contract volume declined in the PSE's FNCI index during the week of October 19, dropping to a total of 3,144 contracts from 7,668 contracts traded the previous week.

<sup>50/</sup> According to information provided by the PSE, these contracts could have been executed at either 10:18 or between 3:08 p.m. and 3:12 p.m. (EST). In either event, the FNCI value at both these times was approximately 172. Thus, the time value premium would be the same regardless of the execution time.

<sup>51/</sup> This change reflects the significant downward price movement of the stocks during this period, when many put options that were out-of-the-money in September became deep-in-the-money during the market break. Similarly, call options that were at-the-money or in-the-money in September became deep out-of-the-money.

from 2.9% of the stock value on October 19 to 7.4% on October 20 (calls) and from 26.9% to 33.2% (puts).

The average stock price increased slightly by October 26, rising to \$65.44 from \$65.02 on October 20. The average call premium, however, decreased 24% from \$4.83 on the 20th to \$3.66 on October 26. The average put premium decreased 15% from \$21.60 to \$18.36. Just as both the call and put premiums increased in value as a percentage of the stock's value for the period October 19-20, the call and put premiums decreased as a percentage of the stock's value on October 26. The average call premium percentage for October 26 was 5.6%, a decrease from 7.4% on October 20, and the average put premium percentage was 28.1%, a decrease from 33.2% of the stock's value on October 20.

### 3. Quotations

Events in the underlying markets during the week of October 19 also affected the size of quotation spreads in the options markets. Under normal market conditions, the maximum spread size is limited by exchange rules as a means of ensuring tight markets. <sup>52/</sup> On October 19, as quote spreads widened in the markets for equity securities, the option exchanges suspended the quotation spread maximums. The suspension permitted market makers to quote bid-ask differentials as wide as the quotation in the underlying security. The options exchanges have stated that they felt compelled to allow options market makers to widen spreads beyond what is customarily permissible because of generally chaotic conditions in the markets for the underlying securities.

Commission staff examined average bid-ask spreads for eleven equity options for the period October 19 through October 26, and compared these figures to the average spreads for the period September 21 through 23, 1987. <sup>53/</sup> For the September period, the average bid-ask spread of these options was \$.428. For these same options on October 19, the average spread increased 145% to \$1.05, while the average percentage spread increased slightly from 18.4% to 22.9%. <sup>54/</sup> On October 20 the average spread increased an additional 46.66% to \$1.54, while the average percentage spread increased again, rising from 22.9% to 24.4%. By October 26 the average spread had decreased 48.7%, to \$.79, and the average percentage spread also had declined, from 24.4% on October 20 to 21% on October 26.

<sup>52/</sup> For example, where the underlying security's bid is between \$10 and \$20, option market makers must bid and/or offer so as to create differences of no more than 3/4 of \$1 in the overlying option. However, bid-ask differentials in option series which are ten or more points in-the-money may be as wide as the quote on the primary market of the underlying security. See CBOE Rule 8.7; Amex Rule 958(c); PSE Rule VI, Sec. 79(b); and Phlx Rule 1014.

<sup>53/</sup> The analysis of quotation spreads contained in this section was generated by DEPA. DEPA examined bid-ask spreads in the same options for which a premium analysis was done. See "Equity Options" at 8-16.

<sup>54/</sup> The average percentage spread is the average bid-ask spread expressed as a percentage of the mean of the bid and ask.



#### 4. Market Maker Participation

Market maker participation data indicates that the market drop on October 19 affected the willingness of some index option market makers to participate in trading. On October 20, approximately 466 market makers participated in at least one trade in OEX sometime during the day, but, during the first rotation, 174, or 38%, of these market makers did not effect a trade. An additional 210 (45%) effected less than 10 transactions during this rotation. A very small number of market makers accounted for the majority of the 2,749 transactions in which a market maker participated during the rotation; less than 10% of the market makers accounted for almost 55% of the transactions.

Market maker participation in OEX, as measured by the number of contracts that market makers bought from or sold to public customers either directly or through floor brokers, declined sharply on October 20. On October 19, OEX market makers participated in 51% of total OEX volume. On October 20, however, market maker participation fell to 39%. In comparison, on October 16, an expiration Friday when total volume on the CBOE exceeded 1.9 million contracts and over 1.16 million OEX contracts were executed, market maker participation in OEX was approximately 66%.

In Amex's XMI options, specialist participation was high in percentage terms on October 16 and 19 but dropped sharply on October 20. Specifically, of the 164,312 XMI contracts traded on October 16, the XMI specialist purchased and sold 30,803 and 39,124 contracts respectively, for a 21% participation rate. <sup>55/</sup> On October 19, when total XMI volume equalled 69,797 contracts, the specialist's percentage rate was 33%, with purchases of 19,542 contracts and sales of 26,041 contracts. <sup>56/</sup> On October 20, when 30,580 XMI contracts were traded, the XMI specialist purchased 5,835 and sold 4,614 contracts for a 17% participation rate. By October 26 specialist participation had climbed to 20%, the average XMI specialist participation rate for September 1987, but volume remained low. <sup>57/</sup>

#### D. Factors Affecting Market Maker Performance

Commission staff interviewed numerous floor brokers, market makers, and officials at each of the options exchanges. During the course of these interviews, various market conditions were identified as having adversely affected market liquidity, depth and quote spreads in the options markets. These conditions included one-sided order flow and difficulties in hedging.

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<sup>55/</sup> Participation is measured as a percentage of twice the total volume because a specialist cannot be both a buyer and seller on any one particular trade. The highest participation rate possible is 50%.

<sup>56/</sup> The imbalance in selling by the specialist apparently reflects the heavy concentration of buy orders and puts being sent to the exchange on those days.

<sup>57/</sup> The XMI specialist reported that the number of ROTS and floor brokers in the XMI trading crowd began to decrease on October 19 and was smaller than usual on October 20. Phlx and PSE officials reported that their exchanges generally did not experience smaller crowds in their index options.

## 1. Order Flow

CBOE market makers stated that order flow in the stock index options was heavily concentrated in put options on October 19-20 and on October 23, and was predominantly one-sided on the buy side. As a result, market makers as a group were forced to facilitate the execution of these orders by trading for their own accounts to a greater degree than under normal market conditions. In the normal case, a market maker's potential risk exposure is limited to some degree by the existence of customer order flow that can be executed without the participation of a market maker, and by the availability to the market maker of both buying and selling interest. On October 19 and 20 CBOE market makers had to participate in a greater number of transactions on the same side of the market. In their opinion the increased risk exposure they assumed on these days contributed to wider quote spreads and higher premiums. <sup>58/</sup> In contrast, equity options floor traders at the CBOE stated that order flow was normal on the morning of October 19 but increased in the afternoon and on Tuesday morning as a large number of institutional market orders to buy puts entered the market. Floor traders also speculated that the number of orders to buy puts related to margin liquidations increased on October 20 and 21. <sup>59/</sup>

## 2. Hedging

In order to hedge the risk of their options positions, market makers usually execute offsetting orders either in the underlying equity markets or in the futures markets. CBOE market makers who are active in OEX and SPX customarily hedge their options positions by establishing offsetting positions in the futures markets, notably in the SPZ future. For example, a short OEX or SPX options position (long put or short call) may be hedged by buying the SPZ. <sup>60/</sup>

On October 19 and 20, OEX and SPX market makers experienced a number of difficulties hedging with the SPZ future. First, market makers were attempting to establish hedge positions at times when a severe and persistent discount existed in the SPZ in relation to the cash value of the index. Market makers stated that as a result of the deep discount they were extremely uncertain as to the price at which their futures orders would be executed, and whether they would be executed at all.

<sup>58/</sup> Commission staff has not had an opportunity to date to conduct an analysis of actual increases in options market maker positions as was done for NYSE specialists. See Chapter Four.

<sup>59/</sup> See discussion of position liquidations by First Options and Fossett Corporation at Chapter Five. Because timely execution of liquidation orders is of primary importance, rather than price, market makers who were forced to close out their positions in order to raise capital to meet margin calls may have been willing to pay unusually high premiums.

<sup>60/</sup> The degree to which an options position is in- or out-of-the-money and its historical and implied volatility dictate the number of futures necessary to fully hedge the options position.

Second, the lack of effective inter-exchange communication left market makers uncertain whether trading halts had been called either formally or informally in the underlying securities or in the futures markets. This uncertainty was particularly notable on the morning of October 20.

Third, hedging in the futures markets became significantly more expensive on October 20 when the margin requirements on the CME increased by more than 100%. During the week of October 19 margin on S&P 500 futures contracts tripled, going from \$5,000 to \$15,000 per contract for a hedged position; additionally, rumors circulated on the options trading floor that the requirements would go even higher, to \$30,000 per contract. CBOE market makers stated that this increase significantly reduced their ability to assume large options positions that under normal conditions would be hedged through the futures market. In addition, they indicated that the margin increases reduced their willingness to quote tight markets and forced some traders out of the market entirely. They stated that the lack of cross-margining between the options and futures markets, *i.e.*, the failure to recognize hedged positions across markets, resulted in cash flow squeezes even in instances where a market maker was fully hedged across markets.

CBOE market makers interviewed by Commission staff also reported that the duration of the OEX opening rotation on October 20 had a significant effect on their hedging capabilities. Because no free trading is permitted during a rotation, market makers were unable for an extended time period to engage in hedging strategies that require positions to be taken in different series in the same class. In addition, OEX market makers were affected by their lack of information while in rotation regarding order imbalances in series not yet open.

XMI traders reported having difficulties similar to those experienced by CBOE market makers. These traders, including the XMI specialist, normally hedge their XMI positions with Major Market Index stock index futures contracts ("MMI") traded on the Chicago Board of Trade ("CBT"). They indicated that liquidity in the CBT's MMI futures contract was particularly thin on October 19 and 20 and that this factor, coupled with substantial discounts in the value of the futures contract, made it difficult to hedge short put and long call positions.

Equity option traders on all the exchanges also experienced difficulty in hedging their options positions with stock. Traders who hedge their positions with securities listed on the NYSE generally were able to buy and sell underlying securities, but experienced problems on October 19 and 20 determining the price at which their stock orders would be executed. During some periods options traders were forced to enter stock orders on the basis of quote information that they deemed non-informative because the quoted spreads were abnormally wide. Traders also reported experiencing delays in stock order routing systems, or, even if no unusual delays were encountered, the market often had moved away from the last quote by the time of the stock order's execution.

Market makers in options overlying OTC options experienced severe problems in effecting trades in their underlying securities on October 19 and 20. <sup>61/</sup> OTC equity options market makers indicated that in many instances they could not reach OTC market makers by telephone and, because of locked and crossed markets, did not know where the underlying stock was trading. Some OTC market makers also reported to the Division that the inability to buy or sell stock to hedge their risk from writing options forced them to set their options prices significantly higher.

#### E. Analysis

The impact of derivative financial instruments on the market as a whole is discussed at length elsewhere in this report. Accordingly, this analysis focuses on the performance of the options exchanges and the ability of market makers and specialists to maintain fair, orderly and continuous markets during the week of October 19. While certain of the options exchanges experienced greater stresses than others during the market break, the Division believes that the following analysis is applicable to all of the exchanges.

Prior to the market break, all of the options exchanges had in place rules and policies designed to accommodate trading during periods of unusual market conditions, such as heavy order flow in a particular options class brought on, for example, by news of a tender offer or a stock re-purchase plan. In such a case a "fast" market could be declared by exchange officials in order to accommodate increased trading interest. The exchanges' contingency rules had never been tested under conditions as extreme as those experienced on October 19 and throughout that week, when unprecedented price volatility went hand in hand with operations system failures and inefficiencies.

Options trading during the week of October 19 highlighted a number of inadequacies in key areas. In particular, the most actively traded index options classes did not provide an effective, continuous market at certain times on October 19 and for virtually all of October 20. Moreover, pricing anomalies on October 20 raise questions as to the fundamental fairness of those markets. Accordingly, the Division believes there are a number of areas that require review by the Commission and the options exchanges.

First, index option opening rotations were excessively long, particularly on October 20. The length of opening OEX trading rotations limited the ability of OEX options customers to receive timely executions and may in some instances have resulted in higher premiums being charged in certain series. Because trading is permitted only in one series of an options class at a time during a rotation, customer orders received by the CBOE after the opening of the series involved could not be executed until free trading commenced or, if a second rotation was called, until the series was called again in the rotation cycle. As a result, an order in a series that opened near the end of a lengthy rotation may have been executed long after the order was entered. The operation of this system and its protracted nature throughout the week of October 19 resulted in some customer orders being executed at prices substantially different from

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<sup>61/</sup> For example, an OTC equity options specialist on the Amex who ordinarily accounts for approximately 20% of the daily volume, reported to Commission staff that he was unable to effect any stock transactions on October 19 and 20.

quotes disseminated at the time of an order's delivery to the CBOE, or in OEX orders in different series being executed when the underlying index was at vastly different prices, solely depending upon the particular series' place in the opening rotation. For example, if orders to buy December 255 puts and November 255 puts were entered before the opening on October 20, the December puts would have been executed at 9:32 a.m. when the OEX index was at 216, while the November puts would have been executed at 10:30 a.m. when the index was at 235.

The CBOE has commenced a study to identify possible means to speed opening rotations, particularly on volatile days. The Division applauds this initiative and will monitor carefully the conclusions of that study. There are, however, two areas relating to rotations that deserve the immediate attention of all the options exchanges.

a. The Division believes that the length of OEX rotations on October 20 is attributable at least in part to the number of additional series made eligible for trading for the first time that morning, and to the five point strike price intervals the CBOE elected to utilize in listing new series. In unusual market conditions, options exchanges are empowered by exchange rule to add as many as four new strike prices above and below the current index price. This provision allows the exchange to make series available in response to significant intra-day volatility. An exchange is not required to list the maximum allowable number of series but has discretion to do so. The exchange may utilize strike price intervals of \$5.00 or greater in listing these additional series. In approving \$5.00 strike price intervals as the minimum allowed, regardless of the value of the index, the Commission stated that its approval was based upon the belief that index values generally tend to be less volatile than the prices of individual stocks. <sup>62/</sup> The Commission noted, however, that in the event of an increase in the volatility of an index, strike price intervals greater than \$5.00 might become desirable; thus it gave the exchanges the authority necessary to widen price intervals in response to volatility increases. <sup>63/</sup> While Commission staff continue to believe that narrow strike price intervals are useful in providing optimum flexibility for hedgers and traders, recent events have demonstrated the problems generated by the proliferation of options series. As was illustrated by the CBOE experience, strike prices set at the absolute minimum during a period of increasing index volatility can contribute to an excessive dispersion of trading interest and dilution of liquidity in all open series.

b. There is a need for the options exchanges to review carefully the manner in which public orders participate in the opening. At present public orders may be routed to the OBO (on CBOE and PSE) or specialist (on Amex, NYSE, and Phlx), or represented by a floor broker in the crowd. Moreover, professional orders on the CBOE and PSE must be represented in the crowd. The Division believes consideration should be given to requiring, at a minimum, all public orders to be represented by the OBO or specialist at the opening. This step would appear to facilitate the identification of the actual order imbalance in a particular series and permit a quicker, more efficient opening of that series. The Division recognizes that such a limitation may reduce the flexibility in how a customer order is handled and raises questions regarding the appropriate

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<sup>62/</sup> Strike price intervals for stock options are set by exchange rules at \$5.00 if the price per share of the underlying stock is less than \$100.00 and \$10.00 if the stock price per share is \$100.00 or more.

<sup>63/</sup> See Securities Exchange Act Release No. 21362 (September 28, 1984), 49 FR 39135.

preferencing of those orders. Nevertheless, the Division believes that all means to achieve faster and coordinated index option openings must be explored.

Second, it is clear that exchange rules regarding opening rotations contributed to the pricing aberrations experienced during the market break and, accordingly, should be reviewed. These rules permit index options to commence opening rotations at the same time as the opening of the stock exchanges. While the rules may have minimal or no adverse impact when all the component securities of an index open quickly (i.e., by 10:00 a.m. at the latest), they appear to have an adverse impact on market maker performance when a substantial percentage of an index's underlying securities fail to trade during the course of the opening rotation. This problem is aggravated by exchange rules that make it permissible to continue trading in the index option for one and one-half hours after the opening rotation even when more than 20% of the index's underlying stocks by index value are not trading. Commission staff believes that the operation of these rules on October 19 and 20 strongly influenced market maker performance by forcing market professionals to estimate, and in some instances guess, the opening price of individual component securities and the cash value of the index. It is questionable whether fair markets can be maintained in derivative index products when many of the index's component securities are not trading. This is particularly true for index options, in which there is more retail customer interest than in index futures. The Division suggests that the Commission and the options exchanges reexamine these rules.

Third, the experience of the options exchanges during the market break in their efforts to have new series promptly listed by vendors highlights the need for advanced planning by all vendors and the exchanges concerning what series, if any, should be delisted when vendor data base capacity is outstripped. While the Division encourages the vendors to work on expanding their capacity, the exchanges and vendors should coordinate the introduction of new series that may exceed vendor capacity, and vendors should adopt policies providing for the fairest deletion possible in the event capacity is outstripped again.

Fourth, the Division believes that the performance of small order execution systems during the week of October 19 evidences the need for the CBOE and the Amex to revisit their rules governing market maker and ROT participation in these systems. The decision of the CBOE to release its market makers from their customary participation obligations, and the CBOE and Amex decisions to limit the availability of their execution systems to out-of-the-money call series, call into question the usefulness of these systems during volatile markets and the commitment of each exchange to provide public customers with enhanced liquidity and trading efficiencies on a continuous basis. While the NASD experienced similar problems with market maker defections from its Small Order Execution System ("SOES") during the week of October 19, the NASD has taken quick action to prevent future defections by proposing to place SOES participation obligations on market makers. The CBOE and Amex should consider similar action.

Fifth, emergency communication procedures between the options exchanges and the NYSE need to be upgraded. On October 19 and 20 inter-exchange communication appears to have become increasingly difficult as conditions in the stock market became more chaotic. As a result, the options exchanges were not completely aware of conditions in the primary market, especially late in the morning of October 20 when trading halts were in effect in 215 NYSE issues. The Division believes the Intermarket Surveillance Group should develop an inter-exchange plan for emergency circumstances.

Finally, market maker performance, especially in index options, was markedly inferior during the market break. As stated previously, market makers and specialists are required by statute and by exchange rules to trade for their own accounts in a manner that ensures the maintenance of fair and orderly markets. In return for the risks these market participants assume, they are accorded preferential margin treatment and are able to trade for their own accounts on the floor of the exchange. While the Division is cognizant of the many problems faced by these individuals in attempting to price derivative products at a time when the underlying markets were experiencing extreme volatility, nonetheless the performance of index options market makers on the CBOE and Amex is disturbing for two reasons. First, the level of market maker participation declined precipitously, primarily due to increased volatility. If market makers do not want to trade during volatile times, then it is questionable whether they should be accorded market maker status. Indeed, the Division questions whether the market makers that failed to participate during the opening rotations on October 20 should have received preferential margin treatment for any trades they did that day. Second, premiums charged for index options were extremely high and variable, often without regard to changes in stock prices. While the Division believes it is premature to judge the fairness of particular trades until the CBOE and Amex have completed their investigations of those trades, the levels of the premiums raise serious investor protection concerns. The Division intends to monitor the exchanges' handling of the situation very closely.

In conclusion, the Division believes the option exchanges need to address several questions in the near future, including: (1) how should opening rotations be handled in volatile markets; (2) how can communication between primary and derivative markets be improved; (3) how should the proliferation of series be handled; (4) how can high levels of market maker participation be ensured in a very volatile market; and (5) how can pricing continuity and fairness be maintained.

