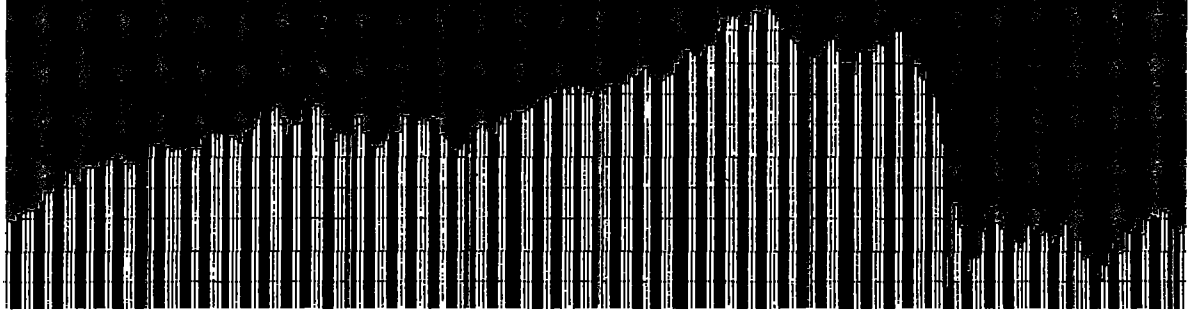
Findings of the Committee of Inquiry

Examining the Events Surrounding October 19, 1987



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Preliminary Report: December 22, 1987

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Final Report of the Committee of Inquiry Appointed by the Chicago Mercantile Exchange to Examine the Events Surrounding October 19, 1987

I. Introduction

On October 28, 1987, the Chicago Mercantile Exchange ("CME") appointed the authors of this report as an independent Committee of Inquiry to study the role of CME's futures market during the extraordinary stock market decline of mid-October 1987. The Committee was also expected to recommend any changes in the CME's contracts or procedures that might improve the functioning of the markets, especially under conditions of great stress. The three academic members of the Committee had each conducted research studies on issues relating to the stock market, the futures and options markets and to the interrelations between the markets; and they have written extensively on these subjects. The fourth panel member is a practicing attorney with substantial experience in financial regulatory matters, including service as General Counsel to the Board of Governors of the Federal Reserve System.

This Final Report of the Committee has been prepared in the wake of numerous studies of the October 1987 crash, intense congressional scrutiny of these

events, and broad public debate about appropriate remedial steps needed to avert recurrences of such trauma and improve the functioning of securities markets. We have followed these studies and discussions with great interest, and in this Final Report we address certain of the major points that have been raised. We have not, however, attempted to respond to or reflect upon each of the many ideas and recommendations put forward, or each of the changes in practices or procedures that may have been adopted over the months since the crash.

II. The Committee's Preliminary Report

A. The Role of Futures During the Crash

On December 22, 1987 we submitted to the CME a preliminary report of our findings and our suggestions.[1] Our study of trading and open interest in CME stock index futures contracts had led us to three tentative conclusions about the role of index futures in the market fall of October 19-20:

First, the crash of October 19 did not originate in Chicago and flow from there by means of index arbitrage, carried out by program trading, to an otherwise calm and unsuspecting market in New York.

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[1] The Committee's Preliminary Report is reproduced as Section II of this Report.

Although this charge was made at the time and has been repeated frequently since then, the evidence shows clearly that the selling wave hit both markets simultaneously. The perception that a price decline in the futures market led the decline in the stock market was an illusion traceable mainly to the different procedures followed in the two markets at their openings. At the New York Stock Exchange ("NYSE") the huge overnight imbalance of sell orders had delayed the opening of many of the leading stocks in the Standard & Poor's 500 ("S&P 500") index. The prices for these stocks used in calculating the publicly reported index value on Monday morning were, therefore, the last available quotes from the previous Friday's close. By contrast, the futures price at the CME reflected the Monday morning information. Thus, while it may have appeared to some that a tidal wave was on the way from Chicago, delayed openings at the NYSE showed that it had already arrived there, even before the opening bell had sounded.

Second, on Monday, October 19 the futures market in Chicago appears actually to have absorbed selling pressure on balance. While some pressure from the selling of futures contracts by portfolio insurers and other institutional investors was indeed transmitted back to the NYSE by index arbitrage, the equivalent of

85 million shares -- about 14 percent of the day's volume on the NYSE and 57 percent of CME S&P 500 volume -- was absorbed by the market makers, day traders, anticipatory hedgers, institutional buyers and speculative position holders in Chicago.

Third, the futures markets in Chicago were no more responsible for the turnaround in the market on Tuesday, October 20 than for the initial downturn on Monday, October 19. The dramatic recovery on Tuesday afternoon is more reasonably traced to the announcement of large corporate buyback programs and the promise of Federal Reserve support for bank liquidity, than to any manipulations in the Major Market Index ("MMI") futures contract at the Chicago Board of Trade or to the rupture of the linkage between the stock market and the main futures market during the 40-minute period that the CME had suspended trading.

In the months since our Preliminary Report presented these tentative conclusions at least five other investigative commissions and regulatory agencies have submitted reports on the crash and several academic studies of the trading record have been completed. These reports and studies have filled in many pieces of the puzzle that were still missing when we first wrote and they have offered new insights and perspectives on the way the markets functioned. After

examining these studies in detail, however, we find no compelling reason to retreat from or to alter the analysis or the conclusions presented in our Preliminary Report. In fact, some of the conclusions we put forth somewhat tentatively at the time, can now be considered as having been strongly supported by the data that subsequently became available.[2] In later sections of this report, we shall note some of the important new findings, particularly where they have a bearing on our policy recommendations.

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[2] An example is the study, "Nonsynchronous Trading and the S&P 500 Stock-Futures Basis in October 1987," by Lawrence Harris, University of Southern California, manuscript, December 1987. Harris constructs a measure for the S&P 500 index that adjusts for delayed openings and trading halts on the NYSE. The revised series strongly confirms our view that the opening discount on October 19 was an illusion. An index adjustment by the Commodity Futures Trading Commission ("CFTC") similar to that of Harris also supports our interpretation of the seeming discount at the opening. See Commodity Futures Trading Commission, Divisions of Economic Analysis and Trading and Markets, "Final Report on Stock Index Futures and Cash Market Activity During October 1987," pp. 15-18, January 1988 ("CFTC Report").

Although most severe at the openings, similar distortions in the normal relation between futures and cash market prices arose at several points during the critical two days in response to trading delays, reporting lags and the efforts of some NYSE specialists to fill in any large gaps between prices on successive trades.

A. Preliminary Policy Recommendations: Portfolio Insurance and Index Arbitrage Program Trading

Although our Preliminary Report sought mainly to establish what had happened, we tried also to give a preliminary assessment of some of the main proposals for change in market structure that had surfaced in the wake of the crash. For some of these proposals, we felt the evidence was already strong enough for us to take a clear stand. In particular, we recommended against any attempts to ban either portfolio insurance or index arbitrage carried out through program trading.

1. Portfolio insurance and the crash

Our recommendation against legislative or regulatory restrictions on portfolio insurance does not mean that we believe portfolio insurance selling played no role in the events of October 19. Certainly, as we showed, substantial portfolio selling did occur. But it is important to keep the portfolio insurance sales in perspective. On October 19, portfolio insurance sales of futures represented somewhere between 20 and 30 percent of the share equivalent of total sales on the NYSE. The pressure of selling on the NYSE by other investors -- mutual funds, broker-dealers and individual shareholders -- was thus three to five times greater than that of the portfolio insurers. Price falls as large, and market conditions as chaotic as those in the

U.S. occurred in many countries on October 19 even in the absence of portfolio insurance programs or an index futures market.

Nor are we persuaded by the view expressed in both the Report of the Presidential Task Force on Market Mechanisms ("Brady Report") and the Report of the Securities and Exchange Commission's Division of Market Regulation ("SEC Report")[3] that the timing of the portfolio insurance sales magnified their impact. The SEC Report notes that portfolio insurance and index arbitrage, although accounting for no more than 20 percent of S&P 500 volume during the entire day on October 19, and no more than 40 percent in the 1:00-2:00 PM EST hour, did account for "more than 60 percent of S&P 500 stock volume in three 10-minute intervals within that hour" (SEC Report, p. xiii). But since transactions are recorded sequentially there must surely have been shorter intervals in which the portfolio insurance trades approached 100 percent of total trades!

No reliable methods exist for relating observed price changes in active, competitive markets to the

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[3] Securities and Exchange Commission, Division of Market Regulation, "The October 1987 Market Break," February 1988. The SEC Report carries the caveat that although the Commission authorized publication of the Report, it has expressed no view on the Report's analysis, findings or recommendations.

actions of particular sellers or buyers. Hence we chose not to attempt the detailed, almost tick-by-tick account of trading presented in the Brady and SEC Reports. We did provide a rough visual sketch in our Figures 12 through 15 of net trading activity by major groups for fifteen-minute intervals during October 19 and 20, but we could find no consistent patterns of association with price changes. Because visual scanning can be deceptive, however, and because both the Brady Commission and the SEC claimed to have seen such patterns, we asked the CME staff to carry out a formal statistical analysis of the degree of association between the transactions by pension funds or broker-dealers and price changes on both October 19 and 20. That study, presented as Appendix II to this report, finds no statistically reliable relation between price changes over 15-minute intervals on those days and trading activity during these intervals by pension funds and broker-dealers.

Some accounts of events on October 19 suggest that the fear of further portfolio insurance selling to come may have been as much or more responsible for frantic selling by the public, and especially by the large trading firms, as the actual portfolio insurance selling that did occur. Such perceptions, of course, are difficult to document; but to the extent that they

did arise on October 19 they point up the need not for restrictions on portfolio insurance, but for better and quicker dissemination of information about the flow of insurance transactions waiting in the wings.[4]

2. Portfolio insurance and the pre-crash buildup

Concern has also been expressed that portfolio insurance may have contributed to the crash by pushing prices in the U.S. stock market to higher pre-crash levels than might have been the case without the comfort that such insurance programs seemed to offer.[5] Once again, however, it is important to keep a sense of proportion about the relevant magnitudes. The U.S. market rose between January and August 1987 by 30 percent, an increase in value of about $600 billion.

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[4] Some of these information-related problems of conducting portfolio insurance might have been avoided had the insurance been carried out with traded options, rather than with the synthetic options created by dynamic hedging with futures. See, e.g., Sanford J. Grossman, "An Analysis of the Implications for Stock and Futures Price Volatility of Program Trading and Dynamic Hedging Strategies," Journal of Business, July 1988 (in press). The much more restrictive position limits on options than on futures, however, have tended to discourage the use of options by the portfolio insurers.

[5] In testimony before the Senate Committee on Banking, Housing and Urban Affairs on February 2, 1988, Federal Reserve Board Chairman Alan Greenspan said: "To the degree that derivative instruments facilitate a better redistribution of price risk to those most willing and able to bear it, they can add to the appeal of cash equity investments to investors, encouraging them to hold larger permanent equity positions."

The total value of pension fund assets under formal portfolio insurance plans at that point may have reached as much as $100 billion. Not all of this total was in equities, of course; pension funds typically also have substantial holdings of fixed income securities to reduce the downside vulnerability of the fund's assets. Believing that portfolio insurance could now play a similar risk reduction role for their equity component, some pension fund managers may well have decided to increase the equity portion relative to the fixed income proportion of their asset mix. But even if this shift in proportion away from debt and toward equity amounted to as much as $30 billion and even if it had all come in 1987, it would still have amounted to less than 5 percent of the increase in the value of U.S. equities between January and the time of the crash.

In the months since the submission of our Preliminary Report the amount of portfolio insurance in force has, by all accounts, been dropping steadily and substantially. The programs have been modified to admit a wider and more flexible range of response by the managers when futures are selling at what appears to be a substantial discount to the cash market, as occurred often on October 19 and the days thereafter.[6] The

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[6] See, e.g., Hayne Leland, "Dynamic Asset

[Footnote continued on next page]

problems posed by portfolio insurance, in short -- if indeed they were problems -- appear to have been largely self-correcting. In recognition of that fact, the calls for restricting portfolio insurance, so frequently voiced in the aftermath of the crash (and again after the presentation of the Brady and SEC Reports), have also largely subsided. Such has not proved to be the case for index arbitrage program trading.

3. Index arbitrage program trading

In our Preliminary Report, we took the position, amply documented in extensive previous academic research on the subject (and apparently fully concurred in by the Brady Commission), that, given an index futures market, inter-market arbitrage was a benign rather than a malignant influence.[7] Index arbitrage carried out

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[Footnote continued from previous page]
Allocation: After the Crash," Investment Management Review, January/February 1988, pp. 13-19. Leland is one of the inventors of portfolio insurance and a co-founder of Leland, O'Brien and Rubinstein, the leading purveyor firm.

[7] Among the many statistical studies of index arbitrage program trading, two recent ones are perhaps worth special notice. In their study "The Dynamics of Stock Index and Stock Index Futures Returns" (Working Paper Series 88-101, Fuqua School of Business, Durham, NC, January 21, 1988), Hans Stoll and Robert Whaley found no evidence that futures tend to "overshoot" their true values and hence to cause whipsawing of the kind pictured in the popular press.

In a paper entitled "Report on Program Trading: An Analysis of Interday Relationships," prepared for the
[Footnote continued on next page]

through program trading is merely one among a large number of examples in economic life of how financial intermediaries, in this case the arbitragers, serve to lower the costs of transacting. Their presence links, and hence increases, the effective market-making capacity in both markets.

Nonetheless, while logic and the evidence of virtually every academic investigation of the subject suggest that index arbitrage program trading is socially beneficial, such trading has come under increasing attack from legislators, as well as many in the investment community including some of the largest brokerage concerns. In part, this hostility may reflect a fear on the part of some mutual funds and other institutional investors of "front running" against them by the brokerage firms with which they do business -- that is, trading the futures to profit on the knowledge of the customer's impending order in the stock market. In part, it may reflect a populist concern that

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Katzenbach study, Sanford Grossman could find no relation "between any measure of volatility or any measure of program trading. The days in which volatility was high were not, systematically, the days in which program trading intensity was high." (p. 2)

The CFTC Report also notes, aptly, that during the immediate post-crash period of October 21-23, volatility was extremely high but program trading had virtually ceased. (CFTC Report, pp. 107-136)

sophisticated traders may be profiting by "locking in" profits without risk through techniques beyond the reach of the average investor. In part, it may also be a response to the strains that such trading sometimes imposes on the transaction processing capacities of the NYSE. Finally, some members of the brokerage community seem to believe, on the basis, however, of no foundation in evidence that we have been able to discover, that ending program trading will somehow reduce market volatility, increase investor confidence and restore trading volume to its pre-crash levels.

To deal in detail with each of these misconceptions about program trading, some of very long standing, is a task best left to the educational arms of the exchanges themselves. The focus of our Committee is the narrower one of the market performance in the crash and its immediate aftermath. Here perhaps we need only call attention once again to a key point emphasized throughout the Brady Report: the markets performed most chaotically precisely when the arbitrage link between them was broken. Breaking the link knocked out market-making capacity both on the floor at the futures markets at Chicago and at the upstairs, block-trading desks in New York. The modestly capitalized specialists at the NYSE were then left to face the avalanche on their own.

III. The Critical Policy Issue: Who Should Set Futures Margins?

An issue that has dominated policy discussions since the crash has been that of index futures margins. Because percentage margins on futures are smaller than some margins required on purchases of stocks, the concern has been voiced that greater leverage can be achieved in the futures market than in the stock market, thus encouraging "speculation" and promoting greater volatility. Further, because stock margins are set by the Federal Reserve, while futures margins are set "privately" by the futures exchanges, it has been argued, in the wake of the crash, that not only equalization, but governmental control of futures margins is necessary.

In our Preliminary Report we stated that we found no evidence that the level or method of setting futures margins had contributed to or intensified the crash, and we cautioned that imposing fundamental changes in the setting of futures margins could easily have unintended and unpredictable consequences for the continued viability of the U.S. futures markets. None of the studies of the crash published since our Preliminary Report has caused us to alter those views. None of the studies, in fact, attempted any detailed or quantitative

appraisal of the role of futures margins. Absent such documentation, we fear that the frequent references to margins in the summaries and in the policy sections of those reports have only tended to reinforce widely held misconceptions about margins and crashes, past as well as present.

Sixty years of academic research, for example, plus a thorough study by the staff of the Federal Reserve Board, have not succeeded in dispelling the misconception that stock market margins on the eve of the crash of 1929 were only 10 percent; or that the vast bulk of shares on the NYSE were held in these low-margined accounts; or that the forced liquidation of those accounts under the pressure of margin calls was mainly responsible for the severity of the crash. As noted, however, not in the text but only, unfortunately, in an Appendix to the Brady Report:

> Beginning in the Summer of 1929, brokers began to increase margin requirements and by the time of the crash, actual margins were about 50 percent. Total outstanding margin debt at the time of the 1929 crash was equal to only about 10 percent of the value of outstanding stocks. It is difficult, therefore, to imagine that margin calls were sufficient to account by themselves for any significant fraction of the secular decline in the stock market following the 1929 crash

(Brady Report, Appendix A, Analytical Study VIII, p. VIII-2)[8]

Similarly, while many may have come to believe that the level of margins on index futures was a cause of the 1987 crash, the facts are that the entire open interest in margined index futures in October 1987 came to the share equivalent of only 2 percent of the value of shares listed on the NYSE; that far from contracting in a liquidation panic under the pressure of margin calls, the open interest in futures actually expanded slightly during October 19; and that futures traders whose margin accounts were classified as "speculative" were, as noted earlier, substantial net buyers of futures, not sellers, on October 19.

Misconceptions about the role of futures margins, if translated improvidently into legislative or governmental policy decisions, could have significant consequences for the efficiency of markets. It is crucial, therefore, that the margin issue be addressed with a clear understanding both of the facts and of the valid purposes and functions of margins.

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[8] Essentially similar findings were made in A Review and Evaluation of Federal Margin Regulation, Board of Governors of the Federal Reserve System, December 1984 ("FRB Study").

1. Futures margins as guarantees of performance

Participants in futures markets buy and sell "contracts" that embody promises to make payments of a fixed sum at some future "delivery" date. The value of such a contract depends upon the relation between the fixed price and the value of some specified "spot" price at the maturity date of the contract. The credibility of such promises to pay in the future is maintained in part by requiring the parties, both the buyer and the seller of the obligation -- not just the buyer, as in stock market transactions -- to post collateral in the form of a cash margin with their brokers. Brokers in turn post margins with a clearing house member when they undertake a trade. For further protection, the margin account is marked to market daily. If the price movement during a day is favorable, and more margin is on deposit than needed, the excess is credited to the customer; but additional margin must be posted whenever prices move adversely and the value of the collateral on deposit falls below a specified maintenance margin level. Thus, knowing that continually updated margins will be required -- and knowing also that the members of the clearing house, and ultimately the membership of the entire exchange, are committed to make good any failures -- a trader may take a position in futures with

no concern about the other party's ability to perform as promised because the clearing house is, in effect, substituted for the other party.

2. How futures margins are set by the exchanges

Futures exchanges currently set their margins by economic standards comparable to those in any other private sector business. Exchanges have the institutional concern of protecting the financial integrity of their clearing system, and they are naturally aware of the basic economic importance of trading volume to their members' operations. They must therefore try to balance the gains to their members from a reduced risk of customer default against the higher costs that the extra degree of protection demanded might impose on the users of the system. Of course, individual members can, and do, elect on their own to increase customer margins on deposit with them to protect further their own obligations to meet exchange requirements.

The margins required to meet the exchange's goals are not set arbitrarily, but depend, among other things, on the price volatility of the contract and the speed and assurance with which additional margin can be collected. Since the futures exchanges make their cash settlements daily, the margins they set have typically

approximated the maximum price move likely in a single day, plus an added safety factor that can be further increased whenever the underlying price volatility suddenly increases. Margins are also lower for "hedgers" and "spreaders" than for speculators, since the hedger's position in the underlying commodity, or the spreader's in the offsetting contract, is itself an implicit guarantor of the availability of the resources required to fulfill the promise in the futures contract.

3. Performance of the margin process during the October crash

That the U.S. futures exchanges have in fact succeeded in finding an appropriate balance of costs and benefits in their margin policies -- and that they have not short-sightedly sought to build up trading volume with margins set too low -- is clear from their survival. On October 19, a day that saw the largest one-day price change ever recorded in the S&P 500 futures market, no trader suffered losses because of a contract default by a counterparty, no clearing house failed, and no futures clearing firm failed to meet its obligations to its customers, despite the unprecedented volume of margin-related cash flows and the intra-day margin calls.

This is not to suggest, of course, that no problems or difficulties with the clearing and margining

process were encountered on October 19 and 20. Serious strains occurred, particularly in the options markets, where the setting of margins for writers of options, or for combinations of option positions, is technically more difficult than setting margins for futures. Even in the more experienced futures markets, however, rumors of impending collapse of particular brokers and clearing firms appear to have circulated at various times during the two days, unquestionably intensifying a sense of panic. Such apprehension can become important because margin accounts at clearing firms and the retail futures commission merchants have some of the characteristics of demand deposits in banks -- not including federal deposit insurance. If rumors start that a brokerage firm is failing or that holders of under-margined accounts are not posting more cash because their banks are refusing to transfer funds, every holder of a margined futures position has an incentive to withdraw any free cash balance as quickly as possible and to refrain from further transactions, even stabilizing ones.

Fortunately, the banking system, with the normal liquidity support to be expected from the Federal Reserve in a threatened crisis, was able to avert a financial collapse in October. Steps for further strengthening the liquidity support system, based in

part on the experience gained during the crash, are already being taken by clearing firms and their banking connections. Whether this strengthening should aim for a unified clearing system covering stocks, options and futures, as recommended in the Brady Report, is far from clear, however. There are no obvious economies of scale or management that we can see in merging the many separate and highly specialized clearing houses into a single giant firm. Competition in providing clearing services, like competition generally, can be a spur to innovation and improved efficiency. Some of the presumed gains from unified clearing, moreover, can be accomplished simply by better sharing of information between banks and clearing houses along lines already being implemented. We believe that if the economic advantages of more integrated inter-market clearing are as large and as unambiguous as the Brady Report suggests, the various exchanges will find ways in their mutual interest to bring about such a consolidation without mandating a national clearing monopoly.

4. The cost of changing the present system of setting futures margins

The demonstrated success of the margin policies of the private-sector futures exchanges carries with it a direct implication for public policy, albeit one that many who recognize that success seem reluctant to

accept. If private-sector margin policies are currently being set on rational, economic grounds, and if they are passing the survivorship test, not only routinely, but in the face of the most dramatic market collapse in our history, then, absent clear evidence that the futures markets are benefiting unjustly from costs that their margin policies impose on others, the adoption by a public sector regulator of any different set of policies can be presumed to be socially inefficient.

In particular, the frequently heard call for 50-percent performance margins on index futures contracts -- far higher than experience has shown necessary to protect the clearing process -- would amount, in effect, to the imposition of a tax on futures transactions, although not a tax, of course, from which any government revenues would be collected. All the negative effects of an excise tax would be present, however, including in particular the reduction in sales volume. That higher margins, arbitrarily imposed, are effectively a tax on futures transactions must be emphasized. The tax is reduced, but not eliminated, by the interest paid on the account either directly by the broker or by the return on any U.S. Treasury bills deposited in lieu of cash. However, funds tied up in such low-yield uses usurp other more productive opportunities for employing the resources.

The argument is sometimes made -- indeed, we made the point in our Preliminary Report -- that even a 50-percent margin requirement might not be onerous for true hedgers because they could, in principle, meet the margin requirement by depositing the assets against which they are selling the futures contract. Quite apart from the fact that 50-percent margins might leave no one in the market to take the other side of the hedgers' trades, the argument that high margins do not deter hedgers overlooks the small, perhaps, but still nontrivial risk of banking large sums without insurance coverage. Margin deposits, although segregated, are still ultimately at risk in the event of a catastrophic crash. Therefore, a pension fund hoping to hedge 25 percent of a $1 billion portfolio of equities would, if faced with a 50-percent margin requirement, surely, and quite properly, be reluctant to deposit as much as $125 million in cash or Treasury bills with an outside broker. Nor would it be likely to turn over custody of any substantial fraction of its $1 billion in shares merely to reduce the interest loss from pledging low-yield liquid assets. The most prudent strategy for such a fund for reducing its equity proportion would be to avoid exchange-traded futures altogether and turn to substitutes -- either selling $250 million of stocks and investing the proceeds in Treasury bills directly, or

perhaps undertaking an equivalent hedging transaction on an overseas exchange or in an off-exchange dealer market.

Driving major classes of users to seek alternatives to futures exchanges not only reduces the revenues of those exchanges but undermines the liquidity and market depth that is, after all, the very reason for their existence. Some of the calls for higher margins on futures appear, in fact, to have just such an undermining of the market's liquidity as an objective. The fear is that in part because of the development of index futures, the market for equities has become too sensitive to news and hence too volatile. Whatever the merits of those arguments -- and we, at least, do not find them persuasive -- they do not appear to recognize the alternatives to futures transactions that pension funds and other large institutional investors already have at their disposal, let alone the alternatives not yet on stream, but that will surely be developed if the U.S. index futures markets can no longer function efficiently.

One of the alternatives to an index futures transaction is, of course, a transaction directly in the stocks that make up the index. Some of the clamor for higher margins on index futures, notably that in the Brady Report, appears to be less a call for killing the

futures markets or reducing their liquidity than an appeal for restoring competitive equality between these two specific alternatives.

The point is made that whatever may be the original motivating differences between futures margins and stock market margins -- good faith deposits in the case of futures, and down-payments on a purchase in the case of stocks -- the margins are functionally equivalent for some classes of traders. Many speculators, and even some longer-term investors, have a choice between buying futures, on the one hand, and borrowing to buy stocks, on the other, as a means of establishing a leveraged position in equities. If they invest on the stock side they may be required to comply with the 50-percent initial cash margin requirement imposed under the Federal Reserve's margin regulations. That requirement is far higher than the margin currently required by the futures exchanges for initial speculative positions in index futures -- about 15 percent.

5. Futures margins and stock market margins: some misconceptions

In evaluating this competitive equality argument, it is important to avoid a number of widely-held misconceptions about current stock market margin rules.

First, very few stock market margins are currently 50 percent. Market professionals, such as specialists and member broker-dealers are exempted from the regular margin rules. They must comply instead with certain minimum net capital requirements. The Brady Report (p. 65) puts these requirements as the effective equivalent of initial margins of 20 to 25 percent.

Second, not all stock market margins, or their equivalents, are set by the Federal Reserve System. The Federal Reserve sets only the initial margins. The critical maintenance margins -- the requirements that trigger margin calls and any inter-market spillovers -- are set by the stock exchanges. The maintenance margin for stocks, currently 25 percent, is as much a private sector responsibility as the maintenance margin for futures. The same is true for bank or other loans against already existing, as opposed to newly-opened, stock positions.

Third, rules on extensions of credit as well as the risk exposure to exchange member firms are very different in the two markets. Futures contracts, unlike

stock, are marked to market daily, and in times of rapid price change are subject to intra-day margin calls. The objective of the futures margin system is to avoid the accumulation of credit obligations. An initial stock purchase, by contrast, need not be settled for five days, and if clearing house funds are used for payment, one additional business day may lapse. Maintenance margin calls, moreover, particularly for good customers, are much less peremptory for stocks than for futures. In other words, larger cash buffers are substituted by stock brokers for the quicker speed of collection approach adopted by the futures industry.

Finally, the 50-percent initial margin requirement applicable in the cash market applies to individual stocks, while index futures contracts relate to portfolios of stocks. It is a well-accepted principle of finance that the price volatility of a portfolio of stocks is less than that of any of its particular components. Hence, if the function of margins is to protect the integrity of the clearing process, margins on baskets of stocks should be lower than on individual stocks -- and if margins on stock baskets were to be set in the private sector, like those on futures, they presumably would be lower. The problem of competitive inequality would disappear.

6. Federal Reserve margin rules and speculative excesses: a skeptical view

That so simple a solution to making margins consistent as removing the Federal Reserve altogether has not so far been seriously proposed is testimony to the lingering power of the notion that control over stock market margins plays an important role in controlling excessive leverage and speculation. The conventional wisdom, echoed repeatedly in the Brady Report, is that the control of leveraged investment in stocks through the Federal Reserve margin rules is necessary to curb speculative excesses. It is worth noting, however, that the Federal Reserve itself, in its 1984 staff study and evaluation of the margin rules, was far less confident than the Brady Report about the role of stock market margins in this respect. The Fed's detailed historical review of market volatility turned up no discernible relation between stock margin levels, or margin changes, and market movements, either in the aggregate or for particular, highly speculative stocks. In the report's words, the evidence pointed up "the lack of any positive demonstration that margin regulation has served to dampen stock price fluctuation." (FRB Study, p. 163)

Certainly the Board's actual decisions on margins over the years suggest no great confidence in that

agency's ability to affect stock market speculation. The current initial margin of 50 percent was set in 1974 and has been kept unchanged at that level ever since. Nor is the Federal Reserve justly to be censured for this passive policy. Neither economics nor legislation offers any clear guidelines to the Federal Reserve as to when speculative "excess" is in fact occurring. Absent any universally accepted indicator that the stock market is at or approaching a level that is unsustainably high, can the Federal Reserve Board reasonably be expected to take dramatic steps to curb stock market credit, and thus risk precipitating a panic that might, like the crash of 1987, reduce national wealth by half a trillion dollars? Or if trading volume is languishing, can the Federal Reserve reasonable be expected to lower appreciably a margin rate that has remained unchanged for almost 15 years, particularly with a recent major crash still so vividly in memory?

The political setting in which the Fed necessarily operates will inevitably cause it to act with great caution -- particularly against the backdrop of its own 1984 study, which reflects strong misgivings about the utility and effectiveness of margins as a tool for curbing "speculative" investment and market volatility. In short, public sector controllers of margins -- whether the Fed, the SEC or the CFTC, and

whether directly responsible or merely exercising final review powers -- bear only the political costs of being charged with setting margins too "low" should another crash occur. The natural tendency, therefore, will be to avoid setting margin levels that might subject the agency in the future to public criticism and political pressures. Margins set in the private sector, by contrast, can go up and down as economic circumstances change because the exchanges themselves both bear the costs and get the benefits of setting margins too high or too low.

7. Margin rules as a private-sector responsibility

We recommend, therefore, that the equalization of margins called for by the Brady Report be undertaken in the most direct way possible, namely by turning over to the private sector those remaining parts of the stock margin process still administered by the Federal Reserve System. We recognize, of course, that in an important sense the issue of competitive equality of initial speculative margins may already have become academic, although some in New York may believe futures margins are still inadequate. The Board of Governors of the CME has made substantial concessions to this view. It recently voted to raise initial speculative margins to 15 percent -- a level three to five times that

applicable to even the most volatile physical commodity and higher than would have been set in the past for the day-to-day volatility currently being experienced. Margin levels higher than needed to protect the settlement process may perhaps serve to deflect political pressure from the futures markets in the short run; but if long maintained they are also likely to add impetus to the kind of search for cheaper methods of portfolio adjustment that led to the development of index futures in the first place.

IV. Trading Halts and Circuit Breakers

The tidal wave of selling on October 19 had effects on both the New York and Chicago exchanges that were similar in all essential respects to those that afflict an electric power utility when all its customers turn on their air conditioners at once. The demand for service then exceeds the system's capacity to supply it at normal cost and a variety of formal and informal rationing and "peak-load pricing" mechanisms come into play. In the equity markets these peak-load pricing and rationing adjustments took the form of widened bid-ask spreads, large gaps between successive prices, over-loaded printer buffers, crossed markets, lost orders, unanswered telephones, bans on program trading, and so on, as described in great detail in the Brady

Report, and the SEC Report, as well as in the report of the General Accounting Office.[9] Under such conditions of system overload, the Brady Report's call for the installation of circuit breakers is certainly understandable, and the possible need for circuit breakers has been a concern of the exchanges themselves, as well.

Shortly before our Committee was formed, the CME had, in fact, instituted 30-point per day price limits for its S&P 500 contract -- a limit of approximately 15 percent. Daily price limits had, of course, long been a feature of commodity futures contracts and even financial futures contracts, notably Treasury bond futures, but had been dropped from stock index futures shortly after their introduction. We summarized in our Preliminary Report the main arguments for and against making those temporary limits a permanent feature of the contract and we need not repeat them here. Since a 15-percent limit would be reached only very rarely,and since its very presence might be reassuring to some panic-stricken investors, our inclination was toward keeping the 15-percent limits in place on stock index contracts, particularly if the consequences of reaching

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[9] General Accounting Office, "Financial Markets: Preliminary Observations on the October 1987 Crash," January 1988 (GAO/GGD-88-38).

the price limit were to trigger only a brief pause, rather than a halt in trading activity until the next trading day.

In the several months since we submitted our Preliminary Report, however, the CME has reduced the daily price limits to 15 points -- roughly 7 percent -- and has instituted a smaller 5-point limit -- about 2.5 percent -- at the opening. We have no great concern with the new limit at the opening since the delay before trading may be resumed is only 10 minutes. All of the studies of the crash have shown that congestion and confusion on October 19 and 20 -- and even later in the week -- was greatest at the open and, as we suggested in our Preliminary Report, some rethinking of opening procedures in all of the markets was clearly needed. The new 15-point daily limit, however, is only half that of the initial margin and hence appears narrower than needed to protect the integrity of the clearing process. Limits that narrow are likely to slow the return to equilibrium. If so, they serve only to reduce the value of the market to hedgers, to exacerbate problems at the resumption of trading and, over the longer run, to weaken the case for maintaining futures exchanges -- particularly U.S. futures exchanges -- as a primary medium for portfolio transactions by large institutional investors.

The same concerns apply with greater force to the price limits imposed by the NYSE that deny access to the Exchange's Designated Order Turnaround ("DOT") system for program trading once a price movement of 50 points on the Dow Jones Industrial Average -- about three percent -- is experienced on any given trading day. Rationing access to the DOT system does not, of course, completely sever the link between the cash and futures markets. Theoretically, index arbitrage could still be carried out manually, as it was before DOT was available, but only at a slower pace and subject to more uncertainty.[10] The higher costs of program trading in New York widen the arbitrage bounds around the index and hence raise the effective costs of trading index futures in Chicago as well. Moreover, the higher cost of hedging positions in Chicago reduces the ability of the block-trading desks in New York to take positions, which in turn reduces the market-making capacity of the NYSE's

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[10] Under a NYSE rule adopted in February, member firms are prohibited from using the DOT system for index arbitrage program trading on any day during which the Dow Jones Industrial Average moves more than 50 points. The first such movement after adoption of the rule occurred on April 6, 1988. According to a press report, sophisticated traders who were prepared for a shutdown of DOT simply switched to manual execution to perform index arbitrage. One floor broker stated "It made things slightly less efficient, but they could still do the trades." Wall Street Journal, April 8, 1988, p. 3.

specialists, thus raising the cost of trading for everyone.

V. Removing Regulatory Obstacles to Market Efficiency

The exchanges are privately-owned business organizations, and as outside observers with no investments at stake, we are reluctant to offer advice about specific methods for making or processing transactions or about other details of running those businesses. We understand that the NYSE is currently planning computer capacity for a one-billion share day. In fact, we suspect that if the orders were to come in large enough lots and at a steady enough pace, the NYSE could handle a load that size even with its present capacity.

The challenge, however, as we see it, is not merely one of meeting maximum processing targets for a few rare peak days, but of developing market mechanisms that can, over the longer run, better accommodate the portfolio-based trading of large, institutional investors. None of the reports on the crash, we believe, has faced up to this critical issue. A main preoccupation of the Brady Commission has not been with the needs of the users, but with the lack of a unified regulatory structure. This focus, we believe, is

misdirected. The chaos and confusion of October 19 and 20 may well have been compounded by regulatory failure, but if so it was not so much a failure to coordinate policies across agency lines, as a failure of the policies themselves.

We propose to call attention here to some of these long-standing regulatory policies that, we believe, served to weaken market structure and performance on October 19 and 20, and that will continue to inhibit the expansion of market capacity, at least in the U.S., for institutional trading.

1. The "uptick" rule

The SEC's so-called "uptick" rule[11] governing short sales of registered stock on a securities exchange allows short sales to be executed only at a price higher than that of the last differently priced trade preceding it. Hence when prices are falling, as they were through much of October 19 and 20, short sales by public traders are effectively ruled out. The rule was introduced originally, and is still defended by some today, as a way of preventing "bear raids" against the shares of thinly-traded corporations.

An unintended consequence of the uptick rule, however, has been to keep selling pressures from being

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[11] Rule 10a-1(a) (1) of the SEC's General Rules and Regulations under the Securities Exchange Act of 1934.

spread efficiently between the index futures market and the stock market. When selling pressures happen to hit the futures market first, the market makers on and around the floor absorb the initial shock into inventory, hoping this will be a temporary condition. Should still more selling orders arrive before these initial position have been offset, increasingly large price concessions must be offered to the market makers to induce them to commit what may still remain of their available capital resources. Additional capacity can be made available from the stock market, however, if index arbitragers can take over some of the market makers' inventory of futures contracts and simultaneously sell shares to market makers and other buyers in the cash markets.

By blocking short sales of stocks, the uptick rule limits index arbitrage to the smaller number of players who happen to be long in those of the underlying stocks that are not trading above previous trades at different prices. If the access of futures traders to the additional market-making capacity of the stock market is reduced, price concessions in the futures market, and hence the effective cost of transacting there, must increase. Some transactors who might otherwise have preferred to sell futures are then driven to sell stock directly; and some who might have

preferred to buy stock are driven to buy futures. Distortions in normal trading patterns of precisely this kind, representing substantial increases in the effective costs of trading to all market participants, were a conspicuous feature of the markets throughout the entire week of October 19.

2. The 30-percent "short-short" rule

The pernicious effects of the SEC's uptick rule in weakening inter-market linkage have long been known both to academic researchers and to market professionals. However, the adverse consequences, particularly on October 19 and 20, of an important provision of the Internal Revenue Code, section 851(b)(3), have so far gone largely unremarked. Under this section, often dubbed the "30-percent" or "short-short" rule, a regulated investment company, such as a mutual fund, may derive no more than 30 percent of its gross income for any taxable year from the sale of securities held for less than three months. Profits from a futures or options transaction, even when resulting merely from the closing out of a successful futures or options hedge, fall under the rule. When the market falls as far as it did on October 19, even partial hedges can quickly exceed the rule's limits, with the result that the fund's entire earnings, not just its profit on the futures component of the hedge,

become subject to full income taxation. It is not surprising, in view of this rule, that mutual funds in the U.S. have virtually shunned the futures markets.

The effects of the 30-percent rule in inhibiting mutual funds, and the effects of many state insurance statutes in preventing insurance companies from using strategies, even risk-reducing strategies, that employ futures or options, are particularly significant in the light of the substantial and persistent discounts of futures under the cash index on October 19 and thereafter. Mutual funds and insurance companies that can anticipate regular inflows of cash subscriptions are natural buyers of underpriced futures; they are, in effect, precisely the kind of potential institutional "sellers" of portfolio insurance whose absence has caused major concern over the possibly destabilizing effects of portfolio insurance.

3. Position limits and sunshine trading

Position limits raise issues that are similar in many respects to those discussed earlier in the setting of futures margins. When the position limits are set by the exchanges and their clearing firms they give little ground for concern. The incentives to balance costs and benefits are appropriate, exactly as with margins. But when the limits are set by outside regulators, the emphasis of the regulators is inevitably less on strict

economic efficiency than on avoiding being seen as too soft on "manipulation" or "speculation." The position limits are thus likely to be set below those that the exchanges would consider reasonable on their own, and in the process to introduce unintended market distortions and imbalances.

We noted earlier, for example, the effect of the SEC-mandated position limits on exchange-traded options as a factor in keeping institutions out of the option market, and, in particular, in inducing many portfolio insurers to turn to constructing synthetic puts with futures. At the same time, the CFTC's position limits on "speculative" holdings of futures were intensifying the seller-buyer imbalance in the futures market, because the limits on the speculator buyers are much smaller than those on the portfolio-insurer hedger sellers.

We recommend, therefore, that both the SEC and the CFTC undertake a thorough reexamination of their policies on position limits for index options and futures. Whether or not there is a rationale for traditional position limits in thinly-traded markets, where there may be some threat of cornering, mandated position limits appear to be pointless, at best, in the index markets, and quite possibly destabilizing.

We believe also that the CFTC should give urgent priority to a review of what has come to be called "sunshine trading." Under sunshine trading, a pension fund or portfolio insurer intending to sell a large number of futures contracts announces that intention in advance. The possible buyers, having been notified of what is being put up for sale, can then develop purchase plans in the spirit of an announced public auction. Under current CFTC rules, however, such an announcement might be construed as "prearranged trading" -- although even now it is far from clear how the CFTC would have responded to a selling announcement by a large portfolio insurer on October 19. In the face of that uncertainty no one, apparently, was willing to try. Instead, some big selling orders were sent directly to the pit where they strained the capacity of the locals.

Open-outcry futures markets are remarkably efficient trading facilities, but they cannot do everything. They tend to be most effective when the order flow is continual and heavy, but the typical order is small relative to the combined capital of the market makers in and around the pit. The agricultural futures pits, in their heyday, could offer deep and liquid markets because so many of the industry's largest traders were directly on the floor. The NYSE, by contrast, adopted the franchised specialist system long

ago, not for any unique advantages that that system of market making possesses, but simply because the order flow for the typical stock was too small and too irregular to support a pit of competing market makers. When the fixed commission was finally eliminated in the early 1970s, and block trading by institutional investors surged, the effective trading market for many big customers moved off the trading floor altogether and on to the trading desks and screens of the large broker-dealers.

The relation of institutional trading to financial futures markets has been subject to a quite different evolution. The first financial futures were in foreign exchange, where a huge, dealer-based "upstairs" forward market already existed -- and, along with the off-exchange "swap" market, still, in fact, dominates the transaction flow. The upstairs dealer markets in U.S. Treasury securities were also well-established long before futures trading was opened in those instruments. But for stock index futures, there was, and still is, no functioning, alternative dealer-based market in the baskets of stocks that are now the relevant trading unit for so many institutional investors. Institutional investors have become the main force in equity futures; but they are not on the floor

and the rules governing their dealings off the floor are far from clear.

We do not mean to suggest, of course, that allowing upstairs block trading of futures or of stock baskets would be an unmixed blessing and that regulation should encourage it. There are important social benefits in centralized, competitive public markets, particularly for "price discovery." Off-exchange trading also raises serious concerns about regulatory "free riding." Clearly, many delicate trade-offs must be studied and appraised before a coherent regulatory policy can be developed on sunshine trading and, more generally, on off-exchange trading of existing futures or contracts closely equivalent to futures. But we fear that by delaying taking a clear stand, the CFTC may be retarding the development of new ways of adapting futures markets to the needs of large institutional traders.

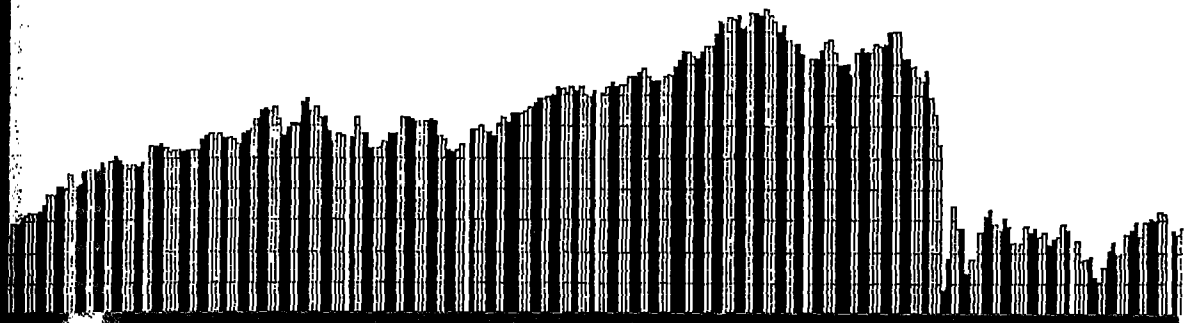
4. A final note

In the face of so many commissions and studies inspired by the October 1987 crash, we are reluctant to recommend the formation of still another study group. There is a clear need, however, to examine the capital markets and their regulation from a perspective broader than that of a single day or week and with a concern beyond that of the individual investor. In the wake of

an event as dramatic as the crash there is a great tendency to look for easy or politically appealing remedies, "fixes" that can be put in place quickly. It is this spirit, we believe, that has caused so much clamor for changes in margin rules, despite the absence of evidence that margins had any relation to October's events, let alone evidence that variable margin requirements can be effectively administered by a public body to dampen "excessive" speculation or curb volatility. Any new study group should include -- as principals, not merely as support staff -- professional economists who are knowledgeable about futures markets and especially some who have contributed to the revolution in the economics profession's thinking about market regulation that has taken place over the last 50 years. The time for an in-depth study of market mechanisms -- a study focusing on means for removing impediments and restrictions that inhibit the efficient functioning of the market -- has indeed arrived.

Appendix

To the Final Report



Appendix A

The Price Pressure Effects from Portfolio Insurance and Arbitrage Activity During the October Crash

The Price Pressure Effects from Portfolio Insurance and Arbitrage Activity During the October Crash

by

Mark S. Rzepczynski [1]

A recurring theme in the crash commentaries has been that program trading, portfolio insurance and arbitrage activity sent selling pressure from the futures exchanges in Chicago to the New York Stock Exchange. Allegedly, these "waves" of selling pressure negatively affected prices by "sinking" the market.[2]

The Brady and SEC reports respectively asserted that portfolio insurance "overwhelmed" buyers or that portfolio insurers were "significant" sellers at key times on October 19 causing a selling "overhang" that dampened the chances of a price recovery.

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[1] Dr. Mark S. Rzepczynski is the Senior Financial Economist in the Strategic Planning Group of the Research Division of the Chicago Mercantile Exchange. The opinions presented are not necessarily the views of the CME.

[2] The major studies on the crash include: The Report of the Presidential Task Force on Market Mechanisms January, 1988 (The Brady Commission Report); The Final Report on Stock Index Futures and Cash Market Activity During October 1987 to the U.S. Commodity Futures Trading Commission January, 1988; The October 1987 Market Break A Report by the Division of Market Regulation U.S. Securities and Exchange Commission February, 1988; Financial Markets Preliminary Observations on the October 1987 Crash U.S. General Accounting Office January 1988; Preliminary Report of the Committee of Inquiry by the Chicago Mercantile Exchange to Examine the Events Surrounding October 19, 1987; and The New York Stock Exchange Report December, 1987.

By contrast, analysis by the CFTC and the CME Blue Ribbon Panel found that stock index futures trading was not a cause in the market break. These studies found that the futures market was a net absorber of selling pressure, serving the risk transfer function and acting as a safety valve for selling pressure. The selling pressure by portfolio insurance hedgers was certainly greater than the buying by arbitrageurs. Who bought the sell orders? The speculators in the futures markets did, thus not transferring additional sell orders to the NYSE.

Such different conclusions derived from the same evidence are disconcerting. This demands a return to the data to analyze how these conclusions were reached. The data establishes for a select period surrounding the October event that there was no significant statistical relationship between:
(i) market price moves and pension/trust selling;
(ii) market price moves and broker/dealer buying; and
(iii) the cash-futures spread and broker/dealer behavior.

These results may not exonerate the impact of specific strategies, but reveal that the selling pressure on October 19 was broad-based and not a subject of concentrated selling as believed by many commentaries.

A Framework for Understanding the Impact of Portfolio Insurance

The crash reports organized the chronological events surrounding the crash and provided statistics on portfolio

insurance selling, arbitrage, and other selling programs. However, neither a model nor a statistical test for the effect of portfolio insurance and arbitrage were presented. Most of the "causal" evidence is from inductive association based on specific time periods during October 19.

However, the percentage of portfolio insurance selling relative to total customer orders in 30 minute intervals matched against a price level is not an appropriate measure of the impact from this strategy. This type of evidence is presented without any control period. Without more structured testing, conclusions may suffer from the classic "post hoc ergo proctor hoc" fallacy; an association does not mean causation.

The impact of portfolio insurance is no different than the effect of large block trades in individual stocks. If securities prices reflect all available information in an efficient market and the trader can convince investors that there is no private information in the transaction, large blocks will sell close to the market price. Any large block trade will have two effects, a price effect based on new information and a price pressure effect associated with concessions necessary to provide liquidity for the other side of the transaction. The price effect covers the costs and risks to those traders who are willing to provide immediacy.

Price pressure effects should lead only to temporary

disturbances away from fundamental values. The market will move back to its old equilibrium price after the transaction. Information effects will change the equilibrium value of the asset permanently until new information enters the market.

Portfolio insurance can easily be structured into a framework similar to block trades. Portfolio insurance or dynamic hedging is essentially a "safety-first" strategy which attempts to place a floor on the probability of returns falling below a set level. Execution of the strategy is not directly dependent on future return expectations. Hence insurers sell to hedge when the market turns down and buy to unwind positions during periods when the market turns up.

Under this stylized description of the strategy, portfolio insurance trading may not provide any new market information and should not permanently affect market prices. However, there may be new information through the disclosure of the risk perceptions of large pensions and trusts. This effect is probably small. There also may exist the possibility that traders are unable to distinguish information trades from portfolio insurance and act as if there is new information. As uncertainty concerning the nature of the trade is resolved, prices should move back to their old level.

If portfolio insurance trades are larger than usual, the market may not be able to provide liquidity for the transaction

without a price concession. However, mispricing allows arbitrageurs who are willing to hold futures and cash simultaneously to profit from the discrepancies.

Concentrated portfolio insurance selling will affect the cash market because arbitrageurs will transfer shocks between markets. If selling pressure moves the futures price below fair value, arbitrageurs will enter the market and buy cheap futures and sell the cash market. Arbitrageurs, through readjusting the market back to its fair value relationship, transmit price information between markets. Arbitrage is usually facilitated through the DOT system which sends program trades to the floor of the NYSE. When the program trades from arbitrageurs hit the market, the specialist will react similarly to the futures market. There may be potential price pressure effects from the block of program trades.

A second line of transmission to the cash market is based on the signalling effect when the futures is out of line with fair value. The market may anticipate arbitrage activity and selloff the cash market early. This signalling effect was considered important on October 19.

Data

I analyzed the spread change and the index change in cash and futures for fifteen minute intervals for the period October 16 through October 20. This three day period includes the period

before the crash, the crash itself, and the immediate post crash market reaction.

The quantity variable was measured through the number of contracts bought or sold. Portfolio insurance was represented by the net selling of pension and trusts for fifteen minute intervals. Arbitrage trades were measured through buys by broker/dealers for fifteen minute intervals. Trade data was obtained from the CME market surveillance department and closely corresponds to the measures of portfolio insurance and arbitrage activity by the other crash reports.

Methodology and Results

I regressed the percentage change in price on the level of portfolio insurance using generalized least squares regression with the Cochrane-Orcutt method to adjust for serial correlation in errors. The results are presented in Table 1 and represent simple tests of price pressure. If there is an impact from these strategies, we would expect a statistically relevant positive relationship between returns and transactions. What has been anticipated by many as a given is not found. The regression results are not significantly different from zero at the 95% level of confidence. It cannot be inferred that selling pressure from the specific strategies caused or were coincident with market moves.

To analyze whether the timing between selling pressure and

market moves are coincident, cross-correlations are presented in Table 2. Again there is little evidence to suggest that selling pressure in one period will beget price movements in subsequent periods. Similarly, there is not a significant price effect before large portfolio insurance selloffs.

Conclusions

The evidence from our tests may not prove that portfolio insurance did not have an impact on market returns; however, it is clear that the true effect of this strategy is more complex than what has been suggested by many market commentators. A causal link between futures and the cash market based on a snapshot of hedging and arbitrage strategies is grossly incomplete and cannot be a basis for regulatory policy.

PRICE PRESSURE EFFECTS FROM PORTFOLIO INSURANCE
AND ARBITRAGE ACTIVITY DURING THE OCTOBER CRASH (October 16-20, 1987)

Dependent Variable	Coefficient					RHO	R^{-2}	S.E.	F-stat
	Constant	PENSEL	NETPEN	ARBUY	NETARB				
FUT	-.007 (.004)	1.44×10^{-6} (5.65×10^{-6})	--	--	--	-.146 (.119)	-.002	.027	.93
FUT	-.007 (.003)	--	2.93×10^{-6} (3.85×10^{-6})	--	--	-.183 (.116)	.004	.027	1.18
CASH	-.002 (.003)	-2.40×10^{-6} (2.43×10^{-6})	--	--	--	.598 (.094)	.351	.010	21.02
CASH	-.004 (.002)	--	-2.63×10^{-6} (1.53×10^{-6})	--	--	.613 (.094)	.368	.010	22.58
SPREAD	-9.56 (4.06)	--	--	-.0004 (.0015)	--	.823 (.067)	.669	6.013	75.63
SPREAD	-9.88 (4.05)	--	--	--	.0004 (.0013)	.827 (.067)	.669	6.012	75.68
CASH	-.003 (.003)	--	--	-6.91×10^{-7} (2.57 X 10-6)	--	.598 (.095)	.343	.010	20.31
CASH	-.003 (.003)	--	--	--	-1.12×10^{-6} (2.37×10^{-6})	.598 (.096)	.344	.010	20.43

Note. - Estimation procedure is based on 15 minute time intervals for cash and futures returns with arbitrage and portfolio insurance transactions. FUT is the fifteen minute futures return for the S&P 500 Decenber contract. CASH is the fifteen minute return for the S&P 500 cash index. SPREAD is the difference between the futures and cash market price. PENSEL is the total selling by portfolio insurers for a fifteen minute interval. NETPEN is the net selling by portfolio insurers for a fifteen minute interval. ARBUY is the arbitrage buys by broker-dealers. NETARB is the net buys by broker-dealers.

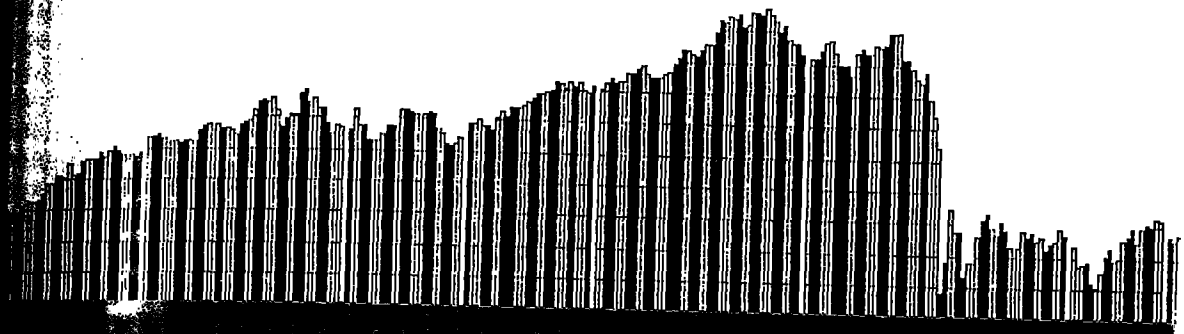
CROSS-CORRELATION BETWEEN MARKET RETURNS AND MARKET ACTIVITIES

Variable	-5	-4	-3	-2	-1	0	1	2	3	4	5
FUT/PENSEL	.022	-.195	.064	-.247	-.168	.085	-.209	-.074	-.157	-.247	-.010
FUT/NETPEN	-.069	.025	-.052	.079	.212	.031	.148	-.103	-.066	.116	-.054
CASH/PENSEL	-.108	-.150	-.186	-.105	-.034	-.131	-.124	-.179	-.150	-.080	.064
CASH/NETPEN	-.002	.095	.207	.225	.119	.135	-.072	-.088	-.033	-.058	-.131
CASH/ARBUY	.167	.258	.229	.206	.039	-.071	-.157	-.195	-.144	-.105	-.163
CASH/NETARB	.133	.298	.365	.334	.128	-.074	-.223	-.273	-.207	-.090	-.122

Note. - Estimation procedure is based on 15 minute time intervals for cash and futures returns with arbitrage and portfolio insurance transactions. FUT is the fifteen minute futures return for the S&P 500 December contract. CASH is the fifteen minute return for the S&P 500 cash index. SPREAD is the difference between the futures and cash market price. PENSEL is the total selling by portfolio insurers for a fifteen minute interval. NETPEN is the net selling by portfolio insurers for a fifteen minute interval. ARBUY is the arbitrage buys by broker-dealers. NETARB is the net buys by broker-dealers.

Preliminary Report

December 22, 1987



Preliminary Report

of the

Committee of Inquiry

Appointed by the Chicago Mercantile Exchange

To Examine the Events Surrounding

October 19, 1987

December 22, 1987

Merton H. Miller, Chairman
University of Chicago

John D. Hawke, Jr.
Arnold & Porter

Burton Malkiel
Yale University

Myron Scholes
Stanford University

This Preliminary Report is submitted to the Chicago Mercantile Exchange by the undersigned members of the Committee of Inquiry appointed by the Exchange to inquire into the events surrounding the extraordinary market decline of October 19, 1987, as they may relate to the activities of the Exchange.

December 22, 1987

Merton H. Miller, Chairman
University of Chicago

John D. Hawke, Jr.
Arnold & Porter

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I. INTRODUCTION

The extraordinary decline in world equity markets that occurred in October 1987, has significantly affected investors and created widespread concern among members of Congress, regulatory bodies and the public. There is little consensus concerning the causes of the events or the steps required to prevent a recurrence. There is, however, widespread agreement that it is important to develop an understanding of the relevant facts so that any proposed remedial steps will not increase the risks inherent in investment activities.

The focus of this Committee's inquiry is not upon the underlying macroeconomic events and circumstances surrounding the decline. Nor is our Preliminary Report intended as a treatise on how futures markets work. We are not advocates for any particular institution or point of view. Rather, we have seen our task as requiring a careful and specific look at the performance of the market provided by the Chicago Mercantile Exchange ("CME") for trading in a futures contract based upon the Standard and Poor's 500 stock price index ("S&P 500") in mid-October 1987.[1]

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[1] A glossary of terms used in this report is provided in Appendix F for the convenience of readers not familiar with futures markets.

Our inquiry was driven by one principal question: Did index futures markets cause, accelerate, alleviate, or have some other impact on the precipitous market decline of October 19?

Our focus is upon the activities in the markets during October: the impact of the trading "mechanics," futures-related strategies, and the relation between activity on the CME and on the stock exchanges. We then review and evaluate actions taken by the CME during this period.

The Committee had broad authority to investigate CME operations and to recommend possible modifications to CME policies.[2] The Committee has met with senior officers and staff of the CME, and at the direction of the Committee, the staff compiled and analyzed various statistical information. The Committee has received complete cooperation from the CME and its staff.

The Committee believes it appropriate to issue a Preliminary Report so that the information compiled can be made available to regulators and other interested persons.

There are a number of points that the reader should bear in mind in reviewing this Preliminary Report: The Committee to date has focused on empirical

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[2] Information concerning the appointment of the members of the Committee is set forth in Appendix A.

data concerning market transactions, and has not attempted to assemble a large body of interview data. While anecdotal evidence is significant and must be considered, the Committee believes that caution must be used in evaluating such evidence, since individual traders are rarely positioned to have a good overall perspective on market events. The Committee is aware that others are in the process of analyzing the events of October and that hearings will be held by various regulatory bodies and by committees of the Congress. Our contribution lies in evaluating the empirical record.

We did not review developments in other markets, except to the extent their actions directly affected or related to trading in the index futures market at the CME. Others undoubtedly will be looking in depth at the performance of the stock and options markets and will evaluate various possible remedial steps, such as improving and expanding the capability of the New York Stock Exchange's ("NYSE") Designated Order Turnaround ("DOT") system for computerized order-taking, revising the NYSE "specialist" system, and strengthening the capital of market intermediaries. That review is beyond the scope of this Preliminary Report. We believe that the October price shocks, as any dramatic events, must serve as a catalyst for constructive review. We hope

that this review will prompt careful thinking about the markets and result in further and better coordination among the CME, the NYSE, and other markets.

We fear that uninformed demands for a quick fix could compel policymakers to look to the government as the arbiter for "correcting" the markets. We anticipate that the events of October will spur the exchanges themselves to review their own procedures and to work toward an even higher level of cooperation. Government oversight should encourage this review, but because of the complicated and highly sensitive nature of these markets, we think it would not be wise for government to attempt to mandate specific changes.

The capital markets are increasingly complex and experts commonly disagree about the effect of proposed changes in economic policy or regulation. Even "noncontroversial" changes in a stable economic environment can lead to unanticipated and far-reaching results. While we must strive to understand the events of October and to make changes that are warranted, we must take equal care to avoid damaging a market system that has fostered unprecedented economic prosperity.

II. The Crash in Perspective

The October crash has raised many questions about the structure and health of the U.S. equity markets. Much attention has been focused on stock index futures, and this report will closely examine the role of index futures in these events. First, however, it may be useful to review the crash from a world perspective, and to place index futures in their proper context as a small component of the world equity market.

Although the U.S. stock market forms an important part of the world market, it is no longer dominant. From January to September, 1987, the dollar value of share volume was $1.42 trillion in the U.S., $1.35 trillion in Japan, and $337.6 billion in the United Kingdom. Furthermore, price increases in foreign equity markets more than kept pace with the U.S. market during the strong bull market of 1982-87. As Figures 1 and 2 illustrate, the U.S. ranked third out of the three most important stock markets in price appreciation over this period, and experienced only an average increase in the ratio of stock prices to corporate earnings.[3] Through 1986, this strong showing drew its momentum from the sustained growth in world gross national product shown in Table 1.

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[3] U.S. stock market performance lagged in both "own currency" and dollar terms, as Figure 3 illustrates.

In 1987, fundamentals weakened across the world. Table 2 shows the sharp rise in interest rates that occurred during the first three quarters of 1987. Despite this pessimistic indicator, world equity prices continued to rise in the period from January through August 1987, eventually reaching historic high levels in most countries. Finally, in October, equity prices fell rapidly and decisively, as illustrated in Table 3.

Since the 1987 rise and fall of equity price was a worldwide event, any explanation must consider factors that were operative worldwide. It does not seem reasonable to conclude that futures could have played a decisive role in the explanation.

Futures markets have developed an important niche in the U.S., but have only begun their development in other countries. No other countries have well-established stock index futures markets. Volume on the Tokyo Stock Exchange, for example, is only slightly smaller than volume on the NYSE in dollar terms, but the dollar value of futures traded on U.S stocks is well over 60 times the value of the recently developed Osaka and SIMEX Japanese stock index futures. Similarly, the London Stock Exchange is about one quarter the size of the NYSE, but again, the value of the recently introduced London International Financial Futures

Exchange ("LIFFE") stock index futures is about 1.7% of the value of U.S. stock futures volume. Germany, France, and Switzerland do not currently have stock index futures.

The fact that stock index futures trading was essentially localized to U.S. markets, while stock prices rose and fell across the world, does not establish that index futures played no role in the U.S. market moves. It does, however, cast doubt on the hypothesis that stock futures and futures-related trading strategies played a primary role in affecting the market collapse.

It is also important to understand the size of U.S. futures markets relative to U.S. equity markets. Futures contracts, by definition, represent short-term hedges that allow investors to alleviate temporary risks. Futures do not replace the underlying assets for purposes of long-term investment. Consequently, although trading volume in futures may equal or exceed volume in the underlying market, "open interest" or positions in futures, rarely represent more than a small fraction of the value in the primary market.

This fact bears directly on the role of futures in establishing U.S. equity values during 1987. For example, activity in S&P futures might theoretically have driven stock prices up early in the year, as

speculators took leveraged positions. However, the size of futures open interest places the importance of this pressure in perspective. The S&P futures contract, which represents 75% of the U.S. stock index futures market, had only about $20 billion in "face value" of open positions on October 15. By comparison, shares listed on the NYSE totaled $2.6 trillion on the same day. Thus, while futures trading certainly influences stock prices on any given day, it seems unlikely that futures positions worth less than 1% of total stock market value could have sustained the 30% appreciation in U.S. stock prices between January and August of 1987.

TABLE 1

WORLD ANNUAL GNP GROWTH RATES
1982-1986

	U.S.	U.K.	JAPAN
1982	3.71%	8.60%	5.02%
1983	7.57%	8.92%	4.03%
1984	10.76%	6.41%	6.37%
1985	6.31%	9.92%	6.30%
1986	5.60%	6.54%	4.26%

SOURCE: DATA RESOURCES, INC.

TABLE 2

INTEREST RATES ON GOVERNMENT SECURITIES
FIRST THREE QUARTERS OF 1987

	U.S.		U.K.		JAPAN	
	SHORT-TERM	LONG-TERM	SHORT-TERM	LONG-TERM	SHORT-TERM	LONG-TERM
1987:1	5.72%	7.62%	9.32%	9.03%	3.99%	3.72%
1987:2	5.82%	8.63%	8.76%	8.99%	3.71%	3.91%
1987:3	6.59%	9.58%	9.77%	9.95%	3.77%	5.48%

SOURCE: DATA RESOURCES, INC.

TABLE 3

EQUITY INDEX PRICES
1986-1987

	U.S. S&P 500	U.K. FTSE 100	JAPAN NIKKEI
DECEMBER 30, 1986	246	1673	18774
SEPTEMBER 30, 1987	321	2366	26010
OCTOBER 30, 1987	224	1749	23328
DECEMBER 11, 1987	223	1651	23035

SOURCE: WALL STREET JOURNAL

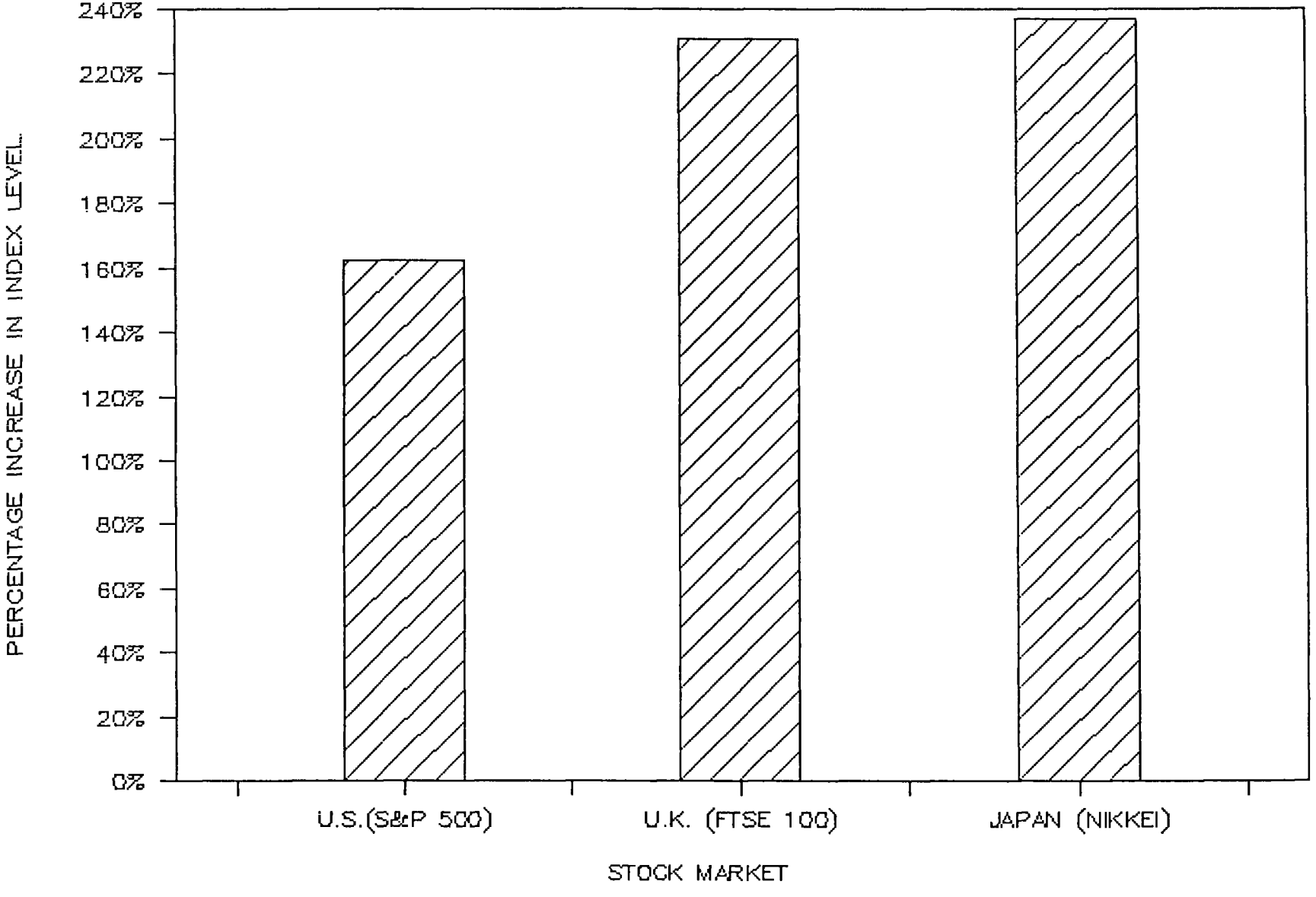
III. Prelude to the Crash

Stock market prices peaked in August, and then declined gradually through September. The decline accelerated in early October, with a total drop of over 5% during the week of October 5, and with further large losses on October 14 and 15. Finally, the pre-crash decline culminated with a 5% drop on October 16, the largest one-day point move on record at that time. In total, the index declined by about 14% between the open on October 5 and the close on October 16.

The price move on October 16 provides a useful backdrop to the events of the next week. Figure 4 shows both the price of the S&P 500 futures contract, and the value of the S&P 500 "cash index," which represents the weighted average prices of the 500 index stocks. As is evident, the futures price maintained a reasonably consistent spread above the index price. The correct or "fair" value of this spread reflects the slightly different characteristics of the futures and the stocks, and depends both on the average dividend rate of the stocks, and on short-term interest rates.

PRICE APPRECIATION ON STOCK MARKETS

JANUARY 1982 TO SEPTEMBER 1987

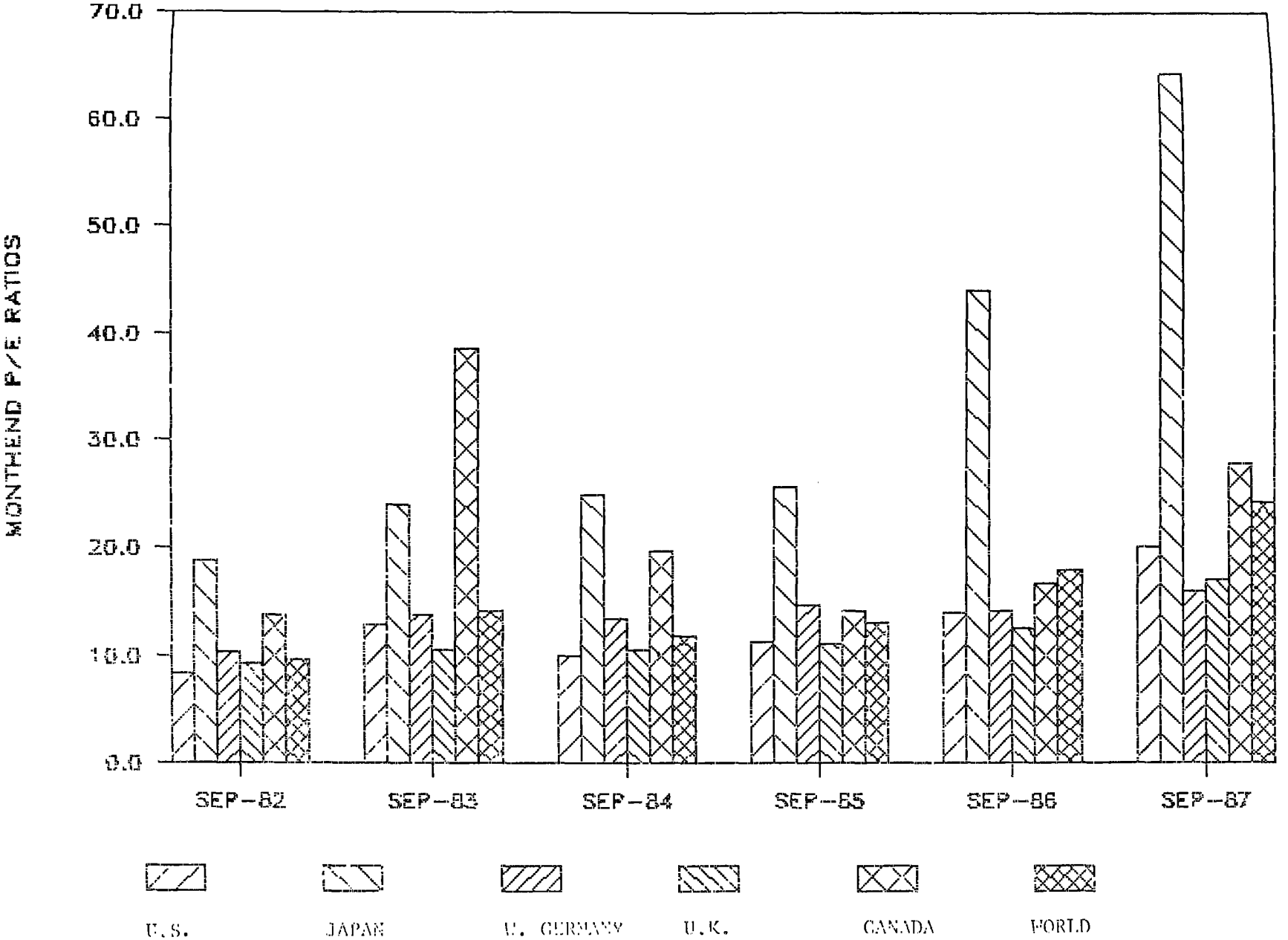


Source: Wall Street Journal

FIGURE 1

P/E RATIOS FOR WORLD STOCK MARKETS

SEPTEMBER 1982 – SEPTEMBER 1987

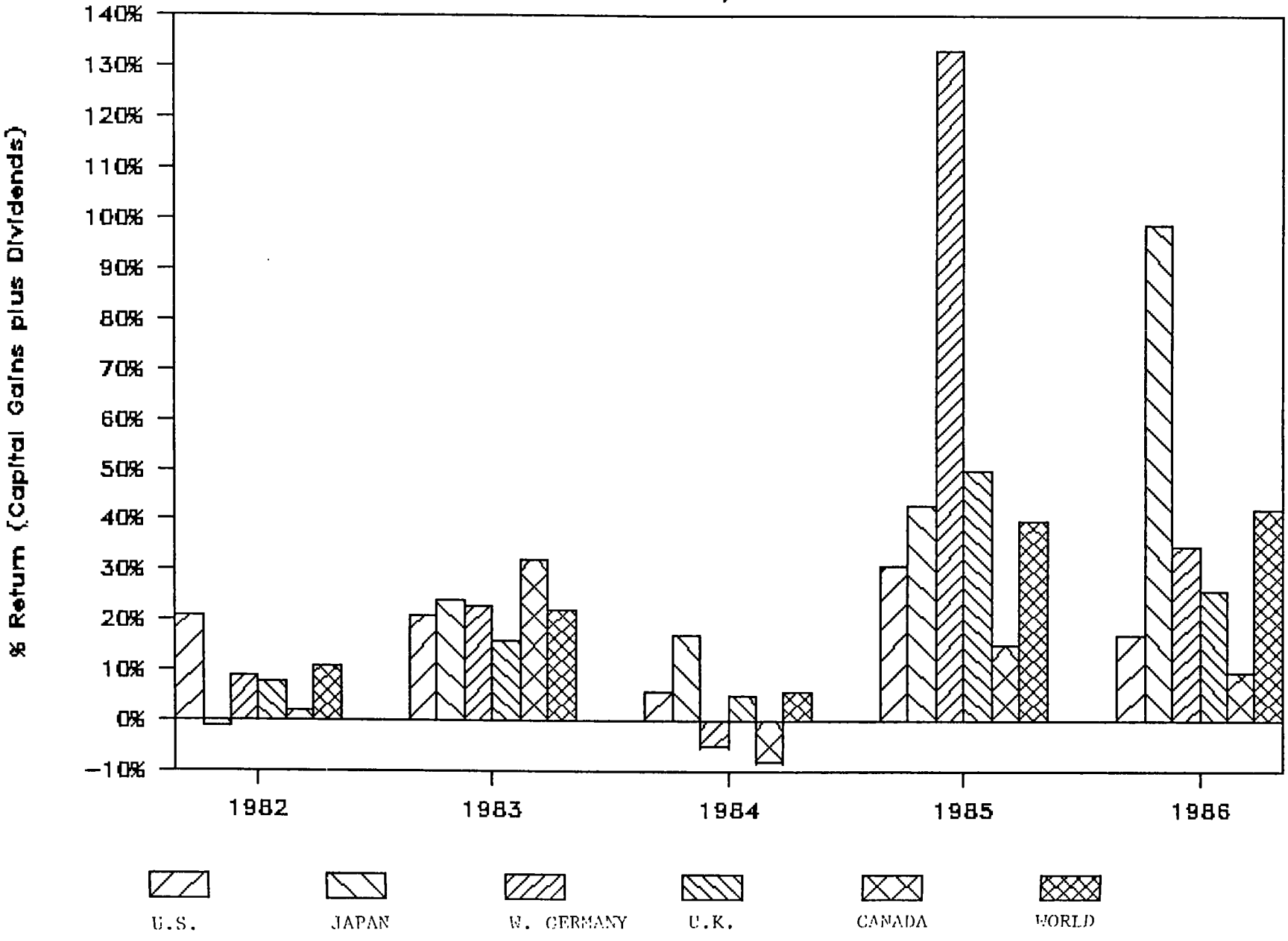


SOURCE: MORGAN STANLEY CAPITAL INTERNATIONAL DATABASE

FIGURE 2

% RETURNS FROM MAJOR STOCK MARKETS

IN U.S. DOLLARS, 1982–86



SOURCE: MORGAN STANLEY CAPITAL INTERNATIONAL DATABASE

FIGURE 3

Under normal conditions, the futures price is held close to the level consistent with interest rates and expected dividends ("fair value") by the activity of index arbitrage, also called program trading. When a sharp change in demand or supply in one market pushes its price away from fair value, arbitrage traders step in to buy the cheaper instrument, while simultaneously selling the more expensive one. This trading keeps the markets in line, and diffuses supply and demand shocks across related markets, thereby moderating the impact on any one market. Arbitrage locks in a profit when properly executed, but arbitrage programs always create the risk of losses for the trader if not precisely executed. This problem becomes especially acute when prices are changing rapidly, or when execution in one of the markets becomes difficult or slow.

Despite the sharp price decline and volatile market on October 16, the spread remained close to fair value throughout the day, reflecting continued, successful arbitrage trading. Toward the end of the day, however, and particularly between 2:30 p.m. and 3:00 p.m. Central Standard Time ("CST"), the spread dropped sharply below fair value, as illustrated in Figure 5.[4] Figure 6, which shows the net activity by

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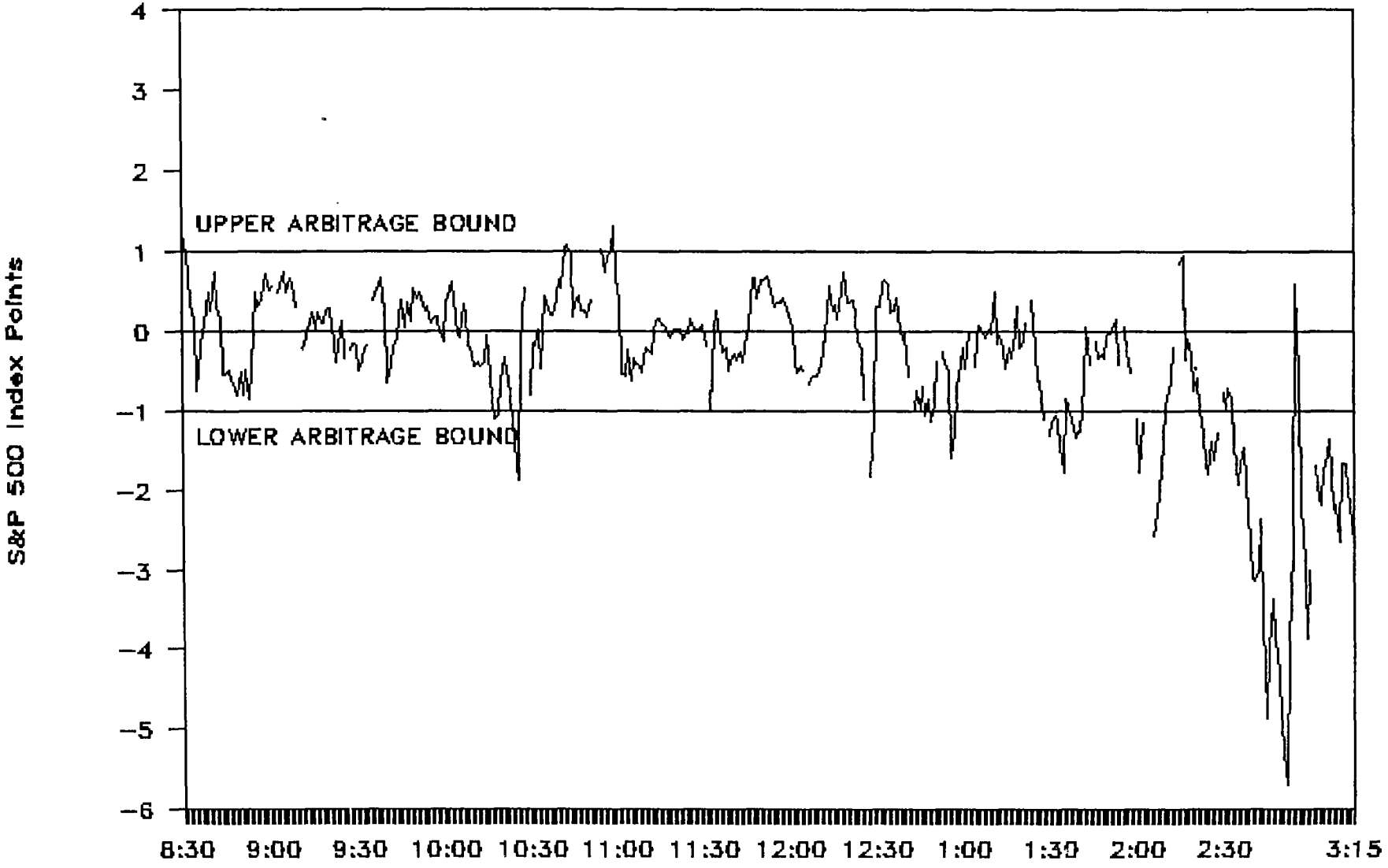
[4] The price of an S&P 500 contract on the CME is $500
[Footnote continued on next page]

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Friday, October 16, 1987

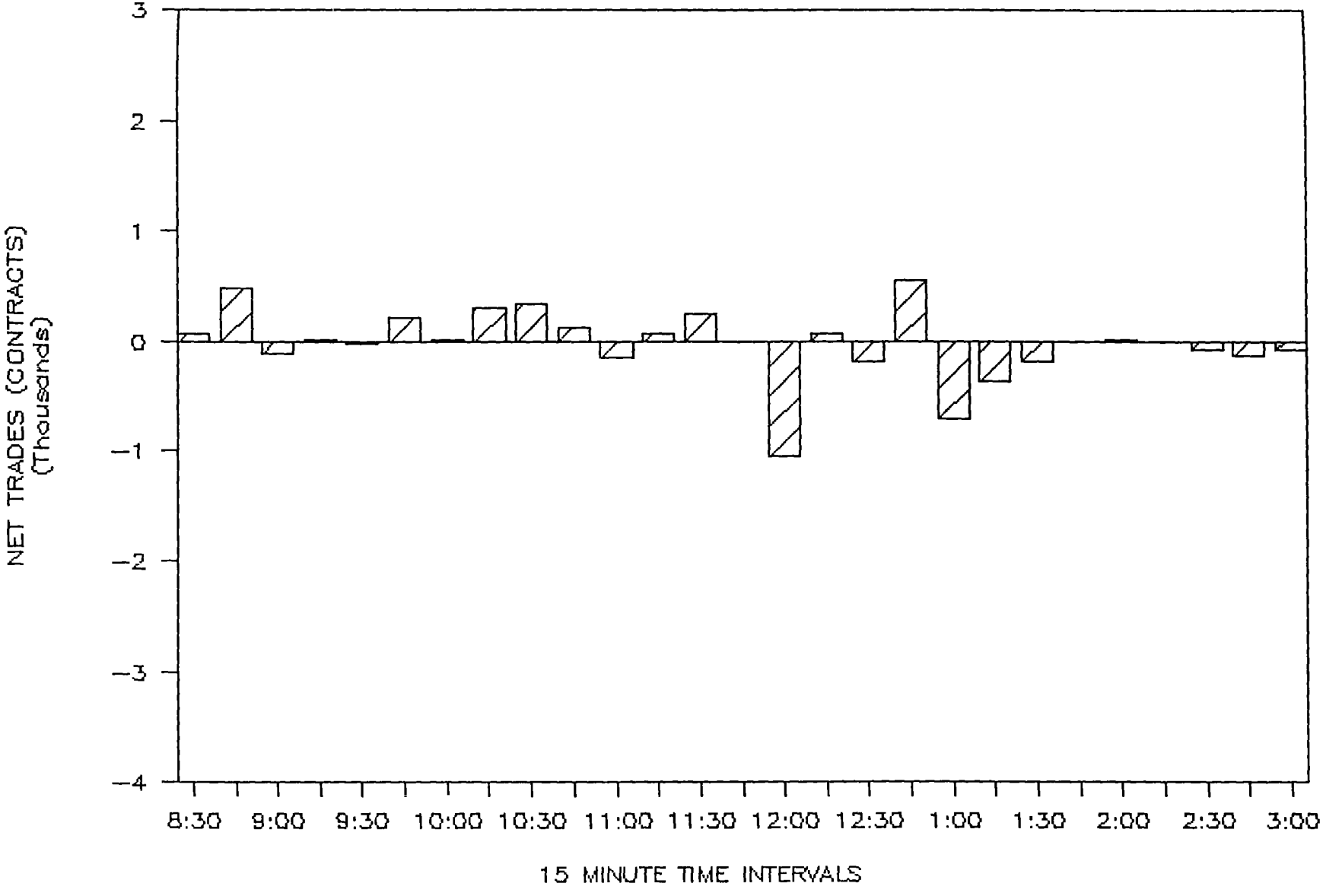


Source: CME and Standard and Poors.

FIGURE 5

NET TRADES, BROKER/DEALERS, SPECIALISTS

OCTOBER 16, 1987



Source: CME Market Surveillance

FIGURE 6

broker-dealers by 15-minute intervals, verifies that trading by these firms, which generally conduct a substantial fraction of total arbitrage activity, slowed after 1:45 p.m.[5] The absence of arbitrage allowed the futures price to fall to a discount below the cash index, although the size of the discount was small compared to those that were to follow over the next few days.

[Footnote continued from previous page]
times the index, so at 282, for example, each contract is worth 500 x 282, or $141,000. Accordingly, a move of one point in the index will reflect a change of $500 value in the contract. The discount from fair value of almost 5 points that occurred just before 3:00 p.m. is thus worth about $2,500 per contract. Since the transaction costs of arbitrage are about $500 per contract -- arising largely from brokerage costs on the stock side of the arbitrage -- arbitrage will usually eliminate any deviation larger than one S&P point away from fair value.

[5] This analysis was constructed from CME trade data, and includes those accounts in each 15 minute period that had net position changes of more than 40 contracts. This methodology will generate somewhat different totals than an analysis based on daily position change data, although the results are broadly consistent.

The activity on October 16 also provides an introductory view of another widely discussed strategy -- portfolio insurance. Portfolio insurance provides institutions with a means of placing a lower bound on their return, at least under normal conditions. An institution that requires a 7% minimum return for its beneficiaries, for example, can afford to take a reasonable amount of risk when its current portfolio is earning 12%. Such an institution might want to increase its exposure to the stock market, thereby increasing the returns its investors can expect. However, a stock price decline that lowered the portfolio's return to 9% would place the fund much closer to its minimum acceptable return. Under these conditions, the institution might seek to reduce its risk by selling some of its stock, and substituting cash or bonds. This strategy, generically known as portfolio insurance, generates stock purchases after a price increase and sales after a decline. These purchases and sales often occur in futures rather than directly in stock, because transaction costs for baskets of stocks are normally lower in futures.

Portfolio insurance is only one of many futures-related strategies used by institutions to manage their risk. Most hedging strategies, however, do not generate

the kind of concentrated buying and selling associated with portfolio insurance.

Figure 7 shows net activity by pension funds and trusts by 15-minute intervals on October 16. This group includes the major portfolio insurers, although not all activity in this category represents insurance. As we would expect, following the substantial declines of October 14 and 15, these institutions were net sellers throughout most of the day on October 16, although they stopped selling after 1:30 p.m. CST. Insurance sales thus contributed selling pressure throughout the day, but probably did not participate in the final 700 points of the 1500 point S&P decline.

In summary, the futures market functioned normally through a week of heavy selling pressure prior to the crash, without any important loss of liquidity, and without falling away from its correct relation to the underlying stocks. However, a more difficult test lay ahead.

NET TRADES, PENSIONS & TRUSTS

OCTOBER 16, 1987

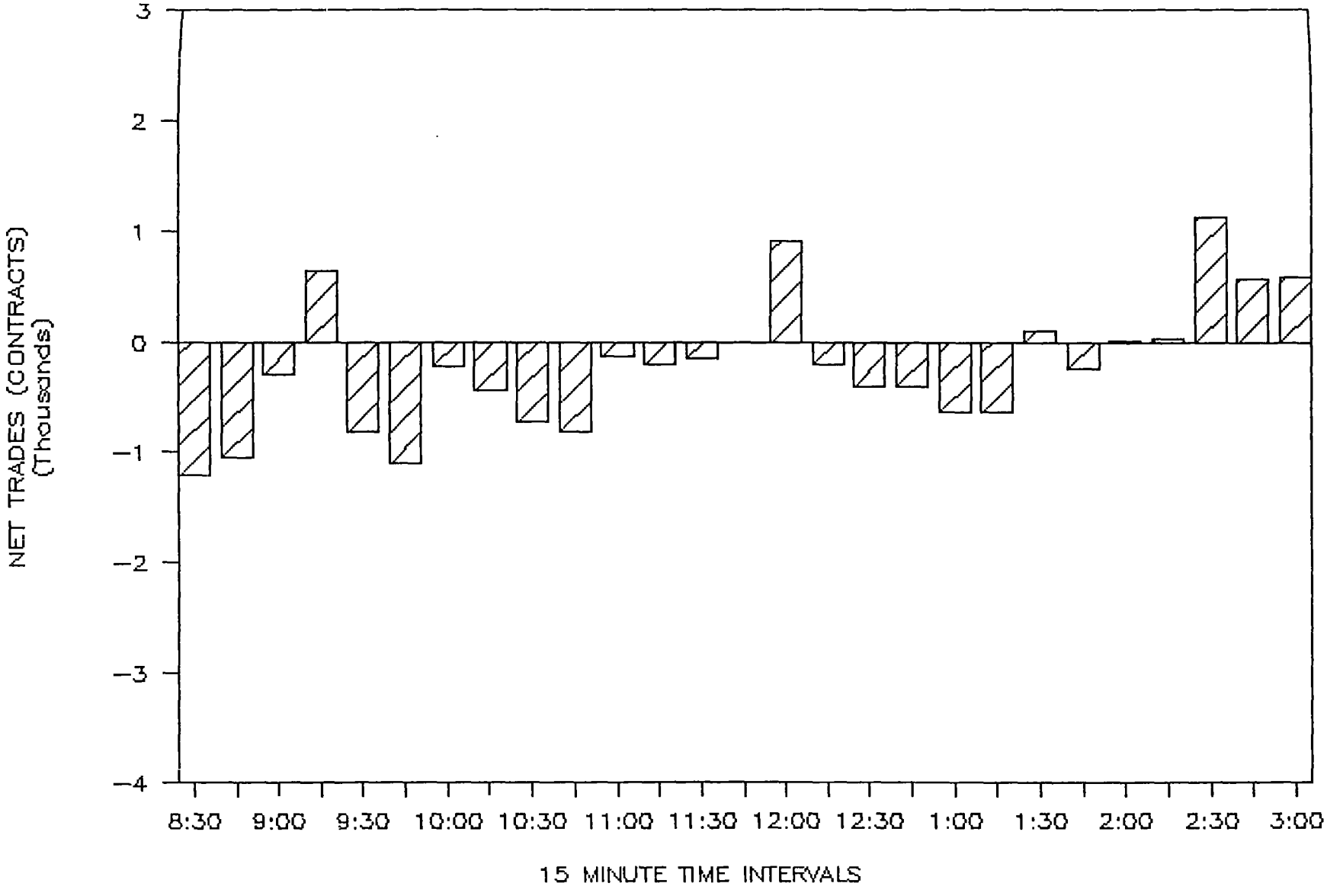


FIGURE 7

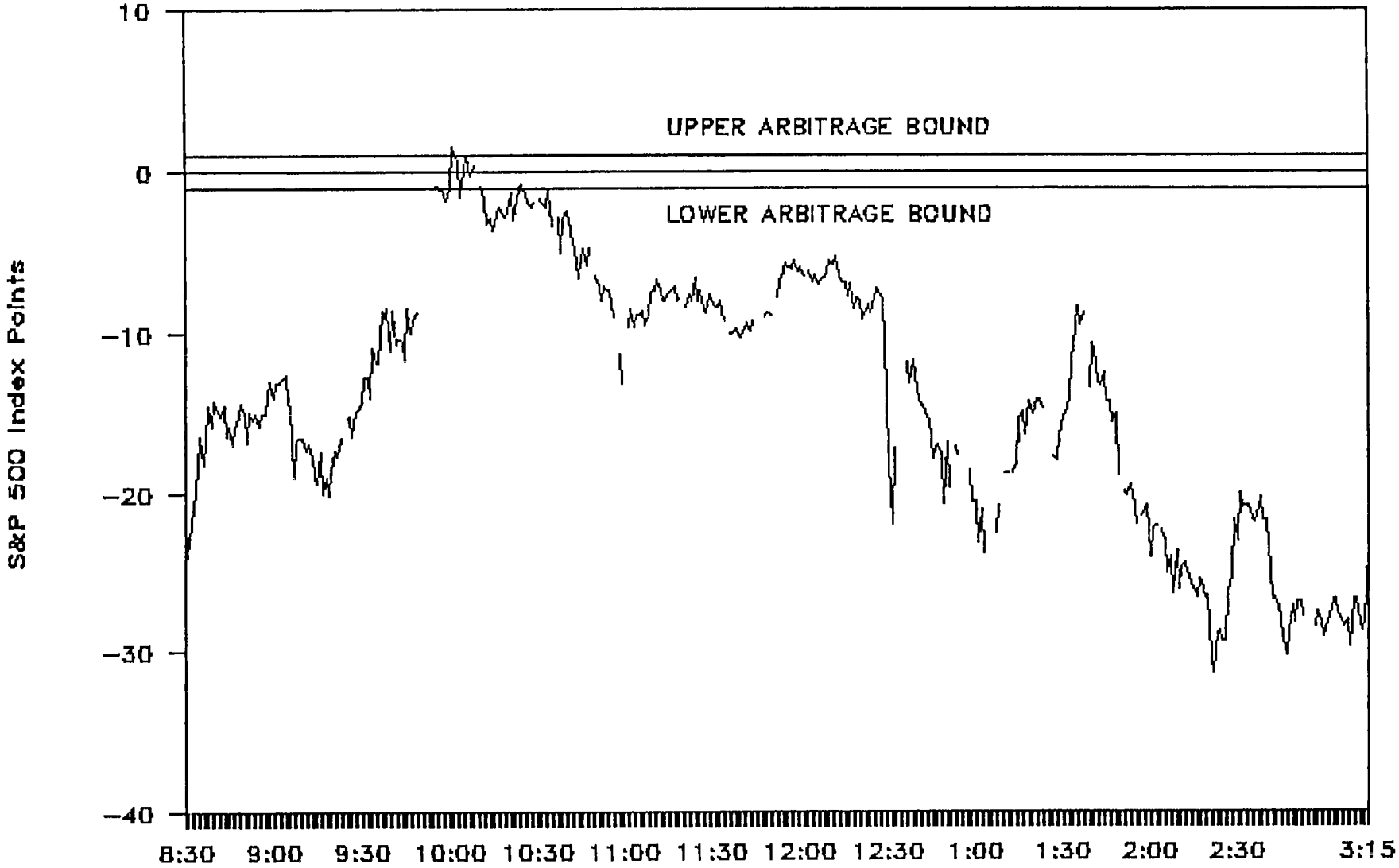
Source: CME Market Surveillance

IV. Events of the Week of October 19

With this brief look back at how the markets fared prior to October 19, we turn now to the events on the critical days of October 19 and 20. We will first present a factual review of events, and will then return to provide a deeper analysis. The relation between the S&P 500 cash and futures prices throughout Monday, October 19 is shown in Figure 8. Figure 9 graphs the spread between the two price series along with the estimated arbitrage boundaries.

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Monday, October 19, 1987



Source: CME and Standard and Poors.

FIGURE 9

The difference between these charts and those of the previous Wednesday or Friday is striking. Note first the enormous gap between the opening futures price on Monday at 264 and the reported index cash value at 283. This discount of the futures price below the cash price of some 19 points (about 7%) was unprecedented.[6] The largest discount seen even in the previous week of somewhat hectic trading had been the gap noted earlier of some 4 points (about 1.4%) shortly before the close on Friday. Since the lower arbitrage trigger point is normally only about one point below fair value, a discount of as much as 19 points might well have suggested that a tidal wave of sell programs was likely to come. Perhaps no single event over the entire two-day span was more responsible than this 19-point gap at the opening for creating the impression that the futures market had initiated the collapse (presumably under the pressures of portfolio insurance selling) and had dragged the cash market down inexorably in its wake. We will return to re-examine this issue in the next few pages.

That some arbitrage-driven program trading or portfolio insurance selling did indeed take place

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[6] A 19 point gap is worth 500 x 19 = $9,500 per contract, far above the normal arbitrage "trigger points" of about $500 above or below fair value.

immediately after the opening will be documented later. Whatever the reason, it is certainly clear from Figure 9 that the discount had closed steadily to little more than half its opening value by 9:00 a.m. CST, although it had widened again by 9:30 a.m. CST. Still, by about 10:00 a.m. CST, something very close to the normal relation between the two series had been reestablished. To be sure, volume in both markets had been heavy to that point and the net downward price movement of about 7% was large by past standards. But the markets were functioning normally at that point and seemed successfully to have absorbed what we will hereafter call the "Opening Shock."

Somewhere shortly before 11:00 a.m. CST, however, a new phase in the market evolution clearly commenced. The futures price slipped below the cash price again, with the discount steadily between 4 and 8 points (2 to 4%) over the next 90 minutes, and with downward jumps in the futures price series carrying the discount on occasion to as much as 12 points (5%). At around 12:30 p.m. CST, a large drop of about 15 points (6%) over the space of a few minutes showed up in the futures price series. The phase we shall call the "Mid-day Plunge" then proceeded rapidly. Gaps and discontinuities in the price series appeared frequently and, despite some occasional temporary rallies, the

trend in the futures price was sharply down to the close. Admittedly, examination of the evidence reflected in Figure 9 seems to suggest that the futures were not only down, but had led the way throughout the collapse. Again, we will return to re-examine this issue.

At the opening on Tuesday, October 20, a semblance of stability had been restored. As Figures 10 and 11 show, the futures contract opened in its normal position above the cash price, although the positive spread of 10 points (4%) reached at 9:00 a.m. CST would seem abnormally high by past "cost-of-carry" standards.[7]

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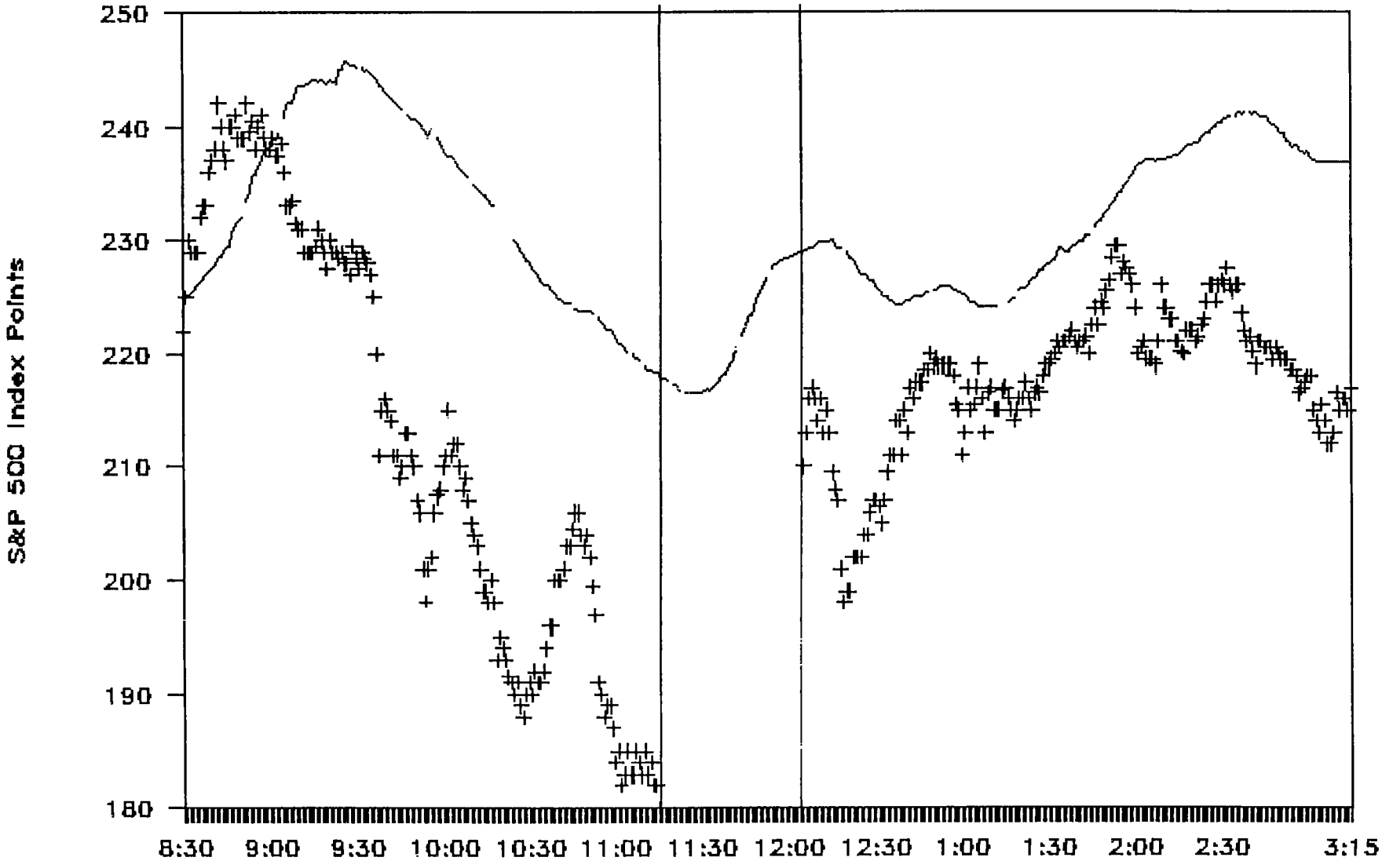
[7] As explained above, expected stock dividends and short-term interest rates interact to create a "cost-of-carry" relation that determines the "fair" value of the futures price.

S&P 500 FUTURES AND STOCK INDEX PRICES

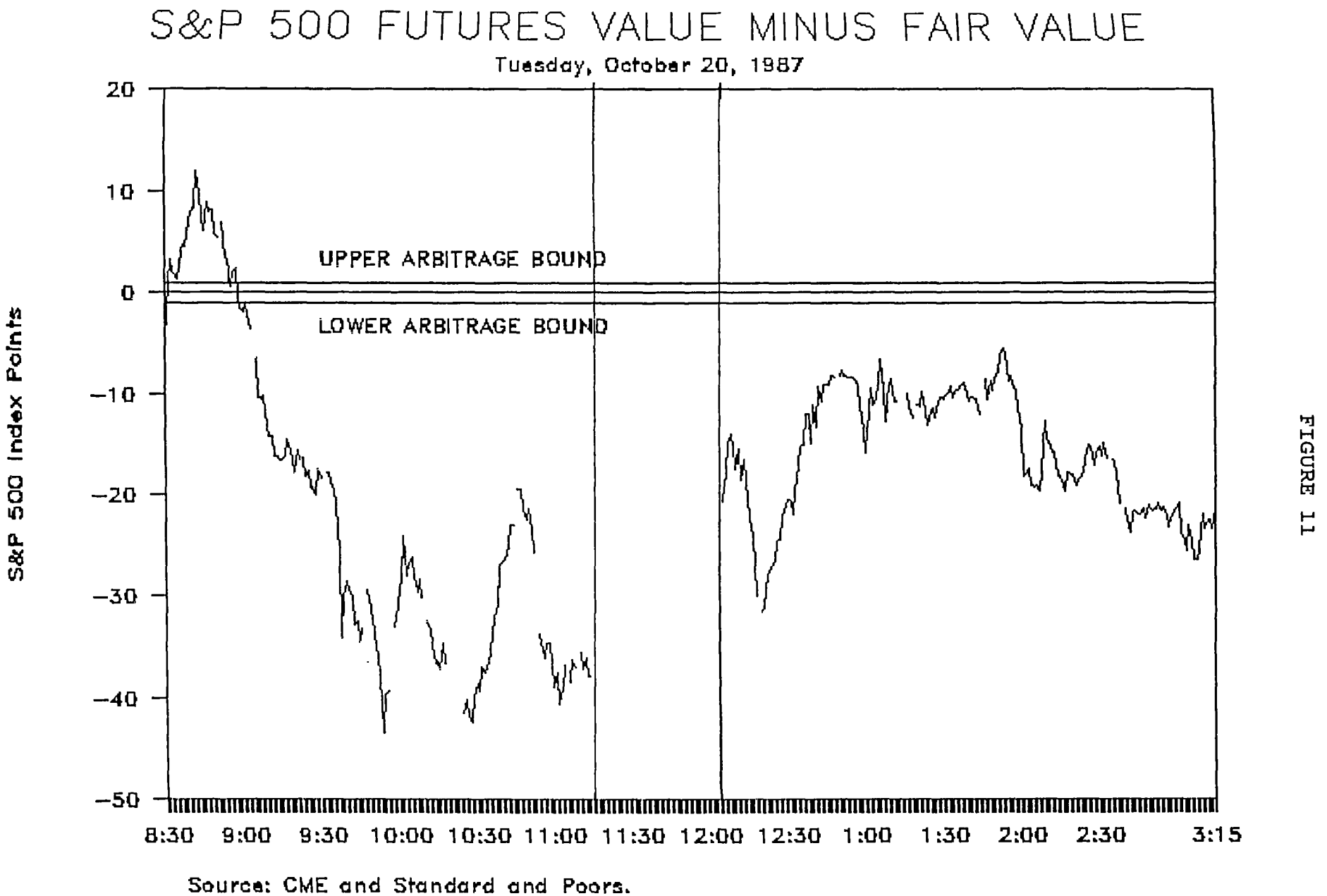
Tuesday, October 20, 1987



Source: CME and Standard and Poors.

—— Stock Index + December Futures

FIGURE 10



Source: CME and Standard and Poors.

FIGURE 11

The apparent stability did not endure, however. By shortly after 9:00 a.m. CST, the futures market entered a new phase, which may be called the "Tuesday Morning Collapse." Prices fell even more rapidly over the next two hours than they had during Monday afternoon. By 11:00 a.m. CST, the discount of futures below the cash price had reached 37 points (a gap of 17%, given the then current index value of about 221). Shortly after 11:15 a.m. CST, trading in the S&P 500 contract was halted on the CME.

Trading was resumed on the CME about 40 minutes later and with that resumption the market entered still another phase, the "Tuesday Turnaround." The S&P 500 contract reopened about 15% above its last recorded value before the halt. The discount remained substantial, however, reaching 46 points (20%) just after noon CST, recovering to about 12 points (5%) at 1:00 p.m. CST, and widening again steadily thereafter to about 20 points (8.5%) at the close. Despite the conventional view that a discount in the futures price to the cash index forecasts (or causes) a market drop, the index cash value itself rose more or less steadily over this interval reaching 237 at the Tuesday close, an increase of about 3% over its value at the reopening of the CME at noon.

By the Tuesday close the worst was over, although aftershocks of varying severity continued to be felt throughout the rest of the week. The normal positive spread of futures over cash had not been restored by the end of the week; in fact, the discount to cash on occasions, such as at the Friday close, reached as much as 10 points (about 2.5%).[8]

[8] At the opening on Thursday, October 22, the discount reached an astonishing 60 points (23%). But as the day developed, this discount was not followed by any major downward price move. The details of prices and spreads on the post-crash days are reflected Figures C1 to C16 in Appendix C.

A. The Opening Shock

We have divided the week's history into several distinct phases because we believe the episodes served as specific "stress tests" of somewhat different parts of the structure of the two markets and of their connecting links. The opening-shock phase, for example, provided simply the most dramatic illustration to date of what both informed academic and industry observers had long realized was the fundamentally different way the two markets deal with any overnight accumulation of order imbalances.[9]

It is apparent that prior to the openings on October 19, the accumulations of sell orders in both cash and futures markets were extremely heavy. The previous week had been unsettling both in terms of news and price movements. The London market had already experienced heavy selling both of U.K. company shares and shares of the internationally-known U.S. companies listed there. The large U.S. brokerage firms with overseas branches knew that further selling by foreign

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[9] It was, in fact, precisely the recognition of these differences in opening mechanisms that had led to what appeared to be a successful resolution of the so-called "triple witching day" problem -- the problem that prior to the October market collapse had seemed to be a leading source of differences between the cash and futures exchanges.

investors was on the way to both the cash and the futures markets in the U.S.

Confronted with these pre-opening selling order imbalances, each market responded according to its own long-standing, but quite different, opening procedures. The rules of the NYSE permit -- indeed encourage -- specialists to delay opening when the overnight accumulation of orders for a particular stock is too far out of balance to allow market clearing at a price near the previous close. The delayed opening is intended to give the specialist time to search for balancing orders on the other side. Under ordinary conditions, when most other stocks have opened and are trading normally, that search is completed successfully and trading resumed -- though, typically, with a somewhat larger than usual price gap -- in a few minutes. On the morning of October 19, however, the order imbalances at opening were apparently so widespread and so large that no immediate help was available to the specialists in many of the stocks most heavily represented in the S&P 500 index. In fact, one hour after the opening bell more than one-third of the stocks in the Dow Jones Industrial Average, including such large capitalization companies as IBM, Sears and Exxon, had yet to start trading.[10]

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[10] The record of delayed openings and major trading halts of the stocks is presented in Appendix C.

By contrast, futures markets seek not to stabilize prices, but to provide a setting in which prices can best and most speedily reflect current information. If the outcry at the opening bell on a futures exchange shows the overnight accumulation of orders to be heavily unbalanced, the price will jump directly to a level at which trading can take place. The previous closing price plays no explicit role in setting that level or the path to reach it. This is clearly demonstrated by the October 19 experience at the CME with respect to the S&P 500 contract, as Figure 8 illustrates, when the opening price had to fall some 7% -- an enormous jump by recent past standards -- before trading could begin.

Normally the differences in the opening procedures of the two markets are mostly of academic interest, but on October 19 the unusually large size of the price drop in the futures market, viewed without regard to the methodology used in constructing the published cash index, presented a fundamentally misleading picture of where the selling pressure was localized. The cash index, which is recalculated and reported by various services at intervals of only a few seconds, is computed from the last transaction price of each component stock. When a stock included in the index does not open, the price used in the calculation is the previous day's close for that stock. Since so many stocks, including

those of some of the largest companies included in the index, did not open on October 19, the reported value of the NYSE cash index, which was relying in substantial measure on October 16 closing prices, was substantially in excess of what it would later be when actual opening prices were available. Thus, it is clear that the discount of the futures price to the cash price reported around the world was excessively large.

To an experienced observer, gaps between cash and futures prices at the open are hardly noteworthy.[11] But given the magnitudes involved on October 19, it is understandable how an observer not fully aware of the events occurring at the NYSE, and not cognizant of the method by which the cash index is constructed, might imagine that Chicago was causing or leading the selling that subsequently occurred on the NYSE. Instead, the gap indicated that large sell imbalances existed in New York as well as Chicago.

This is not to deny, of course, that even after correcting for the stale quotes in the cash index, some discount might have still remained. No one can say with certainty what the prices of the non-trading stocks might have been had they been allowed to open freely.

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[11] See, e.g., the gaps in the spread at opening in the graphs for the Wednesday and Thursday of the week before (Figures C1 to C4 in Appendix C).

We do know that several of the stocks included in the Dow Jones Industrial index that opened after the official open did so at price gaps down from their previous close. These gaps were roughly in line with the futures price drop from the previous close to that point.[12] Moreover, had the NYSE opened, the CME might not have exhibited as large a discount. It absorbed pressure from the NYSE failure to open. In fact, as we have seen earlier, by 10:23 a.m. CST, when the last of the Dow Jones stocks had finally opened, the futures price and the index were back in line. The ominous discount that existed at the opening had vanished.

B. The Monday Mid-day Plunge

Although the two markets appeared to have righted themselves between 10:00 and 11:00 a.m. CST, discounts emerged again shortly thereafter, small at first, but larger and larger as the session wore on.

Stale prices in the index once again undoubtedly accounted for part of the discount, because the specialists were repeatedly forced to delay transactions as they searched for offsetting orders. These delays, however, cannot be the sole explanation. The index

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[12] For example, Hewlett-Packard opened at $53.5 at 8:54 a.m. CST down about 10% from its Friday close at $59.75; Minnesota Manufacturing opened a minute later at $64.00, down about 9% Friday close; Exxon, the last of the Dow stocks to open, opened 10:23 a.m. CST, down about 9% from the Friday close.

never fell as far as the futures had dropped -- although it might have if the trading day had been longer. In part the discount may have been only a reflection of the oft-noted asymmetry in the index arbitrage process introduced by the NYSE's so-called "up-tick" rule. When the futures price rises above its upper arbitrage bound, the warranted cost-of-carry relation between the cash and futures markets is restored as arbitragers sell futures contracts and buy stocks. In principle, anyone can participate in that process, whether or not they actually hold stocks. When the futures price falls to its lower bound, however, arbitrage requires a sale of stock and a purchase of futures. Any arbitrager who actually holds the stocks can sell them --and some institutional investors and index funds did -- but under the "up-tick" rule, short sales cannot be undertaken in any NYSE stock except at a price higher than that of the previous transaction. Thus, theoretically arbitrageable gaps on the down side might tend to be larger and to persist longer than those on the upside.

Since there were few up-ticks during the crash, and even fewer that occurred simultaneously for many of the major stocks in the S&P 500 index basket, the lower-bound asymmetry was undoubtedly larger and more persistent than usual.

But again, this cannot be the entire explanation. Even if the persistence of a discount can be related to the difficulty of effecting arbitrage transactions through short sales in the cash market, this does not explain why so many transactions continued to be made in the futures market at what were seemingly such disadvantageous terms.

That the discounts shown in Figures 8 and 9 must be completely anomalous if taken literally becomes clear once the decision alternatives available to large investors are taken into account. Portfolio insurers and other institutional traders can opt to reduce their equity exposure either by selling futures or by selling stocks from their portfolios. Their choice will depend on which route seems to offer the lower transaction costs, in the broad sense of that term. When the relation between the cash and futures markets is normal, as in Figures C1 to C4 in Appendix C, and arbitrage program trading is able to keep the relative costs in line, the choice may well be futures. But if such investors should perceive that futures are at a very substantial discount to cash -- as appeared to be the case, for example, at 1:00 p.m. CST on October 19, when a 22-point discount appeared -- then they would almost certainly prefer to sell stocks, in order to avoid the extra selling charge of 9% represented by the discount.

The logical explanation for the choice made by investors to sell futures on October 19 is that they did not believe that transaction costs, properly computed, really would be lower in the cash market, for the effective costs in the cash market were raised by the risks attendant to uncertain and delayed execution in a highly volatile market.

We deemed it not within the scope of this Committee's assignment to document the performance of the NYSE DOT system, or to establish why the cash market in New York experienced delays and uncertainties in execution during these critical days. The interaction between the futures and stock markets, however, must play a critical role in any analysis.

C. Estimating Net Absorption by the Futures Market of Selling Pressure

Estimates of the net absorption of selling pressure by the futures market on October 19 and 20 were first presented publicly by the officers of the CME in the immediate aftermath of the crash. Since evidence of spillovers to and from other markets from the practice of risk management strategies that employ futures may be important in weighing some of the policy options currently being suggested, the Committee believed it important to check the source of those earlier estimates. Accordingly, we have discussed the details

of the calculations at some length with the members of the CME's surveillance staff and economic research group. We have concluded that, while recognizing that complete accuracy in these matters cannot be assured, the main outlines of the earlier calculations of net pressure are essentially correct. Traders at the CME apparently did take into inventory a considerable volume of futures contracts sold by portfolio insurers and other hedgers, sales that might otherwise have been diverted to the cash market.

The basic data from which the calculations are constructed are shown in Table 4. The numbers are tabulated from the reports filed under regulations of the Commodity Futures Trading Commission by large traders, defined for this purpose as any account with a position change in excess of 50 contracts and a reportable net position of at least 100 contracts. Virtually all portfolio insurers and index arbitragers active on the critical days will qualify under those guidelines. The table shows breakdowns of purchases and sales of contracts by six broadly defined classes of traders over five separate days. The estimates of net absorption were made by associating particular sub-classes of traders with particular trading strategies.

TABLE 4

CHANGE IN POSITIONS OF LARGE TRADERS*

DEC S&P 500 FUTURES

	BROKER-DEALERS			INSTITUTIONAL INVESTORS						MARKET MAKERS			SPECULATIVE					
	Broker-Dealers (Proprietary)			Pensions/Trusts			Endowments, Corporate Entities, and Other Non-Speculative Institutions			Option Market Makers and "Locals"			Retail Speculative, Partnership Trading and Managed Accounts			Foreign Speculative		
	Bot	Sold	Net	Bot	Sold	Net	Bot	Sold	Net	Bot	Sold	Net	Bot	Sold	Net	Bot	Sold	Net
Oct. 16	4,630	2,148	+ 2,482	5,197	19,598	-14,401	7,374	3,187	+ 4,187	6,559	1,653	+ 4,906	2,026	1,730	+ 296	2,038	3,172	- 1,134
Oct. 19	11,277	2,411	+ 8,866	17,802	43,209	-25,407	17,204	4,410	+12,794	5,844	10,904	- 5,060	4,398	1,273	+ 3,125	3,381	5,000	- 1,619
Oct. 20	13,876	3,028	+10,848	24,144	35,333	-11,189	8,536	3,328	+ 5,208	8,278	6,893	+ 1,385	2,647	3,780	- 1,133	4,520	3,541	+ 979
Oct. 21	2,905	6,136	- 3,231	32,382	15,772	+16,610	13,885	13,100	+ 785	1,693	4,211	- 2,518	1,148	1,779	- 631	1,361	2,696	- 1,335
Oct. 22	7,391	6,878	+ 513	15,744	8,348	+ 7,396	2,898	6,561	- 3,663	959	2,373	- 1,414	2,091	1,434	+ 657	437	1,799	- 1,362

* Preliminary estimates based on large trader accounts with positions changes in excess of 40 contracts

Note: Bot = increase in long plus decrease in short positions
Sold = increase in short plus decrease in long positions

Specifically, portfolio insurance and other hedging selling of futures on October 19 can be estimated conservatively as the sum of sales by institutional investors -- that is, 43,209 contracts sold by pension funds and trusts and 4,410 contracts sold by endowments and other nonspeculative institutional accounts, or a total of 47,619 contracts. These are sales that might otherwise have gone to the cash market. This would have represented total selling pressure of 150 million shares or 25% of total stock market volume.

Index-related arbitrage buys represent the flow back to futures of sales in the cash market. They will show up in the data mainly in the proprietary buys of broker-dealers, but also in the buying by institutional investors. The most conservative estimate would be to assume that most of the buys in those categories, except for those known by market surveillance not to be such, are arbitrage-related, making the flow back to futures from the cash market 11,277 from broker-dealers, 12,802 from pension funds and trusts, and 10,204 from other institutions, for a total of 34,283 contracts. A lower bound on the flow back would be the 11,277 of the broker-dealer group alone. The best estimate of the surveillance staff, based on their knowledge of the

individual accounts, puts the flow back at about 20,000 contracts, or about 10% of NYSE volume.

Based on these calculations, the futures markets absorbed about 27,000 contracts from the total 47,000 contracts of institutional sales, and passed the remaining 20,000 on to the NYSE via arbitrage. The 27,000 contracts would have represented about 85 million shares of stock, or 14% of NYSE volume had they reached New York instead of stopping in Chicago.

These estimates of the gross and net intermarket flows from portfolio insurance and index arbitrage trading on October 19 are shown in Tables 5 and 6 both in units of contracts and of approximate share equivalents. The estimates of the index arbitrage have already been explained. The estimates of portfolio insurance activity are based on position data and on interviews conducted by CME market surveillance staff with portfolio managers. The lower bound of 27,264 contracts represents total insurance sales by those portfolio managers who represent slightly less than 90% of insured assets. The upper bound of 47,619 represent all institutional sales. The staff estimate of 32,000 is an average of these upper and lower bounds.

TABLE 5

Estimated CME Futures Market
Index Arbitrage and Portfolio Insurance Activity
on October 19, 1987
Number of Futures Contracts

	Estimated Index Arbitrage Bids		Estimated Portfolios Insurance Futures Sales	
	Number of Contracts	% of Total S&P Futures Volume	Number of Contracts	% of Total S&P Futures Volume
Upper Bound	34,283	21%	47,619	29%
Staff Estimate	20,000	12%	32,000	20%
Lower Bound	11,277	7%	27,264	17%

SOURCE: CME Market Surveillance

TABLE 6

Estimated CME Futures Market
Index Arbitrage and Portfolio Insurance Activity
on October 19, 1987
In Terms of Equivalent Number of Stock Shares[1]

	Estimated Index Arbitrage Bids		Estimated Portfolios Insurance Futures Sales	
	Number of Shares	% of Total S&P Market Volume	Number of Shares	% of Total S&P Market Volume
Upper Bound	106,651,343	18%	149,375,453	25%
Staff Estimate	62,736,486	10%	100,380,540	17%
Lower Bound	35,356,138	6%	85,519,734	14%

SOURCE: CME Market Surveillance

[1] The conversion of futures contracts to share equivalents is based on the average of opening and closing prices on October 19. In this conversion, one futures contract equals 3,137 shares of stock.

D. Timing of Net Position Changes

Although the futures market on balance appears to have absorbed selling pressure that might otherwise have been directed to the NYSE, many questions about the timing and sequencing of the intermarket flows remain to be considered. Figures 12 and 13 present a breakdown by 15-minute intervals during the day in the net position of large traders. The net selling by pension funds at the opening and again at about 10:00 a.m. CST undoubtedly reflects to a considerable extent the implementation of portfolio insurance programs. The net buying by broker-dealers over the same interval is a likely indication of the backflow from index arbitrage. Note, however, that neither group appears to have been active in the critical period between 10:30 and 11:15 a.m. CST, when the sizeable discounts of futures below cash again began to appear.[13]

Further net selling by pension funds and net buying by broker-dealers occurred in the period between 11:15 a.m. CST and 12:15 p.m. CST, but the discount remained roughly steady until shortly after 12:15 p.m. CST, when the futures price broke sharply below the then quoted cash value. No large position changes, however,

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[13] It is worth noting that the broad tape at 10:54 a.m. CST reported SEC Chairman Ruder's remark about a possible trading halt.

by either pension funds or broker-dealers coincide with this break. No specific bad news event appears to have shown up on the broad tape during this 15-minute interval, but rumors of an impending shutdown were circulating widely at the time. Both pension fund and broker-dealer activity resumed after the break, though on a smaller scale than in the pre-break hour. The price volatility had by then become substantially greater than was the case earlier in the day. Even the smaller net changes in position were associated with larger changes in prices.

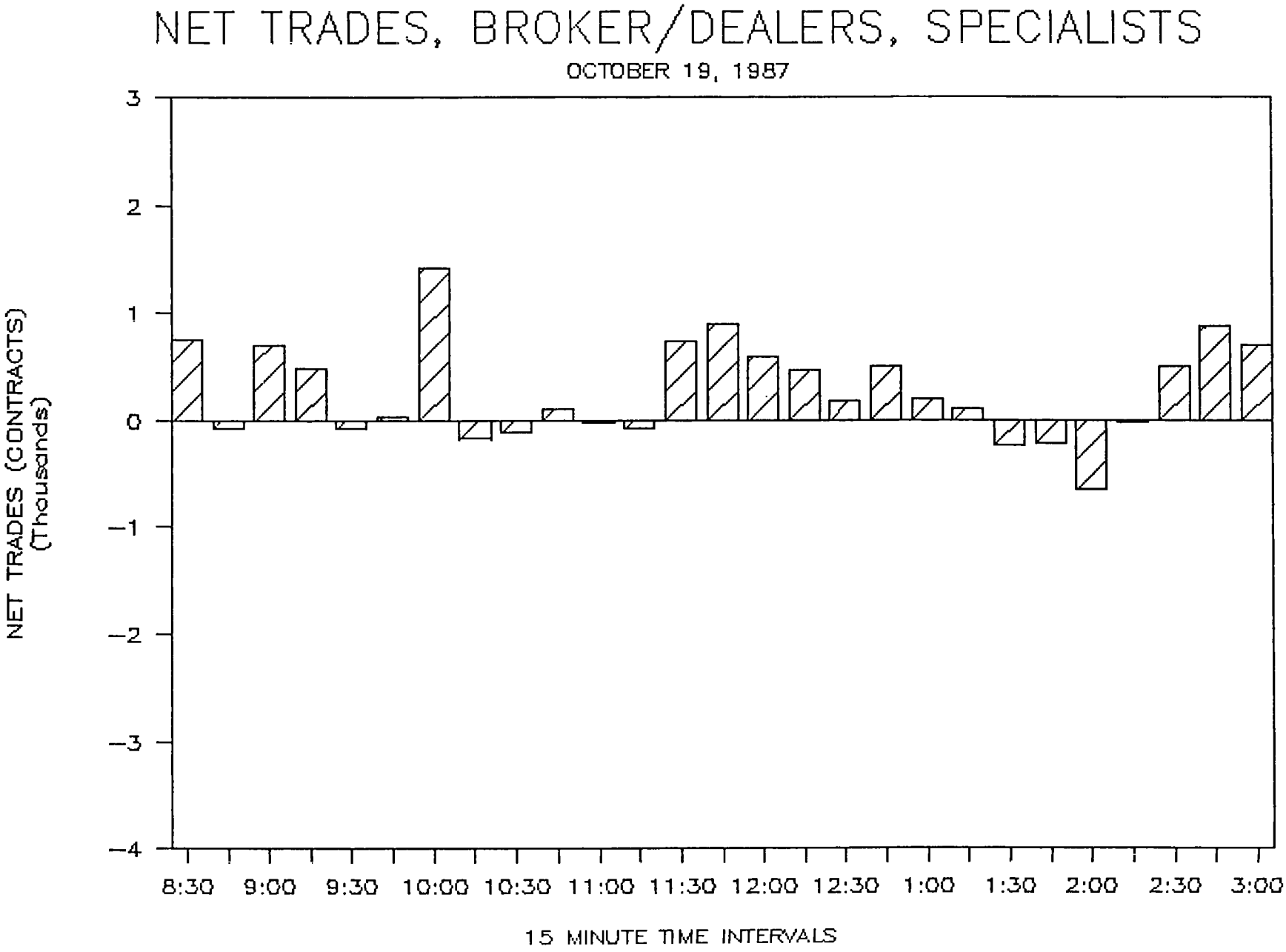

NET TRADES, BROKER/DEALERS, SPECIALISTS
OCTOBER 19, 1987
NET TRADES (CONTRACTS)
(Thousands)
3
2
1
0
−1
−2
−3
−4
8:30
9:00
9:30
10:00
10:30
11:00
11:30
12:00
12:30
1:00
1:30
2:00
2:30
3:00
15 MINUTE TIME INTERVALS

FIGURE 12

NET TRADES, PENSIONS & TRUSTS

OCTOBER 19, 1987

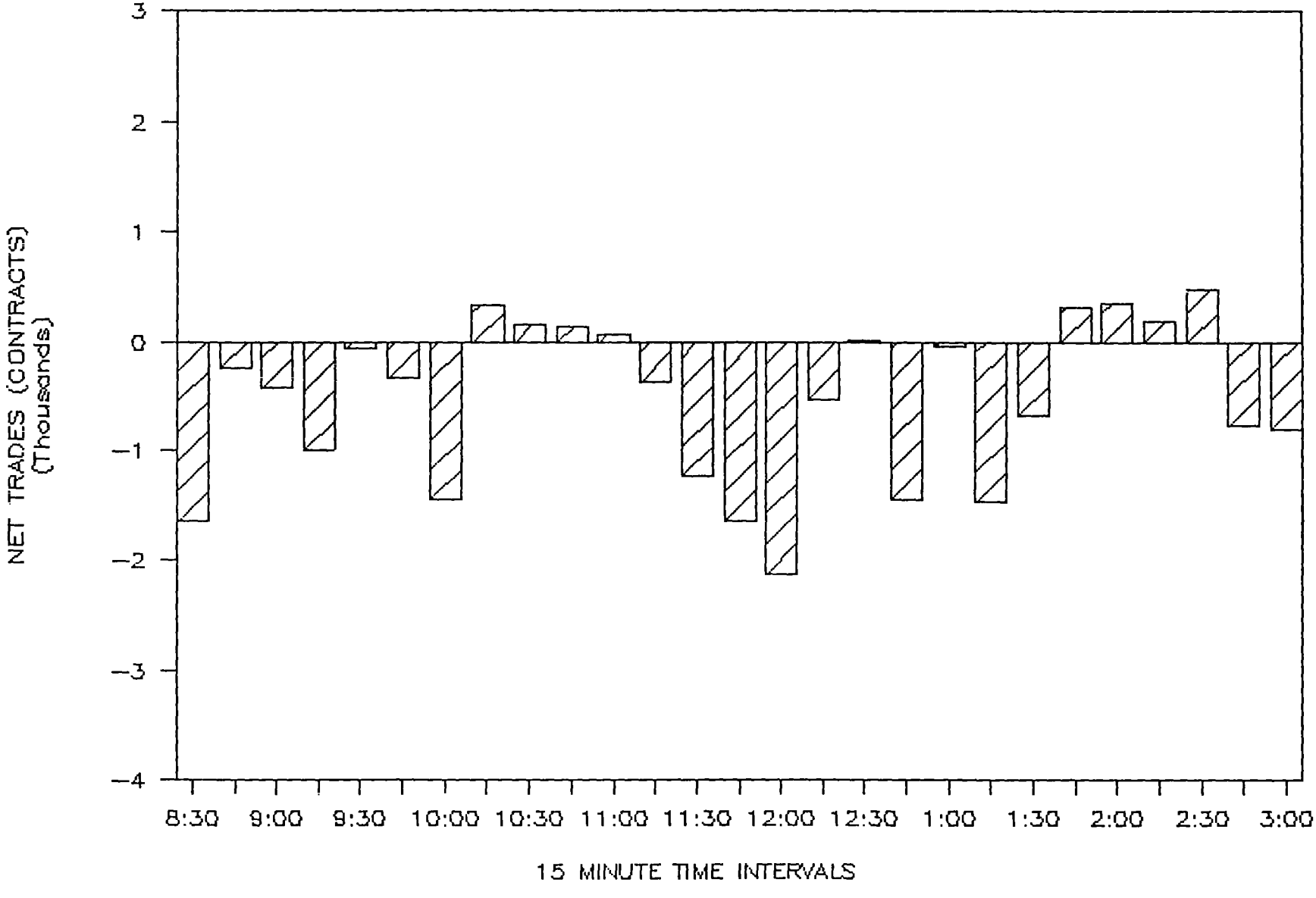


FIGURE 13

E. The Tuesday Morning Collapse

Issues of sequencing became especially important on Tuesday, October 20. Recall that the two markets, after a brief recovery at the opening, slipped steadily downward at an accelerating pace, culminating in a trading halt at the CME at 11:19 a.m. CST. (See Figures 10 and 11). We sought to determine whether the price break had been precipitated by the frantic dumping of big blocks of futures by portfolio insurers whose trigger points had been set off by the 23% drop in share prices of the day before. Our study of the data, however, suggests no such localization of the source of the selling pressure.

Figures 14 and 15 present summary data prepared by the surveillance staff of the CME on net position changes by brokers and dealers and by pensions and trusts in 15-minute intervals on Tuesday. As noted earlier, this analysis, which captures all trades of at least 50 contracts per 15-minute period, will reflect almost all significant index arbitrage and portfolio insurance trading.

NET TRADES, BROKER/DEALERS, SPECIALISTS

OCTOBER 20, 1987

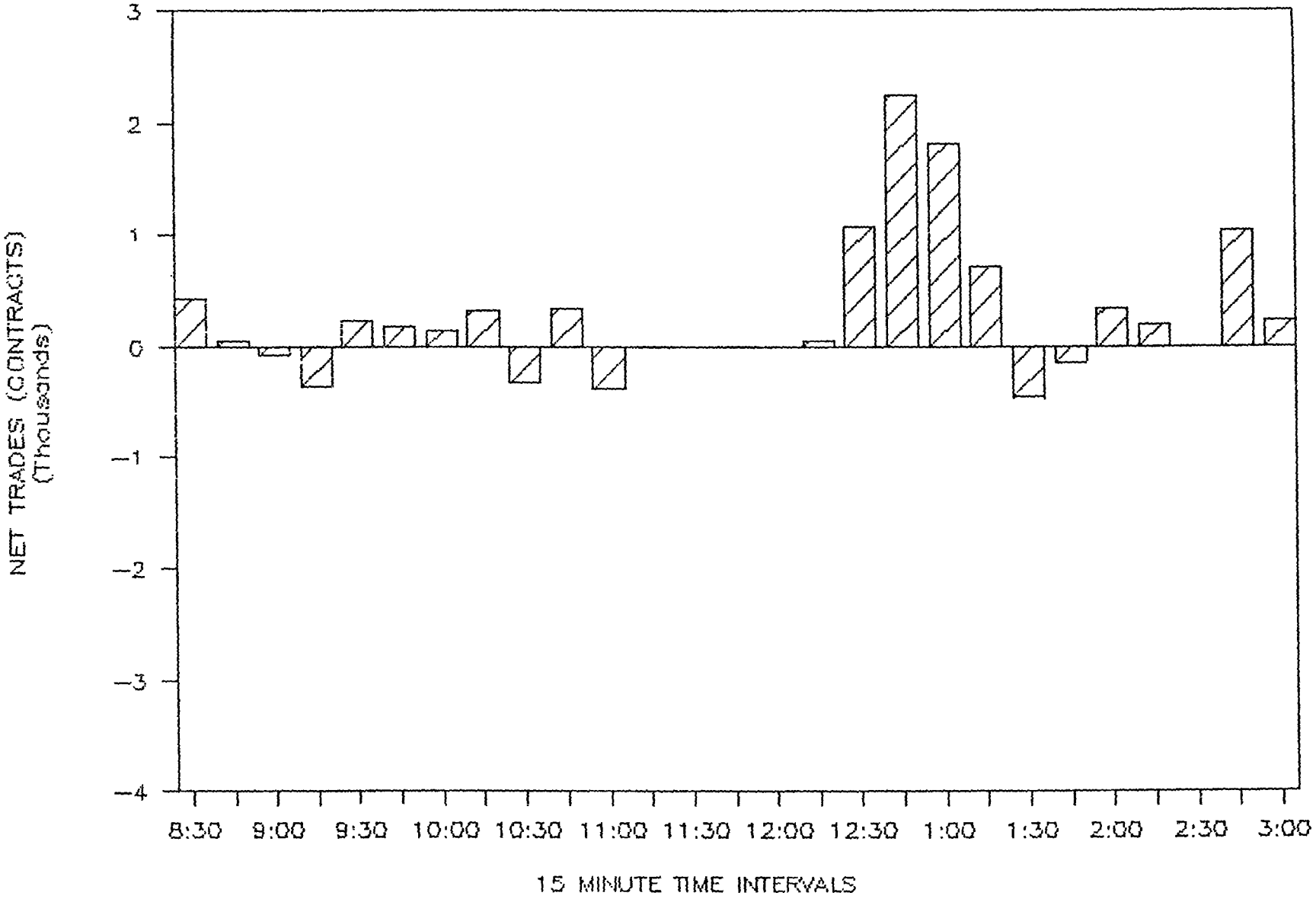
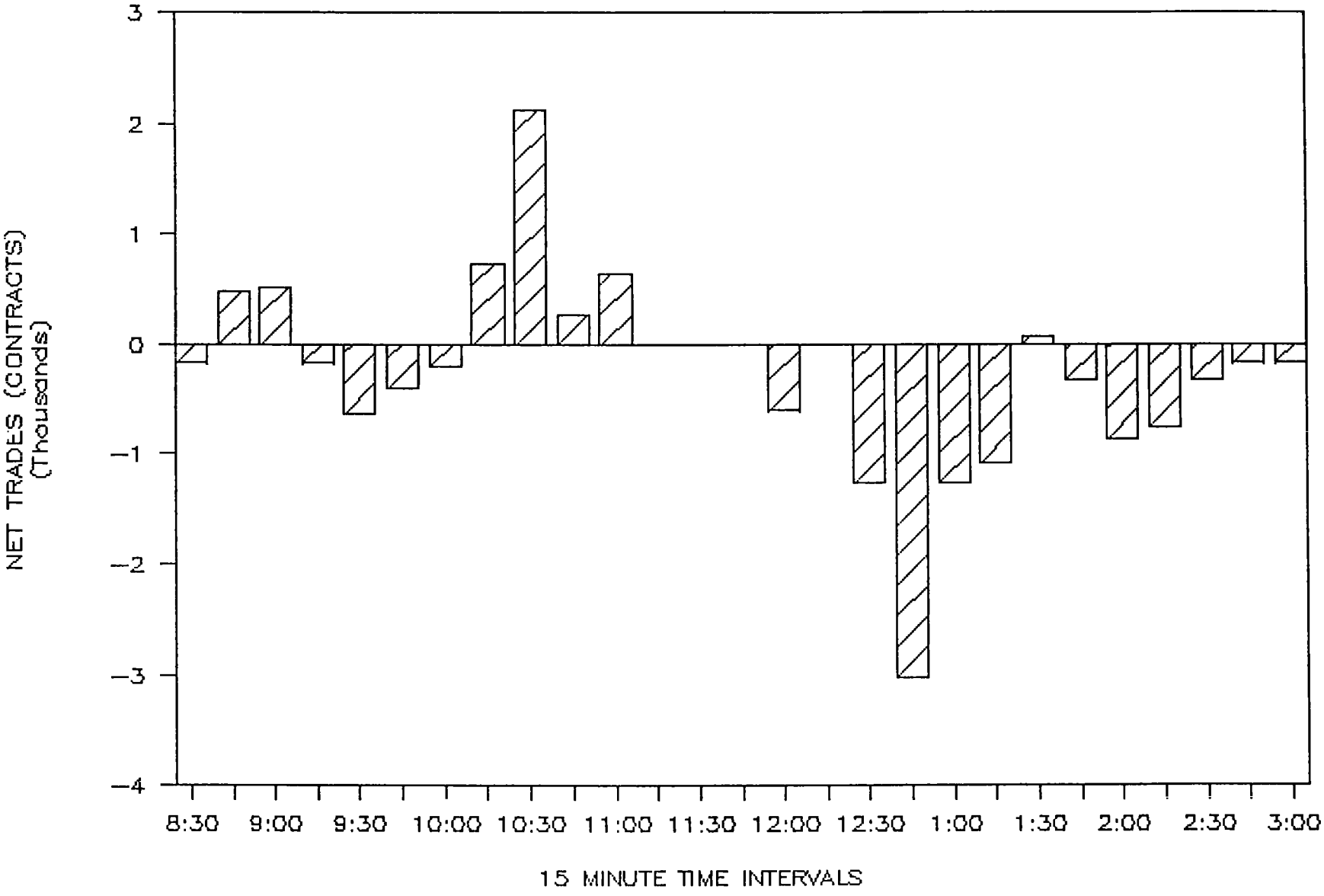


FIGURE 14

Source: CME Market Surveillance

NET TRADES, PENSIONS & TRUSTS

OCTOBER 20, 1987



Source: CME Market Surveillance

FIGURE 15

From Figure 15 it is clear that portfolio insurers in the pension/trust account grouping were not major net sellers in the pre-shutdown period. We know from Table 4 that they were indeed net sellers for the entire day, though on a smaller scale than on the previous day. But in the critical morning period, pension funds and trusts were actually net buyers of futures, not sellers as they have been so widely pictured.

We also should note that the Value Line futures also were selling at a large discount on the Kansas City Board of Trade. Little, if any, portfolio insurance is carried out with this futures contract.

If no heavy portfolio insurance-driven selling was occurring on the morning of October 20, what can account for the very large discounts of futures to cash that were opening up at that time? We believe that a significant part of the answer lies once again in the fact that the reported values for the S&P 500 index itself were not realistic. With prices moving down so fast, any index value based on the last transaction prices was obsolete before it even appeared on the quote screens. The obsolescence factor in the quotes became even more pronounced when trading halts of as much as several minutes began to occur for particular stocks, as they did with increasing frequency after 9:00 a.m. CST. In fact, so many stocks were not trading by

11:15 a.m. CST that the Chicago Board Options Exchange was required to suspend trading in its index options. The CME followed suit a few minutes later at a time when it was widely believed, wrongly as it turned out, that the NYSE was itself about to suspend trading.

In emphasizing the role of index lag and of trading delays in the reported discount, we are not suggesting, of course, that there were no corresponding unrealities in the quoted futures prices. Those prices, too, undoubtedly gave many traders a misleading picture of the executions that could actually be achieved when prices were falling rapidly. It must also be remembered that the market-making capacity in futures, both on the floor and among day traders, had been substantially reduced by the fall in prices of the day before. The extraordinary volatility and uncertainty present in the market meant that very sizeable price concessions had to be offered to induce anyone to take a long position.

Just reassembling the CME trading data from that chaotic day represents a major research effort, and this Committee does not have access to the stock data necessary to reconstruct in detail the stock side of various futures trades. From our perspective, the key policy issues remain largely the same regardless of the market in which the selling pressures originated or even

if, as we suspect was often the case, these pressures were impacting both markets simultaneously.

F. The Tuesday Turnaround

Whatever may have been the role of the CME S&P 500 futures contract in leading or forecasting the fall in prices in the cash market, certainly no such leading role can be assigned to those futures in the sharp turnaround that occurred at about noon on Tuesday. By the time the CME had reopened for trading, the reported index value had already risen by nearly 5% above the value at the time of the halt. The leading role, however, has been attributed in press accounts to another index futures contract, the Major Market Index contract of the Chicago Board of Trade. Whatever current investigations may ultimately show in this regard, there was already evidence of a surge in real buying power coming into the cash market at about that time, and with no direct connection initially to any futures market.

One part of the surge was arranged by the investment banks and "upstairs" block trading firms who worked with their corporate clients in instituting share repurchase programs. The other part was initiated by the Federal Reserve System, which added liquidity by increasing bank reserves and by encouraging banks to make the added liquidity available to the market through

loans to brokers and dealers for financing their inventory positions in securities.

That such liquidity infusions from outside regular market channels had to be invoked to turn the tide of selling should not be regarded as a sign of fatal flaws in the market structures of either the cash or the futures markets. Those markets were never designed to absorb order imbalances of the size and persistence actually experienced; and it is far from clear that any market system could successfully absorb selling of that magnitude over a time interval as short as an ordinary seven-hour trading day.

The market-making structures of the exchanges, whether of the open-outcry or the specialist or the upstairs dealer form, are intended primarily for temporary imbalances of orders, reflecting the lack of perfect synchronization between the arrival of customer buy order and customer sell orders. The market makers take these trading overflows into their own inventory positions hoping, of course, that the positions they are assuming are temporary and can be turned over quickly when offsetting orders come in on the other side. Most of the time they are successful and the markets can function well despite heavy volume, as was the case on the pre-crash Wednesday, Thursday, and Friday, pictured in Figures C1 to C6 in Appendix C.

But if a second surge of sell orders should come in before the first offsetting wave of buy orders has arrived, the market makers are put in a difficult position. Much of their capital has already been committed, and larger inducements in the form of price concessions have to be offered to lead them to increase their positions by committing more of their remaining capital. Some of the market makers in New York may be able to restore their market-making capacity by hedging their inventories with futures -- that is, by shifting some of their inventory overload to other market makers who may still have some uncommitted capacity. But if a third wave and then a fourth wave of sell orders pour in, the capacity of even the best capitalized market makers can be exhausted. The sellers must look then not to market makers or other short-term inventory holders, but to ultimate long-term buyers on the other side of the trade.

There were many such instances of a desperate search for the buy side of trades during the two sell-off days in October. The delays at the opening and the trading halts during the day were only the most visible evidence. The corporate buyback programs and the actions of the Federal Reserve Board may ultimately have been the most effective.

G. The Aftermath

Although no further episodes of cumulative panic occurred after the Tuesday turnaround, conditions during the rest of the week of October 19 can hardly be said to have returned to normal. The diminished capacity of the futures market to supply liquidity to transactions is evident in many ways throughout the period as, for example, in the large reversal in the futures price at the opening on Thursday and again shortly after the opening on Friday. These reversals represent the market's reaction to the imbalance of sell-at-market orders at the open. The imbalances were large even by previous standards. But with the capital resources of market makers reduced by the events of Monday and Tuesday, with volatility so great and with hedging ability reduced by the restrictions on program trading at the NYSE, the price concessions needed to induce market makers to position the orders had to be extremely large by past standards. The discount, which can be considered the effective implicit cost that the sellers of futures on Friday morning had to pay, was about 5%. For sellers at the Thursday opening, the implicit cost was a startling 23%!

Transaction costs this high normally, and quite rightly, are regarded as evidence of market inefficiency. In fact, they virtually define it. It is

disquieting to realize, therefore, that some of the policy proposals currently being advanced, however well-intentioned, would make these inefficiencies of the after-shock days a permanent part of U.S. capital markets. The further irony is that some of these well-intentioned policy proposals, had they already been in place, might actually have intensified, rather than alleviated the panic.

V. Analysis of Policy Alternatives

This section reviews a number of policy alternatives that have been proposed in the aftermath of the crash. We begin with two recommendations that we do not support.

A. Restrictions on Portfolio Insurance and Index Arbitrage

We do not believe that banning portfolio insurance is an appropriate alternative. This view does not indicate our belief that portfolio insurance played no substantial role in the sell-off, nor should it be taken as an endorsement of the insurance concept itself. Quite the contrary, some members of the Committee believe that the purveyors of so-called "dynamic hedging" oversold these programs by marketing them as "insurance." There is reason to believe, however, that use of portfolio insurance will diminish now that the limitations of the insurance concept have been demonstrated. Even if the concept of dynamic hedging were to continue to intrigue portfolio managers, however, there would be no practical way to ban it. Portfolio insurance by dynamic hedging is really a strategy, not a product. Though dynamic hedging is often pictured as the epitome of computer-driven trading, the principles for the strategy can be worked out on the back of an envelope, and their implementation

does not require the presence of a futures market. Dynamic strategies of an exactly equivalent kind are involved, for example, in every stop-loss order that gets to the floor of the stock market.

We believe also that no case can be made for banning or curtailing the other "villain" of the crash, index arbitrage or program trading. The view, widely circulated at the time, that the October 20 ban on program trading led to the dramatic recovery of Tuesday afternoon strikes us as merely an example of the "post hoc, propter hoc" fallacy. We have called attention in our earlier review to the arrival of new sources of buying power that, in our opinion, were decisive in turning the tide. But whatever may have ended the panic, it is hard to find any logical reason that index arbitrage trading would have precipitated or prolonged it.

Index arbitrage serves simply to incorporate all the market makers in the separate markets into one national market system. Should a large order imbalance strike in one of the markets, but not others, the market makers in the impacted market must demand substantial price concessions to take the imbalance into inventory. Some transactors will thus be driven to use the other, and now cheaper markets. Indeed, as we saw, the futures market absorbed a substantial share of selling pressure

on the two crash days. Index arbitrage accomplishes this equalization of trading cost between the markets through specialized intermediaries known as program trading arbitragers. To those market makers on the floor in New York, the flow of program trades rolling off the DOT system will always seem like net new orders; but when we widen the view to take in the whole market, the purely local picture can be seen as a misperception. The same total flow of orders would ultimately have reached the floor even in the absence of program trading -- it would simply have arrived by another route.

B. Margin Policies

One of the policy approaches that surfaced most frequently in the aftermath of the crash was the suggested imposition of a 50% initial margin requirement on index futures contracts, to put trading in such contracts on a par with leveraged purchases of equity securities. These higher margins have been suggested as a means of dampening "speculative" activity in the futures market, especially speculation that supposedly feeds on and reinforces panic.[14]

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[14] The ability of the monetary authorities to employ such a technique usefully, however, has been question by the Federal Reserve Board staff itself. Board of Governors of the Federal Reserve System, A Review and Evaluation of Federal Margin Regulations, A Staff Study (Dec. 1984).

It is instructive, therefore, to refer back to Table 4, which summarizes the trading activity on October 19 and 20 by large transactors, to assess the extent to which purely speculative activity might have contributed to the crash. The largest amount of net selling, as we have seen, was by pension funds, trusts and other institutional portfolio holders who, as hedgers employing portfolio insurance techniques, would not have been directly affected by the proposed 50% margin requirement, since these institutions do not operate with leverage and could generally meet even very large margin requirements. Increased margins would affect primarily the individual speculative accounts; and these, as can be seen from the table, were actually net buyers by and large on both days. Foreign speculative accounts were net sellers; but domestic large speculative accounts were offsetting rather than reinforcing the selling wave. Furthermore, the small non-reportable traders not captured by this table absorbed at least another 7,000 contracts, or almost a third of the amount transferred to the NYSE by arbitrage. Thus, increasing margin requirements on domestic speculative accounts could have done more harm than good, reducing buy pressure in the futures market.

We also see no evidence that futures margins helped set the stage for the stock market collapse. Not

only is the open interest in futures markets insignificant relative to the value of the stock market, but also, unlike stock margins, futures margins apply equally to both the "long" and "short" side of each position. Thus, higher futures margins would be just as likely to drive prices up by forcing short interest from the market, as to have the opposite effect. Most probably it would have no effect at all, except to increase the cost of transacting.

The sole function of futures margins is to act as a performance bond, and in this regard we believe no governmental intervention is justified by the evidence of October events.

Futures markets conventionally adjust margins in response to heightened volatility -- not because they have any illusions that higher margins can reduce volatility, but in order to assure that margins will in fact serve their purpose of protecting financial integrity.

The CME has a standing committee whose primary function is to evaluate margins on futures contracts traded on the Exchange. The committee sets initial margin requirements at a level intended to create, in effect, a one-day performance bond, and as such these levels are related to the historical range of one-day price fluctuations. In addition to the initial margin,

the CME's clearinghouse imposes a variation margin reflecting daily market trading results. During October 1987, the margin committee met repeatedly and frequently changed margins.

In addition to the final variation margin call at the close of market trading, the CME instituted two intra-day margin calls on October 19. Intra-day margin calls must be met within one hour; close-of-market margin calls must be met by 7:00 a.m. the following morning.

The margin changes the CME imposed in October were as follows:

Effective at the close of business Monday, October 19, 1987 for the S&P 500 futures contract:

	Current		New	
	Speculative	Hedge/Member	Speculative	Hedge/Member
Initial	$10,000	$5,000	$10,000	$7,500
Maintenance	$ 5,000	$5,000	$ 7,500	$7,500

Effective at the close of business Thursday, October 22, 1987 for the S&P futures contract:

	Current		New	
	Speculative	Hedge/Member	Speculative	Hedge/Member
Initial	$10,000	$7,500	$15,000	$10,000
Maintenance	$ 7,500	$7,500	$10,000	$10,000

Effective at the close of business Wednesday, October 28, 1987, for the S&P 500 futures contract:

	Current		New	
	Speculative	Hedge/Member	Speculative	Hedge/Member
Initial	$15,000	$10,000	$20,000	$12,500
Maintenance	$10,000	$10,000	$12,500	$12,500

Effective at the close of business Thursday, October 29, 1987, for the S&P 500 futures contract:

	Current		New	
	Speculative	Hedge/Member	Speculative	Hedge/Member
Initial	$20,000	$12,500	$20,000	$15,000
Maintenance	$12,500	$12,500	$15,000	$15,000

Margin requirements on stock index futures contracts appear to have served their purpose of maintaining the financial integrity of the CME during the unprecedented mid-October market conditions. All margin calls were met, no clearing member defaulted, and thus no customer funds were lost due to insufficient financial integrity. In one day, the CME system collected $2.6 billion in margin against a norm of approximately $100 million. The ability of the CME to closely monitor trading activity on a minute-by-minute basis enabled it to adjust margin requirements to appropriate levels in response to heightened market volatility.

The Committee expects to address the issue of futures margins in greater detail in a later report. For present purposes, however, we believe it is important that policymakers resist the facile conclusion that margins in the futures markets should be "equalized" with those in the cash markets. There is no evidence that the different role of margins in the two markets contributed at all to the crash, and the imposition of such fundamental changes in the operations of these complex markets could easily have unintended, even unpredictable, consequences.

C. Price Stabilization by Market Makers

Some critics have argued that market makers in both markets should have more capital, so that they can

more effectively stabilize prices. However, price stabilization efforts could easily intensify a panic. Whatever may be the merits of such a price stabilization policy under normal circumstances, they can be counterproductive in a panic by leading sellers to believe that they can gain by rushing to sell before the stabilizer's reserves are exhausted. This belief can lead to more selling than would otherwise occur.

In the futures market, as noted, the main burden of balancing sell and buy orders falls on the price. In New York, as noted, the specialist is enjoined to stabilize the price rather than let it adjust quickly to its current warranted value. We see no reason to change this futures market policy of allowing the price to adjust quickly to its final value.

D. Futures Opening Procedures

In contrast, the record of the week of October 19 certainly suggests that one place to look for improved performance under stress is at the critical time of the opening of the market. It is precisely at that juncture that the different market-making strategies of the cash and futures systems mesh most poorly. At times, the markets right themselves relatively quickly after an initial dramatic divergence at the open, but in times of great uncertainty, the seemingly inconsistent messages coming from the two markets may increase the volatility

in both. Both futures and stock exchanges should review their opening procedures for possible improvement.

E. Daily Price Limits

Daily price change limits also have been proposed as a way of dampening panics. They have been instituted often in the past in commodity futures markets and are a feature of at least one major stock market, namely the Tokyo Stock Exchange.

On October 23, the CME instituted a daily price limit of 30 points above or below the previous day's settlement price (comparable to a 12% market move) in the S&P 500 contract. This emergency measure was imposed for a temporary 30-day period. Subsequently, other exchanges imposed similar price limits on their stock index contracts.

Although price limits have long been in place for many future contracts, such limits have not been used recently for stock index futures and do not exist in the cash market in the United States. The imposition of price limits on stock index futures on an emergency basis raises some questions as to the advisability of such limits as a more permanent regulatory mechanism.

Whether such price limits would have had any significant beneficial effect on October 19 or 20, of course, can never be known since such limits were not in effect on October 19 when price changes exceeded

30 points, and price changes thereafter did not approach the 30-point limit imposed by the CME on October 23. In theory, price limits may be effective if the limits are set broadly enough to provide parameters that are rarely met, and are known in advance as a rule, not a threatened ad hoc possibility. Price limits may provide an important pause in the markets, allowing participants time to digest a large price move, as well as time to consult with clients and determine what additional liquidity can be added to the market.

From a negative perspective, however, price limits serve to shut down a market at the very time that users have the greatest need to hedge portfolios. Price limits deprive hedgers of the economic freedom to obtain price insurance from the futures markets. Further, artificial price limits may accelerate price movements. The very movement of the price toward the boundary can sometimes itself assure that the boundary will be reached. Moreover, the effectiveness of limits that apply only in one market, and not in others, needs evaluation. If only one market shuts down, for example, trading pressure may not be eliminated but simply transferred to the remaining open markets, thus potentially exacerbating pressures on those markets. In addition, it should be recognized that halting domestic

markets may simply serve to transfer business to foreign financial centers.

For these reasons, price limits as a permanent fixture should be examined very carefully. Moreover, great thought and discussion between the CME, NYSE, and other markets, and between the exchanges and market users, should occur before price limits are imposed on other than an emergency basis.

F. Speculative Position Limits

The rules of the CME limit the maximum net long and net short position that any one person may hold in futures contracts, including stock index futures. Bona fide hedging and arbitrage positions between related markets are allowed to exceed these so-called speculative position limits based on a firm's business needs, its financial ability, and market liquidity, provided that the firm requests an exemption from the CME immediately after exceeding the applicable limit.

On October 20, the CME began to limit requests by major market participants for higher levels of position exemptions. On October 22, the CME took the emergency action of requiring prior approval for trading activity that exceeded the position limits. This action allowed the CME to examine each request to execute a substantial volume against the ability of the market to absorb such

volume at one time without dramatically and perhaps artificially affecting prices.

The CME's action addressed the concern that portfolio insurance could impose concentrated selling pressures that the market could not effectively accommodate.

The CME also required large hedgers to spread their sell orders out across time brackets, thus reducing the potential concentration of these orders. This "bracket rationing" effect of tightened position limits on an emergency basis appeared to have an ameliorating impact in allowing the CME to regulate the flow of large sell orders.

As a permanent regulatory mechanism, however, "bracket rationing" needs careful consideration. Tight position limits restrict the ability of market users to hedge. Users may wish to hedge even though they understand that substantial sell orders will, of themselves, have a market impact cost of moving the price down. Moreover, there is the possibility that, if the CME market is restricted, selling pressure will simply be diverted to the NYSE. Finally, "bracket rationing" requires a delicate balancing of the interests of individual market participants and market users as a whole, which depends on careful monitoring of market activity and an understanding of trading

strategies and capabilities of major market participants. Because "bracket rationing" necessarily involves subjective judgments, criticism of unfairness and judgmental error may be anticipated.

VI. Summary and Conclusions

This report is preliminary, and we will defer final conclusions to our final report. Nonetheless, we feel that the evidence justifies some tentative conclusions.

First, we found no evidence that the futures market led the stock market decline. On the contrary, a tidal wave of selling pressure appears to have hit both markets simultaneously on Monday, October 19.

Second, our analysis indicates that the futures market was a net absorber of selling pressure, and that only a fraction of the total institutional selling that took place in Chicago was transferred to New York. Futures markets therefore probably reduced the pressure on the NYSE, rather than increasing it.

The debate surrounding October 19 has focused on three major concerns: futures margin policy, index arbitrage, and portfolio insurance.

-- We found no evidence that futures margins either caused the 1987 increase in equity prices, or exacerbated the crash. In contrast, higher futures margins would probably have decreased buying interest in the futures market on October 19 and thus led to further price declines.

-- Index arbitrage does not appear to have played a major role in the crash. Arbitrage transmitted selling pressure from the futures market to the stock market on October 19, but did not provide a net source of selling pressure to the equity markets overall.

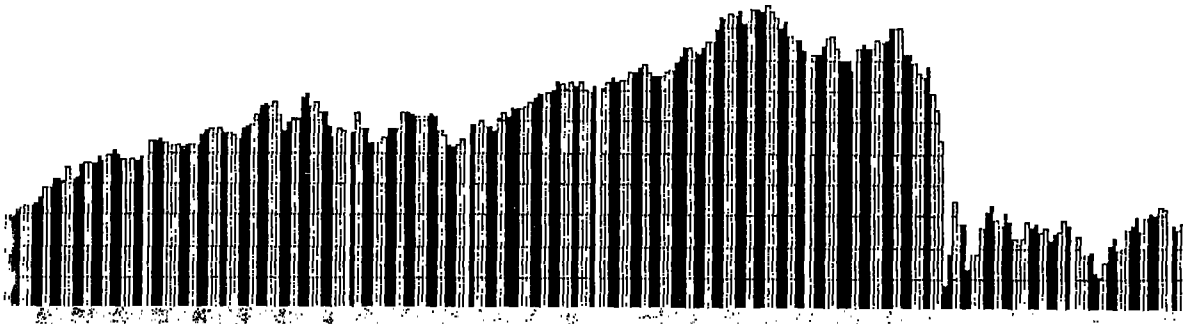
-- Portfolio insurance did contribute significantly to selling in the futures markets. However, this strategy was only one of many sources of selling, and does not by itself explain the magnitude of the crash. Nor can it explain the widespread equity price declines outside the U.S., in markets where portfolio insurance is unknown.

Users of portfolio insurance learned that continuous and smooth exit prices are not obtainable when a collective mass move to an exit occurs. Now that this flaw has been widely exposed, we expect that excessive use of this strategy will no longer be a problem.

In summary, we have found no convincing evidence that equity futures caused the crash or that the CME handled the emergency improperly. The events of October, however, provide abundant material for constructive review. We hope that the record assembled here will contribute to that review.

Appendices

To the Preliminary Report



APPENDIX A

Appointment of the Committee of Inquiry

CHICAGO MERCANTILE EXCHANGE

Contact: Andrew Yemma (312) 930-3434

FOR IMMEDIATE RELEASE

CME ANNOUNCES BLUE RIBBON PANEL
TO STUDY HISTORIC STOCK CRASH

NEW YORK, Oct. 28 -- The Chicago Mercantile Exchange today announced a blue-ribbon panel of experts would assist CME officials in a thorough examination of events before and after the Oct. 19 stock market crash.

Appointed to the panel were:

-- Burton Malkiel, PhD., professor of economics at Yale University and former dean of the Yale School of Management. He was a member of President Gerald Ford's Council of Economic Advisors.

-- Merton Miller, PhD., professor of banking and finance at the University of Chicago and a leading researcher in theories of finance.

-- Myron Scholes, PhD., professor of finance and law at Stanford University, co-developer of the Black-Scholes options pricing model widely used by traders, investors and portfolio managers.

-- John D. Hawke Jr. former general counsel for the Board of Governors of the Federal Reserve System who specializes in

-more-

regulation of financial institutions at Arnold and Porter, a Washington law firm.

Members of the panel will meet with CME officials in Chicago on Friday, October 30.

Leo Melamed, Chairman of the CME Executive Committee and Special Counsel to the Board of Governors, said: "The Chicago Mercantile Exchange is committed first and foremost to preserving a sound financial risk-management system in the United States. Our members and our markets have been a key component of our nation's financial system and we are confident that when the studies are completed, they will show that our markets performed extremely well under adverse economic and psychological conditions."

John F. "Jack" Sandner, chairman of the CME Board of Governors, said: "This prestigious panel of scholars and experts in the field of finance will help the Chicago Mercantile Exchange in conveying the facts and the truths of recent market events. With this information, it is our hope that the public and its policymakers may make informed decisions on what happened and what steps should be taken."

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87-169

CHICAGO MERCANTILE EXCHANGE

November 13, 1987

Mr. John Hawke Jr.
Arnold and Porter
1200 New Hampshire Avenue, N.W.
4th Floor
Washington, DC 20015

Dear Mr. Hawke:

We would like to take this opportunity to thank you for your willingness to assist the Chicago Mercantile Exchange (CME) in its assessment of the events of mid-October 1987 which were manifested in the extraordinary market collapse of October 19.

This letter is intended to set forth the understandings under which you agreed to accept responsibility for the Chicago Mercantile Exchange's public report on the role of the CME's futures and options markets during the recent extreme stock market volatility.

1. You will allocate individual responsibility among yourselves as you see fit.

2. You will have final authority for the scope and content of the report, subject only to the statutory and regulatory confidentiality constraints noted below.

3. You will have immediate access to all of the CME's research and reports respecting the event.

4. The CME staff will promptly provide you with any additional information in the possession or control of the CME respecting those events.

5. The officers, directors, and staff of the CME will fully cooperate with any inquiries you may have.

6. The public report may not disclose confidential information protected by statute or regulation, including the positions of particular traders, trade secrets of market users, the content of investigatory files, etc.

We hope that your report will assess the accuracy and completeness of the CFTC's recent interim report. In addition, we expect that you will include any suggestions for changes in: the terms and conditions of our contracts; our procedures respecting the setting of margins; the levels of our margins; our methods of calling for intra-day margins; and our practices or procedures for dealing with emergencies.

Thank you for your help.

Sincerely,

JOHN F. SANDNER
Chairman of the
Board of Governors

LEO MELAMED
Chairman of the
Executive Committee

WILLIAM J. BRODSKY
President and
Chief Executive Officer

APPENDIX B

Chronology of Wire Service Reports

PROGRAM-TRADING EARLY WIRE SUMMARY

COMPILED BY CME RESEARCH

OCTOBER 26, 1987

All dates are October 87.

All times are New York time on a 24-hour clock.

Time column carries wire-report time.

DATE	TIME	REPORT
Monday		
19	15:39	Despite large discounts to cash, arb trading has been almost nonexistent today. Program traders lack capital. (Knight-Ridder)
19	14:04	Hedging and arb trading contributed to morning losses, but individual investor panic seen as biggest factor. "...selling...coming from the small, man-in-the-street type." -- (Paul Fine, Shearson, NYC, quoted) Big players sidelined. Many big arbs up to limits, portfolio hedgers not major influence. Index arb nearly impossible until all Dow stocks opened. <u>Futures pits offered some the only way out in falling market</u>. Retail brokers reported record numbers of sell orders from brokerage networks just before S&P 500 futures open. Large mutual fund redemptions seen. (Knight-Ridder)
19	17:07	Market watchers say that program trading was not widespread today, despite discounts. Analysts say that the tape was too late to do arb trading. Hedge strategies could backfire on arbs who would not know the execution prices until it was too late. (Dow-Jones)
Tuesday		
20	01:15	Traders said that arb program trading had little to do with stock market drop. Delayed openings and delayed price quotes prevented program-trading execution. (Reuters)

NEW YORK TIMES SUMMARY

COMPILED BY CME RESEARCH

OCTOBER 27, 1987

All quotes are extracted directly from the New York Times.

SATURDAY, OCTOBER 10, p.27

"The stock market ended a tumultuous week yesterday with yet another plunge in prices attributed to concerns about interest rates and the dollar's weakness." (Phillip H. Wiggins, NYT)

"The stock market is in a temporary consolidation stage where it is digesting the unpalatable news on interest rates and the status of the dollar." --(James Kalil, President, Compu-Val Invest., Wilmington, Del.)

"The market finally realized that there is no need to buy stocks when you can get a two-year note yielding about 9 percent." -- (Steven Goldstein, editor of Trade Center Market Letter)

SATURDAY, OCTOBER 17, p.1

"... the market is at a crossroads. After the sharp selloff of recent days, these retail investors and mutual fund owners are wondering if the long, euphoric period is finally over." -- (Kenneth N. Gilpin, NYT)

"...the recent selloff is based on more than just the jitters. A big rise in interest rates in the last two months has suddenly made investments in money market accounts or ... Treasury bills, notes and bonds look very attractive." -- (Gilpin, NYT)

"Because of the rise in interest rates, (Merrill Lynch) said it was now advocating an increase in the bond portion of its model portfolio to 40 percent and a reduction in the stock portion to 40 percent from 45 percent." -- (Gilpin, NYT)

SATURDAY, OCTOBER 17, p.1

"Many analysts said the stock market's current free fall...has been caused by the weakness in the dollar and the concurrent rise in interest rates." -- (Lawrence J. DeMaria, NYT)

The dollar has sagged recently after Government statistics indicated that the huge United States trade deficit remains wide." -- (DeMaria, NYT)

"Individual stock losses yesterday were staggering; some of them looked as if they were the result of takeover deals that fell apart." -- (DeMaria, NYT)

"Adding to the market's woes was the action by the Marine Midland Bank, which yesterday raised its prime lending rate another half a percentage point, to 9.75 percent, following the lead of the Chemical Bank. The increase...is the second in a week...There is also persistent speculation on Wall Street that the Federal Reserve might soon raise its discount rate." -- (DeMaria, NYT)

SATURDAY, OCTOBER 17, p.26

"Gulf War Speculation Spurs Oil-Contract Rise" (Headline)

SATURDAY, OCTOBER 17, p.26

"(On Thursday,) Mr. (James) Baker said he was displeased with recent increases in interest in West Germany, leading traders to wonder whether there was disharmony among the United States and its six key trading partners concerning currency stabilization." (NYT from Associated Press)

SUNDAY, OCTOBER 18, p.1

"In an abrupt shift from its policy of the last eight months, the United States is allowing the dollar to decline against the West German mark, a senior Administration official said today." -- (Peter T. Kilborn, NYT)

"Analysts and another senior Administration official...said (this) could be expected to mean a decline against many other currencies, too." -- (Kilborn, NYT)

"There is the risk...that the stock market...might erode further with a falling dollar. Foreign investors have been a major reason for the market's big move this year...If the dollar falls further their funds would be worth less in their own currencies." -- (Kilborn, NYT)

"(A decline in the dollar) could reinforce weakness in the stock market. Foreign holders will bail out of stocks to bail out of our currency." --(Felix Rohatyn, senior partner of Lazard Freres)

SUNDAY, OCTOBER 18, sec3,p.1

"The cataclysm that hit Wall Street last week shook investors all around the country and made even the staunchest bull wonder if the five-year joy ride had come to an end. While the 17.5 percent decline from the August high ... might be viewed as just a monstrous correction in an ongoing bull market, many investors may be unable to think of it as anything but a reminder of an earlier October massacre -- the Crash of 1929." -- (Andrew Feinberg, NYT)

SUNDAY, OCTOBER 18, sec3,p.24

"Trade Data Set Off a Market Plunge." -- (Headline, NYT)

SUNDAY, OCTOBER 18, sec3,p.24

"The battered bond market took more blows, with yields on long Treasury bonds moving decisively above the psychologically important 10 percent level." (NYT)

SUNDAY, OCTOBER 18, sec4,p.1

"Is the world economy beginning to fall apart? Wall Street, plunging into a downturn that many analysts and investors feared was the end of the big bull market fo the last five years, behaved last week as though the center would not hold." -- (Leonard Silk, NYT)

"The financial markets seem to recognize that where policies ... are concerned, it's every country for itself and the devil take the hindmost." -- (Silk, NYT)

"When the kissing stops among the allies, the money stops flowing on Wall Street and foreign capital stops flowing into dollars. ... That is the great danger that hangs over the American and the world economy." -- (Silk, NYT)

MONDAY, OCTOBER 19, p.1

"In the Aftermath of Market Plunge, Much Uneasiness." -- (Headline, NYT)

MONDAY, OCTOBER 19, p.1

"Last week's spectacular drop in the stock market has led many investors to search for ways to hedge their bets." -- (Alison Leigh Cowan, NYT)

MONDAY, OCTOBER 19, p.1

"Reagan Chooses the U.S. Response to Iranian Attack. Congressional Briefing. Top Commanders at Posts in Pentagon, Hinting Move Could be in Motion." -- (Headline, NYT)

MONDAY, OCTOBER 19, p.21

"Foreigners Called Key to Rates. Markets Fear Cut in Flow of Capital to U.S." -- (Headline, NYT)

"As Treasury bond yields rose above 10 percent last week and stock prices plummeted, the financial markets were focused on the dangers from abroad and unimpressed by assurances from senior Government officials that interest rates were needlessly high and based on exaggerated fears of inflation." -- (Michael Quint, NYT)

"Foreign buying of Treasury bonds has already subsided this year, and there were periods, such as in September, when Japanese institutions were actually net sellers of bonds they bought earlier. Although foreign buying will not stop entirely, (economic adviser to Deutsche Bank) Karczmar said small changes in foreigners appetites could lead to large changes in American interest rates." -- (Quint, NYT)

"Until this month, the stock market seemed oblivious to rising interest rates. But as Treasury bond yields neared 10 percent, the prospects that high interest rates could dampen economic activity and attract money that might otherwise be invested in stocks helped cause a sharp drop in equity prices." -- (Quint, NYT)

MONDAY, OCTOBER 19, p.28

"Small Investors in Rough Seas" -- (Headline, NYT)

"The 'correction' has been so stunning -- and swift -- that even optimistic Wall Streeters cannot be sure that it is not presaging something more significant." -- (Lawrence J. DeMaria, NYT)

MONDAY, OCTOBER 19, p.21

"Plan for Takeover Taxes Stirs Fears in Markets." -- (Headline, NYT)

WIRE REPORT SUMMARY

COMPILED BY CME RESEARCH

OCTOBER 26, 1987

All dates are October 87.

All times are New York time on a 24-hour clock.

Time column carries wire-report time.

DATE	TIME	REPORT
Friday		
16	04:17	London SE halts because of power failures.

Sunday		
18	12:00	James Baker: US doubts Louvre currency pact because German interest rates up. Seen as signal that US will devalue dollar.

Monday		
19	10:40	SEC "concerned."
19	11:41	SEC has discussed trading halt. Not now.
19	11:54	Ruder on trading halt: "Anything possible."
19	13:39	SEC denies trading halt rumors.
19	14:04	Speaker Wright disputes blaming tax bill.
19	14:13	Mixed reports about SEC trading halt.
19	14:28	Reagan may comment after NYSE closes.
19	15:40	Reagan will not comment on market today.
19	15:49	Phelan to hold news conference today.
19	16:10	Pacific SE to close early due to volume.

19	16:16	Rostenkowski blames interest rates, trade imbalance, and deficit.
19	16:46	SEC to brief Congress staff this evening.
19	16:48	NYSE to open normally Tuesday.
19	16:54	Reagan: "Economy is sound."
19	17:04	Phelan: "Meltdown." Market had been expecting correction. Blames inflationary expectations, rising interest rates, declining dollar, and Persian Gulf.
19	22:28	Nikkei plunge sets record.

Tuesday

20		02:35	Bank of Japan affirms Louvre currency pact.
20		02:54	James Baker mtg with German Fin. Minister soothes currency markets. Dollar recoups.
20		03:51	Japanese Fin. Minister: No cause for concern.
20	-->	04:02	Tokyo SE cuts margin to 50% from 70%, possibly to boost stock buying.
20		04:40	FTSE opens down 186.
20		07:02	Goldman Sachs denies insolvency rumors.
20		07:50	Schultz: Economy in "fine shape."
20		07:54	UK Chancellor Excheq. blames US market drop on lack of confidence in US economy and on careless talk. Calls it absurd overreaction.
20		08:54	Fed ready to provide liquidity.
20		08:55	UK Chancellor Excheq. affirms Louvre pact.
20		09:33	Regulators to monitor banking system.
20		09:55	James Baker: No reason to panic.
20		10:04	White House will wait and see.
20		10:09	NYSE asks not to use automated order system for index arb & trading programs.
20		11:22	White House: no crisis atmosphere, no plans for stock-market action.
20		11:27	E.F. Hutton denies insolvency rumors.
20		11:31	Senate leaders call for meetings with Reagan.
20		11:46	Sen. Fin. Comm. Chmn. Bentsen: "Debacle."
20		11:52	White House will act if necessary, but no action planned now.
20		11:55	NY commercial banks restrict forex dealings with US invest firms. Fear insolvency.
20		12:15	CBOE halts index trading.
20		12:18	CBOE says NYSE halts some blue chip trading.

20	12:19	CME halts S&P trading.
20	12:29	NYSE: All Dow stocks except DuPont trading.
20	12:30	NYFE halts NYSE Composite trading.
20	12:42	KCBT halts index trading.
20	12:57	CME to resume S&P at 13:05.
20	13:05	CBOE to resume at 13:15.
20	13:06	Many blue chips stop trading (order imbals).
20	13:07	KCBT to resume at 13:05.
20	13:18	Fed denies rumors of news conference and special meeting today.
20	13:32	Senate Finance Chmn Bentsen: Should not raise discount rate.
20	13:54	Bear Stearns acquires AMEX specialist.
20	13:58	Reagan: Interest rates can fall, pleased with Fed and with banks lowering prime.
20	14:04	NYFE has resumed all trading.
20	15:13	Reagan: Policies not at fault, no stock-market actions planned.
20	15:37	Pacific SE to close early today.
20	15:56	Cong. Markey scheds hearings for Thursday.
20	16:11	White House denies rumors that Volcker will return to govt.
20	16:12	Two UK brokerages deny insolvency rumors.
20	16:28	Reagan meets with Greenspan, Sprinkel, James Baker.
20	16:44	Pacific SE halts trading on 30 stock options.
20	16:46	NYSE may continue limits on auto order system.
20	17:09	Reagan to negotiate budget with Congress.
20	17:31	Reagan: "Don't panic. Indicators solid." Will work with Congress to reduce deficit.

20	17:51	Reagan affirms Louvre pact and repeats assurance from Japanese Prime-Min-Designate.
20	20:33	Hineman: "This is equity-mkt problem. Deficit and Persian Gulf are responsible."
20	21:10	Nikkei fell 1874 to 23,872 in early trading.
20	22:09	Tokyo SE prices shoot up in early trading.
20	22:34	Hong Kong suspends trading until 10/26 after largest one-day drop.

Wednesday

21	00:43	Nikkei down 2516 to 23230.
21	08:05	Brussels SE delays open. Says many buy orders.
21	11:05	Pacific SE closes auto order execution. Says tech problems.
21	11:11	White House has not discussed controls on pgm-trading.
21	11:46	NYSE suspends three member firms.
21	12:42	House Commerce Subcomm postpones stock-mkt briefing.
21	14:33	Sen. Fin. Chmn. Bentsen: Reagan shocked by Monday drop. Bentsen getting mixed signals from White House on tax increase.
21	17:52	Ruder to direct immediate review of market volatility.
21	18:00	Senate passes bill demanding Cong. OK on Gulf
21	18:33	Ruder: "Industry remains strong."
21	20:25	NYSE market-maker folds, Merrill to acquire.

Thursday

22	06:36	FTSE down 85 to reverse one-day rally.
22	08:24	Far East stock markets close up in moderate trading.
22	08:43	NYSE again asks members not to use order delivery system for index arb or for other aspects program trading after today open.
22	09:24	Hong Kong FE faces default.
22	09:55	AMEX to delay open of MMI options until 80% of stocks in MMI index open on NYSE.
22	10:28	Several NY houses see huge sell orders.
22	10:32	NYSE: Not all stocks to open until 11:00.
22	10:54	Elliot Wave theorist Prechter rumored to have predicted new stock-market lows on Wednesday-night phone message.
22	10:55	NYSE has requested major member firms that use program trading not to place any proprietary program trades today. NYSE says it has reviewed this policy with these firms and it has their support. (Dow Jones)
22	11:40	Prechter denies rumors that he has predicted new stock-market lows.
22	12:29	Sen. Bank. Comm. Chmn. Proxmire: When consider federal, business, and household debt and resulting recession risk, "It is hard to understand why the stock market crash did not come even sooner and why it was not even bigger." (Dow Jones)
22	14:10	E.F. Hutton: Should shift away from stocks into bonds. Cut stocks down to 50% from 60%.
22	14:19	Stocks close sharply lower on Europe exchs.
22	14:33	NYSE asks no index arb or pgm-trading on automated order system.
22	14:41	Reagan wants to meet with Cong. on deficit.
22	14:43	Thatcher downplays London stock tumble.
22	16:51	NYSE shortens hours.

22	16:56	AMEX shortens hours.
22	16:58	CME Board of Governors meeting to consider responses to NYSE announcement on shortening NYSE hours.
22	17:04	Effort to curb index arb continues.
22	17:10	Phelan: Pgm-trading was over 20% of volume.
22	17:11	Toronto SE shortens hours.
22	17:19	CBOE shortens stock-product hours.
22	17:22	Sen. Sec. Subcomm. Chmn. Riegle wants study stock markets, wants Federal action.
22	17:33	CBT shortens stock-product hours.
22	18:01	SEC supports NYSE on shorter hours.
22	18:15	KCBT shortens stock-product hours.
22	18:51	Midwest SE shortens hours.
22	19:39	Phelan: Pgm-trading curbs will continue.
22	19:20	PHLX will delay start of Value Line options.
22	20:11	Reagan: "Long-overdue correction." Will work with Congress to reduce deficit. Deficit down to $148 bln from $221 bln.
22	21:06	CME to shorten S&P 500 index futures and options trading hours and to impose price limits on S&P 500 futures.
22	23:35	Cong. Markey: Will tighten regs on index futures. SEC would keep tighter rein on index futures.

Friday

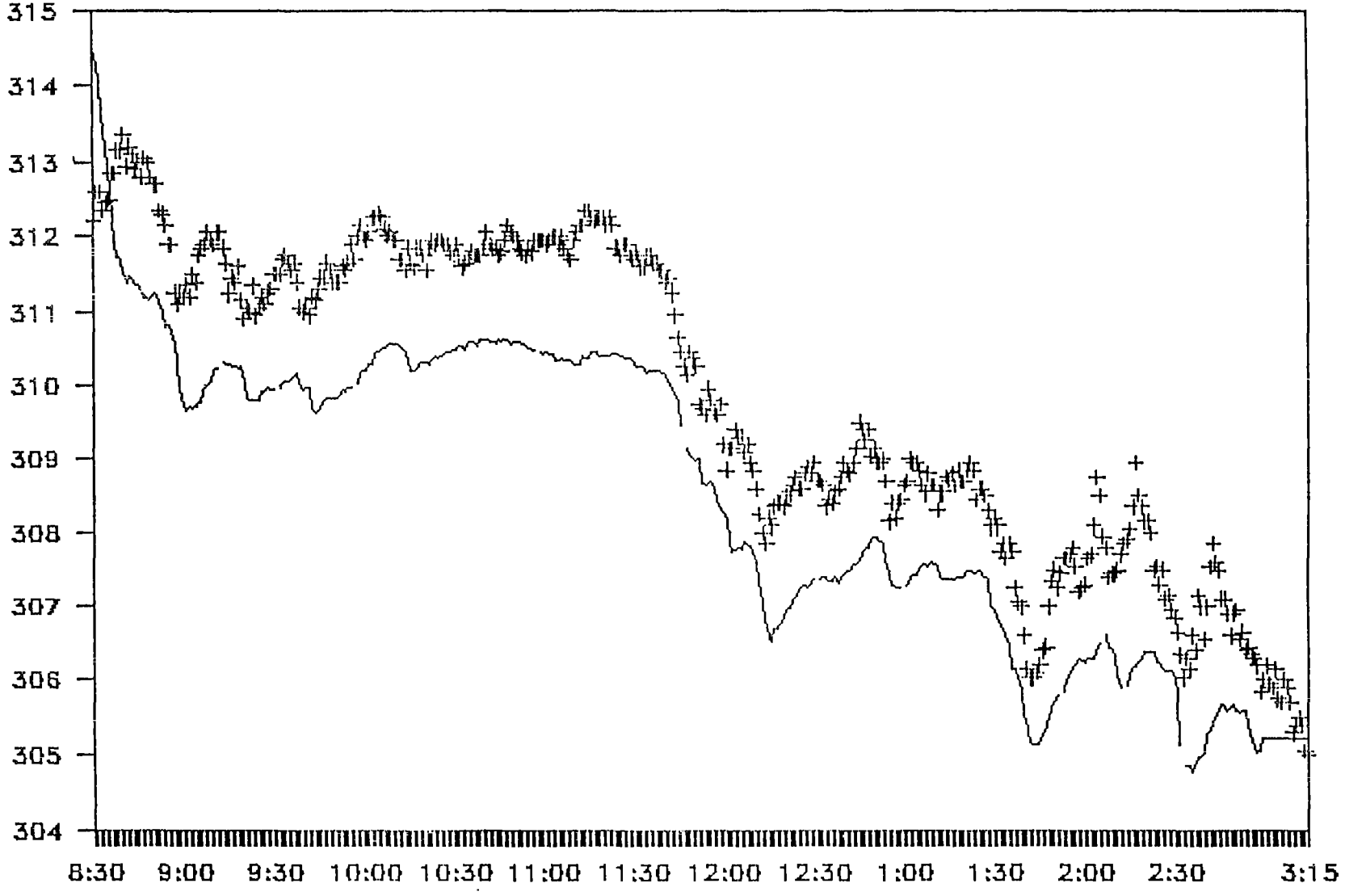
23	09:50	NASDAQ shortens hours.
23	11:49	London SE will keep its regular hours.
23	12:23	US Treasury denies G-5 or G-7 currency mtg this weekend, affirms Louvre currency pact.
23	14:21	Ruder: No major stock brokerages in trouble.
23	15:23	House Energy and Commerce Subcomm. will be "aggressive" to limit stock mkt fluctuations. Will examine pgm trading.
23	22:30	Tokyo SE prices plunge in early trading.

APPENDIX C

Price Data

S&P 500 FUTURES AND STOCK INDEX PRICES

WEDNESDAY OCTOBER 14, 1987



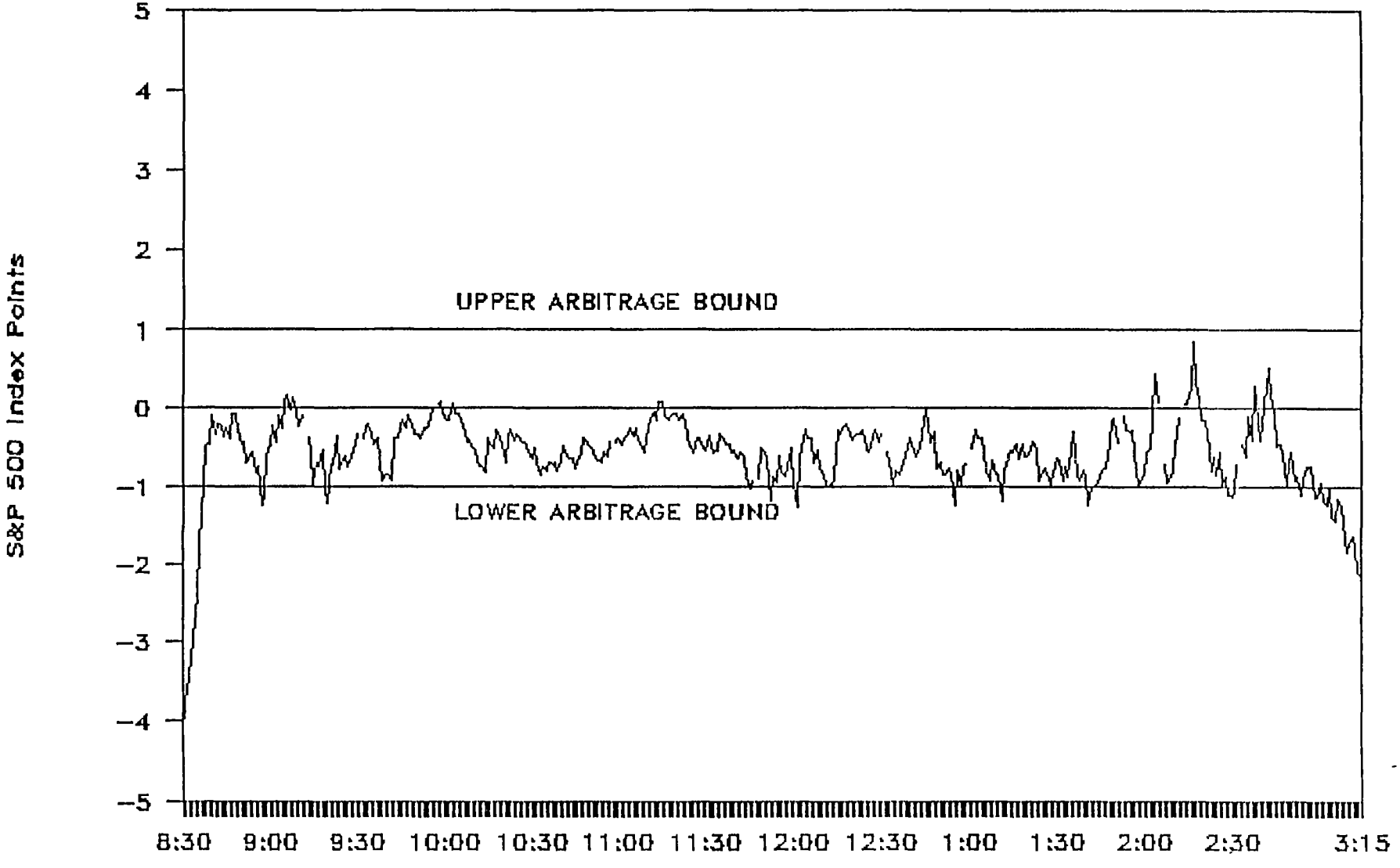
Source: CME and Standard and Poors.

——— Stock Index + December Futures

FIGURE C1

S&P 500 FUTURES VALUE MINUS FAIR VALUE

WEDNESDAY, OCTOBER 14, 1987

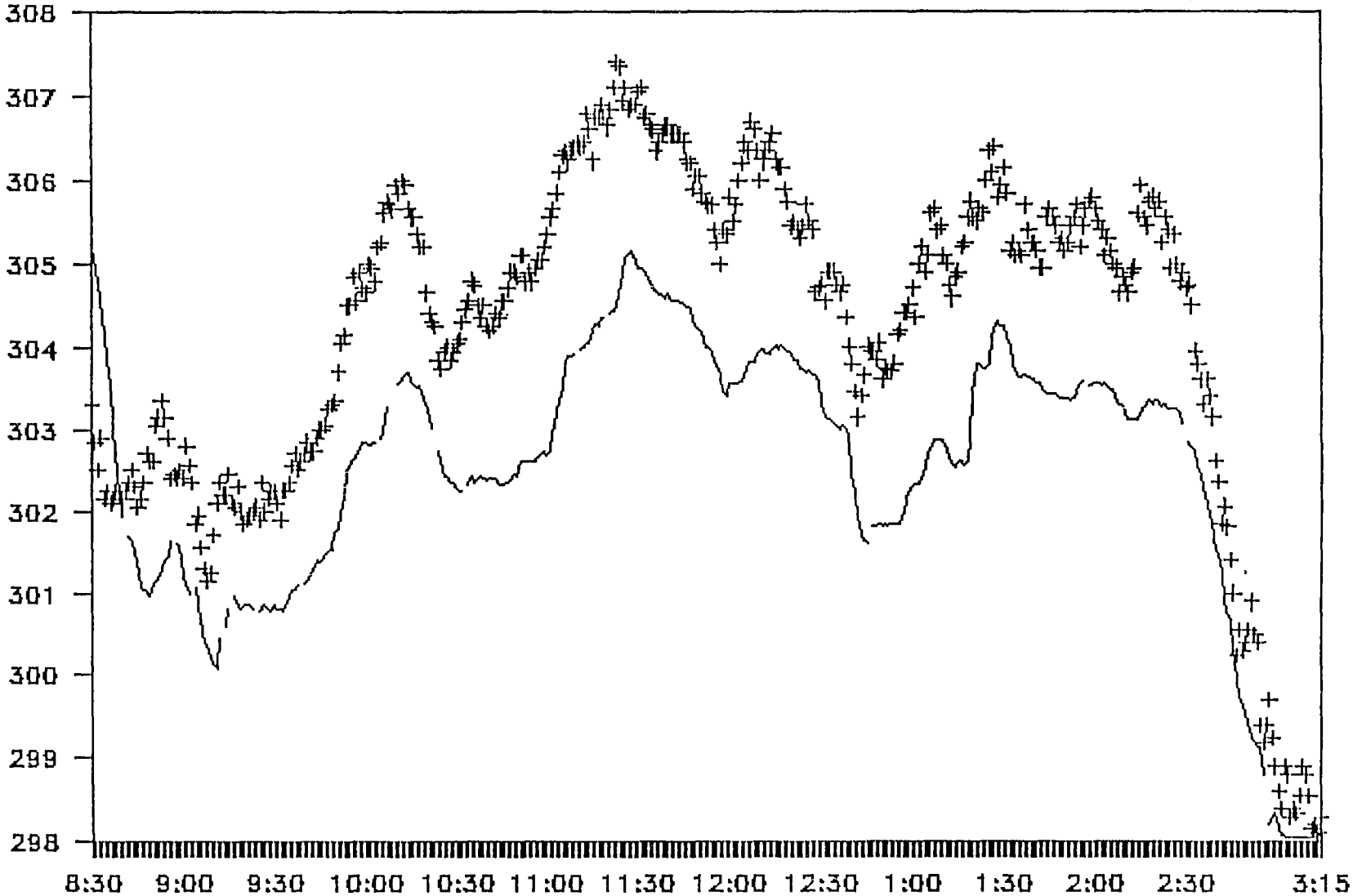


Source: CME and Standard and Poors.

FIGURE C2

S&P 500 FUTURES AND STOCK INDEX PRICES

Thursday, October 15, 1987



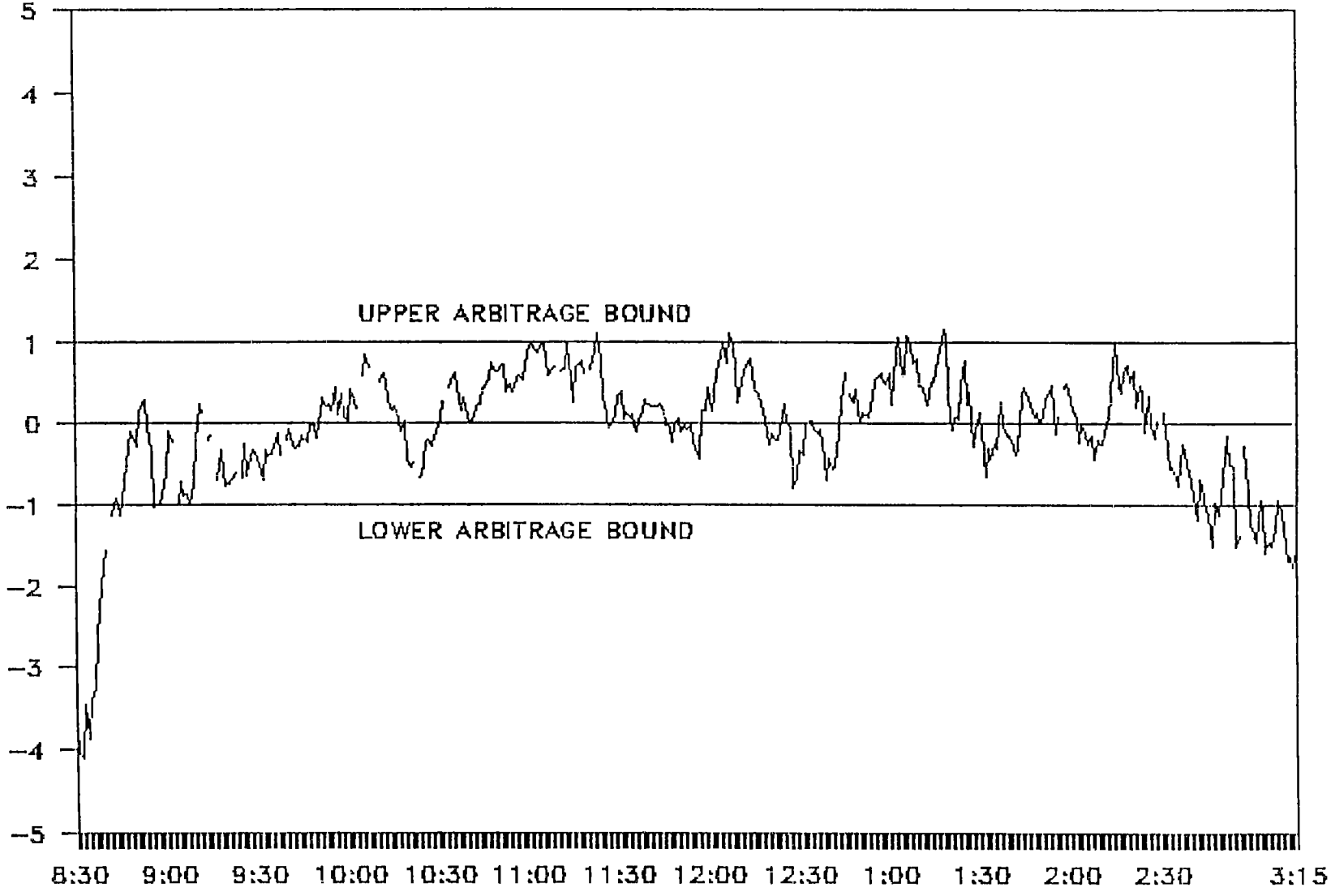
Source: CME and Standard and Poors.

—— Stock Index + December Futures

FIGURE C3

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Thursday, October 15, 1987

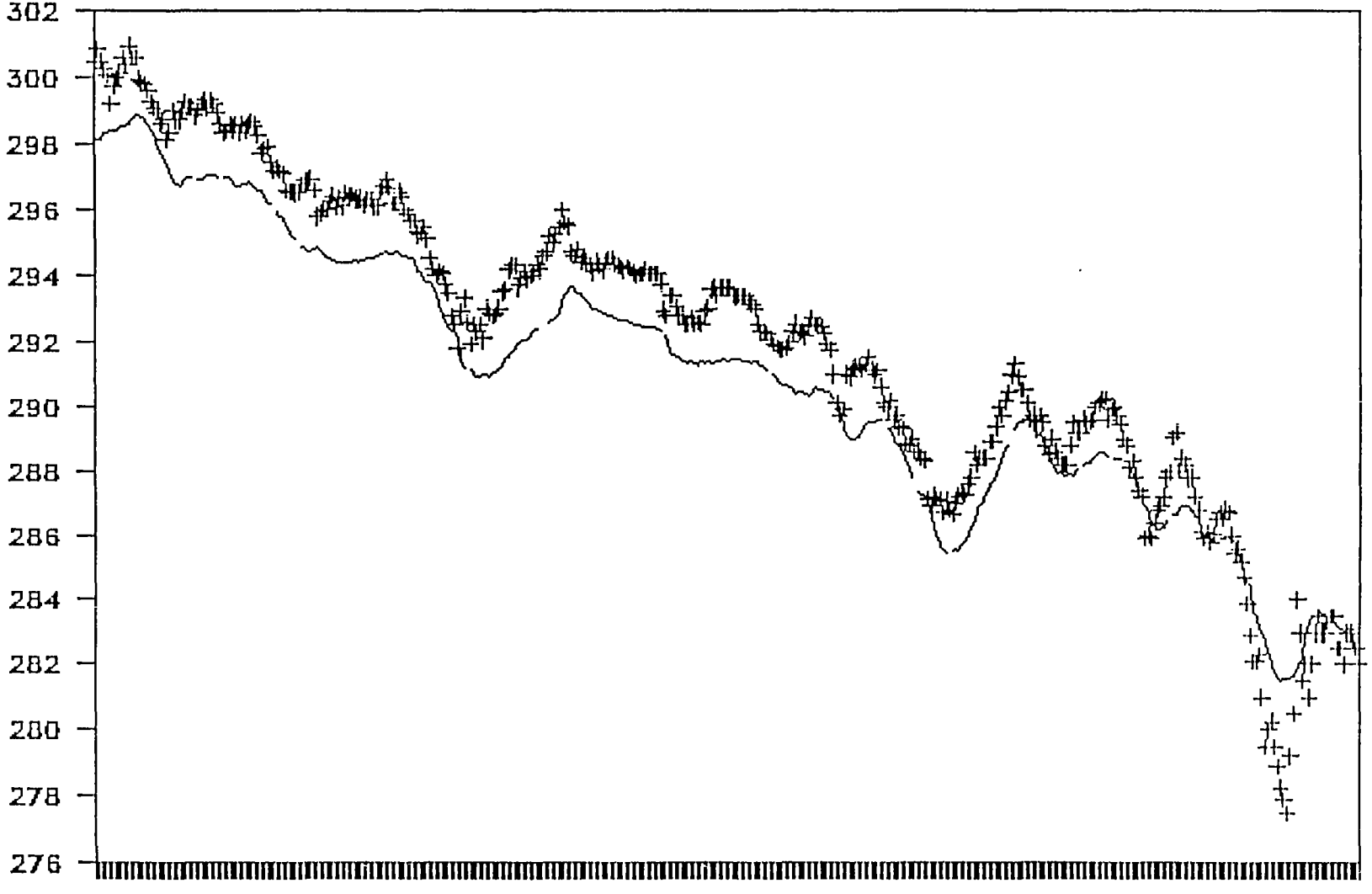


Source: CME and Standard and Poors.

FIGURE C4

S&P 500 FUTURES AND STOCK INDEX PRICES

Friday, October 16, 1987



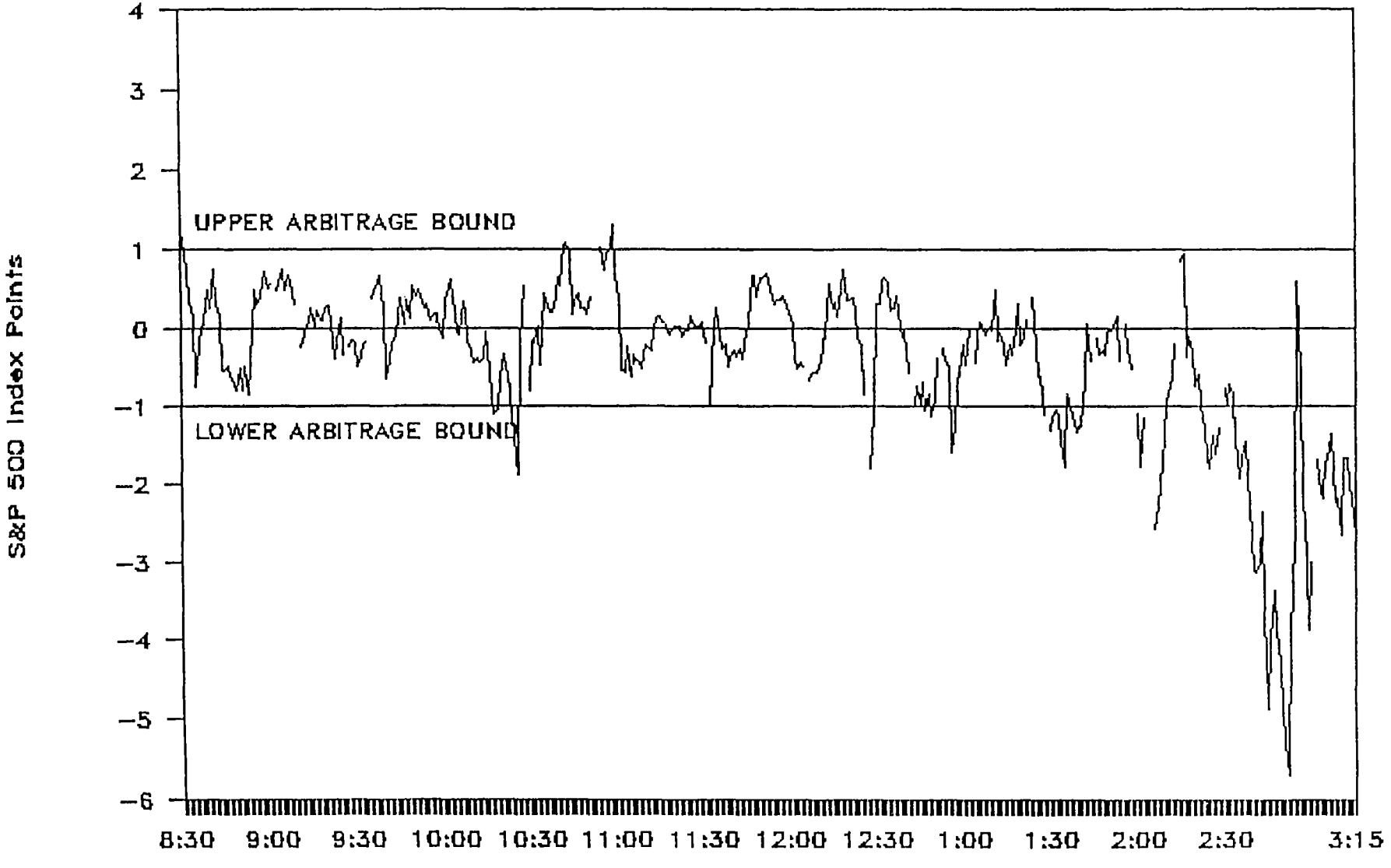
Source: CME and Standard and Poors.

——— Stock Index + December Futures

FIGURE C5

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Friday, October 16, 1987

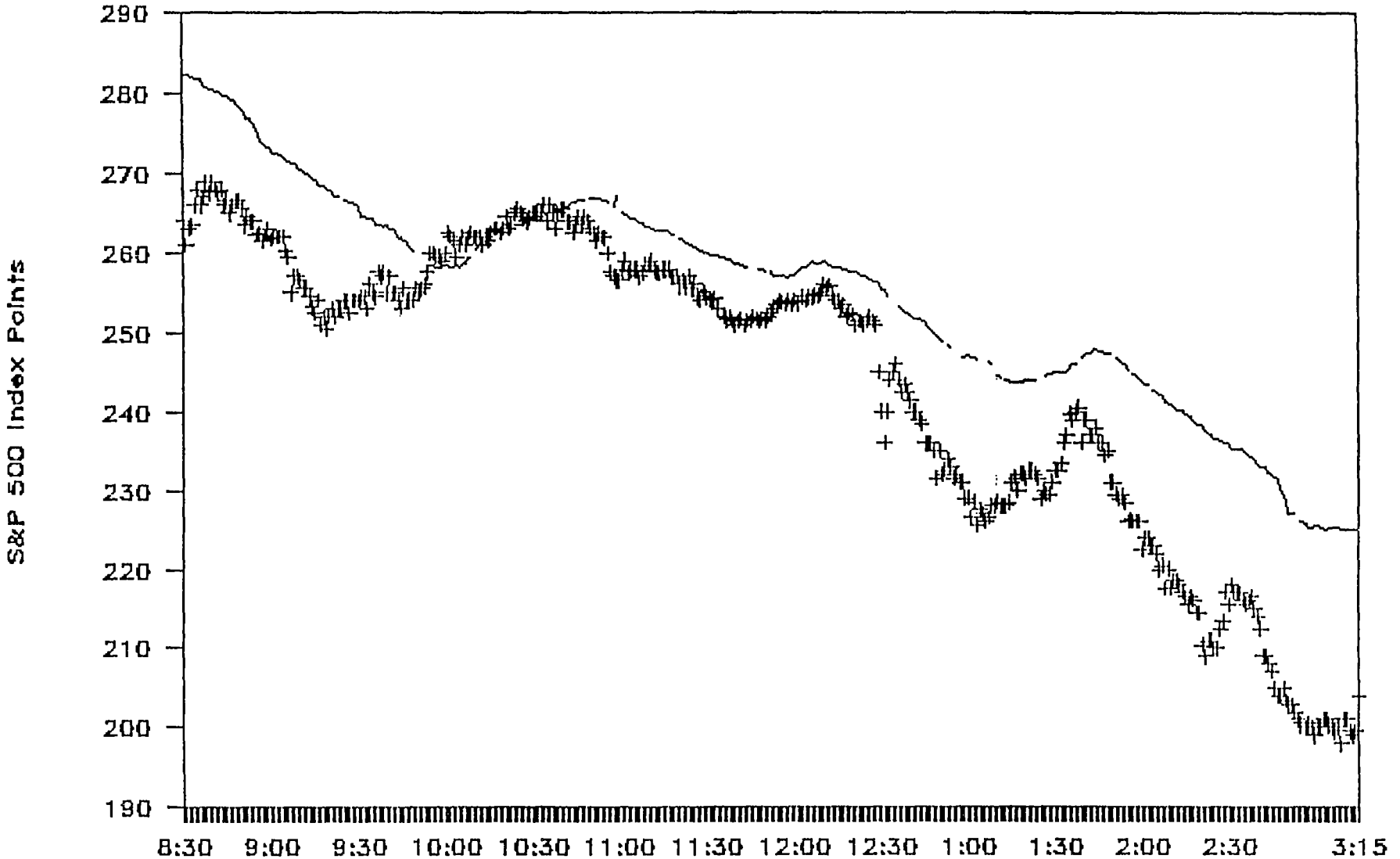


Source: CME and Standard and Poors.

FIGURE C6

S&P 500 FUTURES AND STOCK INDEX PRICES

Monday, October 19, 1987



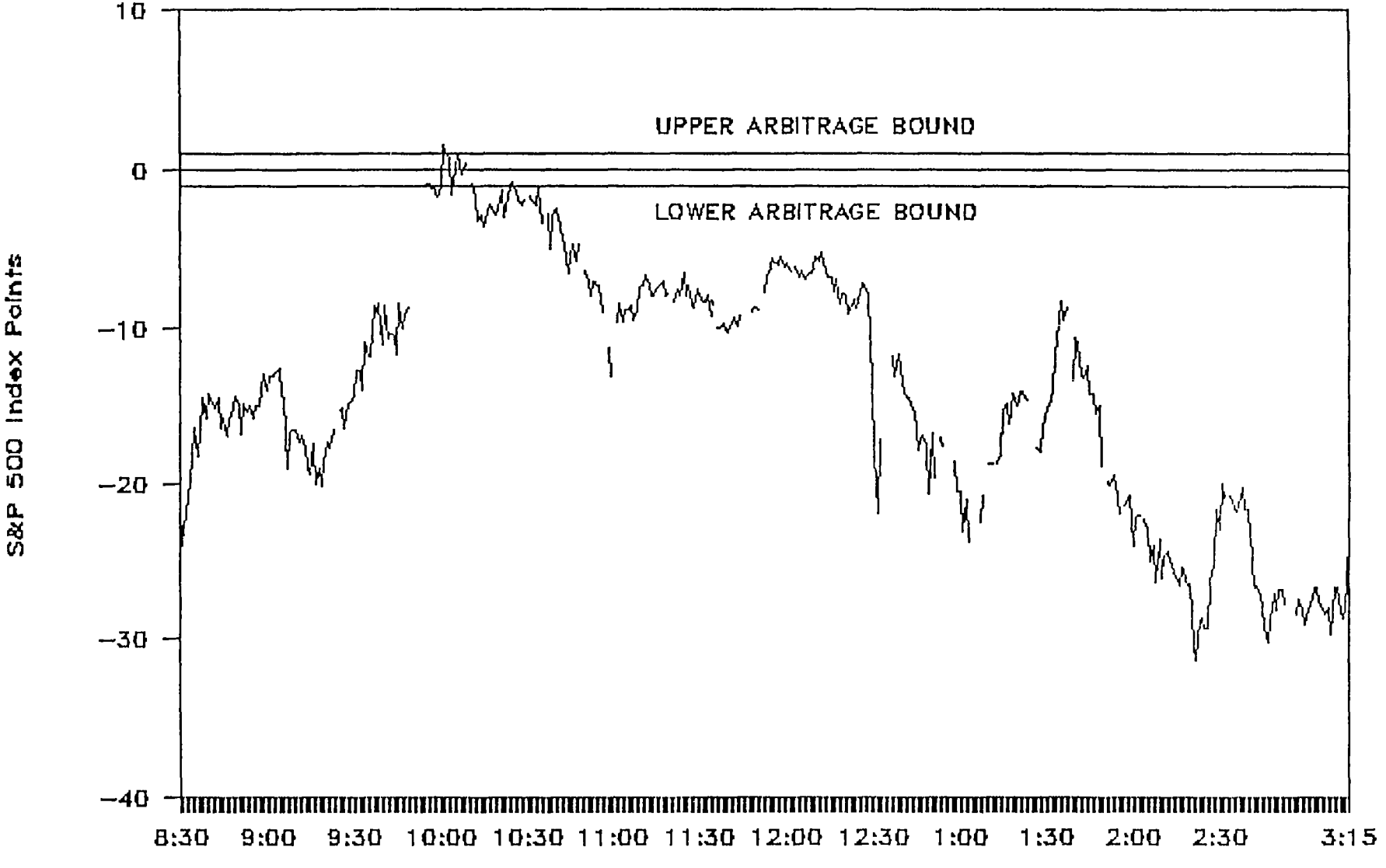
Source: CME and Standard and Poors.

—— Stock Index + December Futures

FIGURE C7

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Monday, October 19, 1987

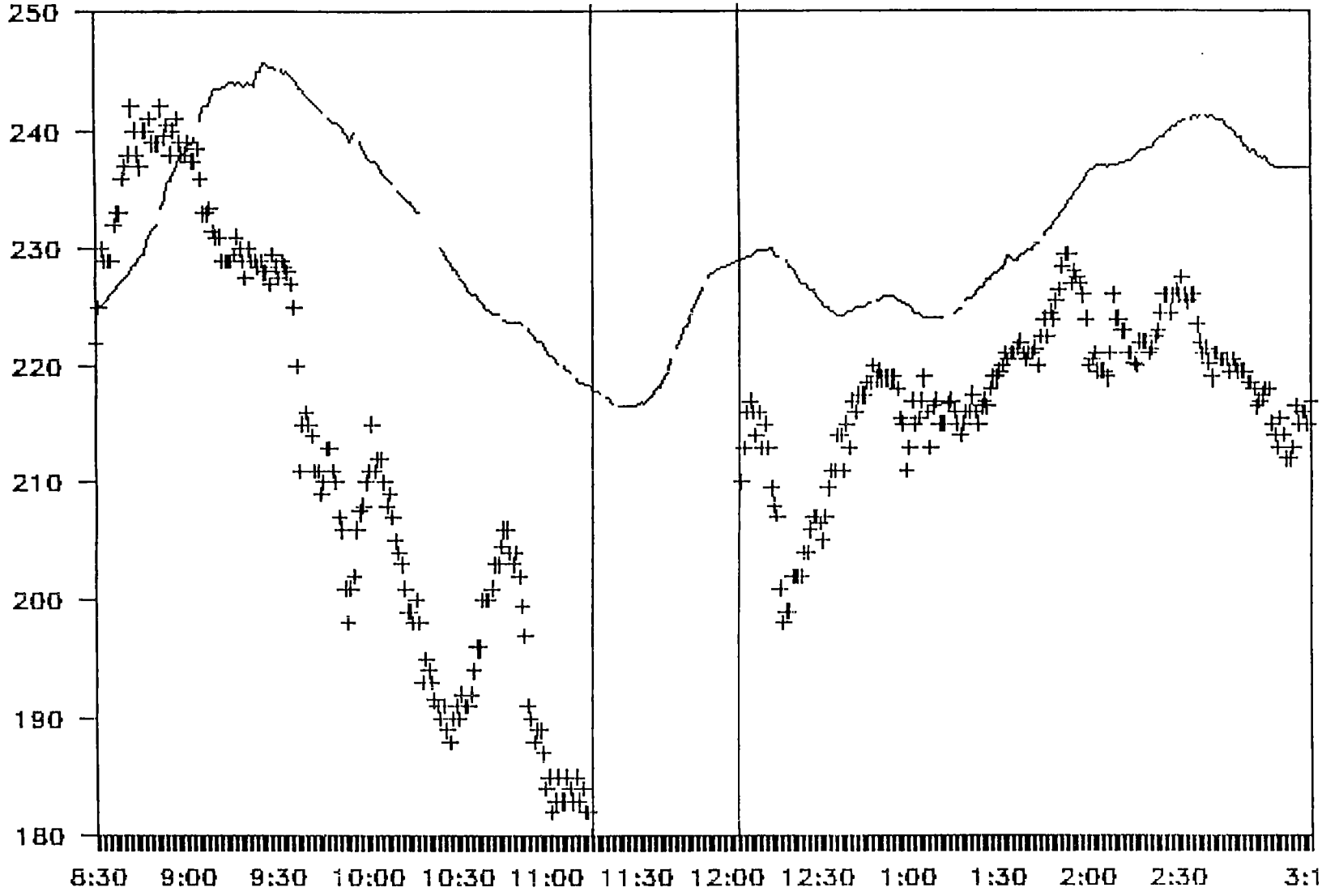


Source: CME and Standard and Poors.

FIGURE C8

S&P 500 FUTURES AND STOCK INDEX PRICES

Tuesday, October 20, 1987



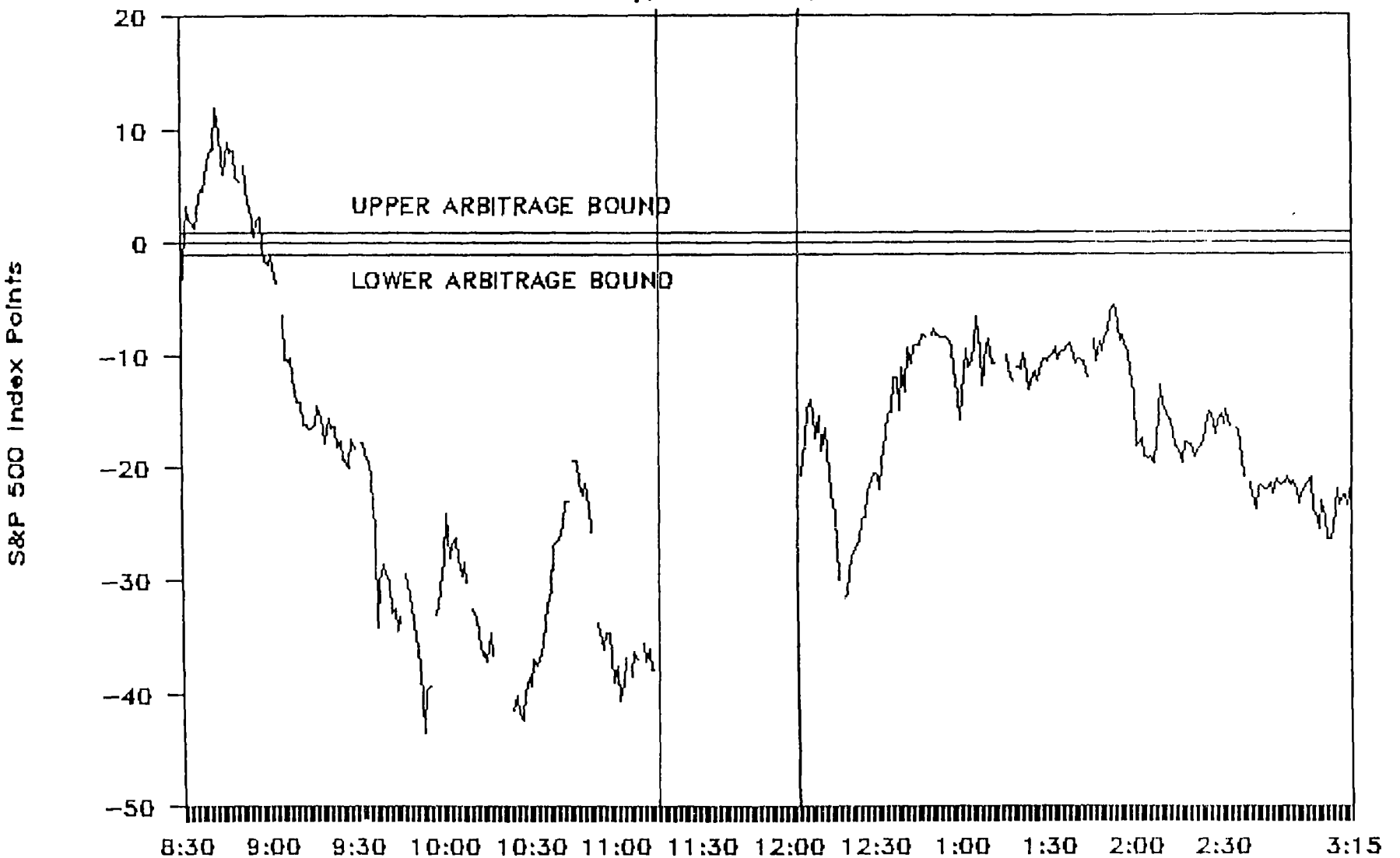
Source: CME and Standard and Poors.

—— Stock Index + December Futures

FIGURE C9

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Tuesday, October 20, 1987

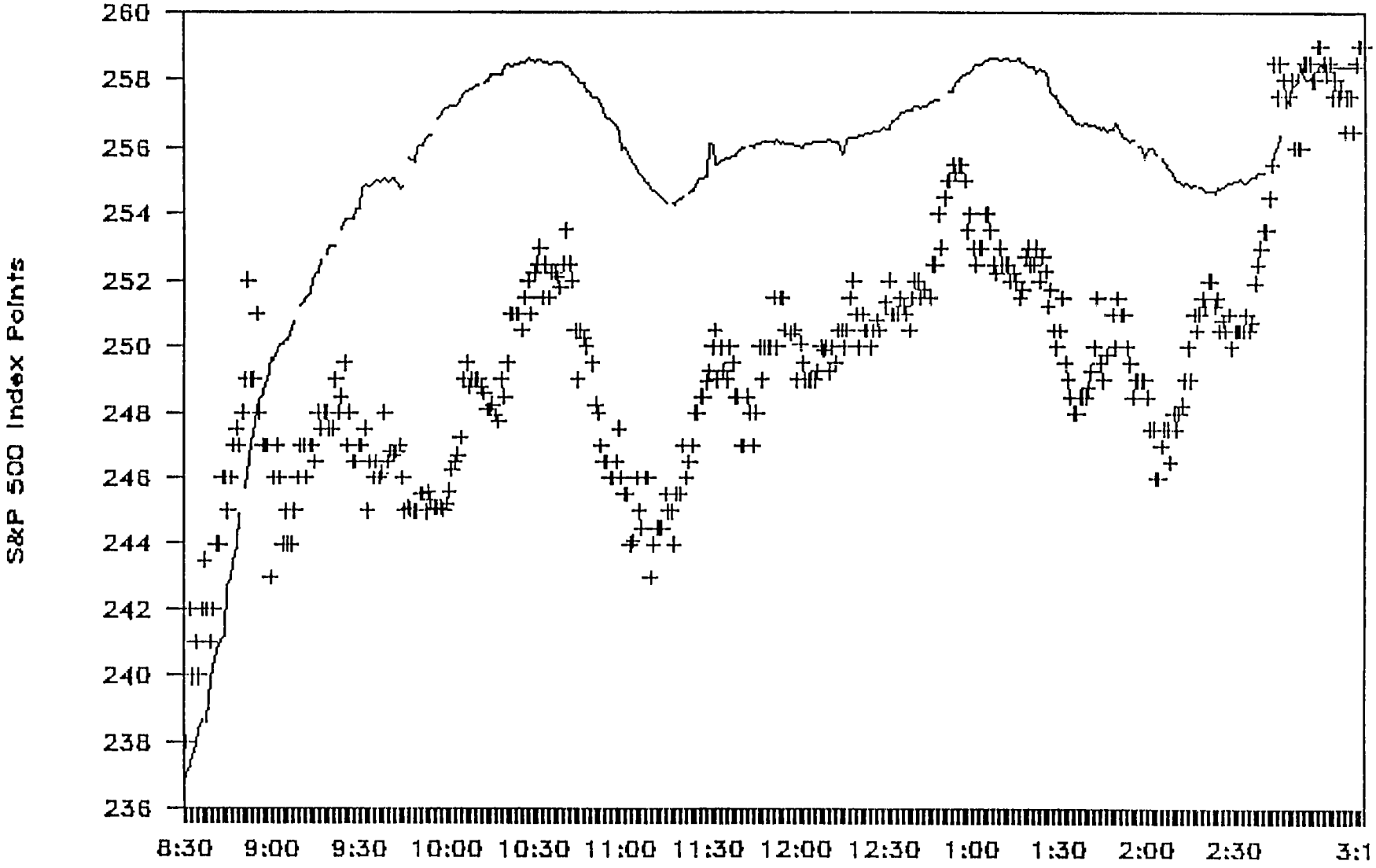


Source: CME and Standard and Poors.

FIGURE C10

S&P 500 FUTURES AND STOCK INDEX PRICES

Wednesday, October 21, 1987



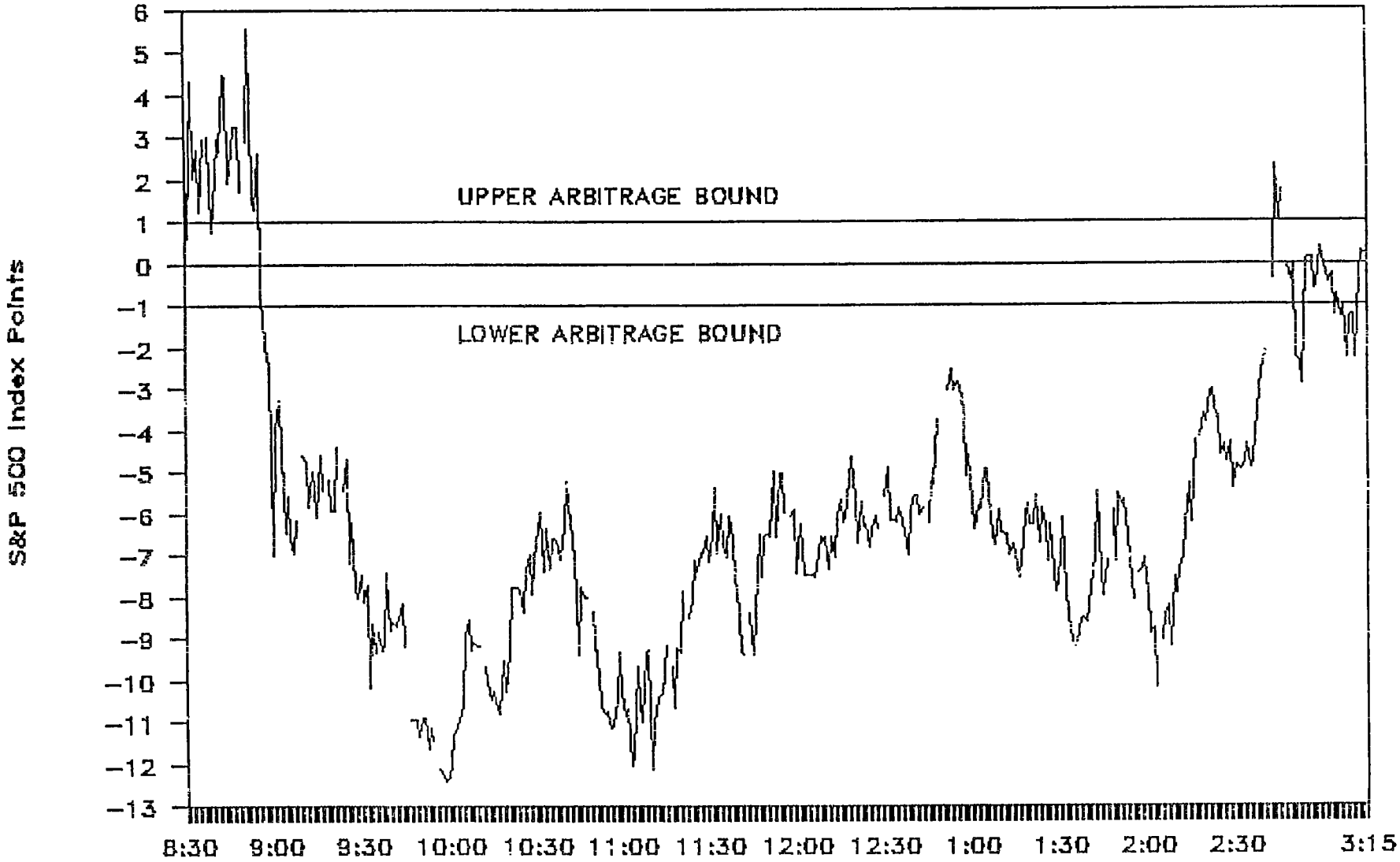
Source: CME and Standard and Poors.

—— Stock Index + December Futures

FIGURE C11

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Wednesday, October 21, 1987

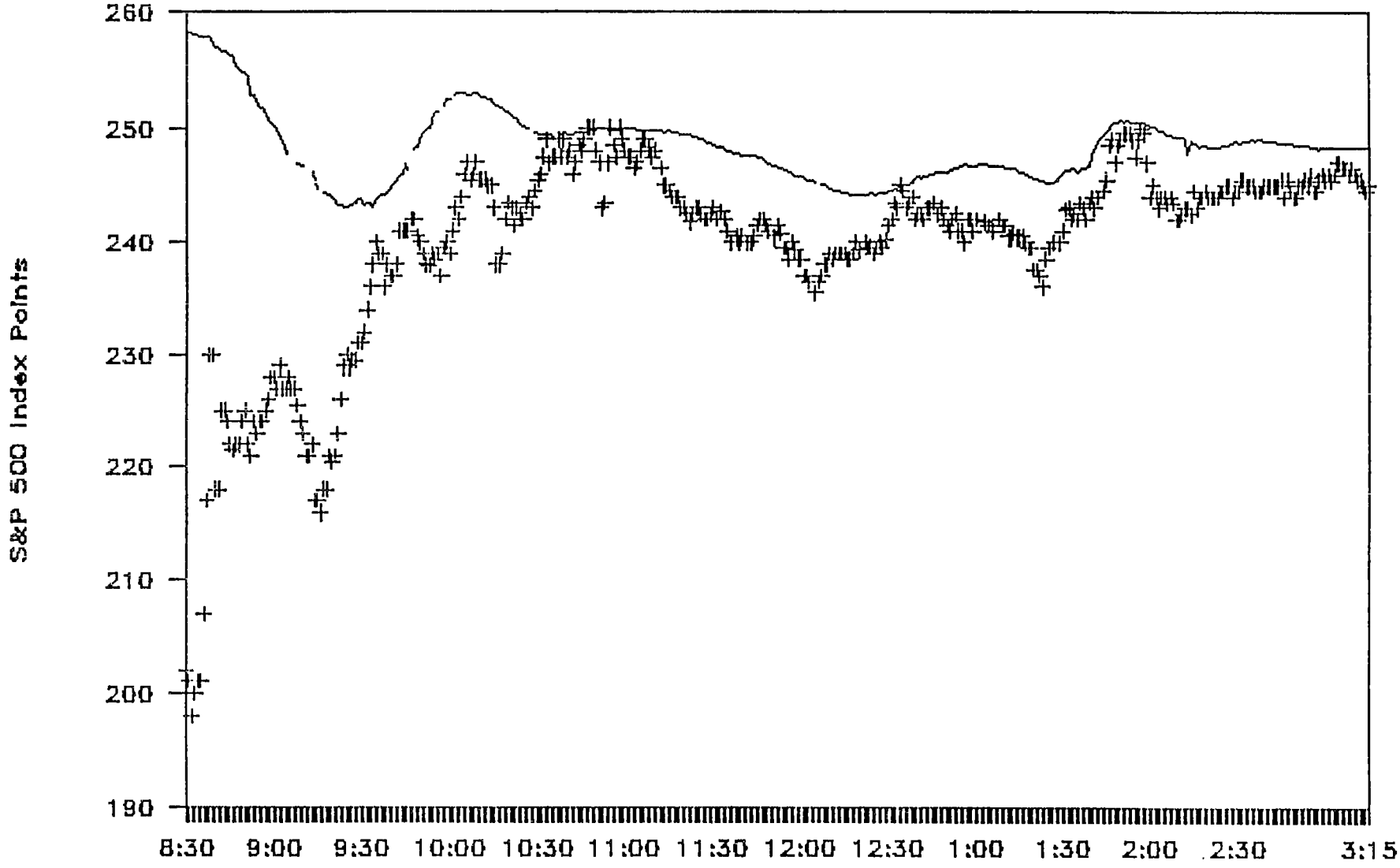


Source: CME and Standard and Poors.

FIGURE C12

S&P 500 FUTURES AND STOCK INDEX PRICES

Thursday, October 22, 1987



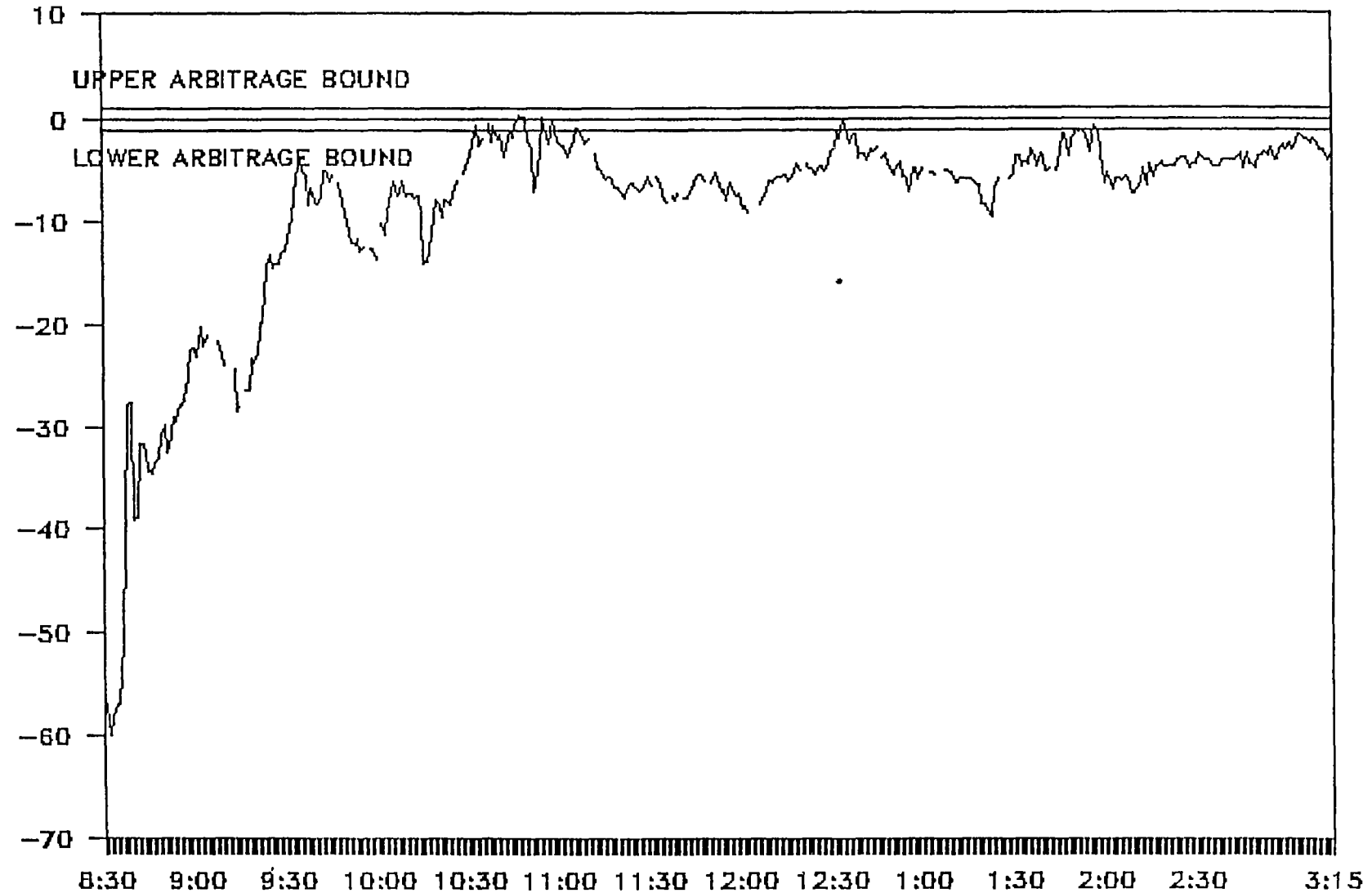
Source: CME and Standard and Poors.

—— Stock Index + December Futures

FIGURE C13

S&P 500 FUTURES VALUE MINUS FAIR VALUE

Thursday, October 22, 1987

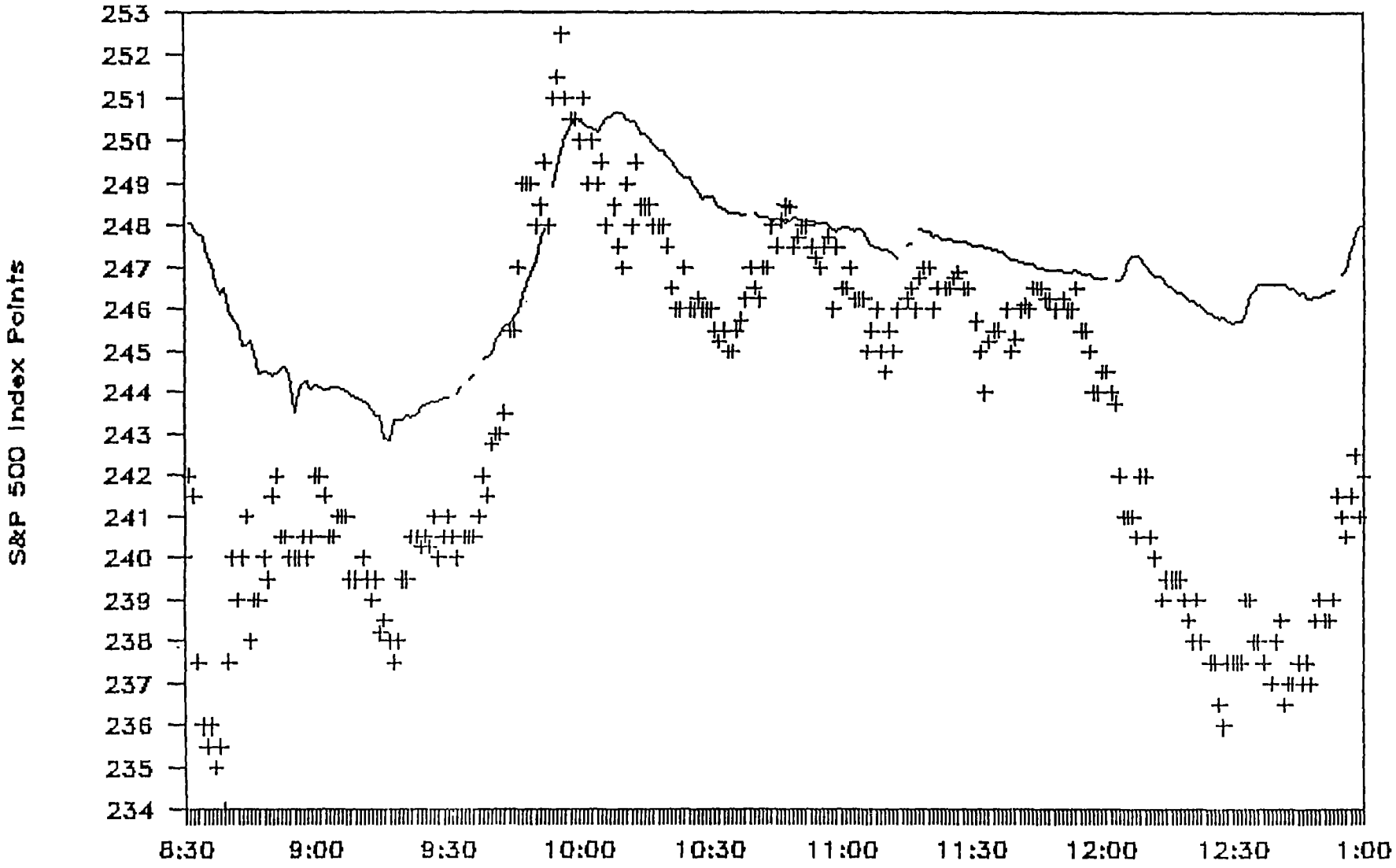


Source: CME and Standard and Poors.

FIGURE C14

S&P 500 FUTURES AND STOCK INDEX PRICES

Friday, October 23, 1987



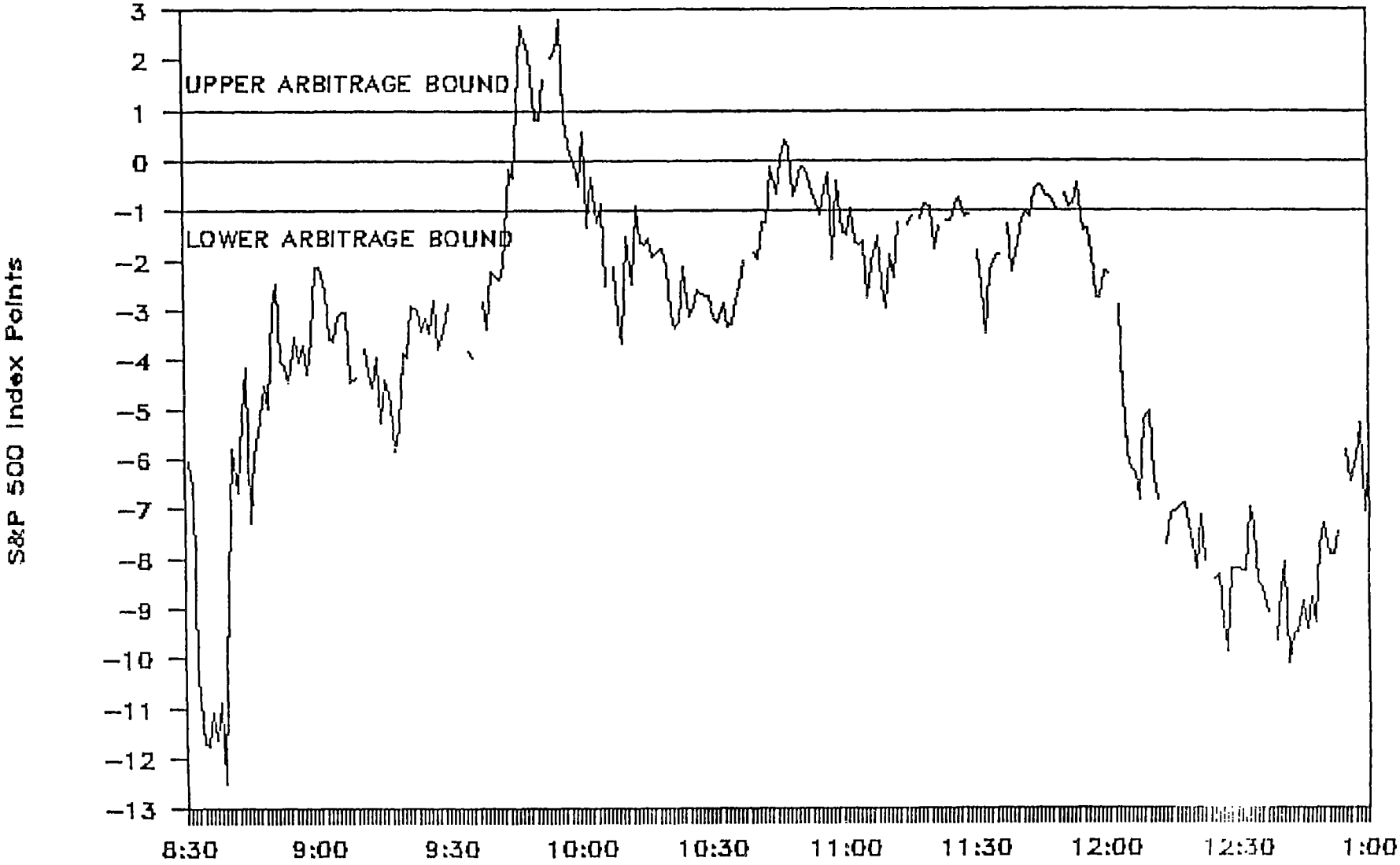
Source: CME and Standard and Poors.

—— Stock Index + December Futures

FIGURE C15

S&P 500 FUTURES VALUE MINUS FAIR VALUE

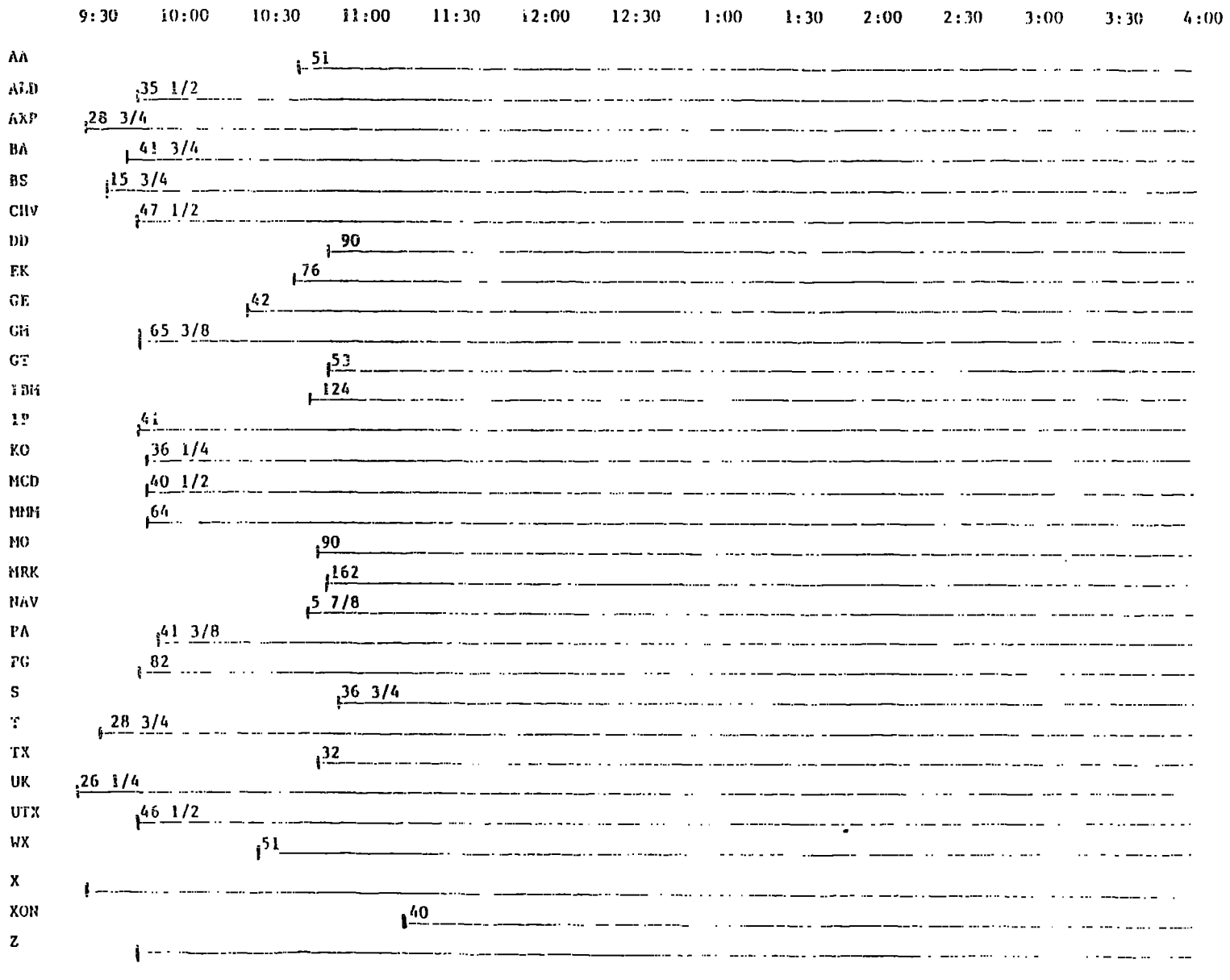
Friday, October 23, 1987



Source: CME and Standard and Poors.

FIGURE C16

NYSE TRADING PERIODS FOR DOW JONES INDUSTRIALS*
OCTOBER 19, 1987

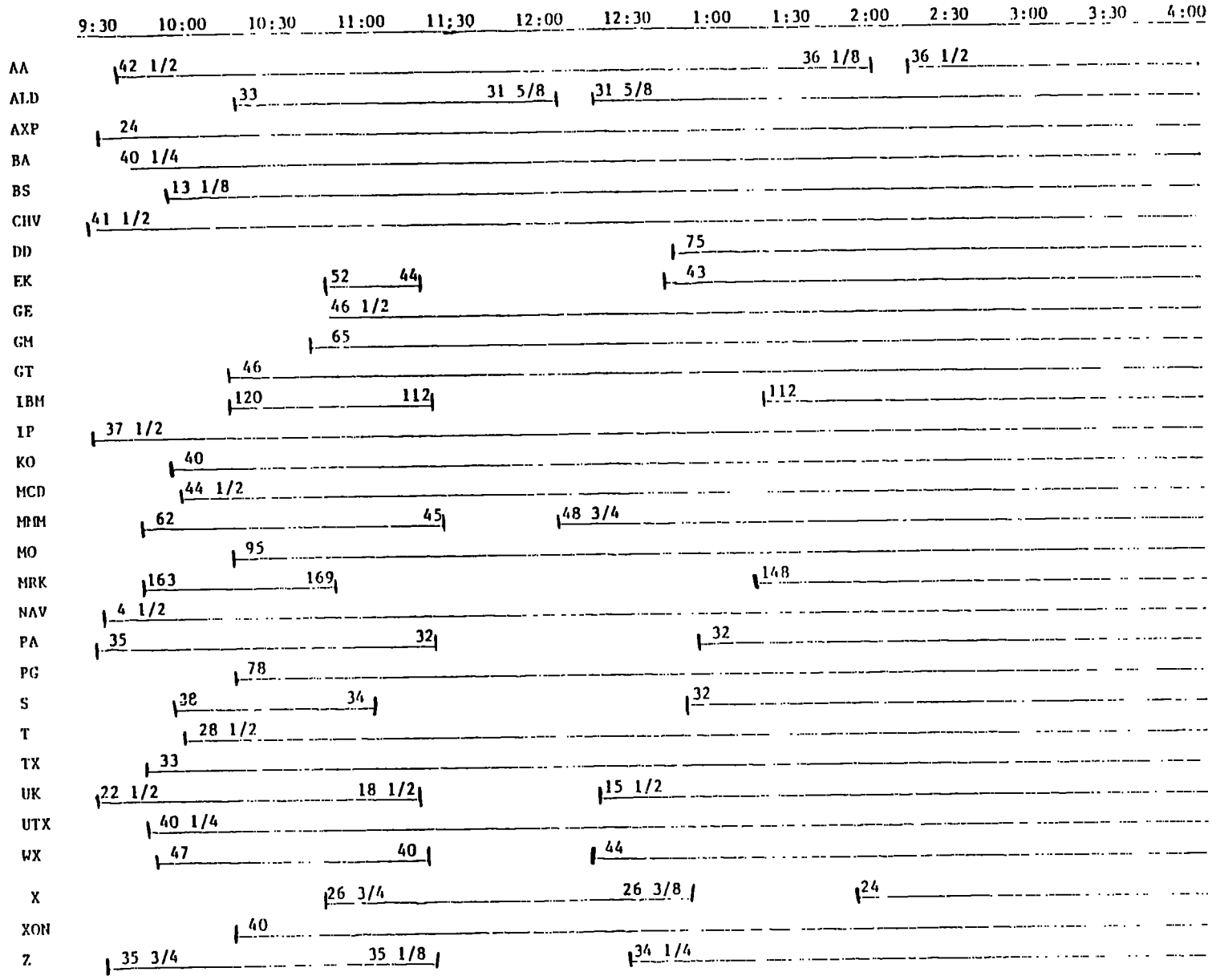


* Only gaps in excess of 10 minutes between sales. Numbers are prices when trading commences or ceases.

Source: F. E. Fitch, Inc. (New York Stock Exchange)

FIGURE C17

NYSE TRADING PERIODS FOR DOW JONES INDUSTRIALS*
OCTOBER 20, 1987

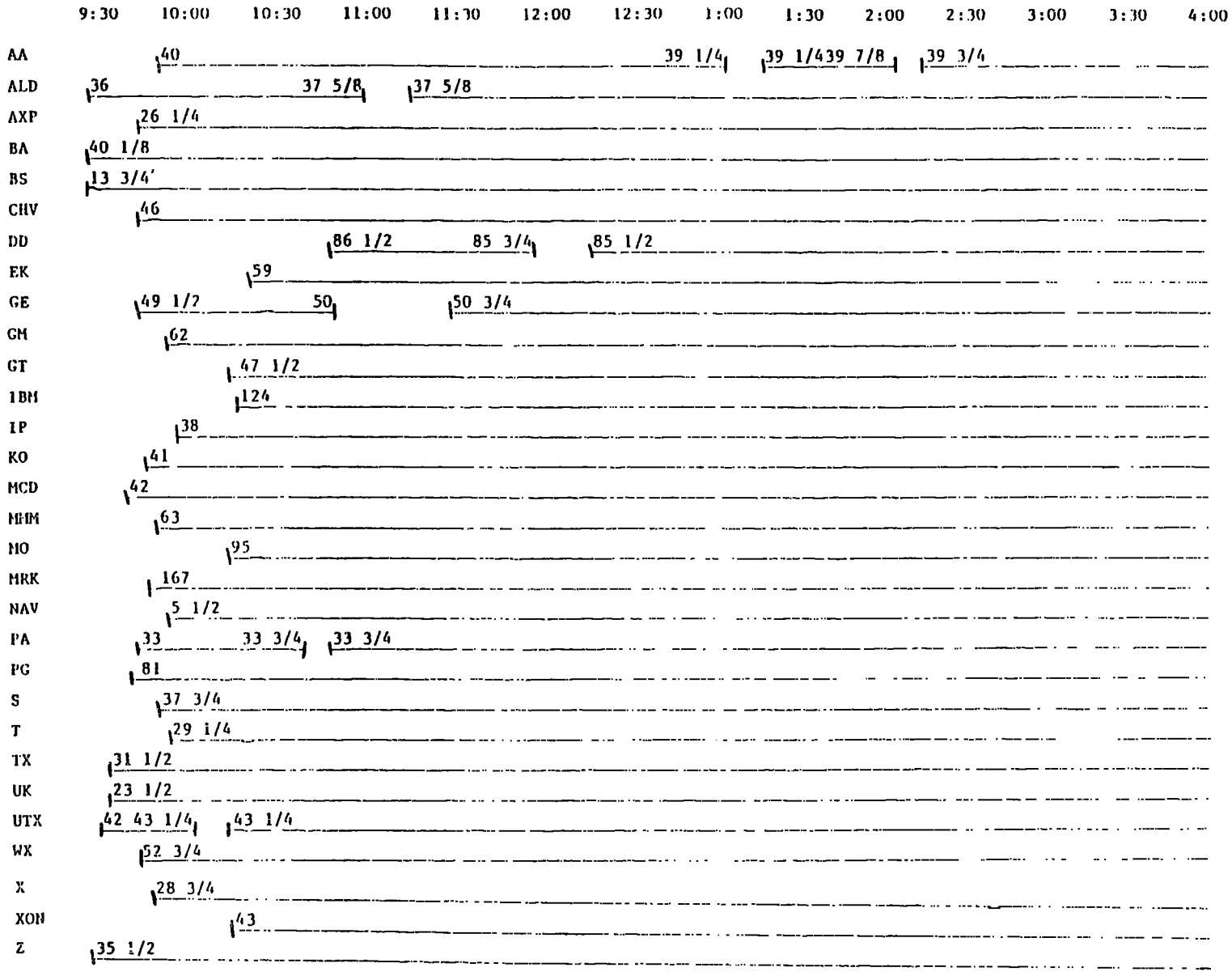


* Only gaps in excess of 10 minutes between sales. Numbers are prices when trading commences or ceases.

Source: F. E. Fitch, Inc. (New York Stock Exchange)

FIGURE C18

NYSE TRADING PERIODS FOR DOW JONES INDUSTRIALS*
OCTOBER 21, 1987



* Only gaps in excess of 10 minutes between sales. Numbers are prices when trading commences or ceases.

Source: F. E. Fitch, Inc. (New York Stock Exchange)

FIGURE C19

APPENDIX D

CME Emergency Authority

The futures market is regulated by rules and regulations adopted by the various exchanges on which futures trading is conducted pursuant to the Commodity Exchange Act, 7 U.S.C. § 1 et seq., and subject to the oversight of the Commodity Futures Trading Commission ("CFTC"). The Commodity Exchange Act ordinarily requires that any rule change of significant economic consequence by an exchange be subjected to public comment and be approved by the CFTC.

The Act and the regulations promulgated by the CFTC thereunder, however, allow an exchange "in an emergency as defined by the Commission" to adopt rules on a temporary basis without prior CFTC approval. The Act specifically requires that the emergency action be approved by a two-thirds vote of an exchange's governing board and then only if the exchange immediately notifies the CFTC and provides a complete explanation of the emergency involved.

In addition, the CFTC itself has power to direct an exchange to take such emergency action as the CFTC believes is necessary "to maintain or restore orderly trading" in any futures contract, including, but not limited to, the setting of temporary emergency margin levels on any futures contract and the fixing of position limits.

The CFTC has adopted extensive regulations implementing the powers granted it under the Act, including rules defining emergencies and delineating procedures for implementing temporary emergency rules.

The normal oversight of the CFTC over futures markets, however, does not extend to margin requirements on futures contracts. The exchanges may adjust margin levels without any approval by the CFTC and, in normal market conditions, the CFTC lacks authority to direct changes in margin requirements. Congress on at least four occasions has considered and rejected allocating to the CFTC oversight responsibility for margins on futures contracts. Congress has determined that it is appropriate to allow the exchanges to immediately adjust margins in response to market changes without resorting to cumbersome rulemaking procedures.

APPENDIX E

Margin Requirements

Margin Requirements in the Futures Market

Margin requirements in the futures market differ fundamentally from margin requirements in the cash market, reflecting the different nature of transactions in the two markets. In the cash market, the customer purchases securities and becomes obligated to pay the entire purchase price of the securities. Federal regulations allow a customer to borrow only up to 50% of the purchase price. The requirement that the customer put up at least 50% of his own money for the purchase of securities is known as the margin requirement. Brokers purchasing stock for a customer on margin are making an extension of credit collateralized by stock, for which they charge interest. If the value of the underlying stock declines, the customer is required to put up additional collateral to maintain the 50% margin on the original purchase price.

In the futures market, in contrast, a customer does not purchase securities but rather enters into a contractual agreement to buy or sell a specified amount of a commodity at a specified price by a specified date in the future. Futures contracts on stock indexes typically are used as a device to hedge stock positions in the cash market and generally are liquidated by offsetting futures contracts prior to maturity. The

customer does not acquire title to the underlying securities.

No money is lent by the customer's broker when a futures contract is made. Rather than an extension of credit, margin requirements in the futures market are a form of performance bond insuring that the customer will be able to meet his obligations under the futures contract. Whereas in the cash market only purchasers of securities are required to post margin, in the futures market buyers and sellers of contracts both are required to post margin.

Margins in the cash market are fixed as a percentage of the value of the stock being purchased. Margins in the futures market, in contrast, are not fixed as a percentage of total contract value but rather are calculated to anticipate potential market moves. This difference reflects the different function of the two markets. Whereas equity markets exist to facilitate the transfer of ownership of corporate stock, the index futures markets exist to provide insurance against price fluctuation in the equity sector as a whole. Accordingly, futures margin requirements are established on the basis of analysis that gauges current market volatility and are generally set at a level sufficient to cover at least one day's price movements. Historically, this level has not exceeded approximately

10% of the value of the underlying futures contract. The risk management function of the futures market is characterized by, and depends upon, a low transaction cost in an efficient market.

Margin requirements are established by the exchanges on which futures contracts are traded and apply both to clearinghouse member firms and their individual customers. When a customer purchases or sells a futures contract, the customer is required to pay an "initial" margin, currently $20,000 in the S&P contract if the customer is a speculator or $15,000 if the customer qualifies as a hedger. Initial margin levels are set by the exchange at a level that reflects market volatility and are frequently adjusted by the exchange on the basis of market changes.

In addition, the customer's broker may require the customer to pay additional "excess" margin based on the customer's financial capability and relationship with the broker. The amount of "excess" margin that may be charged to a customer is not regulated by the exchange and may vary on a customer-by-customer basis from firm to firm.

When a customer initiates a new position through a broker, then the exchange requires the clearing member or brokerage firm to collect the initial margin amount and to deposit with the exchange clearinghouse a

maintenance margin amount, currently $15,000, for each contract purchased or sold. In addition, the clearing firm retains any margin collected from its customer above the required amount. Margin serves as a performance bond for the trader's obligations under a futures contract. Margin constitutes a deposit and may be satisfied by cash, government securities, or irrevocable bank letters of credit.[1]

"Variation" margin is the means by which the clearing firm's account with the clearinghouse is adjusted daily to reflect the results of trading. If a firm's account suffered a net loss as a result of a favorable market movement on a given day, a "variation collect" is collected from the clearing firm by the clearinghouse, which in turn makes a "variation pay" to clearing member accounts that profited as a result of the market's movement.[2] Variation margin is not deducted from a clearing firm's original margin deposit, which remains on deposit as a performance bond, but

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[1] Different original margin requirements apply to different types of traders. As noted, margin requirements for speculators generally are higher than those for hedgers and floor traders. This differential reflects the recognition that futures trading by a hedger generally will be balanced by increases in the value of futures contract positions offsetting losses in opposite cash market positions.

[2] The payments actually take place through settlement banks at the direction of the clearinghouse.

rather must be paid in cash, generally by 7:00 a.m. on the next trading day. During periods of extreme volatility, the clearinghouse may make intra-day margin calls requiring member firms and their customers to deposit substantial amounts of additional funds immediately or else face liquidation of their accounts. A clearing firm that fails to pay variation margin at any time may have its accounts liquidated and its membership in the clearinghouse terminated. The daily "mark-to-market" system ensures that all losses and gains on futures positions are paid daily. Thus, after daily settlement there is no credit in the futures trading system.

A futures customer is subject to maintenance margin requirements set by the exchange which in effect pass through to the customer the clearing firm's variation margin requirements. A margin call will be issued by a broker to a customer whose account equity falls below the maintenance level, usually around 75% of initial margin levels. A margin call requires the customer to deposit sufficient funds to pay any losses not covered by the customer's excess margin. At any time that the customer's account equity falls below the maintenance level, the customer must restore the initial margin to 100% of the initial margin requirement. The

clearing firm will suffer a charge against its capital if customer funds are not deposited on a timely basis.

The responsibility for setting margin requirements in the futures market has always been lodged with the exchanges and not with any government body, although the Commodity Futures Trading Commission has authority to direct an exchange to set temporary emergency margin levels on any futures contract.

APPENDIX F

Glossary

GLOSSARY

Arbitrage	A strategy designed to create profits through taking matched opposite positions in two investments that have identical payoffs but are trading at different prices.
Bid-ask Spread	The difference between the price currently bid on the exchange floor for the purchase of a stock (or futures contract) and the price currently asked for the sale of that same stock. "Market" orders to buy a stock will be transacted at the asked price. "Market" orders to buy a stock will be transacted at the asked price. "Market" order to sell a stock will be transacted at the bid price.
Cash Market	The market for (immediate) exchange of title of a security or other asset for cash.
Dividend Yield	The dividend income accruing to, say, a portfolio of stocks expressed as a fraction of the stock or portfolio value.
Futures Contract	A standardized agreement to buy or sell a particular asset or commodity at some deferred date.
Index Futures Arbitrage	A strategy that exploits price discrepancies between index futures contracts and the stocks that compromise their underlying indexes. If the futures price is less than its fair value, the arbitrageur will buy futures and sell the stock index. If the futures price is greater than fair value, the arbitrageur will sell futures and buy the stock index. In the process of trying to profit from pricing discrepancies, arbitrageurs force cash and futures prices to their fair value relationship.

Liquidity	The continuity of the order flow and therefore the orderliness of price changes in an asset market. Other things held constant, a market's liquidity rises with its size.
Long Position	The position created through the purchase of a contract.
Marked-to-Market Settlement	The procedure by which all open accounts are debited or credited the cash amount of the change in contract value due to the daily change in the futures price.
Net Cost-of-Carry	The difference between the financing cost and the productive yield of a cash market position over the period ending with the future's expiration date.
Open Interest	The number of contracts entered but as yet neither offset nor otherwise satisfied by a final settlement such as delivery.
Portfolio Insurance	A strategy that attempts to limits risk by selling stocks as the market declines and buying stocks as the market rises.
Program Trading	The popular name given to arbitrage trading between stock index futures market and the cash market in stocks.
S&P 500 Index	An index number that relates the current value of a weighted average of the prices of the stocks that comprise Standard and Poor's list of 500 stocks to that of a historical base period.
Short Position	The position created through the sale of a futures contract or the sale of borrowed stock
Specialist	The marketmaker -- price setter and order flow matcher -- for a stock in the New York Stock Exchange system for stock trading.

Spread	The difference between the prices of two assets.
Transaction Costs	Costs of executing a trading strategy. For the program trader, these costs consist of commissions and the bid-ask spread on the cash stock side and the commission and one-half of the bid-ask spread on the futures side.
Volatility	A measure of the dispersion of possible percentage price changes about their mean value.

SOURCE: John J. Merrick, Fact and Fantasy About Stock Index Futures Program Trading, Business Review, Federal Reserve Bank of Philadelphia, September-October, 1987, pp. 12-25 and CME Research Division.