FINAL REPORT ON STOCK INDEX FUTURES AND CASH MARKET ACTIVITY DURING OCTOBER 1987 TO THE U.S. COMMODITY FUTURES TRADING COMMISSION

THE DIVISION OF ECONOMIC ANALYSIS
THE DIVISION OF TRADING AND MARKETS

JANUARY 1988

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FORWARD

This report represents the completion of several initiatives directed by the Commission in connection with the historic decline in stock prices during October 1987. In particular, during a public meeting on October 27, 1987, the Commission directed the staff to prepare an Interim Report on stock index futures trading activity based on data already in hand or quickly obtainable. In addition, the staff was directed to embark on a longer-term examination of issues related to the role and performance of stock index futures and the trading systems for those contracts during the period surrounding October 19, 1987.

The staff completed and issued an Interim Report on November 9, 1987, which covered a number of topics, including a preliminary review of large-trader activity in futures markets, an initial evaluation of the financial performance of the futures markets and their clearing systems, and a description and preliminary assessment of the performance of the Commission's and the exchanges' regulatory and oversight programs during the week of October 19. Following that report, on January 6, 1988, the Commission's Division of Trading and Markets published a Financial Follow-up Report that confirmed the general conclusions

of the Interim Report on financial performance. This confirmation was based on more extensive data and detailed analyses and suggested improvements in certain areas related to the financial infrastructure of the stock index futures markets.

In addition, on January 4, 1988, the Division of Trading and Markets made public a report on the October 20, 1987, midday trading activity in the Chicago Board of Trade's Major Market Index contract. That report assessed whether the large price movement in that contract during a period when the other stock index futures contracts were not trading was caused by manipulative activity. Based on a thorough examination of trade data, the report found no reasonable indication of such activity.

This Final Report concludes the staff's examination of remaining issues identified in the Interim Report, including an analysis of more extensive and detailed data concerning the futures trading activities of major broker/dealers and institutional investors, along with certain pertinent aspects of their trading in the stock market. Much of this information was collected in a cooperative endeavor with staff of the Securities and Exchange Commission through a special survey of major broker/dealers and sponsors of institutional hedging programs. A detailed statistical analysis of futures and stock market price relationships was also conducted. In addition, this Final Report examines the performance and floor activities of futures exchange members in handling and executing customer orders, market making and trading practices in general. This examination is based upon

data obtained through the Chicago Mercantile Exchange's computerized audit trail system, which allows the identification of trades by individual customers within one-minute time intervals.

Based on the evaluations and assessments in the Interim Report, Financial Follow-up Report and this Final Report, the staff has made certain recommendations to augment or improve several aspects of futures regulatory and self-regulatory programs. The Commission believes these recommendations merit serious consideration.

Now that the staff has collected and reported to the Commission on the relevant facts surrounding the stock market events of October 1987, the Commission looks forward to continuing its examination of fundamental policy issues. If we conclude that additional regulatory or legislative responses are appropriate, we will not hesitate to raise them in the course of what we expect to be a vigorous and healthy public dialogue over the next several weeks and months.

For the Commission

Kalo A. Hineman

Kalo A. Hineman
Acting Chairman

January 29, 1988

SUMMARY

During a few days in mid-October 1987--most notably October 19--U.S. and foreign stock exchanges experienced record declines in stock prices. The abruptness and magnitude of October's fall in stock values placed severe strains on the operational and financial control systems of securities and futures exchanges and created strains for the banking system as well. Although no system failed and no broader economic crisis has ensued, a number of regulatory and self-regulatory issues were raised that are receiving close scrutiny by the Congress, Federal authorities, and self-regulatory organizations in the futures and securities industries.

The Commission addressed several of the issues pertaining to trading on futures exchanges in its Interim Report and in two subsequent reports released by the Commission's Division of Trading and Markets. (See Section I.) This final report primarily focuses on the futures and related stock market activity (including "program trading") of major commercial participants in the October 1987 markets, as well as the performance and floor activities of futures exchange members. In addition, this report contains recommendations for regulatory improvements in several areas.

A persistent assertion regarding the impact of stock index futures markets on stock prices concerns the "cascade theory." That theory suggests that short portfolio hedging and stock/ futures market arbitrage activities can interact to cause a

downward spiral in stock prices. A careful examination indicates certain inherent problems with the theory as an explanation of the October 19 market break. For one thing, the theory is dependent upon some assumptions that may not correspond to actual trading practices. More importantly, the cascade theory appears to describe at most a short-term and limited technical realignment of cash and futures prices that results from, rather than causes, an overall change in the equilibrium price level.

To ascertain the pattern of futures and related stock market trading in mid-October 1987, this report contains an extensive analysis of the timed daily trading data for the index arbitrage and portfolio insurance strategies of major broker/dealers and their institutional customers. Information on other forms of program trading in the stock market also is considered. The data were collected in a special survey that was conducted by the staffs of the CFTC and SEC.

As background to the trading activity of major market participants, Section II of this report summarizes a statistical analysis of the relationship between the S&P 500 index and the price of the December S&P 500 future for the period October 14 through 26. The focus of that analysis is a "trading proxy index," which was created for each day to minimize or eliminate the impact of delayed or stale stock market prices on reported values of the S&P 500 index. That analysis indicates that, during the periods when the reported futures discount was at extremes (e.g., the mornings of October 19 and 22), a significant portion of those discounts was illusory since a substantial

number of the stocks included in the S&P 500 index were not actively trading. Among other things, these findings cast substantial doubt upon both the cascade theory and the supposition that futures prices were leading the stock market as reasonable representations of what occurred during the morning of October 19.

Section III of this report provides an extensive analysis of the special intraday survey data. Index arbitrage programs in which futures contracts were bought and stocks were sold were largest on October 14, 16, and 19 but were insignificant thereafter as a result of the New York Stock Exchange's (NYSE) restrictions. The largest arbitrage trades accounted for sales of nearly 38 million shares on both October 16 and 19, representing about 11 percent and 6 percent, respectively, of total NYSE volume. On a relative basis, reported index arbitrage sell programs were more significant on October 14, when they accounted for more than 13 percent of total NYSE stock sales.

Portfolio hedge sales in the Chicago Mercantile Exchange's (CME) S&P 500 futures market were at their highest levels on October 16, 19, and 20. Daily gross sales ranged from nearly 15,000 to nearly 34,000 S&P 500 futures contracts, amounting to from 10 to 30 percent of total daily volume in that market. The largest reported net portfolio hedge sales occurred on October 19, nearly 28,000 S&P 500 futures contracts. Since index arbitrage was only significant from October 14 through 19, and portfolio hedge selling was substantial only on October 16 through 20, a significant interaction of the two trading

strategies most likely would have occurred on October 16 and 19. The analysis of the survey data on an intraday basis, however, does not support the contention that the two trading strategies interacted to cause the large fall in stock prices experienced on those days.

October 16 was the expiration date of a number of index option contracts as well as the Chicago Board of Trade's (CBT) Major Market Index futures contract. Consequently, most index arbitrage activity that day occurred during the final hour of trading. Portfolio hedge selling, however, was dispersed throughout the day and was not particularly heavy during the periods when stock prices fell the most and when arbitrage sell programs were the largest. At times within the day and at the close, index arbitrage sell programs may be construed to have contributed to short-term, technical pressures on stock prices. It is noteworthy, however, that, at those times, futures prices were falling along with stock prices despite an equivalent magnitude of futures index arbitrage buying, thus indicating overall market weakness.

On Monday, October 19, the stock market opened with a massive wave of selling. Nearly 100 million shares of stock were sold in the first hour of trading on the NYSE even though a number of major stocks had delayed openings, and over 600 million shares were sold that day. One mutual fund group alone accounted for sales of 17.5 million shares (34 percent of volume) in the first half hour of trading, which was nearly three times the reported index arbitrage sell programs during that period. For

the day, program selling of stocks not related to futures transactions was of a significantly greater magnitude than index arbitrage, totaling nearly 52 million shares. Clearly, index arbitrage was not the dominant selling force in the stock market that day. Also, the absolute amount as well as the percentage of arbitrage sell programs on October 19 were smaller than the stock sales associated with index arbitrage identified in prior studies that concluded that index arbitrage did not cause the significant stock price declines at other times.

Further, the intraday analysis of trading by major commercial firms does not support the interaction of index arbitrage and portfolio hedging strategies as an explanation for the extraordinarily large fall in stock prices on October 19. Although high levels of index arbitrage occurred early in the day, after 2:00 p.m. that activity diminished significantly. Moreover, for each half-hour interval after 10:00 a.m., other program selling in the stock market was larger than stock sales associated with index arbitrage. Portfolio hedge sales of futures contracts were persistent throughout the day, but the highs and lows of that activity did not correspond with the periods of greatest weakness or recovery of futures prices.

Because of the imposition of NYSE restrictions on program trading, index arbitrage was insignificant on October 20. On that day, portfolio hedge selling in the futures market was large at times and was not offset by futures purchases from index arbitrage trading. Consequently, there were large futures price

discounts relative to the underlying index that persisted throughout the day.

After October 20, stock prices continued to be volatile in the absence of significant index arbitrage and significant hedge selling of futures. For example, on October 22, when the Dow fell 78 points on volume of nearly 400 million shares, reported index arbitrage stock sales were less than 3 million shares. Similarly, on October 26, when the Dow fell 157 points on volume of over 300 million shares, no index arbitrage trades were reported. Furthermore, stock prices after October 19 did not recover to near the level of October 16, much less that of October 1. At the close on October 26, the Dow was only 55 points higher than at the close on October 19. This lack of recovery in the absence of index arbitrage reinforces the conclusion that futures-related program trading was not the principal cause of the collapse of stock prices. Instead, the wave of selling that engulfed both the stock and index futures markets, particularly on October 19, appears to have been precipitated by a massive change in investors' perceptions.

The SEC/CFTC survey data and interviews conducted by CFTC staff indicate that institutional hedging in futures markets was not uniform in nature during the mid-October period under review. In particular, while some firms employed portfolio insurance strategies, others pursued more varied hedging and market-timing strategies, including several who purchased futures during periods of declining stock prices in anticipation of later purchasing stocks. And, among those firms that earlier in

October were adhering to portfolio insurance strategies, many abandoned or reduced the amount of futures or stock market sales implied by the plans. In addition, representatives of institutional investors indicated that, in the short run, they could use the stock market and stock index futures interchangeably for many portfolio management strategies. In particular, fund managers indicated that stocks would have been sold in the absence of the ability to hedge them in the futures market.

Section IV of this report examines trading in and the operational performance of the S&P 500 futures contract. Commission staff found that the operational systems of both the CME and its member firms functioned well, despite the high trading volume and price volatility in that market. Although a larger than usual number of outtrades occurred on October 16 and 19, they largely were resolved before the opening of trading the next day because of two special trade checking sessions. In addition, a staff survey of twenty-three CME member firms found that their order-routing and execution systems required no substantial modifications. The order-execution times at one major wire house were reviewed in detail, revealing that those orders generally were executed expeditiously, with nearly half of all customer orders executed within a minute of their receipt on the trading floor.

CME audit trail data document broad participation in the market on October 19 and 20 by all major market groups, including members trading for their own accounts and brokers executing customer orders. CME members trading for their own accounts

absorbed customer sell orders on those days when the market was falling, including those times when the market fell the most. Further, the number of "primary" brokers executing customer trades in the S&P 500 futures market increased on October 19 and 20 from the active trading day of October 16, indicating that experienced brokers remained available to execute customer orders.

Section V of this report describes the Commission's heightened trade-practice surveillance of stock index futures trading beginning on October 14. CFTC staff maintained an almost continual presence on the floors of the CME and the CBT during the week of October 19. Through the use of the CFTC's computer-assisted trade database and one-minute execution times required by CFTC audit trail regulations, staff reviewed large amounts of trading data on an expedited schedule. In addition, market participants were interviewed and exchange investigations of potential trading abuses were monitored. In particular, staff examined October 20 trading in the CBT's Major Market Index contract and trading in the S&P 500 futures contract by a CME clearing member that took place on the morning of October 22, as well as all exchanges of futures for cash executed in the S&P 500 contract during the mid-October period under review. To date, the staff has not discovered any pattern of trading activity in futures or options on futures that would indicate violative activity.

The final section of this report examines several pertinent aspects of the current regulatory system and suggests areas for

improvement. Although the staff believes its current market surveillance system for stock index futures is sound, improved data collection capabilities in other markets, particularly regarding stock market trades of firms engaging in index arbitrage, would greatly expedite any subsequent studies of these markets.

The staff examined the traditional uses of daily price limits in futures markets, assessing the advantages and disadvantages of such limits. All but one of the smaller stock index futures contracts currently have rules providing for such limits. Any tightening of those limits, however, should take into account the potential impact on other markets.

Section VI also includes a brief review of interagency coordination, which describes the Commission's establishment of surveillance liaisons with the SEC and banking regulators. While the staff believes both interagency and interexchange coordination generally were excellent during October 1987, improvements are needed regarding access of futures exchanges to accurate information on delayed openings and trading halts of NYSE stocks. Coordination among exchanges with respect to emergency closings should be enhanced.

This report also summarizes the recommendations of its Financial Follow-up Report. That report comprehensively analyzed the futures market financial systems and found that those systems withstood the stress placed upon them by the events of October 1987.

Staff considered the concept of intermarket frontrunning as it may relate to trading between securities and futures markets. It was found that both securities and futures exchanges have rules that can be applied to such activity. The Intermarket Surveillance Group was identified as an appropriate forum for facilitating the communication of intermarket surveillance data needed to monitor such activities. CFTC staff also is considering the advisability of Commission regulatory action on frontrunning.

CONTENTS

I. INTRODUCTION

The historic price declines in the stock and related markets during October 1987 have been well publicized and are the subject of a number of studies and reports. An interim report prepared by staff of the Commodity Futures Trading Commission (CFTC or Commission) was issued on November 9, 1987. That report was among the first to provide specific information concerning the role of futures markets, the futures clearing and financial systems, futures large-trader activity, and the activities of the futures regulatory and self-regulatory organizations (SROs) during that period. 1/ Since that time, the Commission's staff has published two additional reports, as discussed below, dealing with the financial performance of the futures markets during October 1987 and trading in the Chicago Board of Trade's (CBT) Major Market Index (MMI) contract on October 20. 2/ The present study completes the staff's report on trading and trade practice

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1/ Interim Report on Stock Index Futures and Cash Market Activity During October 1987, Division of Economic Analysis and the Division of Trading and Markets, Commodity Futures Trading Commission, hereinafter "Interim Report."

2/ Follow-up Report on Financial Oversight of Stock Index Futures Markets During October 1987, Division of Trading and Markets, Commodity Futures Trading Commission, January 6, 1988, hereinafter "Financial Follow-up Report"; and Analysis of Trading in the Chicago Board of Trade's Major Market Index Futures Contract on October 20, 1987, Division of Trading of Markets, Commodity Futures Trading Commission, January 4, 1988.

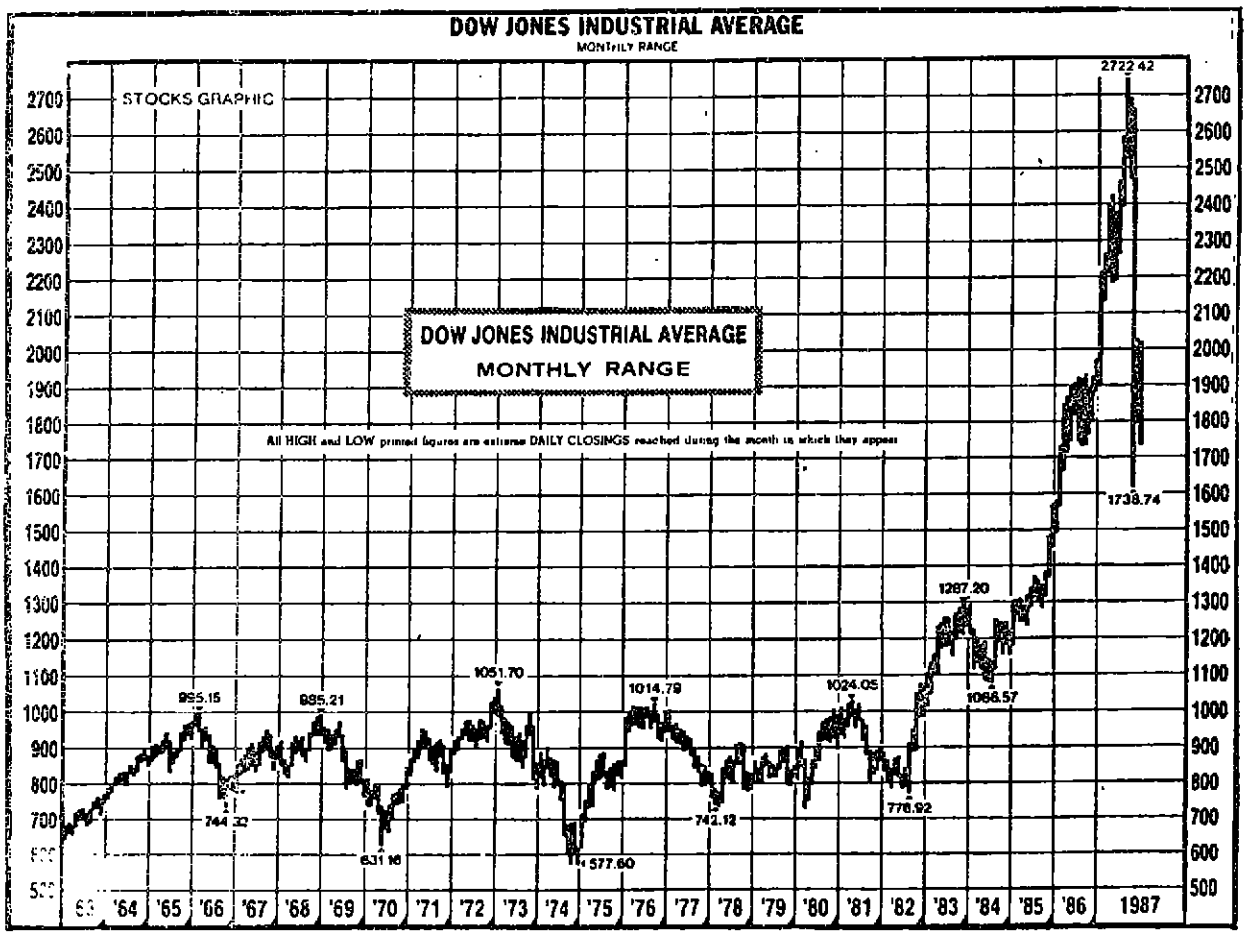
activities in stock index futures markets during mid-October 1987.

One of the longest bull markets in stock market history apparently ended in October 1987. The Dow Jones Industrial Average (Dow) and the Standard and Poor's 500 (S&P 500) peaked in mid-August 1987 at 2,722 and 337 points, respectively, after having risen about 240 percent since August 1982 (Figure 1). The last two years of that period, from mid-August 1985 through mid-August 1987, were especially strong for stocks, with the Dow rising 107 percent (from 1313 to 2722). Between October 1 and October 16, 1987, however, the Dow declined 392 points, or about 15 percent in value, including a 108-point drop on October 16, the largest absolute decline to that date.

On Monday, October 19, stock indices and stock index futures opened sharply lower and ultimately established record one-day declines in both absolute and relative terms. On record stock volume of over 600 million shares, the Dow closed down 508 points (23 percent) at 1739, and the S&P 500 closed down nearly 58 points (20 percent) at 225.

The market traded in extremely wide price ranges over the next several days. On October 20, the Dow traded in a range of 450 points and closed with a record gain of 102 points on record volume. On October 21, the Dow established a new record gain of nearly 187 points. This significant price recovery was mostly offset by losses of 78 points and 157 points in the Dow on October 22 and 26, respectively. On October 26, the Dow closed

FIGURE 1



Source: The Washington Post

at 1794, only 55 points higher than its closing value on October 19.

At year-end, the Dow closed at 1940, about 700 points (26 percent) lower than its close on October 1, indicating that the stock market recovered less than a quarter of the value lost in mid-October. In fact, the Dow ended 1987 at about the same level as it had begun the year (Figure 2). Thus, the price fall of mid-October was not a technical aberration; it was a fundamental realignment, albeit abrupt, of stock values.

Many market analysts have attributed October's stock market fall to various economic and political factors that had created a market environment conducive to a substantial decline. Nevertheless, the precipitous nature of the decline during October 1987, accompanied by what appeared to be large discounts of stock index futures to their underlying stock indices, caused some to question whether various types of so-called "program trading," 3/ especially trading related to stock index futures markets, had a destabilizing effect on stock prices. Other issues were raised

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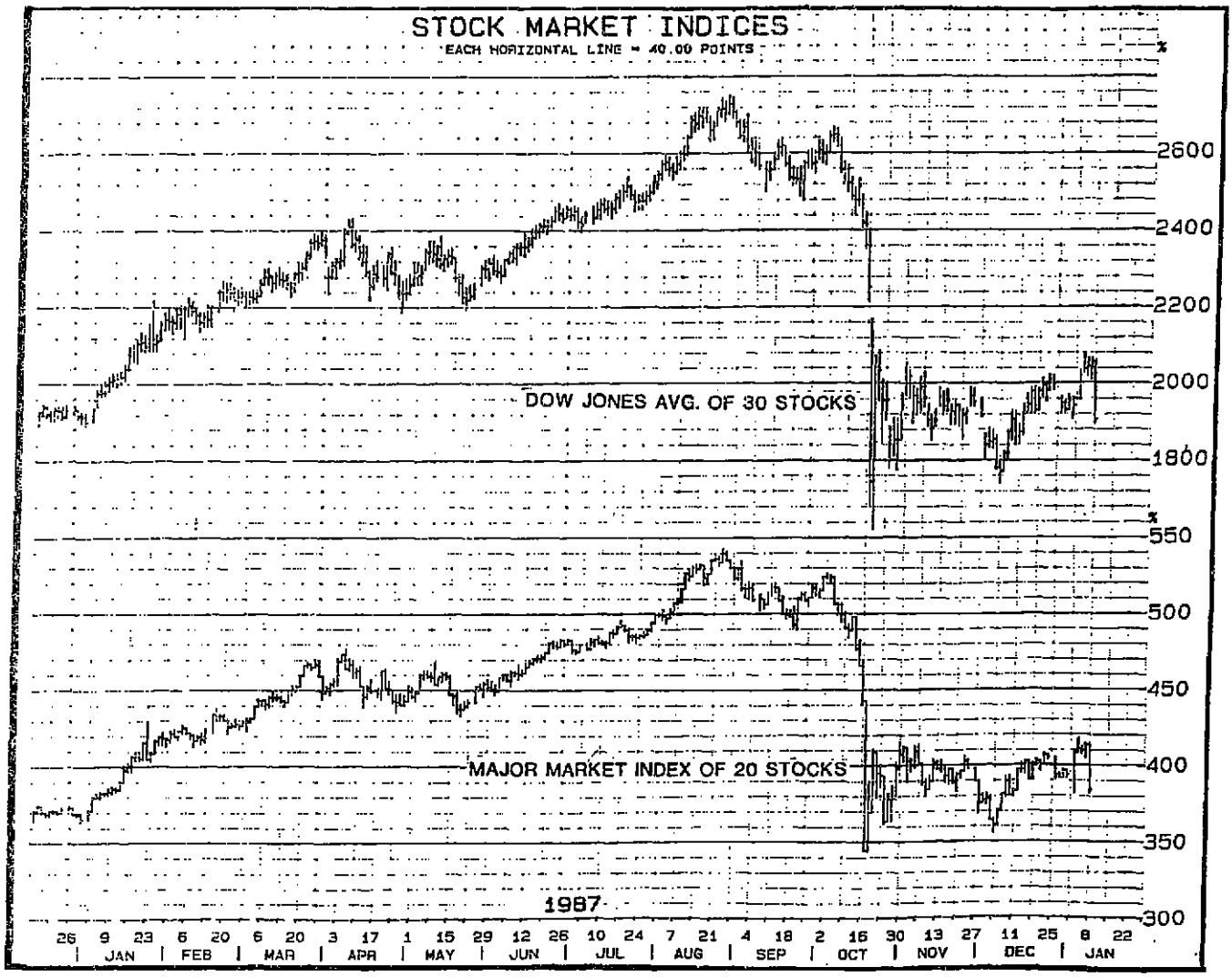
3/ Program trading is a generic term used to denote the purchase or sale of a predetermined basket of securities. This purchase or sale of securities may either stand alone or may be executed in conjunction with activities in some other instrument or market (for example, selling a basket of stocks and buying Treasury bonds to reduce equity exposure and increase debt market exposure). "Index arbitrage" or "portfolio insurance" (the latter being a form of hedging when executed in a derivative market) are included in the general term program trading. A more detailed discussion of such trading activities is found in Section III of this report.

FIGURE 2



concerning the adequacy of trade execution systems on the various stock, futures, and option exchanges, the severe financial stresses experienced by financial institutions and market participants, and the regulatory and self-regulatory actions taken during that period.

The Commission staff's Interim Report provided a preliminary review of those various issues as they related to futures markets. That report used data routinely available from the Commission's clearing member, large-trader, and other reporting systems and preliminary data on selected stock transactions collected jointly with the staff of the Securities and Exchange Commission (SEC).

With respect to futures market trading activity, the Interim Report described the commercial 4/ and noncommercial composition of the major stock index futures markets and included data showing that reportable 5/ commercial traders held from about 60 to 75 percent of all open contracts in the Chicago Mercantile Exchange's (CME) S&P 500 futures market (the most active stock index futures market) during October 1987. (See Appendix C,

4/ Commercials are those whose business activities generally relate to the cash market and whose futures trading is mainly in connection with such cash market activities.

5/ The reporting level for the CME's S&P 500 futures contract is currently 300 contracts; for the Kansas City Board of Trade's (KCBT) Value Line Average Index (VLA) and the New York Futures Exchange (NYFE) New York Stock Exchange (NYSE) Composite Index, 100 contracts; and for the CBT MMI, 50 contracts. Terms and conditions of these contracts are summarized in Appendix C, Exhibit 1.

Exhibit 2.) The commercial firms using stock index futures are also among the major participants in the stock market, most notably pension and endowment funds, investment bankers, and broker/dealers.

Based on the reports that stock index futures prices were at large discounts to reported cash prices, some observers alleged that the futures market was leading or causing declines in the cash market. The Interim Report examined the nature of the relationship between futures and cash prices from October 16 to 23. That report noted the wide discounts of stock index futures to the cash index that were reported on October 19 and subsequent days. There is evidence that those reported discounts were in part the result of significant lags in the cash index's values, which were not limited to periods when trading was halted in a large number of stocks included in the S&P 500 index. It was also at this point that the normal arbitrage mechanism that links the cash and futures markets was impeded, preventing the two markets from directly affecting each other.

The Interim Report also reviewed preliminary data relative to the futures and cash market activities of reportable futures traders during October 1987. Reportable traders were classified as broker/dealers, institutional investors, other commercial firms, or noncommercial traders. The Interim Report included extensive data showing, for each class of traders, the size distribution of net futures positions and position changes from October 12 to October 23.

For broker/dealers, the data indicated substantial buying of futures on certain days during the period. These data are consistent with the proposition that such traders were engaged in index arbitrage by buying futures and selling stocks, thereby tending to narrow the intermarket spreads when there were discounts of futures to cash. Nevertheless, based on preliminary data obtained from large futures traders concerning their cash market activities during that period, futures traders' related stock market activities appeared to be small relative to NYSE volume on those days.

For institutional investors, which include portfolio insurance users and other futures hedgers, the Commission's data showed a pronounced tendency of these futures market participants to increase their overall short futures positions. The combined net short futures positions of institutional investors had particularly large increases on October 16, 19, and 20. Those data were corroborated subsequently by data collected in a special survey jointly conducted by the staffs of the CFTC and the SEC. Those survey data are used extensively in the trading analysis portion (Section III) of this report.

The Interim Report also described the Commission's regulatory program for ensuring the financial integrity of the futures marketplace. That program relies principally upon a system of industry self-regulation, which the Commission oversees and supplements. As examined more fully in the Interim Report, the various Federal and self-regulatory safeguards of financial integrity include the segregation of customers' funds, the

minimum capital requirements, an "early warning" system, the futures margining system, and SROs rule enforcement responsibilities.

The Interim Report confirmed that, during that financially stressful period, those safeguards already in place for the futures markets worked effectively. No customer funds were lost as the result of a futures firm's failure or default; no futures commission merchant (FCM) failed; exchange clearing organizations collected all margins due them from member firms, including daily and intra-day payments of unprecedented magnitudes; and the futures clearing mechanisms operated effectively despite record volumes, price swings, and margin flows. No futures market had to be closed because of financial or margin collection problems.

Overall, the Interim Report met the Commission's objective of providing as much factual information as quickly as possible, even though some of the data were preliminary in nature. Already underway were detailed analyses of financial flows, FCMs' capital and segregation compliance, and customer default and other financial data to identify strains on the financial system. Also in progress was an analysis of intra-day futures trading data to identify possible trading abuses, to develop profiles of participants in the major stock index futures pits, and to review the timing and quantity of order flows and executions. In addition, Commission staff was supplementing the many large-trader interviews conducted during that period of heightened market volatility with additional interviews of representatives from 20

firms conducted with the more detailed trading data from the survey in hand. 6/

As mentioned above, since the issuance of the Interim Report, Commission staff also has published separately additional information on certain aspects of stock index futures trading during October 1987. In particular, on January 4, 1988, the Division of Trading and Markets made public a report on the October 20, 1987, mid-day trading activity in the CBT's Major Market Index contract. 7/ That report reviewed trading activity during the period of unusual price movement that occurred in the MMI when other stock index futures markets were closed. The report found no reasonable indication that the price movement was caused by manipulative activity.

In addition, on January 6, 1988, the Commission's Division of Trading and Markets published its Financial Follow-up Report that, based upon more extensive data, confirmed the conclusions of the Interim Report and identified certain areas where improvements could be made. 8/ Specifically, the Financial Follow-up Report analyzed available data concerning FCM capital and segregation compliance, reviewed the effectiveness of the

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6/ These interviews involved ten broker/dealers (who were included in the survey) and ten institutional traders who had significant futures trading activity during mid-October 1987. The interviews were conducted from December 10 to December 29, 1987.

7/ See footnote 2.

8/ Ibid.

systems for collection and payment of futures margins, and evaluated the adequacy of futures margins and self-regulatory systems from a financial perspective during the period under review. In this connection, the Financial Follow-up Report also presented survey data on the experience at 23 FCMs that carried two-thirds of customer equities in the S&P 500 futures contract in mid-October.

Although the systems for maintaining the financial integrity of the futures marketplace, including minimum financial requirements, segregation of customer funds from a firm's own house funds, and margin requirements, were found to have withstood the stress placed upon them by the events of October 1987, the market break also provided an opportunity to examine in detail how these systems operate under stress and to suggest further enhancements. The Financial Follow-up Report made the following recommendations: (1) that the rights and obligations of clearing organizations and settlement banks with respect to variation margin confirmations be clarified; (2) that establishment of a mechanism for expanding the availability of the Fedwire in periods of extreme volatility be explored; (3) that banks effecting margin settlements be given increased access to financial data concerning clearing firms; (4) that futures markets' use of intra-day margin pays and collects be increased; (5) that margin and audit procedures be reviewed by FCMs to assure that they obtain adequate security from foreign customers; and (6) that the pay and collect information-sharing arrangement among futures exchanges be expanded to include securities option data. These

recommendations and other aspects of the Financial Follow-up Report address issues regarding the financial integrity of futures markets that were later raised in other reports on the October market break, such as the Report of the Presidential Task Force on Market Mechanisms (Brady Commission Report).

The present report updates and provides additional information and analyses in several areas. In particular, the next section reviews the futures-cash basis in greater detail and for a longer period than in the Interim Report. The third section of this report includes a comprehensive review of the daily and intraday trading activities of futures hedgers, including so-called portfolio insurers, as well as stock index arbitrageurs, from October 14 through October 26. The fourth section analyzes changes in the performance of the stock index futures markets in terms of order execution experience, unmatched trades and the composition of intra-day trading on the futures market during the mid-October period. The fifth section presents a description of the Commission's trade practice surveillance systems and the application of those systems to the stock index futures markets during the period. The final section assesses the adequacy of the regulatory and self-regulatory systems as related to trade practice, financial and market surveillance and presents several staff suggestions for enhancements of existing systems and programs.

II. STATISTICAL ANALYSES OF PRICE AND BASIS BEHAVIOR, OCTOBER 14-26, 1987

A. Introduction

During the week of October 19-23, there were periods during which reported S&P 500 stock index futures prices were at very large discounts to the reported levels of the S&P 500 cash index. This observation has led some commenters to claim that such large discounts were indicative of futures prices that substantially led stock market prices and that such discounts could trigger a decline in the stock market due to index arbitrageurs' buying the relatively cheaper stock index futures and selling in the stock market.

Others have correctly observed that a large negative basis 9/ makes hedging strategies more expensive. In addition, an unrealistic or uneconomic basis raises questions concerning the general functioning of the markets, including their efficiency and liquidity.

In reviewing stock market and futures price data for the period under consideration, one should be aware that there are several possible sources of the large reported disparities in relative prices. First, since not all stocks included in a stock index trade at each moment in time, the last sale price for a

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9/ The term "basis" is defined for purposes of this report as the futures price minus the cash price.

stock does not necessarily reflect the latest market valuation for both the stock and, consequently, the cash index of which that stock is a component. This is particularly significant if a sizeable portion of the stocks in an index have delayed openings or trading halts in a period of rapidly changing prices. 10/ This disparity or gap, which can result from stale stock price quotes, delayed openings, or trading halts in the midst of a moving market, is called the "non-trading effect." At many times during the week of October 19-23, the lag in trading or price reporting of many NYSE stocks was reported to be significant, and it would not have been possible to execute the stock side of an arbitrage strategy at the last, but outdated, prices included in the stock index.

Second, under market conditions existing during the October 19-23 period, arbitrage transactions at times were discouraged or impeded. For instance, if particular stocks were not trading, it would not have been possible to include those stocks in an index arbitrage program executed on the NYSE. Among other things, this increased the risk of miscalculating an arbitrage opportunity. This either would have eliminated arbitrage or reduced its magnitude. If arbitrage does take place under such conditions, arbitrageurs require a greater disparity in prices because of the increased uncertainty surrounding stock prices. Further, to the

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10/ For discussion of delayed openings and trading halts, see Study VI, Part IV, of the Brady Commission Report.

extent the bid-ask spreads on a stock index futures contract and/or the stocks that replicate the underlying index increase, the cost of arbitrage rises. Finally, impairment of the technical capability to execute arbitrage trades, such as that occasioned by the closing of the NYSE's Designated Order Turnaround (Super DOT) system to certain arbitrage trades starting on October 20, 1987, decreased arbitrage activities and thereby affected the price differentials between the index futures and the underlying index. 11/

B. Methodology and Statistical Analyses

To examine the degree to which futures prices may have led actual stock prices, Commission staff constructed portfolios of the most continuously traded stocks in the S&P 500 index for each day of the October 14-26 period. The stocks chosen were those that traded in at least 90 percent of the five-minute intervals (e.g., 9:30-9:35 a.m., 9:35-9:40 a.m., etc.) 12/ on each day, with a minimum of 50 stocks in each day's portfolio. The price used for each stock in the portfolio was the price closest to the end of each five-minute interval. Those subsets of the S&P 500

11/ A more detailed discussion of the prevalance of arbitrage transactions on particular trading days, as well as market participants' assessments of the feasibility of such transactions, is contained in Section III of this report.

12/ All times reported in this section are Eastern Daylight Time.

index served as each day's estimated "trading proxy index," which would reflect more current price information than the last transaction prices used in the reported S&P 500 index calculation. 13/ The price change behavior of this trading proxy index and the reported S&P 500 index were both compared to the price change behavior of the December S&P 500 future over five-minute intervals each day during the period under review.

A statistical examination of the December S&P 500 future's price series indicates that the futures price changed in a way that would be expected in a market in which prices are based on currently available information. That is, when prices are determined based on current information, the successive changes in the series are statistically unrelated. However, the reported changes in the underlying S&P 500 index showed significant statistical relationship from one price change to the next, which is consistent with the existence of periods of stale price data for some of the stocks included in the index calculation. These characteristics of the price changes in the December S&P 500 future and the reported S&P 500 index yield a relationship between the two series indicating that price changes in the December S&P 500 future at times preceded changes in the S&P 500 index by as much as fifteen minutes during the period under review.

13/ See Appendix A for a more detailed description of the construction of the trading proxy index and the methodology discussed in this section.

The behavior of the changes in the trading proxy index were significantly different from those of the reported S&P 500 index. Price changes in the proxy index were not statistically related to that index's previous changes, indicating that the prices of the stocks included in the proxy index exhibited behavior consistent with their having been formed on a current basis. The comparison of the trading proxy index and the December S&P 500 future implies that the lead of the futures contract, which might be inferred from values of the reported index, is much reduced or totally eliminated.

The relationships among the three series can be seen in Appendix B, Exhibits B-1 through B-9, 14/ where the reported S&P 500 index, the trading proxy index, and the December S&P 500 futures price are plotted for each day from October 14 through October 26 for those five-minute intervals when the trading proxy index estimates were most reliable (generally from 9:50 a.m. to the close of trading on the NYSE). At times when prices moved significantly, the reported S&P 500 index tended to lag the December S&P 500 future's price change, although that lag is significantly reduced or eliminated when the plot of the trading proxy index is compared to the December S&P 500 future's prices. This indicates that the value of stocks actually being traded at a given moment on the NYSE floor and the concurrent value of the

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14/ All exhibits referenced in this section are located in Appendix B.

December S&P 500 future moved on a more simultaneous basis than was reflected by the reported S&P 500 index.

The trading proxy index also was used to calculate the trading proxy basis (proxy basis) for the December S&P 500 future. Exhibits B-10 through B-18 chart the basis derived from the December S&P 500 future and the reported S&P 500 Index (reported basis) and the proxy basis for each day from October 14 through October 26 for the same five-minute intervals.

C. Intraday Analyses of the Reported and Proxy Bases

Examination of the basis charts shows that both the reported basis and the proxy basis generally were positive and close together from October 14 through 16. This indicates the absence of a significant non-trading effect and the existence of an effective arbitrage link between the markets on those dates. On October 19, however, the stock and futures markets opened significantly lower, and the December S&P 500 future's reported basis ranged between a 10- and 20-point discount from 9:30 to 10:00 a.m. Nevertheless, at, for example, 10:00 a.m., the estimated proxy basis was nearly zero, while the reported basis was at a 10- to 12-point discount. This indicates that the sharp decline in the futures opening price did not lead the stock market down, but rather reflected the decline that had occurred in those stocks open for trading. The proxy basis remained at a slight discount for most of the period from 9:55 to 11:55 a.m., and larger deviations were corrected towards zero quickly,

indicating that the markets were relatively well-linked by arbitrage activity.

This behavior of the proxy basis also indicates the absence of a critical trigger mechanism early on October 19 for the cascade theory 15/--a scenario positing that selling in futures markets drives the prices of futures to a sufficient discount from their theoretical levels so that arbitageurs buy the undervalued futures and sell the stocks, thus transmitting selling pressures from the futures to the stock markets and causing further selling pressure and price declines on the stock market. Basis levels equal to that of the proxy basis that existed through 11:30 a.m. on October 19 had been seen countless times in the past without triggering a cascading decline in stock prices.

In order to contend that futures trading on October 19 ignited a decline in the stock market, it is necessary to contend two improbable facts. First, that the sophisticated broker/dealers who conduct the majority of index arbitrage transactions responded with massive futures/stock arbitrage programs to an illusory discount of the futures. Second, it was market mechanisms, particularly the existence of the stock index futures market, rather than a fundamental reevaluation of stock values, that triggered the October stock market break.

15/ A more detailed description of the cascade theory is contained in Section III of this report.

The extent to which arbitrageurs were reacting to illusionary discounts is discussed above. With respect to the market break, the decline of the proxy index from the beginning of stock market trading on October 19 is indicative of a fundamental reevaluation of stock prices occurring on the NYSE. Further, as discussed in the following section of this report, evidence from the intraday analyses of index arbitrage and futures portfolio hedging activities does not support the cascade theory's mechanical view of the October 19 stock market decline.

From 12:00 to 1:25 p.m. on October 19, both the reported and proxy bases were at a more negative average discount consistent with a weakened arbitrage link between the two markets. Beginning at 1:30 p.m., the reported and trading proxy bases began to fall to much deeper discounts that persisted through the close of trading that day, indicating a substantial elimination of the arbitrage link between the two markets. 16/

On October 20, there was a noticeable non-trading effect around 10:00 a.m. and again during the period immediately

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16/ To estimate the basis more accurately for the opening intervals on October 19 not plotted in Exhibit B-13, the same estimation methodology was employed using a portfolio of those stocks that traded in at least five of the six intervals in the first half hour of trading on October 19. Exhibits B-19 and B-20 show the results from that 29-stock portfolio estimate. The basis results show that, from 9:35 a.m. to 10:00 a.m., the proxy basis was nearly zero, reinforcing the above statements that the futures price level reflected what was occurring on the NYSE floor (including actual trading delays/halts) and that a cascade trigger mechanism was not present at the opening on October 19.

preceding the S&P 500 futures trading halt on the CME. However, after 10:00 a.m. and for the remainder of the day, the reported and proxy bases were at significant discounts, indicating the lack of a significant arbitrage link between the two markets.

On October 21, the stock and futures markets opened higher with a positive reported basis. However, the level of the trading proxy index indicates that the reported stock index was understating the extent of the market increase and, therefore, the proxy basis was at a discount nearly equal to that which existed during the afternoon of October 20. From approximately 11:15 a.m., the reported and proxy bases were nearly equal and showing futures at a discount to cash index values. The discount gradually diminished until the last hour of trading when the discount was eliminated completely.

The manner in which the discount was eliminated during the day on October 21 is not necessarily consistent with the existence of arbitrage activity. The continual, gradual realignment of those two markets during the day appears more consistent with standard valuation processes acting to equilibrate price levels in two similar markets operating contemporaneously during a day of relatively stable trading (the trading proxy varied over a relatively narrow range throughout the entire day) rather than the rapid realignment that would be expected from arbitrage activity.

On October 22, the S&P 500 December future opened sharply lower while the reported S&P 500 index remained relatively unchanged, resulting in a huge reported discount that reached a

maximum of 63 points by 9:35 a.m. The plot of the reported and proxy bases in Exhibit B-16 indicates that as late as 9:45 to 9:50 a.m., when the reported basis had been reduced to a 32-point discount, the discount of the trading proxy basis was approximately 20 points. Also, from the graph of the three price series (Exhibit B-7), it is evident that a strong non-trading effect was present in the reported S&P 500 index until 10:15 a.m. For the remainder of October 22, there is no evidence of a strong non-trading effect, and both bases remained at a moderate discount.

On October 23, there was no evidence of a significant non-trading effect, and the levels of the bases through 10:30 a.m. were similar to their levels during the afternoon of October 22.

For October 26, the plots in Exhibit B-18 indicate that the non-trading effect accounted for about 50 percent of the reported discount at 9:55 a.m. By 10:15 a.m., the non-trading effect was eliminated, and the discount in both bases widened gradually for the remainder of the day, indicating an absence of significant arbitrage activity between the two markets.

D. Conclusions

This examination of the reported and proxy bases during the week of October 19 suggests several conclusions. First, during the periods when the reported futures discounts were at extremes (e.g., the mornings of October 19 and 22), a significant portion

of those discounts were illusory due to the lack of frequent trading in a substantial number of stocks within the S&P 500 index. In addition, the lack of a significant discount in the basis derived from the trading proxy index during the morning of October 19 undermines the cascade theory as an empirical representation of what occurred that morning. Finally, after approximately 1:30 p.m. on October 19 and through the remainder of that week, the arbitrage link between the two markets was, at critical times, weak or non-existent. 17/

17/ These results regarding the pattern of the non-trading effect and arbitrage linkage are very similar to results obtained through a different methodology by Lawrence Harris, "Nonsynchronous Trading and the S&P 500 Stock-Futures Basis in October 1987," University of Southern California, Working Draft, December 22, 1987.

III. TRADING ANALYSIS 18/

A. Introduction

As discussed in the Interim Report, the majority of open interest in stock index futures contracts is held by firms that also are among the major firms active in the underlying stock market, i.e., broker/dealers, pension and endowment funds, mutual funds, and other institutional investors and commercial interests. For instance, CFTC data for reportable accounts in the S&P 500 futures contract (i.e., those accounts holding positions of 300 contracts or more) indicate that, during October 1987, those firms held between 60 and 75 percent of both sides of the S&P 500

18/ This report uses terms such as "buyer," "seller," "buys futures," and "sells futures" to describe a person who enters into a futures contract. However, in contrast to stock transactions, which involve the transfer of title to securities, payment, and the delivery of certificates evidencing ownership, a futures contract consists only of the exchange of mutual promises to perform in the future--the seller (short) promises to deliver the commodity or cash-settle the contract and the buyer (long) promises to pay for the commodity upon delivery or cash-settle the contract. Most futures contracts are settled by liquidating trades prior to expiration of the contract. Very few futures contracts are held to maturity so as to result in actual delivery or cash settlement, whether the underlying commodity is wheat, gold, gasoline, or a cash-settled stock index. Indeed, the futures seller and buyer most often do not dispose of or acquire the commodity through futures trading. Instead, principal participants in futures markets are hedgers seeking to protect their cash market positions from the risks of subsequent price changes and speculators who assume those risks in the hopes of earning a profit.

futures market on individual days 19/ (Appendix C, Exhibit 2). 20/

The futures trading activity of institutional investors, particularly pension funds, is of particular interest since it constitutes the major share of stock index futures trading activity by commercial interests and complements directly their activity in the underlying cash sector. One major trading strategy employed by those firms is the sale of futures contracts for the purpose of limiting the downside exposure of their equity portfolios, i.e., short hedging. In the classic case, a portfolio manager employs such a strategy when a market decline is anticipated or when the manager decides to liquidate a stock portfolio and futures are sold as a temporary substitute for selling the stocks.

A specialized form of portfolio hedging has been referred to as portfolio insurance or "dynamic asset allocation." While akin to other short hedging strategies in its basic objective, this strategy calls for specified increases (decreases) in equity exposure as the market rises (falls). The objective of the

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19/ In addition, the CFTC obtained large-trader data from the CME for October 21, a day when the Exchange's reporting level was 100 or more contracts. The CME's data, which covered about 85 percent of the total open contracts, both long and short, show that, even at those smaller position levels, commercial interests represented the vast majority of traders with reportable positions in that futures market.

20/ All exhibits referenced in this section are located in Appendix C.

strategy is to limit the decrease in value of the portfolio associated with market declines while participating in gains when market advances occur. Rather than adjusting the proportion of stock in the portfolio or purchasing put options, futures markets are used to adjust the degree of a portfolio's equity exposure, primarily because of the futures market's lower costs and other efficiencies. When implemented in accordance with a specified model, the cumulative returns on such a strategy replicate the returns on a purchased put option, in combination with the long position in stock, over the selected investment horizon.

CFTC interviews with major institutional users of futures markets during October 1987 indicate that many hedgers used stock index futures to rebalance their portfolio exposure between equities and fixed income securities, i.e., investment managers used stock index and interest rate futures to alter the equity versus fixed-income exposure reflected in their overall portfolios. In the longer run, of course, the mix of the underlying portfolio can be adjusted through cash market purchases and sales, and the futures positions can be liquidated. Similarly, institutions have used stock index futures markets when anticipating outright stock purchases. This is the case, for instance, where firms wish to achieve larger equity market exposure in advance of selecting and purchasing the actual stocks (i.e., market timing and positioning strategies).

All of these futures trading objectives of institutional firms can be achieved, in one form or another, in the cash market

alone, although normally not as efficiently. 21/ In fact, prior to the availability of liquid futures markets, such strategies were carried out in that manner. That is, the underlying securities are simply purchased or liquidated without the intermediate step of futures market purchases or sales. However, during the last several years, stock index futures markets have become an integral adjunct to the cash market activities of many major institutional investors for several reasons.

First, commission costs associated with comparable sized trades are normally considerably lower in the futures market. Further, it generally is considerably faster to initiate a single futures market trade representing a basket of stocks rather than numerous transactions in a broad range of individual stocks or bonds. In addition, futures markets most often offer greater liquidity and result in smaller execution costs and price effects than comparable transactions in the stock market. Finally, as discussed below, futures markets at times also may offer price advantages.

Not surprisingly, CFTC interviews with major institutional participants in the stock index futures market during October 1987 indicated that a significant portion of those investors holding futures positions during that time viewed the cash and

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21/ While the stock market does not provide a low-cost means of temporarily hedging a stock portfolio, an investment manager could sell the portfolio and repurchase it at a later date when he was more optimistic about the market's outlook.

futures markets as interchangeable for purposes of short-term implementation of their strategies. The interchangeability of these markets is, of course, subject to the considerations mentioned above: relative cost, liquidity, and value. For instance, major institutional investors told CFTC staff that, each time they decided to adjust their equity exposure, they also evaluated the relative merits of each market (futures or cash) in carrying out that objective at a particular time, and the institutions executed their overall strategy accordingly.

If a firm wished to reduce its equity exposure, it might sell in the stock market if the value in that market were higher than in stock index futures market after adjustments for such factors as the net cost of carry, as discussed below. Likewise, a firm wishing to increase its equity exposure might, in the short run, buy the relatively undervalued futures (as a temporary substitute for the stock) under such circumstances, based on the firm's perceptions of value, liquidity, and other factors. Institutional investors, which routinely increase and decrease market exposure in this manner, tend to unify the pricing function of the cash and futures markets. 22/

22/ This unification of cash and futures market pricing is not unique to stock index futures. In fact, it is essential to the economic utility of futures markets in general. Futures have long been recognized as the primary price discovery and pricing mechanism for agricultural markets, such as the grains and cotton, and more recently have achieved a more prominent role in the pricing of U.S. Treasury bonds, crude oil, copper, and other physical commodities or assets upon which futures contracts are actively traded.

In addition to hedging, major professional participants in stock index futures markets, particularly broker/dealers and some pension funds, engage in stock index arbitrage. The key relationship in these transactions is that the futures price should equal the spot index price plus the net cost of holding the stocks comprising the index. (The net carrying cost of a stock portfolio is the interest paid to finance, or forgone in holding, the stocks minus the dividends paid on the stocks in the portfolio over the holding period.) In particular, if the futures price is less than the spot price plus the appropriate net carrying charge, then the relatively undervalued futures contract will be bought and the relatively overvalued basket of stocks will be sold. Conversely, if the futures price exceeds the spot price plus the appropriate net carrying cost, the futures contract will be sold and the basket of stocks will be purchased.

In such arbitrage activities, the gain is computed in terms of the expiration of the cash-settled futures contract so that no additional transactions are necessary until that contract expires. However, if the pricing relationship changes prior to the futures expiration, it may become worthwhile for arbitrageurs to liquidate their futures and cash positions. Alternatively, if the next or deferred futures spread is favorable, the futures position can be rolled forward while maintaining the cash position. Such index arbitrage maintains the appropriate, equilibrium basis between the price of the underlying stock index and the stock index futures contract. Such a basis is a

prerequisite for the hedging transactions discussed above since they depend on the use of futures as a temporary substitute for stock market transactions.

One form of index arbitrage utilized by index funds--those funds structured to replicate the performance of a stock index such as the S&P 500--has been called "index substitution." Such arbitrage involves the sale of a portion of the index portfolio and the purchase of a comparable value of stock index futures when the futures contract becomes temporarily undervalued relative to the market value of the stocks in the index. The data tabulated for this report combine index substitution with other forms of index arbitrage. 23/

Due to the natural market forces discussed above in connection with institutional intermarket trading, the price disparities between stock index futures and replicating baskets of stock are typically small and opportunities for profits are precluded for all but those with the lowest transaction costs. That is why arbitrage transactions are typically carried out by major broker/dealers and certain institutional investors.

23/ Index substitution has received special attention from some commentators because of the difficulty facing arbitrageurs, other than those actually owning the relevant basket of stocks, in executing index arbitrage programs involving stock sales during a general stock market decline. This asymmetry in index arbitrage results from the securities industry's "tick test," which inhibits short sales unless the most recent price change was an increase. Rule 10a-1 under the Securities Act of 1934 requires that short sales of stock must be executed at a price equal to or higher than the last price.

While typically considered beneficial, arbitrage transactions have become the object of some concern in the case of stock market derivative products (i.e., index options and futures). In the first instance, this involved the "third Friday" effect, where it was perceived that the unwinding of the cash market leg of arbitrage positions at the expiration of the futures contract was causing unwarranted volatility in the prices of the underlying stocks. This is plausible since the liquidation of the futures or option leg of the arbitrage position is via cash settlement. Under such circumstances, there are no strong economic incentives for the arbitrageur to unwind the position in an orderly manner, with coordinated intermarket purchases and sales, since losses in one market will be compensated in the other when the stock index futures contract is settled at the closing value of the relevant stock index.

In view of this, the cash settlement period for the S&P 500 futures and option contracts was moved from the closing to the opening period of the NYSE, and measures were adopted to disseminate, in a timely fashion, the stock order imbalances that sometimes accompany the liquidation of arbitrage positions on the NYSE. This change in the settlement time of the S&P 500 futures contract was first effective for the expiration of the June 1987 S&P 500 future, and experience to date indicates that the change has been beneficial.

In addition to this special case of the third Friday or expiration effect, arbitrage activities have received attention in connection with the cascade theory, which was discussed

briefly in Section II above. Under that scenario, stock prices begin to decline as a result of fundamentally negative economic news; pressure on futures prices is then exerted as portfolio hedgers use the relatively liquid, low-transaction-cost futures markets to increase their short futures positions in light of declining stock prices; stock index futures begin trading below their arbitrage value vis-a-vis the stocks in the underlying index; arbitrageurs enter the markets, buying the (relatively) underpriced futures and selling the (relatively) overpriced replicating basket of stocks; stock prices then decline further; more short hedging takes place in the futures market; and that begets more arbitrage selling in the stock market, etc.

Whether arbitrage and portfolio insurance can interact to depress stock market prices to an unwarranted level is an empirical issue, rather than a foregone conclusion. In fact, the scenario is not supported by observed behavior of market participants during mid-October 1987. First, short hedging becomes more expensive if futures are underpriced relative to the cash market, and as a result futures hedging is inhibited, as happened on October 19. As discussed below, some fund managers terminated their use of portfolio insurance strategies that day rather than sell stock index futures at deep discounts. Further, this "lock-step," sequential chain of events generally is not consistent with the trading activities of arbitraguers who reportedly have large amounts of available funds and the ability (and need) to move quickly in order to capitalize on these relatively risk-free trading opportunities. In practice,

arbitrageurs' buying of futures typically would occur more closely in time with the sale of futures contracts by institutional hedgers, thereby mitigating downward pressure on futures prices. In any case, since arbitrageurs' purchases of futures place upward pressure on futures prices as selling in the stock market lowers prices, such buying and selling tend to reestablish the equilibrating relative prices.

More importantly than the above, however, is that the cascade theory is postulated as strictly a technical phenomenon and ignores the existence of any market consensus based upon fundamental market information. That is, under this theory, it is the trading sequence that places downward pressure on stock prices rather than a reassessment of the fundamental values of the stocks. Obviously, any market that fits the description implied in the cascade theory is not in a stable equilibrium and is subject to a rapid, substantial adjustment. Any trading activity associated with that adjustment is simply the vehicle for expressing and implementing the downward revision in value already made by stock holders, not the cause. Furthermore, if a market moved abruptly due to a technical rather than a fundamental phenomenon, it soon should return to its fundamental value.

Although the 508-point (23 percent) decline of the Dow Jones average on Monday, October 19, 1987, is the focal point of most analyses of the stock market events of October 1987, the decline in stock values began prior to that date. As previously discussed, the values of the most widely followed stock indices had peaked in August, and between October 1-16, 1987, the Dow

declined 392 points, or 15 percent in value, including three days (October 6, 14, and 16) on which the declines were 92, 95, and 108 points, respectively. 24/ Shortly after October 19, stock prices recovered somewhat from their lowest levels, but they did not return to the levels of early October, much less to the market's August highs. In fact, at the close of trading on Monday, October 26, 1987, the Dow was just 55 points above the close on October 19 and 842 points below the level of October 1.

B. Methodology

Since the higher price volatility and substantial price declines began before October 19, this report contains data for the broader period of October 14-26, 1987. Those days encompass the period of large, successive price declines (October 14-19) and the days of high price volatility during the week following October 19 and the following Monday.

Initially, the Commission's surveillance staff was able to estimate the amount of index arbitrage and portfolio insurance from the large-trader position reports that the Commission routinely collects on a daily basis. However, neither those reports, nor any data routinely collected by any regulatory or

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24/ See also the Interim Report, pp. 1-4. Although the SEC/CFTC survey data of sixteen firms include information for October 6, this analysis starts with the larger, more continuous decline that began October 14 and continued through each successive day until October 26.

self-regulatory organization in the futures or securities industries, identify which positions or trades were made as a result of index arbitrage or portfolio insurance trading strategies. The lack of precision in the terminology applied to various strategies further complicates strict attribution to specific types of trading activity. Therefore, to obtain data for this analysis, the SEC and CFTC staffs jointly requested sixteen firms to provide detailed trading data (hereinafter referred to as the SEC/CFTC survey data).

The sixteen firms surveyed included twelve broker/dealers, 25/ three investment managers that were prominent users of portfolio insurance strategies, and one other professional investment manager who was particularly active in the futures market on October 19. The twelve broker/dealers were selected for two reasons. First, they were the firms most active in index arbitrage, on both a principal and an agency basis. Second, as

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25/ A report commissioned by the NYSE states that twenty-nine brokerage firms engage in program trading on the NYSE. (Katzenbach, An Overview of Program Trading and its Impact on Current Market Practices, December 1987, p. 13, hereinafter Katzenbach Report.) Eleven of the twelve broker/dealers surveyed by the CFTC and SEC are included in that list. The firm omitted in the Katzenbach Report executed a substantial number of index arbitrage and portfolio insurance trades during the survey period. CFTC large-trader reports for the survey period show that, of the remaining eighteen traders included in the Katzenbach Report's list of twenty-nine firms, ten had no futures positions and eight had only small positions, indicating that the program trading of those firms was almost entirely through stock market purchases or sales with little or no involvement in futures-related program trading.

futures commission merchants and/or clearing members of the CME, those firms' customer accounts included nearly all of the large (i.e., reportable) institutional accounts in the S&P 500 futures market during the period under review.

Each of those sixteen firms was asked to provide data for October 6 and October 14-23, that listed, separately for proprietary and customer accounts, each trade in stock, stock index option, or stock index futures markets that was executed pursuant to index arbitrage (including index substitution), portfolio insurance, or some other program trading strategy, including those not related to futures market trading. 26/ The firms were requested to provide for each trade the order entry time, dollar value, number of shares of stock, and number of futures or option contracts traded. The firms also were requested to identify the markets on which these trades were executed. Additionally, one-minute futures trade execution times from the CME's Computerized Trade Reconstruction (CTR) audit trail system were used to augment the survey data for specified accounts. 27/

26/ The letter requesting these data is found in Appendix D of the Interim Report. As discussed above, because the focal point of this analysis is the period immediately surrounding October 19, 1987, the data for October 6 are not analyzed herein.

27/ Survey results appeared to underreport portfolio insurance trades executed in the CME's S&P 500 contract. Commission staff, working with staff at the broker/dealers, identified customer accounts that were likely to use portfolio insurance strategies but which were not reported in the survey data. These were predominately accounts for pension

(Footnote Continued)

In the analysis that follows, the magnitude and timing of index arbitrage and portfolio hedging activities are examined separately. Index arbitrage activity is analyzed principally in terms of its share of total NYSE or S&P 500 stock volume, although data on the corresponding futures or option market trading are included in the exhibits. Portfolio hedging is analyzed in relation to CME S&P 500 futures volume. 28/ Following this, the interaction between the two types of activity is examined, and an assessment is made of the extent to which these trading techniques may have contributed to the fall in stock prices during the period under examination. The data gathered in the SEC/CFTC survey generally appear to be consistent with the data presented in the Brady Commission Report, although different presentation formats are used.

(Footnote Continued)
funds and trusts. As noted above, data concerning the trades for such accounts were extracted from the CME's audit trail system.

28/ These data are analyzed in terms of shares of stock or numbers of futures contracts rather than the value of the transactions, in contrast to much of the analysis in the Brady Commission Report. Although SEC/CFTC survey information was collected and tabulated in terms of shares of stock, numbers of futures contracts, and their dollar values, the dollar values are not used because they lack precision. In particular, reported dollar values could reflect varying time periods, prices, or both.

C. Stock Index Arbitrage Activity

The SEC/CFTC survey data obtained for this study indicate active index arbitrage trading occurred on October 14 through the early afternoon of October 19, when trading conditions made arbitrage executions difficult, but very little thereafter. As discussed below, the marked reduction in index arbitrage on October 20 and subsequent days resulted from the actions of the NYSE temporarily to discourage program trading by its member firms beginning on the morning of October 20, 1987. The reported daily totals of stocks traded on the NYSE as part of index arbitrage trades are summarized below. (See also Exhibit C-3. This and the other tables in this section are derived from the more detailed data in the indicated exhibits in Appendix C.)

Stock Index Arbitrage Trading

1987 Date	NYSE Shares Bought	NYSE Shares Sold	NYSE Volume	Share of NYSE Volume Bought	Share of NYSE Volume Sold
	(Million Shares)			(Percent)	
Oct. 14	2.2	28.1	209.7	1.0	13.4
Oct. 15	7.4	16.6	266.3	2.8	6.2
Oct. 16	4.7	37.9	344.0	1.4	11.0
Oct. 19	3.1	37.5	608.3	0.5	6.2
Oct. 20	1.3	2.2	613.7	0.2	0.4
Oct. 21	0.7	4.8	452.3	0.2	1.1
Oct. 22	0.1	2.6	395.3	--	0.7
Oct. 23	0.9	0.6	247.6	0.4	0.2
Oct. 26	0	0	307.2	--	--

Stock prices fell substantially during the period of October 14-19, 1987, as successively larger record-price declines were registered. On each of those days, index arbitrage mostly

consisted of "sell programs," in which stocks were sold and futures contracts were purchased. The largest sales of stocks as part of index arbitrage trades occurred on October 16 and 19, when sales of nearly 38 million shares were reported for each day. 29/ On a net basis, subtracting buy programs from sell programs, the amount of reported arbitrage-related selling of stocks was greatest on October 19. 30/

However, when reported index arbitrage is considered as a percentage either of total NYSE volume or of volume in the NYSE stocks included in the S&P 500 index during this period, the greatest concentration occurred on October 14. On that date gross arbitrage sell programs amounted to over 13 percent of total NYSE volume and about 18 percent of volume in the S&P 500 stocks. On October 16, reported arbitrage-related sales accounted for about 11 percent of NYSE volume (and 15 percent of S&P 500 volume), and on October 19 such sales accounted for over 6 percent of NYSE volume (9 percent of S&P 500 volume).

Despite the magnitude of the price declines during that period, a significant amount of short sales of stocks are

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29/ This table and the others that follow exclude stock trades that were identified for other exchanges or as off-exchange trades. About 82 percent of the stock trades occurred on the NYSE, while 17.5 percent were reported as London transactions.

30/ Broker/dealers responding to the survey may have under-reported customer index arbitrage on some days if their customers executed stock and futures orders separately without identifying the purpose of the whole trade.

included in index arbitrage trades. Prior studies have postulated that the tick test of the securities industry 31/ would restrict substantially the amount of stock that would be sold short for arbitrage trades in rapidly falling markets. As the schedule below indicates, however, on October 19 short sales of 9 million shares of stock were executed as part of index arbitrage trades. This was nearly a quarter of all reported index arbitrage sell programs that day. Five different broker/dealers executed those short sales on the NYSE, while another broker/dealer executed additional short sales of stock in London that are not reflected in these data. 32/ Short sales of stock totaling over 5 million shares also were executed for index arbitrage purposes on October 14 and 16. (See also Exhibit C-3.)

Short Sales of Stock on the NYSE for Index Arbitrage Trades

1987 Date	Index Arbitrage Sales	Short Sales	Short Sales as a Percent of Index Arbitrage
	(Million Shares)		
Oct. 14	28.1	5.0	17.8
Oct. 15	16.6	3.9	23.5
Oct. 16	37.9	5.3	14.0
Oct. 19	37.5	9.0	24.0
Oct. 20	2.2	1.2	54.5
Oct. 21	4.8	2.3	47.9
Oct. 22	2.6	0.7	26.9
Oct. 23	0.6	0	0

31/ See, in particular, the Interim Report, p. 61, and The Role of Index-Related Trading in the Market Decline on September 11 and 12, 1986, Division of Market Regulation, Securities and Exchange Commission, March 1987, pp. 4-5, 12.

32/ This short selling was more prevalent than during September 11 and 12, 1986, where the SEC found only one broker/dealer executed such trades to initiate index arbitrage positions. Ibid., p. 12.

As the survey data show, index arbitrage activity dropped precipitously from October 20 through the remainder of the survey period. Despite a second consecutive day of trading volume exceeding 600 million shares on the NYSE, reported index arbitrage trading on October 20 was only 1.3 million shares bought and 2.2 million shares sold, amounting to less than one percent of the volume of either all NYSE stocks or S&P 500 stocks. Index arbitrage remained at very low levels throughout the remainder of the survey period. For example, on October 22, when the Dow fell 78 points on volume of nearly 400 million shares, reported index arbitrage stock sales were less than 3 million shares. Similarly, on October 26, when the Dow fell 157 points on volume of over 300 million shares, no index arbitrage trades were reported.

On the morning of October 20, 1987, the NYSE issued a special notice to its members requesting them "to refrain from using NYSE order delivery systems for purposes of executing orders relating to index arbitrage or any other aspect of program trading after today's opening." The Exchange maintained some form of this restriction in place until November 9, 1987. The restriction initially applied to members' proprietary trading through the NYSE's automated order entry system (Super DOT). Consequently, customer and proprietary arbitrage trades in which orders were physically carried to specialists' posts were permitted. On October 23, the NYSE extended the restriction by asking members to refrain from all proprietary program trading

and to use the Super DOT system for customer program trades only prior to the opening. As a direct result of these actions, index arbitrage and other types of stock program trading were reduced drastically on October 20 and thereafter until the restrictions on the use of the Super DOT system were terminated.

Index arbitrage traders interviewed by CFTC staff said that index arbitrage was very difficult to execute on October 19, particularly after 1:00 p.m. (EDT), 33/ because of difficulties in trade executions on the NYSE. Because of NYSE trading halts and because traders had no assurance if, when, or at what prices stock sales could be made, index arbitrage effectively was limited by the marketplace before the NYSE issued its request concerning the DOT facility.

As indicated below, reported data for the S&P 500 futures side 34/ of index arbitrage trades have the same pattern as the reported stock trades. The largest quantity of arbitrage-related purchases of S&P 500 futures contract relative to total futures volume were reported for October 14, about 7,100

33/ All times reported in this section are Eastern Daylight Time.

34/ The CME S&P 500 futures contract generally was involved in over two-thirds of the reported arbitrage-related stock sales during the period October 14-19. Index arbitrage trades also were reported that involved the S&P 100 option on the Chicago Board Options Exchange (CBOE), MMI futures on the CBT, VLA futures on the KCBT and the NYSE Composite Index futures on the NYFE.

contracts 35/ (6.2 percent of S&P 500 volume for the day). The largest gross arbitrage-related S&P 500 futures purchases occurred on October 19, when about 9,700 contracts (about 5.9 percent of that contract's volume) were reported. On October 16, the reported arbitrage-related S&P 500 futures volume was about 7,800 contracts (5.4 percent of volume). (See also Exhibit C-4.)

Index Arbitrage Futures Trades

Date	CME Futures Bought	CME Futures Sold	CME Volume	Share of CME Volume Bought	Share of CME Volume Sold
	(Thousand Contracts)			(Percent)	
Oct. 14	7.1	0.4	114.5	6.2	0.3
Oct. 15	3.3	0.8	127.5	2.6	0.6
Oct. 16	7.8	0.3	145.0	5.4	0.2
Oct. 19	9.7	0.2	163.2	5.9	0.1
Oct. 20	0.5	0	113.1	0.4	0
Oct. 21	1.4	0.2	82.0	1.7	0.2
Oct. 22	0.5	0	48.4	1.0	0
Oct. 23	0.1	0.2	38.1	0.3	0.5

As part of the evaluation of the magnitude of index arbitrage activity during the period, it would be instructive to compare current magnitudes to a base period. Unfortunately, since data have not been collected routinely to measure the extent of index arbitrage trading, the only points of comparison are special studies by the CFTC or SEC that were done in response

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35/ For purposes of the narrative, throughout this section futures trades are rounded to the nearest hundred contracts. More precise numbers for daily and intraday trading are found in the exhibits in Appendix C.

to unusually large daily price declines on the NYSE. 36/ Two such studies have been published, the SEC report on trading on September 11 and 12, 1986, and the CFTC report on January 23, 1987 trading. 37/

The SEC's report on trading on September 11 and 12, 1986, published the results of a special survey of seven firms' program trading activity. On those two trading dates, when declines in the Dow of 86.6 points (4.6 percent) and 34.2 points (1.9 percent), respectively, were experienced, index-related program trades totaled about 42 million shares and accounted for about 17 percent of total NYSE volume on each date.

The SEC report concluded that the price declines on those two days were not caused by index-related arbitrage, portfolio insurance, or a cascade effect resulting from the interaction of those two trading strategies. That report concluded that:

36/ Although it has been reported that the NYSE collects data on program trades transmitted through its Super DOT system, that system does not distinguish index arbitrage from other forms of program trades, such as those of mutual funds, index funds, or other institutional purchases or sales of many different stocks. See the Katzenbach Report, op. cit., pp. 12-13.

37/ The CFTC report concentrated on intraday futures trading to assess the question of whether intraday manipulation occurred when the Dow fell about 115 points within a few hours. Although no survey of index arbitrage was conducted, estimated buy programs totaled 9.3 million shares of stocks (3 percent of NYSE volume on January 23), and estimated sell programs totaled 4 million shares of stocks (1.3 percent of NYSE volume).

> ... the magnitude of the September decline was a result of changes in investors' perceptions of fundamental economic conditions, rather than artificial forces arising from index-related trading strategies. Nevertheless, index-related futures trading was instrumental in the rapid transmission of these changed investor perceptions of individual stock prices, and may have condensed the time period in which the decline occurred. 38/

The SEC/CFTC survey data for the period October 14-26, 1987, reveal total index arbitrage trading of a smaller magnitude, both in absolute and relative terms, than that of September 11 and 12, 1986, despite the much higher stock trading volumes during the October 1987 period under review. The index arbitrage trading on October 19, 1987, for example, was less than 38 million shares of stock and accounted for only about 6 percent of total NYSE volume.

The SEC/CFTC survey also requested data on program stock trades other than index arbitrage. Such trading would include any orders simultaneously to purchase or sell a group of stocks for reasons such as rebalancing a portfolio, increases or decreases in the size of a portfolio's equity holdings, or portfolio insurance trades implemented in the stock market. The schedule below compares total reported program trades involving NYSE stocks with reported index arbitrage trading during the period October 14-26, 1987. 39/ (See also Exhibit C-5.)

38/ Op. cit., p. i.

39/ Other stock program trades, such as sales for mutual funds,
(Footnote Continued)

Index Arbitrage and Total Program Trading on the NYSE By Surveyed Firms

1987 Date	Index Arbitrage Bought	Index Arbitrage Sold	Total Program Trades Bought	Total Program Trades Sold	Arbitrage Share of Total Program Trades Bought	Arbitrage Share of Total Program Trades Sold
	(Million Shares)				(Percent)	
Oct. 14	2.2	28.1	2.8	28.7	78.6	97.9
Oct. 15	7.4	16.6	11.6	20.7	63.8	80.2
Oct. 16	4.7	37.9	7.0	50.0	67.1	75.8
Oct. 19	3.1	37.5	3.2	89.3	96.9	42.0
Oct. 20	1.3	2.2	2.3	13.3	56.5	16.5
Oct. 21	0.7	4.8	3.1	15.8	22.6	30.4
Oct. 22	0.1	2.6	21.5	7.9	0.5	32.9
Oct. 23	0.9	0.6	11.1	8.8	8.1	6.8
Oct. 26	0	0	2.6	7.3	0	0

On October 14 through 16, index arbitrage accounted for over three-quarters of all reported stock sell programs, which substantially exceeded stock buy programs in magnitude. On October 19, however, index arbitrage sell programs accounted for 42 percent of total sell programs, as a total of over 89 million shares of stock (nearly 15 percent of total NYSE volume) were sold in all program trades combined among the surveyed firms.

On October 19, and to a lesser extent October 16, much of the other program stock sales involved stock sales for portfolio insurance purposes. Those sales totaled 39.9 million shares on October 19 and 5.1 million shares on October 16 (Exhibit C-6). One pension fund, using a self-directed asset allocation strategy

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(Footnote Continued)
likely were made through other NYSE member firms which were not included in the SEC/CFTC survey because the survey firms were chosen on the basis of their large futures positions. As a result, the survey data likely underestimate the other stock program trades that do not involve index arbitrage.

to reduce its equity exposure and increase its cash in a declining market, accounted for over two-thirds of the portfolio insurance stock selling on October 19. That fund executed most of its transactions through stock sales rather than futures hedging on that day.

In sum, there was significant index arbitrage activity among the surveyed firms from October 14 to October 19 and stock sell programs were substantially larger than stock buy programs. However, beginning on October 19, other program sales among the surveyed firms exceeded those program stock sales with a futures counterpart via index arbitrage. In addition, as previously discussed, the survey data do not capture the program sales of eighteen of the firms identified in the Katzenbach Report as engaging in such transactions because those firms had either very small or no futures positions during the period under review.

D. Futures Hedging by Institutional Investors

Magnitude of Reported Institutional Hedging. As described above, the trading data initially reported in response to the SEC/CFTC survey appeared to under-report portfolio insurance activity. Consequently, an augmented data set was obtained for institutional trading at the surveyed CME clearing firms. 40/

40/ An analysis of CFTC large-trader reports showed that nearly all of the institutional accounts with reportable futures
(Footnote Continued)

While these augmented trading data, which are labelled "other hedging," 41/ only include the S&P 500 futures contract, that contract generally accounted for about 95 percent of the reported futures portfolio hedging. 42/

The total daily quantities of reported portfolio insurance and other hedging in the S&P 500 futures contract by institutional accounts, principally pension funds, are summarized below. (See also Exhibit C-7.)

Institutional Hedging in CME S&P 500 Futures

Date	Portfolio Insurance		Other Hedging		Total		Share of CME Volume	
	Bought	Sold	Bought	Sold	Bought	Sold	Bought	Sold
	(Thousand Contracts)						(Percent)	
Oct. 14	0.1	1.8	0.5	1.7	0.6	3.5	0.5	3.1
Oct. 15	0.5	3.6	0.9	4.5	1.3	8.1	1.0	6.4
Oct. 16	0.1	10.3	2.3	4.2	2.4	14.5	1.7	10.1
Oct. 19	0.3	25.8	4.5	6.9	4.8	32.7	2.9	20.0
Oct. 20	6.1	28.7	11.6	4.9	17.7	33.6	15.6	29.7
Oct. 21	9.7	11.7	14.8	3.1	24.5	14.8	29.9	18.0
Oct. 22	5.4	1.3	3.3	2.1	8.7	3.4	18.0	7.0
Oct. 23	6.8	5.0	1.6	5.3	8.4	10.3	22.0	27.0
Oct. 26	7.0	4.7	2.8	5.5	9.8	10.2	30.7	32.0

(Footnote Continued)
positions carried their accounts with the ten active CME clearing members included in the survey.

41/ Although this report uses the term hedging to describe the futures trading of institutional accounts, the staff has not ascertained whether all of this trading fully comports with the Commission's definition of bona fide hedging, §1.3(z) of the Commission's regulations. However, the staff has no basis for believing that any of this activity would not qualify for either hedging or risk-management exemptions from exchange speculative limit rules. On September 14, 1987, the Commission published in the Federal Register an interpretative statement distinguishing hedging and risk reduction from risk-management strategies.

42/ Small amounts of portfolio hedging also were reported for the KCBT's VLA and the NYFE's NYSE Composite futures markets.

These data show the substantial increase in portfolio hedge selling in the S&P 500 futures market on October 16, 19, and 20, both in absolute terms and relative to total volume in that contract. Gross futures selling by institutional accounts at the surveyed broker/dealers who also were active CME clearing members increased from about 3,500 contracts (3 percent of total sales) on October 14 to 14,600 contracts (10 percent of total sales) on October 16. On October 19, this selling increased markedly, to 32,700 contracts (20 percent of S&P 500 futures volume), and it increased again to 33,600 contracts (30 percent of S&P 500 futures volume) on October 20. Although that latter day had the largest gross futures selling by institutional hedgers--primarily reported as portfolio insurance-- some of those accounts also substantially increased their purchases of futures on October 20 to 17,700 contracts. Thus, net sales by those accounts were 15,900 contracts that day.

Although institutional hedging activity continued at substantial levels from October 21 through October 26, it consisted either of net purchases or more evenly balanced purchases and sales of futures contracts. Those purchases of futures generally represented the liquidation of short hedge positions, although some fund managers purchased futures to increase their equity exposure.

Types of Hedging Strategies. CFTC staff interviews with managers of some of the pension funds that were most active in the S&P 500 futures market during the October 16-20 period revealed diverse portfolio management strategies in reaction to

prevailing market conditions. The pension funds using portfolio insurance strategies all determined, based on their trading models, that they should reduce substantially their equity exposures. As stock prices fell dramatically on October 19, portfolio insurance models called for substantial additional sales of stock index futures or of stocks.

However, the managers reacted differently to these programmed signals. One manager sold all the futures he could on October 19 until the firm's CME hedge exemption was exhausted. 43/ When that firm advised clients it could sell no more futures that day, one large pension fund client determined to terminate its portfolio insurance program rather than seek the degree of hedge coverage indicated by its program. However, during the following days, that fund directed its outside manager to continue selling futures to attain a 50 percent hedge of its portfolio, which it achieved by the end of the month. 44/

Another pension fund stopped selling futures as part of its portfolio insurance strategy around noon on October 19, despite the continued sell recommendation being made by the program. That manager elected not to sell futures at what appeared to be

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43/ Under CME rules, hedgers could exceed their hedge exemption and retroactively submit data to demonstrate that the larger positions were in fact hedges. By emergency action, the CME terminated its retroactive exemption provision on October 22.

44/ When fund managers terminate their portfolio insurance programs and assume control of their own futures hedge trading, they may apply for separate hedge exemptions.

deeply discounted prices since such sales would substantially increase the cost of the portfolio insurance program. Since the NYSE tape was running very late on October 19 and some stocks were not open for trading on the NYSE, fund representatives said they also were uncertain of stock prices. On subsequent days, the fund resumed sales of futures when the basis narrowed and refrained from selling when it widened. Since that fund already had reduced substantially its equity exposure prior to October 19, it apparently did not feel pressure to hedge its equities portfolio regardless of price on that date.

Two other fund managers who use portfolio insurance had similar reactions. Both had hedged substantial portions of their portfolios prior to October 19. One fund decided not to sell discounted futures on October 19 despite the signals from its model, although it did sell some equities. After October 19, the fund gradually increased its hedge coverage from 50 to 65 percent by the end of the month. Another small fund was able to complete most of its desired hedging on October 19 despite market conditions but decided to buy futures the next day to reduce its hedge coverage from about 85 to 40 percent.

Another fund manager, who said he neither used portfolio insurance nor engaged in index arbitrage, decided to purchase futures contracts on October 19 because of the apparent futures discount to stock prices in anticipation of purchasing stock at a later date. Another fund switched its position from short to long futures and bought stocks on October 19, and, on October 20, it bought futures instead of stocks because it believed futures

were relatively undervalued. A third in-house manager of a fund decided to liquidate totally a substantial short futures hedge position between October 16 and 20. That manager, who reestablished a short hedge later in the month when stock prices had recovered somewhat, said that without the futures hedges, the fund would have had to sell stock during the October plunge rather than during the following month.

Overall, it is evident that institutional hedging in the futures market was not monolithic during the mid-October period under review. In particular, while some firms employed portfolio insurance strategies, others pursued more heterogeneous market-timing strategies, including several who purchased futures during periods of declining stock prices in anticipation of later purchasing stocks. Moreover, among those firms that earlier in October were adhering to purchase and sale signals generated by portfolio insurance programs, many abandoned those programs or reduced the amount of futures or stock market sales dictated by the programs.

E. Review of Intraday Index Arbitrage and Portfolio Hedging Activities

The preceding sections describe the daily magnitudes of index arbitrage and portfolio hedging activity. As discussed above, the SEC/CFTC survey data generally indicated that index arbitrage trading was greatest on October 14, 16, and 19, and portfolio hedging activity was greatest on October 19, 20, and 21. In this section, the magnitude of index arbitrage and

portfolio hedging activity is analyzed on an intraday basis. 45/ This section also examines the interaction between those two trading strategies, particularly on October 19, 1987.

As discussed in Section II of this report, during the period under examination, reported values of the S&P 500 index were often subject to considerable non-trading effects due to rapid changes in stock values between transactions, delays in openings of individual stocks, and trading halts. As indicated in that section, one result was that what appeared to be wide basis relationships often were not reflective of current market conditions. That section developed empirical estimates of the basis using the prices of stocks that were actually trading. With this caveat in mind, the discussion contained in this section is cast primarily in terms of the reported values of the S&P 500 index, with no adjustments for the non-trading effect. This approach was adopted to maintain the consistency of references to certain price movements with other reports and publicly available data. However, the following analysis implicitly takes into account the results of Section II in terms of the non-trading effect and references them where appropriate.

45/ Transaction data from the SEC/CFTC survey are sequenced by the times reported--generally order entry times. Because of lags between order entry and execution, especially on the high volume days that are the subject of this report, and because of some imprecisions in reported times, these intraday analyses are based on half-hour intervals. The detailed, sequential data are available from the Commission upon request. Section V of this report discusses the execution times for a sample of orders for S&P 500 futures.

Wednesday, October 14, 1987. On this day, the Dow fell 95 points (3.8 percent), the largest recorded absolute decline to that date, on volume of nearly 210 million shares. During the day, the most pronounced price weakness in S&P 500 futures and stocks was during the first half hour of trading and from about 12:30 to 1:15 p.m. (Figure 3). The reported basis was only at a discount at the open and the close, although the premium of the December S&P 500 future appeared to be at less than the arbitrage equilibrium value at numerous times during the day (Figure 4).

Portfolio hedge selling was small on October 14, never exceeding 800 contracts or 12 percent of CME volume in any single half-hour interval (Figures 7 and 8 and Exhibit C-7). Index arbitrage sell programs, however, were of substantial magnitude (Figures 5 and 6). The largest intraday concentrations of those sell programs (those that, in aggregate, represented stock sales of 2 million or more shares per half-hour interval) are listed below in terms of stock shares on the NYSE. (See also Exhibit C-3.)

October 14, 1987
Arbitrage Sell Programs

Time 46/	NYSE Share Volume (millions)	Percent NYSE Volume	Percent S&P 500 Stocks Volume
9:30 - 10:00	4.0	16.0	21.6
12:30 - 1:00	3.0	21.0	28.3
1:00 - 1:30	4.2	21.0	28.8
2:30 - 3:00	3.8	19.0	26.0
3:30 - 4:00	3.0	12.9	17.6

46/ Throughout this report, trades with reported order entry times prior to the open of the market are included in the first half-hour trading interval. Trades with reported times shortly after the NYSE close, termed the "run off" period, are included in the last half-hour interval.

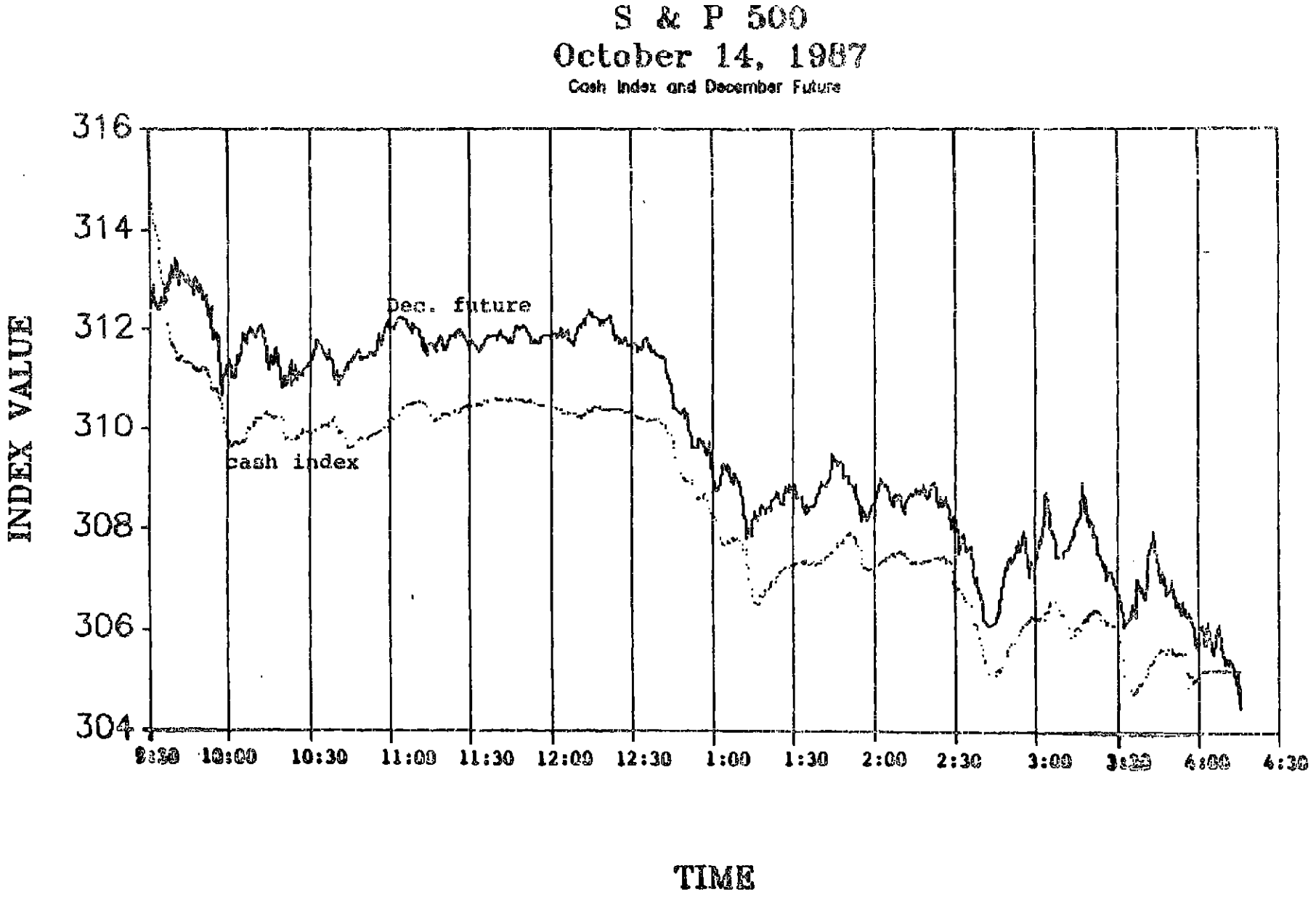

S & P 500
October 14, 1987
Cash Index and December Future
316
314
312
310
308
306
304
INDEX VALUE
Dec. future
cash index
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 3

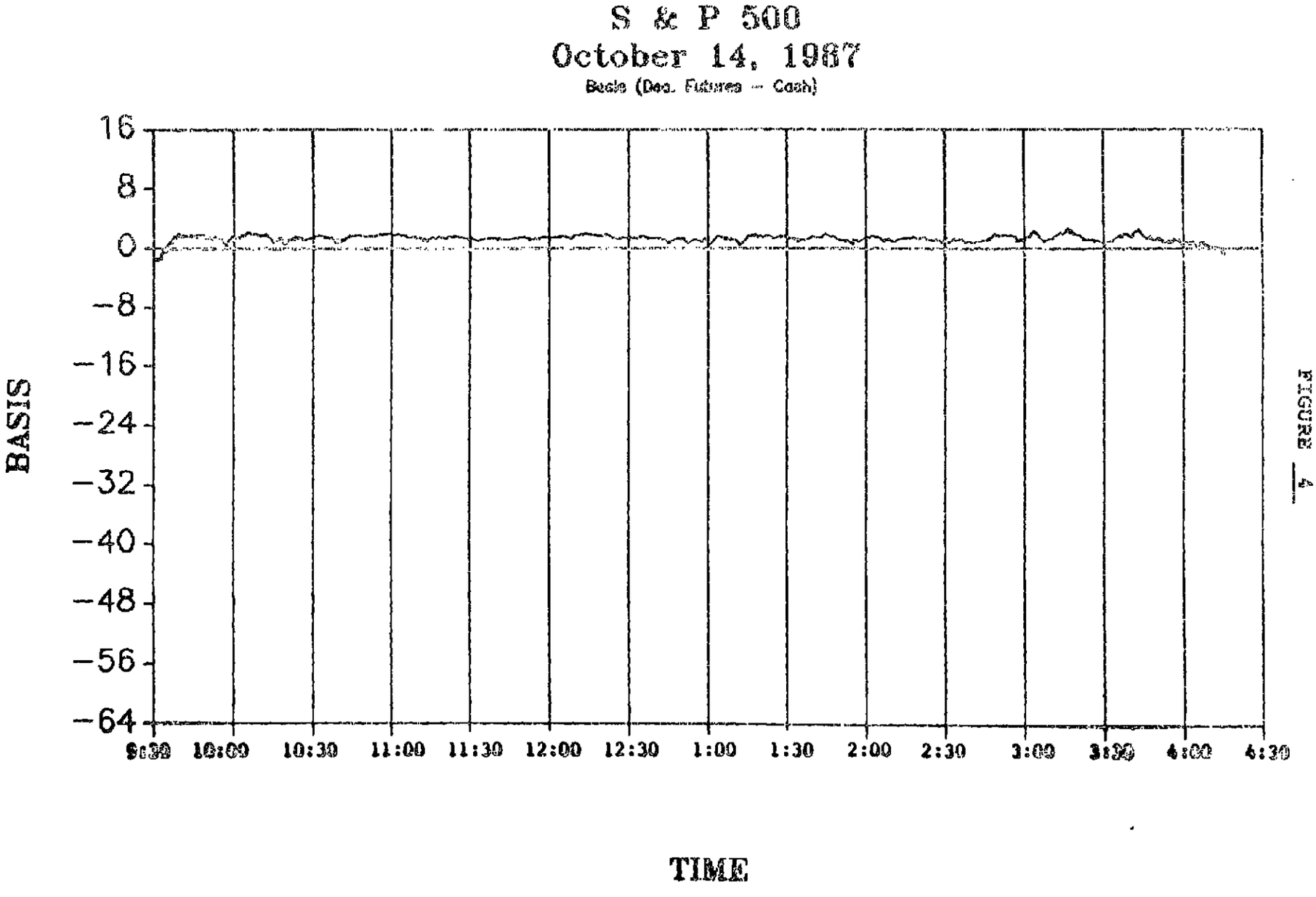
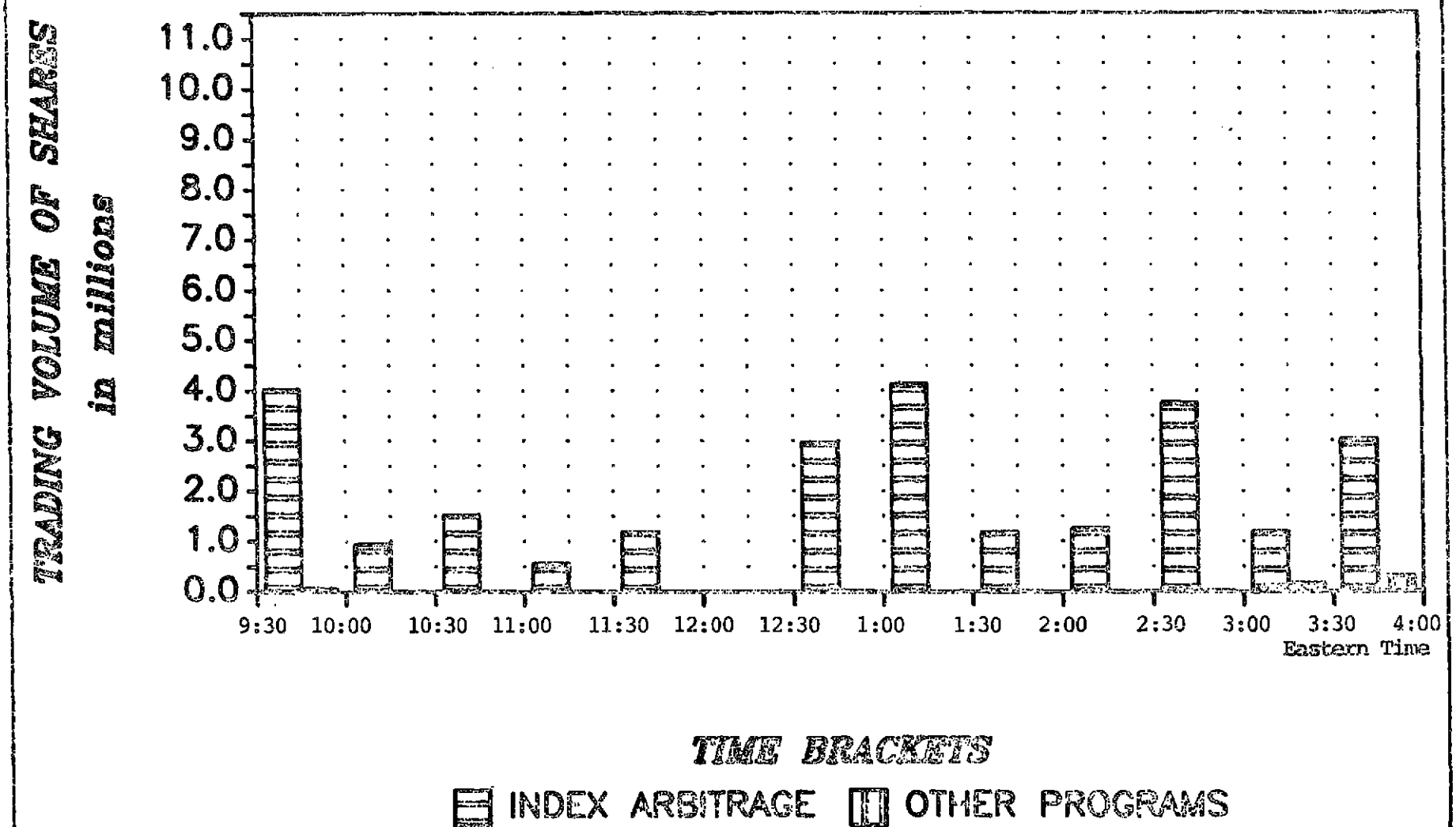

S & P 500
October 14, 1987
Basis (Dec. Futures – Cash)
16
8
0
-8
-16
-24
-32
-40
-48
-56
-64
BASIS
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

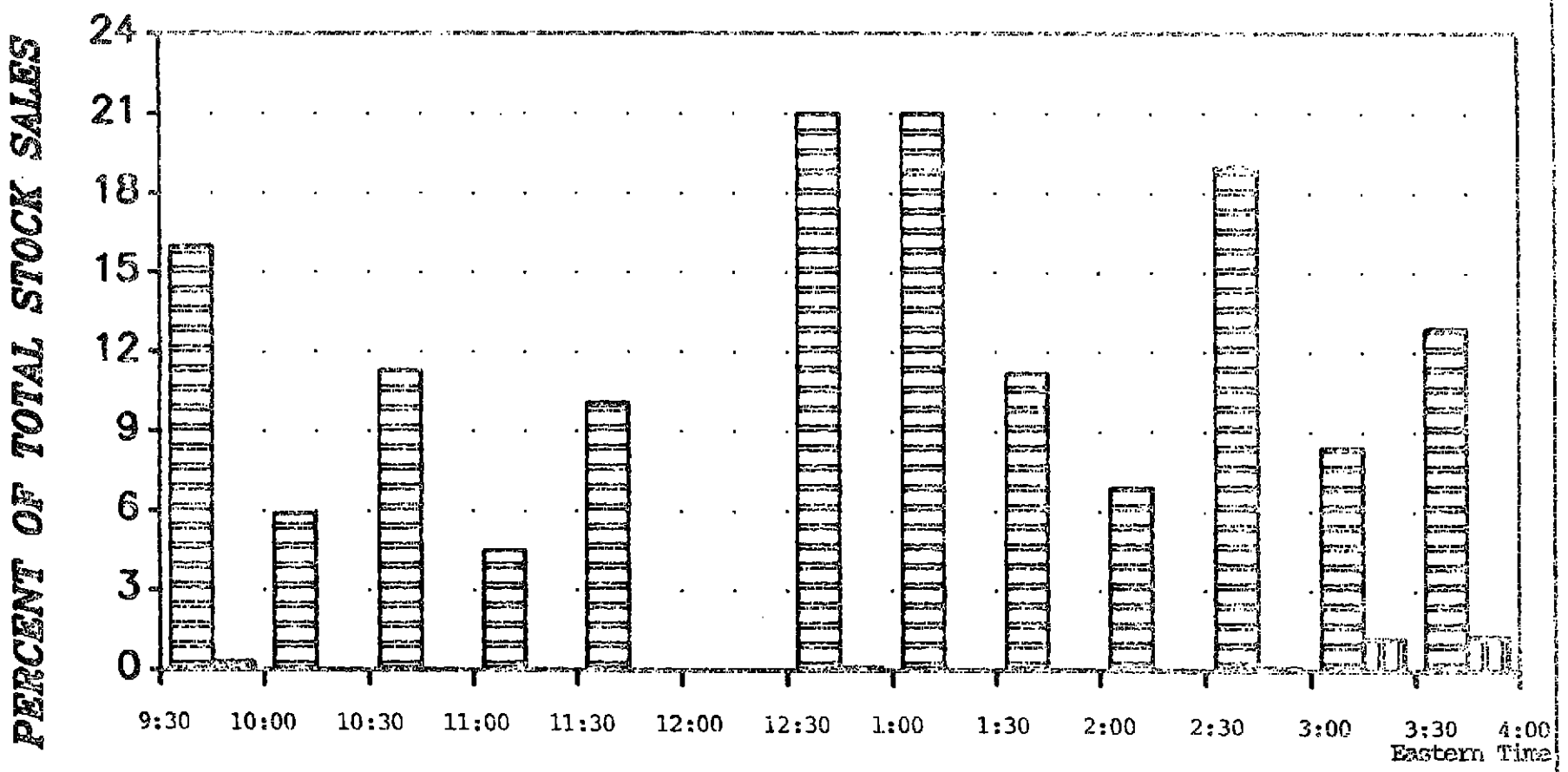
FIGURE 4

FIGURE 5

OCTOBER 14, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES



OCTOBER 14, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

FIGURE 6

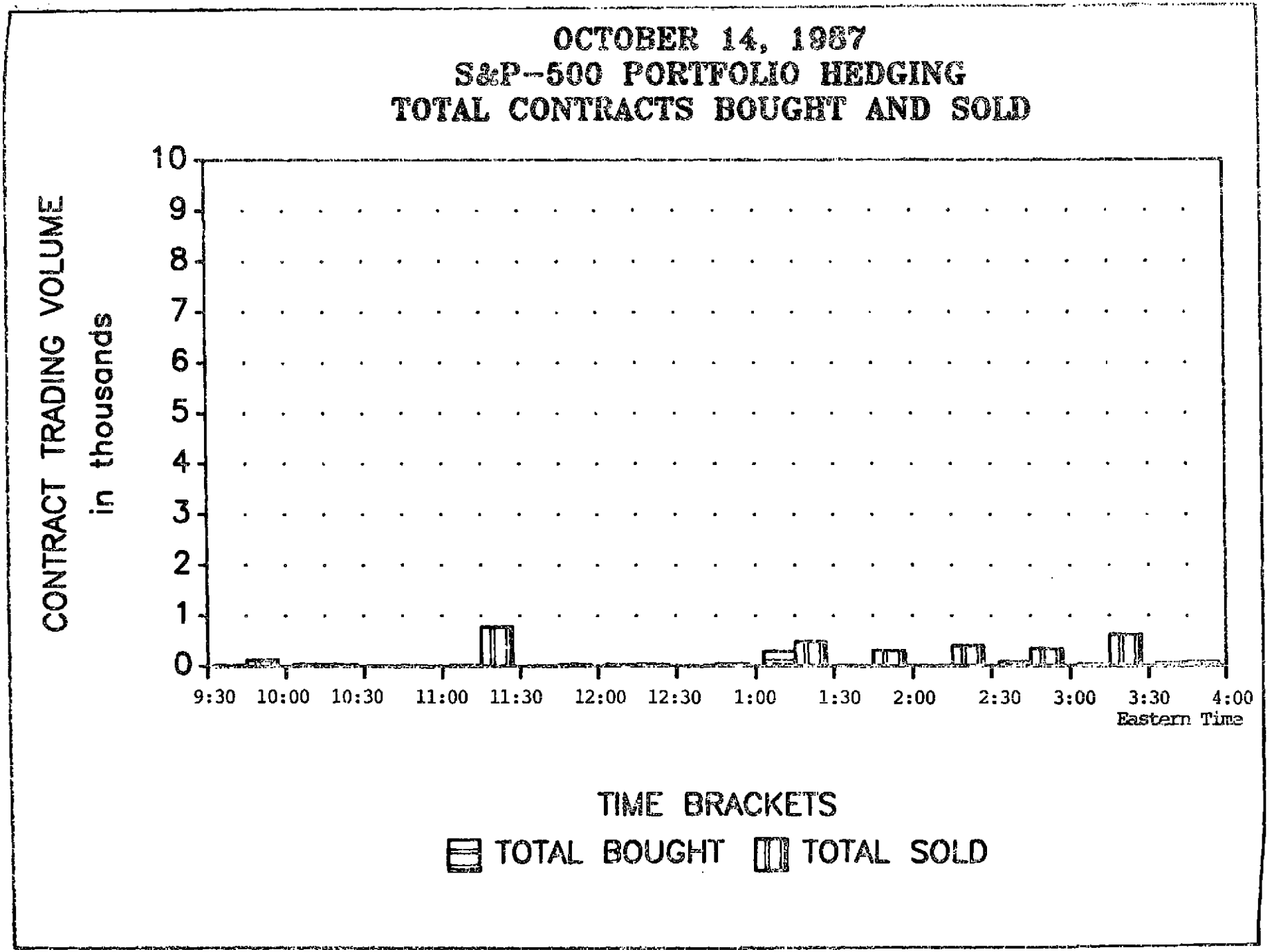

OCTOBER 14, 1987
S&P--500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD
CONTRACT TRADING VOLUME
in thousands
10
9
8
7
6
5
4
3
2
1
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
TOTAL BOUGHT
TOTAL SOLD

FIGURE 7

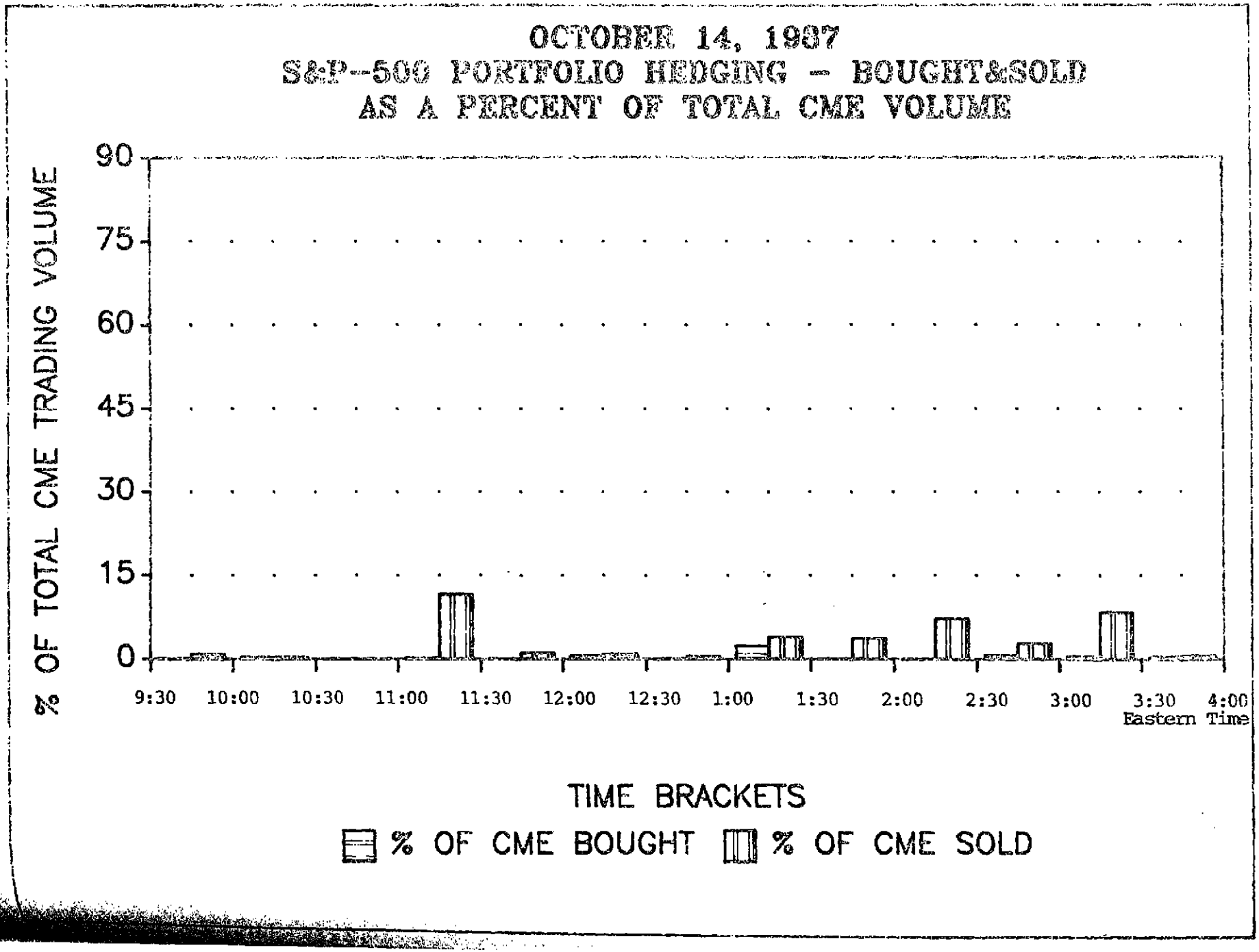

OCTOBER 14, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME
% OF TOTAL CME TRADING VOLUME
90
75
60
45
30
15
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
% OF CME BOUGHT
% OF CME SOLD

FIGURE 8

Although cumulative stock sales of 3 to 4 million shares within a half-hour interval do not seem particularly large, those trades represented a sizeable share of trading in all NYSE stocks as well as in the S&P 500 index stocks during those time periods. During the periods of the largest amounts of index arbitrage, both stock and futures prices fell. It is notable that futures prices fell even though index arbitrage resulted in substantial purchases of futures--much more than were sold during those intervals for portfolio hedging. Furthermore, stock prices did not recover significantly, as might be expected if arbitrage sell programs were a temporary destabilizing influence. Nor did stock prices rebound the next morning. Instead, it appears that the futures market more rapidly reflected the falling value of securities than did the stock market, which created arbitrage opportunities as firms bought relatively under-priced futures and sold relatively over-priced stocks until the two markets became properly realigned.

Thursday, October 15, 1987. The Dow opened the day about unchanged from the prior day's close. Although stock prices ended that day with the Dow down 58 points, for most of the day the market reflected only modest gains or losses from the prior day's close. Prices of the S&P 500 futures and cash index were weakest during the opening and closing half-hour intervals (Figure 9). The December S&P 500 future opened at a substantial discount to the quoted index but was relatively stable during the first hour of trading as the value of the index fell below the futures price level to achieve a normal basis relationship.

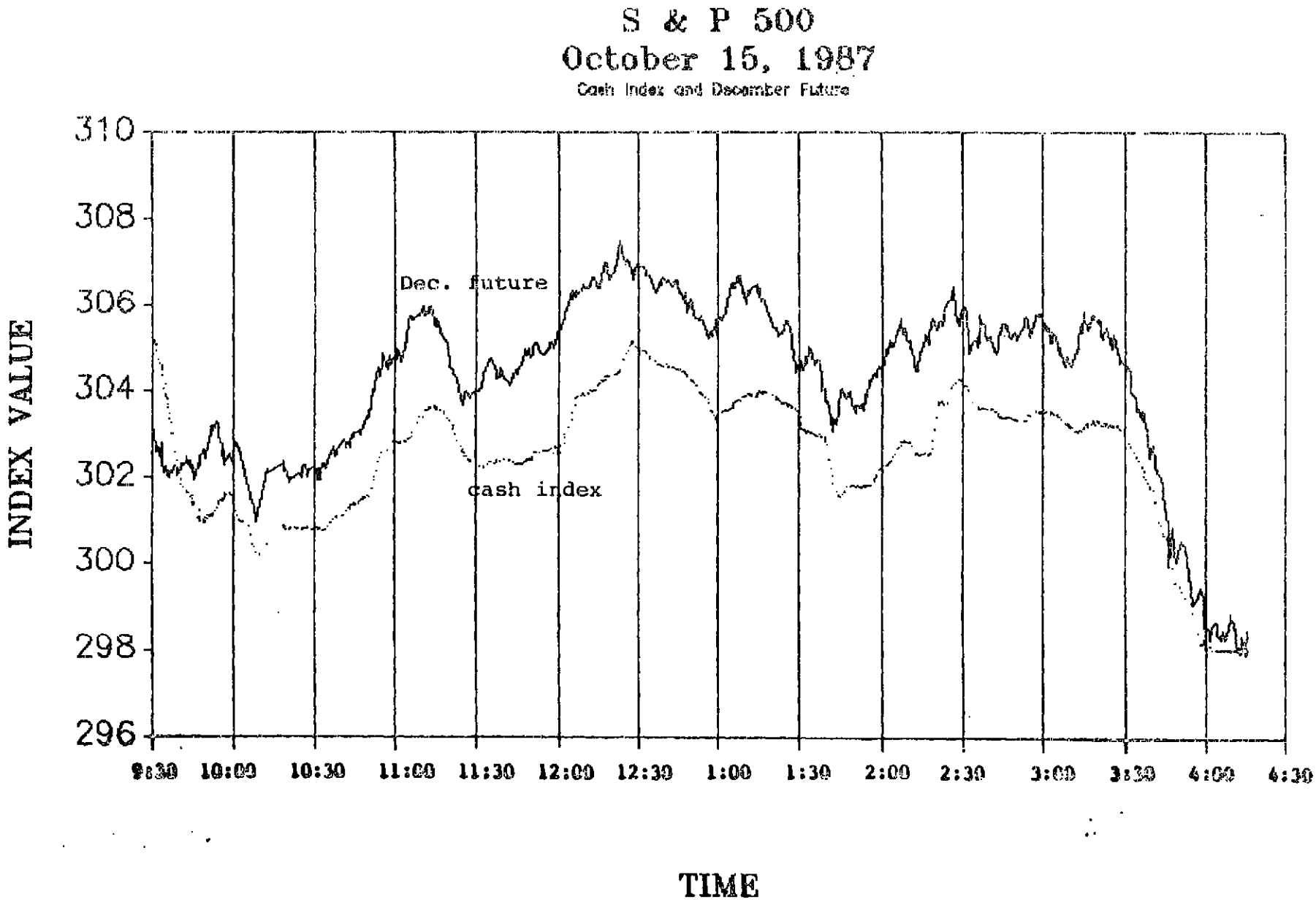

S & P 500
October 15, 1987
Cash Index and December Future
INDEX VALUE
310
308
306
304
302
300
298
296
Dec. future
cash index
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 9

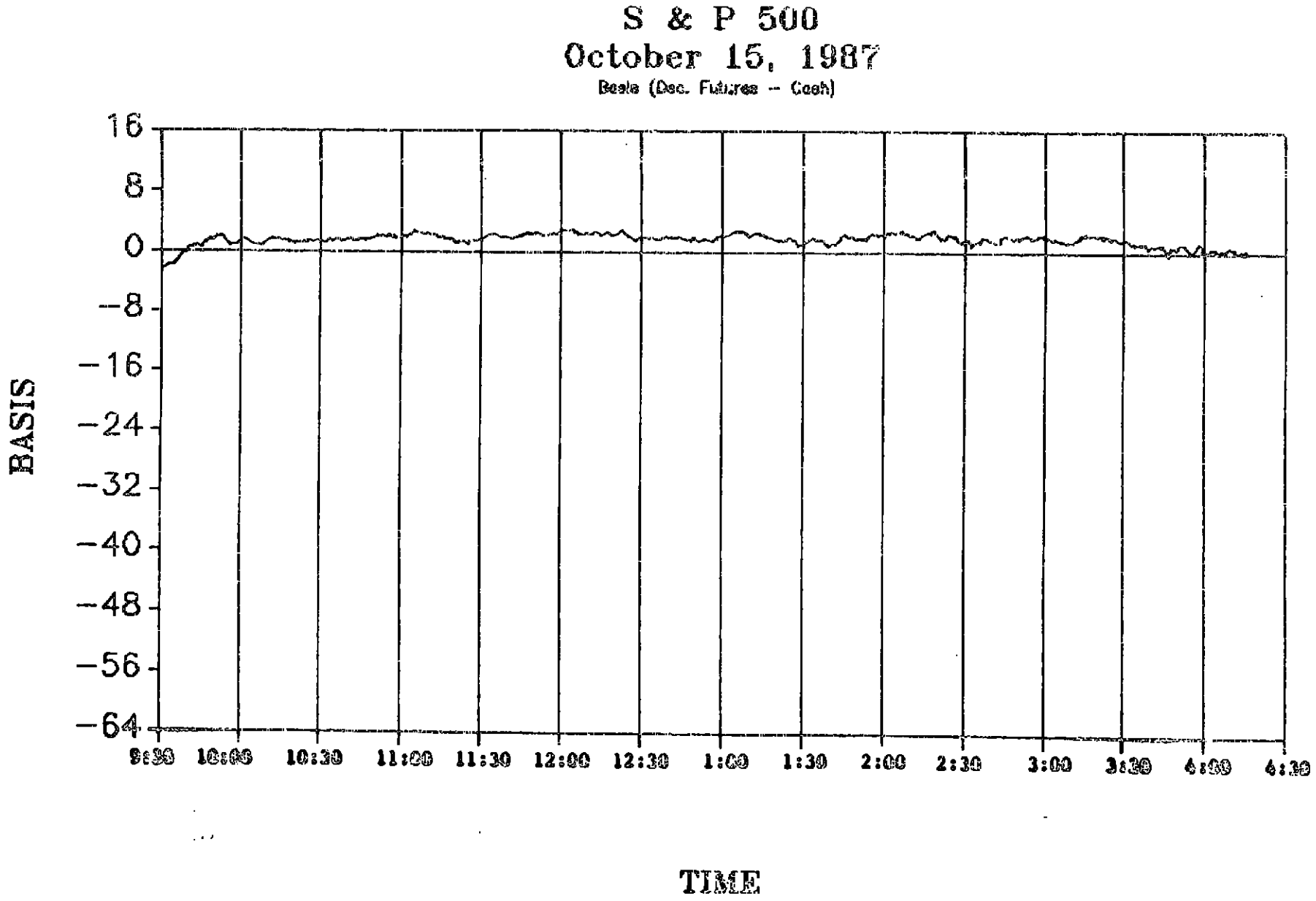

S & P 500
October 15, 1987
Basis (Dec. Futures -- Cash)
16
8
0
-8
-16
-24
-32
-40
-48
-56
-64
BASIS
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 10

OCTOBER 15, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES

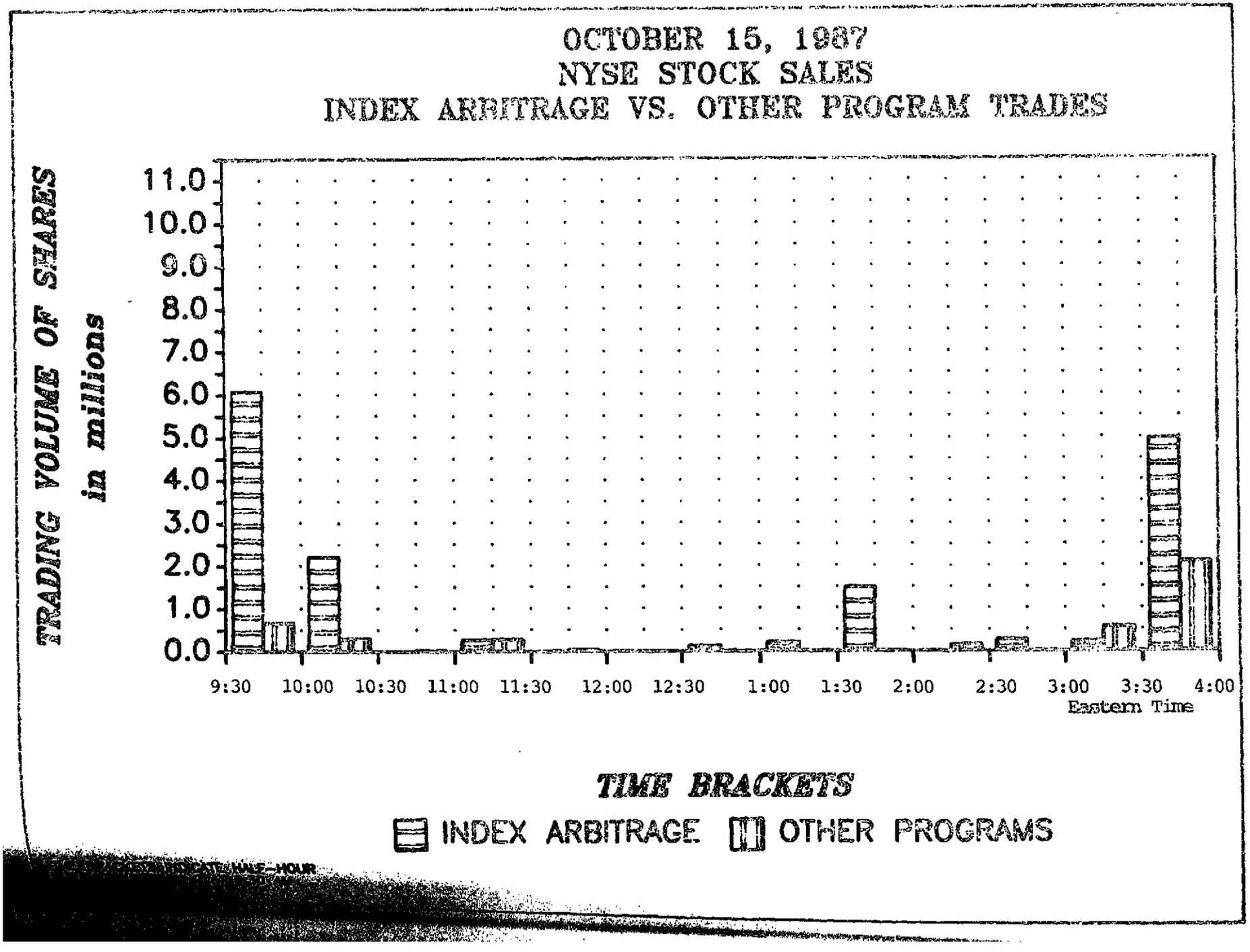
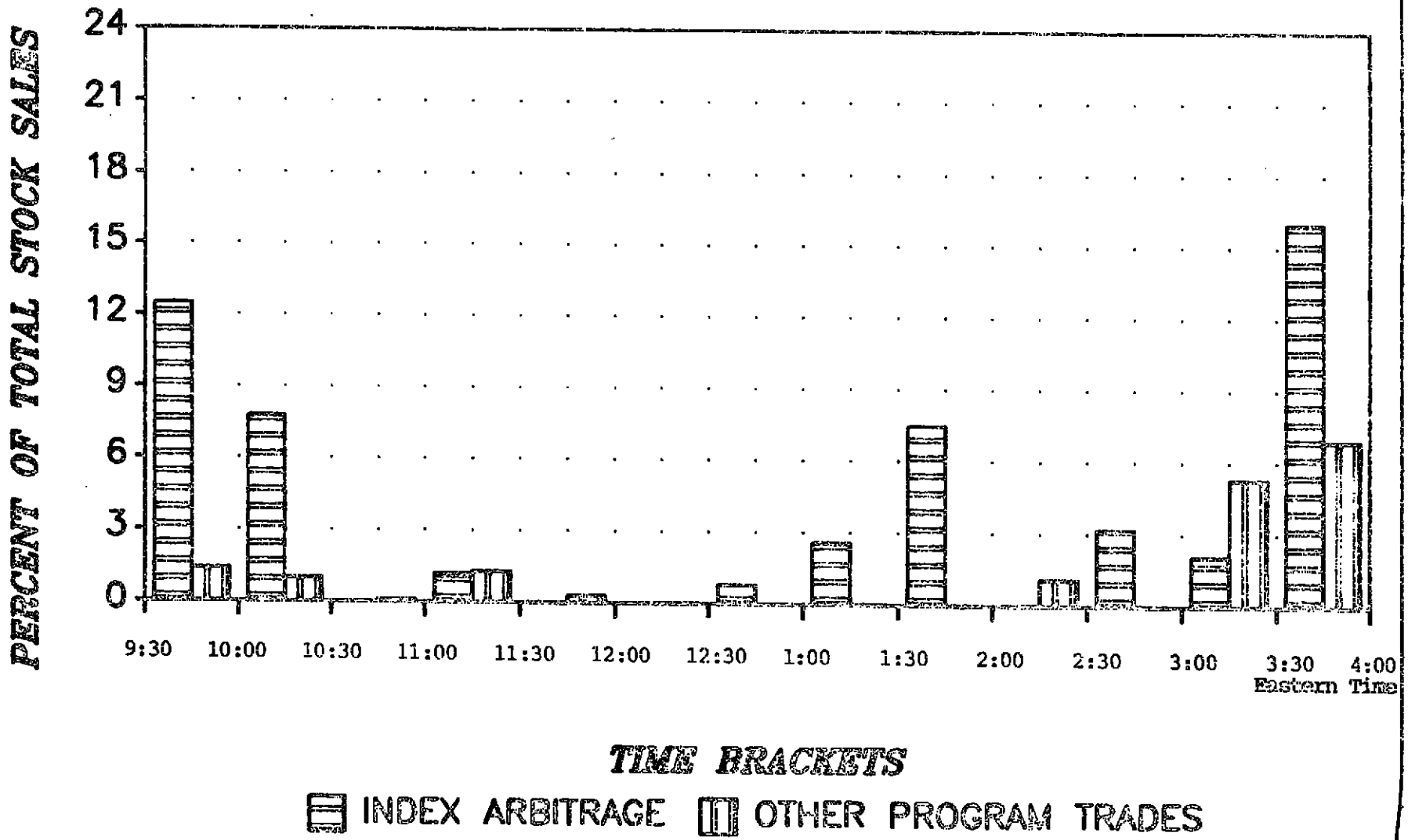


FIGURE 11

FIGURE 12

OCTOBER 15, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

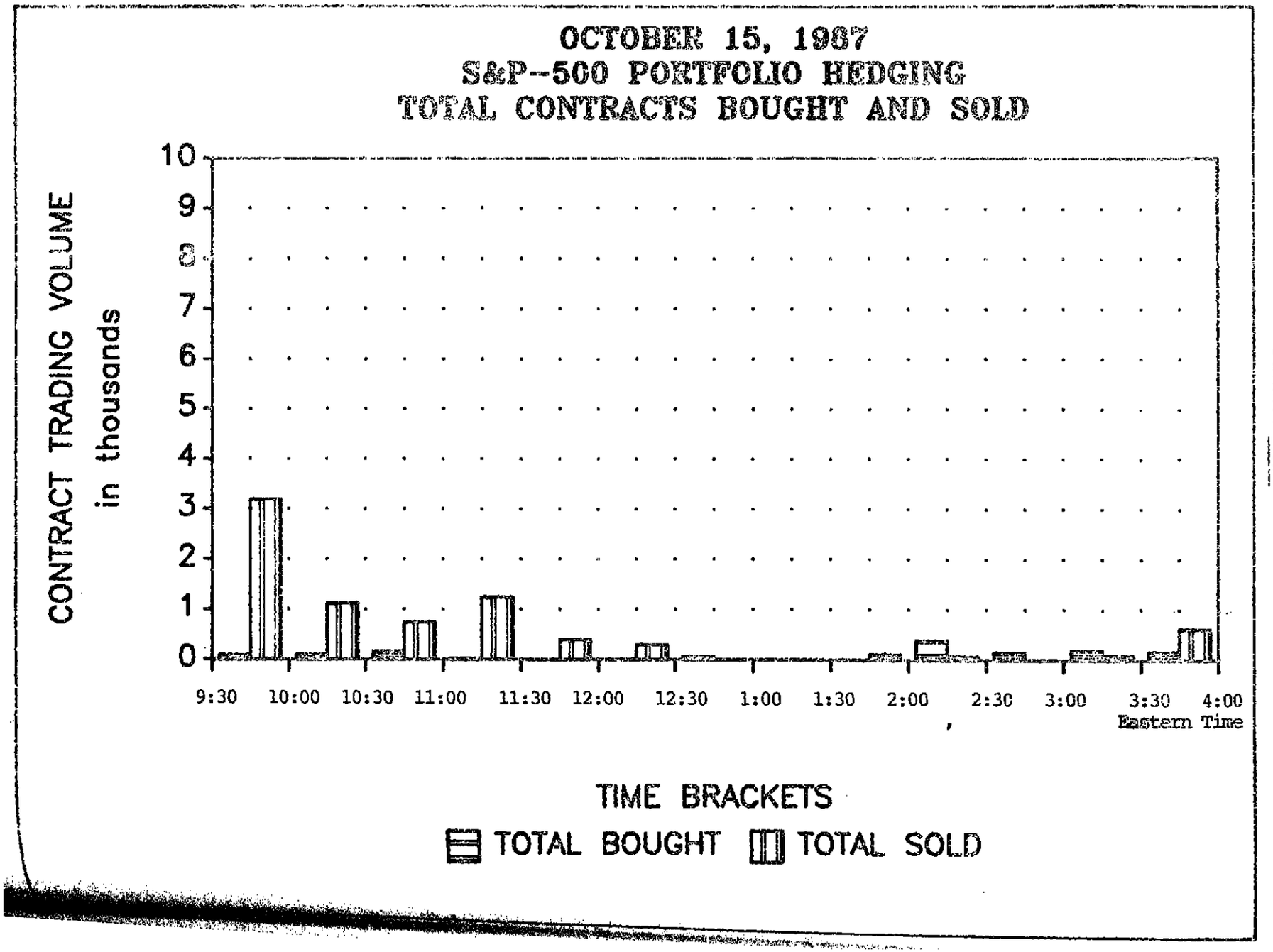

OCTOBER 15, 1987
S&P--500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD
CONTRACT TRADING VOLUME
in thousands
10
9
8
7
6
5
4
3
2
1
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
TOTAL BOUGHT
TOTAL SOLD

FIGURE 13

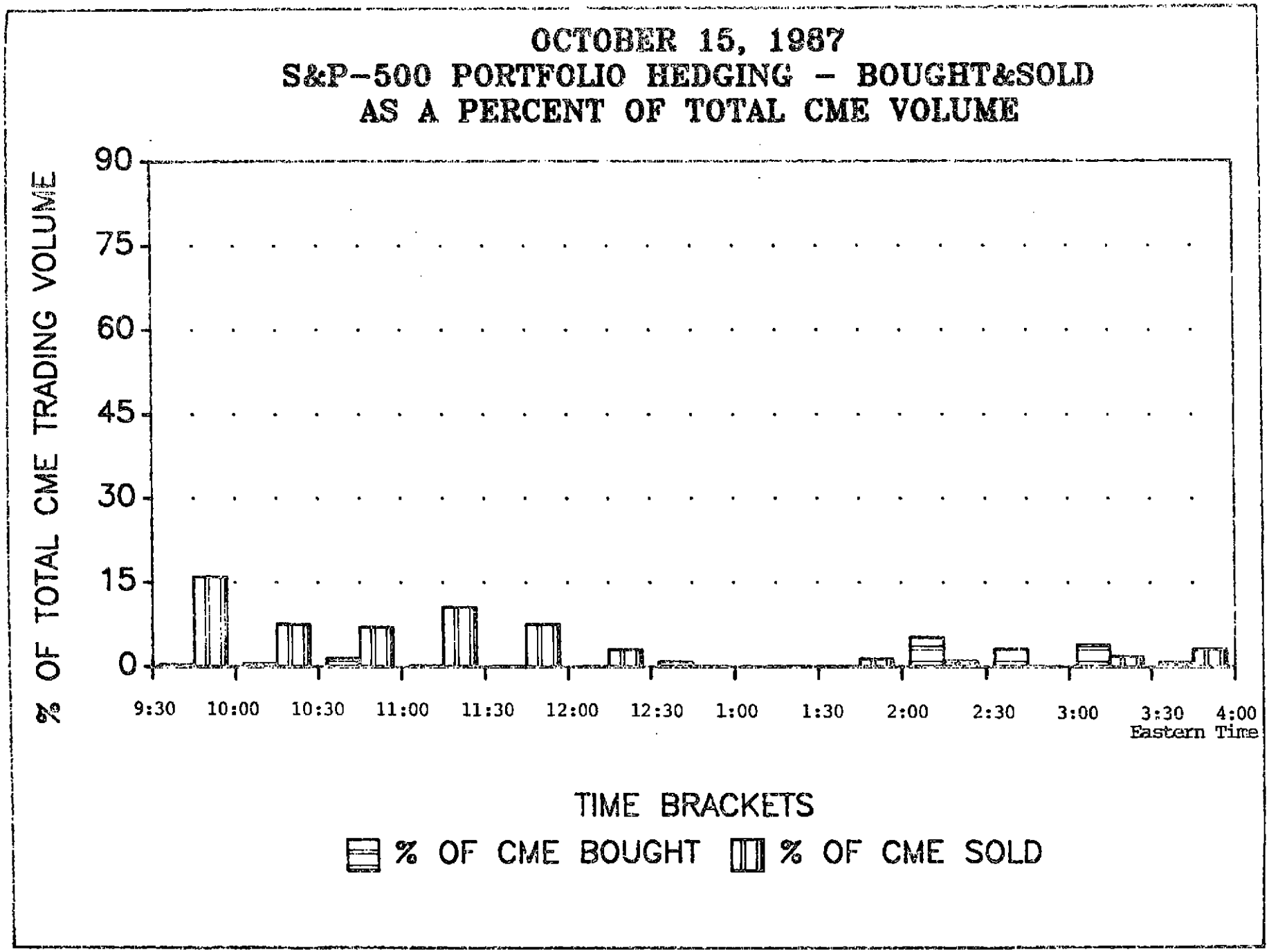

OCTOBER 15, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME
% OF TOTAL CME TRADING VOLUME
90
75
60
45
30
15
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
% OF CME BOUGHT
% OF CME SOLD

FIGURE 67
14

During the first 15 minutes of trading, however, the December future was at a sizeable discount to the quoted index, creating apparent arbitrage opportunities (Figure 10). After 3 p.m., and particularly during the last half hour of trading, stock and futures prices fell substantially. Futures prices fell relatively faster and frequently were at about the same level as the quoted index during the last 15 minutes of trading on the NYSE.

As can be expected from these basis relationships, 47/ arbitrage sell programs were most active in the first and last half hours of trading on the NYSE (Figures 11-12). The three half-hour periods when arbitrage sell programs, in aggregate, exceeded 2 million shares are summarized below. (See also Exhibit C-3.)

October 15, 1987
Arbitrage Sell Programs

Time	NYSE Share Volume (millions)	Percent NYSE Volume	Percent S&P 500 Stock Volume
9:30 - 10:00	6.1	12.5	18.3
10:00 - 10:30	2.2	7.8	10.3
3:30 - 4:00	5.0	16.0	21.6

47/ Although the S&P 500 futures basis is discussed here, index arbitrage sell programs on the open and close involved VLA, MMI, and NYSE Composite futures as well. The S&P 500 futures contract was involved in 10.5 million of the 16.6 million shares of index arbitrage stock sales on the NYSE that day as reported in the survey data.

Portfolio hedging was somewhat more prominent on October 15 than on October 14 and was most prevalent in the morning (Figures 13-14). The three half-hour periods with the largest sales (those with aggregate sales greater than 1,000 S&P 500 futures contracts) are summarized below. (See also Exhibit C-7.)

October 15, 1987
Portfolio Hedge Sales in S&P 500 Futures

Time	Futures Sales (thousand contracts)	Percent of CME Volume
9:30 - 10:00	3.2	16.0
10:00 - 10:30	1.1	7.6
11:00 - 11:30	1.2	10.6

Although both index arbitrage and portfolio hedging were at their most substantial levels during the first half hour of trading, the portfolio hedging appears contemporaneous with, rather than preceding, the index arbitrage. Of the approximately 6.1 million shares of stock involved in arbitrage sell programs during that period, orders for 2.4 million shares had entry times prior to the opening of trading on the NYSE, and another 3.5 million shares had entry times within the first 10 minutes of the opening. Arbitrage sell orders thereafter diminished significantly until about 10:00 a.m. Portfolio hedge sales in the first ten minutes of trading totaled nearly 2,200 contracts before also tapering off. This pattern would not lead to the conclusion that the hedge sales induced the arbitrage sell programs. Furthermore, there was no sustained downward price movement after that

interval as prices were fairly stable for the next half hour and then rose above opening levels.

During the last half hour of NYSE trading, reported index arbitrage and other program trading of stocks accounted for about 5.0 million and 2.1 million shares of stock, respectively, or about 23 percent of total NYSE volume during that period. About 5.1 million shares of that trading had order entry times during the last 17 minutes of trading, after prices already had fallen substantially. Such trading could have contributed only to the final 3 points of the day's decline of slightly over 7 points in the S&P 500 index.

Friday, October 16, 1987. Despite a very weak close the prior day, the December S&P 500 futures market opened 2.25 points higher and at a premium to the reported index (Figures 15-16). Stock and futures prices began falling soon after the opening, however. The Dow closed down 108 points, a new record drop, and the S&P 500 index fell 15 points. The December future traded at a premium to the reported index during most of the day, although it fell to the level of the index at several points and was quoted at a discount during most of the final half hour of trading on the NYSE. The three periods of the most pronounced price weakness of the day were from 11:00 to 11:30 a.m., from 1:30 to 2:00 p.m. and from 3:30 to 4:00 p.m. October 16 also was the expiration date for the October MMI future, CBOE S&P 100 option, and twelve other index option contracts.

Both index arbitrage and portfolio hedging were at substantial levels on October 16. Although both strategies were

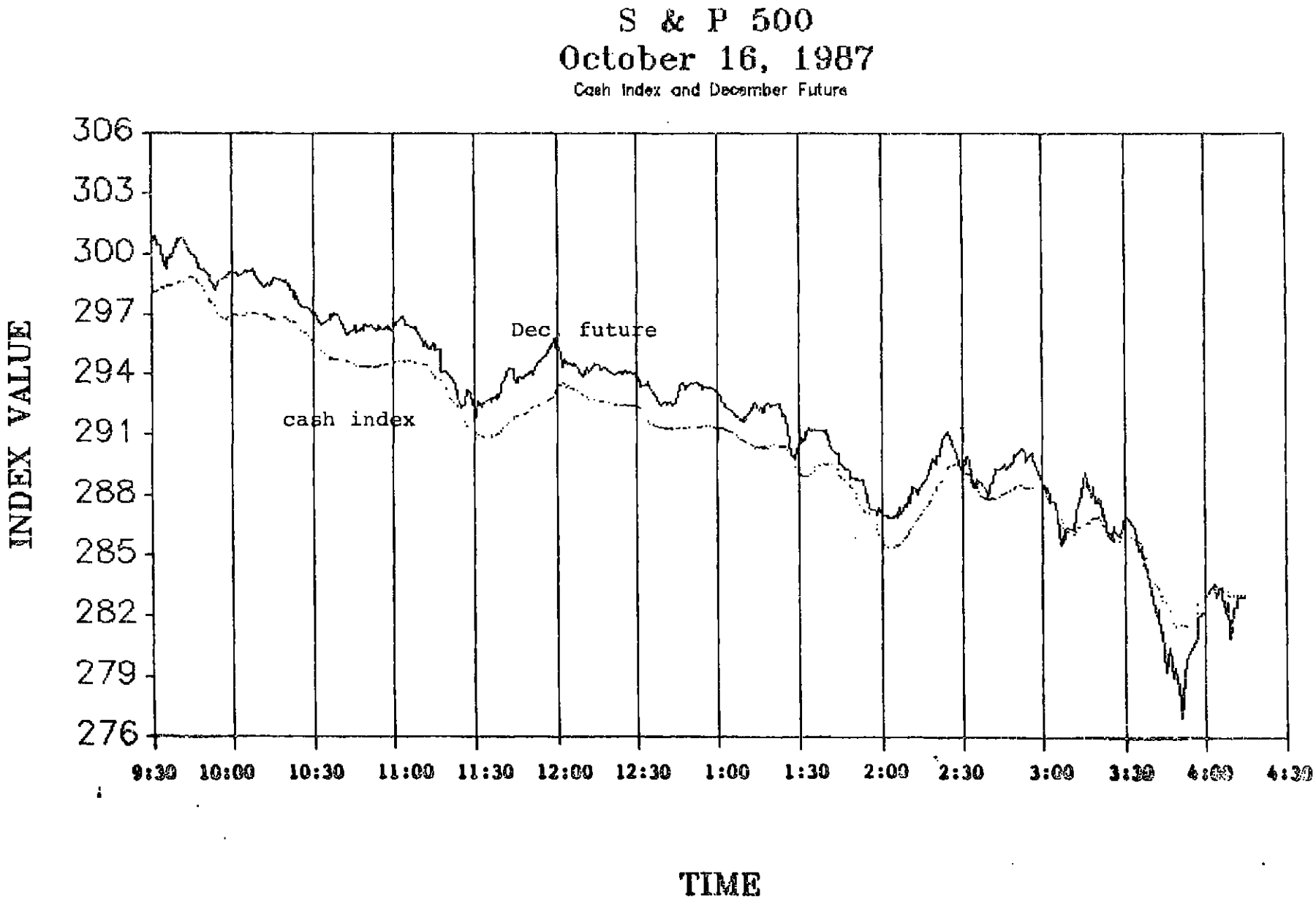

S & P 500
October 16, 1987
Cash Index and December Future
INDEX VALUE
306
303
300
297
294
291
288
285
282
279
276
Dec future
cash index
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 15

S & P 500
October 16, 1987
Basis (Dec. Futures -- Cash)

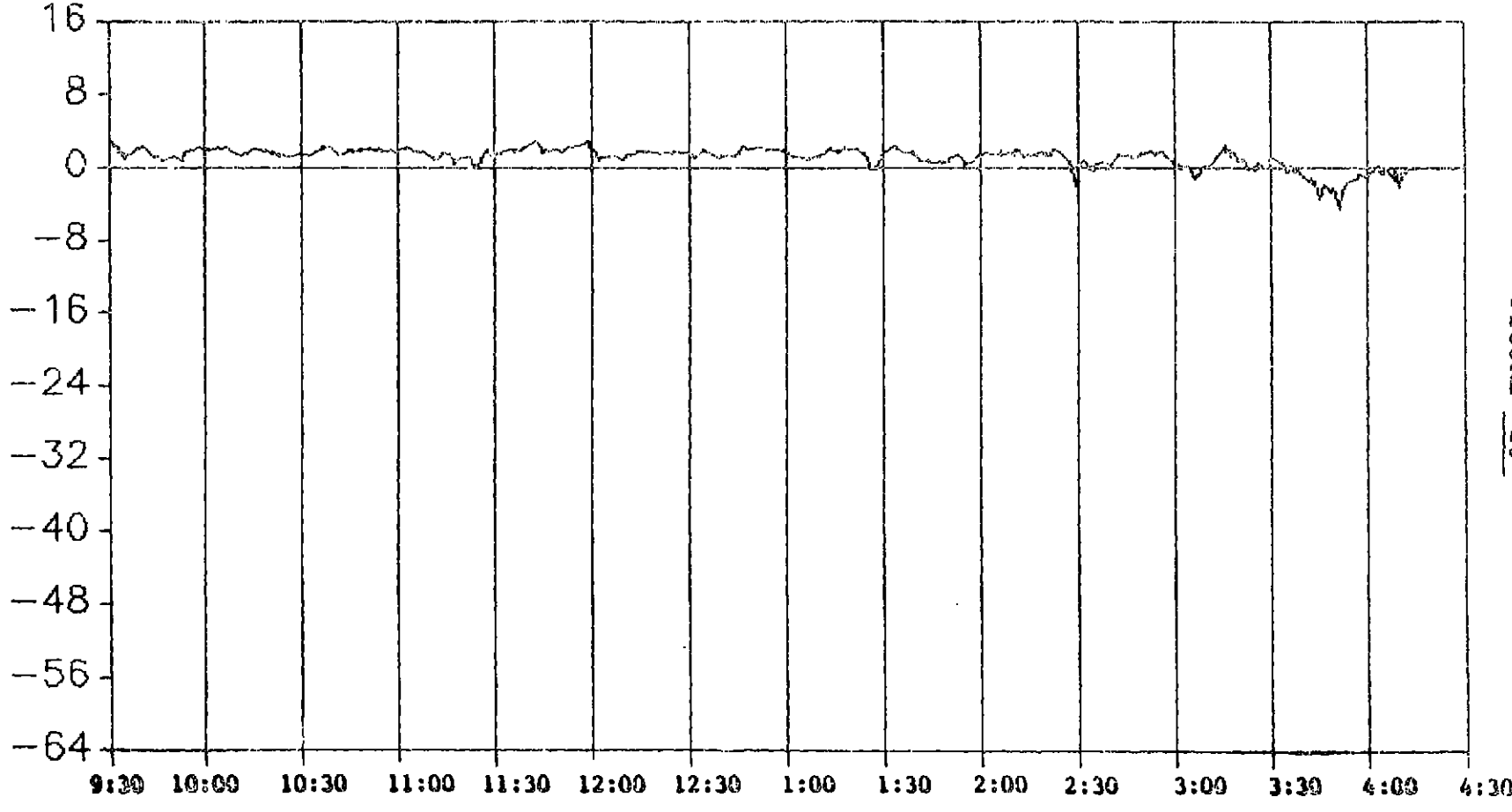


FIGURE 16

OCTOBER 16, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES

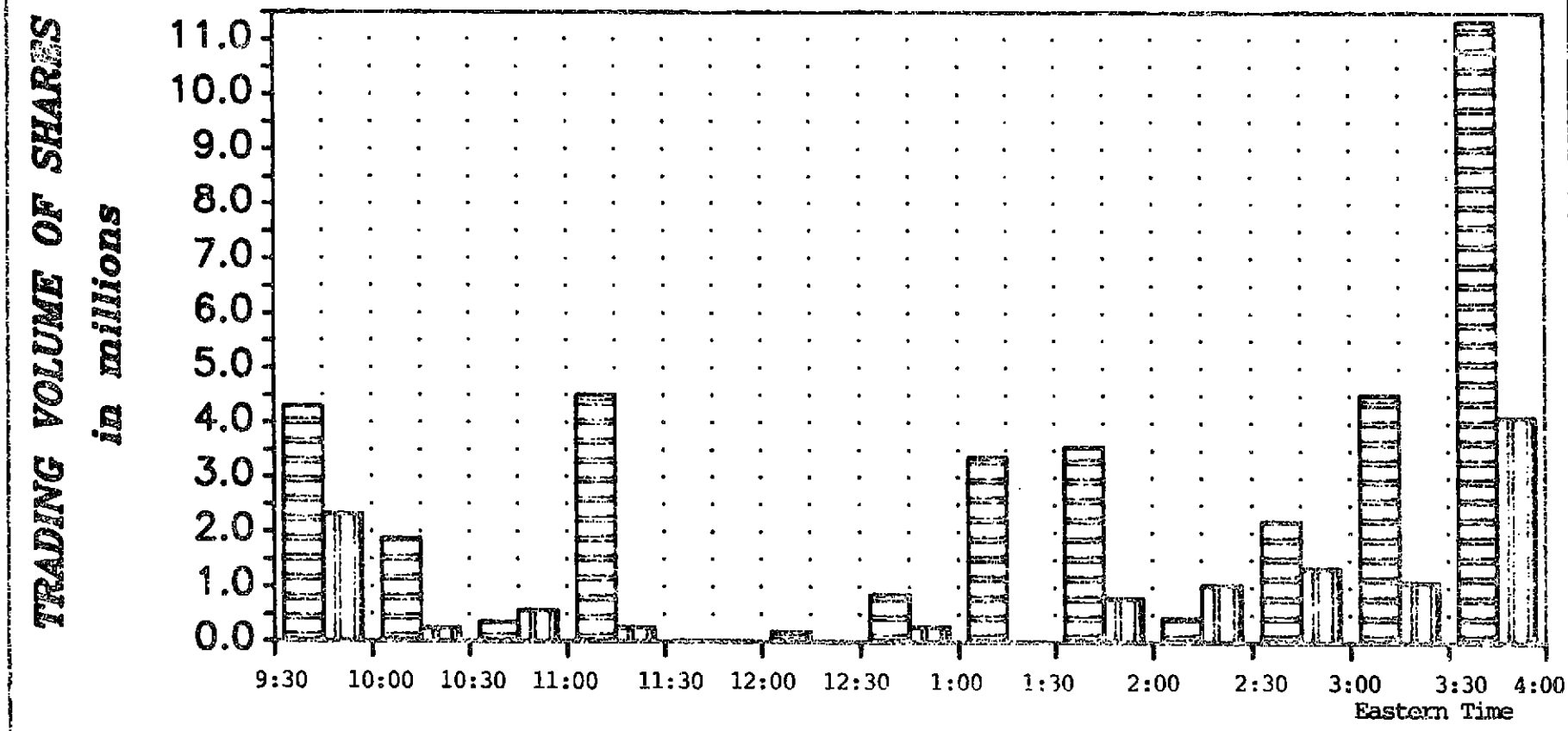


FIGURE 17

OCTOBER 16, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES

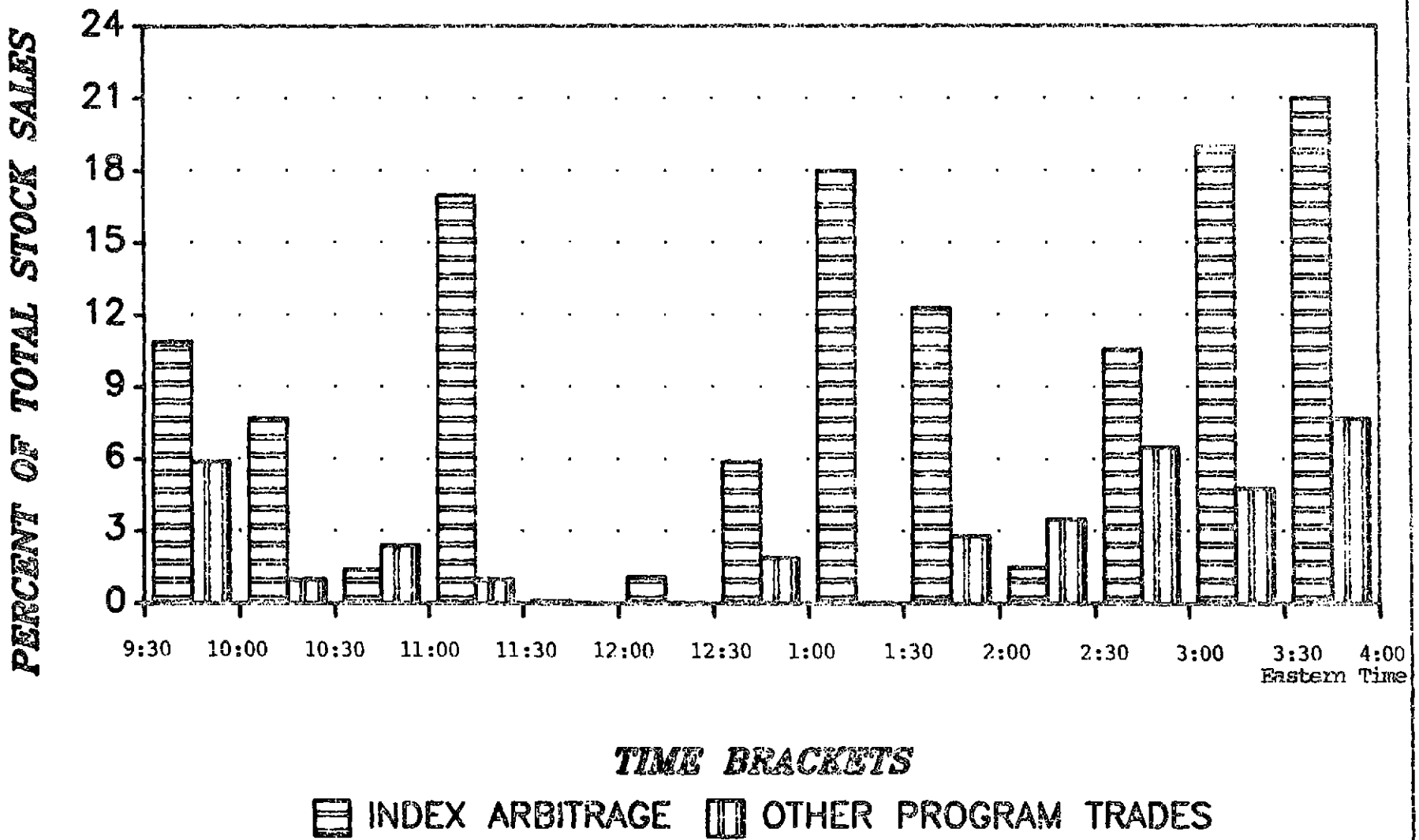


FIGURE 18

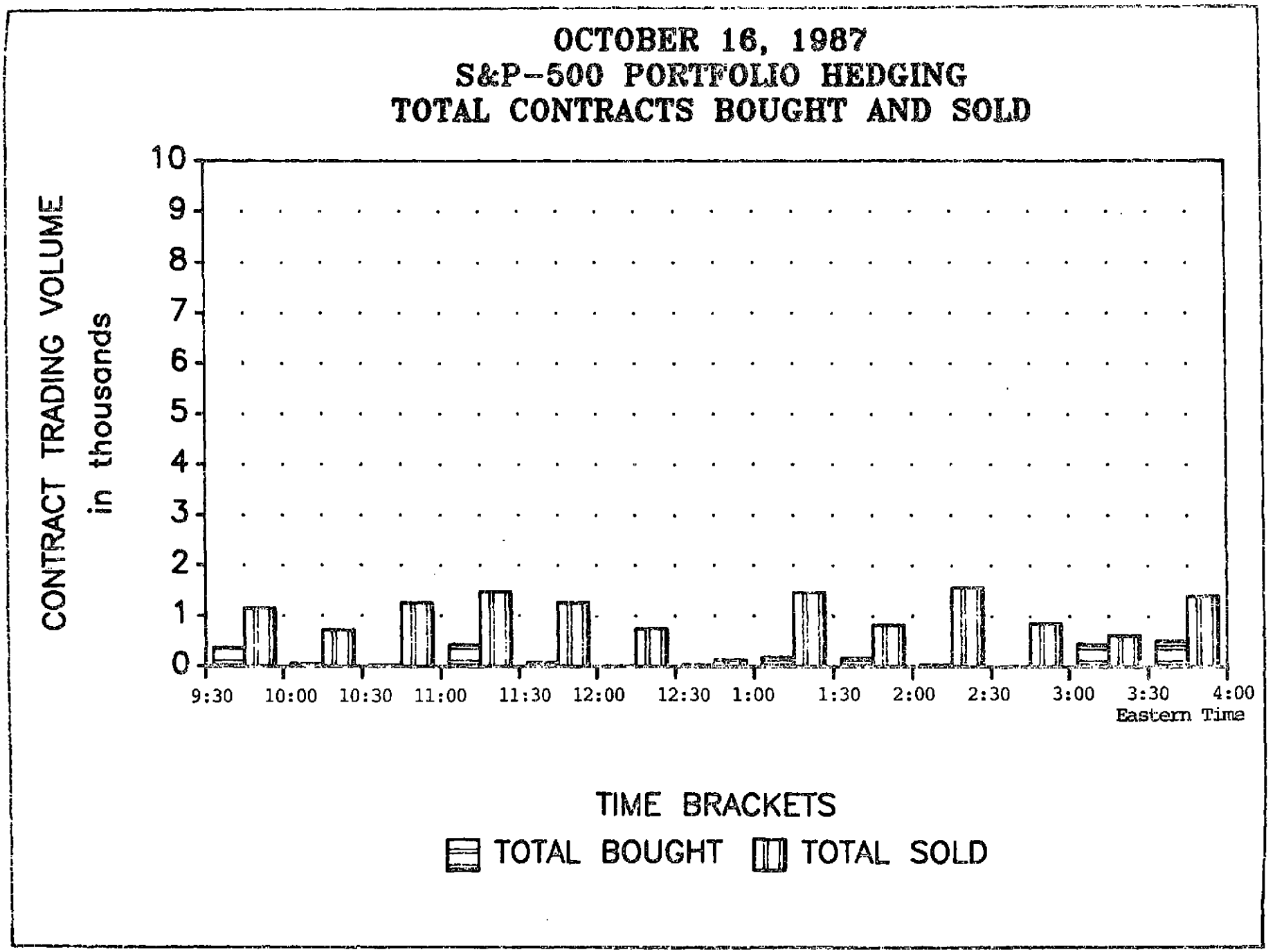

OCTOBER 16, 1987
S&P-500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD
CONTRACT TRADING VOLUME
in thousands
10
9
8
7
6
5
4
3
2
1
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
TOTAL BOUGHT
TOTAL SOLD

FIGURE 19

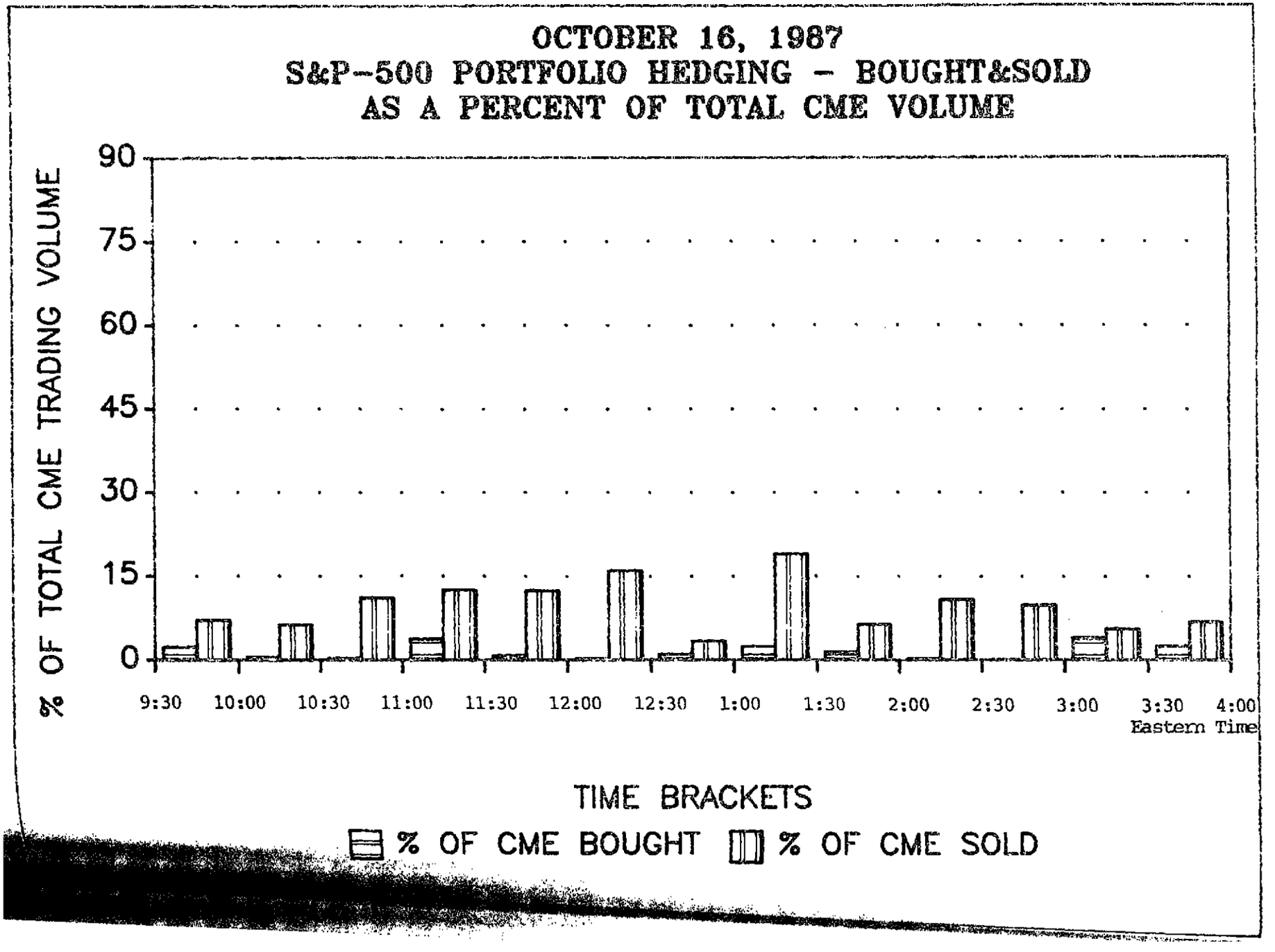

OCTOBER 16, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME
% OF TOTAL CME TRADING VOLUME
90
75
60
45
30
15
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
% OF CME BOUGHT
% OF CME SOLD

FIGURE 20

prominent at various times during the day, index arbitrage was greatest after 3 p.m. and was particularly large at the close of the NYSE (Figures 17-18). Portfolio hedging, although more evenly distributed during the day, had its greatest concentrations before 2:30 p.m. (Figures 19-20). The largest concentrations of index arbitrage sell programs are summarized below. (See also Exhibit C-3.)

October 16, 1987
Arbitrage Sell Programs

Time	NYSE Share Volume (millions)	Percent NYSE Volume	NYSE Percent S&P 500 Stocks Volume
9:30 - 10:00	4.3	10.9	15.1
11:00 - 11:30	4.5	17.0	23.1
1:00 - 1:30	3.4	18.0	26.6
1:30 - 2:00	3.6	12.3	17.2
2:30 - 3:00	2.2	10.6	14.8
3:00 - 3:30	4.5	19.0	25.6
3:30 - 4:15 48/	11.3	21.0	26.3

There also were substantial sales of stock on October 16 as part of reported program trades other than index arbitrage. Those other program sales of stock totaled 12.1 million shares for the day, of which over 5 million were reported as portfolio insurance sales in the stock market. The largest concentrations of those other program sales, which had no futures market counterparts, were at the open and after 2 p.m. At the open, those sales totaled 2.3 million shares, or 5.9 percent of NYSE

48/ During this interval, which includes the NYSE run-off volume, 2.3 million shares of stock also were purchased as part of buy programs associated with MMI futures.

volume. The other large concentration of those stock sales was 4.1 million shares (7.7 percent of volume) during the last half hour on the NYSE (Exhibit C-5).

The intervals during which portfolio hedge selling of S&P 500 futures exceeded 1,000 contracts are summarized below. (See also Exhibit C-7.)

October 16, 1987
Portfolio Hedge Sales in S&P 500 Futures

Time	Futures Sales (thousand contracts)	Percent CME Volume
9:30 - 10:00	1.1	7.1
10:30 - 11:00	1.3	11.1
11:00 - 11:30	1.5	12.5
11:30 - 12:00	1.3	12.4
1:00 - 1:30	1.5	19.0
2:00 - 2:30	1.6	10.8
3:30 - 4:15	1.4	6.8

None of the intervals had particularly large quantities of futures portfolio hedging, although in one interval it amounted to 19 percent of the sales on the CME. Nor was hedge selling particularly heavy during the three half-hour periods when stock prices fell the most, 11:00-11:30 a.m., 1:30-2:00 p.m., and 3:30-4:00 p.m. Furthermore, neither the magnitudes nor the timing of this trading on October 16 is indicative of any significant interaction between portfolio hedging and index arbitrage sell programs.

Index arbitrage sell programs were relatively large from 11:00 to 11:30 a.m. when stock prices dropped significantly, but, during the next half hour, stock prices recovered nearly to the level prevailing at 11:00 a.m. Stock prices weakened significantly between 1:30 and 2:00 p.m., during a period of more modest sell programs, and recovered completely in the subsequent half hour. Although not definitive, these price patterns are consistent with short-term pressure resulting from a concentration of arbitrage sell programs.

The 30-minute period during which stock and futures prices fell most on October 16 was the last half hour of NYSE trading in which the S&P 500 index and the December S&P 500 future both fell about 5 points, although the future had fallen nearly 10 points by 3:51 p.m. before recovering. That period also coincided with the expiration of the October MMI future on the CBT and thirteen stock index options traded on securities exchanges, the most prominent of which was the CBOE's S&P 100 option. All of those futures and option contracts are cash settled on the basis of the closing values of their respective stock indices that day. The closing out of any index arbitrage positions left open until the future's expiration would require a purchase or sale of stock on the close of the NYSE, preferably at the last sale price of each stock.

As indicated above, during the final half hour of trading on October 16, there was a substantial amount of arbitrage-related stock trading in addition to other program trades. During that period, which includes the NYSE run-off transactions reported

After 4:00 p.m., index arbitrage buy programs totaled approximately 2.3 million shares while index arbitrage sell programs totaled 11.3 million shares. (As discussed below, not all of those arbitrage programs were related to the expirations of the MMI future and index option contracts.) Other reported stock sell programs not related to futures trading amounted to 4.1 million shares, of which 1.7 million shares were portfolio insurance implemented in the stock market.

The 11.3 million shares of stock sales associated with index arbitrage were related to both index option and index futures contracts. About 5 million shares of stock were sold as part of option arbitrage, mostly involving the CBOE S&P 100 option, while about 6.3 million shares were sold as part of futures arbitrage trades. About 5.1 million of those futures-related stock sales involved the S&P 500 futures contract, which was not expiring that day. MMI futures were involved with stock purchases of 2.3 million shares and sales of 1.1 million shares during that period.

Monday, October 19, 1987. This day began with a massive wave of stock selling that continued relentlessly -- in all markets -- as the day progressed, resulting in record declines in stock values on all exchanges trading stocks or stock index instruments in the United States and around the world. The breadth and magnitude of that selling was unprecedented, and it

emanated from numerous sources. 49/ The resultant magnitude of the fall in stock values also was unprecedented.

The selling pressure created substantial order imbalances on the books of the NYSE specialists causing delays in the opening of trading in many stocks for hours. Telephone lines to securities brokerage firms were jammed with orders and inquiries. NASD market-makers also were overwhelmed with sell orders and reportedly many customers were unable to reach their brokers by telephone.

The wave of selling that engulfed the global securities markets on October 19 was not initiated by trading in index products nor did it principally emanate from such trading. There was a massive change in investor perceptions, building from the previous week's experience, about the value of stocks, and many investors acted simultaneously and in unprecedented volumes upon those changed perceptions. However, as mentioned in the Brady Commission Report, there was, as a result of stock price declines the previous week, a significant overhang of portfolio insurance

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49/ The Brady Commission Report stated that trading activity was concentrated in the hands of surprisingly few institutions. See Executive Summary, p. 5. Although the SEC/CFTC survey, as well as CFTC surveillance data, reveal that some institutions engaged in large transactions, that does not mean that most trading on either the NYSE or the CME was accounted for by a few institutions. All reported program stock sales in the SEC/CFTC survey accounted for less than 15 percent of the 608 million shares sold on the NYSE on October 19. Similarly, total portfolio hedge selling of S&P 500 futures as reported in the SEC/CFTC survey data accounted for only 20 percent of the selling in that contract on October 19.

sell programs, which were likely to be implemented in the stock or futures market that Monday.

Despite delayed openings of many stocks, trading volume during the first hour totaled nearly 100 million shares on the NYSE. After two hours, about 215 million shares had been traded -- more than the normal volume for an entire day. By day's end, a record 608 million shares had traded on the NYSE.

Although this wave of selling pressure was of unprecedented proportions, it was not totally unanticipated. The large stock price declines of the prior week, the substantial increase in interest rates and bond yields, and developments regarding the prospects for further weakening of the dollar, all boded ill for stock prices on Monday morning, which had been presaged by the historic decline of the previous Friday. Large price declines on international stock markets, particularly Tokyo and London, before the NYSE opened, provided further confirmation of the global change in investors' sentiments regarding stock values. Apparently in response to these signals, the Chairman of the NYSE called a special meeting of the heads of the largest member firms for 10:00 a.m. to assess the situation and to consider the extraordinary question of whether the NYSE should halt trading. 50/

Another clear indicator of the depth and breadth of the wave of selling that hit the NYSE that Monday morning was the stock

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50/ Katzenbach Report, p. 20.

sales of one large mutual fund group. Reportedly in response to redemption requests from a large number of its customers that had built up over the weekend, that fund sold about 25.8 million shares of stock on the NYSE on October 19. Moreover, nearly 17.5 million of those shares were sold during the first half hour of trading that day, and other sizeable sales were executed in London before U.S. markets opened. Those sales alone accounted for over 34 percent of NYSE volume during the first half hour of trading, nearly twice the size of total index arbitrage and all other program sales of stock reported for that half hour in the SEC/CFTC survey. 51/

On October 19, the first reported values for the Dow and the S&P 500 indices were little changed from Friday's close, although it is generally agreed that those figures are misleading. Since a substantial number of the component stocks of the indices were not trading, their current values were not reflected in the indices. 52/ The December S&P 500 future opened within a range of about 262 to 264, which was at an unusually large discount to the reported cash index values (Figures 21-22). For most of the day, the December future traded at substantial discounts to the

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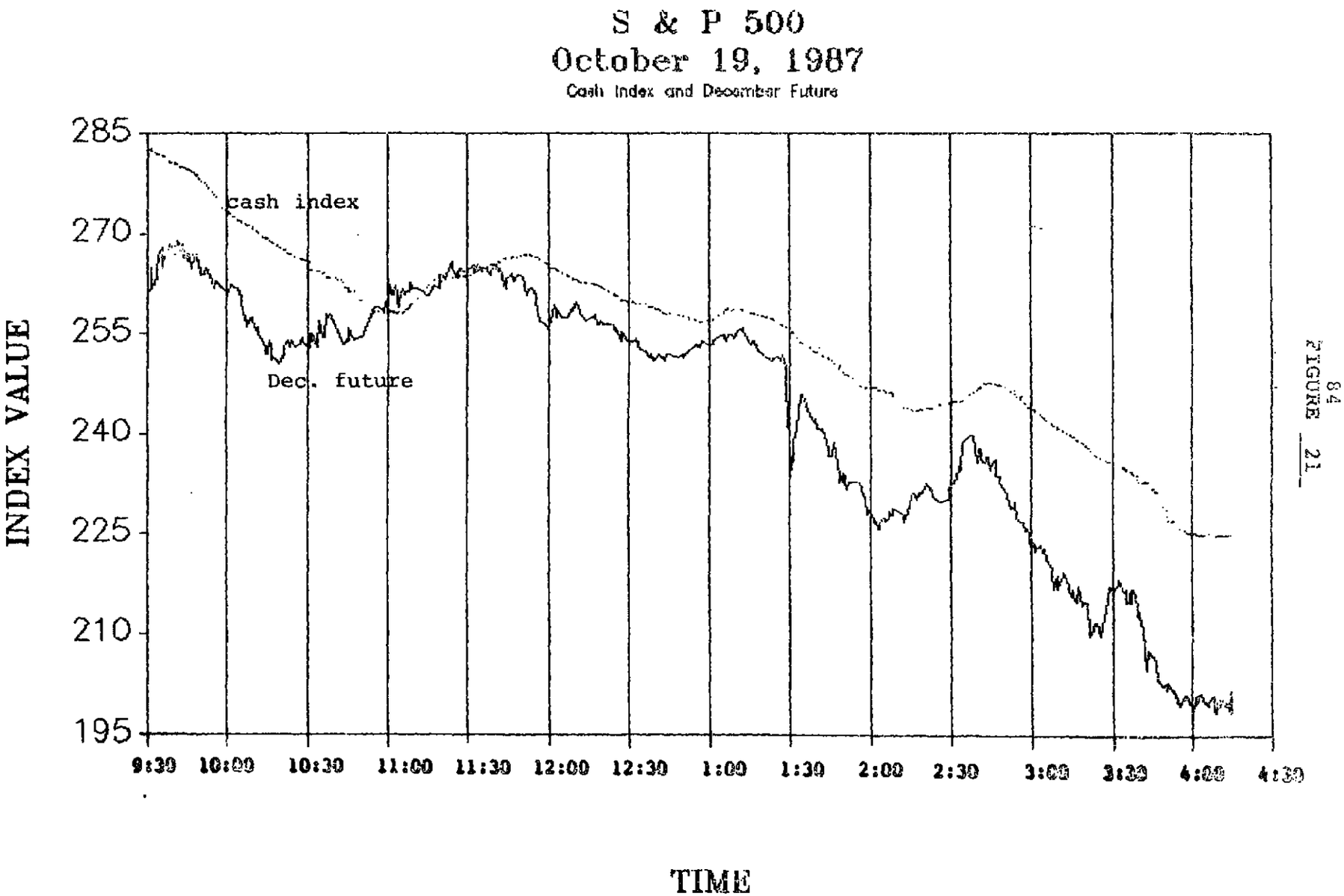
51/ As indicated above, since the surveyed firms were drawn from those actively involved in index arbitrage and portfolio insurance trading implemented in the futures market, the survey data do not include types of program stock trades that did not involve futures trading and those executed through other firms.

52/ See Section II above for a more detailed discussion of this non-trading effect and estimates of its magnitude.


S & P 500
October 19, 1987
Cash Index and December Future
285
270
255
240
225
210
195
cash index
Dec. future
INDEX VALUE
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

84
FIGURE 21

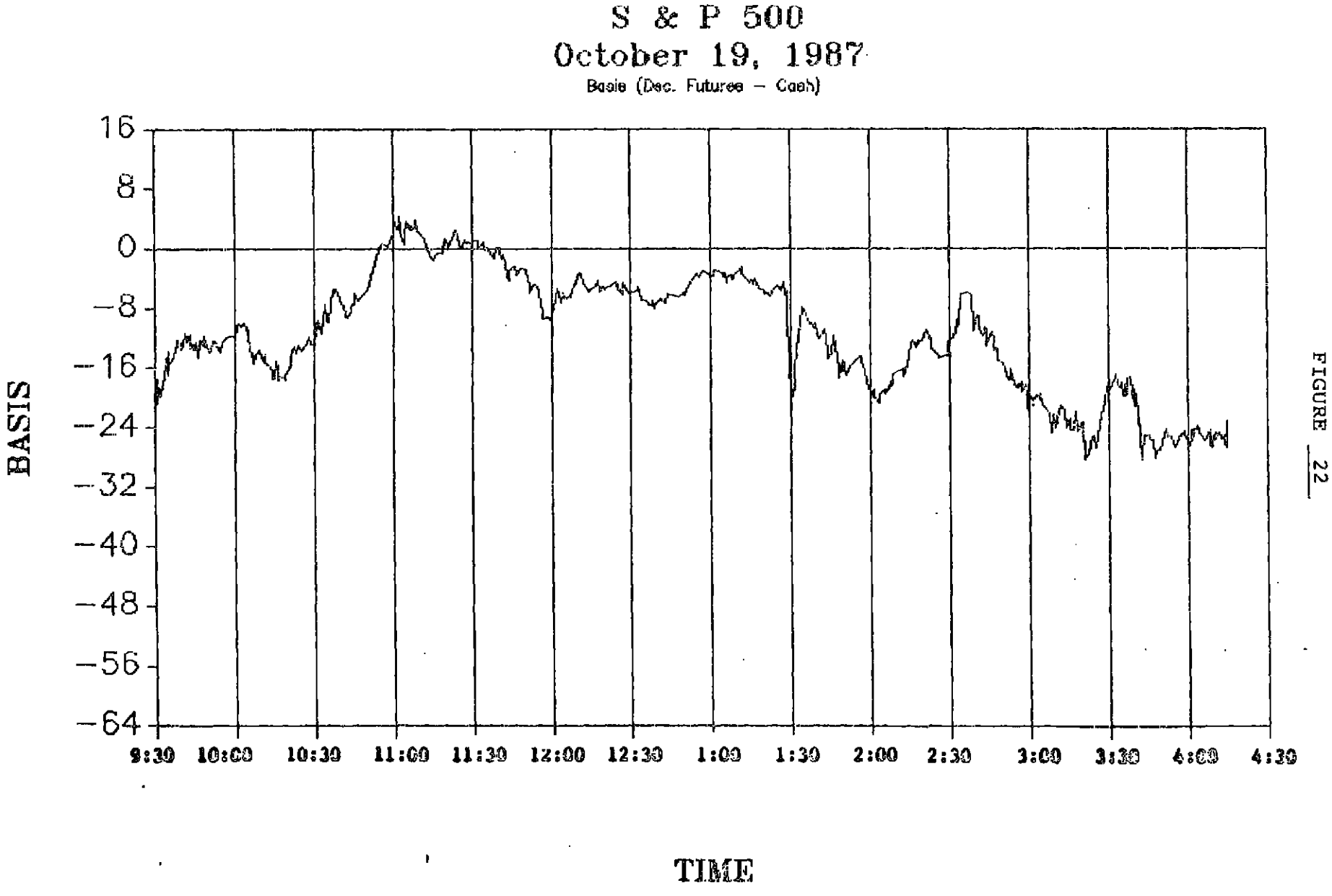

S & P 500
October 19, 1987
Basis (Dec. Futures – Cash)
BASIS
16
8
0
-8
-16
-24
-32
-40
-48
-56
-64
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 22

OCTOBER 19, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES

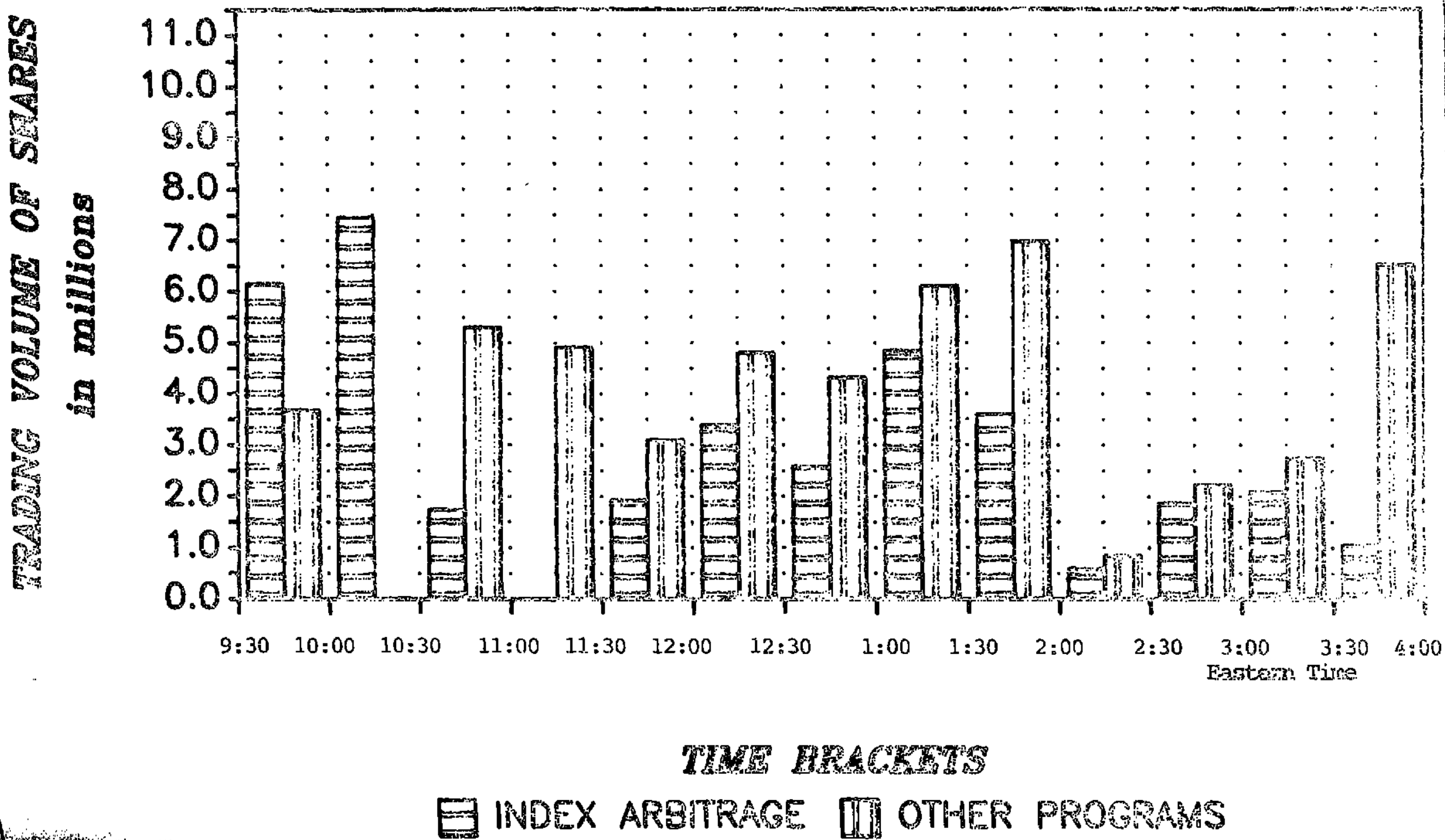
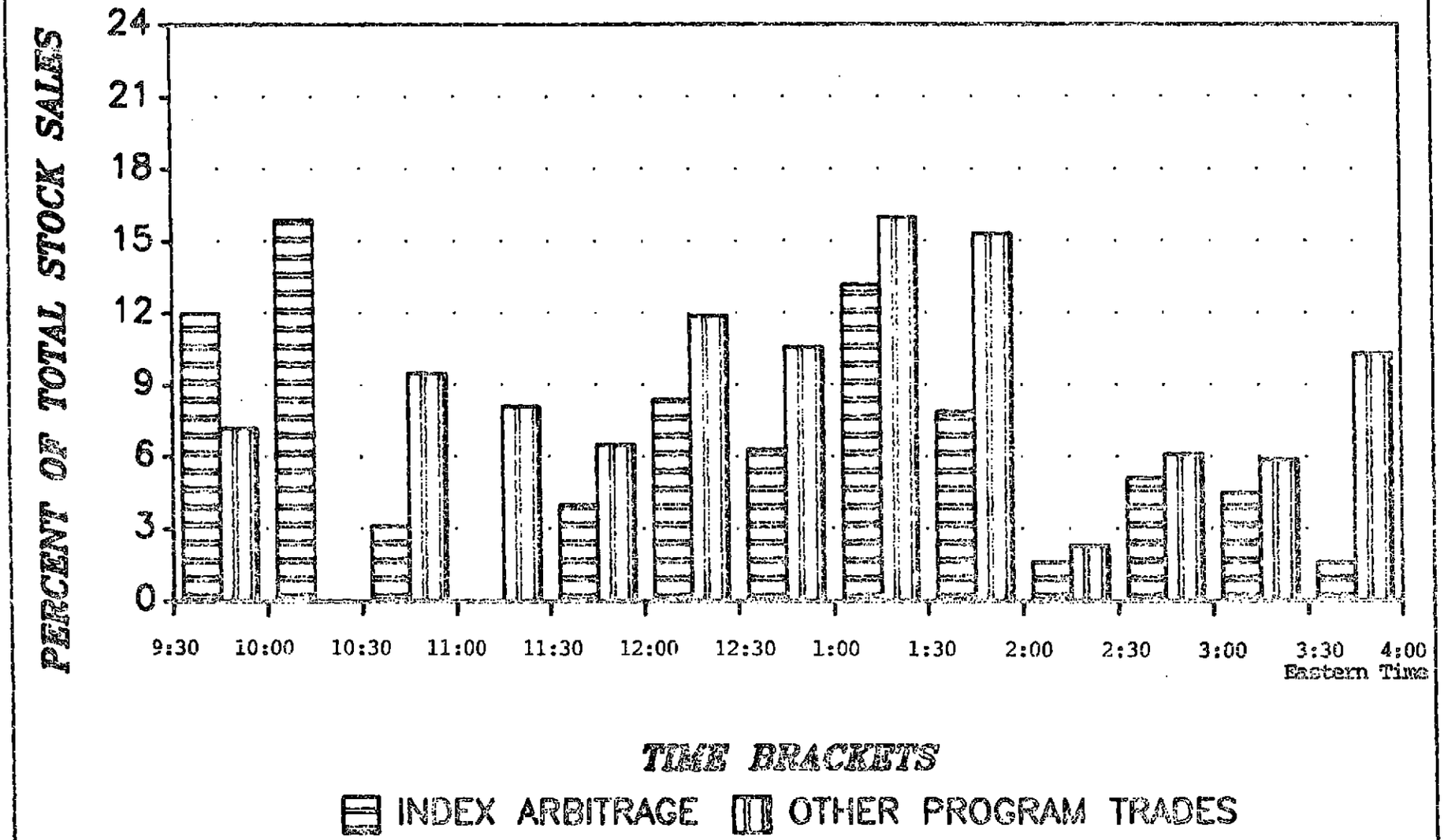


FIGURE 23

OCTOBER 19, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

FIGURE 24

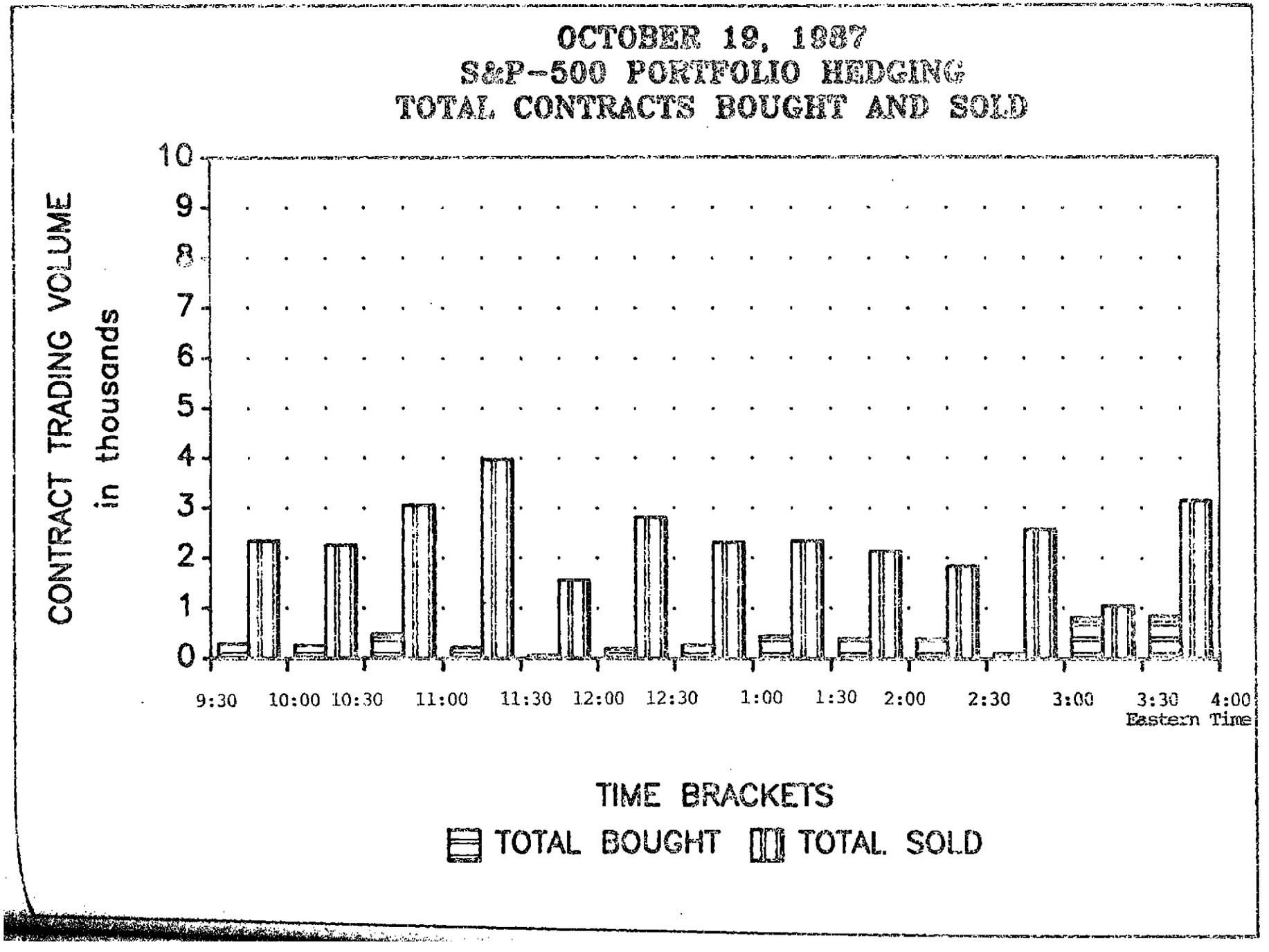

OCTOBER 19, 1987
S&P-500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD
CONTRACT TRADING VOLUME
in thousands
10
9
8
7
6
5
4
3
2
1
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
TOTAL BOUGHT
TOTAL SOLD

FIGURE 25

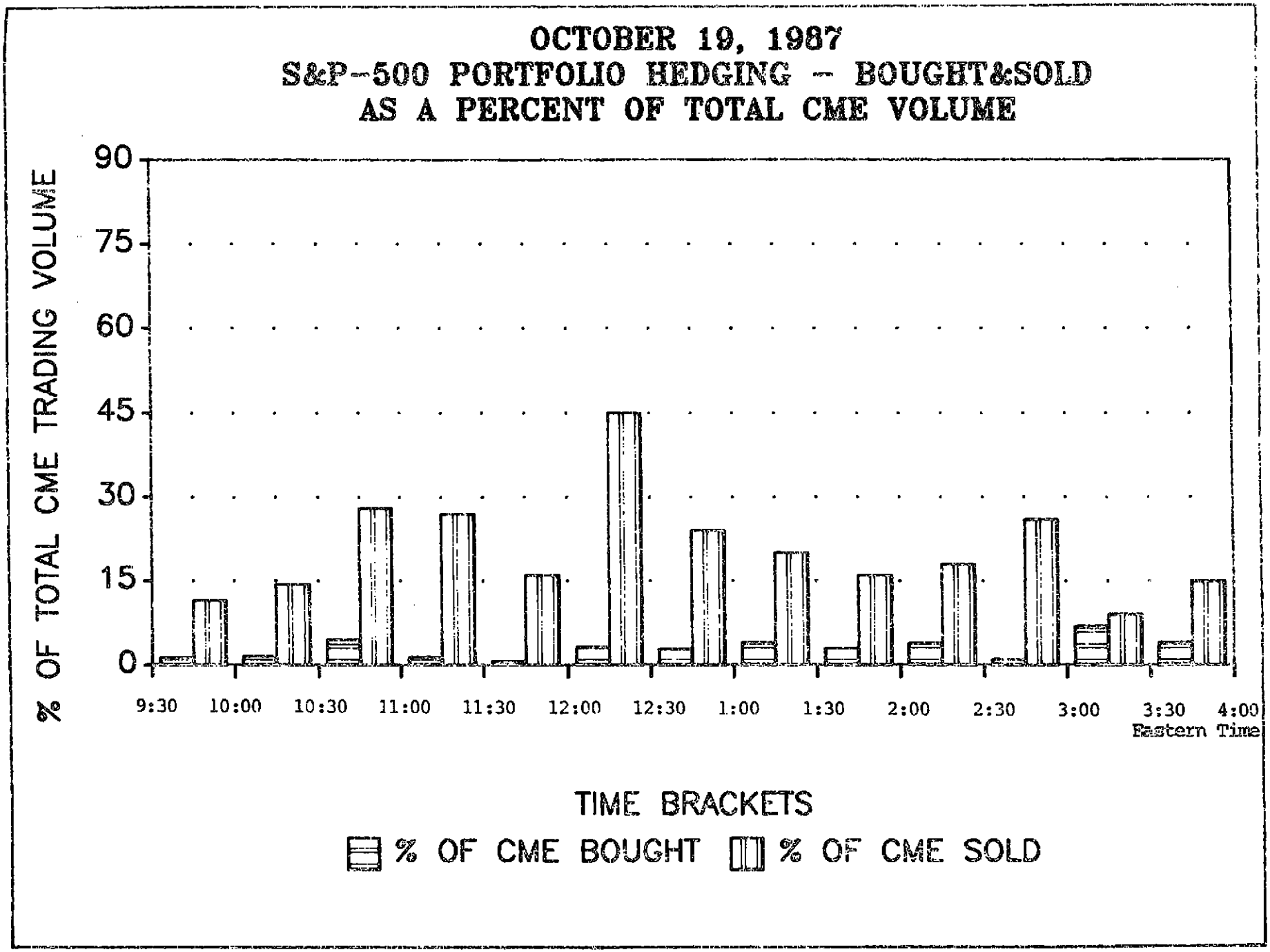

OCTOBER 19, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME
% OF TOTAL CME TRADING VOLUME
90
75
60
45
30
15
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
% OF CME BOUGHT
% OF CME SOLD

FIGURE 26

reported values of the S&P 500 index, as did the November MMI future relative to its underlying index.

Stock and futures prices fell precipitously throughout the day on October 19, with only a brief respite between 11 a.m. and noon. The three periods with the greatest declines in both markets were the first hour of trading, between 1:30 and 2:00 p.m., and from 3:00 p.m. to the NYSE close. The price of the December S&P 500 future also fell sharply relative to the reported cash index between 11:45 and noon and at around 1:30 p.m.

The net magnitudes of index arbitrage and portfolio hedging on October 19 were the largest of the period examined in this report (Figures 23-26). As reported in the SEC/CFTC survey, other program trading unrelated to futures trading also was largest that day, with a large portion consisting of stock sales executed pursuant to portfolio insurance strategies. The intraday intervals during which aggregate stock sales associated with index arbitrage trading exceeded 2 million shares on October 19 are summarized below. (See also Exhibit C-3.)

October 19, 1987
Arbitrage Sell Programs

Time	NYSE Share Volume (millions)	Percent NYSE Volume	Percent S&P 500 Stocks Volume
9:30-10:00	6.2	12.0	18.3
10:00-10:30	7.5	15.9	24.2
12:00-12:30	3.4	8.4	11.2
12:30- 1:00	2.6	6.3	10.2
1:00- 1:30	4.9	13.2	21.6
1:30- 2:00	3.6	7.9	12.5
3:00- 3:30	2.1	4.5	6.4

The greatest concentrations within the day were during the first hour of trading and between 1:00 and 1:30 p.m. Despite the persistently large reported discounts of futures prices to stock index values after 2:00 p.m., the magnitude of index arbitrage trades declined significantly, both in absolute terms and relative to NYSE volume. 53/ These data are consistent with staff interviews of arbitrage traders and other investment managers who said it became very difficult or impossible to execute index arbitrage or other stock trades on that Monday afternoon because no one could be sure whether stock sale orders would be executed and, if executed, what the transaction prices of the individual stocks in the arbitrage portfolios would be. Managers of large pension funds reported that their brokers told them they could not even guarantee stock orders would reach the floor of the NYSE, much less be executed. Some said it was days before they learned whether stock orders entered on October 19 had been filled.

The total number of shares of stock reported as arbitrage-related sales during each of the first two half-hour periods on October 19 was higher than the levels reported for other days, except for the last half hour of trading on October 16. Nevertheless, on October 19, index arbitrage stock sales, even during the morning, did not constitute as large a

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53/ Estimates discussed in Section II indicate consistency between the trading proxy and reported bases after 2:00 p.m.

percentage of NYSE volume as on October 14 or 16, when concentrations as high as 17 to 21 percent of NYSE volume were recorded during several intraday periods.

While index arbitrage-related stock selling diminished on October 19 as the day progressed, SEC/CFTC survey data indicated an increase in stock sales associated with other program sales not involving futures trading. The largest concentrations of such gross stock sales (those over two million shares) per half-hour interval are summarized below. (See also Exhibit C-5.)

October 19, 1987
Other Program Stock Sales

Time	NYSE Share Volume (Millions)	Percent NYSE Volume	Percent S&P 500 Stocks Volume
9:30-10:00	3.7	7.2	10.9
10:30-11:00	5.3	9.5	12.7
11:00-11:30	4.9	8.1	10.5
11:30-12:00	3.1	6.5	9.4
12:00-12:30	4.8	11.8	15.8
12:30- 1:00	4.3	10.6	16.8
1:00- 1:30	6.1	16.0	26.8
1:30- 2:00	7.0	15.2	24.4
2:30- 3:00	2.2	6.1	8.8
3:00- 3:30	2.8	5.9	8.5
3:30- 4:00	6.5	10.3	17.2

On October 19, those other reported program sales of stock were of greater magnitude than stock sales related to index arbitrage--for the entire day 51.7 million shares of other program sales versus 37.5 million for index arbitrage. Nearly 40 million shares reported as other program stock sales were for portfolio insurance executed in the stock market rather than as

hedge positions via the futures market. Those other program stock sales were most heavily concentrated between 10:30 a.m. and 2:00 p.m. In particular, virtually all of the other program stock sales shown above for the intervals beginning 10:30 a.m., 1:00 p.m., and 1:30 p.m. represent portfolio insurance sales of stock.

Portfolio hedging with S&P 500 futures on October 19 totaled about 4,800 contracts purchased and 32,700 sold. Those gross sales accounted for 20 percent of all sales on the S&P 500 futures market that day. That day registered the largest net sales of futures for portfolio hedging during the survey period, and nearly 80 percent of that selling was identified as portfolio insurance.

Total portfolio hedging sales of S&P 500 futures by half-hour intervals were quite constant over the course of the day, ranging from a high of about 4,000 contracts from 11 to 11:30 a.m. to a low of about 1,000 contracts from 3 to 3:30 p.m. Portfolio hedge selling, however, became a high proportion of total futures selling during the mid-day period when the futures volume waned, amounting to as much as 45 percent of all selling from 12:00 to 12:30 p.m. (Exhibit C-7)

Periods of high volume portfolio hedge sales in S&P 500 futures do not correspond with the periods of price weakness, nor do periods of low volume of such sales correspond with price recoveries. The largest volumes of hedge sales occurred in the two half-hour periods between 10:30 and 11:30 a.m., when futures prices, and subsequently stock index values, were rising.

Between 11:30 and noon, when futures prices fell substantially and a large futures discount reappeared, reported portfolio hedge sales were only about 1,600 contracts (16 percent of the futures volume). Hedge sales were large again (2,800 contracts, or 45 percent of the futures volume) between noon and 12:30 p.m., a period in which futures prices recovered and stabilized somewhat.

Nevertheless, portfolio hedging on the futures market was persistent throughout the day on October 19. Furthermore, as previously mentioned, substantial portfolio insurance sales also took place on the stock market--in part because hedgers had reached their exemption limits on the futures market 54/ or because the portfolio managers chose to sell in the stock market in view of the apparent substantial discount of futures to stock prices.

As previously mentioned, the SEC/CFTC intraday survey data do not support the cascade theory as the explanation for the fall in stock prices on October 19. The only interval in which there were substantial quantities of both index arbitrage stock sell programs and portfolio insurance futures sales was from 9:30 to 10:30 a.m. During the next hour of trading, however, arbitrage sell programs were very light while portfolio insurance sales

---

54/ By Monday afternoon several portfolio insurance managers had reached or exceeded their hedge exemption levels approved by the CME, and these managers began consulting with Exchange staff about assuming additional short futures positions. Beginning October 20, the Exchange informally limited the amount of additional futures selling these firms could do per half-hour period. See Interim Report, pp. 42-45.

intensified -- both in the futures and the stock markets. Rather than seeing a greater futures discount to the S&P 500 index and/or a further fall in stock prices, however, the opposite occurred. The price of the December future trended upward from 10:30 through 11:30 a.m., and reported stock index values also rose from 11 a.m. to nearly noon (Figure 21). During that interval, the reported large futures discount disappeared.

Between 1:00 and 2:00 p.m., there were substantial quantities of index arbitrage sell programs, while hedge sales of futures were at approximately the average level for the day, about 4,500 contracts or 18 percent of S&P 500 futures volume during that hour. Stock and futures prices fell substantially during that interval but then recovered somewhat over the next 45 minutes.

After 2:30 p.m., futures and stock prices plunged. After that time, however, substantial quantities of index arbitrage were no longer possible, and there was no significant upsurge of futures hedge selling. On the NYSE, other program selling unrelated to futures trading continued at levels higher than arbitrage-related selling, but the largest portfolio insurance seller of stocks had stopped trading. Futures prices fell substantially more than stock prices during the final two hours of trading as index arbitrage was insufficient to keep prices in the two markets in alignment.

In sum, the analysis of intraday trading does not support a contention that on October 19 the stock market fell as fast and as far as it did because of a continuously intensifying

interaction between index arbitrage stock sales and portfolio insurance selling in the futures market. The initial impetus to the fall appears to have been the changed perceptions of stock investors--both domestic and international--over the weekend and during the prior week, which led to an onslaught of sell orders in the stock and futures markets when they opened Monday morning. It was only then that index arbitrage sell programs were instituted in response to price disparities created by such broad-based sell pressure.

Part of the sell pressure at the outset on Monday morning represented portfolio insurance activity. That selling on the futures market, however, was of a relatively constant absolute magnitude throughout the day. It was not concentrated either in the morning or during periods of the greatest weakness of stock index futures prices. Moreover, at the opening, the large stock sales by one mutual fund group far outweighed the reported stock sales associated with index arbitrage plus all other program trades.

As the day progressed, portfolio insurance selling persisted in the futures market, ultimately straining the liquidity provided by locals, index arbitrage traders, and futures purchases by institutions who bought substantial quantities of undervalued futures without making related stock sales. The rapid fall in stock values triggered additional portfolio insurance sales. When the reported futures discount became abnormally large, some of those sales took place directly on the stock market; during the entire day, one large pension fund made

most of its portfolio insurance sales directly in the stock market. Those sales did not begin, however, until about 10:30 a.m., and that pension fund entered its last stock sale order at about 2:00 p.m. 55/

After 2:00 p.m., index arbitrage involving the S&P 500 future was diminished greatly, although smaller quantities involving purchases of MMI futures continued. By early afternoon, futures prices apparently became decoupled from stock values, and arbitrage traders reported that they could not determine the current values of a large proportion of the stocks in the index.

Tuesday, October 20, 1987. Trading that morning began with a short-lived but substantial rally in stock and futures prices as many NYSE specialists opened their stocks considerably higher than the prior day's close. As the morning progressed, however, stock prices experienced a drastic turnaround, there were trading halts in many high-capitalization stocks, and there were rumors that all NYSE stock trading would be halted. As a result, the markets for stock index options and all but one stock index futures contract closed for about an hour near mid-day. After a volatile afternoon, the Dow ended the day about 100 points higher.

55/ Managers of that pension fund said they had decided, prior to the NYSE open, to reduce their equity market exposure primarily by sales in the stock market rather than futures market hedging because of expected large discounts of futures to stock index values.

Despite delayed openings for a number of major stocks, NYSE volume again was very high from the start of trading. Total volume during the first 90 minutes was about 200 million shares, with less than one percent or about a million shares of that volume related to index arbitrage. Prior to the open, the NYSE requested that its members curtail their use of the Super DOT system for index arbitrage or other program trading. That request effectively curtailed most index arbitrage, although SEC/CFTC survey data indicate that other program stock sales, not related to futures, amounted to approximately 3 million shares during the first hour of trading and about 11 million shares for the day. Only about a half-million shares of such stock selling was reported as portfolio insurance implemented in the stock market.

The December S&P 500 future opened at 221 on October 20, up about 20 points from the prior day's record fall. In the first 15 minutes of trading, that future advanced to 242, which proved to be its high price for the day. During that interval, the future was at a substantial premium to the quoted index, but many stocks on the NYSE again failed to open near 9:30 a.m. due to order imbalances. Although the magnitude of that premium normally would have led to arbitrage buy programs, the NYSE's action to inhibit index arbitrage effectively curtailed such arbitrage throughout October 20 and for the following two weeks. (Figures 27-28)

Portfolio hedge selling of S&P 500 futures, however, was large during the first half hour of trading. Although the gross

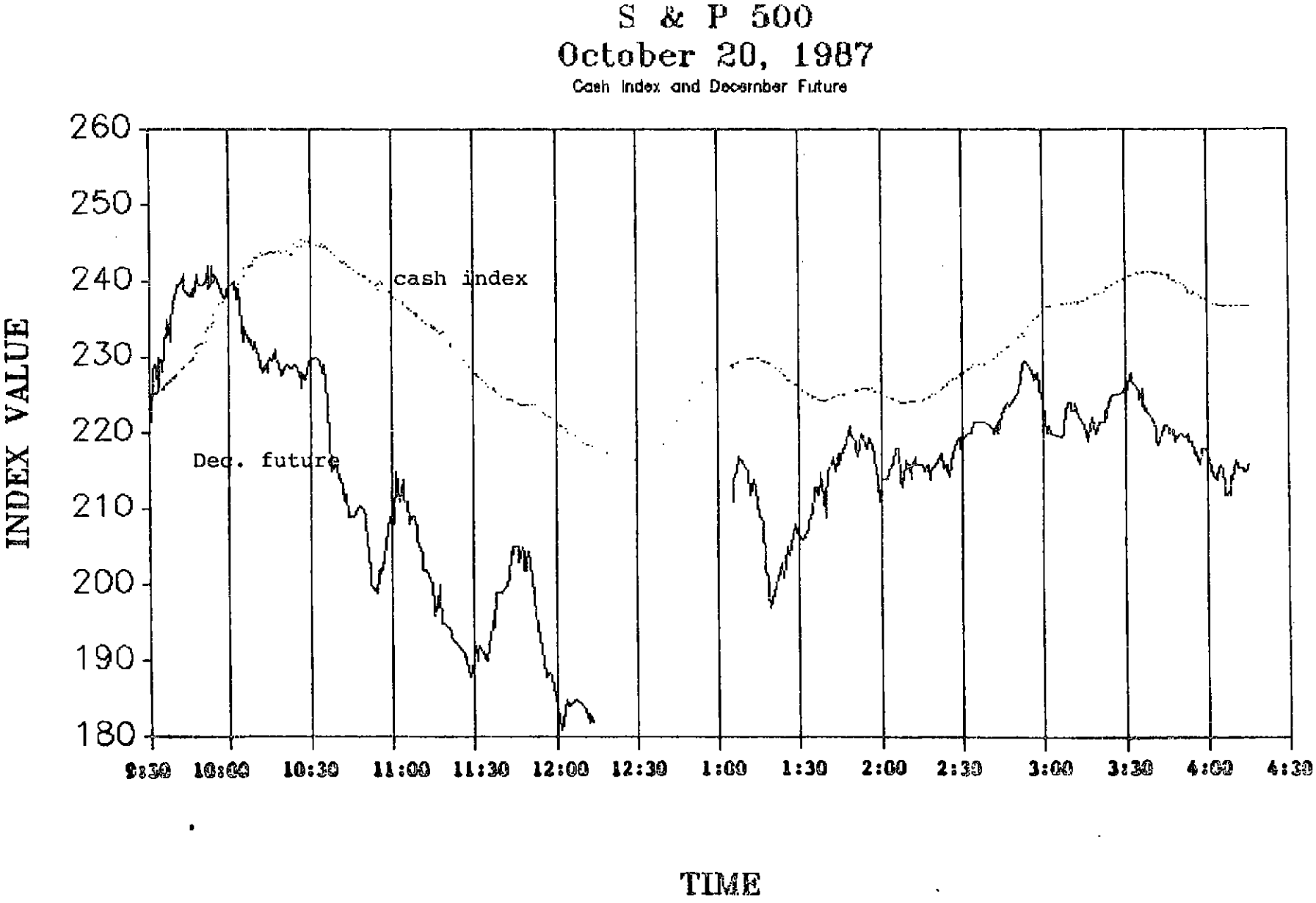

S & P 500
October 20, 1987
Cash Index and December Future
INDEX VALUE
260
250
240
230
220
210
200
190
180
cash index
Dec. future
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 27

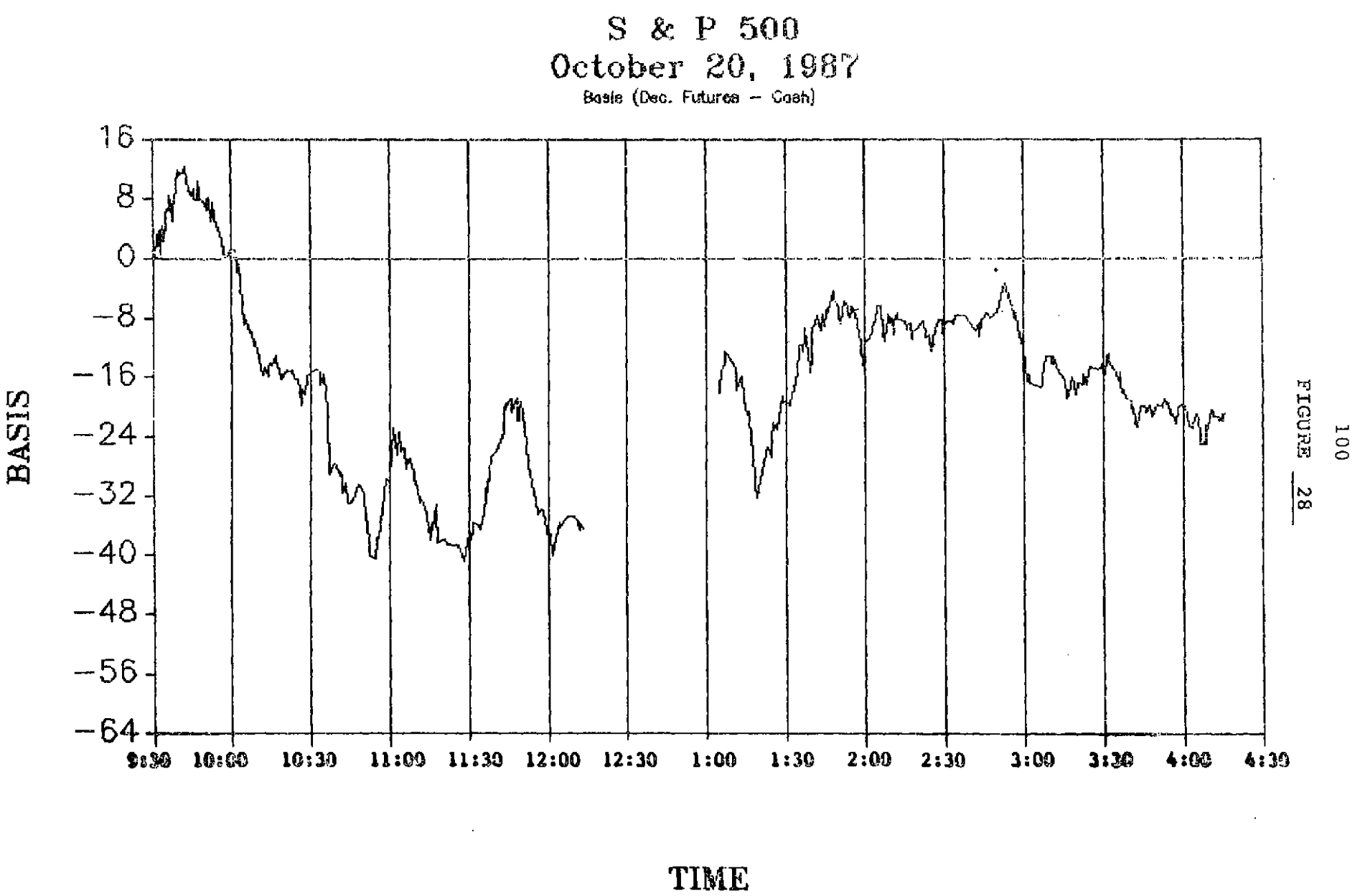
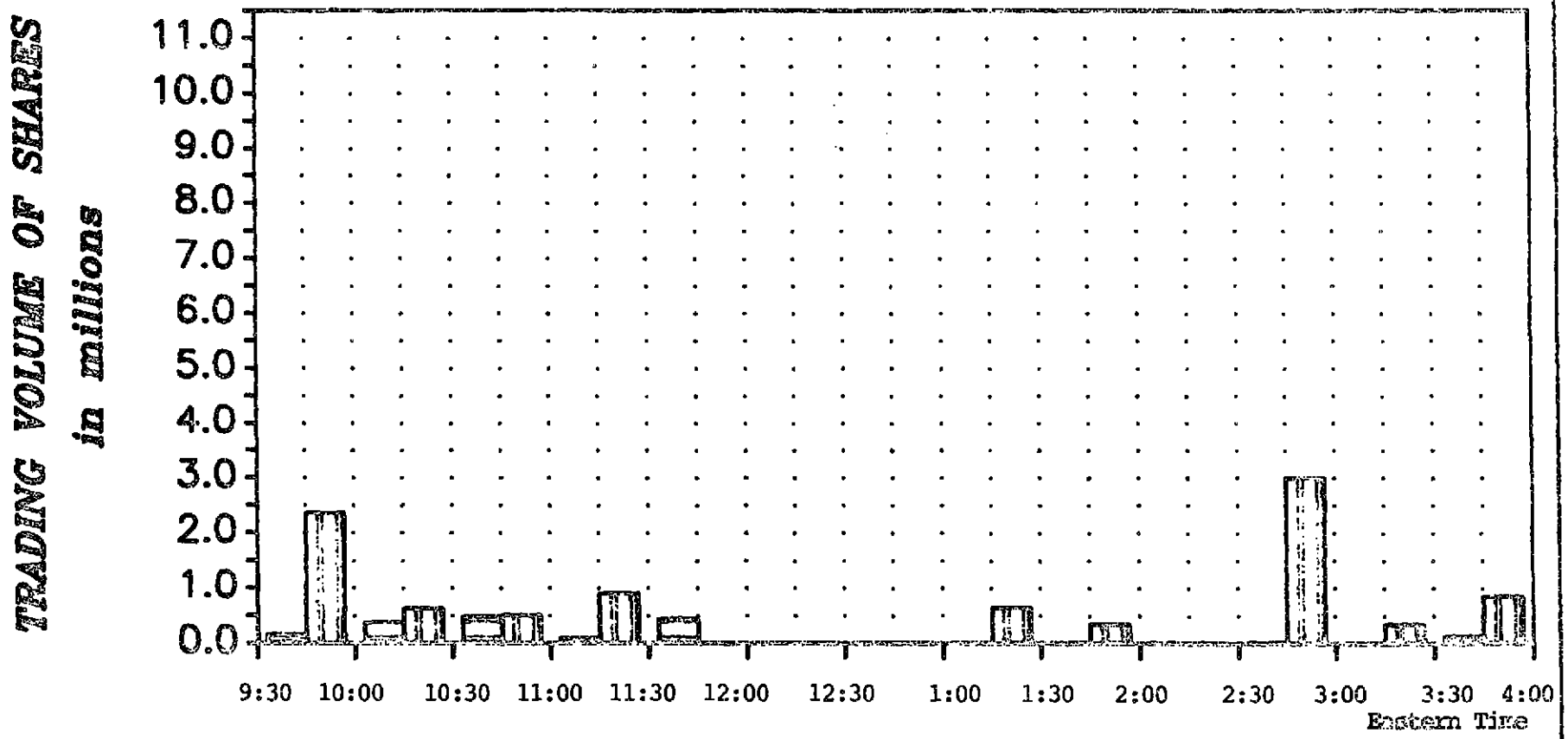

S & P 500
October 20, 1987
Basis (Dec. Futures – Cash)
BASIS
16
8
0
-8
-16
-24
-32
-40
-48
-56
-64
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 28

OCTOBER 20, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

FIGURE 29

OCTOBER 20, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES

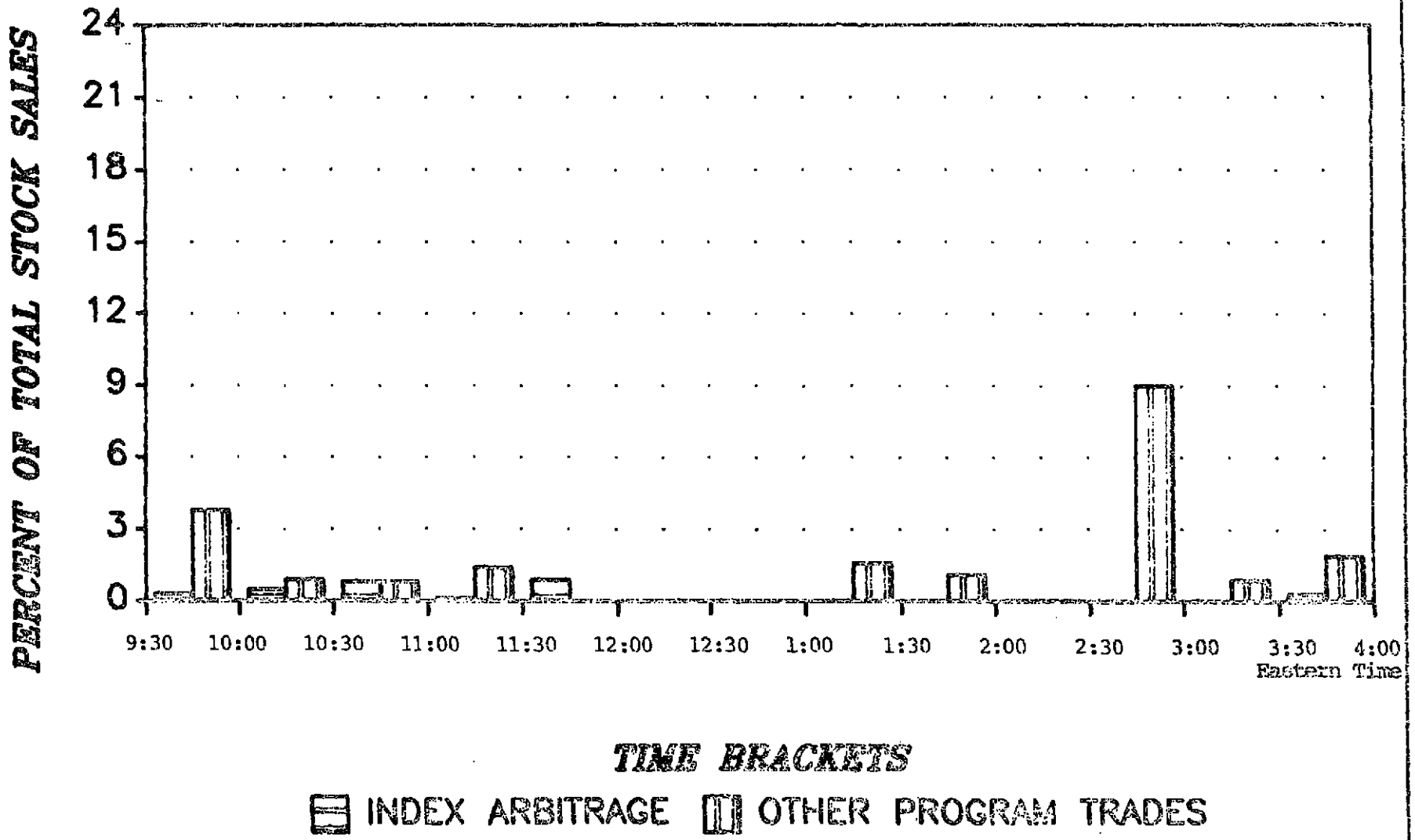
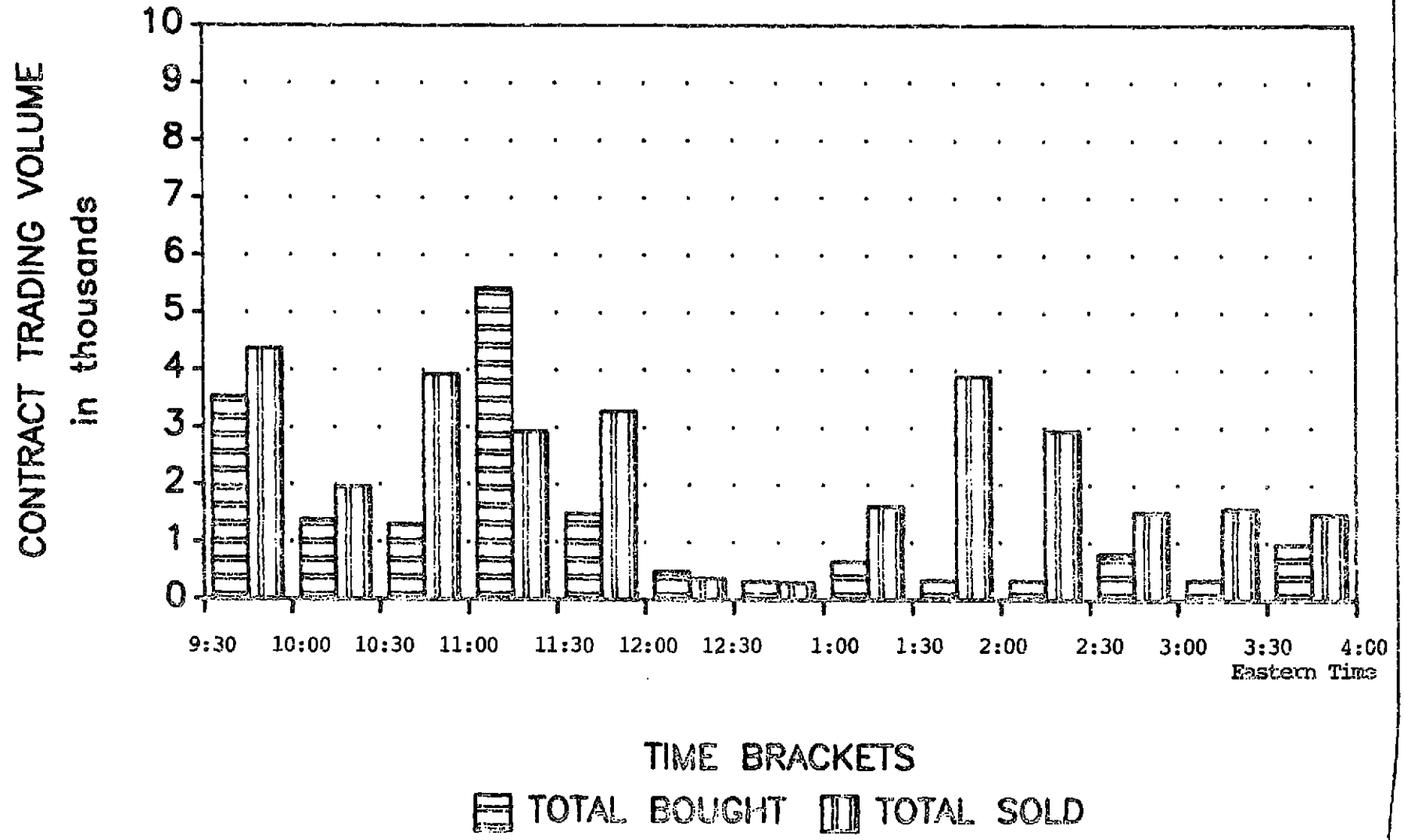


FIGURE 30

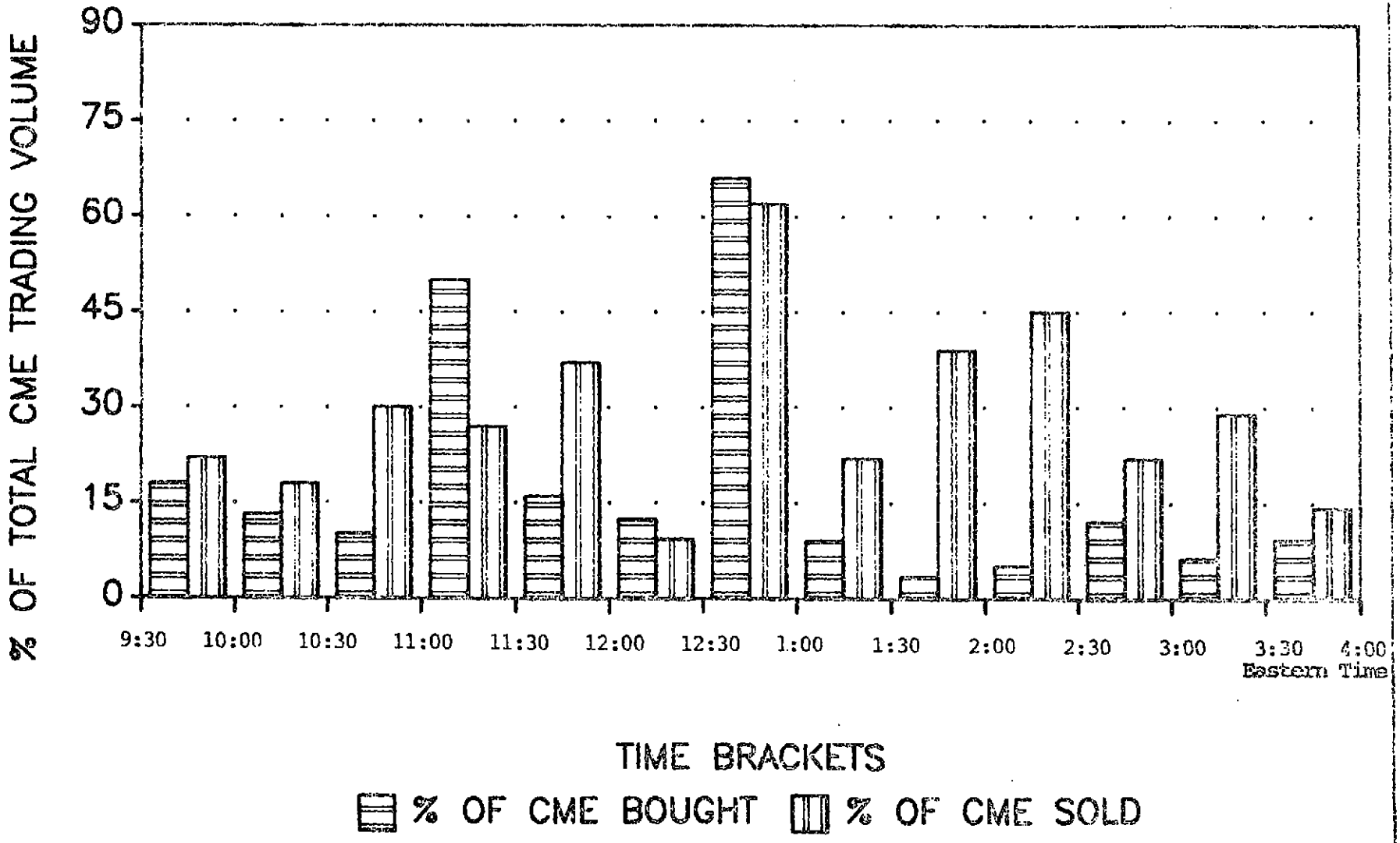
FIGURE 31

OCTOBER 20, 1987 */
S&P-500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD



*/ Trading was halted from about 12:14 to 1:05 EDT based on CME price [illegible]

OCTOBER 20, 1987 */
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME



*/ Trading was halted from about 12:14 to 1:05 EDT based on CME price quotation records.

FIGURE 32

sales of 4,400 contracts (22 percent of futures sales during the period) was the largest absolute amount of the day, and larger than any other half-hour interval during the October 14-23 period, such sales were nearly balanced by hedge buying of about 3,500 contracts (18 percent of the S&P 500 futures buys during the period). (Figures 29-32)

After 10 a.m., S&P 500 futures prices fell drastically and at a much faster rate than quoted values of the underlying index, resulting in unprecedented reported discounts of up to 40 points. Portfolio hedge sales were not significant between 10 and 10:30 a.m., but they were large from 10:30 to 11 a.m. Gross sales during that period were about 3,900 contracts, or 30 percent of total S&P 500 futures sales.

The price of the December S&P 500 future fell sharply again from 11 to 11:30 a.m., despite the fact that portfolio hedgers' buys of about 5,400 futures contracts exceeded their sales of about 2,900 contracts. Those accounts represented 50 percent of the buys and 27 percent of the sells during that half hour of plunging prices.

By noon, stock index values had fallen precipitously, and many NYSE specialists had closed trading in their stocks. At noon, the Dow was quoted at 1726, down 224 points from its opening level. The December S&P 500 future again was trading at a substantial discount of about 30 points to the reported S&P 500 index.

Between 11:30 a.m. and noon, rumors that the NYSE would close were circulating in the markets and in Washington. During

that period, the SEC advised the CFTC that the NYSE might be closing shortly; trading in a large number of stocks already had been halted. The Commission immediately shared that information with exchanges trading stock index futures. Shortly thereafter, the CBOE halted trading in its S&P 100 option in accordance with its rules because stocks comprising 80 percent of the capitalization-weighted value of that index were not open for trading on the NYSE. At about 12:13 p.m., the CME and all but one other futures exchange halted trading in their stock index futures and futures option contracts. 56/ Those futures exchanges immediately notified the Commission of their emergency actions as required by Commission Regulation 1.41.

Although portfolio hedge selling during the morning of October 20 as compared to the prior morning was larger on a gross basis (about 16,500 contracts versus 13,200 contracts on the S&P 500 futures contract), such sales were much smaller on a net basis (3,300 contracts versus 11,900 contracts) than during the morning of October 19. One big difference in the futures market on the morning of October 20, however, was the absence of buying by arbitrageurs. Although index arbitrage accounted for purchases of nearly 4,700 contracts from 9:30 a.m. to noon on October 19, only about 500 S&P 500 futures contracts were

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56/ The CBT did not halt trading in its MMI futures contract because, based on available information, it believed that trading was taking place in 17 of the 20 stocks in that index.

purchased for index arbitrage purposes during the entire day on October 20 due to the NYSE restriction on index arbitrage. Consequently, portfolio hedge sales appear to have had a greater price impact in the S&P 500 futures market on Tuesday morning than at any time on the prior days examined in this analysis.

Stock prices reversed course and began rising at about 12:30 p.m., reportedly in response, in part, to announced buy-backs of stock by a number of corporations. The Dow increased nearly 100 points to 1825 by 1 p.m. The December S&P 500 future resumed trading at about 1:05 p.m., also at substantially higher prices than before the trading halt. After a few minutes, however, futures prices again fell sharply for a short period of time before rebounding.

From the resumption of futures trading on the CME until 1:30 p.m., gross portfolio hedge sales were about 1,600 contracts (22 percent of all S&P 500 futures sells), while net hedge selling was just under 1,000 contracts. Gross and net hedge selling increased significantly over the next hour as prices recovered and then stabilized. Stock index values rose more than the S&P 500 futures prices over the remainder of the day. The Dow closed 115 points above the noon quote and 102 points above the close on October 19.

Wednesday, October 21 through Monday, October 26. On these final days of the SEC/CFTC survey period, the stock market experienced several after-shocks from the events of October 19 and 20 in terms of continued volatility. Volume in all stock

index futures markets--and particularly volume related to index arbitrage and portfolio insurance--declined significantly after October 20. With the NYSE Super DOT restrictions still in place, the basis continued to reflect abnormal discounts of futures prices to their underlying indices. It is significant that in the absence of substantial index arbitrage and with portfolio hedgers being net buyers rather than sellers of the S&P 500 futures, the Dow closed on October 26 at 1794, only 55 points higher than the close on October 19. Very little price recovery occurred in the week following October 19, and, at year-end, stock index values still were well below their October 1 levels.

On October 21, the December S&P 500 future opened up 25.75 points, which was in line with the S&P 500 index. Within a half hour, however, futures prices were falling while reported stock index values continued to rise. As a consequence, a substantial futures discount prevailed until the final 15 minutes of NYSE trading. The Dow closed up 187 points that day, a record advance, at 2028. (Figures 33-38)

Index arbitrage was inconsequential in magnitude both for the day as a whole and on an intraday basis. Portfolio hedging was substantially smaller on the sell side and larger on the buy side than during the preceding several days. Portfolio hedgers were net buyers of about 9,700 S&P 500 futures contracts that day, as the hedgers began to liquidate short futures positions. Shortly before 10:00 a.m., a substantial futures discount developed as the price of the December S&P 500 future fell while the reported cash index value was rising. The reported futures

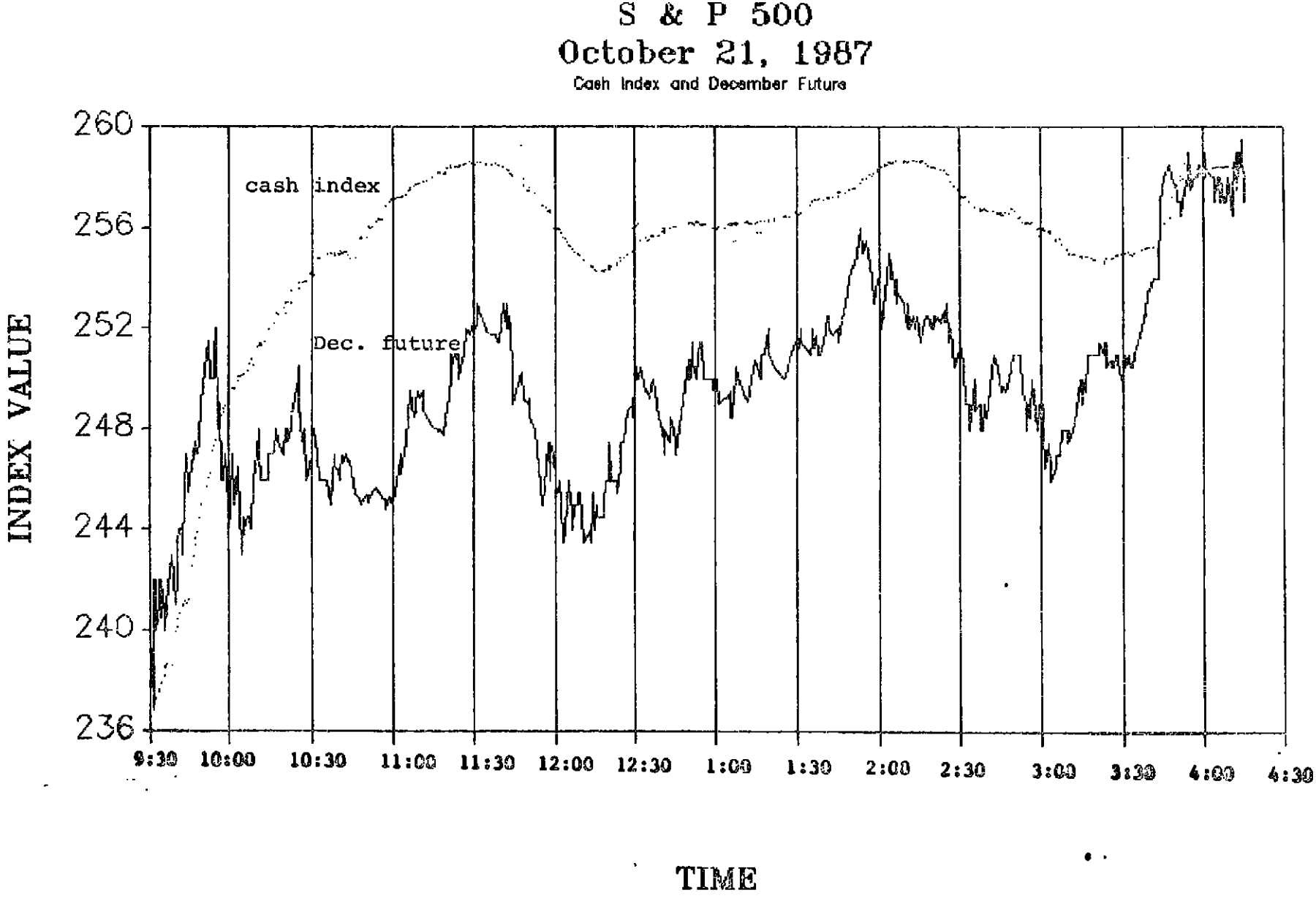

S & P 500
October 21, 1987
Cash Index and December Future
INDEX VALUE
260
256
252
248
244
240
236
cash index
Dec. future
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 33

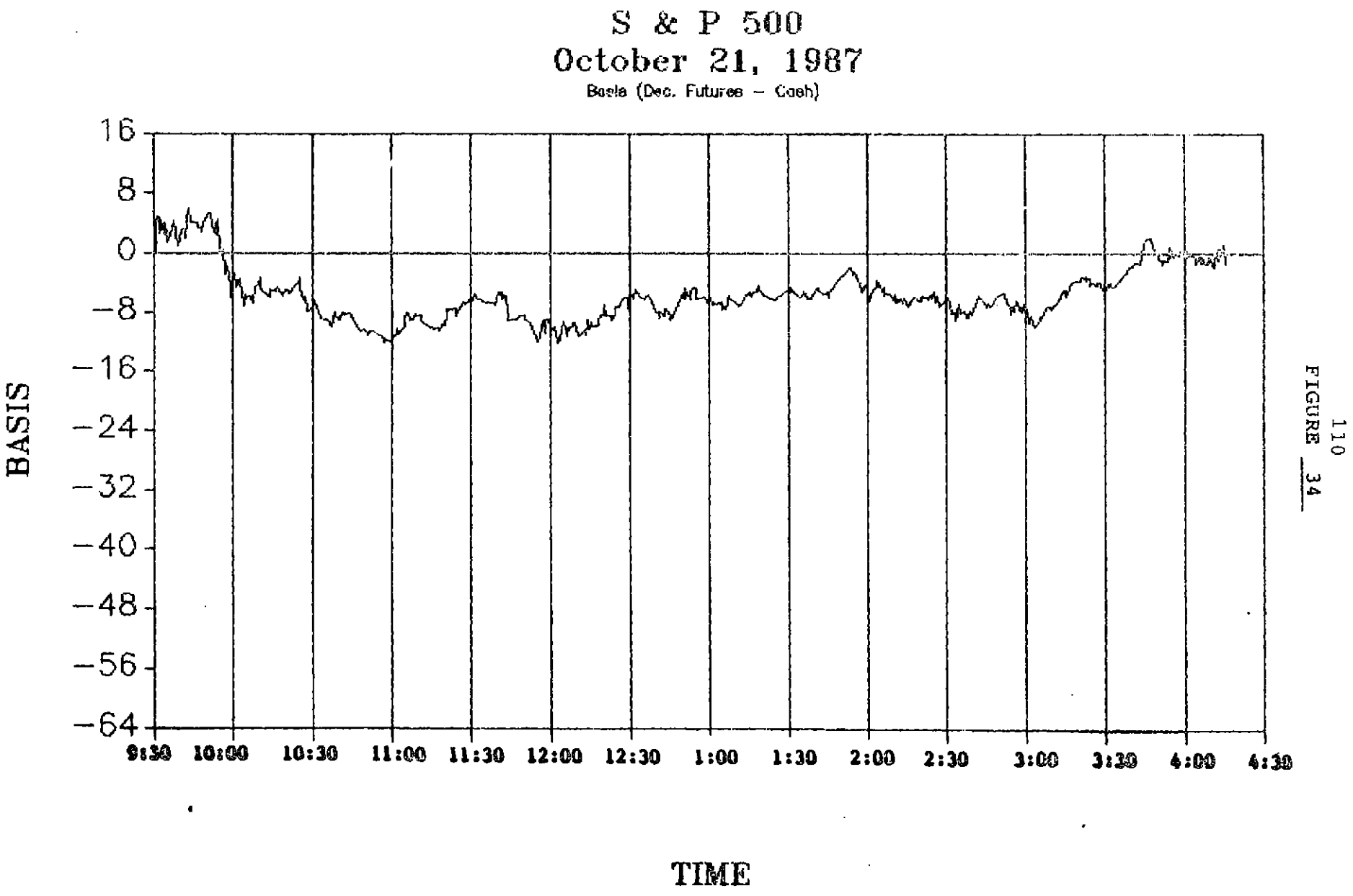
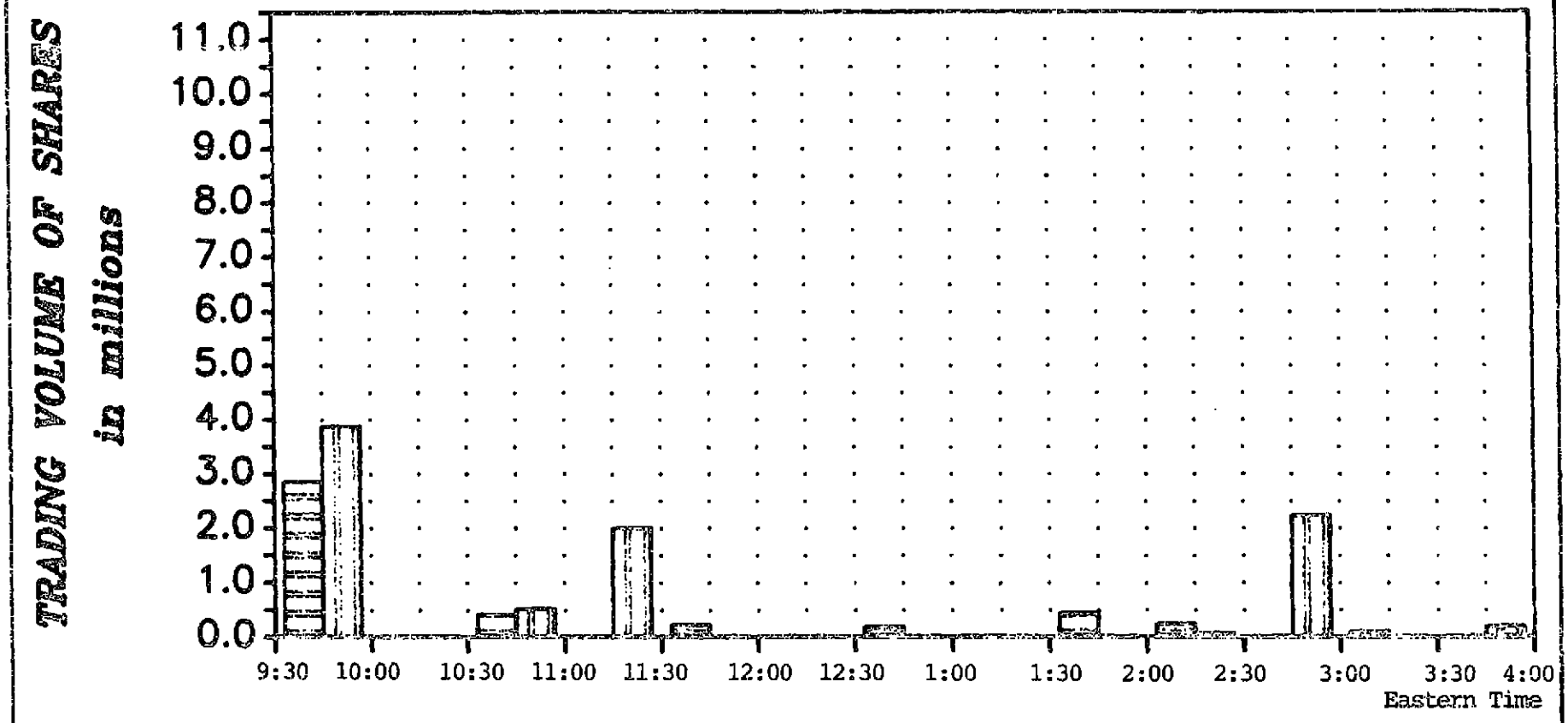

S & P 500
October 21, 1987
Basis (Dec. Futures – Cash)
BASIS
16
8
0
−8
−16
−24
−32
−40
−48
−56
−64
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 34

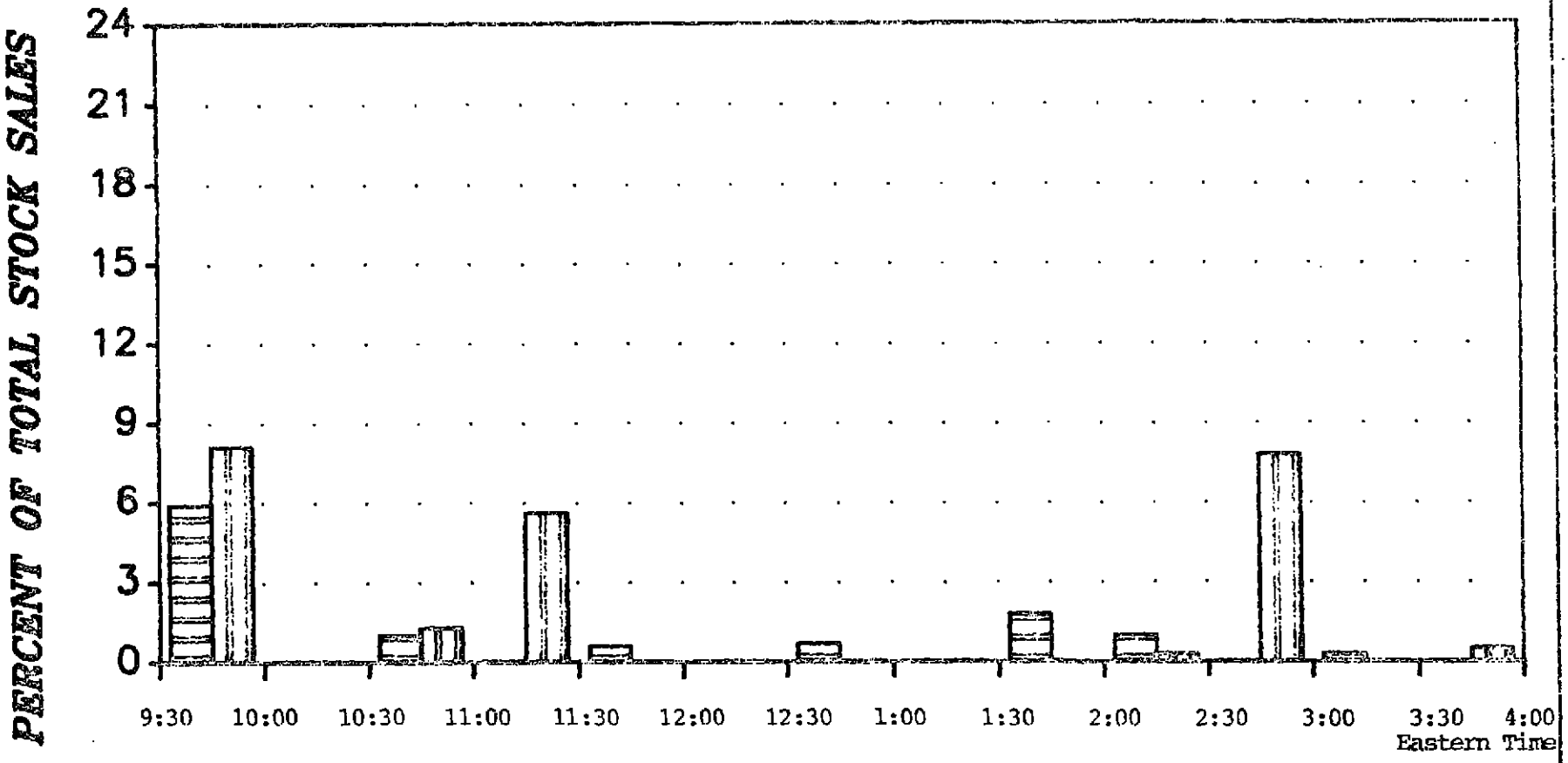
FIGURE 35

OCTOBER 21, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

OCTOBER 21, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES



TIME BRACKETS INDICATE HALF--HOUR INTERVALS BEGINNING AT 9:30 AM

112

FIGURE 36

FIGURE 37

OCTOBER 21, 1987
S&P-500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD

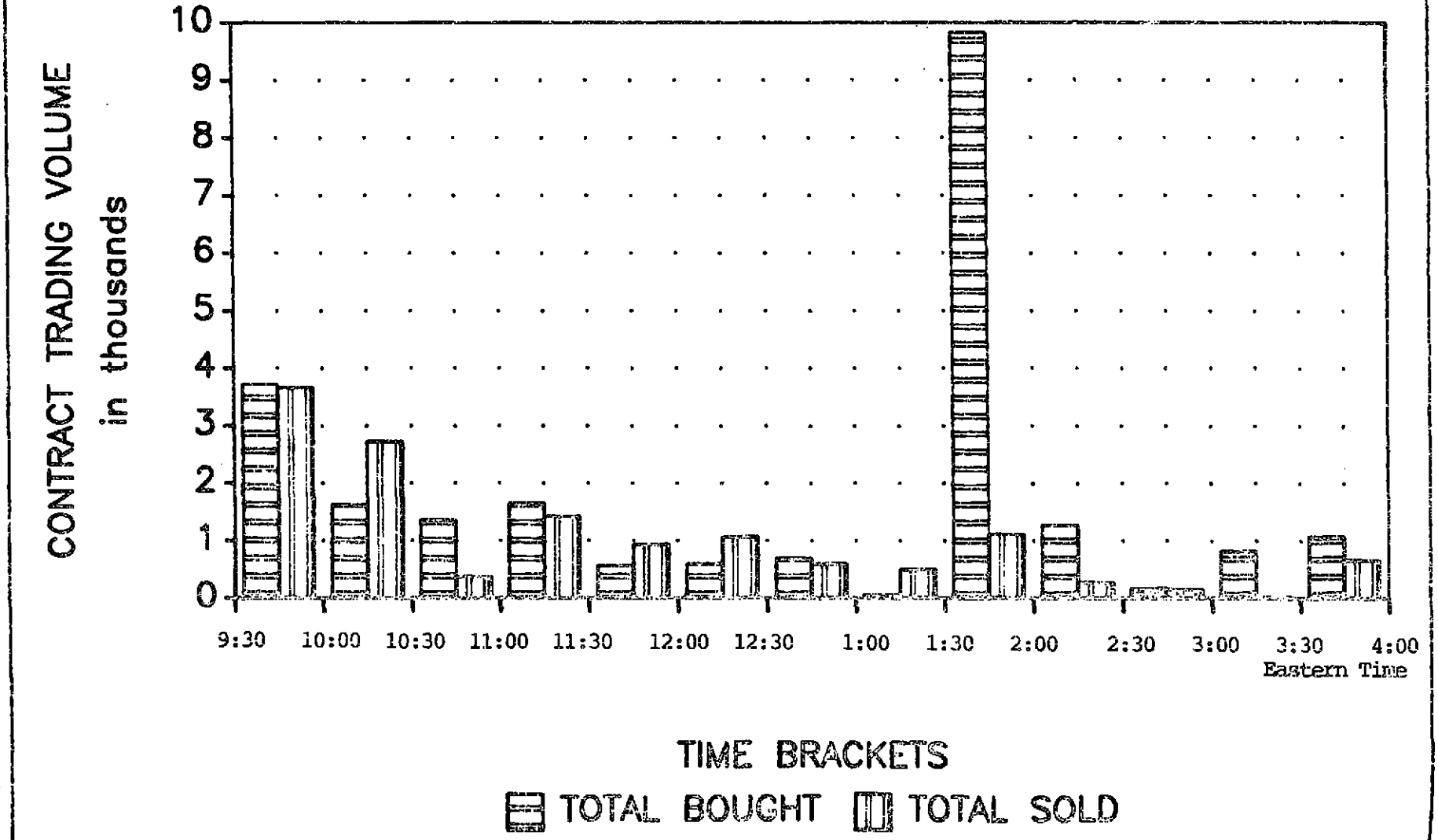
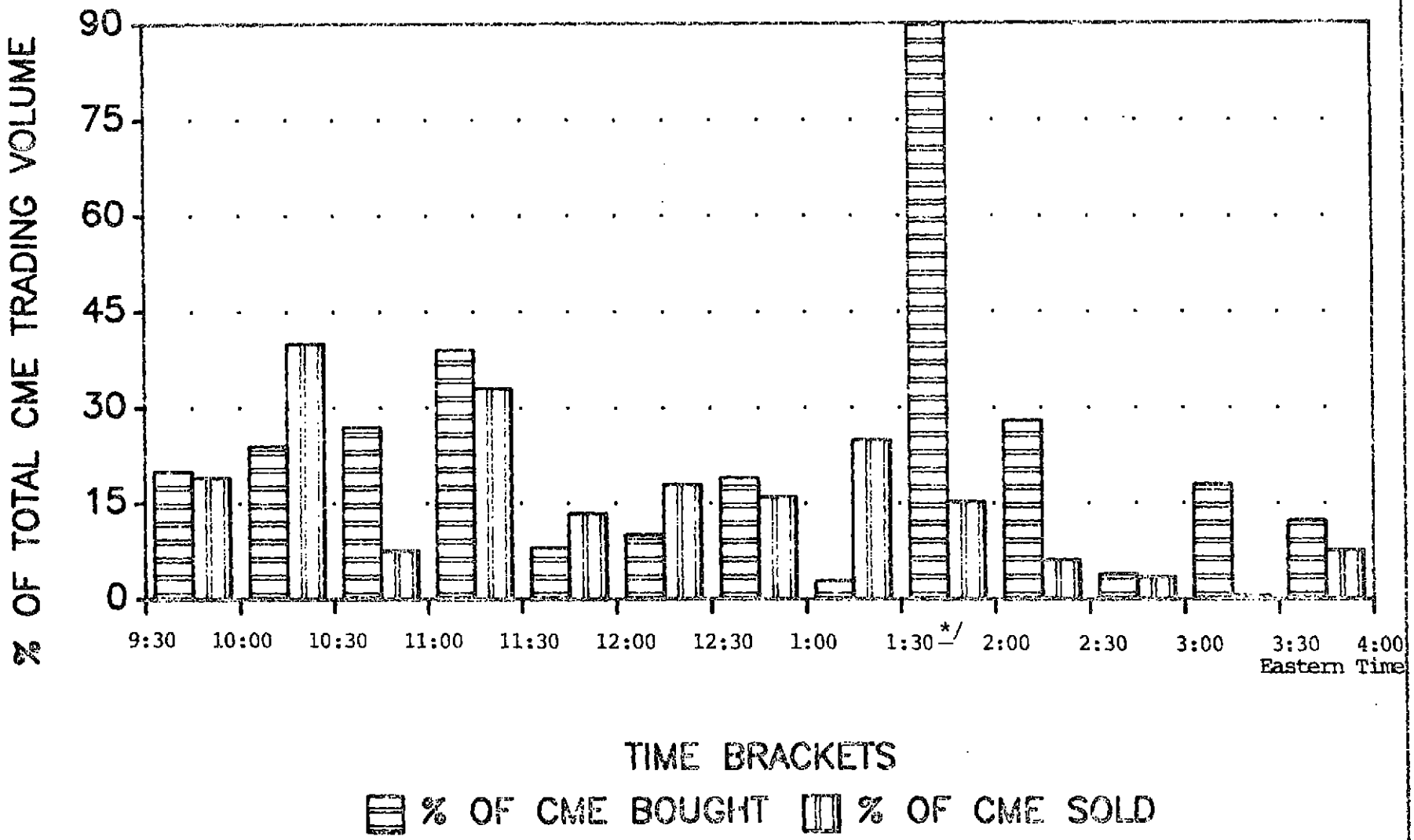


FIGURE 38

OCTOBER 21, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME



*/ The reported entry times for "other hedging" buys were equivalent to 134 percent of volume for the half-hour. The actual executions must have occurred over a longer interval.

discount continued to widen from 10:30 to 11 a.m. Although portfolio hedgers were net buyers in the preceding and subsequent half-hour intervals, they were net sellers of about 1,100 S&P 500 futures contracts between 10:00 and 10:30 a.m. Their gross selling during that interval represented 40 percent of total volume on the S&P 500 futures contract. The largest net sell orders were reported around 10:00 a.m., after the futures price began falling, but before the discount became large. (Exhibit C-7)

On October 22, the December S&P 500 future opened at 202, down 58 points from the prior day and at a discount of about 55 basis points relative to the S&P 500 index. 57/ After 10:30 a.m. stock prices rose substantially for about a half hour, but then prices began to trend downward for the remainder of the day. By the close of trading, the S&P 500 index had fallen 10 points, and the Dow had declined 78 points. (Figures 39-44)

Index arbitrage activity again was very small. Portfolio hedge trading also was reduced, and it reflected continued net buying to reduce short hedge positions. During the opening half hour, when the December S&P 500 future traded at its lowest levels and largest discounts of the day, portfolio hedgers were

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57/ The Division of Trading and Markets, in conjunction with the Division of Economic Analysis, analyzed trading related to that price move in depth and found that the pattern of trading did not appear to warrant further investigation. See also Section V of this report.

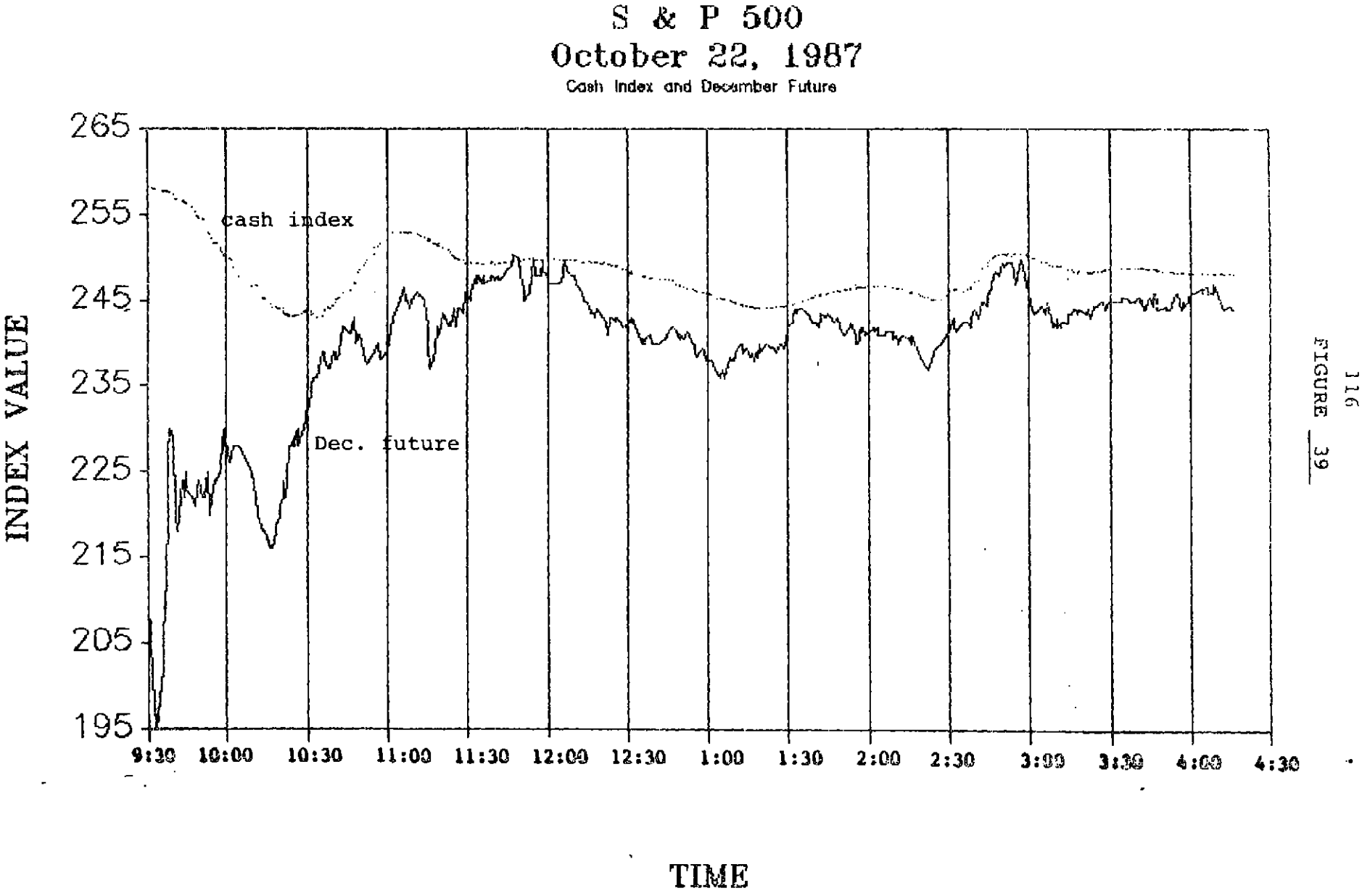

S & P 500
October 22, 1987
Cash Index and December Future
265
255
245
235
225
215
205
195
cash index
Dec. future
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
INDEX VALUE
TIME

FIGURE 39

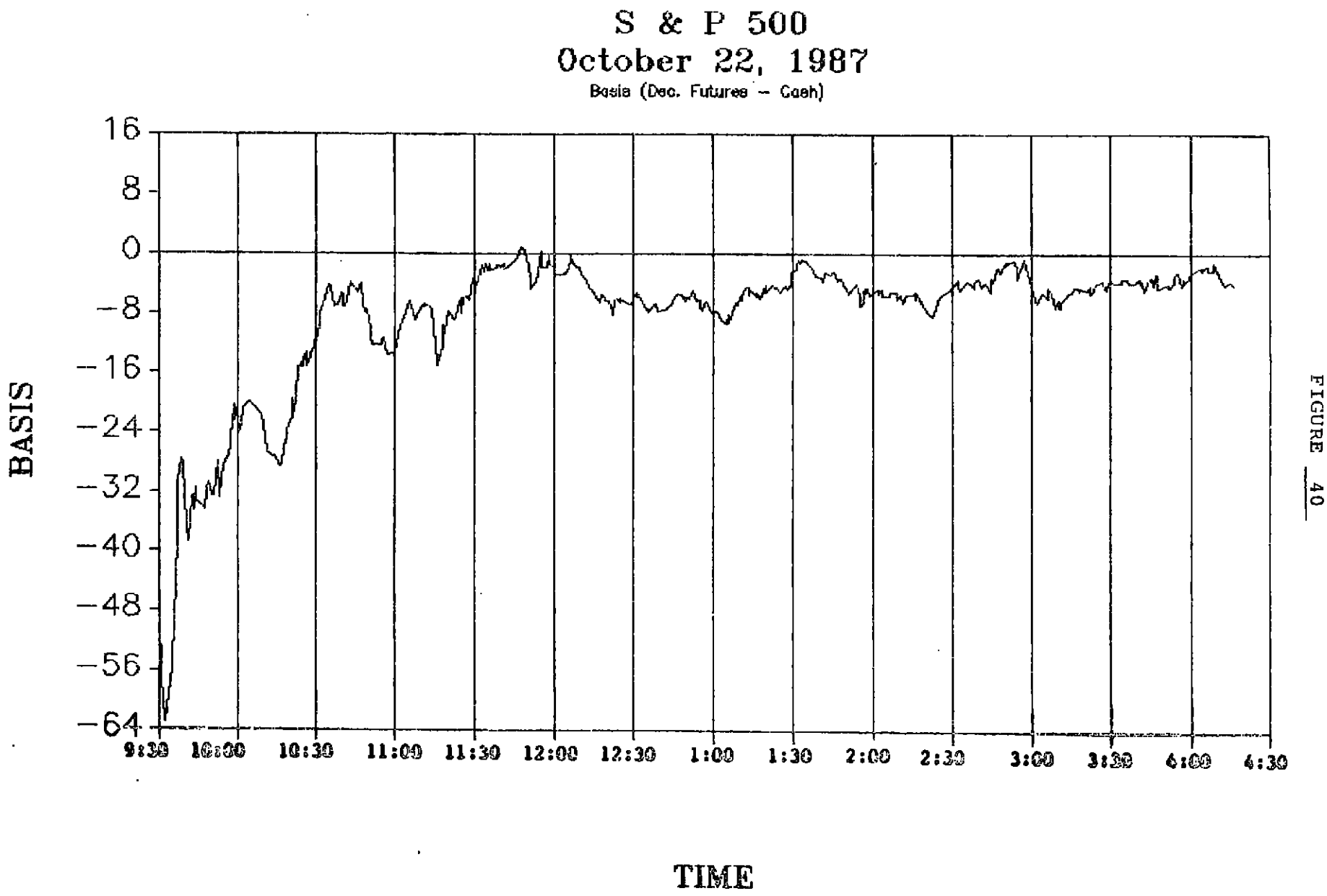
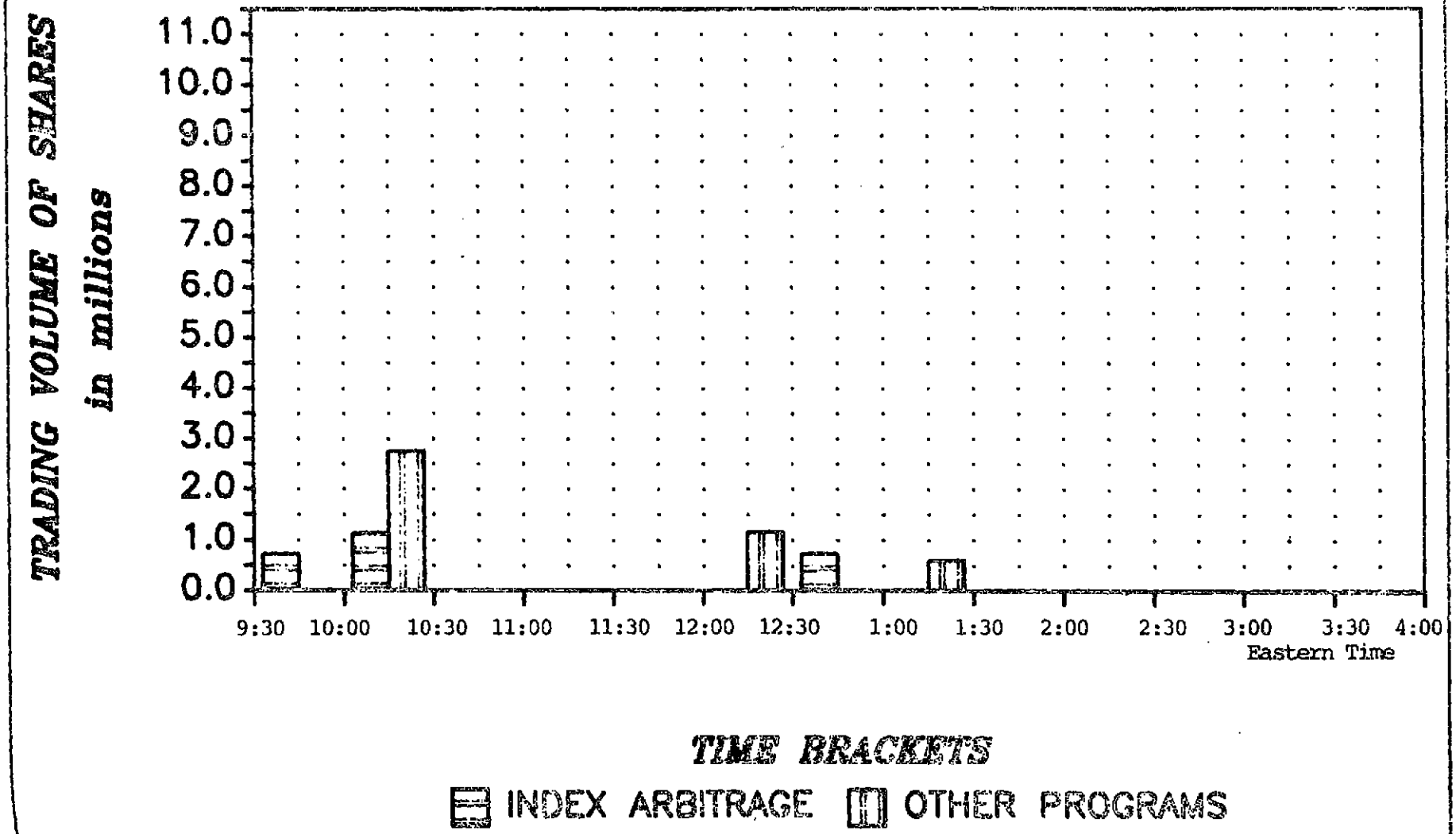

S & P 500
October 22, 1987
Basis (Dec. Futures – Cash)
16
8
0
−8
−16
−24
−32
−40
−48
−56
−64
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
BASIS
TIME

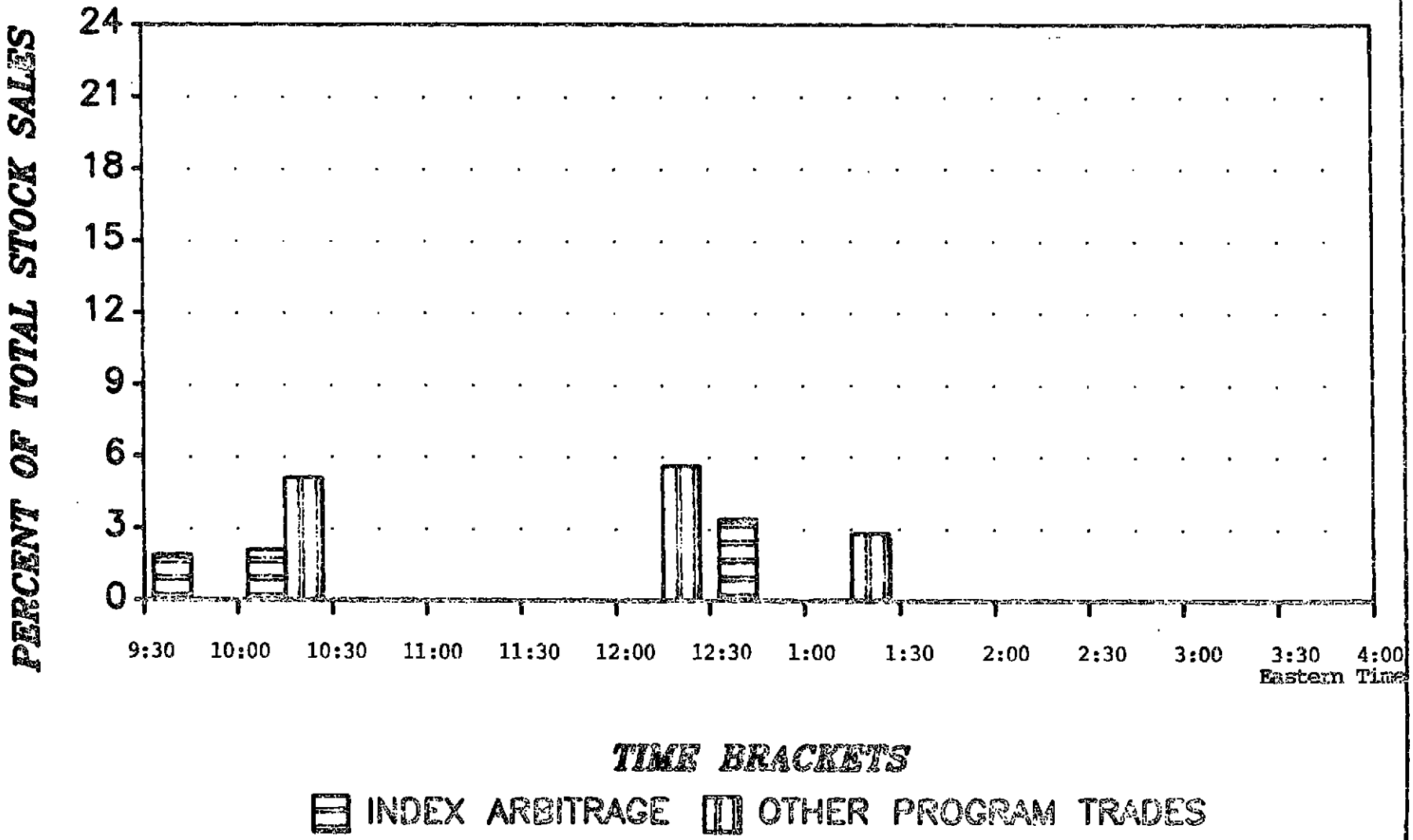
FIGURE 40

FIGURE 41

OCTOBER 22, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES



OCTOBER 22, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

FIGURE 42

OCTOBER 22, 1987
S&P-500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD

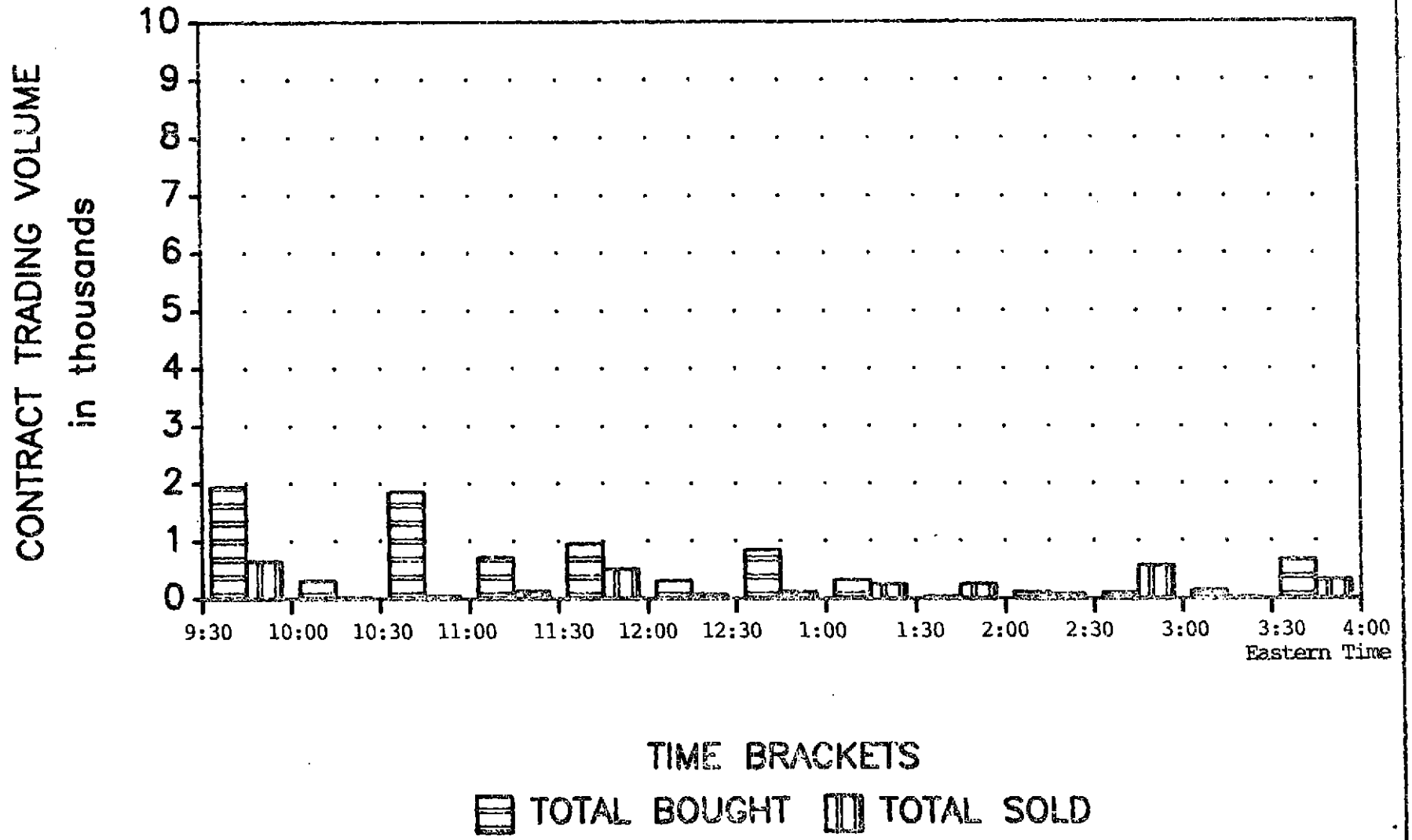


FIGURE 43

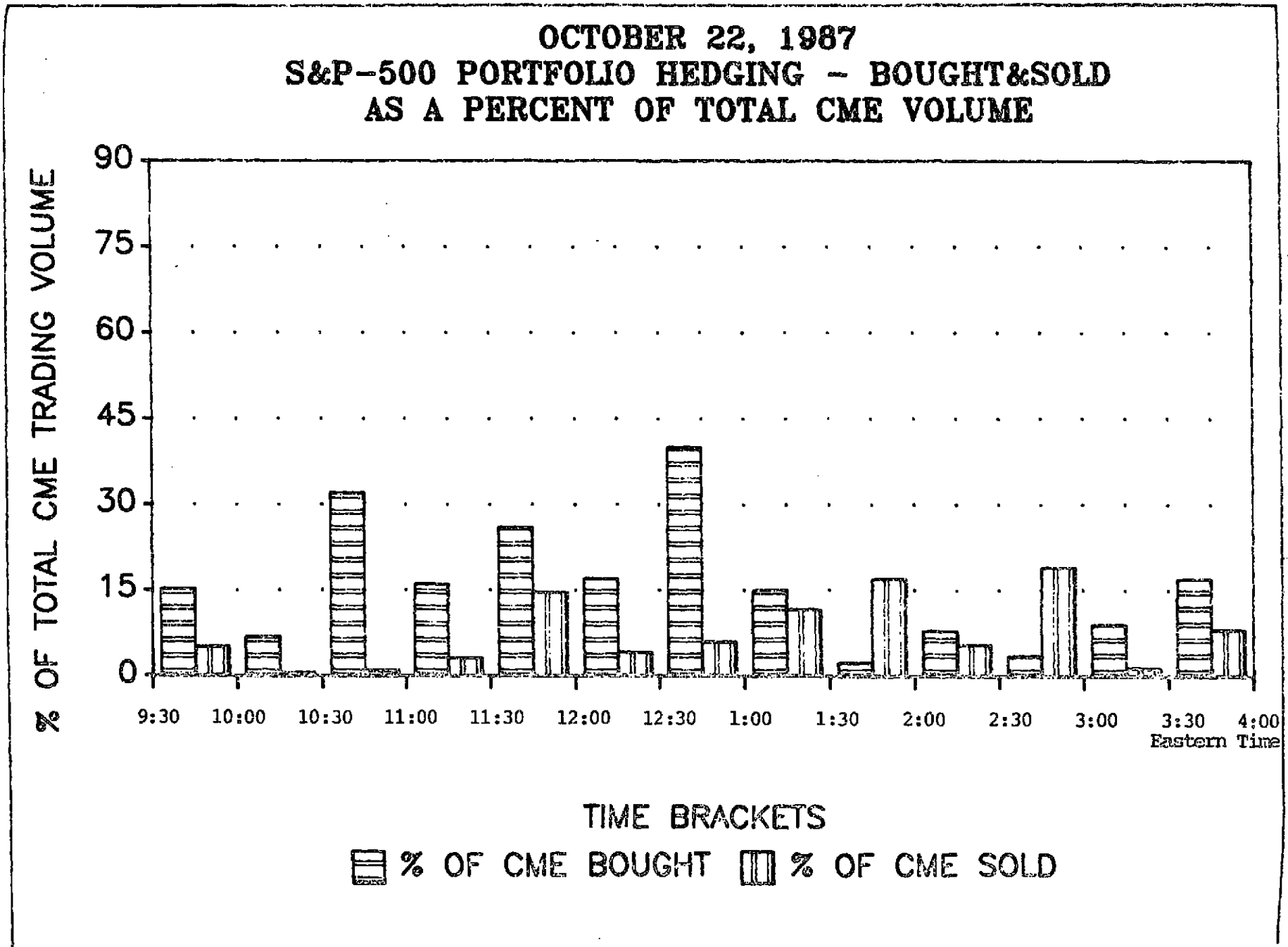

OCTOBER 22, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME
% OF TOTAL CME TRADING VOLUME
90
75
60
45
30
15
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
% OF CME BOUGHT
% OF CME SOLD

FIGURE 44

net buyers of nearly 2,000 S&P 500 futures contracts. The selling that depressed futures prices principally came from the liquidation of long futures positions by a professional investment manager.

October 23 was a day of high intraday price volatility for stock index futures but ultimately little change from the prior day's close. The December S&P 500 future opened at 240, a discount of 8 points from the opening index value, and rapidly fell to 234, the low for the day. Within a little more than an hour, the December future rallied to 253, the high for the day. The futures experienced one more plunge between 1:00 and 1:30 p.m. and then rose during the final 15 minutes of trading. 58/ The Dow ended the day up one point at 1951. (Figures 45-50)

On October 23, index arbitrage again was insignificant and other program stock trades amounted to only small net buys for the day. 59/ Portfolio hedge selling was larger than during the prior day, but the largest concentrations of net selling did not

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58/ Stock index futures markets closed at 2 p.m. EDT from October 23 through October 30, and after that date had progressively later closing times until returning to normal closing times on November 12. This was in response to the NYSE's announced early closings to facilitate efforts to decrease its recordkeeping backlogs.

59/ On that day, the NYSE issued a new circular expanding its restrictions on program trading. In particular, the NYSE requested its members to refrain from proprietary program trading by any means and to use the Super DOT system for customer program trades only prior to the opening of trading. Customer program trade orders after the open were to be entered manually.

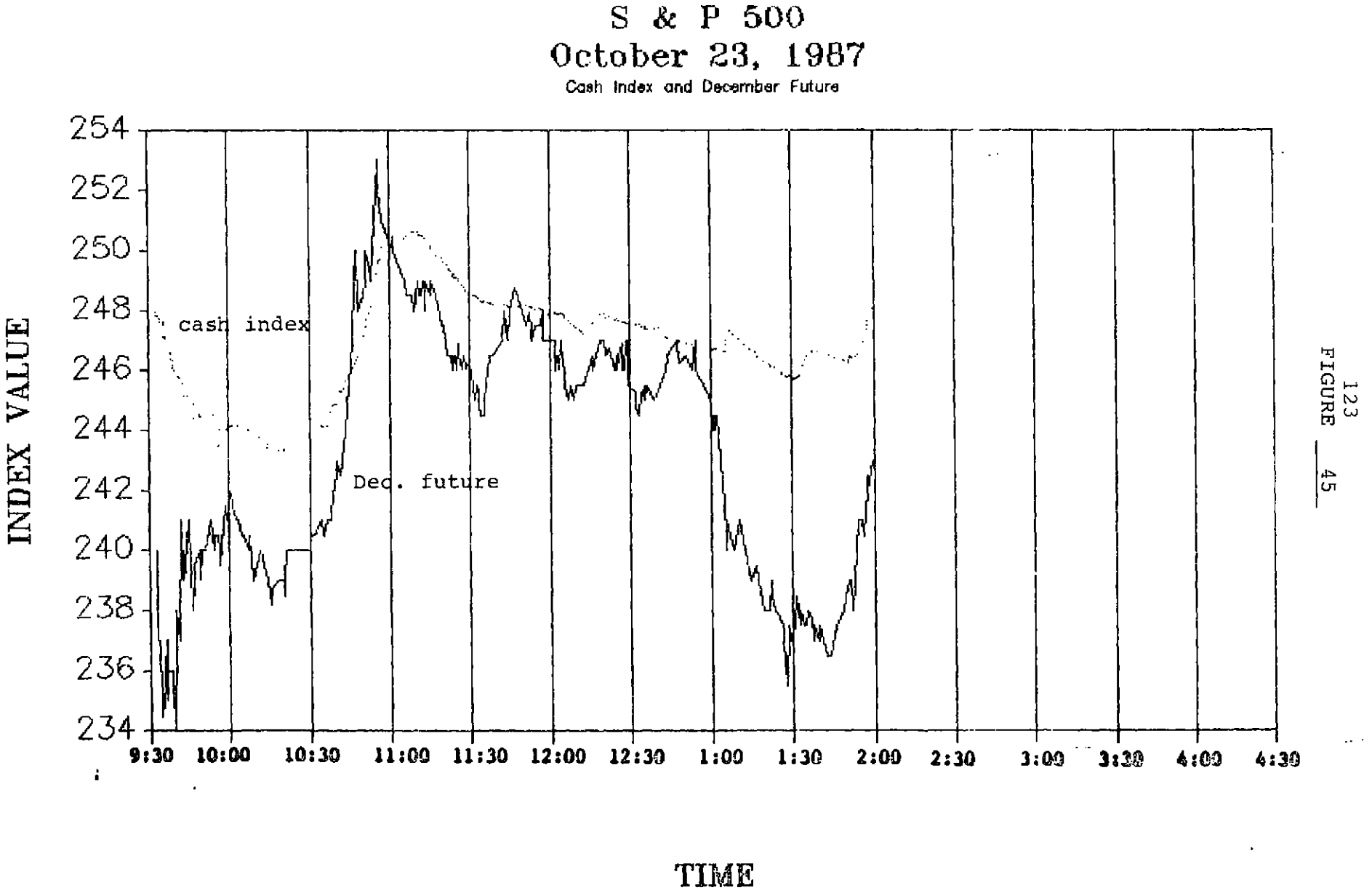

S & P 500
October 23, 1987
Cash Index and December Future
INDEX VALUE
254
252
250
248
246
244
242
240
238
236
234
cash index
Dec. future
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 45

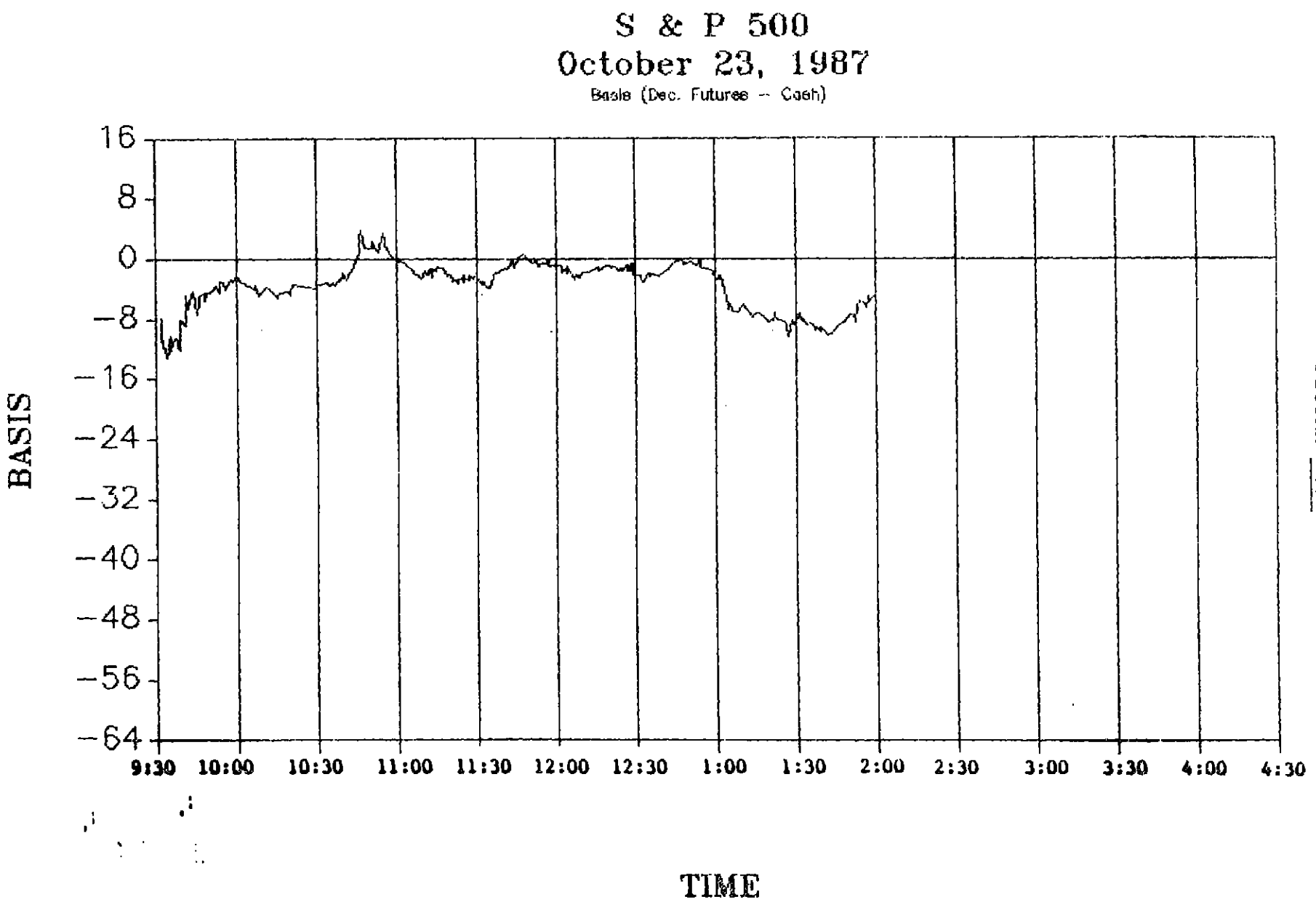
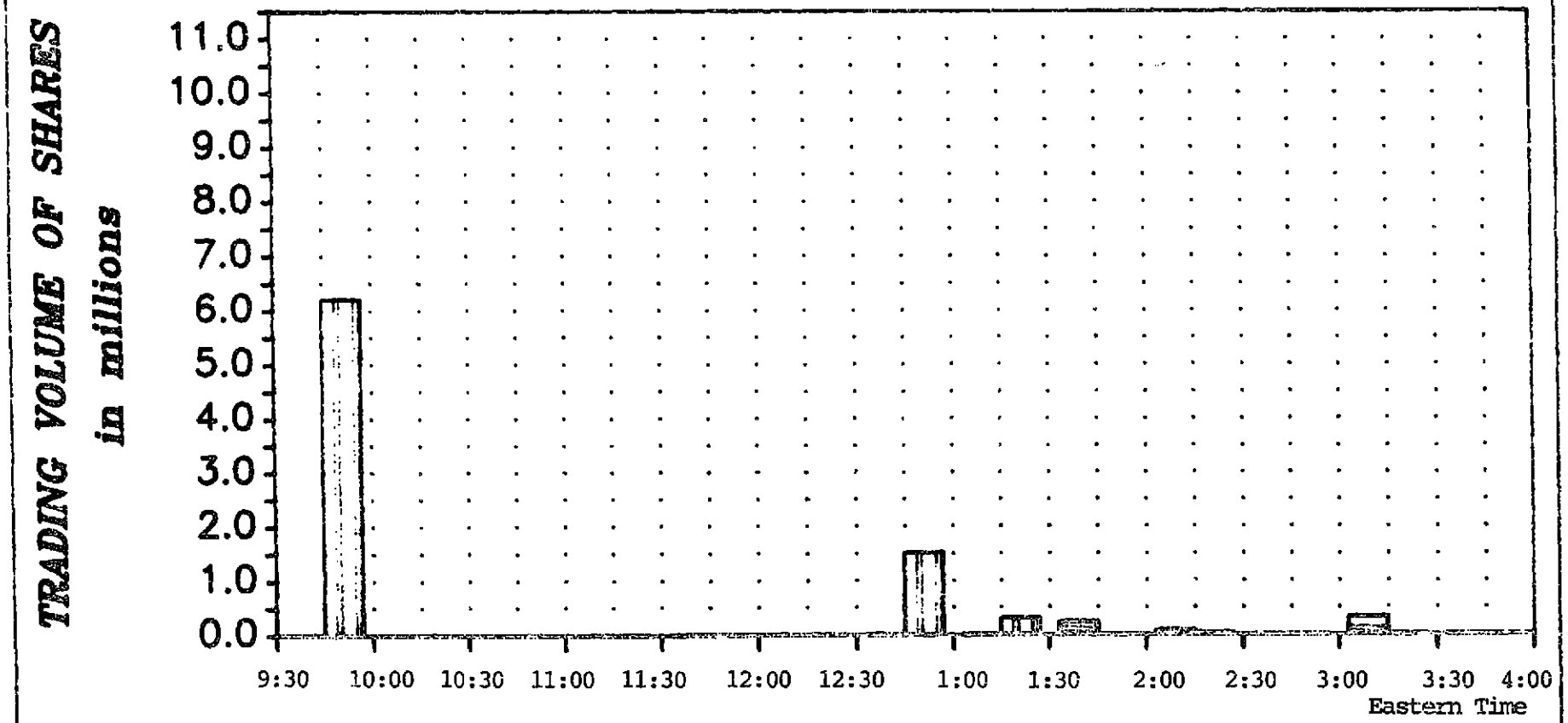

S & P 500
October 23, 1987
Basis (Dec. Futures -- Cash)
16
8
0
-8
-16
-24
-32
-40
-48
-56
-64
BASIS
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

FIGURE 46

OCTOBER 23, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

FIGURE 47

OCTOBER 23, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES

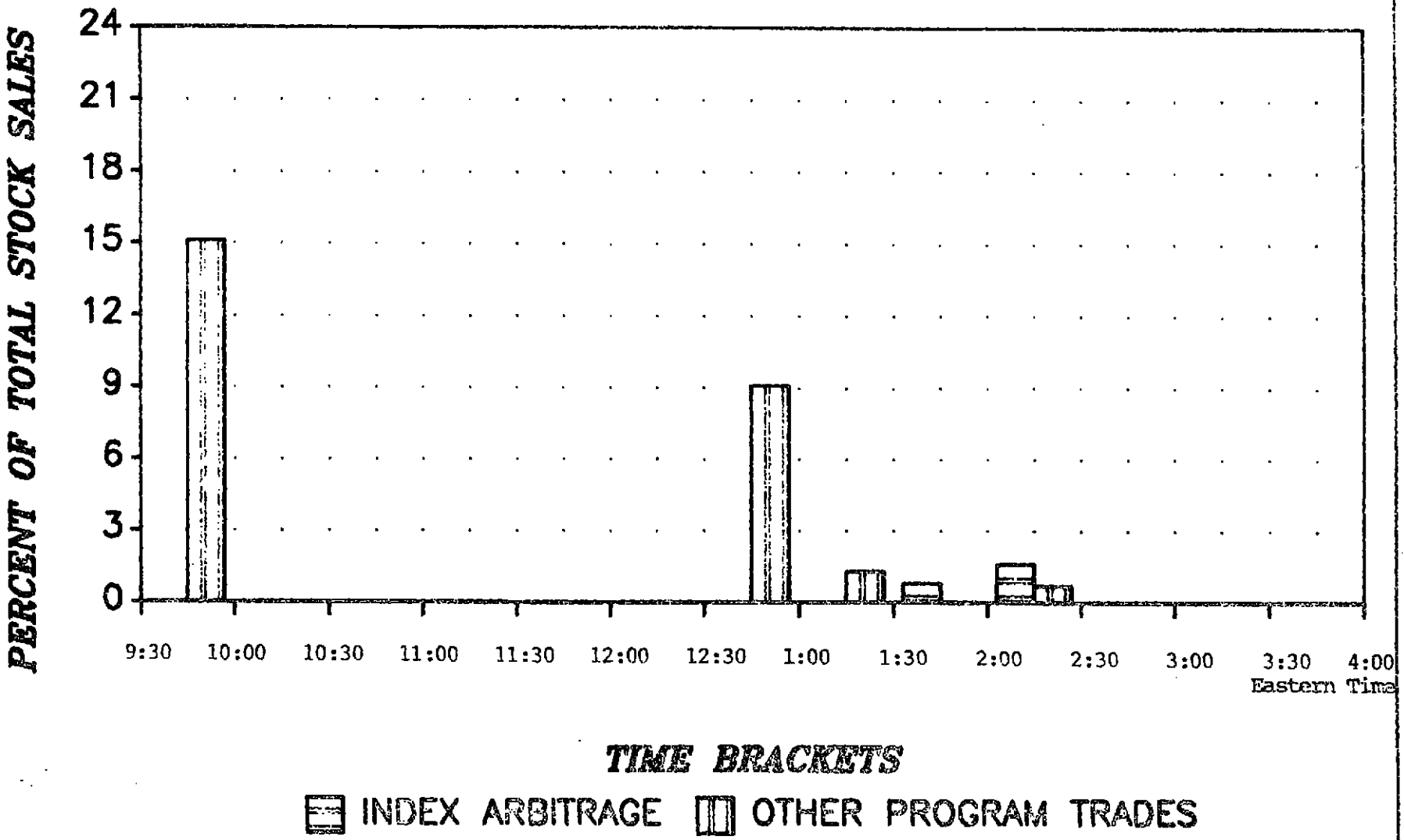


FIGURE 48

FIGURE 49

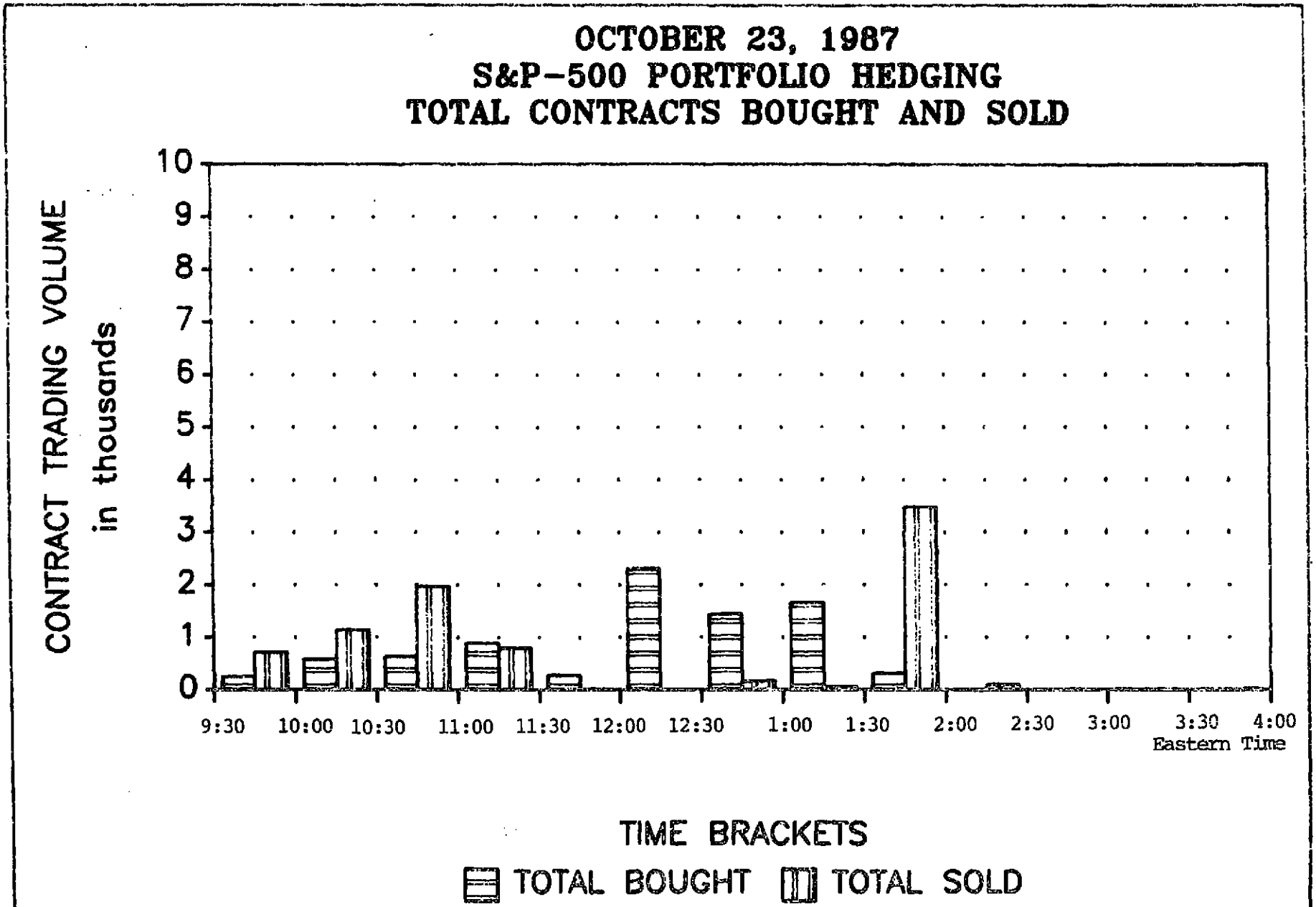
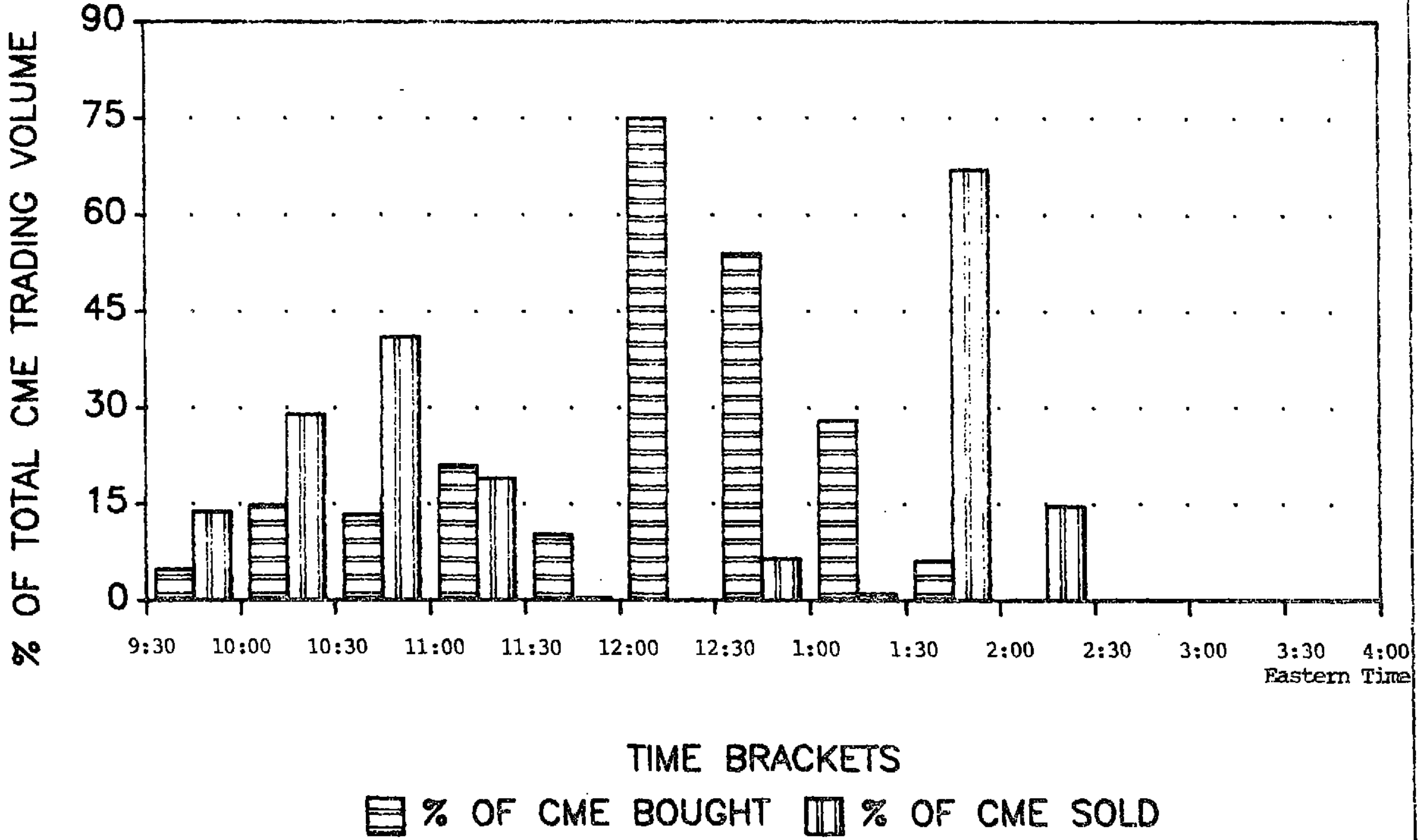

OCTOBER 23, 1987
S&P-500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD
CONTRACT TRADING VOLUME
in thousands
10
9
8
7
6
5
4
3
2
1
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
TOTAL BOUGHT
TOTAL SOLD

FIGURE 50

OCTOBER 23, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME



correspond to the periods of greatest price weakness in S&P 500 futures. The largest concentrations of hedge selling occurred between 10:30 and 11 a.m. and between 1:30 and 2 p.m., when futures prices had their strongest gains of the day.

On Monday, October 26, the Dow fell 157 points as stock prices fell continuously throughout the day. The December S&P 500 future opened at a discount of 16 points to the S&P 500 index. Although that reported discount narrowed significantly by 10:15 a.m., it persisted throughout the day. (Figures 51-56) Despite those discounts, no index arbitrage trades were reported in the survey data.

During the first half hour of trading, portfolio hedge buying and selling was substantial relative to total S&P 500 futures volume but consisted of net buying of about 1,600 contracts as portfolio insurers continued to reduce short positions. There were two periods of concentrated net selling that day on the S&P 500 futures contract, although futures prices did not fall significantly during either. These were from 11 to 11:30 a.m. (net sales of about 2,600 contracts) and from 1:30 p.m. to the close (net sales of 1,800 contracts). (Exhibit C-7) Sell orders entered during that first interval, however, may have led to the substantial decline in futures prices beginning at 11:30 a.m. The S&P 500 index ended the day down about 21 points, and the Dow closed 157 points lower at 1,794.

Although index arbitrage trading virtually ceased after October 20 and portfolio hedging also was of a lower magnitude--and consisted of more buying than selling--stock

S & P 500
October 26, 1987
Cash Index and December Future

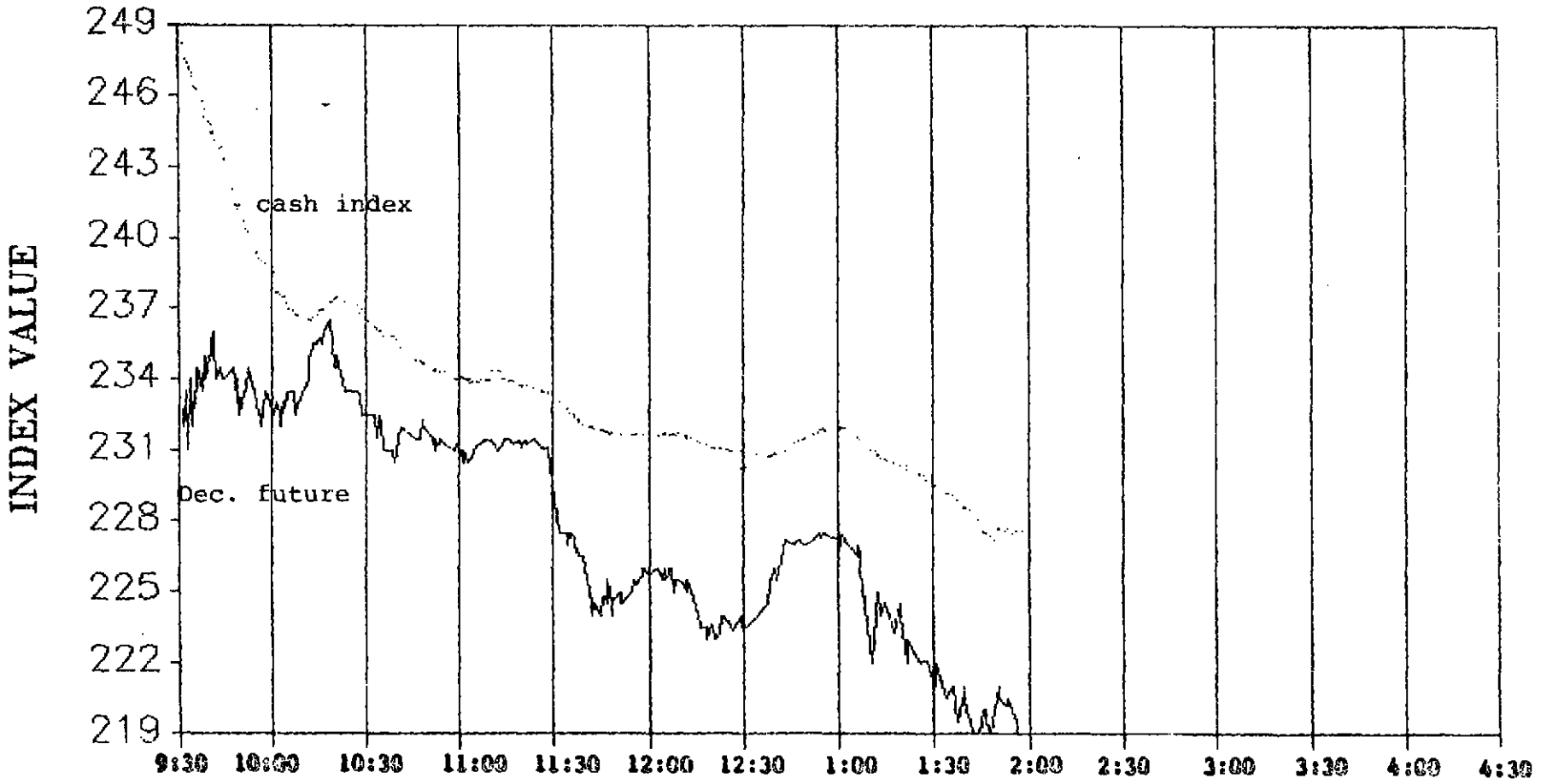


FIGURE 51

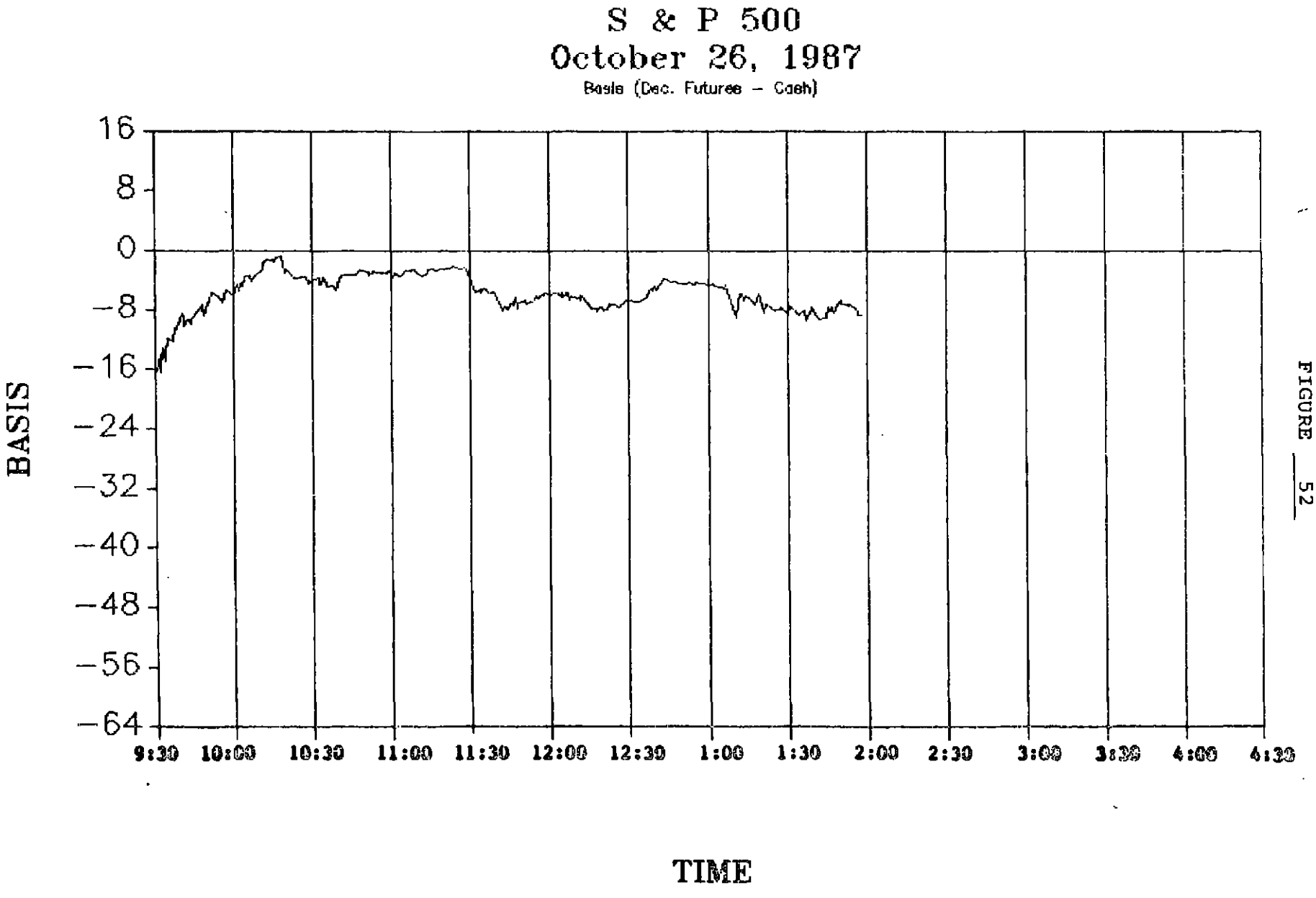
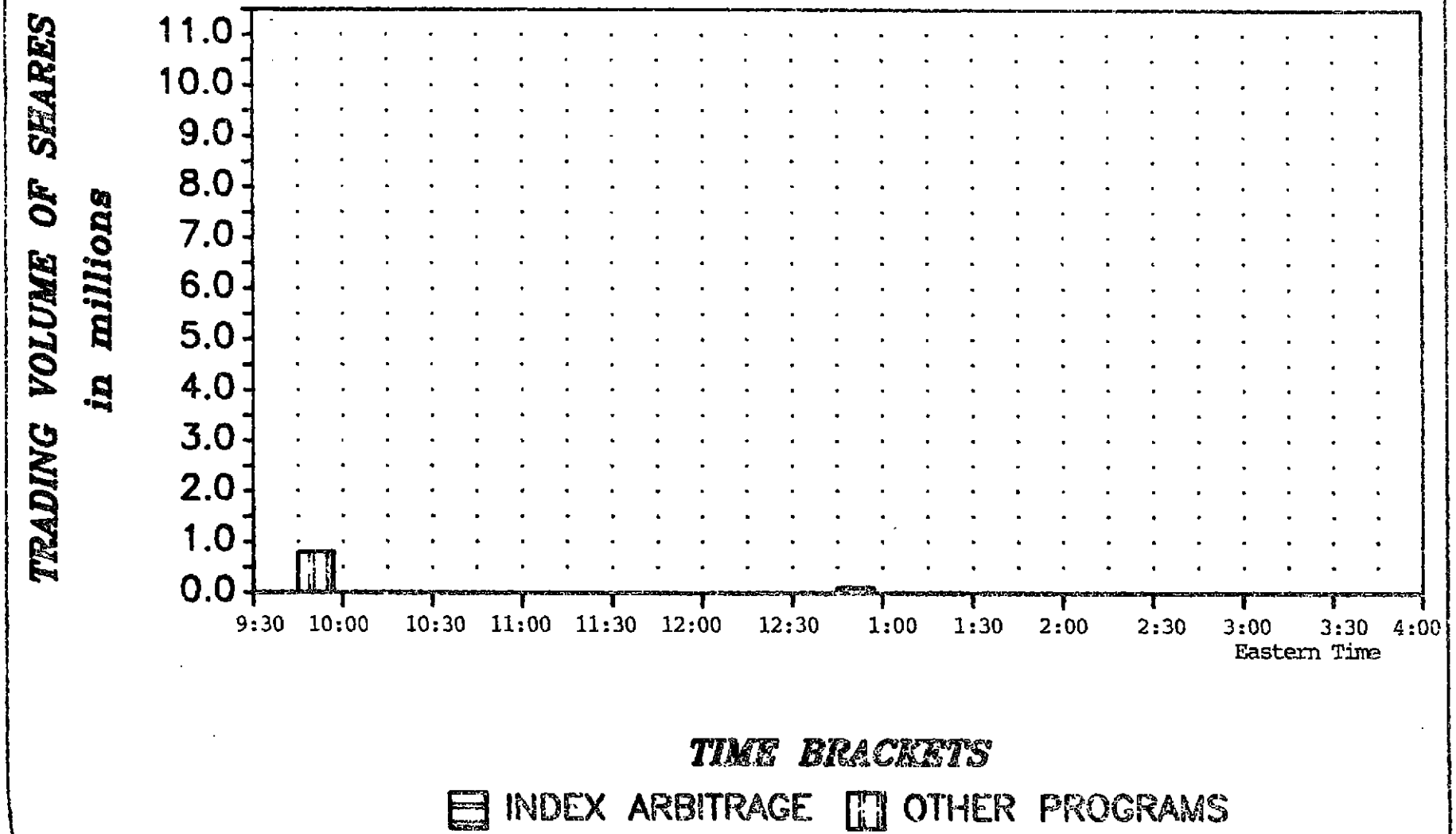

S & P 500
October 26, 1987
Basis (Dec. Futures – Cash)
16
8
0
−8
−16
−24
−32
−40
−48
−56
−64
BASIS
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
TIME

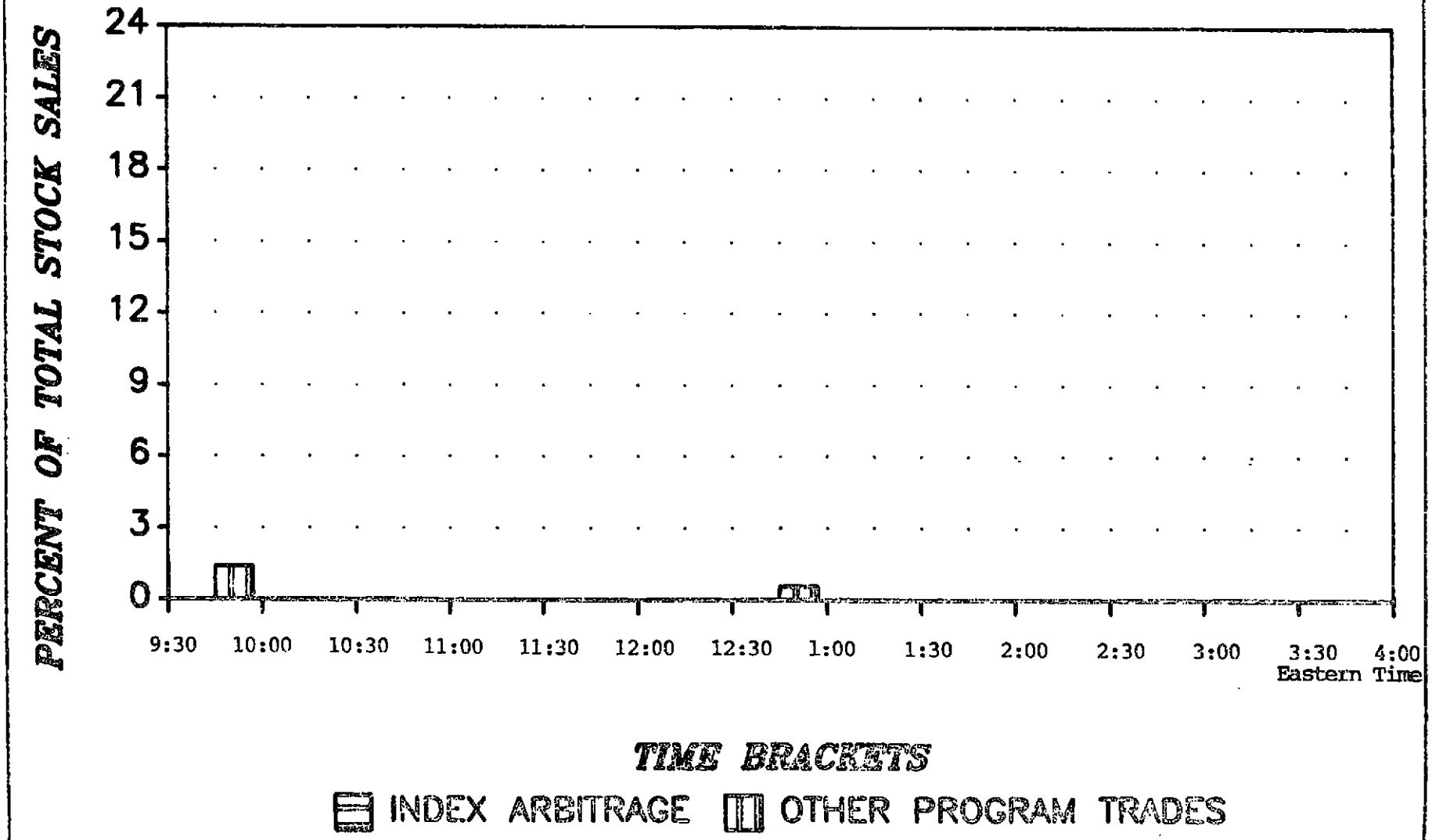
FIGURE 52

FIGURE 53

OCTOBER 26, 1987
NYSE STOCK SALES
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES



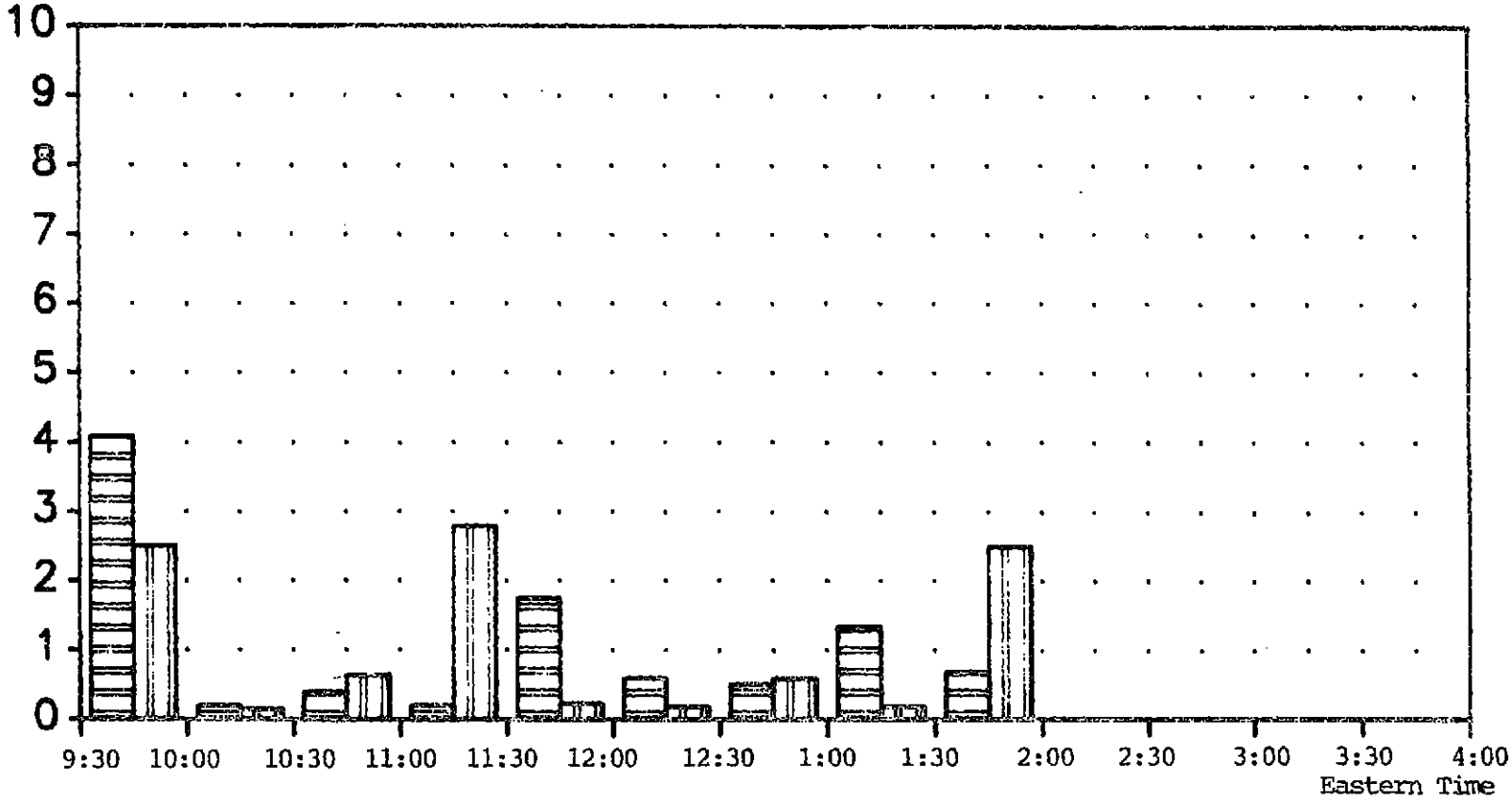
OCTOBER 26, 1987
INDEX ARBITRAGE VS. OTHER PROGRAM TRADES
AS A PERCENT OF TOTAL STOCK SALES



TIME BRACKETS INDICATE HALF-HOUR INTERVALS BEGINNING AT 9:30 AM

FIGURE 54

OCTOBER 26, 1987
S&P-500 PORTFOLIO HEDGING
TOTAL CONTRACTS BOUGHT AND SOLD



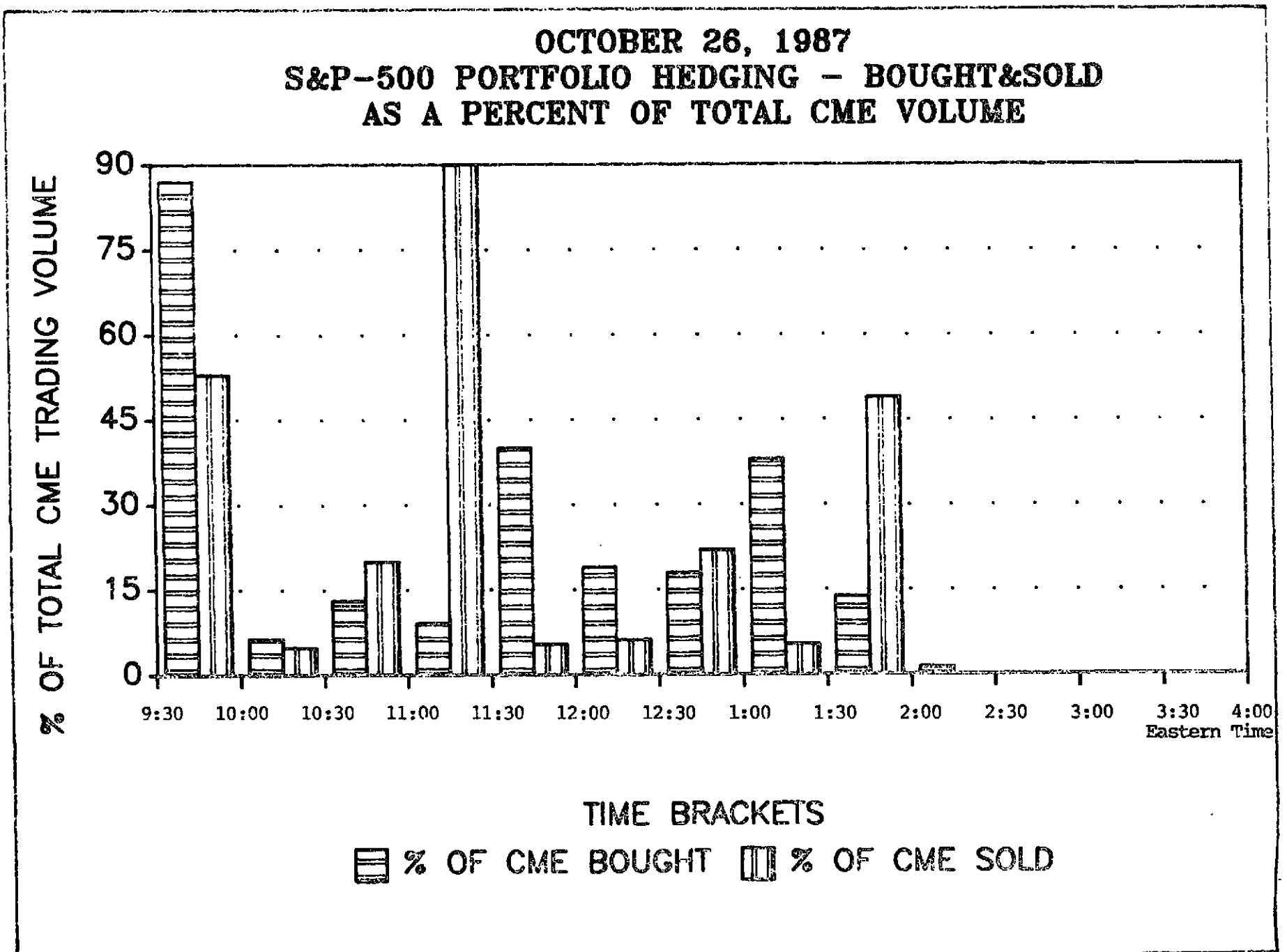

OCTOBER 26, 1987
S&P-500 PORTFOLIO HEDGING - BOUGHT&SOLD
AS A PERCENT OF TOTAL CME VOLUME
% OF TOTAL CME TRADING VOLUME
90
75
60
45
30
15
0
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
Eastern Time
TIME BRACKETS
% OF CME BOUGHT
% OF CME SOLD

FIGURE 56

prices remained volatile. The Dow did not recover near to the level of its close on October 16, much less to its level when the month began. This lack of recovery and the continued volatility of stock prices in the absence of program stock or futures selling reinforces the conclusion drawn from trading data that futures-related program trading was neither the impetus nor the principal cause of the collapse of stock prices in mid-October 1987.

F. Summary and Conclusions

Analysis of Commission and CME large-trader data indicates that, for the period October 14 to October 26, broker/dealers, institutional investors, and other commercial firms accounted for about two-thirds of total open interest in the CME S&P 500 futures contract. Special SEC/CFTC survey data further identify the activities of major firms with respect to those futures-related trading strategies that have been the object of specific concern. In particular, those data indicate that index arbitrage (including index substitution) was at relatively high levels on October 14, 16, and 19. On those dates, the total daily gross selling of component stocks for arbitrage purposes ranged between 28 and 38 million shares and between 6 and 13 percent of total NYSE volume, although substantially higher concentrations of activity occurred during some intraday periods. Those daily amounts, however, are less than reported for September 11 and 12, 1986, a time period for which the SEC

concluded that index arbitrage was not the cause of the magnitude of the market declines experienced on those days. Further, following actions by the NYSE on October 20 to discourage all forms of member program trading as well as other impediments to index arbitrage, such as trading halts in a number of major stocks, the amount of arbitrage activity declined significantly.

Portfolio hedging activities on the sell side (including portfolio insurance) were at relatively high levels on October 16, 19, and 20, when gross daily futures sales for those purposes by major institutions ranged between 15,000 and 34,000 S&P 500 futures contracts and amounted to between 10 and 30 percent of total daily trading volume in that market. In contrast, on October 21, significant hedge selling in the S&P 500 futures market was more than offset by buying in that market on the part of institutional hedgers.

A detailed examination of the trading data by half-hour intervals from the SEC/CFTC survey does not provide empirical support for the theory that hedging in the futures market and index arbitrage activities interacted to cause a technical downward price spiral of stock prices. In those instances where it might be asserted that the stock market temporarily reacted to arbitrage selling, it is notable that futures prices were also declining despite offsetting arbitrage purchasing pressure in the futures market. Such a situation is more suggestive of a general weakness in the market than a stock market reaction to the selling side of arbitrage transactions.

CFTC interviews with institutional investors who held futures positions during October 1987, as well as the SEC/CFTC survey data, highlight certain facts that must be considered in analyzing the relationship of cash and futures activities and their impact on prices. In particular, while some may consider the stock market as a market for investing and the futures a market for hedging or initiating portfolio readjustments, major institutional investors and broker/dealers view the cash and futures market as interchangeable for short-term implementation of their portfolio decisions, subject to considerations of relative transaction costs, market liquidity, and market value.

One indication of this is that, although futures normally have been used for portfolio hedging, on October 19, the firms surveyed indicated that about 40 million shares of stock were sold, via program trading, in implementing portfolio insurance strategies. This implies that firms may undertake certain trading objectives irrespective of the existence of futures markets. Another implication is that regulatory measures aimed at correcting market deficiencies perceived as a result of the October stock market decline should be designed to address a particularly identified problem and not harm other facets of the market.

IV. OPERATION OF AND PARTICIPATION IN THE CME S&P 500 FUTURES MARKET

A. Operational Performance of the CME's S&P 500 Futures Market on October 16-23, 1987

Commission staff examined the operational performance of the S&P 500 futures market between October 16 and 23. In particular, staff examined the capability of the CME and its members to receive, execute, report, and clear S&P 500 futures orders, focusing on orders executed for customers and for clearing firms' proprietary (house) accounts, in view of the record volume of trades and the unusually high volatility on those dates (in particular on October 19 and 20). From an operational perspective, the order routing, trade execution, and clearing procedures employed by member firms and the CME performed well during this period. With few exceptions, clearing firms were able to process orders, notwithstanding the high volatility and volume, with little or no disruption to their normal order routing and trade execution systems, and the CME was able to process and clear trades in a reasonably expeditious manner, using special trade checking sessions when necessary to accomplish this task.

Clearing of Trades. Commission staff reviewed the three high volume days of October 16, 19, and 20 to assess the CME's ability to process and clear the large volume of contracts traded on each of those days. On Friday, October 16, the S&P 500 futures volume was 135,344 contracts. A record 162,022 contracts were traded on October 19, and on October 20, 126,562 contracts were traded. This compares with average daily volume in the S&P

500 of 92,258 and 81,150 contracts during September and October 1987, respectively.

The staff found that the percentage of unmatched trades, commonly referred to as "outtrades," 60/ on each of these days was above the average S&P 500 futures outtrade rate of 11 percent for the prior six-month period ending September 30, as detailed below. However, the CME, in order to hasten the reconciliation of these outtrades, conducted two special trade checking sessions which greatly reduced the number of outtrades unresolved prior to the following day's opening. At these special trade checking sessions, held Saturday, October 17, and in the late evening of Monday, October 19, and lasting into the early morning hours of October 20, personnel of member firms and member outtrade representatives were required to be present to reconcile outtrades.

60/ Futures market transactions generally are cleared on the same day that a transaction takes place. In contrast, securities transactions generally clear five business days after the transaction. However, before a futures trade can be accepted for clearance by the CME's clearinghouse, each side to the transaction must match as to price, quantity, commodity, contract month and year, transaction type (buy/sell), transaction date, executing and opposite broker, and executing and opposite clearing member. When both sides do not agree on one or more of these clearing criteria, both sides to that transaction become outtrades and must be resolved before the trade can be accepted for clearance. An outtrade can result from a keypunch error, as well as from a legitimate discrepency between the parties to the trade. The clearing method used at the CME is known as a "four-way match" system, because the four parties involved in the transaction, namely the buying and selling clearing members and the buying and selling brokers, all must agree that they were the participants to the trade.

As a result of the Saturday trade checking session, the outtrade percentage by transaction in S&P 500 futures for October 16 declined from 16.6 percent (11,421 transactions) to seven percent (4,908 transactions), well below the six-month average. After the evening trade checking session on October 19, outtrades for that date were reduced from 14.4 percent (8,464 transactions) to 8 percent (4,767 transactions), again below the average number. On October 20, 13 percent of the day's transactions or 4,969 trades were unmatched, slightly above the Exchange's average. In this case, however, a special trade checking session was deemed unnecessary because the actual number of transactions unmatched, 4,969, was within normal levels.

With the vast majority of outtrades on October 16, 19, and 20 reconciled and cleared after one day, including those matched at the special trade checking sessions, the CME continued to reduce routinely the remaining outtrades over the following three days. Specifically, there were 11,421 trades unmatched on October 16; 10,017 of those trades cleared on the following business day, October 19, and an additional 1,009 of the trades cleared over the following three days. Similarly, on October 19, there were 8,464 trades unmatched; 6,865 of those were cleared the following day, and 906 were cleared over the following three days. Finally, 3,522 of the 4,969 trades unmatched on October 20 were cleared on October 21, without the necessity of a special

trade checking session, with an additional 480 clearing over the subsequent three days. 61/

These figures demonstrate that despite the record large volume of trades during the time period of October 16-20, the CME was able to process and clear those trades in an expeditious manner. Although the daily rate of S&P 500 outtrades exceeded the Exchange's norm, the CME, its members, and member firms diligently worked to reduce those outtrade levels. Particularly notable are the CME's successful efforts to reconcile the unusually large number of initially unmatched trades during a special Saturday trade checking session on October 17 and during a late evening session on October 19.

Order Routing and Execution. CFTC staff surveyed twenty-three FCM-members of the CME which clear a substantial percentage of the trades in the S&P 500 pit. 62/ These firms represent a cross-section of FCMs, including full-service wire houses, futures brokerage firms, discount futures brokerage firms, firms that handle predominantly institutional business,

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61/ CME Rule 527 requires that, whenever possible, outtrades be resolved prior to the following day's opening. However, in those instances when an outtrade cannot be resolved prior to the next day's opening, in order to avoid the risk of adverse market movement, Rule 527 requires that one of the traders to the transaction immediately cover the position by making the indicated trade in the market. Any resulting loss, if not resolved between the traders, may be brought before a CME arbitration panel.

62/ The FCMs surveyed represent approximately 64 percent of the aggregate adjusted net capital of all FCMs and 67 percent of the total customer equities carried by all FCMs.

and firms that clear floor trader or "local" business. They were requested, among other things, to describe their routine order-routing and execution systems, any changes made to those systems due to the market conditions of October 16-23, and whether any problems were experienced in the S&P 500 futures market regarding order routing and execution of orders. These firms represented that for the most part they continued to use their routine procedures for order entry, execution, and reporting over this time period, and that there were minimal problems with regard to order execution.

Typically, and as was the case during this timeframe, major wire houses communicate orders to the CME trading floor either via direct telephone lines to the CME floor or through their internal teletype wire system, while futures brokerage firms, including discount houses and firms handling large institutional accounts, communicate orders to the floor almost exclusively by telephone. Generally, customer orders from wire houses are received from a firm's branch office over the teletype wire system to the floor. For order tickets taken off the wire machine, the minute of receipt on the floor is time-stamped automatically, as required by Commission regulations. The order then is taken by runner to the pit where the executing broker fills the order. After being filled, the order ticket is picked up from the broker by a runner and brought back to the firm's wire desk, where the order again is time-stamped. At the wire desk, the order is given to a teletypist for input to (1) the originating branch office, where the account executive notifies

the customer of the price received, and (2) the firm's back office system for submission to clearing. The wire machine also automatically records the minute of input.

In the case of customer orders phoned to the floor, the order is received and time-stamped by a telephone clerk at the firm's order desk and either is hand-signaled (flashed) 63/ or hand-delivered to a broker in the pit. The executed order is either hand-signaled or hand-delivered back to the telephone desk, where it is again time-stamped and a verbal report of trade execution is confirmed to the branch office via telephone. These telephone communications usually are effected over dedicated telephone lines (i.e., lines connected directly to the CME floor).

Clearing member proprietary orders from wire houses usually are communicated to the floor by telephone, recorded on an order ticket, and either are taken to the pit by runners or are flashed to the pit. Similarly, customer and proprietary orders from futures brokerage firms and firms handling large institutional accounts generally are directed by telephone to the CME floor for execution, either directly from a branch office or from a central back office order desk located in New York or Chicago. These orders then either are taken to the pit by runners or are flashed to the pit for execution. Most S&P 500 orders are executed by

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63/ Flashed orders are communicated to the pit by hand-signals from a firm's telephone clerk to the executing broker, rather than by written order.

independent floor brokers, although some major wire houses also use floor brokers who are employees of the firm to execute their orders.

Only three of the twenty-three FCMs surveyed found it necessary to institute procedural changes in the S&P 500 pit during the time period studied, and those changes only slightly altered the above-described routine order routing and execution systems. These changes all related to the handling of orders that are flashed to the pit for execution. Specifically, one FCM that predominantly handles institutional business instituted three changes in its procedures to accommodate the increased volume and flow of orders. First, for internal control purposes, all orders larger than 100 contracts were routed through one salesperson. Second, to minimize the possibility of any misunderstanding, orders of less than 100 contracts were written down on order tickets and carried by hand to the pit for execution, with only orders of 100 contracts or more flashed to the pit. Third, that firm augmented its capacity to have orders executed by requesting that another member of the CME provide two experienced floor brokers to handle customer orders, thereby increasing the speed and efficiency with which such orders could be executed.

A second firm, a large wire house, suspended the routine use of hand-signaling of all orders into the pit in an effort, similar to the first firm, to avert potential costly miscommunication. This firm also restricted the use of direct phone orders to its S&P 500 desk, requiring all orders to be transmitted by wire or over the firm's dedicated telephone lines

to the floor. Therefore, orders could not be telephoned directly to the floor using regular lines. Both of these changes were made to maximize use of available order entry facilities, while minimizing operational disorders and possible trading errors. Finally, one discount brokerage firm also limited its flashing procedures, requiring that all market orders be hand-carried into the pit, rather than transmitted via hand-signal.

Two FCMs, one wire house and one discount brokerage firm, reported that some independent floor brokers in the S&P 500 futures pit were accepting orders on a "not held" basis only. That is, because of the extreme volatility in the market at that time, these brokers would execute orders only if they were not held responsible for execution prices that may have been away from where the market was trading at the time the order reached the floor. In addition, the same discount firm and a futures brokerage firm noted that other independent floor brokers, who normally executed their orders, chose not to fill orders due to the increased risk and volatility associated with the market, particularly on October 19 and 20. These firms, therefore, solicited other floor brokers to execute their orders during this time period.

Notwithstanding the unusual market conditions that existed at the time, only one of the twenty-three FCMs surveyed, a wire house, noted any problems concerning the timeliness of order executions or delays in reporting of executions out of the pit. That firm, which handles large institutional customers, stated that it experienced a delay in receiving executions out of the

pit, thus retarding the reporting of execution prices back to its customers. 64/

In sum, responses to the survey indicate that, despite the increased volume and, at times, hectic conditions in the S&P 500 market during this period, the order routing procedures for these firms performed well. Although, as can be expected during such market conditions, there were some execution prices which were questioned by the customers placing those orders, it appears that these discrepancies were related to the unusually volatile price movement in the pit, rather than the inability of firms to process the orders.

Timeliness of Order Executions. The final aspect of the operational performance of the S&P 500 examined was the timeliness of order executions. Commission staff examined the execution of customer orders of a major wire house known to execute a large number of trades for retail customers. Staff examined the timeframes involved in executing that firm's customer orders in the S&P 500 futures pit on October 19, the day

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64/ In this connection, CFTC staff also requested customer complaint information from the twenty-three surveyed FCMs and received responsive complaint data from twenty-one firms. These FCMs reported a total of seventy-three customer complaints. Of these, forty-seven relate to poor execution, seven to delays in receiving verbal confirmation of fills, and ten to margin calls or liquidations. The remaining thirteen complaints were categorized as "others." This can be compared to press reports of Congressional testimony that 9,000 oral and 700 written complaints were received relating to the securities and securities option markets for the same period.

the S&P 500 experienced record volume of 162,022 contracts. 65/ The execution timeframes were derived by calculating the number of minutes and/or seconds between the entry times stamped on the firm's order tickets as they were received on the CME floor and the time of execution assigned by the CME's Computerized Trade Reconstruction system. 66/

65/ In addition to the record volume that day, the S&P 500 traded in a "fast market" condition for virtually the entire trading session. A fast market exists when transactions in a pit take place with such rapidity that price reporters in the pit cannot record each price change, as is normally the case. On October 19, a fast market existed in the S&P 500 from 8:30 a.m. (the opening time) to 11:24 a.m.; from 12:29 p.m. to 1:30 p.m.; and from 1:35 p.m. to the close at 3:15 p.m. (All times are central daylight time (CDT).)

66/ The CME placed CTR into effect in July 1987 in response to the enhanced audit trail requirements approved by the Commission in 1986. The CTR system imputes a trade execution time based on several known variables. These variables include: order ticket entry timestamp, 30-minute bracket period designation, trade price, trading card sequence number, and time and sales reports. Although the operation of the CTR system has not been reviewed formally by Commission staff, based upon the market conditions of October 19, such as the uniqueness of prices due to the downtrending market, it appears that the CTR times generated were sufficiently precise for that date to sequence transactions effectively.

CFTC staff did not itself examine underlying order tickets to determine order entry times. Order entry times were those submitted to the CME by the clearing firm under the CME's CTR system. Therefore, for purposes of this limited review, staff could not distinguish market orders, which require immediate execution, from contingent orders, such as stop orders and limit orders, which usually do not call for immediate execution. Without such a distinction, it is difficult to determine with complete reliability whether orders were executed expeditiously. However, with this caveat in mind, it is still possible to characterize trade execution timeframes based upon reasonable assumptions, such

(Footnote Continued)

The analysis found that a significant number of orders, 611 (44.5 percent) of the firm's 1,374 total S&P 500 customer orders, were executed within one minute of receipt on the floor. Further, 15.7 percent of the orders were executed within two minutes of receipt, 7.6 percent within three minutes, 4.5 percent within four minutes, and 2.8 percent within five minutes. During one particular timeframe, between 12:28 and 12:31 p.m. CDT, there were 24 orders which were executed after one hour of receipt. This represented one-third of the 75 orders (5.5 percent of the total orders executed) which were filled an hour or longer after receipt on the floor. However, in all likelihood, many of these orders were stop or limit orders placed earlier in the day and were triggered for execution by the decline of the December S&P 500 futures contract from 250 to 235 over that time. Finally, as is typical, a number of orders executed during the closing period (the last thirty seconds of trading) were executed long after order entry. This is because "market on close" orders typically are submitted earlier in the trading session and are held in the broker's deck until the closing period when they become executable.

In sum, the vast majority of this firm's customer orders, given the market conditions which prevailed throughout the day, appear to have been executed promptly. Indeed, 75 percent of the

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(Footnote Continued)
as assuming that orders with wide timeframes are contingent orders that, when placed, were away from the then-current market.

firm's orders were executed within five minutes of receipt on the floor, with nearly one half of the firm's total orders executed within one minute of receipt.

Conclusion. Commission staff found that, notwithstanding the high volume and unusual price volatility associated with the S&P 500 market over the time period examined, the CME and its member firms' operational procedures performed well. With few exceptions, member firms were able to process orders with little or no disruption to their routine order routing and trade execution systems. Moreover, the CME, although experiencing a higher than usual number of outtrades due to large volume and price volatility, was able to resolve the vast majority of those outtrades by the opening of the following day's trading. This resulted, in large part, from successful efforts to reconcile outtrades at special Saturday and evening trade checking sessions.

B. Participation in the CME S&P 500 Futures Market on October 16, 19, and 20, 1987

Commission staff reviewed trading data for October 16, 19, and 20 to evaluate the extent to which members who traded for their own accounts were active in the CME S&P 500 futures contract and the extent to which brokers were available to execute customer orders in that contract. As discussed below, this review of trading indicates that, although the participation by brokers and members who traded for their own accounts declined

somewhat, there still was substantial participation by these groups.

Various data from the CFTC's database system for October 16, 19, and 20, were reviewed and analyzed using October 16 as a base day from which to make comparisons to the two more volatile days of October 19 and 20. The data reviewed include the number of members who traded for their own accounts, trading by "primary" brokers (described below), the volume of customer trades, the number of members who executed any trades during the relevant days, and the trading volume of the 30 most active members.

Members Trading for Their Own Accounts. To assess the participation of members trading for their own accounts, including trading by locals, who trade solely for their own accounts, the staff reviewed data on the number of CME members who traded for their own accounts (customer type indicator (CTI) 1 trades) 67/ on October 16, 19, and 20. Each of the days examined was divided into 30-minute time periods, beginning with the 8:30 a.m. CDT start of trading in the S&P 500 futures contract. The figures shown below for each of the 30-minute time

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67/ Commission Regulation 1.35(e) requires exchanges to determine and record with respect to each side (buy and sell) of every trade whether the person executing the trade was trading:

(1) for his own account (CTI 1);
(2) for his clearing member's house account (CTI 2);
(3) for another member present on the exchange floor, or an account controlled by such other member (CTI 3); or
(4) for any other type of customer (CTI 4).

periods list the number of members who actually executed CTI 1 trades and do not include members who may have been present in the S&P 500 pit, but for one reason or another chose not to execute any CTI 1 trades.

Number of CME Members Executing CTI 1 Trades in S&P 500 Futures

Time Period	October 16	October 19	October 20
8:30- 9:00	275	230	187
9:00- 9:30	242	202	140
9:30-10:00	221	174	131
10:00-10:30	205	189	136
10:30-11:00	194	168	106
11:00-11:30	141	141	81
11:30-12:00	126	155	68/
12:00-12:30	179	156	93
12:30- 1:00	193	167	111
1:00- 1:30	187	152	86
1:30- 2:00	159	146	89
2:00- 2:30	160	155	95
2:30- 3:00	157	142	97
3:00- 3:15	106	101	71

As indicated above, the number of CME members executing CTI 1 trades on October 16 ranged from 106 to 275 per 30-minute time period, with an average of 182 per period. The October 19 range was from 101 to 230, with a 163-member average. Finally, the number of members executing CTI 1 trades on October 20 ranged from 71 to 187 per 30-minute period, with an average of 114 members during each period that trading was conducted. These data indicate that although the average number of members

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68/ Note that trading was suspended from 11:19 a.m. to 12:05 p.m. CDT.

executing CTI 1 trades decreased on each of the three days examined, there remained a substantial number of members in the pit who participated in the market by executing trades for their own accounts. 69/

The percentage of trades that were CTI 1 trades during each 30-minute period of trading on October 16, 19, and 20 also was reviewed in relation to overall market activity. The results of this review are shown below.

Percentage of CTI 1 Trades in S&P 500 Futures

Time Period	October 16	October 19	October 20
8:30- 9:00	38.8	34.0	24.8
9:00- 9:30	42.1	35.3	24.1
9:30-10:00	37.4	31.5	20.5
10:00-10:30	34.1	33.2	22.8
10:30-11:00	35.7	34.4	20.5
11:00-11:30	33.9	30.2	27.1
11:30-12:00	35.3	30.3	70/
12:00-12:30	36.6	29.8	29.0
12:30- 1:00	37.1	30.7	20.9
1:00- 1:30	30.8	29.5	24.1
1:30- 2:00	36.6	28.7	19.6
2:00- 2:30	34.1	33.0	25.4
2:30- 3:00	29.3	26.8	26.0
3:00- 3:15	31.4	23.3	28.0

69/ Despite reports that certain members were restricted from trading their own accounts on October 20 due to increased financial requirements imposed by their clearing firms, the data show that a substantial number of members traded for their own accounts.

70/ Note that trading was suspended from 11:19 a.m. to 12:05 p.m. CDT.

As reflected above, the number of CTI 1 trades as a percent of total trades for the three days examined declined each day, from 35.3 percent on October 16, to 31.3 percent on October 19, and to 23.6 percent on October 20.

Although these data show a general decrease in the percentage of CTI 1 trades during the three days examined, a review of CTI 1 net buy and sell transactions indicates that members executing CTI 1 trades absorbed buying and selling pressure from the market in many instances. 71/ For example, on October 19, in six of the ten 30-minute time periods during which the S&P 500 futures price decreased, there were net CTI 1 buy transactions, including three of the four 30-minute periods during which the S&P 500 futures price declined the most on that day. 72/ This

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71/ Notably, unlike specialists in securities markets, futures exchange members who trade for their own accounts have no obligation to trade for their own account to offset customer buying and selling pressure.

72/ Commission data indicate that members executing CTI 1 trades were net buyers and members executing CTI 4 trades net sellers during the following 30-minute periods on October 19 in which the S&P 500 futures price decreased:

Time Period	Decrease in S&P 500 Futures Price
8:30-9:00	20.25
9:00-9:30	9.00
11:00-11:30	3.00
11:30-12:00	0.50
12:00-12:30	12.50
12:30-1:00	12.00

The periods of 8:30 - 9:00 a.m., 12:00 - 12:30 p.m., 12:30 - 1:00 p.m., and 2:30 - 3:00 p.m. CDT (a decline of 15.00) were the periods on October 19 when the S&P 500 futures index fell the most.

indicates that members executing trades for their own accounts were absorbing selling pressure in the falling market. This conclusion is supported by data in the Brady Commission Report, which stated that on October 19, CTI 1 net buyers absorbed 47 percent of customer (CTI 4) net futures sales. 73/ Conversely, in three of the four 30-minute periods on October 19 during which the S&P 500 futures price increased, there were net CTI 1 sell transactions, which absorbed buying pressures in the market.

For October 20, CME members executing CTI 1 trades were net buyers in three of the five 30-minute periods when the S&P 500 futures price declined prior to the suspension of trading. 74/ However, during the opening 30-minute period, when the market rose, there were net CTI 1 sell trades. During the last four 30-minute trading periods on October 20, CTI 1 net trading activity reinforced the dominant market trend, with net CTI 1 buying during the market rise and net CTI 1 selling when the market declined slightly at the end of the day.

Trading By "Primary" Brokers. To assess the availability of floor brokers to execute customer orders, data were obtained on the number of "primary" pit brokers executing customer trades on October 16, 19, and 20. For this purpose, the term primary

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73/ See The Brady Commission Report, Study VI, "Performance of the Equity Market During the October Market Break and Regulatory Overview," p. VI-66.

74/ Ibid., p. VI-67.

broker does not connote a particular minimum volume or percentage of customer (CTI 4) trades executed, but instead is based on a functional determination of which brokers filled most of an individual clearing member's orders. 75/

Staff examined each of the eighty CME member firms that cleared trades on the three days under review. Six firms did not clear any CTI 4 trades on any of these days. Of the remaining seventy-four firms, the number of primary brokers executing CTI 4 trades that cleared through these firms, plus the daily CTI 4 volume, are as follows:

CME Primary Brokers and CTI 4 Volume

October 16		October 19		October 20	
Number of Primary Brokers	CTI 4 Contract Volume	Number of Primary Brokers	CTI 4 Contract Volume	Number of Primary Brokers	CTI 4 Contract Volume
115	69,192	170	89,550	132	75,747

75/ Each broker who executed more than an incidental amount of orders for a clearing member was deemed a primary broker. However, because the size of clearing firms vary, so too did the relative notion of a primary broker. For example, for a small clearing firm, a primary broker may be one who executes at least 200 contracts per day. However, for a large clearing firm, where primary brokers may execute 5,000 contracts or more per day, a broker executing only 200 contracts for such a firm would not be considered a primary broker.

Another feature of the S&P 500 pit is that it is common for "broker groups," associations of brokers organized pursuant to CME rules, to execute customer orders for large firms. Under such arrangements, one broker in the group may receive all the large orders, another the smaller orders, another all the orders for deferred month contracts, and yet another all the spread orders. In contrast, customer orders from smaller clearing firms tend to be executed by the firms' own employees or by smaller independent brokers.

These data show the increase in primary brokers on October 19, when CTI 4 volume also increased, and the decrease in primary brokers on October 20, when CTI 4 volume also decreased.

Of the sixty-six clearing firms that cleared CTI 4 trades on October 16, fifty-eight had CTI 4 trades executed by primary brokers. 76/ On October 19, seventy-two firms cleared CTI 4 trades, with seventy of these firms clearing CTI 4 trades executed by primary brokers. Finally, primary brokers executed customer trades at sixty-five of the sixty-nine firms which executed CTI 4 trades on October 20. Of the fifty-eight firms noted above which had customer trades executed by primary brokers on October 16, all firms had at least one primary broker filling orders on October 19, and only one of the fifty-eight firms had no primary broker filling orders on October 20. These data illustrate that there continued to be primary brokers available to execute customer orders from CME clearing members on October 19 and 20, consistent with the normal flow of customer orders, despite the extreme market volatility on those two days. Indeed, compared to October 16, twelve and seven additional clearing firms cleared trades by primary brokers on October 19 and 20, respectively.

76/ For those eight firms that cleared CTI 4 trades on October 16 that were not executed by primary brokers, the CTI 4 trades were spread among a number of floor brokers such that no one of these particular brokers could be characterized as a primary broker.

Volume of Customer Trades. Using the CFTC's database, Commission staff analyzed the volume and size of CTI 4 trades for October 16, 19, and 20. Initially, the volume of CTI 4 trades was compared to total S&P 500 futures volume as follows:

Date	CTI 4 Volume as a Percent of Total S&P 500 Futures Volume
10/16	48.93
10/19	55.27
10/20	59.85

As can be seen, the CTI 4 percentages of total volume increased both on October 19 and 20, which tends to refute a concern that there may have been a material disruption in the execution of customer orders in the market.

As part of this analysis, the number of trades by smaller customers also was reviewed. Because smaller trades generally are for smaller customers and the execution of larger trades generally are for larger customers, smaller trades were quantified to assess whether smaller customers were getting their orders filled. 77/ The following categories were established for

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77/ Although this assumption does not fit every trade, trading patterns generally support this notion. For example, individual small customers generally trade in small quantities, as opposed to large institutional customers whose orders often involve large quantities. When bid or offered, large orders generally first will be filled opposite other large orders or locals able and willing to trade large quantities. Even for large orders that are filled opposite a number of other participants, the individual trades that fill large orders tend to be large in size.

purposes of analysis: five contracts or less; six to ten contracts; eleven to twenty-five contracts; twenty-six to forty-nine contracts; and fifty contracts or more. Within each category, the number of transactions bought and sold also was calculated. 78/ The number of transactions in each category are shown below:

Number of CTI 4 Transactions

	Transaction Size (contracts)									
	5 or Less		6-10		11-25		26-49		50 or More	
Date	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
10/16	10,397	9,780	1,483	1,716	752	912	209	247	167	197
10/19	7,689	7,368	1,432	1,551	885	995	332	364	428	420
10/20	4,218	4,771	884	941	617	667	219	255	392	394

Considered another way, the percentage of CTI 4 buy and sell transactions within the various transaction-size categories compared to total CTI 4 buy and sell transactions yields the following:

Percentage of CTI 4 Transactions Within Size Categories

	Transaction Size (contracts)									
	5 or Less		6-10		11-25		26-49		50 or More	
Date	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
10/16	80	76	11	13	6	7	2	2	1	2
10/19	71	70	13	14	8	9	3	3	4	4
10/20	67	68	14	13	10	9	3	4	6	6

78/ Buy-side and sell-side figures often vary because of split fills, e.g., a 15-lot trade being filled opposite two members, one getting five lots and the other ten lots. In addition, buys and sells will not be equal in quantity because these figures include only CTI 4 trades and thus do not consider those CTI 1, 2, and 3 trades filled opposite CTI 4 trades.

The figures reveal that the percentage of CTI 4 transactions involving five contracts or less did not drop below 67 percent, indicating that a high percentage of smaller customer trades continued to be executed on October 19 and 20. In addition, a breakdown of CTI 4 trades on each of the three days by the 30-minute time periods in which the trades occurred indicates that CTI 4 trading generally was distributed similarly in corresponding 30-minute time periods throughout the day.

Member Trading. In addition to reviewing the number of members who executed CTI 1 trades, the total number of members who executed S&P 500 futures trades also was determined. These data show that 553 CME members executed trades in the S&P 500 pit on October 16, with an average of 282 members trading per 30-minute period. That number decreased only slightly to 526 members (263 members per 30-minute period) on October 19, the record volume day, and more significantly to 438 members (197 members per 30-minute period) on October 20. However, the volume of contracts traded on October 20 was down 7 percent from October 16, and the number of transactions decreased by approximately 53 percent. These figures indicate that a significant number of members participated in trading on both October 19 and 20.

As shown below, Commission staff also reviewed trading by the 30 members who traded the largest quantities on October 16 to

determine if these members similarly were active on October 19 and 20. 79/

Trading by the 30 Members Most Active on October 16

Date	Aggregate Volume	Percent of Total Volume	Aggregate Transactions	Average Transaction Size
10/16	58,228	43	7,431	7.84
10/19	88,684	55	6,921	12.81
10/20	63,635	50	4,845	13.13

As these figures indicate, the 30 members who executed the largest volume of trades on October 16 continued to be active in the market on October 19 and 20.

Conclusion. The data regarding trading on October 19 and 20 indicate that there was broad participation in S&P 500 futures by all major market groups, including members trading for their own accounts and brokers who executed customer orders. In addition, CME members trading for their own accounts absorbed customer selling pressure on both days at times when the market was falling. Although volatile market conditions may have deterred some customers and members from trading, it appears that there generally continued to be broad participation from all segments of the market.

79/ Of these thirty members, seven traded predominantly for their own accounts (CTI 1 trades), twenty-one traded predominantly for customer accounts (CTI 4 trades), and two traded predominantly for house accounts (CTI 2 trades) or for members present on the CME floor (CTI 3 trades).

V. TRADE PRACTICE SURVEILLANCE

Although the Commission has in place an ongoing, comprehensive trade practice surveillance program, Commission staff particularly monitored and examined trading activity during the week of October 19 in order to determine whether any trading abuses or market manipulations occurred. The particular investigations conducted by Commission staff are described below following a general overview of the Commission's trade practice surveillance program.

Generally, the purpose of the Commission's trade practice surveillance program is to detect, deter, and provide a basis for prosecuting trade practices which can lessen the competitiveness of futures trading or by which floor brokers or futures commission merchants take advantage of customers. 80/ The Commission's trade practice surveillance program has several elements, including: (1) the collection of trading data; (2) trade practice investigations (TPIs), the direct analyses of particular market segments, transactions, or participants to detect trading abuses; and (3) random floor surveillance to detect and deter violative trading practices, to keep apprised of routine and

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80/ The particulars of the CFTC's trade practice surveillance program are set forth as they relate to the two largest stock index futures markets in Chicago and the activity of the Commission's Chicago regional staff, although such programs are in place for all markets.

variant trading practices and procedures, and otherwise to obtain information from exchange members and exchange or firm personnel.

This program supplements similar trade practice surveillance programs required to be maintained by each futures exchange and is the focal point of CFTC oversight of exchange trade practices. Based on this monitoring, Commission staff regularly refers suspicious trading activity to the exchanges and also may refer such activity to the Commission's Division of Enforcement. CFTC staff also regularly issues public rule enforcement reviews of exchange trade practice surveillance programs, which evaluate, among other things, the adequacy of exchange activities in this area, including exchange follow-up on Commission staff referrals and other recommendations.

A. Trade Practice Investigations

TPIs are conducted by Commission staff on a regular basis on all contracts. To accomplish this task, the Commission has assembled a database of computer-readable trade information for every trade cleared through each clearing firm of an exchange for all days and markets. 81/ That database is updated monthly (or more frequently, when necessary) and includes for each trade essentially all data found on original trading documents, such as

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81/ Exchanges' time and sales data, which reflect trade prices and times at which they occurred, also are obtained in computer-readable and hard copy form on an as-needed basis.

the contract, month, price, quantity, buying and selling members, buying and selling clearing members, the customer type indicator, and the minute of trade execution. 82/

This computerized data enables staff to identify in the first instance potentially improper trade practices and to analyze suspicious trading patterns expeditiously and efficiently without engaging in the time-consuming task of requesting, gathering, and analyzing the original documents. Later in the investigative process or when the data are ambiguous or in conflict, original trading records may be requested. However, by identifying in the first instance specific conduct, these data permit focused document requests that address particular transactions. As a result, the more limited set of documents can be obtained from FCMs and traders and analyzed by Commission staff more quickly than if a much larger number of the original trading documents were collected to reconstruct trading. This substantially decreases the burden on market participants of gathering and producing documents, and on Commission staff of analyzing voluminous documents relating to large, undifferentiated segments of market activity.

Commission staff analyze these data with the assistance of both personal and mainframe computers. Through the use of more than thirty programs designed to isolate for further review

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82/ These and other data are required to be generated and maintained by exchanges pursuant to Commission regulations.

suspicious trades or patterns of trades, staff is able to conduct thorough analyses more quickly. For example, if there is concern regarding preferential trading between certain members or groups of members, staff initially may request a report showing all of the trades made by a specific individual with another member or group of members for any period of time, from a period of minutes to a month or even longer. If a pattern of suspicious activity is identified for a particular individual or time period, a more focused and detailed report may be obtained. The types of activity which such analyses are designed to detect include, among other trading violations: trading ahead (when a broker trades for his own account while holding executable customer orders); 83/ wash trading (entering into or purporting to enter into transactions for the purpose of giving the appearance that purchases and sales are being or have been made but without actually taking a position in the market); bucketing (directly or indirectly taking the opposite side of a customer's order into the handling broker's own account or into an account in which he has an interest, not in accordance with exchange rules); and other noncompetitively executed transactions. Commission staff also investigates possible instances of market manipulation.

83/ A time-sequenced listing of all trades of a dual trader (a member who executes customer orders and also trades for his own account) can be generated during a selected timeframe to determine whether that broker traded at a better price for his own account than he did for a customer and thereby traded ahead of his customer in violation of the Commodity Exchange Act and exchange rules.

In addition to detecting trading abuses, CFTC staff evaluates markets and market events by determining the nature of trading or trade participation at particular times. 84/ Such market studies were begun in the stock index futures contracts during the week of October 19 relative to trading activity during that week.

The Commission's and the exchanges' ability to conduct effective trade surveillance has been enhanced greatly with the recent implementation of improved exchange audit trail systems, under which one-minute execution times must be provided for each trade. The Commission amended Regulation 1.35(g) in January 1986 to require such one-minute execution times in lieu of the previously required half-hour bracket designations. The exchanges implemented systems to comply with this requirement by July 1987. The addition of the one-minute execution times facilitates automated sequencing of transactions for an entire market or any subset thereof. 85/

In addition, data available from the Commission's large-trader reporting system and other Commission files are available

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84/ See section V.B, infra.

85/ The Brady Commission Report noted the significance of trade timing data in assessing the nature and cause of a market crisis, determining who bought and sold, diagnosing developing problems, and uncovering potentially damaging abuses. The Brady Commission found that the futures clearinghouse and large-trader information systems permit such assessments, but that the stock exchanges have no system which details trades and trading times by customer. Brady Commission Report, p. 67.

to Commission staff. 86/ Such additional data may provide direct or supporting evidence of a possible violation. Finally, Commission staff also conducts interviews to obtain additional information relevant to investigations.

The staff initiates TPIs for any of several reasons. As described above, TPIs very often are initiated as a matter of routine coverage of the futures and option contracts traded on commodity exchanges. TPIs also may be initiated as a result of: (1) increased volatility; (2) monitoring prices and specific market information provided by wire services; (3) allegations or information provided to staff anonymously or by an identified market source or found in the news media; (4) market rumors; or (5) referrals of suspicious activity uncovered in market surveillance activity. In the case of more extensive investigations, CFTC staff may issue a report setting forth its findings. 87/

Under the Commodity Exchange Act and Commission regulations, exchanges are required to develop and maintain compliance staffs and effective trade practice surveillance programs to fulfill

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86/ See Interim Report, pp. 25-26, and section VI, infra, for a description of the Commission's large-trader reporting system and database.

87/ See Report of the Division of Trading and Markets: Volume Investors Corporation (July 1985); Division of Trading and Markets, Silver Market of 1970/1980, Actions of the Chicago Board of Trade and the Commodity Exchange, Inc.

their self-regulatory responsibilities. 88/ The exchanges conduct floor surveillance and perform TPIs using the data generated by the clearing organizations and their own computer capabilities. These exchange programs are expected to constitute the first-line of regulation and are subject to Commission oversight through the rule enforcement review program, TPIs, and other less formal oversight mechanisms, such as floor surveillance.

B. The Week of October 19, 1987

Commission staff initially was alerted on October 14 to the potential for increased stock index volatility when several staff members present on the trading floor observed the activity in the S&P 500 market. By the afternoon of October 19, Commission staff maintained a nearly continual presence on the trading floors of both the CME S&P 500 and CBT MMI markets, which included observing trading and speaking to members and exchange personnel on the

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88/ Commission Regulation 1.51 requires that each contract market use due diligence in maintaining a continuing affirmative action program to secure compliance with provisions of the Act, Commission regulations, and exchange rules and bylaws. With respect to trade practice surveillance, such programs must include surveillance of trading on the floor of the exchange, investigation of complaints received from customers concerning the handling of their accounts or orders, investigation of all other alleged or apparent violations, and such other surveillance as is necessary to enforce the Act, Commission regulations, and exchange rules and bylaws.

floor. On October 21, staff requested stock index futures trading data for the period from October 12 forward. Upon receipt of these data, the staff immediately initiated a series of computer-assisted TPIs to detect possible violative activity and to perform background market analyses of trading and pit participation.

Staff also monitored exchange investigations into trading during this period. The CME initiated eight S&P 500 futures investigations, four because of customer or clearing firm complaints, three internally generated, and one because of a member's complaint. The investigation arising from the member's complaint has been completed, referred to a disciplinary committee, and closed with the finding that no violation of exchange rules had occurred. The customer or firm complaints generally question the prices they received on their filled orders. The other investigations involve allegations of non-competitive trading, wash trading, or the disclosure of customer orders. One investigation is, in part, an inquiry into the opening of trading on October 22. (The staff's investigation of that activity is discussed below.)

The CBT initiated six investigations in MMI futures, opened another investigation following a customer's complaint, and conducted a study of MMI futures trading for that period of time on October 20 when trading in stock index futures was halted at other exchanges. The six investigations are routine analyses of the opening trading period or other active trading periods during the week of October 19-23, one of which was closed with a finding

of no apparent Exchange rule violations. The customer complaint involves a question regarding the price movement of the MMI near the close of trading on October 21.

Commission staff also initiated TPIs to detect possible trade practice violations from October 12 through 23, with particular emphasis on October 16 through 22. Initial computer reports sorted the data in a manner conducive to detecting possible violative activity, and supplementary reports were generated where necessary to focus the analysis. To date, Commission staff has not identified any pattern of futures or options on futures trading which indicates possible violative activity or warrants referral to the Commission's Division of Enforcement or the exchanges for further investigation.

Of the TPIs initiated by Commission staff, three are described below. First, CFTC staff conducted an investigation of an unusual price movement in the CBT's MMI futures contract on October 20 when other stock index futures markets temporarily closed. The investigation focused on trading between 11:00 a.m. and 12:30 p.m. CDT to determine whether the MMI contract's price movement was caused by any violative activity. The investigation found no reasonable indication of price manipulation of the MMI futures contract. 89/

89/ Analysis of Trading in the Chicago Board of Trade's Major Market Index Futures Contract on October 20, 1987. The Division of Trading and Markets published this report because of public interest in the October 20 MMI market

(Footnote Continued)

Second, because of reports heard by Commission staff during CME floor surveillance on the morning of October 22 and of concerns expressed elsewhere, Commission staff investigated the activities of a particular clearing firm, traders clearing through that firm who executed large sell orders during that morning, and the impact of those orders on the price of the December 1987 S&P 500 futures contract. CFTC staff analyzed all trades executed between 8:30 and 10:00 a.m. CDT, particularly the opening five minutes of trading and trading through that clearing firm.

The December S&P 500 futures contract settled at approximately 258 on October 21 but opened at 8:30 a.m. on October 22 at 202. The price dropped to 195 (the low of the day) in the next minute, rose to 200, again dropped to 195 within another minute, and then began rising until it reached 235 at 8:38 a.m. Approximately two minutes before the opening bell, a customer of the clearing member in question submitted a 1200-contract sell order at a limit price of 200.

At 8:34 a.m., after most of the first order had been sold, a second, identical 1,200-contract sell order from the same customer was delivered to the same broker who executed the prior order. However, because of a misunderstanding when the second order was transmitted to the broker, the broker inadvertently

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(Footnote Continued)
move. The Division's findings were supported in the Brady Commission Report. See the Brady Commission Report, pp. VI-68 - VI-69.

oversold 651 contracts. This resulted in a total sale of 3,051 contracts. Consistent with industry practice, the oversold contracts were taken into the clearing firm's error account, resulting in a significant monetary loss to that firm. The 2,400 contracts sold for the customer were executed in forty-two transactions opposite twenty other brokers/traders clearing through twenty-four firms. The 651 contracts filled in error were executed in eleven other transactions, opposite eight brokers/traders clearing through six firms. 90/

The Commission's large-trader reporting system showed that the customer in question assumed a 2,400-contract long position in the S&P 500 contract on October 21. After selling the 2,400 contracts on October 22, the customer had no reportable position. 91/ The sell trades on October 22 liquidated the open long position from October 21 and represented a loss of at least $50 million. Commission staff did not pursue this investigation further because, absent other information, the pattern of trading did not appear to warrant further investigation. 92/ The

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90/ Within the longer time period analyzed on October 22, the clearing firm in question also entered and filled four large sell orders for a pension fund customer between 9:34 and 10:45 a.m. A total of 2,478 contracts were sold at successively higher prices ranging from 230 to 241.

91/ The Commission's reportable level for the CME S&P 500 futures contract is 300 contracts.

92/ The CME Compliance staff also initiated an investigation into this matter. Although the CME has not closed its investigation, Commission staff review of the Exchange's

(Footnote Continued)

liquidation of a large long position established on the previous day (October 21) at a substantial loss through multiple transactions involving many different opposite members and accounts, all at one price, is inconsistent with the selling of futures for the purpose of lowering the market price.

Another area of trading reviewed by CFTC staff was six exchange of futures for physicals (EFP) transactions executed from October 19 through 23. 93/ Following its own recently completed and extensive study of EFPs in all markets, including

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(Footnote Continued)
investigation indicates that information developed by the Exchange generally is consistent with the findings of Commission staff.

93/ EFPs are an exception to the competitive execution requirements of the Act and the Commission's regulations when permitted pursuant to exchange rules which have been approved by the Commission. A stock index EFP is a transaction in which one party buys the cash (stocks) and simultaneously sells futures contracts, while the other party sells the cash and simultaneously buys futures contracts. The price of the futures contract, the quantity of the futures and cash positions, and other terms are privately negotiated by the parties rather than being competitively executed in the pit.

Stock index EFPs usually are priced at a differential based on the current price of the stock at a premium or discount to the fair value of the stock index futures contract. The structure of the EFP makes it a very efficient vehicle to facilitate combined cash/futures transactions, such as stock index arbitrage. The cash component of the transaction involves a basket of stocks whose weighted prices are correlated closely with the value of the index. In the S&P 500 futures contract, for example, the cash leg of EFPs generally consists of about 480 of the 500 stocks in appropriate proportions. The remaining stocks, usually those least capitalized and having the least influence in the index, are omitted due to liquidity or operational barriers.

the stock index futures, 94/ Commission staff gathered and analyzed data related to the six EFP transactions and interviewed traders who had arranged or executed those trades.

The six EFP transactions reviewed were as follows:

(1) On October 19, clearing firm A's house account exchanged 1,000 futures contracts in two EFPs, selling 400 contracts opposite a clearing firm A pension fund customer account and 600 contracts opposite clearing firm B's house account.

(2) On October 22, 4,400 futures contracts were exchanged between clearing firm C's house account and clearing firm D's house account. Clearing firm C bought the futures and sold the cash.

(3) On October 23, clearing firm D, on behalf of a pension fund customer account managed by an institutional manager, exchanged 1,435 futures contracts in three EFPs, selling the contracts opposite three clearing firm E customer accounts managed by that institutional manager, for 820 contracts, 410 contracts and 205 contracts.

Review by Commission staff indicated that the EFPs involved the actual exchange of securities and futures and, further, that there was no question as to the bona fides of these transactions. The EFP between clearing firm A and clearing firm B (1 above) was similar to a number of other transactions entered into by those firms opposite each other between February and October 19, 1987. That EFP, as well as the remaining EFPs, was effected to transfer combined cash/futures positions. Three of the transactions involved customer accounts on both sides (3 above), two involved

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94/ Division of Trading and Markets, Report on Exchanges of Futures for Physicals (October 1, 1987) hereinafter EFP Report.

house accounts on both sides (1 and 2 above), and one involved a house account opposite a customer account (1 above).

Generally, these transactions involved accounts that had an established long futures/short stock position. Such a position "locks in" a profit based on the differential between the futures and cash prices when the position is assumed because the futures contract settles at the price of the cash index. However, when futures prices fall greatly, as they did during the week of October 19, significant margins are required on the long futures position. The cost of maintaining such a position was magnified by increases in CME margin requirements during the week these EFPs were executed. To avoid additional margin calls, the position could be liquidated via an EFP if a counterparty could be found for the transaction.

EFPs provide an efficient means to effect such a liquidation because the party seeking to avoid further margin obligations liquidates its futures position, while the other establishes a new futures position via an EFP. Accordingly, the EFPs reviewed by CFTC staff were consistent with the parties' prior business practices and/or stock index EFP practices as described in the EFP Report. 95/

95/ Ibid., pp. 91-108.

C. Conclusion

The trade practice surveillance systems in place at the Commission have the demonstrated capacity to review large amounts of trading data on an expedited schedule. In particular, the CFTC's computer-assisted trade database and recently required one-minute trade execution times permit effective and prompt evaluations of such data for a variety of purposes. Commission staff conducted floor and computer-assisted surveillance, TPIs, and market studies of trading activity during the week of October 19. Included were three trade practice investigations that focused on trading related to two large market price moves and EFPs. This trade practice surveillance activity did not identify any pattern of futures or options on futures trading which indicates violative activity.

VI. ASSESSMENT OF REGULATORY AND SELF-REGULATORY PROGRAMS

A. The Commission's Market Surveillance Program

The Commission routinely conducts direct, daily market surveillance of all futures and option markets under its jurisdiction. The Commission receives, each day for each futures market, data detailing the total market activity, the aggregate positions and trading for each clearing member (separately for proprietary and customer accounts), and the positions of individual traders in excess of specified reporting levels. Those data are transmitted to the Commission via telecommunications or magnetic tape by exchanges, futures commission merchants, clearing members, and foreign brokers and are available for analysis on a next-day basis.

Preliminary computer processing subjects the data to an array of edit and cross checks among various data items for consistency. Displays of likely errors and inconsistencies allow Commission staff readily to identify and correct likely reporting errors. In addition, using specified identification items, individual trader's positions are combined for all reporting brokerage firms. A variety of computer analyses of large data are available, providing intra- and inter-commodity comparisons of traders by size of positions, trading activity, and deliveries on the underlying contract. Additionally, software systems combine option and futures data, immediately pinpointing those traders who may have exceeded Federal or exchange-set speculative

positions limits. Other software systems are available for retrieving and analyzing historical data for single traders or groups of related traders.

Computer software also is available that provides analyses of prices and price relationships, open contracts, and trading volume, including comparisons with similar periods of time during previous months or years. These various data are useful both for detecting unusual trading patterns or price relationships that might indicate sources of potential market problems and for providing insights into changing market conditions. Analysts frequently contact major traders to discuss new trading strategies and to resolve potential market congestion. In addition, the Commission has broad inspection powers that permit immediate access to records of firms' and individuals' trading activities in futures and related option and cash markets.

Futures exchanges' market surveillance programs also rely heavily on large-trader reporting systems. Exchange surveillance programs periodically are reviewed by the Commission to determine, among other things, whether exchanges are obtaining and analyzing accurate and comprehensive data, whether traders' positions are identified properly and aggregated on the basis of common control or financial interest for speculative limits enforcement and general surveillance, and whether exchange analysts are receiving the information in a timely and usable

manner. 96/ The Commission generally has found that exchanges' large-trader reporting systems meet CFTC standards, and Commission staff has provided, via its rule enforcement program, suggestions to each exchange for improving its systems.

CFTC and exchange surveillance of the four principal stock index futures and their associated option markets was intensified in early October 1987 as markets became more volatile. Emphasis was placed on the S&P 500 futures contract because it has much larger volume and open interest than the other stock index futures. The expiration of the CBT's October MMI future on October 16, 1987, was monitored closely as well.

The results of the ongoing monitoring, analysis, and trade contacts were provided to the Commission and other regulatory agencies throughout the October period. As detailed in the Interim Report, the Commission's staff maintained particularly close contact and cooperation with staffs of the relevant futures exchanges, the SEC, and the Board of Governors of the Federal Reserve System (Federal Reserve Board). SEC staff, in particular, was provided detailed futures position data and, along with staff of the Federal Reserve Board, attended Commission surveillance briefings. 97/

96/ The results of such reviews routinely are published by the Commission's staff. See, for example, Follow-up Rule Enforcement Review of the Chicago Mercantile Exchange, Division of Trading and Markets, June 30, 1987.

97/ See Interim Report, op. cit., pp. 25-29.

Comparable data regarding NYSE activity by firms active in stock index futures, however, were not available on a timely basis as events unfolded. Detailed securities transaction data were not obtained by CFTC or SEC staffs until late November when firms responded to the previously discussed SEC/CFTC survey. While Section III of this report is based in large part on those survey data, the collection of those data was very labor intensive and difficult to standardize, and there was little opportunity to verify the accuracy or consistency of all of the survey information. At present, it is the deficiency in the rapid and accurate identification of timed stock transactions, by beneficial ownership, that is the principal weakness in implementing a comprehensive data system spanning stock and stock index futures transactions.

Commission staff believes a more routine and efficient means of compiling individual account data, for example on arbitrage-related stock transactions, is needed. 98/ In this context, Commission staff is analyzing alternative means and already has taken certain steps to improve the routine collection of futures market information to capture more specific stock index futures data by trading strategy. Such data will be particularly useful in conjunction with improved availability of cash market data. In particular, Commission staff has improved the timeliness of

98/ See also the SEC's report regarding trading on September 11 and 12, 1986, op. cit., Executive Summary.

obtaining profiles of market participants by formalizing and automating what had been a manual method of classifying certain commercial traders' positions in stock index futures. In this context, the staff has flagged, in the account identification system, broker/dealers, whose futures trading is often associated with index arbitrage, and institutional investors, whose futures trading is often associated with portfolio insurance or other hedging strategies. Computer analyses of large-trader data using these profiles enable the staff to evaluate rapidly the aggregate size of certain types of trading strategies and, by reviewing the cumulative daily net position changes, to estimate the volume of those activities on specific dates.

The Commission's large-trader reporting system presently classifies traders, and from those trader classifications assumptions can be made about the trading strategies being employed. Nevertheless, a better way is needed to classify market activity by particular strategies since some traders employ multiple strategies. For example, traders engaged in index arbitrage could be required to conduct all such activity through separately identified futures trading accounts. That trading could then be reconstructed rapidly on an execution-time basis through the futures exchanges' current audit trail systems. Similar procedures could be used to isolate other trading strategies of regulatory interest. Commission staff presently is exploring the most effective means of obtaining, on a routine basis, such detailed data on the magnitude of stock index futures trading classified by principal trading strategies.

B. Daily Price Limits

Daily price fluctuation limits have a long history on futures exchanges. Such rules prohibit trading at prices a specified level above or below the previous day's settlement price. The most often cited rationale for price limits is that they constrain the daily financial exposure of futures commission merchants and clearing members by providing a ceiling on the amount of margin calls due as a result of any day's trading. In addition, proponents of price limits believe they may serve to keep the markets from overreacting to major market news or rumors, particularly during periods of significant uncertainty. The thought is that during such periods the market may temporarily move too far in one direction before reestablishing a less extreme equilibrium and that price limits will prevent participants from being "whipsawed" out of the market, for financial reasons, by the interim fluctuations. This latter argument typically is used with respect to futures markets that play a central role in pricing cash commodities, such as in the grains, and where the futures market is the major price-reference point.

The disadvantages of price limits are also quite straightforward in that they prevent the market from "clearing" on days they are in effect, i.e., some traders will be unable to liquidate their positions, and new orders will go unfilled because the equilibrating price lies outside the daily price limit. This, for instance, makes it difficult or impossible to liquidate or establish hedging positions at those times when

firms particularly may wish to do so. 99/ In addition, of course, daily price limits directly impede the price discovery process and can result in intermarket distortions--and corresponding risks--when comparable limits do not exist for related markets.

Although price limits were at one time uniformly in effect on every actively traded futures contract, 100/ there were none in effect for any of the actively traded stock index futures contracts on October 19, 1987. A trend toward liberalization or abandonment of price limits by futures exchanges began in the early and mid-1970's in response to volatile conditions in the grain markets. In response to episodes of successive "lock-limit days" that occurred at that time, exchanges first increased the levels of their price limits and then adopted rules for "variable" or "expanding" limits. Under such rules, the level of a price limit is increased automatically one or more times (and sometimes removed altogether) after a prespecified number of limit-move days, and the original levels are automatically restored once the limit moves have ceased. The rationale behind

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99/ In this regard, it has been argued that the fear of being "locked in" is an impediment to full commercial participation and liquidity in futures markets. It also has been suggested that the threat of being locked in may precipitate further limit moves on successive days as traders scramble to get out of the market.

100/ In May 1980, the Commission designated the first futures contracts to trade without daily price limits. These were the New York Futures Exchange's foreign currency contracts.

such variable limits is to provide the short-run advantages of price limits but to allow the market to adjust in a more orderly yet timely fashion to the new equilibrium in the event of continued, unidirectional pressure.

Another trend in the liberalization of daily price limits has been their removal from the trading in the nearby (i.e., next to expire) month and, in some cases, the two most nearby contracts. Often used in conjunction with variable limits, the rationale of this provision is to assure that there is always at least one segment of the market (i.e., the lead month) available for trading. Even if trading in the more distant months is impeded by limits, traders can trade in the lead month, on a proxy basis, as a means of covering existing positions or establishing new ones. 101/

As initially designated by the Commission in 1982, several of the stock index futures contracts included price fluctuation limit rules and others did not. However, in many of those cases where price limits were initially in effect, amendments to remove them were subsequently approved. For instance, the CME S&P 500 futures contract had a maximum daily price fluctuation limit at

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101/ In this regard, there generally are no limits on the values for spread transactions, i.e., transactions executed as the difference between a buy and a sell in different trading months. Under the conditions noted above, a spread transaction with one leg in the lead month may be executed as a means of rolling a more deferred position into the lead month where it can be liquidated in the absence of price limits.

the time of its designation in April 1982. The Commission subsequently approved an increase in those limits and, in January 1983, their deletion. 102/

On October 23, the CME, NYFE, and KCBT, by emergency actions, put into effect price fluctuation limits for their actively traded stock index contracts. The fourth exchange with stock index futures trading activity, the CBT, did not implement limits on an emergency basis. Subsequently, however, the Commission has approved permanent limits for the CBT's, CME's, and KCBT's actively traded stock index contracts (Appendix C, Exhibit 1). In each case, the exchanges' rules contain an expansion factor that increases the initial limit by amounts of between 30 and 50 percent after two days of limit moves. In addition, the limits do not apply on the last day of trading in an expiring contract.

Analysis of the recently approved price limits in terms of the 1986 and 1987 daily close-to-close prices of the nearby contracts in the three stock index futures contracts indicates that the limits would have been reached only on October 19, 1987. On that date the base limit level constituted from 37 to 74 percent of the close-to-close range for the spot future. For instance, the closing settlement price for the S&P 500 December

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102/ The CME also has removed all price limits from the Exchange's foreign currency futures (approved by the Commission in February 1985) and all other actively traded financial futures (approved by the Commission in December 1985).

future dropped nearly 81 points between Friday, October 16, and Monday, October 19, while the recently approved price limit is 30 points (37 percent). 103/ There were, however, other time periods when the intraday movement in some stock index futures markets exceeded the levels of the recently approved price limits, and there also were days when price changes approaching those levels were experienced. In submitting permanent price limits rules, two of the exchanges noted that they were continuing to consider alternative approaches or indicated that matters were still under review. 104/ Further, in a January 19, 1988, letter to the Commission concerning price limits for its NYSE composite stock index futures contract, the NYFE stated that it was considering other alternatives.

The price limits imposed by the exchanges appear to strike a balance between the competing benefits and costs noted above. The magnitudes of the stock index futures limits now in place are outside the range of daily price movements typically experienced in the underlying index, yet these limits would have been reached during the trading day on October 19 in the case of each of the

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103/ The base (non-expanded) limit levels for the other two actively traded stock index futures contracts with the October 16 to 19 change in closing prices in parenthesis are: CBT MMI, 40 points (108.50) and KCBT VLA, 35 points (46.90).

104/ Provisions of the Commodity Exchange Act pertaining to exchange emergency actions contain a 90-day limitation on the effective period of such rules. As noted, three of the exchanges implemented their emergency price rules on October 23, 1987, and permanent rules were approved by the Commission on January 21, 1988.

three stock index futures contracts that currently have price limits. 105/

One further observation is warranted. The discussion and analyses in previous sections of this report indicate that, when futures contracts are not accurately reflecting cash market prices, firms are likely to execute desired trades directly in the cash market. Accordingly, if the price fluctuation limits for stock index futures are reached, one effect may be to place additional pressures on the liquidity in the stock market.

C. Interagency Coordination

In today's complex, interrelated financial system the need for continued coordination among the Federal authorities responsible for regulating various segments of the system is undeniable. A significant failure in one segment can have serious repercussions for the other segments. Moreover, since

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105/ In addition to price limits for the above-mentioned futures contracts, the CME also amended the terms of its option on the S&P 500 futures contract to provide that that contract will cease trading in the event that the underlying futures contract reaches its limits. These rules, which were approved by the Commission on January 21, 1988, on a permanent basis, also had been previously adopted as emergency rules. The option on the KCBT's VLA future is currently dormant within the meaning of Commission Rule 5.2, which provides that the option cannot be relisted without an opportunity for review by the CFTC. The CBT is not designated to trade an option on the MMI future, although the American Stock Exchange does trade an option on that index.

the threat of a financial failure could take place in any segment, all regulatory authorities need to be alert continuously to surrounding economic events.

The importance of interagency coordination became increasingly apparent to the Commission in the aftermath of the silver market crisis of 1979-80. Immediately following that situation, the Commission began to seek more formal liaison and information-sharing relationships with other financial market regulators. The Commission established regular interagency financial futures surveillance meetings involving staff representatives of the Commission, the Federal Reserve Board, the New York Federal Reserve Bank, and the Department of the Treasury. When stock index futures began trading in 1982, the Commission also invited Securities and Exchange Commission staff to participate in those quarterly surveillance meetings. At those meetings, which precede the expirations of the major fixed-income, foreign currency and stock index futures contracts, confidential surveillance information about those markets is exchanged. Designated staff members at each of the agencies also have been authorized to share confidential surveillance information more routinely when the need arises.

In recognition of the concerns of banking regulators, in 1982 the Commission also initiated a monthly report in which the reportable futures positions of all banks and savings and loan institutions are provided by CFTC staff to the appropriate regulatory authorities. The recipients of these data include the New York Federal Reserve Bank, the Federal Reserve Board, the

Comptroller of the Currency, the Federal Deposit Insurance Corporation, and the Federal Home Loan Bank Board.

With these interagency liaison arrangements in place, when the events of mid-October unfolded, the Commission immediately began sharing extensive information with appropriate Federal counterparts, particularly the SEC and the Federal Reserve Board. Futures and securities exchanges also maintained close communications among themselves and with the CFTC, SEC, and Federal Reserve Board. The generally excellent information sharing and coordination among the futures and securities industry regulatory and self-regulatory organizations helped to confine the financial strains resulting from the October stock price decline and to avoid a broader, more serious financial crisis.

There is one area, however, in which interindustry coordination could have been better during this period. That involves the closing of trading in individual stocks on the NYSE, especially on October 19 and 20, and, in particular, the confusion concerning the reported imminent closing of the entire NYSE at mid-day on Tuesday, October 20. Futures exchanges were not able to obtain accurate information from the NYSE about the number of stocks that were closed or had never opened. Consequently, the futures exchanges could not determine the exact extent to which trading was occurring in the stocks underlying the indices on which their respective futures contracts are based. Better sharing of accurate, timely information and coordinated interexchange responses to the situation at the NYSE

clearly were needed; the unnecessary closing of any financial market should be avoided wherever possible.

The staff believes that the overall regulatory system worked effectively to help prevent a broader crisis. Staff evaluation of the events of mid-October has not revealed a basis for any major structural change in those systems. Complacency, however, is not in order. The strains placed on the nation's financial system as a result of the collapse of stock prices were sufficiently severe to warrant continuing efforts to identify further areas in which the market surveillance and financial control systems of futures and securities exchanges can be strengthened and to expand existing channels of coordination. In essence, additional emergency preparedness planning from an interindustry perspective is needed.

D. Financial Self-Regulatory Programs

As discussed previously, the staff's assessment of the operation of financial self-regulatory systems during the October stock market decline is contained in the Division of Trading and Markets' Financial Follow-up Report issued January 6, 1988. That report included recommendations with respect to aspects of financial self-regulatory systems that should be given further study to assure that they provide sufficient protection in periods of high market volatility. In particular, Commission staff made the following recommendations:

Clarification of legal relationships between clearing organizations and clearing banks. Based upon a review of the operation of futures clearing systems during the October 19-23 period, Commission staff concluded that the clearing and banking systems for the settlement of variation margin operated effectively in making daily and intraday margin settlements, which at the CME and CBT totaled nearly twice the number normally made in less volatile markets. However, to assure that variation margin transfers in volatile markets are not impeded by a lack of clearly defined relationships among key participants in the settlement process, the staff recommended that the legal relationships between clearing organizations and settlement banks be clarified to ensure that they adequately establish the finality of settlement bank confirmations of variation margin payments.

Availability of the Fedwire in exigent market conditions. On October 19 and October 20, 1987, banks of the Federal Reserve System accommodated the increased margin flows generated by frequent intraday margin calls by keeping the Fedwire open later than usual. A number of market participants have cited potential benefits that might have accrued from early opening of the Fedwire during that period. The staff recommended that mechanisms for expanding the capacity of the system to transfer funds in periods of extreme volatility, for example, a special procedure for opening the Fedwire early or extending its hours, be explored.

Settlement banks' access to financial data. The ability of settlement banks to evaluate the creditworthiness of holders of clearing firm accounts could be enhanced by measures to assure that such banks receive prompt notice of variation margin obligations and have access to data concerning other variation settlements with respect to their customer clearing member firms. The specific measures identified by the staff that could facilitate bank credit determinations and verifications of the availability of funds to satisfy variation obligations include: providing notice to settlement banks of clearing firm obligations on the evening preceding the daily morning settlement; fostering interbank communication concerning the aggregate variation payments and collects for individual clearing firms; and, with the consent of clearing firms, sharing actual clearing member position data among the banks with which the member maintains a banking relationship.

Intraday margin calls. Commission staff also recommended that the use of intraday margin settlements (both pays and collects) on a daily basis or with increased frequency be considered as a potential means to enhance the ability of the settlement system to function smoothly in times of extreme volatility.

FCM collection of customer margins. A staff survey of twenty-three FCMs concerning customer defaults and liquidations of customer positions in the S&P 500 futures contract elicited data on a sample basis reflecting that liquidations resulting in customer deficits represented a very low percentage of those

FCMs' adjusted net capital and total customer equities. Those data also indicated a disproportionate incidence of such liquidations in accounts attributable to foreign-based traders. The staff therefore recommended that FCMs review their procedures to assure that they obtain adequate security from foreign customers to protect against aberrant price fluctuations and attendant high margin calls.

Financial adequacy of margin levels. While Commission staff's review indicated that applicable margin requirements afforded adequate financial security during the October 19-23 period, the staff recommended that the futures SROs review the adequacy of clearing and customer margin levels to protect against aberrant price spikes and extreme volatility. In particular, the staff recommended that consideration be given to the addition of a percentage "cushion" to margin levels derived from moving averages of historical volatility to establish greater protection against unexpected price spikes and that margin systems be reviewed to assure that they adequately address the increased risks created by undiversified or concentrated positions. 106/

Enhancement of financial surveillance data systems. Commission staff is exploring several ways in which existing data,

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106/ While the staff's recommendations focused on futures oversight issues, the staff also recommended that the futures SROs carefully review the adequacy of option margin levels to assure their sufficiency in volatile markets.

particularly the large-trader and exchange clearing member position data currently collected and used by the Commission and futures exchanges for market and financial surveillance, could be refined to conduct more effective financial surveillance. The staff is developing new formats to aggregate and analyze existing data to generate additional financial surveillance information of use to, but not generally immediately available to, the futures SROs. Such data also would be useful to the SEC and the securities SROs for dually-registered firms and could be made available in appropriate cases to foreign regulators.

The futures clearing organizations and the SRO audit and financial surveillance staffs now routinely conduct daily financial surveillance over their member FCMs. In this connection, they use large-trader, margin and debit/deficit data for positions held in their markets, and pay and collect (daily margin settlement) data for all markets that currently participate in the Board of Trade Clearing Corporation's data-sharing system, which provides data concerning clearing firms' pays and collects and risk projections based upon such data. Those data indicate circumstances where a firm's financial position may be in jeopardy, thereby facilitating identification of those firms that merit intensified surveillance, including on-site audit work or other intervention.

Use of Intermarket Trade Data for Financial Surveillance. Commission staff continues to believe that aggregated intermarket position data should be shared among regulators and self-regulators for fully effective financial surveillance of

firms' position concentrations in related markets. In the past, the SROs have resisted attempting routinely to collect and share these data directly because of the sensitivity of position data generally and because of confidentiality concerns. As discussed below, the staff is pursuing several avenues to augment the availability of such intermarket data. In this connection, CFTC staff believes that the Commission's existing large-trader and clearing member data base may permit the Commission to act as the repository for aggregate position data for financial surveillance purposes. Aggregate data could be made available to exchanges and other regulators during periods of volatile markets to identify concentrations of similar or related positions in futures held by customers and/or by clearing firms on multiple exchanges that may pose a possible financial threat to a clearing firm. Such intermarket position data would be useful not only to the futures SROs but, where firms or customers also are involved in the securities markets, to the SEC and the securities SROs. Additionally, once established, such a program could provide a model for routine compilation of data to permit ongoing, daily assessments of full intermarket exposures, including domestic and foreign securities as well as futures positions. Commission staff is taking steps to determine what systems changes or refinements would be necessary to produce aggregate intermarket position data for financial surveillance purposes for those markets regulated by the CFTC.

Continuous Input of Trade Data. The Financial Follow-up Report discussed the feasibility of continuously inputting trade

data from the trading floor and recommended making such data available on an on-line basis to financial surveillance personnel to facilitate financial surveillance of margins and open positions on a more current basis. At present, the most recent trading data available to financial surveillance personnel at most SROs is as of the close of business of the prior trading day. Enhancing computer systems to render such data available on a more current basis, consistent with exchange trade-data collection schedules, could enhance self-regulatory financial and clearance systems in several ways. For example, the availability of on-line information to financial surveillance personnel at SROs would assist them in identifying large traders with significant accumulated losses on positions established during a particular trading day. In addition, the continuous availability of such data may enhance the effectiveness of existing SRO systems for the identification and resolution of outtrades.

Development of central computerized financial data base. To facilitate financial surveillance and analysis of FCM financial positions, financial information should be maintained routinely on a computerized data base that would be accessible to the Commission as well as to all SRO financial surveillance staff. The Commission currently maintains financial information filed by FCMs in hard copy and computerizes a limited amount of such data. The staff is reviewing potential measures that may be taken by the Commission and futures SROs to establish a centralized data base for FCM financial data.

Ongoing Evaluation. The CFTC staff currently reviews the adequacy of the design and execution of financial compliance programs of the various SROs and recommends or requires adjustments as may be necessary.

E. Intermarket Frontrunning

Frontrunning can be defined generally as conduct that entails trading while in possession of nonpublic information concerning orders or transactions that affect or could affect the market price of the instrument purchased or sold. 107/ Historically, the concept of intermarket frontrunning has been deemed applicable to activity involving nonpublic information about securities or securities option "block" orders and related trading in those markets. 108/ Recently, however, a question has been raised as to the applicability of the concept of frontrunning to intermarket activity between securities or securities option block orders and trading in stock index futures contracts or options thereon. 109/

107/ See A. Bromberg & L. Lowenfels, Securities Fraud and Commodities Fraud, vol. 3, ¶7.4 (135)-(136) (1986).

108/ See Poser, "Spotlight on Frontrunning," Investment Dealers' Digest 18 (1984). A block order generally is defined as an order for either 10,000 or more shares or a quantity of stock having a value of $200,000 or more. See, e.g., New York Stock Exchange Floor Official Manual, p. 38.

109/ See the Katzenbach Report, pp. 23-24. That report included reference to trading activity by a firm involving futures trading for a proprietary account and securities trading for

(Footnote Continued)

What constitutes frontrunning under particular market circumstances is not always clear. 110/ Although provisions of the federal securities laws and the Commodity Exchange Act may be applicable to particular instances of frontrunning, 111/ no provision in either statutory scheme specifically addresses frontrunning. Similarly, the rules of securities, securities option, and futures exchanges do not specifically address inter-market frontrunning.

Securities and securities option exchanges have sought to address frontrunning through issuance of circulars pursuant to exchange rules that generally prohibit acts in violation of "just

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(Footnote Continued)
customer and proprietary accounts on December 19, 1986. The firm in that case was a member of the securities exchange in question, had a discretionary order to trade securities for the customer (which it held during the day and did not disclose despite a request by the securities exchange that market-on-close orders be disclosed), and also traded securities for its proprietary account on the close. Given these facts, such activity should be cognizable under securities laws.

Notably, no allegations of frontrunning involving trading in stock index futures or options on futures during October 1987 have been brought to the attention of Commission staff.

110/ The SEC has stated that "[t]he line which separates appropriate hedging and other legitimate activity and frontrunning is not always clear." Chicago Board Options Exchange Rule Proposal, Securities Exchange Act of 1934, Release No. 14156 (Nov 9, 1977).

111/ See, e.g., Securities Exchange Act of 1934 §§10(b), and 14(e); SEC Rule 10b-5; Commodity Exchange Act §4b (1986); and Commodity Exchange Act §9(b) (1983). To date, the staff's research has not identified any cases brought by the SEC under the foregoing securities statutes and rule charging frontrunning as described above.

and equitable principles of trade." 112/ Significantly, futures exchanges have similar rules that, among other things, prohibit acts that are in violation of "just and equitable principles of trade" or are "substantially detrimental to the interest or welfare of the Exchange." 113/ In fact, the CME, CBT, KCBT, and NYFE, which trade stock index futures contracts, likewise take the position that frontrunning can constitute a violation of such exchange rules. 114/ Accordingly, intermarket frontrunning activity involving stocks, stock options, and stock index futures and options thereon can be a violation of the rules of all relevant exchanges. 115/

Notwithstanding the existence of futures exchanges' rules that address frontrunning activity under appropriate

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112/ American Stock Exchange Information Circular 82-37 (July 6, 1982); Chicago Board Options Exchange Information Circular No. 23 revised (Feb 21, 1986); NYSE Information Memo 85-36 (1985). The disciplinary actions that have been discussed in publications are few in number and focus on frontrunning of customer orders in favor of proprietary accounts.

113/ See, e.g., CME Rule 432(q), CBT Rule 504.00, NYFE Rule 501(a)(iv), and KCBT Rule 1173.00. Futures exchanges, in accordance with Commission Regulation 155.2(a) and (b), also specifically prohibit trading in the futures and futures option markets ahead of a customer's order for purchase or sale of a futures or futures option contract. See, e.g., CBT Rule 350.05 and NYCE Rule 1.05(a).

114/ Letters from the CME, CBT, KCBT, and NYFE to the Division of Trading and Markets dated April 6, April 15, May 7, and May 1, 1987 respectively.

115/ Section 8a(1)(A) of the Commodity Exchange Act provides that, if an exchange fails to act, the Commission may take disciplinary action in accordance with the exchange's rules.

circumstances, the CFTC staff is continuing to consider this issue. In that regard, CFTC staff believes that it is necessary to establish standards for identifying potential intermarket frontrunning trading patterns and a mechanism for the timely and effective communication of market surveillance data related to possible frontrunning activity among all exchanges with common self- regulatory interests. The Intermarket Surveillance Group (ISG), of which all securities and securities option exchanges are members, appears to be an appropriate forum for facilitating the communication of such market surveillance data. The ISG has considered frontrunning issues in the past, and futures exchanges that trade stock index contracts have participated as observers in an ISG subcommittee. Currently, the ISG is considering the manner in which futures exchanges could be included more formally in its deliberations. The Commission believes that some manner of formal recognition of the futures exchanges by the ISG would contribute significantly to addressing common surveillance concerns of all exchanges. Lastly, CFTC staff also is considering whether it is advisable to recommend a regulation establishing a minimum futures industry standard for the prohibition of frontrunning activity involving transactions on futures exchanges.

APPENDIX A

Description of Trading Proxy Index Construction

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The percent changes between five-minute periods for capitalization-weighted subsets of the S&P 500 index were calculated for all five-minute intervals during the day. The index value of a given day's trading proxy was normalized to the S&P 500 in a five-minute period of the day in which surrounding price movement was small and a large proportion of both the S&P 500 index and the trading proxy index stocks traded. The trading proxy index estimate was obtained by taking the value of the S&P proxy subset and multiplying it by that portfolio's normalization factor.

This procedure assumes that the trading proxy index subset is a good proxy for the S&P 500. To examine this assumption, the capitalization-weighted betas of the nine trading proxy subset portfolios (whose number of stocks ranged from 54 to 165) were calculated. They were close to the S&P 500 portfolio beta of 1.00, ranging from 1.03 on October 22 to 1.10 on October 20 and averaging 1.06.

For each five-minute period during each day under study, the trading proxy index value was subtracted from the CME S&P 500 futures price to calculate an estimate of the basis that existed at that point in time. The futures price used to calculate this basis value was that which was closest in time to the capitalization-weighted average time of observations in the trading proxy subset in that five-minute interval.

Values of the indices and the bases were not reported in Appendix B, Exhibits 1-18, if the capitalization-weighted time of the prices was outside the range of that interval. 1/ For example, if the capitalization-weighted transaction time in the 9:35-9:40 a.m. interval was 9:34 (assigning closing values from the prior day a 9:00 a.m. time), then that interval was dropped from the exhibits.

1/ As noted in Section II of this report, one of the criteria for inclusion in the proxy index was that a stock trade in at least ninety percent (rather than all) of the five-minute intervals during the day.

APPENDIX B

Reported and Proxy Basis Charts for the S&P 500 Index

S&P 500 Index, Trading Proxy Index and December Future

October 14, 1987

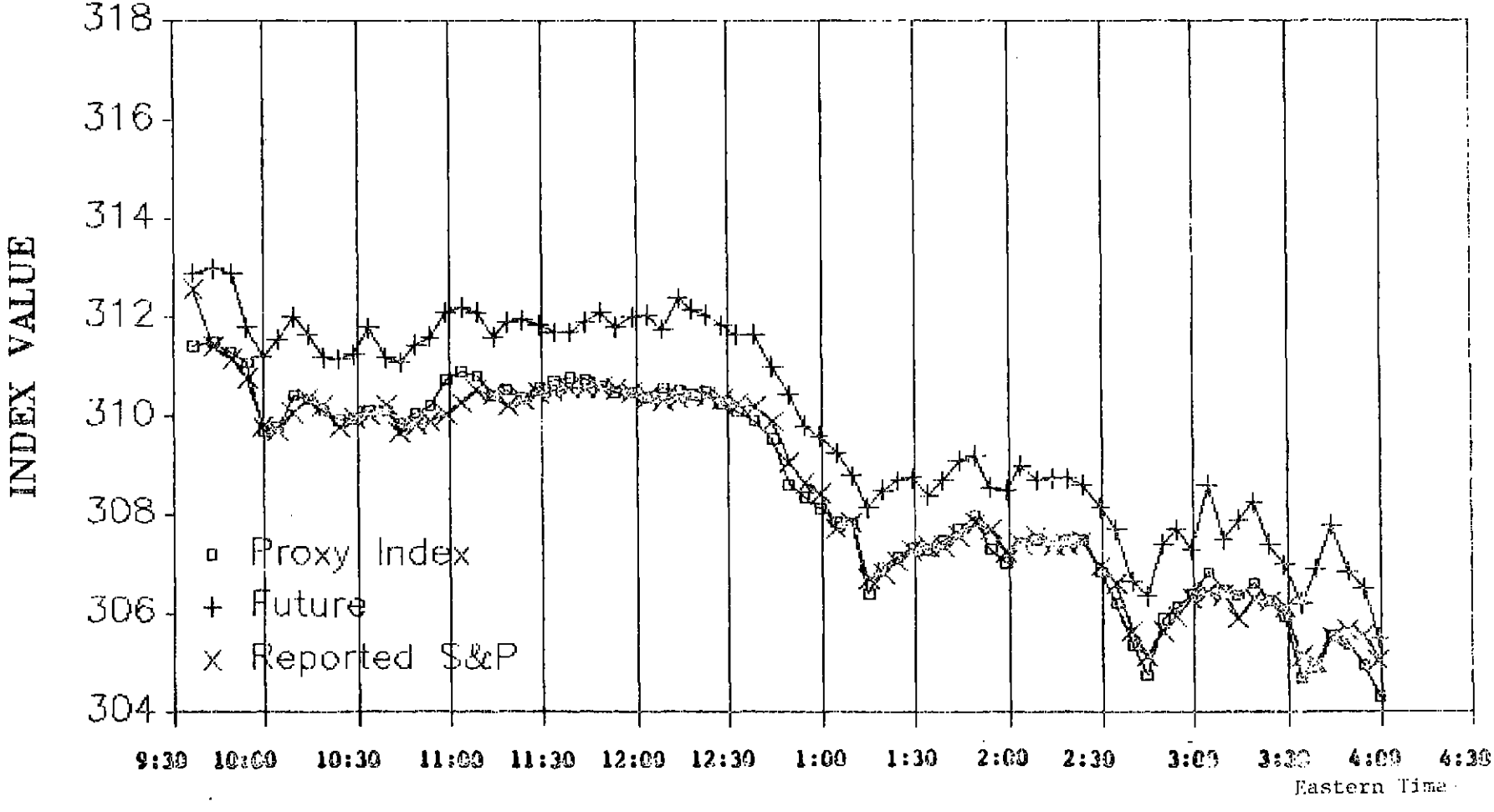


EXHIBIT B-1

S&P 500 Index, Trading Proxy Index and December Future

October 15, 1987

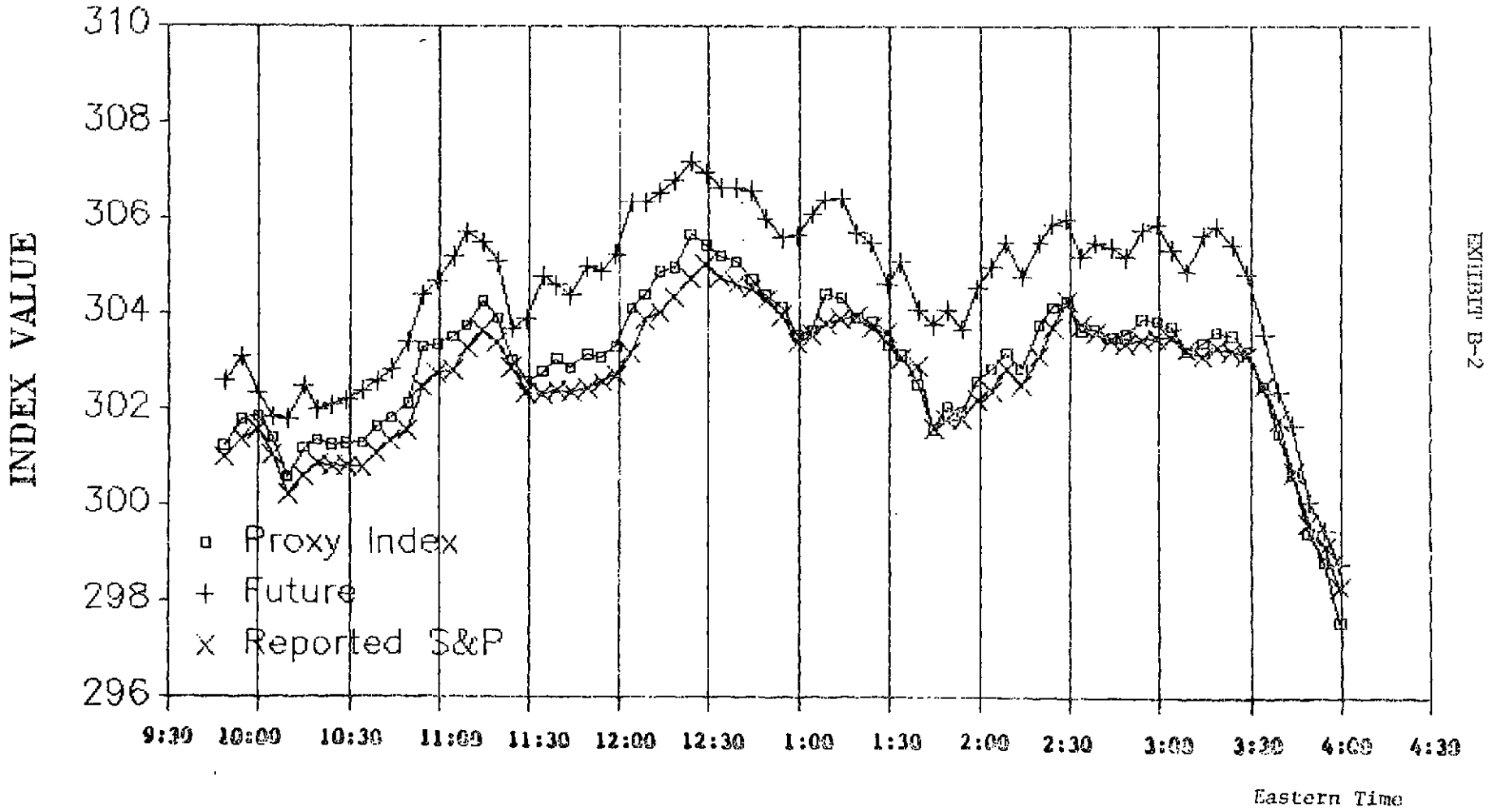


EXHIBIT B-2

S&P 500 Index, Trading Proxy Index and December Future

October 16, 1987

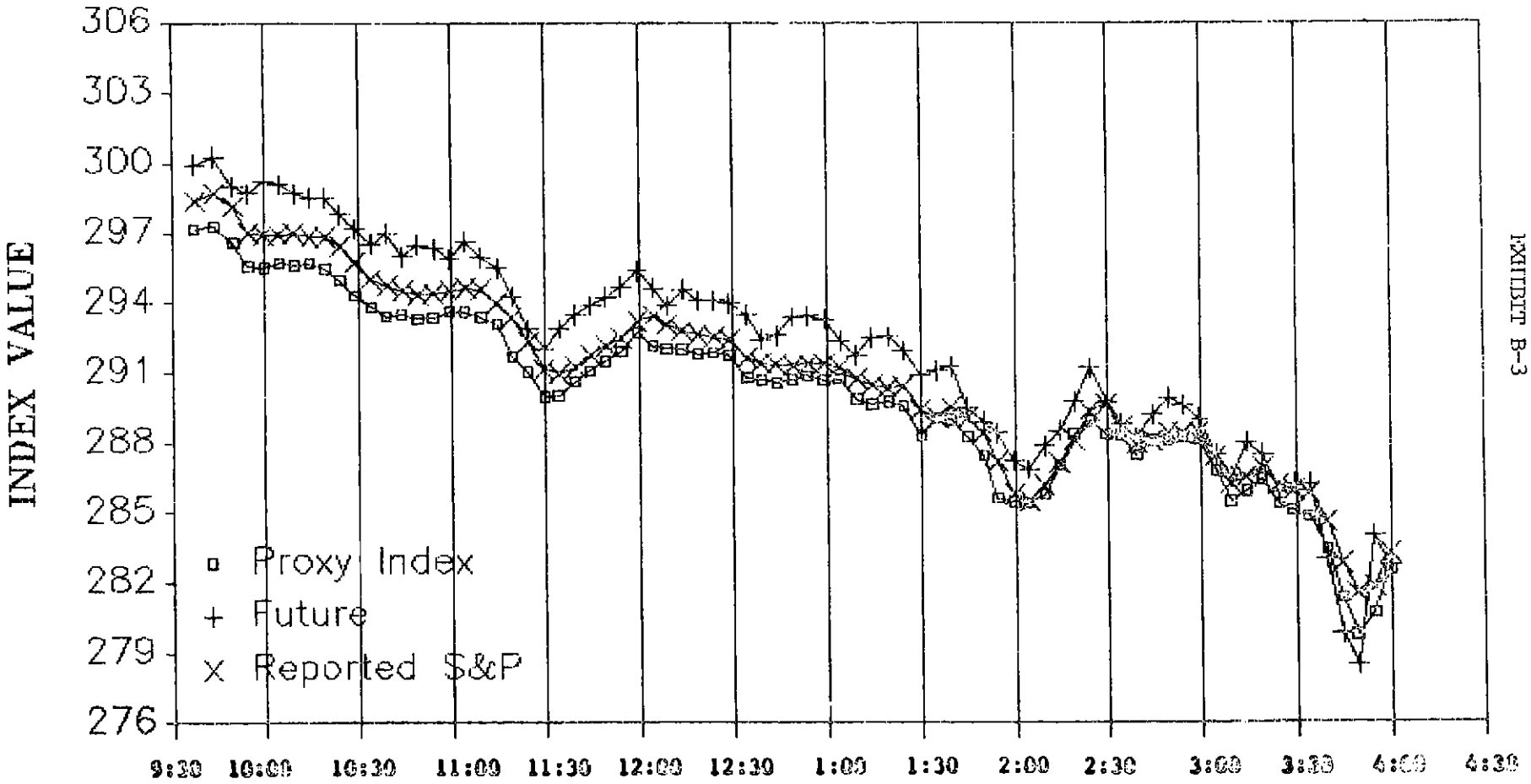
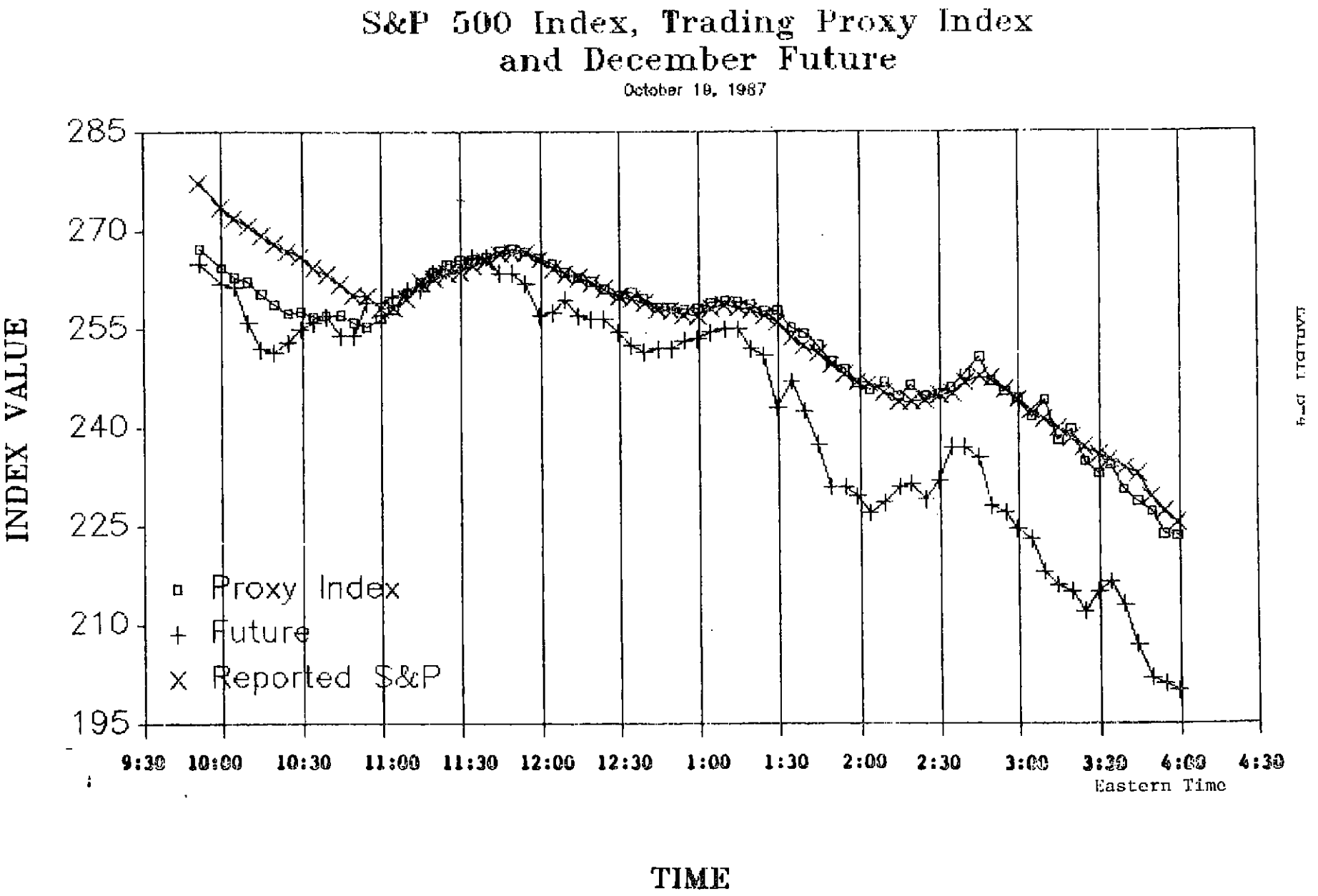


EXHIBIT B-3


S&P 500 Index, Trading Proxy Index
and December Future
October 19, 1987
285
270
255
240
225
210
195
INDEX VALUE
Proxy Index
Future
Reported S&P
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
Eastern Time
TIME

S&P 500 Index, Trading Proxy Index and December Future

October 20, 1987

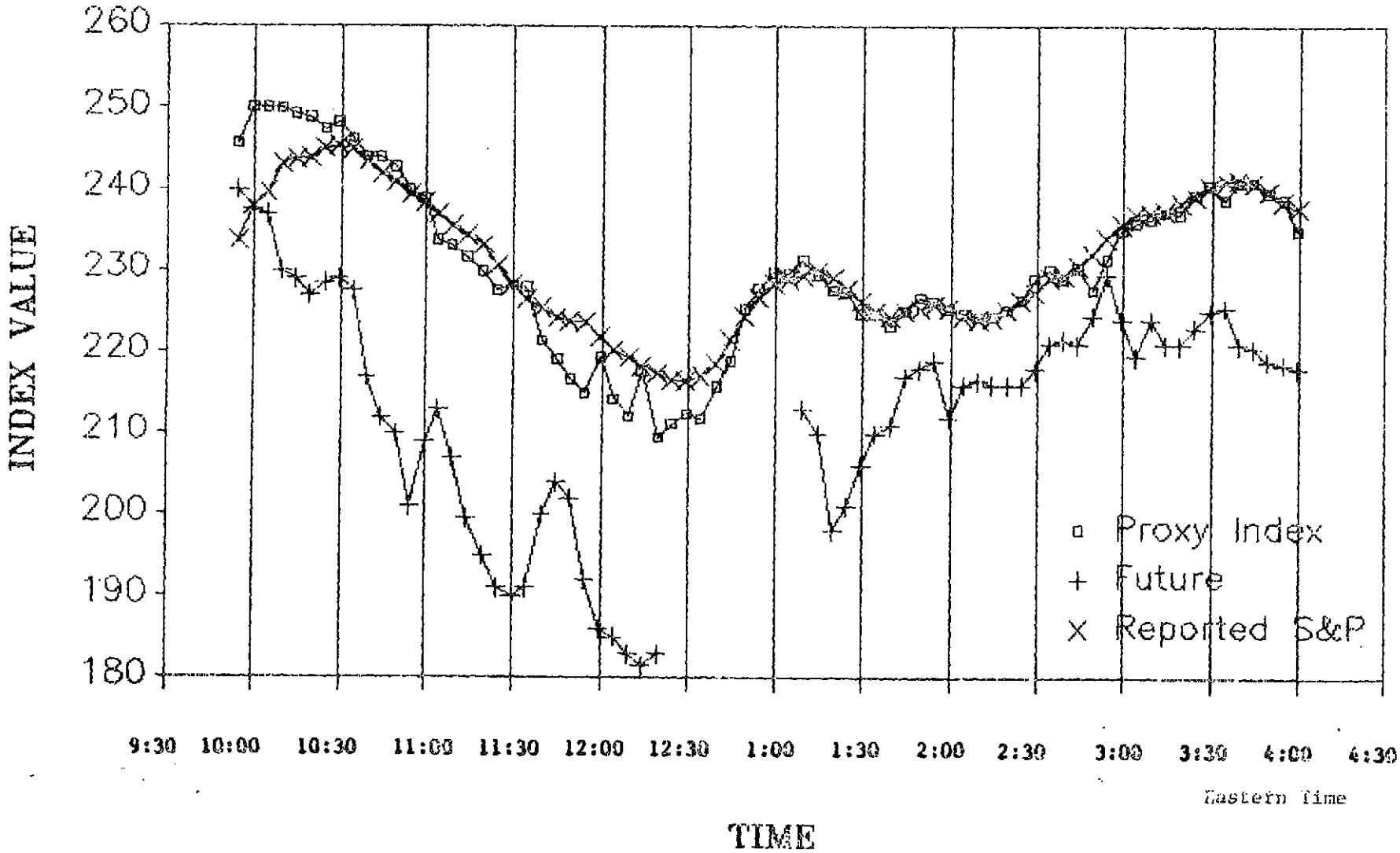


EXHIBIT B-5

S&P 500 Index, Trading Proxy Index and December Future

October 21, 1987

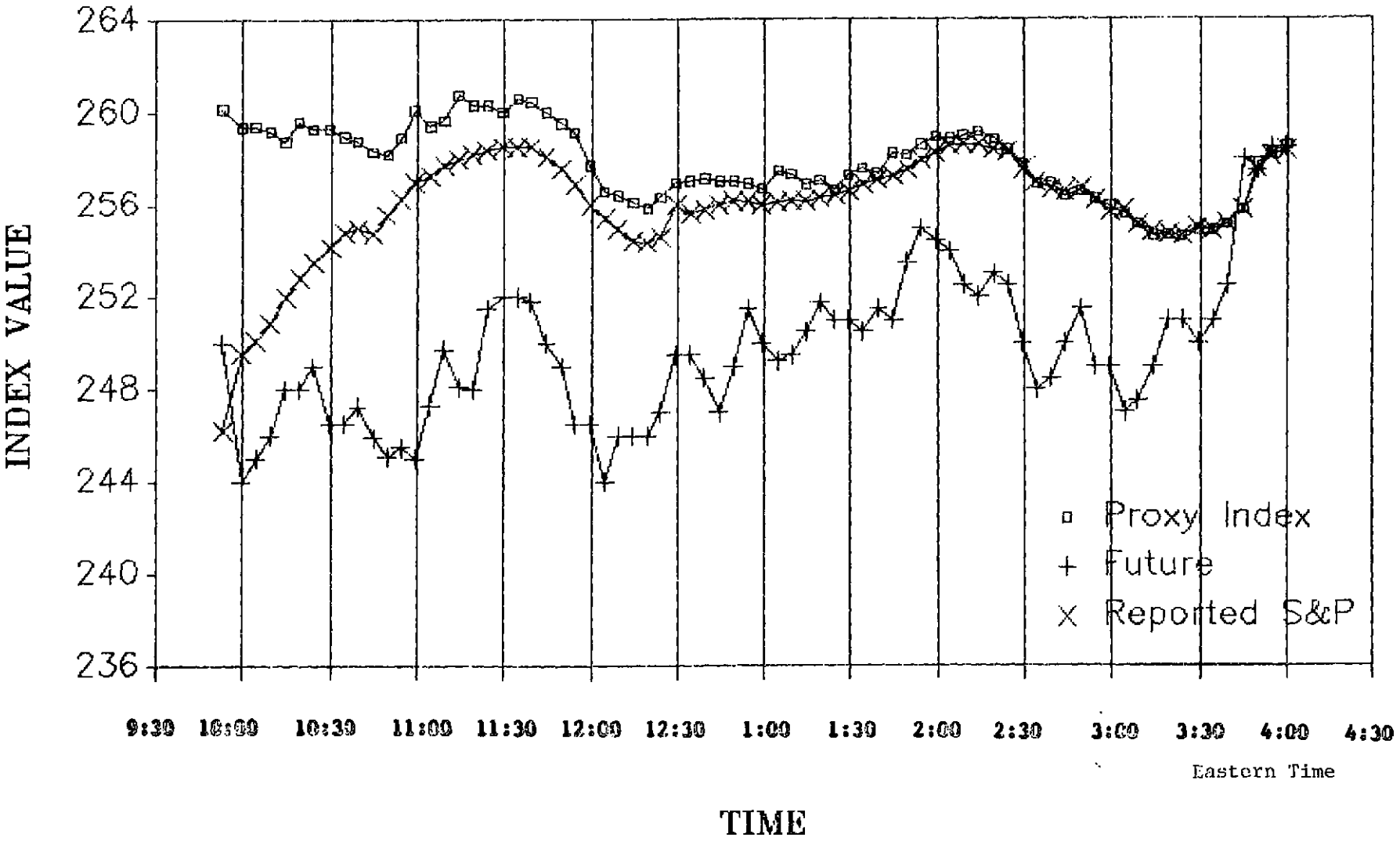


EXHIBIT B-6

S&P 500 Index, Trading Proxy Index and December Future

October 22, 1987

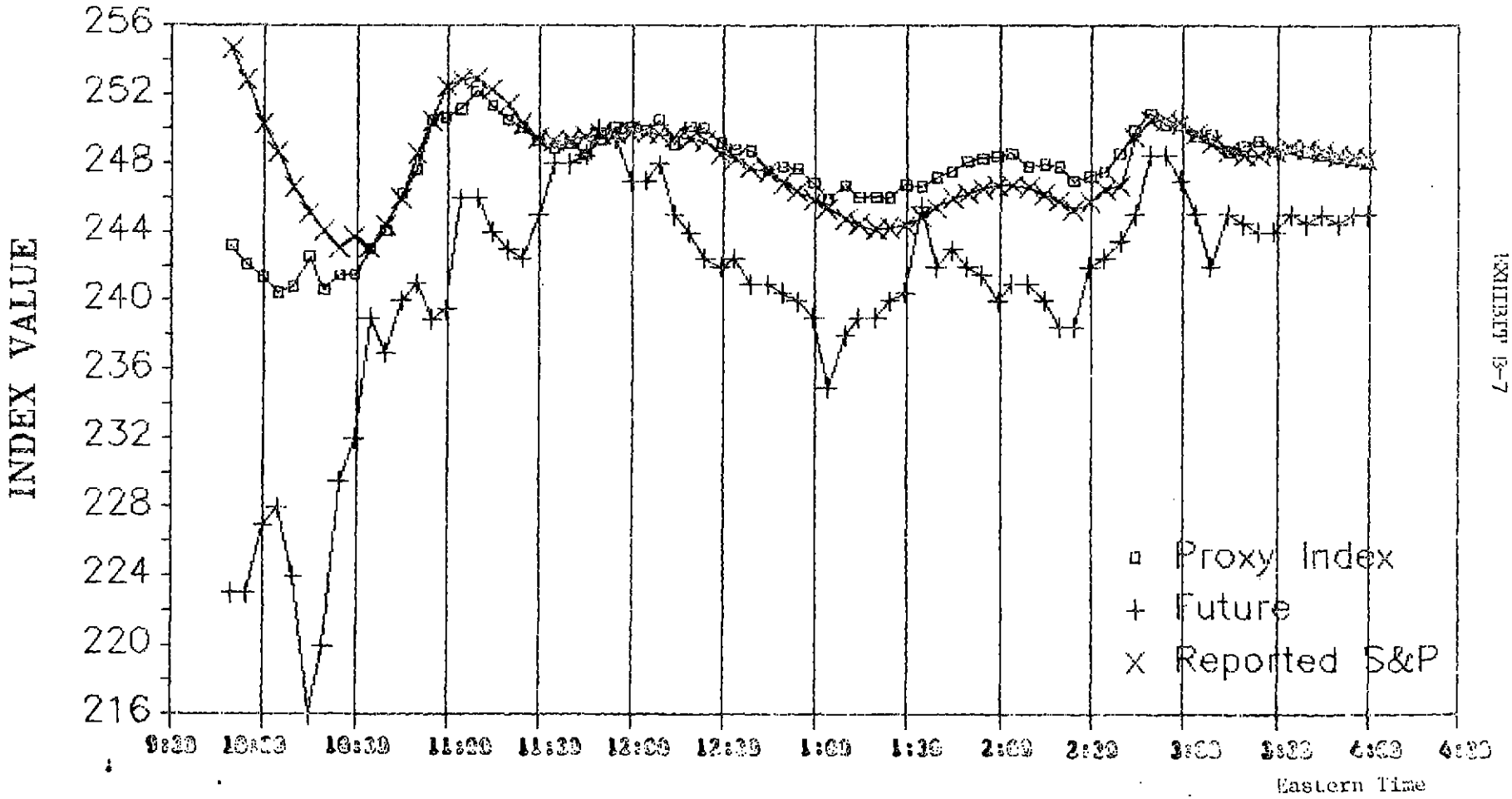


EXHIBIT 3-7

S&P 500 Index, Trading Proxy Index and December Future

October 23, 1987

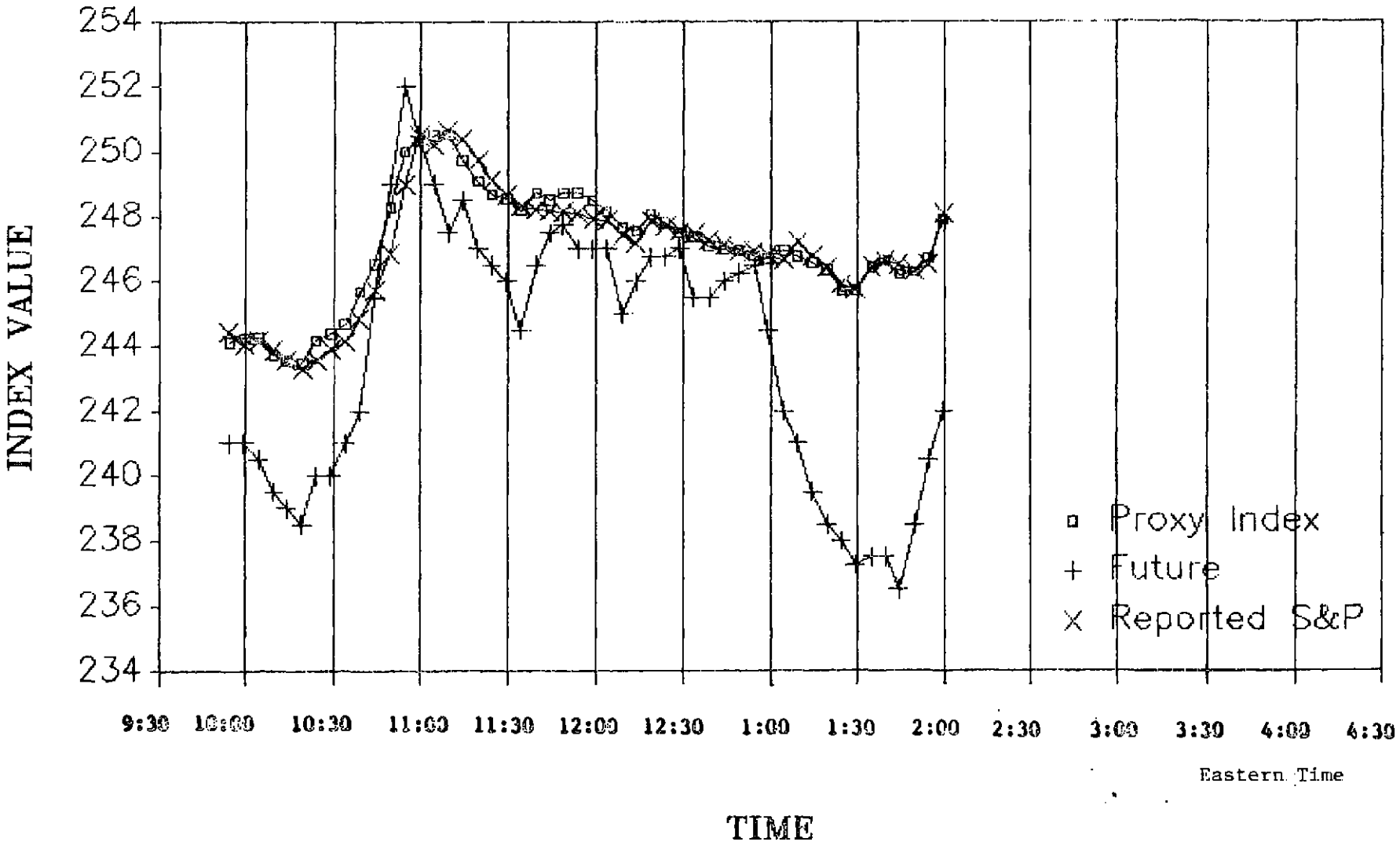


EXHIBIT B-8

S&P 500 Index, Trading Proxy Index and December Future

October 26, 1987

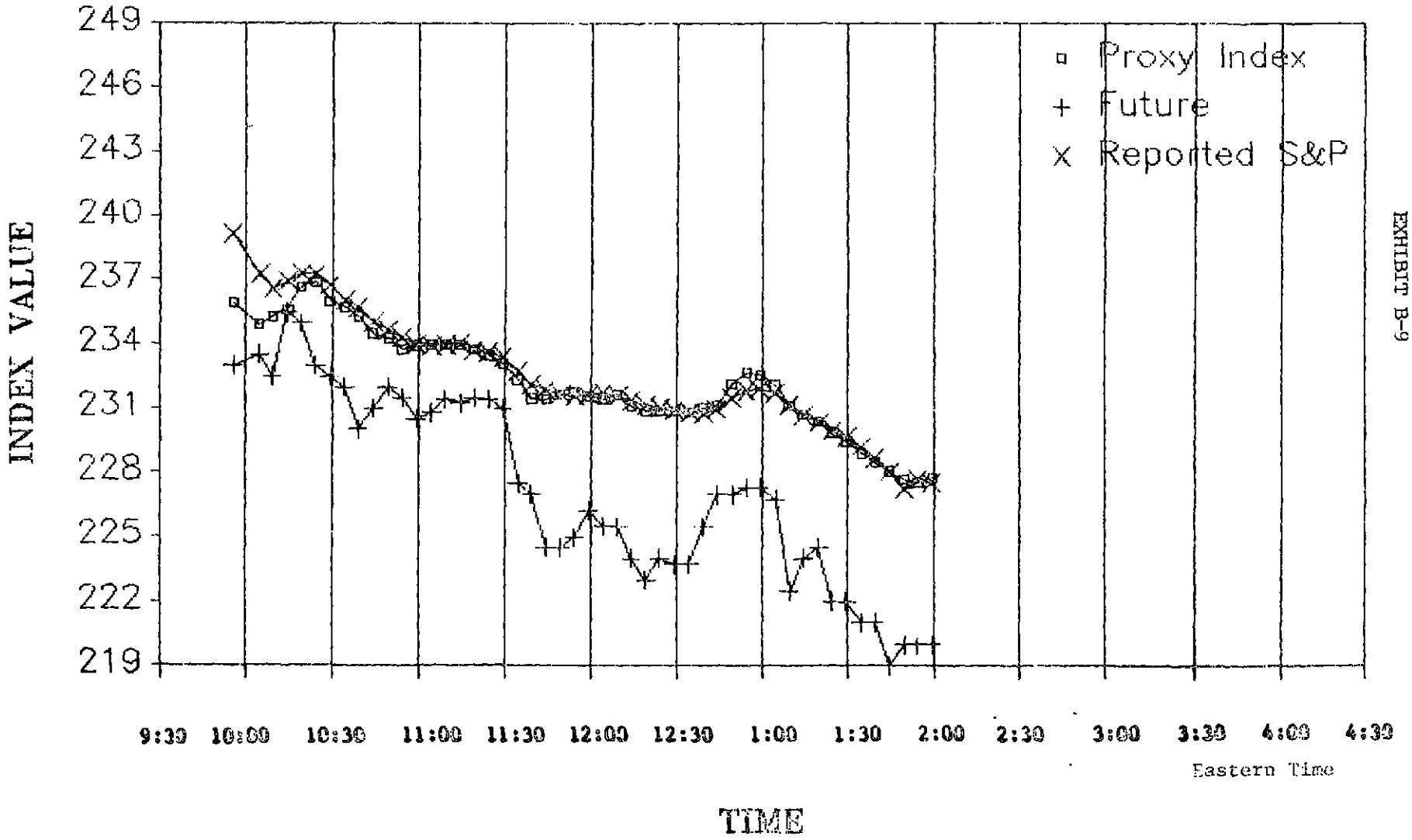


EXHIBIT B-9

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future – Index)

October 14, 1987

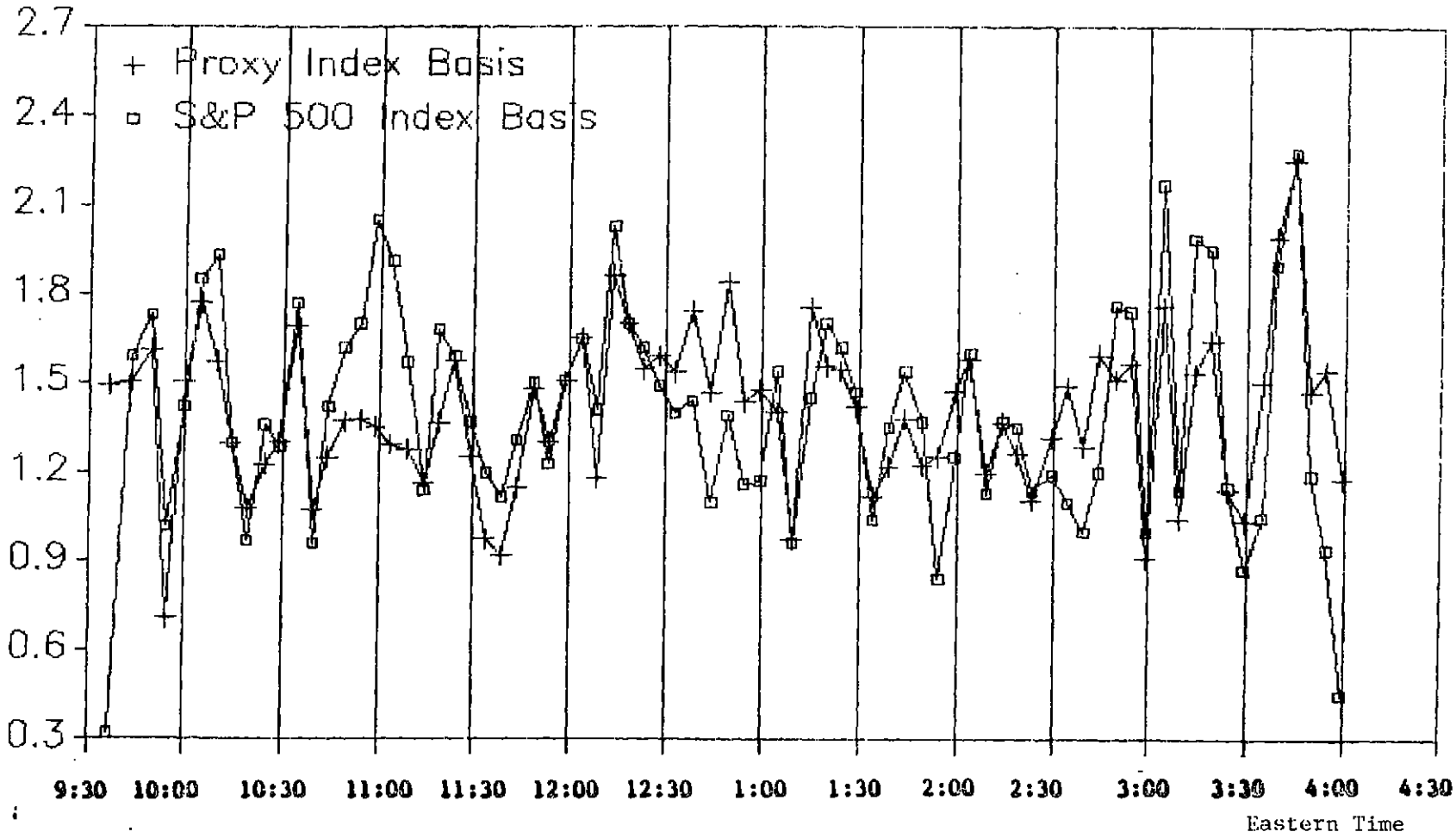
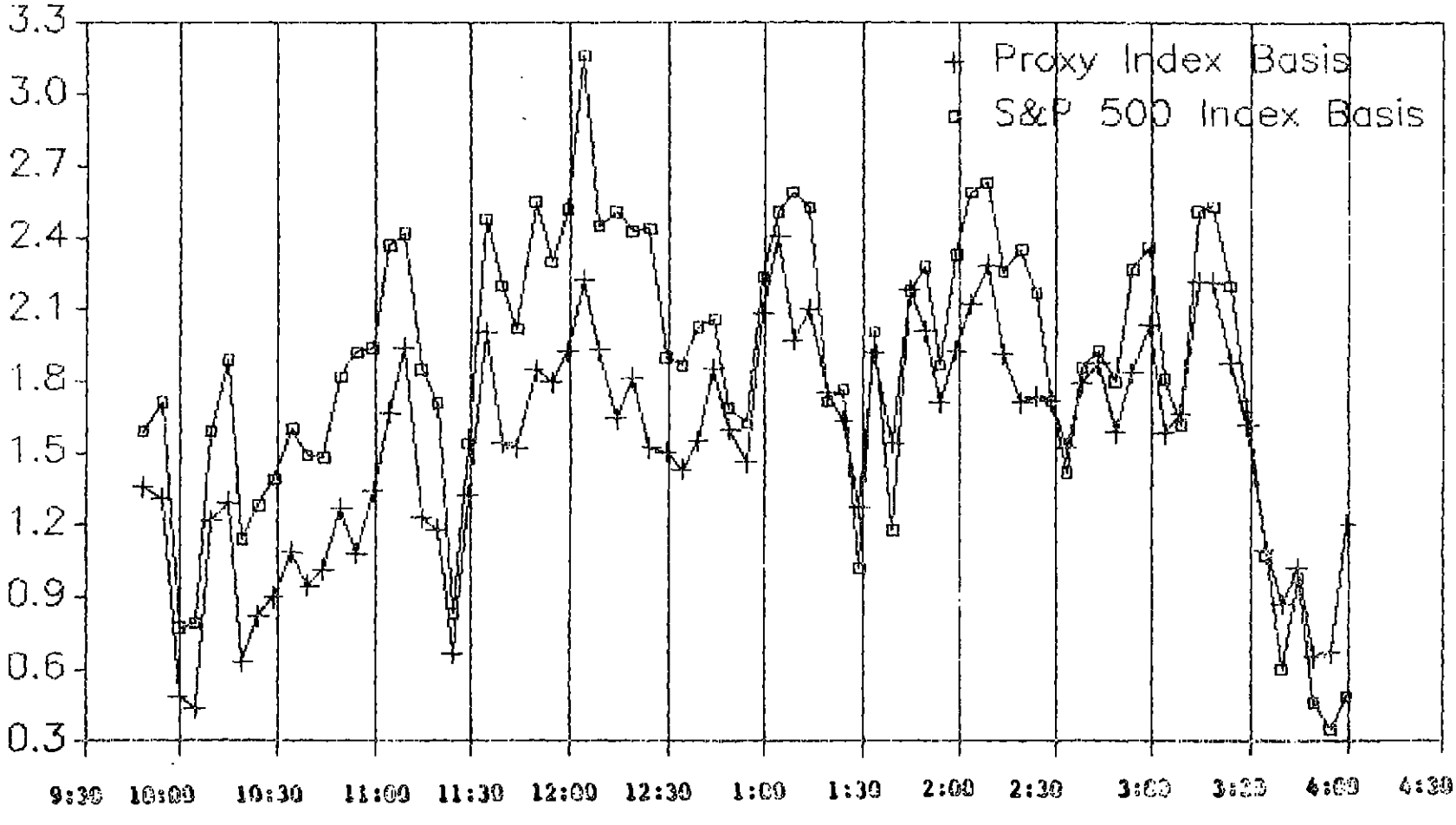


EXHIBIT B-10

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future – Index)

October 15, 1987



BASIS

TIME

EXHIBIT B-11

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future − Index)

October 16, 1987

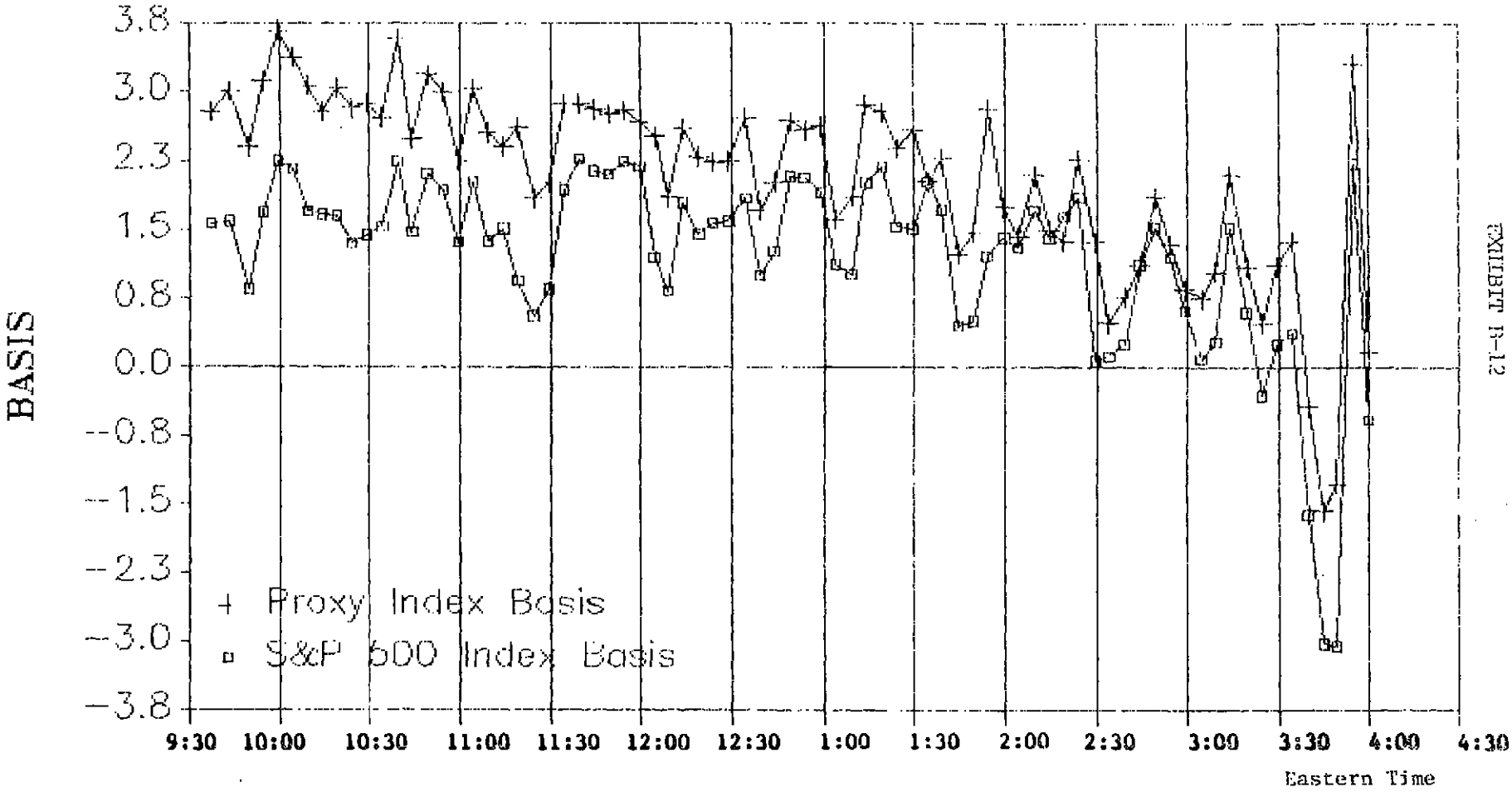


EXHIBIT B-12

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future–Index)

October 19, 1987

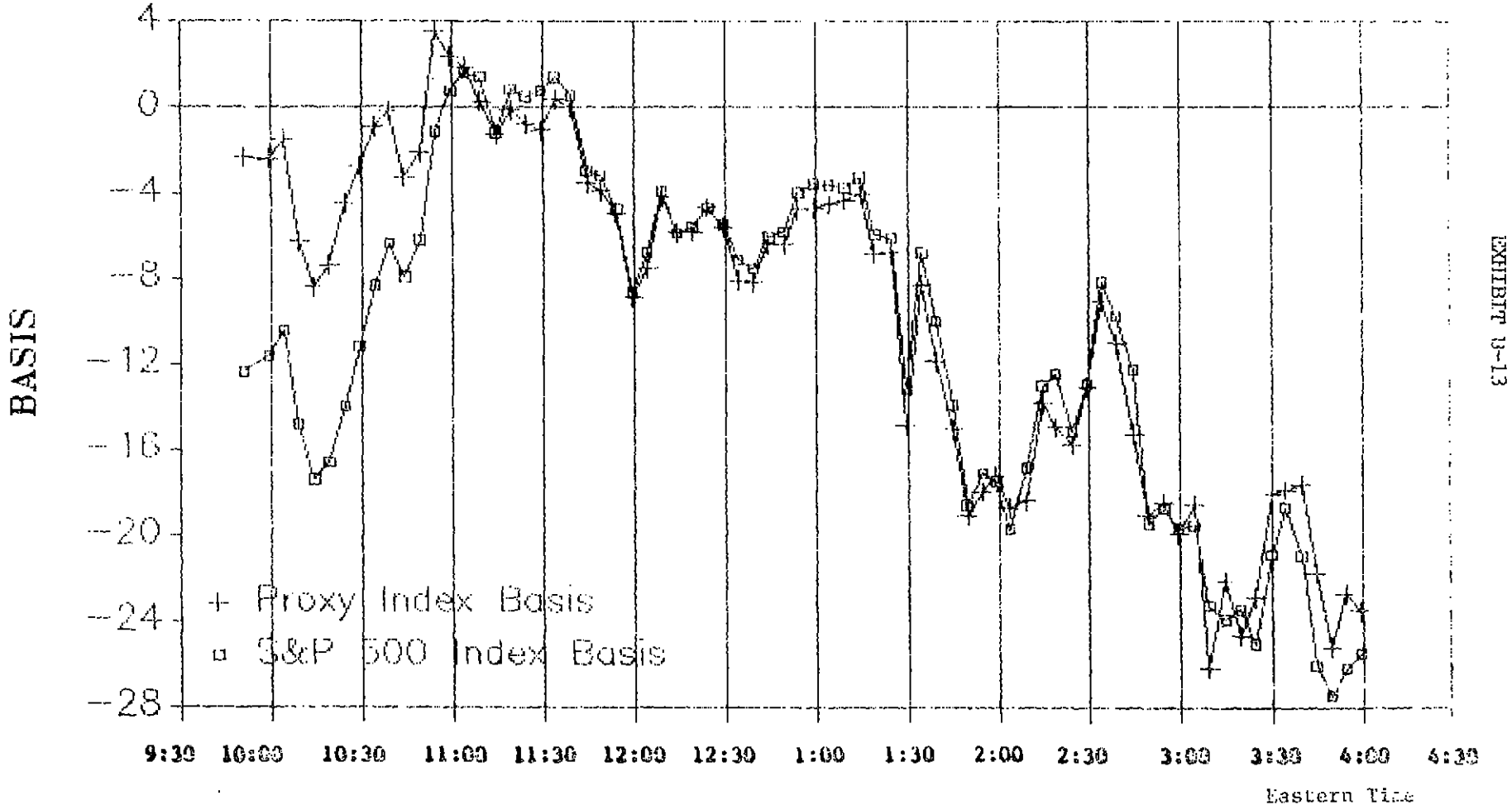
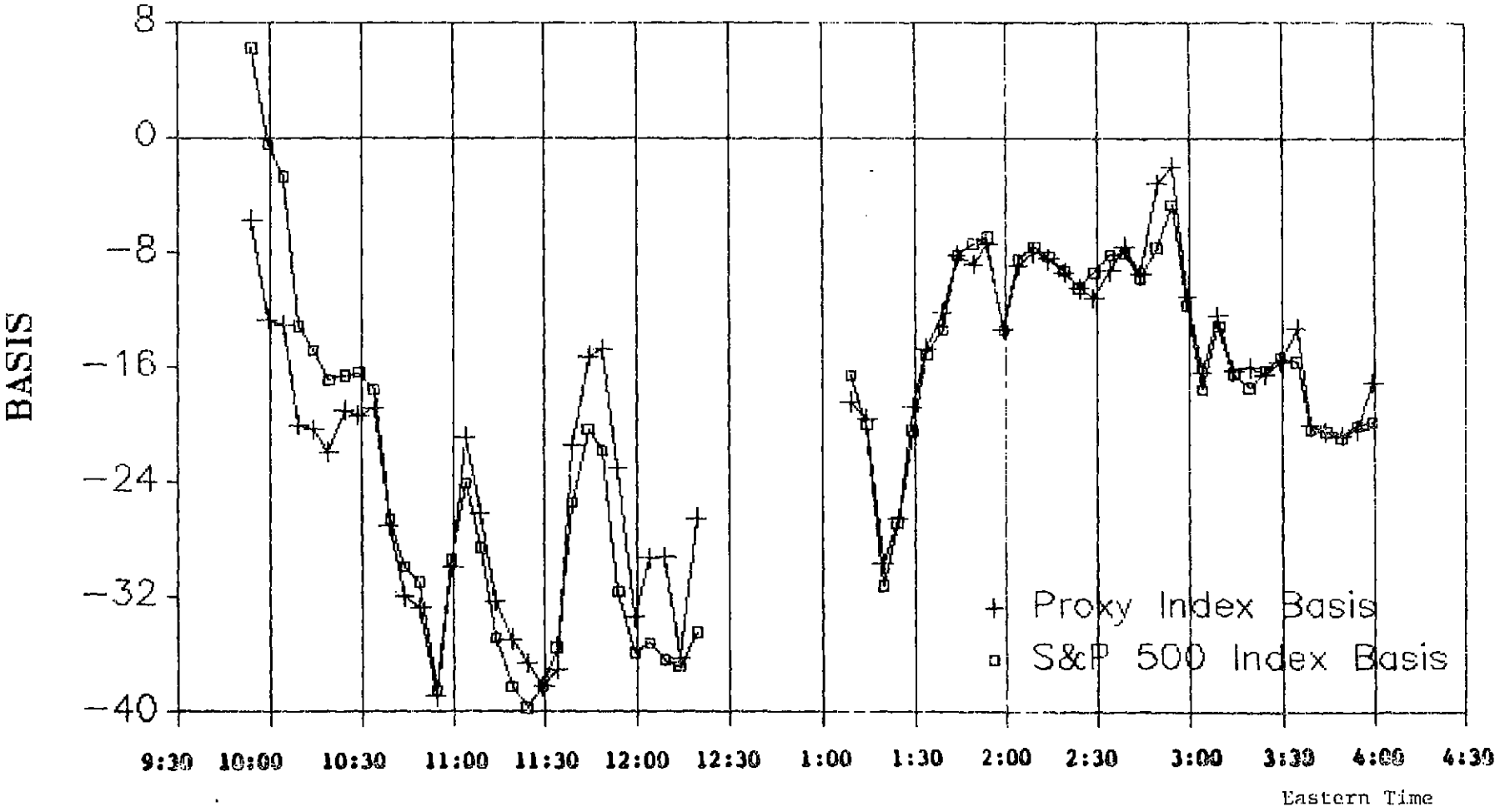


EXHIBIT IV-13

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future – Index)

October 20, 1987



TIME

EXHIBIT I-14

S&P 500 Index and Trading Proxy Index
Bases (Dec. Futures – Index)

October 21, 1987

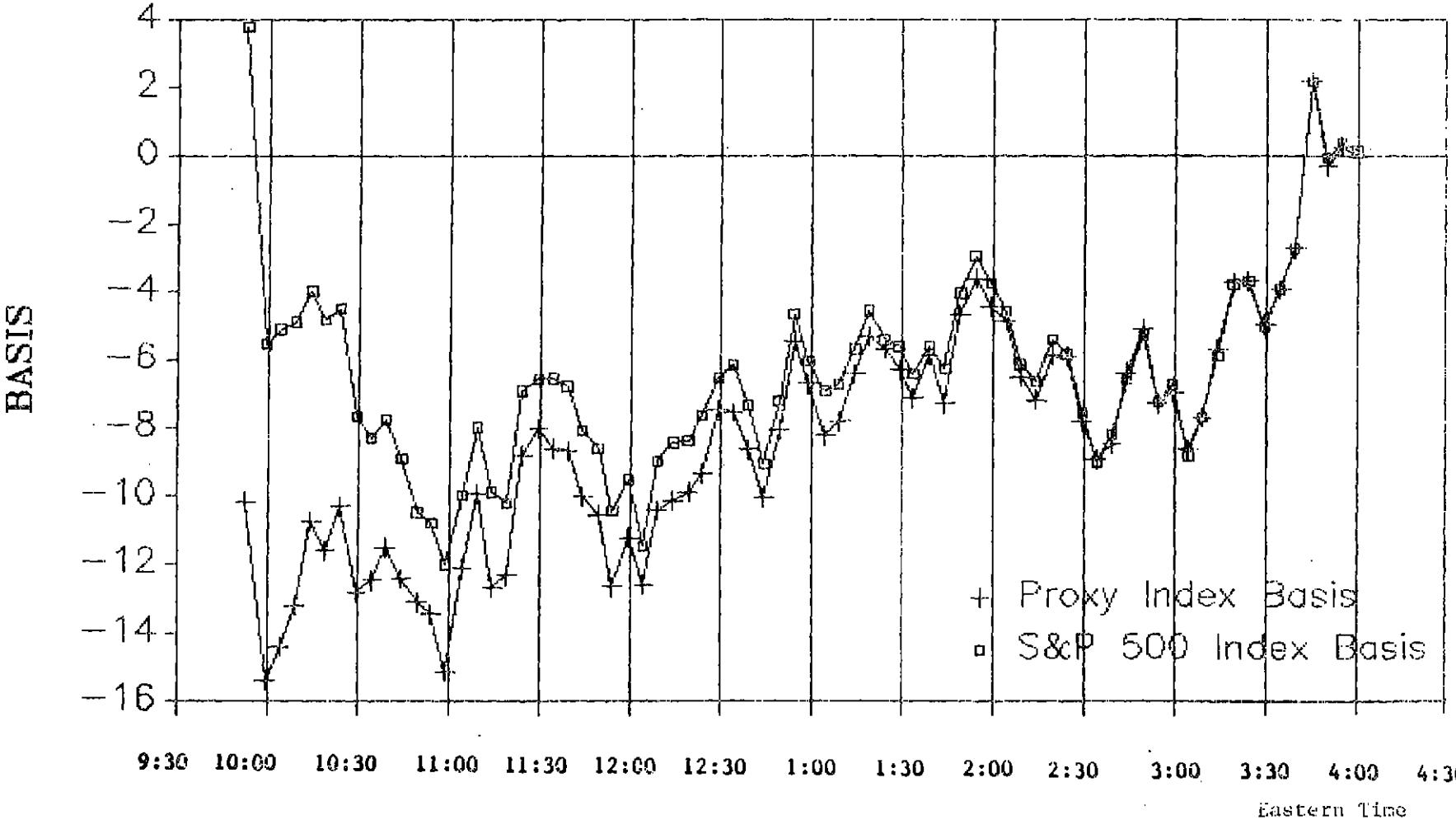
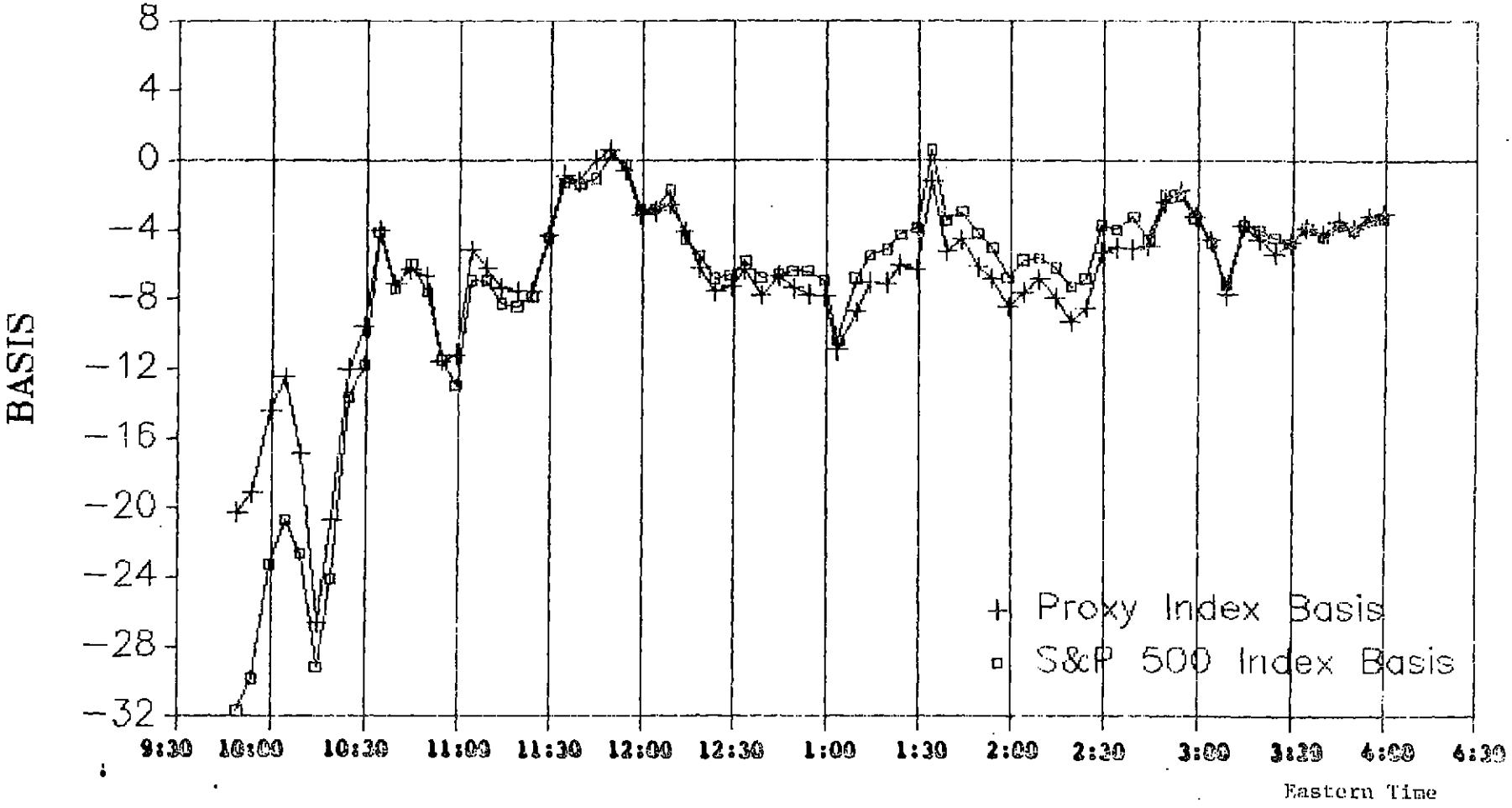


EXHIBIT B-15

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future − Index)

October 22, 1987

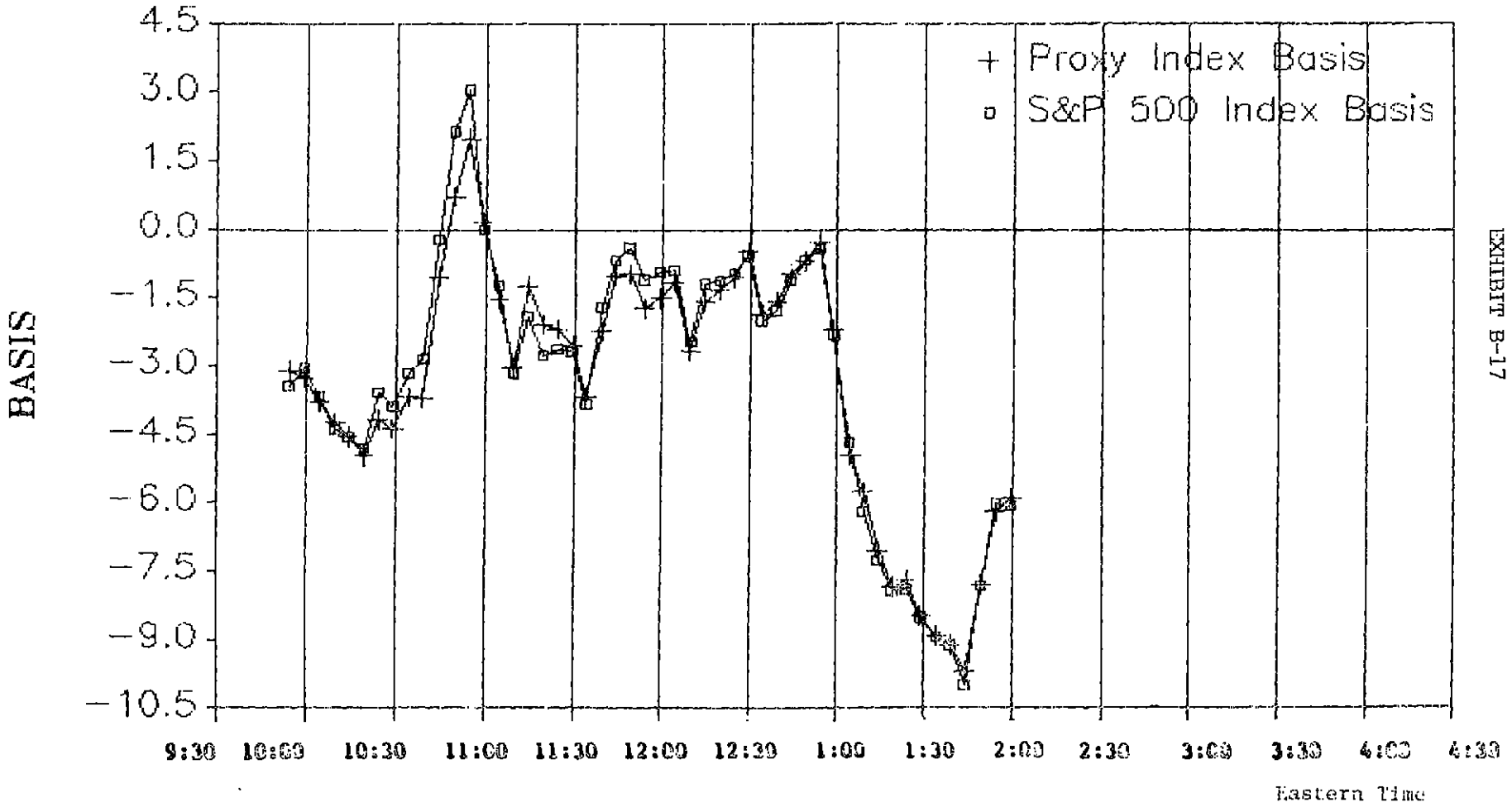


TIME

EXHIBIT D-16

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future – Index)

October 23, 1987



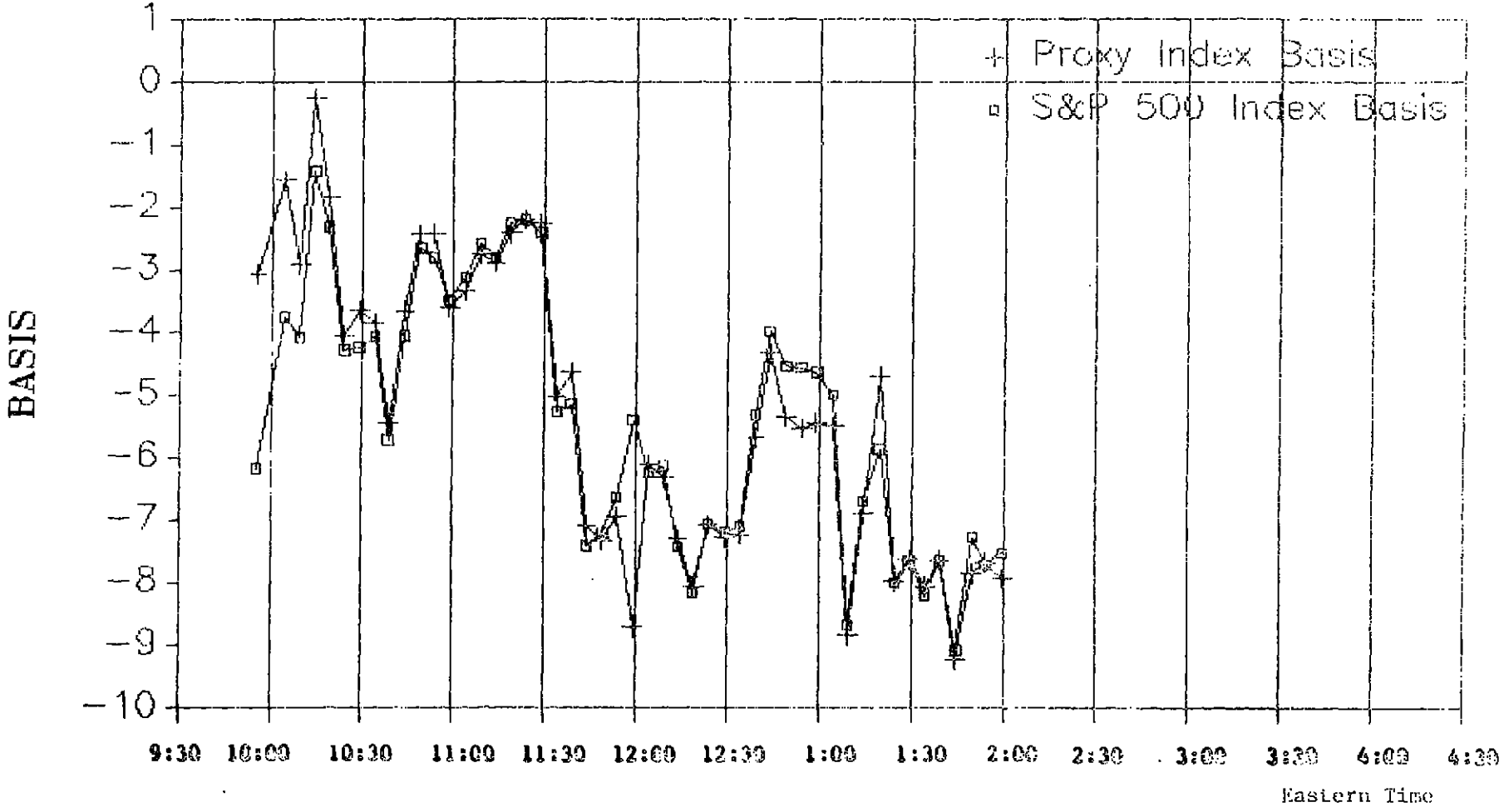
BASIS

TIME

EXHIBIT B-17

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future − Index)

October 26, 1987



BASIS

TIME

S&P 500 Index, Trading Proxy Index and December Future

Small Portfolio : October 19, 1987

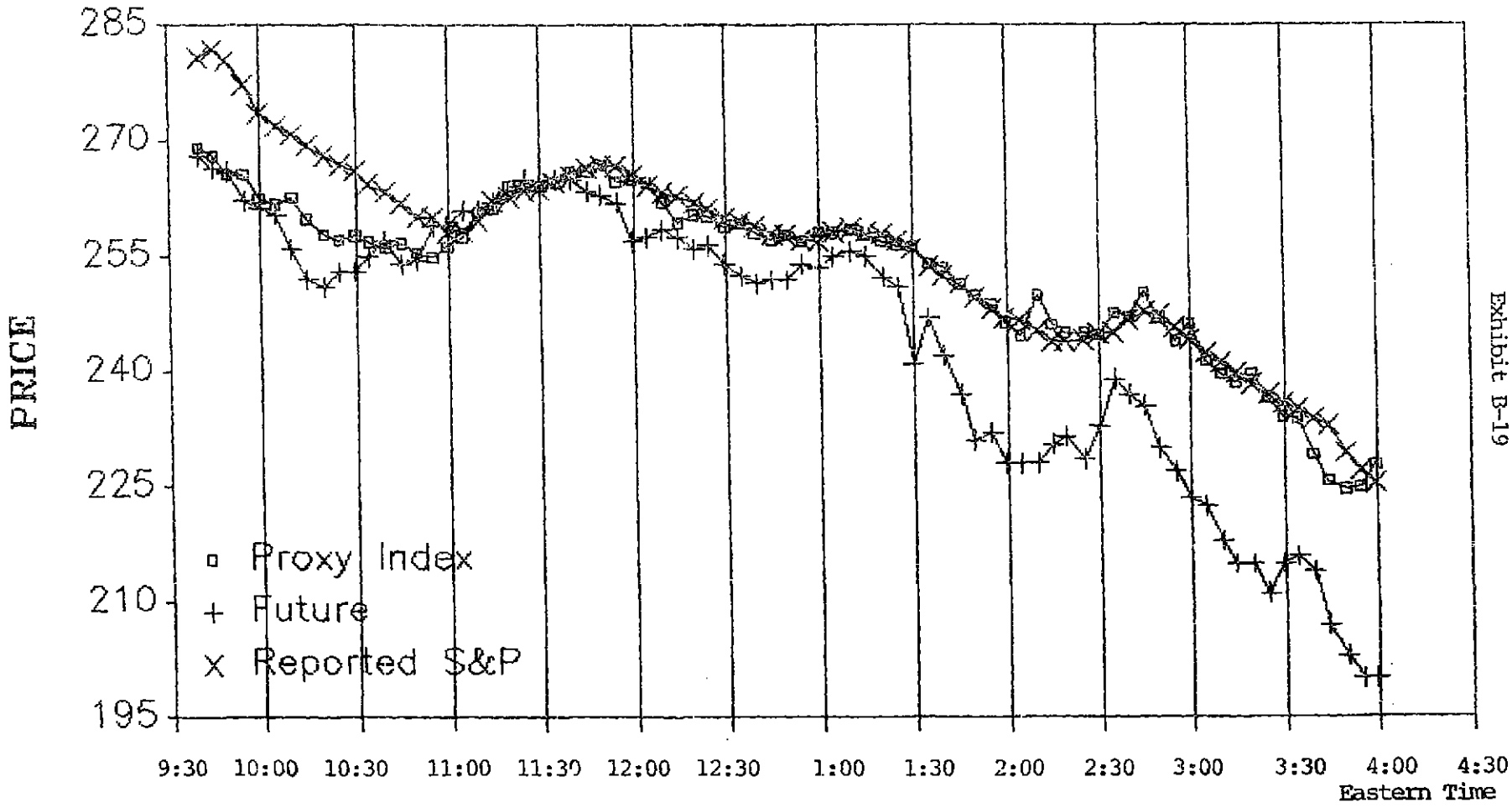
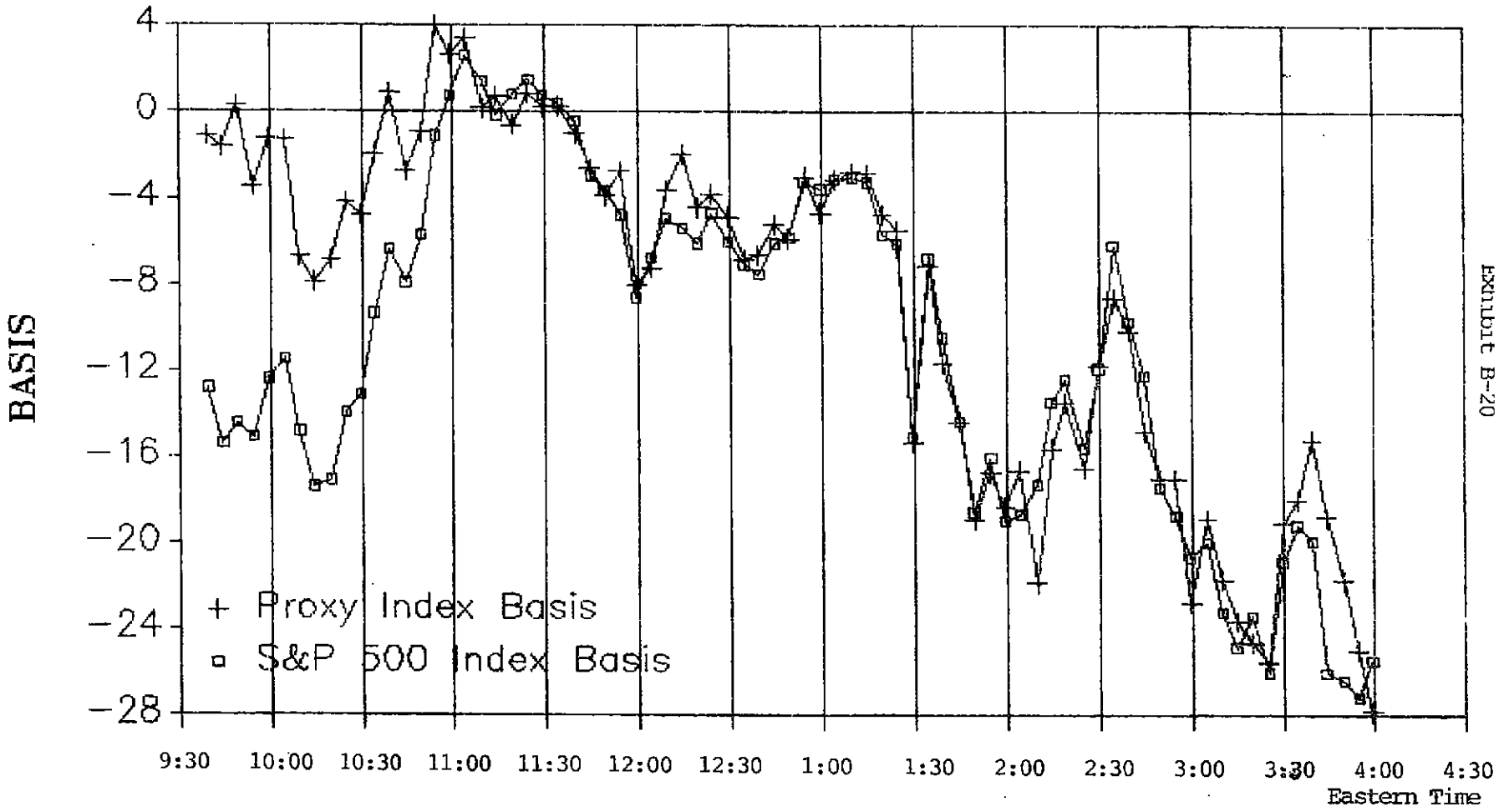


Exhibit B-19

S&P 500 Index and Trading Proxy Index
Bases (Dec. Future − Index)

Small Portfolio : October 19, 1987



BASIS

TIME

Exhibit B-20

APPENDIX C

Trading Analysis Data

STOCK INDEX FUTURES FACT SHEET

	S&P 500	NYSE COMPOSITE	MAJOR MARKET (MAXI)	VALUE LINE
EXCHANGE	CME	NYFE	CBT	KCBT
BASED UPON	500 Major Stocks: - 400 Industrials - 40 Utilities - 20 Transportation Companies - 40 Financial Companies	1,500 + NYSE stocks	Total of 20 "blue chips", 17 of which are included in D.J. Industrial Average	1,700 + Stocks
WEIGHTING OF THE INDEX	Capitalization	Capitalization	Price	Geometric average of price relatives
CONTRACT VALUE	$500 x Index	$500 x Index	$250 X Index	$500 x Index
FUTURES MONTHS	- March, June, Sept. Dec.	- March, June, Sept. Dec.	All months	March, June, Sept., Dec.
SETTLEMENT TIME	Third Friday of Contract Month	Third Friday of Contract Month	Third Friday of Contract Month	Third Friday of Contract Month
LOCAL TRADING HOURS	8:30am to 3:15pm	9:30am to 4:15pm	8:15am to 3:15pm	8:30am to 3:15pm
SPECULATIVE LIMITS	5,000 contracts	5,000 contracts	8,000 contracts	5,000 Contracts
SPECULATIVE MARGINS (as of 1/20/88)	Initial - $15,000 Maintenance - $10,000	$6,000 $4,000	$16,000 $10,000	$7,500 $7,500
DAILY PRICE LIMITS	30.00 points (Expand to 45.00*)	None**	40.00 points (Expand to 60.00*)	35.00 points (Expand to 50.00*)

* In each case the daily limits expand to the amount indicated after two sucessive days of limit moves in the same direction. These limits do not apply to the last trading day of the expiring future.

** Under temporary emergency rules made effective by the NYFE on October 23, 1987 price limits of 25.00 points (and expanding to 35.00 points after two days of limit moves) were imposed on this contract. The effective date of that emergency action expired on January 21, 1988, however, and was not replaced by permanent rules.

EXHIBIT C-1

S&P 500 - OPEN CONTRACTS HELD BY COMMERCIAL LARGE TRADERS AS A PERCENT OF THE OPEN INTEREST

COMMERCIAL

DATE	OPEN INTEREST	BROKER/ DEALERS		INSTITUTIONAL INVESTORS		OTHER COMMERCIALS		TOTAL COMMERCIAL	
		LONG	SHORT	LONG	SHORT	LONG	SHORT	LONG	SHORT
10/12	123,064	16.3	4.0	38.7	44.2	9.1	12.9	64.1	61.1
10/13	119,880	17.0	4.7	38.5	45.9	9.4	12.6	64.9	63.2
10/14	127,582	17.7	3.4	37.7	45.8	9.9	13.0	65.3	62.2
10/15	133,696	18.3	3.7	36.4	47.5	10.3	14.6	65.0	65.8
10/16	146,653	18.0	3.8	35.3	52.4	11.3	14.0	64.6	70.2
10/19	172,178	18.7	2.9	35.2	56.9	15.6	12.2	69.5	72.0
10/20	174,184	23.5	3.0	36.6	63.1	14.7	10.6	74.8	76.7
10/21	169,934	23.4	3.6	38.9	60.6	10.3	7.4	72.6	71.6
10/22	158,774	26.1	4.2	39.6	60.2	11.3	9.0	77.0	73.4
10/23	156,650	25.9	1.9	40.0	58.6	10.9	10.0	76.8	70.5
10/26	158,715	23.8	1.9	37.7	56.8	9.5	9.9	71.0	68.6

EXHIBIT C-2

STOCK TAPE TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DATE
(NUMBER OF SHARES)

OBS	DATE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
1	10/14/87	2,190,763	26,094,438	-5,005,400	1.0	13.4
2	10/15/87	7,365,200	16,565,921	-3,923,168	2.8	6.2
3	10/16/87	4,736,400	37,857,750	-6,345,547	1.4	11.0
4	10/19/87	3,077,979	37,545,724	-9,017,269	0.5	6.1
5	10/20/87	1,297,800	2,242,951	-1,250,051	0.2	0.4
6	10/21/87	650,700	4,780,700	-2,381,800	0.1	1.0
7	10/22/87	85,000	2,588,652	-723,152	0.0	0.7
8	10/23/87	879,200	645,100	0	0.4	0.3
9	10/26/87	0	0	0	0	0

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

EXHIBIT C-3

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/14/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
1	09:30-09:59	0	4,045,600	-878,000	0.0	16.0
2	10:00-10:29	9,900	951,293	-248,000	0.1	5.9
3	10:30-10:59	0	1,532,000	-607,900	0.0	11.3
4	11:00-11:29	40,000	572,100	-248,000	0.3	4.5
5	11:30-11:59	0	1,200,000	-1,200,000	0.0	10.1
6	12:00-12:29	66,200	0	0	0.6	0.0
7	12:30-12:59	80,000	2,982,055	-302,500	0.6	21.0
8	13:00-13:29	312,300	4,154,190	0	1.6	21.0
9	13:30-13:59	0	1,198,600	-248,000	0.0	11.2
10	14:00-14:29	0	1,271,100	-643,000	0.0	6.9
11	14:30-14:59	84,000	3,777,100	-382,000	0.4	19.0
12	15:00-15:29	80,000	1,202,100	0	0.6	8.4
13	15:30-16:15	1,078,363	3,048,300	-248,000	4.6	12.9
14	UNCLASSIFIED	440,000	2,160,000	0	0	0
DATE		2,190,763	28,094,438	-5,005,400		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/15/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
15	09:30-09:59	189,900	6,084,011	-1,950,079	0.4	12.5
16	10:00-10:29	1,586,050	2,219,150	-400,000	5.5	7.8
17	10:30 10:59	666,300	0	0	2.8	0.0
18	11:00-11:29	824,700	272,000	-250,000	3.6	1.2
19	11:30-11:59	506,000	0	0	3.3	0.0
20	12:00-12:29	1,137,300	0	0	5.6	0.0
21	12:30-12:59	0	128,000	0	0.0	0.8
22	13:00-13:29	161,300	214,300	0	2.0	2.6
23	13:30-13:59	482,250	1,504,300	-250,000	2.4	7.5
24	14:00-14:29	875,700	0	0	6.3	0.0
25	14:30-14:59	20,000	270,000	0	0.2	3.2
26	15:00-15:29	79,700	233,700	0	0.7	2.1
27	15:30-16:15	96,000	4,980,460	-1,073,089	0.3	16.0
28	UNCLASSIFIED	740,000	660,000	0	0	0
DATE		7,365,200	16,565,921	-3,923,168		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/16/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
29	09:30-09:59	224,000	4,303,222	-1,938,289	0.6	10.9
30	10:00-10:29	0	1,882,900	-400,000	0.0	7.7
31	10:30-10:59	84,000	349,900	0	0.4	1.4
32	11:00-11:29	99,100	4,516,081	-650,000	0.4	17.0
33	11:30-11:59	666,300	17,000	0	2.5	0.1
34	12:00-12:29	229,000	178,500	0	1.5	1.1
35	12:30-12:59	0	874,600	0	0.0	5.9
36	13:00 13:29	40,000	3,388,129	-1,073,179	0.2	18.0
37	13:30-13:59	44,000	3,577,910	0	0.1	12.3
38	14:00-14:29	526,000	447,100	-212,900	1.8	1.5
39	14:30-14:59	80,000	2,214,450	0	0.4	10.6
40	15:00-15:29	164,000	4,526,579	-1,073,179	0.7	19.0
41	15:30-16:15	2,260,000	11,341,379	0	4.2	21.0
42	UNCLASSIFIED	320,000	240,000	0	0	0
DATE		4,736,400	37,857,750	-5,345,547		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE 10/19/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
43	09:30-09:59	0	6,162,579	-2,549,679	0.0	12.0
44	10:00-10:29	0	7,456,000	-1,172,000	0.0	15.9
45	10:30-10:59	380,000	1,736,500	0	0.7	3.1
46	11:00-11:29	2,040,979	0	0	3.3	0.0
47	11:30-11:59	188,000	1,928,400	0	0.4	4.0
48	12:00-12:29	165,000	3,396,850	-997,720	0.4	8.4
49	12:30-12:59	0	2,587,430	-847,330	0.0	6.3
50	13:00-13:29	84,000	4,854,600	-1,050,000	0.2	13.2
51	13:30-13:59	0	3,609,700	-797,100	0.0	7.9
52	14:00-14:29	0	598,820	-347,720	0.0	1.6
53	14:30-14:59	100,000	1,867,525	-886,000	0.3	5.1
54	15:00-15:29	0	2,096,020	-347,720	0.0	4.5
55	15:30-16:15	0	1,049,300	-22,000	0.0	1.6
56	UNCLASSIFIED	120,000	200,000	0	0	0
DATE		3,077,979	37,545,724	-9,017,269		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/20/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
57	09:30-09:59	40,000	165,800	-165,800	0.1	0.3
58	10:00-10:29	0	379,800	-96,000	0.0	0.5
59	10:30-10:59	0	482,400	-482,400	0.0	0.8
60	11:00-11:29	0	90,000	-60,000	0.0	0.1
61	11:30-11:59	0	445,851	-445,851	0.0	0.9
62	12:00-12:29	0	0	0	0	0
63	12:30-12:59	0	0	0	0	0
64	13:00-13:29	0	0	0	0	0
65	13:30-13:59	1,129,800	0	0	3.7	0.0
66	14:00-14:29	0	0	0	0	0
67	14:30-14:59	128,000	0	0	0.4	0.0
68	15:00-15:29	0	0	0	0	0
69	15:30-16:15	0	128,000	0	0.0	0.3
70	UNCLASSIFIED	0	551,100	0	0	0
DATE		1,297,800	2,242,951	-1,250,051		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/21/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
71	09:30-09:59	0	2,856,700	-547,800	0.0	5.9
72	10:00-10:29	0	0	0	0	0
73	10:30-10:59	0	420,000	-250,000	0.0	1.0
74	11:00-11:29	0	0	0	0	0
75	11:30-11:59	0	230,150	-230,150	0.0	0.6
76	12:00-12:29	0	0	0	0	0
77	12:30-12:59	0	192,000	-192,000	0.0	0.7
78	13:00-13:29	0	0	0	0	0
79	13:30-13:59	0	445,850	-445,850	0.0	1.8
80	14:00-14:29	0	240,000	-240,000	0.0	1.0
81	14:30-14:59	0	0	0	0	0
82	15:00-15:29	0	96,000	-96,000	0.0	0.3
83	15:30-16:15	650,700	0	0	1.6	0.0
84	UNCLASSIFIED	0	300,000	-300,000	0	0
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DATE		650,700	4,780,700	-2,301,800		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/22/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
85	09:30-09:59	0	723,152	-723,152	0.0	1.9
86	10:00-10:29	0	1,133,100	0	0.0	2.1
87	10:30-10:59	0	0	0	0	0
88	11:00-11:29	0	0	0	0	0
89	11:30-11:59	0	0	0	0	0
90	12:00-12:29	0	0	0	0	0
91	12:30-12:59	0	732,400	0	0.0	3.4
92	13:00-13:29	0	0	0	0	0
93	13:30-13:59	0	0	0	0	0
94	14:00-14:29	0	0	0	0	0
95	14:30-14:59	80,000	0	0	0.3	0.0
96	15:00-15:29	0	0	0	0	0
97	15:30-16:15	0	0	0	0	0
DATE		80,000	2,588,652	-723,152		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL.
(NUMBER OF SHARES)

DATE 10/23/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
98	09:30-09:59	0	0	0	0	0
99	10:00-10:29	0	0	0	0	0
100	10:30-10:59	300,000	0	0	0.9	0.0
101	11:00-11:29	0	0	0	0	0
102	11:30-11:59	0	0	0	0	0
103	12:00-12:29	324,200	0	0	1.7	0.0
104	12:30-12:59	255,000	0	0	1.5	0.0
105	13:00-13:29	0	0	0	0	0
106	13:30-13:59	0	240,000	0	0.0	0.8
107	14:00-14:29	0	80,000	0	0.0	1.6
108	15:00-15:29	0	325,100	0	0	0
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DATE		879,200	645,100	0		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE = 10/26/87

OBS	TIME INTERVAL	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
109	09:30-09:59	0	0	0	0	0
110	10:00-10:29	0	0	0	0	0
111	10:30-10:59	0	0	0	0	0
112	11:00-11:29	0	0	0	0	0
113	11:30-11:59	0	0	0	0	0
114	12:00-12:29	0	0	0	0	0
115	12:30-12:59	0	0	0	0	0
116	13:00 13:29	0	0	0	0	0
117	13:30-13:59	0	0	0	0	0
118	14:00-14:29	0	0	0	0	0
119	14:30-14:59	0	0	0	0	0
DATE		0	0	0		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY DATE

DERIVATIVE MARKET =SECURITIES OPTIONS

OBS	DATE	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
1	10/14/87	132.9	89,500	1,734,400	0	2,789	165
2	10/15/87	191.7	3,174,700	816,000	126,000	514	7,785
3	10/16/87	344.3	109,200	5,786,075	0	6,533	2,354
4	10/19/87	36.3	0	616,400	0	315	0
5	10/23/87	1.1	16,000	0	0	0	58

DERIVATIVE MARKET =CME S & P 500

OBS	DATE	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
6	10/14/87	1102.8	1,207,263	23,796,438	-4,950,900	7,125	387
7	10/15/87	620.9	2,568,700	10,545,003	-1,650,200	3,316	784
8	10/16/87	1174.7	847,300	26,217,918	-2,133,500	7,615	286
9	10/19/87	1391.8	598,300	31,814,345	-7,197,090	9,746	187
10	10/20/87	63.4	0	1,763,151	-928,251	549	0
11	10/21/87	180.0	570,700	3,952,700	-1,473,800	1,394	184
12	10/22/87	74.0	0	1,971,580	-106,080	545	0
13	10/23/87	41.3	683,200	325,100	0	99	237

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY DATE

DERIVATIVE MARKET =KCBT VALUE LINE

OBS	DATE	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
14	10/14/87	2.8	0	54,500	-54,500	5	0
15	10/15/87	37.4	0	2,238,818	-2,146,968	333	0
16	10/16/87	50.0	0	3,212,047	-3,212,047	390	0
17	10/19/87	55.2	1,127,679	2,299,179	-1,798,179	105	140
18	10/20/87	26.0	1,129,600	165,800	-165,800	10	196
19	10/22/87	12.0	0	617,072	-617,072	28	0

DERIVATIVE MARKET =CBT MAJOR MARKET INDEX

OBS	DATE	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
20	10/14/87	190.9	894,000	1,450,000	0	867	559
21	10/15/87	249.1	1,601,800	2,187,800	0	980	980
22	10/16/87	281.0	3,739,900	2,403,700	0	1,363	2,274
23	10/19/87	297.5	1,352,000	2,815,800	-22,000	1,679	672
24	10/20/87	27.5	168,000	314,000	-156,000	178	90
25	10/21/87	69.0	80,000	828,000	-628,000	518	50
26	10/22/87	5.0	80,000	0	0	0	50
27	10/23/87	31.5	180,000	320,000	0	200	113

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY DATE

DERIVATIVE MARKET ENTER NYSE COMPOSITE

OBS	DATE	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
28	10/14/87	42.9	0	1,059,100	0	480	0
29	10/15/87	31.4	0	776,300	0	360	0
30	10/16/87	8.8	0	236,010	0	109	0

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

DATE 10/14/87 DERIVATIVE MARKET =SECURITIES OPTIONS

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
1	09:30-09:59	1.7	0	22,000	0	24	0
2	13:00-13:29	4.9	89,500	0	0	0	165
3	15:00-15:29	13.3	0	232,400	0	450	0
4	UNCLASSIFIED	113.0	0	1,480,000	0	2,315	0
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TOTAL		132.9	89,500	1,734,400	0	2,789	165

DATE 10/14/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
5	09:30-09:59	177.9	0	3,747,700	878,000	1,158	0
6	10:00-10:29	44.5	0	927,393	248,000	286	0
7	10:30-10:59	65.7	0	1,532,000	-637,000	455	0
8	11:00-11:29	29.3	0	572,100	-248,000	192	0
9	11:30-11:59	52.7	0	1,200,000	1,200,000	343	0
10	12:30-12:59	114.7	0	2,895,655	-248,000	881	0
11	13:00-13:29	152.8	212,903	3,990,193	0	1,153	68
12	13:30-13:59	37.9	0	891,900	248,000	268	0
13	14:00-14:29	40.5	0	861,200	-643,000	267	0
14	14:30-14:59	150.5	0	3,458,300	-382,000	1,034	0
15	15:00-15:29	36.0	0	800,000	0	245	0
16	15:30-16:15	170.3	994,563	2,920,300	248,000	898	319
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AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/14/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
TOTAL		1102.8	1,207,263	23,786,438	-4,950,900	7,125	387

DATE =10/14/87 DERIVATIVE MARKET =KCBT VALUE LINE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
17	12:30-12:59	2.8	0	54,500	-54,500	5	0

DATE =10/14/87 DERIVATIVE MARKET =CBT MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
18	09:30-09:59	21.0	0	275,900	0	133	0
19	10:00-10:29	3.2	9,900	24,200	0	19	6
20	11:00-11:29	3.0	40,000	0	0	0	25
21	12:00-12:29	6.7	66,200	0	0	0	38
22	12:30-12:59	8.6	80,000	31,900	0	13	50
23	13:00-13:29	13.3	9,900	164,000	0	103	8
24	13:30-13:59	4.8	0	46,200	0	33	0
25	14:30-14:59	12.9	84,000	59,800	0	34	54
26	15:00-15:29	9.9	80,000	40,000	0	25	50
27	15:30-16:15	16.2	84,000	128,000	0	81	53
28	UNCLASSIFIED	83.0	440,000	680,000	0	426	275
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TOTAL		180.9	894,000	1,450,000	0	867	559

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/14/87 DERIVATIVE MARKET =NYSE COMPOSITE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
29	13:30-13:59	10.8	0	200,500	0	120	0
30	14:00-14:29	16.1	0	409,900	0	180	0
31	14:30-14:59	10.5	0	259,000	0	120	0
32	15:00-15:29	5.5	0	129,700	0	60	0
TOTAL		42.9	0	1,059,100	0	480	0

DATE =10/15/87 DERIVATIVE MARKET =SECURITIES OPTIONS

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
33	09:30-09:59	10.6	60,000	126,000	-126,000	514	0
34	10:00-10:29	22.7	1,210,450	0	0	0	954
35	10:30-10:59	19.5	349,900	0	0	0	1,326
36	11:00-11:29	17.7	316,600	0	0	0	598
37	11:30-11:59	17.6	316,600	0	0	0	598
38	12:00-12:29	4.3	50,400	0	0	0	590
39	13:00-13:29	5.8	95,300	0	0	0	167
40	13:30-13:59	23.1	420,250	30,000	0	0	1,145
41	14:00-14:29	18.6	325,200	0	0	0	1,360
42	15:30-16:15	1.8	30,000	0	0	0	0
43	UNCLASSIFIED	50.0	0	660,000	0	0	1,025

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/15/87 DERIVATIVE MARKET =SECURITIES OPTIONS

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
TOTAL		191.7	3,174,700	816,000	-126,000	514	7,755

DATE =10/15/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
44	09:30-09:59	155.0	0	3,405,032	-750,200	1,034	0
45	10:00-10:29	102.1	221,700	2,037,400	-400,000	606	70
46	10:30-10:59	12.6	272,400	0	0	0	84
47	11:00-11:29	31.8	380,100	250,000	-250,000	83	130
48	11:30-11:59	7.6	167,400	0	0	5	50
49	12:00-12:29	46.4	978,900	0	0	0	231
50	13:30-13:59	61.7	0	1,278,300	-250,000	421	0
51	14:00-14:29	28.1	526,500	0	0	0	189
52	14:30-14:59	11.5	0	208,000	0	95	0
53	15:00-15:29	7.8	39,700	83,200	0	30	30
54	15:30-16:15	156.3	0	3,283,071	0	1,050	0
TOTAL		620.9	2,586,700	10,545,003	-1,650,200	3,316	784

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY ARE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/15/87 DERIVATIVE MARKET =CBOT VALUE LINE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
55	09:30-09:59	17.0	0	1,073,079	-1,073,079	149	0
56	10:00-10:29	3.4	0	91,850	0	35	0
57	15:30-16:15	17.0	0	1,073,689	-1,073,689	149	0
TOTAL		37.4	0	2,238,618	-2,146,968	333	0

DATE =10/15/87 DERIVATIVE MARKET =CBT MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
58	09:30-09:59	73.8	129,900	1,349,900	0	533	66
59	10:00-10:29	19.8	153,900	89,900	0	58	100
60	10:30-10:59	3.3	44,000	0	0	0	28
61	11:00-11:29	14.0	128,000	22,000	0	14	69
62	11:30-11:59	1.7	22,000	0	0	0	14
63	12:00-12:29	9.5	108,000	0	0	0	69
64	12:30-12:59	9.7	0	128,000	0	81	0
65	13:00-13:29	11.4	66,000	84,000	0	53	28
66	13:30-13:59	9.7	62,000	66,000	0	28	39
67	14:00-14:29	1.7	22,000	0	0	0	14
68	14:30-14:59	7.4	20,000	62,000	0	39	13
69	15:00-15:29	4.7	40,000	22,000	0	14	26
70	15:30-16:15	26.4	66,000	364,000	0	160	30
71	UNCLASSIFIED	56.0	740,000	0	0	0	484

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE 10/15/87 DERIVATIVE MARKET POST MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
TOTAL		249.1	1,601,600	2,187,600	0	980	980

DATE 10/15/87 DERIVATIVE MARKET NYFE NYSE COMPOSITE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
72	09:30-09:59	5.2	0	129,200	0	60	0
73	13:00-13:29	5.5	0	130,300	0	60	0
74	13:30-13:59	5.2	0	130,000	0	60	0
75	15:00-15:29	5.1	0	128,500	0	60	0
76	15:30-16:15	10.4	0	260,300	0	120	0
TOTAL		31.4	0	778,300	0	360	0

DATE 10/16/87 DERIVATIVE MARKET NYFE FUTURE MARKET

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
77	14:00-14:29	3	40,000	0	0	0	0

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/16/87 DERIVATIVE MARKET SECURITIES OPTIONS

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
78	10:00-10:29	4.7	0	89,500	0	164	0
79	10:30-10:59	10.7	0	349,900	0	1,328	0
80	11:00-11:29	2.8	49,200	0	0	0	128
81	11:30-11:59	1.0	0	17,000	0	0	0
82	13:00-13:29	3.8	0	64,000	0	0	0
83	13:30-13:59	1.8	0	30,000	0	0	0
84	14:00-14:29	13.7	60,000	190,200	0	365	0
85	15:30-16:15	297.4	0	5,045,475	0	4,675	2,226
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TOTAL		344.3	109,200	5,786,075	0	6,533	2,354

DATE =10/16/87 DERIVATIVE MARKET CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
86	09:30-09:59	145.9	0	3,197,533	-870,600	1,000	0
87	10:00-10:29	45.9	0	1,729,400	-400,200	369	0
88	11:00-11:29	174.1	40,000	4,506,181	-650,000	1,166	25
89	11:30-11:59	22.7	496,300	0	0	0	121
90	12:00-12:29	16.5	229,000	90,500	0	28	90
91	12:30-12:59	41.4	0	874,600	0	288	0
92	13:00-13:29	88.5	0	1,896,950	0	592	0
93	13:30-13:59	147.2	0	3,199,900	0	998	0
94	14:00-14:29	16.0	80,000	212,900	-212,900	67	50

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/16/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
95	14:30-14:59	98.0	0	2,134,450	0	667	0
96	15:00-15:29	142.6	0	3,253,400	0	1,023	0
97	15:30-16:15	235.7	0	5,122,104	0	1,657	0
TOTAL		1174.7	647,300	26,217,918	-2,133,500	7,815	286

DATE =10/16/87 DERIVATIVE MARKET =KCBT VALUE LINE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
98	09:30-09:59	16	0	1,065,669	-1,065,669	130	0
99	13:00-13:29	17	0	1,073,179	-1,073,179	130	0
100	15:00-15:29	17	0	1,073,179	-1,073,179	130	0
TOTAL		50	0	3,212,047	-3,212,047	390	0

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/16/87 DERIVATIVE MARKET =CME MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
101	09:30-09:59	28.8	924,000	40,000	0	25	115
102	10:00-10:29	4.8	0	64,000	0	41	0
103	10:30-10:59	6.0	84,000	0	0	0	55
104	11:00-11:29	1.8	9,000	9,000	0	5	8
105	11:30-11:59	20.4	168,000	0	0	0	100
106	12:00-12:29	6.5	0	88,000	0	56	0
107	13:00-13:29	29.2	40,000	354,000	0	175	0
108	13:30-13:59	11.2	44,000	110,000	0	70	25
109	14:00-14:29	37.0	366,000	44,000	0	28	194
110	14:30-14:59	20.0	80,000	80,000	0	0	50
111	15:00-15:29	35.2	164,000	200,000	0	52	103
112	15:30-16:15	42.8	2,260,000	1,173,800	0	758	1,369
113	UNCLASSIFIED	42.0	320,000	240,000	0	150	200
TOTAL		281.0	3,739,900	2,403,700	0	1,363	2,274

DATE =10/16/87 DERIVATIVE MARKET =NYFE NYSE COMPOSITE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
114	13:30-13:59	8.8	0	238,010	0	109	0

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/19/87 DERIVATIVE MARKET =SECURITIES OPTIONS

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
115	13:30-13:59	1.3	0	29,100	0	100	0
116	15:30-16:15	35.0	0	587,300	0	215	0
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TOTAL		36.3	0	616,400	0	315	0

DATE =10/19/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
117	09:30-09:59	197.3	0	4,364,400	-751,500	1,347	0
118	10:00-10:29	323.9	0	7,458,000	-1,172,000	2,277	0
119	10:30-10:59	72.4	0	1,736,500	0	543	0
120	11:00-11:29	18.4	433,300	0	0	0	137
121	11:30-11:59	68.6	0	1,728,400	0	530	0
122	12:00-12:29	153.4	165,000	3,356,850	-997,720	982	50
123	12:30-12:59	101.4	0	2,327,430	-847,330	724	0
124	13:00-13:29	201.4	0	4,690,600	-1,050,000	1,516	0
125	13:30-13:59	120.4	0	3,090,800	-797,100	992	0
126	14:00-14:29	22.8	0	478,820	-347,720	101	0
127	14:30-14:59	58.8	0	1,387,525	-886,000	441	0
128	15:00-15:29	53.0	0	1,195,020	-347,720	293	0
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TOTAL		1391.8	598,300	31,814,345	-7,197,090	9,746	187

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/19/87 DERIVATIVE MARKET =KCBT VALUE LINE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
129	09:30-09:59	27.0	0	',798,179	-1,798,179	105	0
130	11:00-11:29	18.0	1,127,679	0	0	0	140
131	15:00-15:29	10.2	0	501,000	0	0	0
TOTAL		55.2	1,127,679	2,299,179	-1,798,179	105	140

DATE =10/19/87 DERIVATIVE MARKET =CBT MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
132	10:30-10:59	26.2	380,000	0	0	0	181
133	11:00-11:29	32.8	480,000	0	0	0	242
134	11:30-11:59	26.3	188,000	200,000	0	130	121
135	12:00-12:29	2.9	0	40,000	0	25	0
136	12:30-12:59	17.2	0	260,000	0	166	0
137	13:00-13:29	21.4	84,000	164,000	0	104	53
138	13:30-13:59	38.1	0	489,800	0	273	0
139	14:00-14:29	8.7	0	120,000	0	76	0
140	14:30-14:59	40.7	100,000	480,000	0	241	0
141	15:00-15:29	29.0	0	400,000	0	250	0
142	15:30-16:15	33.2	0	462,000	-22,000	289	0
143	UNCLASSIFIED	21.0	120,000	200,000	0	125	75
TOTAL		297.5	1,352,000	2,815,800	-22,000	1,679	672

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/20/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
144	10:00-10:29	9.5	0	283,800	0	60	0
145	10:30-10:59	16.4	0	482,400	-482,400	140	0
146	11:30-11:59	17.0	0	445,851	-445,851	140	0
147	UNCLASSIFIED	20.5	0	551,100	0	189	0
TOTAL		63.4	0	1,763,151	-928,251	549	0

DATE =10/20/87 DERIVATIVE MARKET =KCBT VALUE LINE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
148	09:30-09:59	8	0	165,800	-165,800	10	0
149	13:30-13:59	18	1,129,800	0	0	0	196
TOTAL		26	1,129,800	165,800	-165,800	10	196

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/20/87 DERIVATIVE MARKET =CBT MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
150	09:30-09:59	3.0	40,000	0	0	0	0
151	10:00-10:29	4.6	0	96,000	-96,000	60	0
152	11:00-11:29	5.1	0	90,000	-60,000	38	0
153	14:30-14:59	7.2	128,000	0	0	0	80
154	15:30-16:15	7.6	0	128,000	0	80	0
TOTAL		27.5	168,000	314,000	-156,000	178	80

DATE =10/21/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
155	09:30-09:59	108.8	0	2,856,700	-547,800	1,004	0
156	10:30-10:59	20.1	0	420,000	-250,000	160	0
157	11:30-11:59	11.1	0	230,150	-230,150	90	0
158	13:30-13:59	16.5	0	445,850	-445,850	140	0
159	15:30-16:15	23.5	570,700	0	0	0	184
TOTAL		180.0	570,700	3,952,700	-1,473,800	1,394	184

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/21/87 DERIVATIVE MARKET =CBT MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
160	12:30-12:59	13.0	0	192,000	-192,000	120	0
161	14:00-14:29	16.0	0	240,000	-240,000	150	0
162	15:00-15:29	6.5	0	96,000	-96,000	60	0
163	15:30-16:15	5.0	80,000	0	0	0	50
164	UNCLASSIFIED	19.5	0	300,000	-300,000	188	0
TOTAL		60.0	80,000	828,000	-828,000	518	50

DATE =10/22/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
165	09:30-09:59	5.0	0	106,080	-106,080	1	0
166	10:00-10:29	41.9	0	1,133,100	0	334	0
167	12:30-12:59	27.1	0	732,400	0	210	0
TOTAL		74.0	0	1,971,580	-106,080	545	0

DATE =10/22/87 DERIVATIVE MARKET =KCBT VALUE LINE

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
168	09:30-09:59	12	0	617,072	-617,072	28	0

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE =10/22/87 DERIVATIVE MARKET =CBT MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
169	14:30-14:59	5	80,000	0	0	0	50

DATE =10/23/87 DERIVATIVE MARKET =SECURITIES OPTIONS

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
170	10:30-10:59	1.1	16,000	0	0	0	58

DATE =10/23/87 DERIVATIVE MARKET =CME S & P 500

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
171	10:30-10:59	4.7	104,000	0	0	0	36
172	12:00-12:29	12.3	324,200	0	0	0	99
173	12:30-12:59	12.0	255,000	0	0	0	100
174	15:00-15:29	12.3	0	325,100	0	99	0
TOTAL		41.3	683,200	325,100	0	99	237

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION ON THE NYSE BY DERIVATIVE BY HALF HOUR TIME INTERVAL

DATE 10/23/87 DERIVATIVE MARKET CBT MAJOR MARKET INDEX

OBS	TIME INTERVAL	VALUE	VOLUME BOUGHT	VOLUME SOLD	SHORT SALES	FUTURES BOUGHT	FUTURES SOLD
175	10:30-10:59	11.5	180,000	0	0	0	113
176	13:30-13:59	15.0	0	240,000	0	150	0
177	14:00-14:29	5.0	0	80,000	0	50	0
TOTAL		31.5	180,000	320,000	0	200	113

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK VALUE IS IN MILLION DOLLARS, STOCK VOLUME IN NUMBER OF SHARES AND FUTURES VOLUME IN NUMBER OF CONTRACTS.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY DATE
(NUMBER OF SHARES)

OBS	DATE	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
1	10/14/87	2,190,763	28,094,438	628,492	577,450	2,819,255	28,671,888	-5,005,400	1.3	13.7
2	10/15/87	7,365,200	16,565,921	4,251,006	4,128,869	11,616,206	20,694,790	-3,923,168	4.4	7.8
3	10/16/87	4,736,400	37,857,750	2,219,227	12,147,322	6,955,627	50,005,072	-5,345,547	2.0	14.5
4	10/19/87	3,077,979	37,545,724	168,680	51,744,903	3,246,659	89,290,627	-12,269,369	0.5	14.7
5	10/20/87	1,297,800	2,242,951	1,010,600	11,085,892	2,308,400	13,328,843	-3,867,751	0.4	2.2
6	10/21/87	650,700	4,780,700	2,415,220	11,044,778	3,065,920	15,825,478	-2,301,800	0.7	3.5
7	10/22/87	80,000	2,588,652	21,375,000	5,310,790	21,455,000	7,899,442	-1,223,152	5.4	2.0
8	10/23/87	879,200	645,100	10,268,680	8,199,113	11,147,880	8,844,213	0	4.5	3.6
9	10/26/87	0	0	2,622,100	7,281,319	2,622,100	7,281,319	0	0.9	2.4

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/14/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
1	09:30-09:59	0	4,045,600	25,800	65,100	25,800	4,110,700	-878,000	0.1	16.4
2	10:00-10:29	9,900	951,293	0	0	9,900	951,293	-248,000	0.1	5.9
3	10:30-10:59	0	1,532,000	0	0	0	1,532,000	-607,900	0.0	11.3
4	11:00-11:29	40,000	572,100	54	0	40,054	572,100	-248,000	0.3	4.5
5	11:30-11:59	0	1,200,000	0	0	0	1,200,000	-1,200,000	0.0	10.1
6	12:00-12:29	66,200	0	0	0	66,200	0	0	0.6	0.0
7	12:30-12:59	80,000	2,982,055	190,000	10,000	270,000	2,992,055	-302,500	1.9	21.1
8	13:00-13:29	312,300	4,154,190	0	0	312,300	4,154,190	0	1.6	21.8
9	13:30-13:59	0	1,198,600	0	0	0	1,198,600	-248,000	0.0	11.2
10	14:00-14:29	0	1,271,100	0	0	0	1,271,100	-643,000	0.0	6.9
11	14:30-14:59	84,000	3,777,100	54	10,000	84,054	3,787,100	-382,000	0.4	19.8
12	15:00-15:29	80,000	1,202,100	54	172,100	80,054	1,374,200	0	0.6	9.7
13	15:30-16:15	1,078,363	3,048,300	207,530	320,250	1,285,893	3,368,550	-248,000	5.5	14.4
14	UNCLASSIFIED	440,000	2,160,000	205,000	0	645,000	2,160,000	0	0	0
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DATE		2,190,763	28,094,438	628,492	577,450	2,819,255	28,671,888	-5,005,400		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/15/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
15	09:30-09:59	199,900	6,084,011	1,279,000	668,400	1,468,900	6,752,411	-1,950,079	3.0	13.9
16	10:00-10:29	1,586,050	2,219,150	47,500	300,000	1,633,550	2,519,150	-400,000	5.7	8.8
17	10:30-10:59	666,300	0	76,400	13,200	742,700	13,200	0	3.1	0.1
18	11:00-11:29	824,700	272,000	73,400	285,000	898,100	557,000	-250,000	4.0	2.5
19	11:30-11:59	506,000	0	0	40,000	506,000	40,000	0	3.3	0.3
20	12:00-12:29	1,137,300	0	154,700	0	1,292,000	0	0	6.3	0.0
21	12:30-12:59	0	126,000	130,700	0	130,700	126,000	0	0.8	0.8
22	13:00-13:29	161,300	214,300	65,400	0	226,700	214,300	0	2.8	2.7
23	13:30-13:59	482,250	1,504,300	0	0	482,250	1,504,300	-250,000	2.4	7.5
24	14:00-14:29	875,700	0	2,161,806	150,185	3,037,506	150,185	0	22.0	1.1
25	14:30-14:59	20,000	270,000	0	0	20,000	270,000	0	0.2	3.2
26	15:00-15:29	79,700	230,700	115,800	578,842	195,500	809,542	0	1.8	7.4
27	15:30-16:15	96,000	4,980,460	146,300	2,096,242	242,300	7,076,702	-1,073,089	0.8	23.6
28	UNCLASSIFIED	740,000	660,000	0	0	740,000	660,000	0	0	0
DATE		7,365,200	16,565,921	4,251,006	4,128,869	11,616,206	20,694,790	-3,923,168		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/16/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
29	09:30-09:59	224,000	4,303,222	418,000	2,326,955	642,000	6,630,177	-1,936,289	1.6	16.9
30	10:00-10:29	0	1,882,900	481,100	246,000	481,100	2,128,900	-400,000	2.0	8.7
31	10:30-10:59	84,000	349,900	51,300	576,700	135,300	926,600	0	0.6	3.9
32	11:00-11:29	99,100	4,516,081	82,500	266,000	181,600	4,782,081	-650,000	0.7	18.0
33	11:30-11:59	666,300	17,000	110,900	0	777,200	17,000	0	2.9	0.1
34	12:00-12:29	229,000	178,500	280,000	0	509,000	178,500	0	3.4	1.2
35	12:30-12:59	0	874,600	0	280,000	0	1,154,600	0	0.0	7.8
36	13:00-13:29	40,000	3,388,129	0	0	40,000	3,388,129	-1,073,179	0.2	19.0
37	13:30-13:59	44,000	3,577,910	280,000	813,200	324,000	4,391,110	0	1.1	15.2
38	14:00-14:29	526,000	447,100	120,000	1,050,000	646,000	1,497,100	-212,900	2.2	5.1
39	14:30-14:59	80,000	2,214,450	0	1,352,200	80,000	3,566,650	0	0.4	17.2
40	15:00-15:29	164,000	4,526,579	379,500	1,108,967	543,500	5,635,546	-1,073,179	2.4	24.6
41	15:30-16:15	2,260,000	11,341,379	15,927	4,126,100	2,275,927	15,467,479	0	4.2	28.8
42	UNCLASSIFIED	320,000	240,000	0	0	320,000	240,000	0	0	0
43	OTHER	0	0	0	1,200	0	1,200	0	0	0
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DATE		4,736,400	37,857,750	2,219,227	12,147,322	6,955,627	50,005,072	-5,345,547		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/19/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
44	09:30-09:59	0	6,162,579	0	3,680,500	0	9,843,079	2,649,679	0.0	19.2
45	10:00-10:29	0	7,458,000	0	0	0	7,458,000	-1,172,000	0.0	15.9
46	10:30-10:59	380,000	1,736,500	0	5,310,800	380,000	7,047,300	0	0.7	12.6
47	11:00-11:29	2,040,979	0	0	4,925,500	2,040,979	4,925,500	0	3.4	8.1
48	11:30-11:59	188,000	1,928,400	43,640	3,103,900	231,640	5,032,300	0	0.6	10.6
49	12:00-12:29	165,000	3,396,850	0	4,815,200	165,000	8,212,050	-997,723	0.4	20.3
50	12:30-12:59	0	2,567,430	0	4,334,500	0	6,921,930	-847,330	0.0	17.0
51	13:00-13:29	84,000	4,854,600	26,000	6,109,500	110,000	10,964,100	-1,050,000	0.2	29.9
52	13:30-13:59	0	3,609,700	36,400	6,988,877	36,400	10,598,577	-797,100	0.1	23.2
53	14:00-14:29	0	598,820	10,000	852,335	10,000	1,451,155	-647,723	0.0	4.0
54	14:30-14:59	100,000	1,867,525	0	2,226,421	100,000	4,093,946	-1,536,000	0.3	11.2
55	15:00-15:29	0	2,096,020	9,000	2,756,070	9,000	4,852,090	-347,720	0.0	15.6
56	15:30-16:15	0	1,049,300	43,640	6,534,300	43,640	7,583,600	-2,644,100	0.1	12.0
57	UNCLASSIFIED	120,000	200,000	0	107,000	120,000	307,000	0	0	0
DATE		3,077,979	37,545,724	168,680	51,744,903	3,246,659	89,290,627	-12,289,369		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/20/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
58	09:30-09:59	40,000	165,800	0	2,355,973	40,000	2,521,773	-733,500	0.1	4.0
59	10:00-10:29	0	379,800	293,700	625,000	293,700	1,004,800	-96,000	0.4	1.4
60	10:30-10:59	0	482,400	0	500,000	0	982,400	-982,400	0.0	1.5
61	11:00-11:29	0	30,000	0	900,000	0	990,000	960,000	0.0	1.6
62	11:30-11:59	0	445,851	0	0	0	445,851	-445,851	0.0	0.9
63	12:00-12:29	0	0	0	0	0	0	0	0.0	0.0
64	12:30-12:59	0	0	316,900	0	316,900	0	0	0.7	0.0
65	13:00-13:29	0	0	0	650,000	0	650,000	650,000	0.0	1.6
66	13:30-13:59	1,129,800	0	0	348,870	1,129,800	348,870	0	3.7	1.1
67	14:00-14:29	0	0	0	0	0	0	0	0.0	0.0
68	14:30-14:59	128,000	0	0	3,005,740	128,000	3,005,740	0	0.4	9.9
69	15:00-15:29	0	0	0	348,870	0	348,870	0	0.0	0.9
70	15:30-16:15	0	128,000	400,000	850,000	400,000	978,000	0	0.9	2.3
71	UNCLASSIFIED	0	551,100	0	1,501,439	0	2,052,539	0	0	0
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DATE		1,297,800	2,242,951	1,010,600	11,085,892	2,308,400	13,328,843	-3,867,751		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/21/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
72	09:30-09:59	0	2,856,700	407,320	3,878,678	407,320	6,735,378	-547,800	0.9	14.1
73	10:00-10:29	0	0	0	0	0	0	0	0.0	0.0
74	10:30-10:59	0	420,000	0	525,300	0	945,300	-250,000	0.0	2.3
75	11:00-11:29	0	0	0	2,000,000	0	2,000,000	0	0.0	5.6
76	11:30-11:59	0	230,150	0	0	0	230,150	-230,150	0.0	0.6
77	12:00-12:29	0	0	0	0	0	0	0	0.0	0.0
78	12:30-12:59	0	192,000	0	0	0	192,000	-192,000	0.0	0.7
79	13:00-13:29	0	0	0	0	0	0	0	0.0	0.0
80	13:30-13:59	0	445,850	64,000	0	64,000	445,850	-445,850	0.3	1.8
81	14:00-14:29	0	240,000	0	64,000	0	304,000	-240,000	0.0	1.2
82	14:30-14:59	0	0	0	2,239,200	0	2,239,200	0	0.0	7.8
83	15:00-15:29	0	96,000	30,000	0	30,000	96,000	-96,000	0.1	0.3
84	15:30-16:15	650,700	0	1,913,900	192,500	2,564,600	192,500	0	6.2	0.5
85	UNCLASSIFIED	0	300,000	0	2,145,100	0	2,445,100	-300,000	0	0
DATE		650,700	4,780,700	2,415,220	11,044,778	3,065,920	15,825,478	-2,301,800		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/22/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
86	09:30-09:59	0	723,152	0	0	0	723,152	-723,152	0.0	1.9
87	10:00-10:29	0	1,133,100	24,400	2,756,800	24,400	3,889,900	-500,000	0.0	7.3
88	10:30-10:59	0	0	70,000	0	70,000	0	0	0.1	0.0
89	11:00-11:29	0	0	0	0	0	0	0	0.0	0.0
90	11:30-11:59	0	0	0	0	0	0	0	0.0	0.0
91	12:00-12:29	0	0	0	1,157,700	0	1,157,700	0	0.0	3.6
92	12:30-12:59	0	732,400	136,500	0	136,500	732,400	0	0.7	3.5
93	13:00-13:29	0	0	74,000	604,390	74,000	604,390	0	0.3	2.8
94	13:30-13:59	0	0	0	0	0	0	0	0.0	0.0
95	14:00-14:29	0	0	1,863,800	0	1,863,800	0	0	8.5	0.0
96	14:30-14:59	80,000	0	0	0	80,000	0	0	0.3	0.0
97	15:00-15:29	0	0	7,661,700	0	7,661,700	0	0	33.7	0.0
98	15:30-16:15	0	0	33,500	0	33,500	0	0	0.1	0.0
99	UNCLASSIFIED	0	0	11,511,100	791,900	11,511,100	791,900	0	0	0
DATE		80,000	2,588,652	21,375,000	5,310,790	21,455,000	7,899,442	-1,223,152		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/23/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
100	09:30-09:59	0	0	0	6,217,763	0	6,217,763	0	0.0	15.2
101	10:00-10:29	0	0	0	0	0	0	0	0.0	0.0
102	10:30-10:59	300,000	0	0	0	300,000	0	0	0.9	0.0
103	11:00-11:29	0	0	3,216,480	0	3,216,480	0	0	10.9	0.0
104	11:30-11:59	0	0	0	0	0	0	0	0.0	0.0
105	12:00-12:29	324,200	0	2,012,300	0	2,336,500	0	0	12.4	0.0
106	12:30-12:59	255,000	0	0	1,519,100	255,000	1,519,100	0	1.5	9.1
107	13:00-13:29	0	0	2,012,300	307,000	2,012,300	307,000	0	8.5	1.3
108	13:30-13:59	0	240,000	1,009,200	0	1,009,200	240,000	0	3.5	0.8
109	14:00-14:29	0	80,000	2,018,400	33,400	2,018,400	113,400	0	39.4	2.2
110	15:00-15:29	0	325,100	0	0	0	325,100	0	0	0
111	UNCLASSIFIED	0	0	0	121,850	0	121,850	0	0	0
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DATE		879,200	645,100	10,268,680	8,199,113	11,147,880	8,844,213	0		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS INDEX ARBITRAGE AND SUBSTITUTION OR OTHER PROGRAMS ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/26/87

OBS	TIME INTERVAL	ARB + SUB BOUGHT	ARB + SUB SOLD	OTHER PROGRAMS BOUGHT	OTHER PROGRAMS SOLD	TOTAL BOUGHT	TOTAL SOLD	TOTAL SHORT SALES	TOTAL BOUGHT AS A % OF NYSE VOLUME	TOTAL SOLD AS A % OF NYSE VOLUME
112	09:30-09:59	0	0	2,127,700	806,482	2,127,700	806,482	0	3.8	1.5
113	10:00-10:29	0	0	0	0	0	0	0	0.0	0.0
114	10:30-10:59	0	0	0	0	0	0	0	0.0	0.0
115	11:00-11:29	0	0	8,500	0	8,500	0	0	0.0	0.0
116	11:30-11:59	0	0	0	0	0	0	0	0.0	0.0
117	12:00-12:29	0	0	0	0	0	0	0	0.0	0.0
118	12:30-12:59	0	0	233,000	112,800	233,000	112,800	0	1.2	0.6
119	13:00-13:29	0	0	0	0	0	0	0	0.0	0.0
120	13:30-13:59	0	0	252,900	0	252,900	0	0	0.7	0.0
121	14:00-14:29	0	0	0	0	0	0	0	0.0	0.0
122	14:30-14:59	0	0	0	0	0	0	0	0.0	0.0
123	UNCLASSIFIED	0	0	0	6,362,037	0	6,362,037	0	0	0
DATE		0	0	2,622,100	7,281,319	2,622,100	7,281,319	0		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF AN ARBITRAGE OR SUBSTITUTION TRADE EXECUTED PRIMARILY ON THE NYSE AND A DERIVATIVE MARKET.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS PORTFOLIO INSURANCE ON THE NYSE BY DATE
(NUMBER OF SHARES)

OBS	DATE	VALUE $1,000,000	VOLUME BOUGHT	VOLUME SOLD	PERCENT OF NYSE VOLUME BOUGHT	PERCENT OF NYSE VOLUME SOLD
1	10/14/87	10.0	19,800	168,700	0.01	0.08
2	10/15/87	17.6	73,400	283,000	0.03	0.11
3	10/16/87	231.0	0	5,065,400	0.00	1.47
4	10/19/87	1652.8	0	39,858,542	0.00	6.55
5	10/20/87	19.5	0	498,093	0.00	0.08
6	10/21/87	45.0	0	1,155,200	0.00	0.26
7	10/23/87	7.0	0	307,000	0.00	0.12

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF A TRADE EXECUTED PRIMARILY ON THE NYSE.

STOCK MARKET TRANSACTIONS REPORTED AS PORTFOLIO INSURANCE ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/14/87

OBS	TIME INTERVAL	VALUE ($1,000,000)	VOLUME BOUGHT	VOLUME SOLD	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
1	09:30-09:59	0.7	19,800	0	0.1	0.0
2	15:00-15:29	9.3	0	168,700	0.0	1.2
DATE		10.0	19,800	168,700		

DATE =10/15/87

OBS	TIME INTERVAL	VALUE ($1,000,000)	VOLUME BOUGHT	VOLUME SOLD	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
3	09:30-09:59	13.3	0	283,000	0.0	0.6
4	11:00-11:29	4.3	73,400	0	0.3	0.0
DATE		17.6	73,400	283,000		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF A TRADE EXECUTED PRIMARILY ON THE NYSE.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS PORTFOLIO INSURANCE ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE 810/16/87

OBS	TIME INTERVAL	VALUE ($1,000,000)	VOLUME BOUGHT	VOLUME SOLD	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
5	09:30-09:59	46.6	0	986,200	0.0	2.5
6	10:00-10:29	4.8	0	104,000	0.0	0.4
7	10:30-10:59	26.9	0	576,700	0.0	2.4
8	11:00-11:29	4.7	0	104,000	0.0	0.4
9	13:30-13:59	12.7	0	283,000	0.0	1.0
10	14:30-14:59	30.0	0	650,000	0.0	3.1
11	15:00-15:29	30.0	0	650,000	0.0	2.8
12	15:30-16:15	75.3	0	1,711,500	0.0	3.2
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DATE		231.0	0	5,065,400		

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF A TRADE EXECUTED PRIMARILY ON THE NYSE.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS PORTFOLIO INSURANCE ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/19/87

OBS	TIME INTERVAL	VALUE ($1,000,000)	VOLUME BOUGHT	VOLUME SOLD	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
13	09:30-09:59	12.4	0	312,800	0.0	0.6
14	10:30-10:59	260.0	0	5,310,800	0.0	9.5
15	11:00-11:29	219.3	0	4,422,500	0.0	7.3
16	11:30-11:59	120.5	0	2,503,900	0.0	5.3
17	12:00-12:29	205.9	0	4,215,200	0.0	10.4
18	12:30-12:59	198.9	0	4,310,500	0.0	10.6
19	13:00-13:29	300.0	0	6,016,200	0.0	16.4
20	13:30-13:59	316.2	0	6,878,242	0.0	15.0
21	14:00-14:29	29.6	0	741,700	0.0	2.0
22	14:30-14:59	20.2	0	487,600	0.0	1.3
23	15:00-15:29	90.5	0	2,501,800	0.0	5.4
24	15:30-16:15	76.3	0	2,157,400	0.0	3.4
DATE		1852.8	0	39,855,542		

DATE =10/20/87

OBS	TIME INTERVAL	VALUE ($1,000,000)	VOLUME BOUGHT	VOLUME SOLD	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
25	09:30-09:59	19.5	0	498,093	0.0	0.8

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF A TRADE EXECUTED PRIMARILY ON THE NYSE.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

STOCK MARKET TRANSACTIONS REPORTED AS PORTFOLIO INSURANCE ON THE NYSE BY HALF HOUR TIME INTERVAL
(NUMBER OF SHARES)

DATE =10/21/87

OBS	TIME INTERVAL	VALUE ($1,000,000)	VOLUME BOUGHT	VOLUME SOLD	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
26	UNCLASSIFIED	45	0	1,155,200	0	0

DATE =10/23/87

OBS	TIME INTERVAL	VALUE ($1,000,000)	VOLUME BOUGHT	VOLUME SOLD	BOUGHT AS PERCENT OF NYSE VOLUME	SOLD AS PERCENT OF NYSE VOLUME
27	13:00-13:29	7.0	0	307,000	0.0	1.3

AMERICAN STOCK EXCHANGE AND/OR OVER THE COUNTER STOCK TRANSACTIONS ARE INCLUDED IF THEY WERE REPORTED AS PART OF A TRADE EXECUTED PRIMARILY ON THE NYSE.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY DATE
(NUMBER OF FUTURES CONTRACTS)

OBS	DATE	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	PERCENT OF CME BOUGHT	PERCENT OF CME SOLD
1	87-10-14	114	1,811	462	1,669	576	3,480	114,506	0.5	3.0
2	87-10-15	452	3,605	864	4,494	1,316	8,099	127,507	1.0	6.3
3	87-10-16	60	10,341	2,339	4,168	2,399	14,509	145,031	1.6	10.0
4	87-10-19	310	25,832	4,523	6,900	4,833	32,732	163,212	2.9	20.0
5	87-10-20	6,089	28,697	11,576	4,695	17,665	33,552	113,108	15.6	29.0
6	87-10-21	9,702	11,677	14,778	3,080	24,480	14,757	82,009	29.0	17.0
7	87-10-22	5,393	1,331	3,269	2,091	8,682	3,422	48,427	17.0	7.1
8	87-10-23	6,773	5,006	1,598	5,307	8,371	10,313	38,077	21.0	27.0
9	87-10-26	6,997	4,661	2,792	5,541	9,789	10,202	31,865	30.0	32.0

EXHIBIT C-7

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE =87-10-14

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
1	09:30-09:59	2	40	20	91	22	131	14,011	0.2	0.9
2	10:00-10:29	23	38	15	0	38	38	11,899	0.3	0.3
3	10:30-10:59	0	1	0	0	0	1	6,542	0.0	0.0
4	11:00-11:29	10	0	5	785	15	785	6,782	0.2	11.6
5	11:30-11:59	0	11	0	23	0	34	3,005	0.0	1.1
6	12:00-12:29	22	17	3	17	25	34	3,985	0.6	0.9
7	12:30-12:59	0	44	0	0	0	44	8,940	0.0	0.5
8	13:00-13:29	1	490	298	0	299	490	12,208	2.4	4.0
9	13:30-13:59	0	114	0	200	1	314	8,187	0.0	3.8
10	14:00-14:29	0	69	0	338	0	407	5,604	0.0	7.3
11	14:30-14:59	1	248	80	100	81	348	11,715	0.7	2.9
12	15:00-15:29	0	530	35	100	35	630	7,479	0.5	8.4
13	15:30-16:15	55	67	5	15	60	82	14,148	0.4	0.6
14	UNCLASSIFIED	0	142	0	0	0	142	0	0	0
DATE		114	1,611	462	1,669	576	3,480	114,506		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE 87-10 15

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
15	09:30-09:59	6	1,287	80	1,904	85	3,191	19,854	0.4	16.0
16	10:00-10:29	0	776	95	348	95	1,124	14,844	0.6	7.6
17	10:30-10:59	2	494	161	256	163	750	10,440	1.5	7.1
18	11:00-11:29	21	124	0	1,120	21	1,244	11,767	0.2	10.6
19	11:30-11:59	0	204	0	200	0	404	5,292	0.0	7.6
20	12:00-12:29	0	0	0	299	0	299	9,471	0.0	3.1
21	12:30-12:59	0	0	60	5	60	5	6,835	0.9	0.1
22	13:00-13:29	0	0	0	0	0	0	5,126	0	0
23	13:30-13:59	0	14	0	100	0	114	7,659	0.0	1.4
24	14:00-14:29	353	5	31	71	384	76	7,233	5.3	1.0
25	14:30-14:59	0	0	153	0	153	0	4,773	3.2	0.0
26	15:00-15:29	0	87	192	4	192	91	4,782	4.0	1.9
27	15:30-16:15	71	438	92	187	163	625	19,431	0.8	3.2
28	UNCLASSIFIED	0	176	0	0	0	176	0	0	0
DATE		452	3,605	864	4,494	1,316	6,099	127,507		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE 87-10-16

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
29	09:30-09:59	0	915	375	234	375	1,149	16,068	2.3	7.1
30	10:00-10:29	0	408	55	312	55	720	11,487	0.5	6.3
31	10:30-10:59	30	941	0	318	30	1,259	11,319	0.3	11.1
32	11:00-11:29	0	462	438	1,019	438	1,481	11,798	3.7	12.5
33	11:30-11:59	30	769	51	499	81	1,268	10,147	0.8	12.4
34	12:00-12:29	0	591	7	163	7	754	4,541	0.2	16.6
35	12:30-12:59	0	83	40	73	40	136	4,027	1.0	3.4
36	13:00-13:29	0	1,017	188	455	188	1,472	7,800	2.4	18.9
37	13:30-13:59	0	637	179	190	179	827	12,956	1.4	6.4
38	14:00-14:29	0	1,418	35	155	35	1,573	14,487	0.2	10.8
39	14:30-14:59	0	743	0	118	0	861	8,621	0.0	9.8
40	15:00-15:29	0	409	454	217	454	626	11,225	4.0	5.6
41	15:30-16:15	0	1,087	517	315	517	1,402	20,555	2.5	6.8
42	UNCLASSIFIED	0	881	0	100	0	981	0	0	0
DATE		60	10,341	2,339	4,168	2,399	14,509	145,031		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE =87-10-19

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
43	09:30-09:59	0	1,036	294	1,304	294	2,340	20,284	1.4	11.5
44	10:00-10:29	0	2,019	263	242	263	2,261	15,718	1.6	14.4
45	10:30-10:59	0	2,205	497	860	497	3,065	10,762	4.6	28.5
46	11:00-11:29	95	3,299	132	674	227	3,973	14,636	1.5	27.1
47	11:30-11:59	15	974	50	594	65	1,568	9,448	0.7	16.6
48	12:00-12:29	100	2,704	106	120	206	2,824	6,191	3.3	45.6
49	12:30-12:59	0	1,495	276	828	276	2,323	9,371	2.9	24.8
50	13:00-13:29	100	1,796	356	554	456	2,350	11,312	4.0	20.8
51	13:30-13:59	0	2,044	401	100	401	2,144	13,382	3.0	16.0
52	14:00-14:29	0	1,294	391	545	391	1,839	9,961	3.9	18.5
53	14:30-14:59	0	2,024	101	550	101	2,574	9,587	1.0	26.9
54	15:00-15:29	0	776	810	274	810	1,050	11,663	6.9	9.0
55	15:30-16:15	0	2,896	846	255	846	3,151	21,024	4.0	14.9
56	UNCLASSIFIED	0	1,270	0	0	0	1,270	0	0	0
DATE		310	25,832	4,523	6,900	4,633	32,732	163,212		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE =87-10-20

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
57	09:30-09:59	1,053	3,746	2,484	622	3,537	4,368	19,367	18.0	22.6
58	10:00-10:29	734	1,899	650	60	1,384	1,959	10,495	13.1	18.0
59	10:30-10:59	437	3,484	862	446	1,299	3,930	12,809	10.1	30.6
60	11:00-11:29	1,153	2,760	4,277	174	5,430	2,934	10,814	50.0	27.0
61	11:30-11:59	893	3,045	596	246	1,489	3,291	8,879	16.0	37.0
62	12:00-12:29	4	337	490	32	494	369	3,986	12.4	9.3
63	12:30-12:59	316	100	0	200	316	300	478	66.0	62.6
64	13:00-13:29	220	1,317	438	310	658	1,627	7,264	9.0	22.0
65	13:30-13:59	336	3,179	0	715	336	3,894	9,307	3.4	39.0
66	14:00-14:29	0	2,685	330	259	330	2,944	6,463	5.1	45.0
67	14:30-14:59	407	1,060	397	472	804	1,532	6,663	12.1	22.0
68	15:00-15:29	307	1,327	37	265	344	1,592	5,483	6.3	29.0
69	15:30-16:15	229	1,202	735	293	964	1,495	10,432	9.3	14.3
70	UNCLASSIFIED	0	2,516	280	801	280	3,317	0	0	0
DATE		6,089	28,657	11,576	4,695	17,665	33,552	118,158		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE =87-10-21

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
71	09:30-09:59	1,872	3,368	1,851	300	3,723	3,668	18,345	20.0	19.0
72	10:00-10:29	715	2,205	899	519	1,614	2,724	6,706	24.0	40.0
73	10:30-10:59	1,220	200	132	178	1,352	378	4,958	27.0	7.6
74	11:00-11:29	495	800	1,153	623	1,648	1,423	4,192	39.0	33.0
75	11:30-11:59	173	680	394	256	567	936	6,970	8.1	13.4
76	12:00-12:29	305	762	291	301	596	1,063	5,903	10.1	18.0
77	12:30-12:59	619	100	80	500	699	600	3,634	19.0	16.0
78	13:00-13:29	57	500	1	1	58	501	1,937	2.9	25.0
79	13:30-13:59	1,376	987	8,455	124	9,831	1,111	7,288	134	15.2
80	14:00-14:29	820	228	450	50	1,270	278	4,496	28.0	6.1
81	14:30-14:59	150	143	23	7	173	150	4,351	3.9	3.4
82	15:00-15:29	760	12	65	10	825	22	4,418	18.0	0.5
83	15:30-16:15	247	462	834	211	1,081	673	8,811	12.3	7.6
84	UNCLASSIFIED	893	1,230	150	0	1,043	1,230	0	0	0
DATE		9,702	11,677	14,778	3,080	24,480	14,757	82,009		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE -87 10-22

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
85	09:30-09:59	1,150	407	795	250	1,945	657	12,763	15.2	5.1
86	10:00-10:29	239	12	79	10	318	22	4,549	6.9	0.5
87	10:30-10:59	1,132	0	725	50	1,857	50	5,717	32.0	0.9
88	11:00-11:29	674	75	47	62	721	137	4,382	16.0	3.1
89	11:30-11:59	706	115	248	405	954	520	3,543	26.0	14.6
90	12:00-12:29	90	75	226	0	316	75	1,825	17.0	4.1
91	12:30-12:59	617	0	225	124	842	124	2,074	40.0	5.9
92	13:00-13:29	25	0	297	250	322	250	2,146	15.0	11.6
93	13:30-13:59	33	200	0	50	33	250	1,452	2.3	17.0
94	14:00-14:29	99	61	20	0	119	81	1,493	7.9	5.4
95	14:30-14:59	20	114	81	455	101	569	2,939	3.4	19.0
96	15:00-15:29	0	0	144	23	144	23	1,597	9.0	1.4
97	15:30-16:15	608	2	64	320	672	322	3,947	17.0	8.1
98	UNCLASSIFIED	0	250	338	92	338	342	0	0	0
DATE		5,393	1,331	3,269	2,091	8,682	3,422	48,427		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE =87-10-23

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
99	09:30-09:59	250	315	2	400	252	715	5,177	4.8	13.8
100	10:00-10:29	581	692	3	250	584	1,142	3,933	14.8	29.0
101	10:30-10:59	637	1,315	0	653	637	1,968	4,791	13.3	41.0
102	11:00-11:29	891	711	0	80	891	791	4,143	21.0	19.0
103	11:30-11:59	200	10	77	0	277	10	2,707	10.2	0.4
104	12:00-12:29	871	0	1,435	0	2,306	0	3,070	75.0	0.0
105	12:30-12:59	1,444	170	0	0	1,444	170	2,636	54.0	6.4
106	13:00-13:29	1,625	20	40	40	1,665	60	5,746	28.0	1.0
107	13:30-13:59	274	103	41	3,384	315	3,487	5,195	6.1	67.1
108	14:00-14:29	0	100	0	0	0	100	682	0.0	14.6
109	UNCLASSIFIED	0	1,370	0	500	0	1,870	0	0	0
DATE		6,773	5,006	1,598	5,307	8,371	10,313	38,077		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.

PORTFOLIO INSURANCE AND OTHER HEDGING IN THE S & P 500 FUTURES CONTRACT ON THE CME BY HALF HOUR TIME INTERVAL
(NUMBER OF FUTURES CONTRACTS)

DATE 87-10-26

OBS	TIME INTERVAL	PORTFOLIO INSURANCE BOUGHT	PORTFOLIO INSURANCE SOLD	OTHER HEDGING BOUGHT	OTHER HEDGING SOLD	TOTAL BOUGHT	TOTAL SOLD	CME S&P 500 VOLUME	TOTAL BOUGHT AS % OF CME VOLUME	TOTAL SOLD AS % OF CME VOLUME
110	09:30-09:59	1,761	117	2,334	2,387	4,095	2,504	4,672	87.6	53.6
111	10:00-10:29	200	148	0	0	200	148	3,102	6.4	4.8
112	10:30-10:59	400	512	0	128	400	640	3,059	13.1	20.8
113	11:00-11:29	202	258	2	2,538	204	2,796	2,210	9.2	126
114	11:30-11:59	1,650	131	96	100	1,746	231	4,273	40.8	5.4
115	12:00-12:29	250	118	345	67	595	185	2,984	19.8	6.2
116	12:30-12:59	500	351	5	236	505	587	2,658	18.8	22.8
117	13:00-13:29	1,334	154	5	35	1,339	189	3,459	38.8	5.4
118	13:30-13:59	700	2,450	0	50	700	2,500	5,080	13.8	49.8
119	14:00-14:29	0	0	5	0	5	0	395	1.3	0.0
120	UNCLASSIFIED	0	422	0	0	0	422	0	0	0
DATE		6,997	4,661	2,792	5,641	9,789	10,202	31,855		

TOTAL BOUGHT OR SOLD AS A PERCENT OF CME VOLUME MAY EXCEED 100 SINCE SURVEY DATA REFLECTS ORDER ENTRY TIME WHILE CME VOLUME REFLECTS ORDER EXECUTION TIME.

UNCLASSIFIED TRADES WERE REPORTED WITHOUT SPECIFIC TIMES.