

Experimental Stock Market Instructions

August 20, 1969

The experimental stock market is designed to simulate under laboratory conditions the trading activity in an actual market environment. The experimental market is conducted in the Management Science Laboratory at the University of California, Berkeley. In this section of the write-up, a general introduction to the experimental market will be given. In the following section, details of play will be discussed.

The Teletypes and Computers

The experiment takes place in a central staging area containing several teletype stations which are linked together by the two PDP computers in the laboratory. The computer-teletype system serves several functions in the experimental market:

(i) It is a source of regular reports on the condition of the "outside world" describing the performance of the firms for which stocks are traded on the market.

(ii) It carries out the accounting for all transactions. Records are kept in the computer of all participants' portfolios, and these are updated as transactions occur. The computer also keeps record of players' cash balances, and accrues dividends and interest to them.

(iii) The computer records players' actions for later study and evaluation.

Participants will be given identifying numbers by which their records are indexed in the computer. Participants will be assigned permanently to teletypes in groups of three.

Sessions

The game is conducted in a series of sessions. Each session begins with a report for the preceding quarter on the condition of the "outside world"

economy" and the operations of the three firms (Firm A, Firm B, and Firm C) for which stocks are traded on the market. Thus one quarter (3 months) nominally elapses in the outside world between sessions.

Each session will take about 20 minutes. A session begins with a series of reports, the Investors Summary Reports, which give all information on the previous trading session and on the outside world.

Then there is a period for reflection, generally 10 minutes, in which the participants (or players) are free to formulate their trading strategy for the session. They may talk among themselves, reviewing the preceding quarter and discussing their expectations as to the future performance of the traded firms and the market. During this period each player prepares two items on the forms provided, the Forecast Questionnaire and the Trading Array. These are prepared in secret, and may not be shown to other players. When the forms are completed, they are deposited in the boxes provided for this purpose at the teletypes. After all players have completed their forms, none may be altered and forms need no longer be kept secret.

Finally, to conclude the session, all players type their Forecast Questionnaire and Trading Array into the computer at the teletype stations to which they are assigned. The computer processes these as described below, and a final decision by the players serving as Stock Specialists completes the session.

Portfolios

Each player holds a portfolio consisting of a certain number of shares of each of the three stocks and a cash balance. At the outset of the game, each player receives 4 shares of each of the three stocks and a cash balance of zero. The players may hold positive or negative amounts of each stock and may have a positive or negative cash balance. A negative amount of a

stock corresponds to a "short position," in which a player profits if the value of the stock declines. Players holding positive amounts of stocks will receive dividends quarterly, while players holding negative amounts of stock will have these dividends deducted from their cash balances.¹ Players with positive cash balances (lenders) will receive interest, paid at the rate of 2% per quarter, while players with negative cash balances (borrowers) will have interest in this amount deducted from their cash balances.

Trading

The primary goal of each player is to increase the worth of his portfolio. This may be accomplished by trading as well as by collecting dividends and interest. The trading arrangement in the experimental market has much in common with the trading arrangements in actual markets, but it seems somewhat more complex at first sight.

Someone buying or selling shares on the New York Stock Exchange through a broker will customarily make an order to buy or sell a certain number of shares. In this case, the customer expects the shares to be purchased or sold at the market price, whatever that may be at the time the transaction is made, and consequently the order is called a market order. For our purposes, all participants are floor traders, and there is no market price until trades have been agreed among the traders. Hence something as simple as a market order is not possible.

¹The reasoning behind the deduction of a dividend in the case of a short holding is as follows: In actuality, a short seller has acquired a negative holding by selling a positive holding to some other player. Thus the short seller has made the commitment to provide all the advantages normally accruing to a stockholder to some other player, but the short seller is unable to deliver a share of stock entitling the buyer to dividends paid by the firm, and hence must meet the dividend payments owed to the buyer. In real markets, a short seller is committed to deliver a share of stock at some later date, but in the experimental market the short seller may continue his negative position for as long as he wishes.

One possible trading arrangement would be to divide the participants into one group who behave as customers and another group who function as brokers. Still another would be to have all players negotiate trades by crying offers aloud, so that whenever any two players meet and agree on a trade the trade is recorded as a transaction. These possible structures may be tried in later experiments, but were rejected on the grounds of excessive chaos.

The trading arrangement which was finally selected is one in which players submit limit orders. A limit order to buy is an order to buy a certain number of shares of a stock at a price at or below the specified limit price. A limit order to sell is an offer to sell a certain number of shares at a price at or above the limit price.

The advantage of this kind of order is that it can be used before the market price is set. If a player submits a buy order of this kind, he is assured that the most he will have to pay for the stock is the limiting price he has set. If the market price is higher, his order will not be put into effect. If the market price is lower, the stock will be purchased for him at that price and he will have obtained a bargain, since he was prepared to pay the higher limiting price.

Players are allowed to submit both a buy and a sell order for a stock at the same time. This permits the player to bracket the value which he feels is the present "true" value of the stock. To give a specific example, the trading order which a player submits concerning each stock consists of:

(1) an offer to sell x_1 number of shares at the highest possible price, but in no case at a price which is lower than p_1 dollars,

(2) a request to buy x_2 number of shares at the lowest possible price, but in no case at a price which is higher than p_2 dollars.

Suppose that a player feels that a stock is worth \$210, and that he presently holds one share of the stock. He might then submit the following trading order:

Sell		Buy	
x_1	P_1	x_2	P_2
3	215	3	205

In this order, the player has bracketed his evaluation of the stock's worth with buy and sell orders. His order to sell will come into effect only if the market price turns out to be at least as high as 215, in which case he will sell 3 shares at the market price, thus realizing a gain (in his view) of \$5 per share or more, and ending the session with a 2 share short position. Conversely, his buy order will go into effect only if the market price is lower than \$205, in which case he will buy the shares at a bargain price (in his view) of \$5 or more below the stock's worth, and will hold four shares of the stock at the end of the session.

This procedure allows each player to "make a market" in each stock, for each player can estimate the stock's true worth and then offer to sell shares of the stock at a somewhat higher price and buy shares at a somewhat lower price. The players can, if they wish, offer to buy or sell up to 5 shares in each session. There is no other restriction, other than common sense, on the number of shares which a player may buy or sell, for any player may borrow as much cash as needed for purchases at a fixed interest rate, and may sell short an unlimited number of shares without penalty.

A player may submit a buy order only or a sell order only or no order at all on a stock. If he wishes to omit any order, this is done by typing zeros in the spaces provided for quantity (x) and price (p). However, players are encouraged to submit both orders on all stocks for two reasons.

Firstly, a larger number of orders will result in a more active and interesting market. Secondly, players can only profit from an accurate assessment of a stock's value by submitting orders which exploit deviations of the market price from this assessed value. In fact, the more accurately a player can assess the correct value of a stock, the greater is the probability that he can realize a profit by using limit orders. A more accurate value assessment allows the spread between the buy and sell limit prices to be reduced, thus increasing the probability that the market price will permit a profitable transaction. The decision to be made here in determining trading strategy is similar to that which must be made by any dealer who "makes a market" for goods; an example of a market made up of such dealers is the Over the Counter Securities Market.

Returning to the trading arrangement in the experimental market, each participant secretly prepares a trading array, consisting of a buy and sell order for each of the three stocks, and deposits this in the box provided at his teletype station. When all forms are complete, participants withdraw them and type them into the teletypes as described below. The order in which players submit trading arrays is immaterial. All trading arrays are then collected in the central computer and processed.

In order to explain the processing of the trading arrays, it is necessary to introduce the concept of an excess demand function. The excess demand function gives the net difference between the number of shares for which there are effective buy orders and the number of shares for which there are effective sell orders. The best way of clarifying this is by an example:

For simplicity, suppose that there are only two players in the market, and that they submit the following orders for one stock:

	Sell		Buy	
Player I	3	215	3	205
Player II	2	204	5	200

At a price of 200 or smaller, both buy orders will be in effect; no sell orders will be in effect, and the excess demand will be

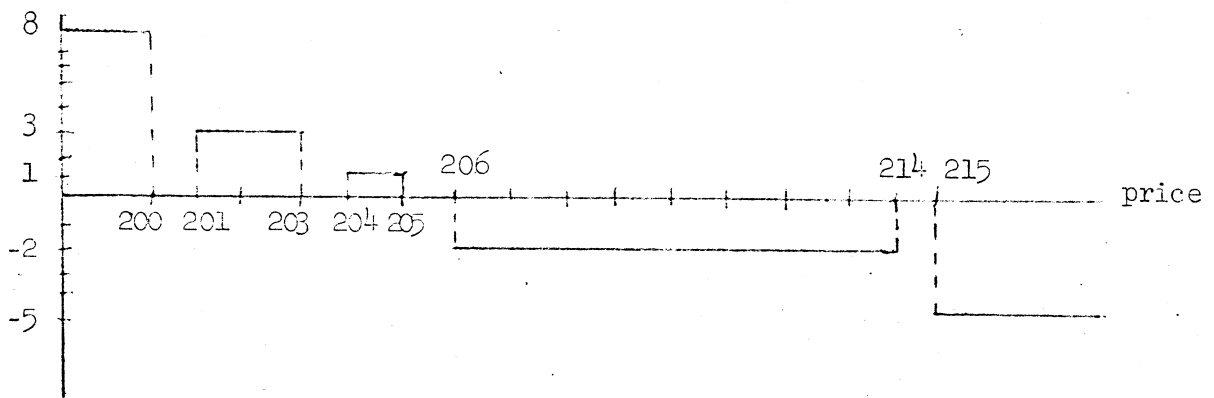
$$(\text{effective buy orders}) - (\text{effective sell orders}) = (3+5) - (0) = 8$$

At 201, the limit price for the second player's buy order has been passed. At prices of 201, 202, or 203, only the first player's buy order is effective, and neither of the sell orders is effective, so the excess demand is 3.

At 204, the limit price for the second player's sell order has been reached, so the first player's buy order and the second player's sell order are effective. Hence the excess demand is $(3) - (2) = 1$. This situation continues at the price of 205.

At 206, the remaining buy order limit is passed, and excess demand shifts to $(0) - (2) = -2$. This level of excess demand continues until the remaining sell order comes into effect at 215, where excess demand changes to -5.

The excess demand function may be graphed as follows:



Notice that at prices of 204 and 205 a transaction may take place. However, at no price is the amount of excess demand equal to zero, or in more familiar terms, at no price is the market cleared. However, the market would be cleared if some additional participant met the excess demand by selling one more share at either of these prices. Similarly, the market would be cleared if an additional participant entered the market and bought two shares at any price between 206 and 214.

In this experimental market, as on the New York Stock Exchange, this role of final agent in clearing the market is played by the Specialist. One of the players will be designated specialist for each of the three stocks. Since the computations involved in developing the excess demand function are time consuming, they are carried out inside the computer. The teletype at which each specialist is stationed then prints out the excess demand function for his stock.

The whole excess demand function is not printed, but rather only the six steps of the excess demand function at which the excess demand is smallest in absolute magnitude. For each step, the specialist is given the most advantageous choice: For instance, in the two player example above, the step corresponding to excess demand of +1 is at two prices, 204 and 205. Since the specialist must clear the market at this step by selling one share, the more favorable price for him is 205. Thus one entry in the output to the specialist would state that at a price of 205 he may clear the market by selling one share. The next entry would state that at a price of 206 (the most advantageous buying price for the next step), he may clear the market by buying 2 shares.

Since there are only five steps on the excess demand function in this example, all would be outputted as choices to the specialist:

Price	Transaction
200	Sell 8
203	Sell 3
205	Sell 1
206	Buy 2
215	Buy 5

The specialist must choose one of these available options. The price he chooses becomes the market price, and all buy and sell orders which are effective at that price (including the specialist's own transaction) are carried out. In the example above, if the specialist selects 205 as the market price, Player I buys three shares at this price, Player II sells two shares at this price, and the specialist sells one share at this price. The players' cash balances are debited or credited accordingly.

One detail can be mentioned now: the specialist submits buy and sell orders only on the two stocks other than his own. A trading order for his own stock would be pointless, since he will always have the same and better trading opportunities at the later time when he reviews the excess demand function. The specialist's position is an advantageous one. He will always be presented with several choices, and among them will be one or the other of the following two opportunities:

- (i) do nothing, or
- (ii) either buy a certain number of shares at price p_1 or sell a certain number of shares at price $p_1 + 1$.

A moment's reflection will show that this insures that the specialist will never be forced to make a transaction which he expects to result in a loss, regardless of his view as to the correct price of the stock. Moreover, the discretion given to him to make his decision after all other players

have committed themselves to offers is a great advantage if combined with a careful assessment of the stock's value.

This completes the discussion of the trading arrangements. Players will become familiar with them rapidly.

Forecast Questionnaires

In order to study more carefully the workings of the experimental market, the designers have also requested players to submit questionnaires describing their forecasts as to certain aspects of one stock's behavior. The experience of preparing these forecasts should be helpful to participants, for accurate forecasting of the requested items is an important step in correctly valuing the stock.

Specifically, each participant is asked to prepare a forecast for four aspects of some one stock (usually Firm A). The forecasts to be prepared in the t^{th} session are:

(i) Short term price forecast--the market price in the following session (session $t + 1$).

(ii) The long term price forecast--the market price four quarters hence (session $t + 4$).

(iii) The short term dividend forecast--the average quarterly dividend over the next four quarters (sessions t through $t + 3$).

(iv) Long term dividend forecast--the average quarterly dividend for the year commencing four years from the present quarter (sessions $t + 16$ through $t + 19$).

For each of these four entries, the participant is asked to forecast an expected value (the value which he expects on the average to occur), and a standard error or deviation (a measure of the uncertainty which he feels is attached to his forecast). These two numbers are needed to describe roughly

the individual's expectations as to the behavior of the forecasted variable.

Since players may be somewhat unfamiliar with the use of an expected value (a mean) and a standard deviation to describe the probabilities associated with an uncertain event, a brief discussion will be helpful:

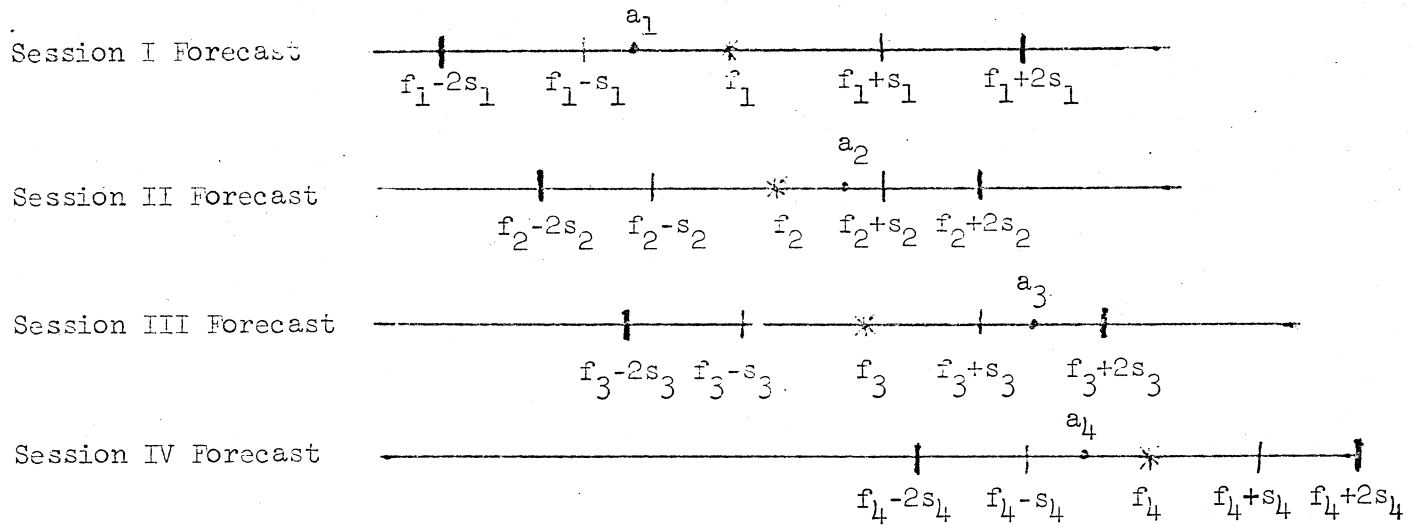
The mean value for the forecasted variable is the value to be expected on the average. The standard deviation is a quantity measuring the degree of variability of the forecast variable around its expected value. A rough guide for choosing the standard deviation to attach to a forecast, which will suffice for the purposes used here, is that the standard deviation should be chosen so that:

(i) roughly 50% of the time the actual variable will fall within 1 standard deviation of the forecasted value,

(ii) roughly 95% of the time the actual variable will fall within 2 standard deviations of the forecasted value.

(The variability of forecast errors is such that both of these conditions can hold once.)

At first, these rules may be difficult to apply, for most people are unaccustomed to providing a measure of the reliability of their forecasts. However, the players can learn to apply them fairly quickly if they review past forecast errors. For example, suppose that the first four price forecasts f , actual values of the prices for which the forecasts were made a , and standard deviations of forecasts s lead to the following graphs:



The asterisks mark the forecast, the points mark the actual value which was observed, the light vertical bars mark the boundaries of the regions determined by the specified standard deviations within which the actual value is expected to fall 50% of the time, and the heavy vertical bars mark the boundaries of the region within which the actual value is expected to fall 95% of the time. In this case, the actual value fell within the narrower intervals 75% of the time and within the wider intervals 100% of the time, indicating that the player has probably set his standard deviations at slightly too large values.

Players are encouraged to keep track of their errors in a fashion akin to this, with a view to understanding the character of forecasting errors which tend to be made. Notice that changes in price and in dividends are crucial determinants of the profitability of holding stocks, so that the ability to forecast these is a major factor in successful stock market trading. In view of this, players will be rewarded at the end of the game both for increases in the worth of their portfolios and for successful forecasting.

The Outside World

The figures on the outside world which are announced at the beginning of each quarter (GNP, the interest rate on top quality corporate bonds, and

earnings, dividends, sales, and operating margin for the three firms) are designed to follow realistic patterns. In attempting to forecast firms' future performance, participants will be most successful if they view the firms as actual firms in an industrialized economy similar to our own over the last two decades. Do not attempt to spot patterns which are identical to historical patterns in the U.S. economy, or any other economy for that matter, for there will be none. A model of the process determining aggregate economic variables and of the microeconomic processes which relate the performance of individual firms to aggregate economic activity has been constructed and simulated to generate "outside world" reports. The model appears to be highly realistic, so players who treat these outside world reports as relating to an actual economy should be the most effective forecasters.

Miscellany

In order to aid players in evaluating the stocks, a history of the most relevant information is collected in compact form on an extra teletype, called the Report Teletype. The detailed histories originally outputted on the other teletype stations will also be available, but these are somewhat more cumbersome to use.

Because of the nature of calculations within the computer, stock prices must be kept within a reasonable range. If a closing price falls below 200 or rise above 650, the stock will automatically be reverse split, 1 for 2, or split, 2 for 1, and all portfolios will be appropriately adjusted.

As the experiment is normally constructed, there are no restrictions on the amount of borrowing and short selling which a player may do.

Occasionally, a leverage check will be instituted in which the player will be penalized if the net worth of his holdings falls below an announced proportion of the sum of the absolute values of his holdings.

End of the Game

At the conclusion of the last quarter, the worth of players' portfolios will be totaled. However, the prices that will be used to value the stocks will not be the closing prices on that quarter's market. Instead, stocks will be valued at their "true value," in that the future stream of dividends from each stock (which is known to the game's designers) will be discounted according to the prevailing interest rate, with an adjustment for the future dividends' uncertainty (a risk premium).

This procedure may seem strangely roundabout, but a moment's reflection will indicate that the other alternative, to value the stocks at the last quarter's closing price, would be equivalent to allowing all players to sell their stocks at the price which is reached by trading in the final quarter. In this circumstance, the player with the largest holding of any stock would attempt to buy more of that stock at the highest possible price since all stocks held would then be "resold" at that same high price. This would result in a chaotic final session, to say the least. In order to avoid distortion of the last sessions, and to reward sound stock evaluation, the rule to value stocks according to their future dividend stream, appropriately discounted, has been adopted.

Players will be rewarded according to the final value of their portfolios and their success on the forecast questionnaires: 70% of the reward will be based on portfolio value, 30% on the accuracy with which forecasts and forecast standard errors were recorded on the questionnaires.

A DETAILED DESCRIPTION OF PLAY

I. Investors' Summary Reports

First an "outside world report" is printed on all teletypes. It consists of the following: the national economy's latest quarter G.N.P. and the prevailing interest rate; quarterly reports for the latest quarter for the three firms, giving gross sales, operating margin, earnings per share, and the dividend paid per share. The format is as follows:

OUTSIDE WORLD REPORT

GROSS NATIONAL PRODUCT = 129 BILLION

INTEREST RATE = 0.063

QUARTERLY STATEMENTS

FIRM	G.S.	OMRG	E/SH	D/SH
A	100	0	352	64
B	41	0	71	30
C	3547	0	0	8

Gross sales is in units of millions of dollars. Operating margin (cash flow/gross sales) is a pure number, given in tenths of a percent, and is reported only every fourth quarter (in the annual report). Earnings per share and dividends per share are in cents. The closing price and trading volume for all stocks in the previous trading session are then announced in a market report.

MARKET REPORT

FIRM	P.L.	T.M.
A	3.5	7
B	3.74	13
C	5.12	17

Following these three reports, printed identically on all teletypes, the present portfolios of the three players assigned to each teletype are printed on that teletype only.

PLAYER PORTFOLIO REPORT

PLAYER	*****SHARES*****			CASH
	A	B!	C	
1	330	29	19	\$6,231
2	7	29	29	-\$5,840
3	5	9	29	-\$6,140

II. A Digression on Teletype Use

The following comments on teletype use may be helpful. For the purposes of this game, each teletype on-off switch must be set for "on line" operation, thereby linking the teletype to the laboratory computers.

While the computers are outputting messages and reports the teletype keyboard should not be used, since characters typed may be superimposed on the output. The teletype prints each message one line at a time, proceeding immediately to the next line when a line is finished. After requesting a player's input, the teletype will rest and wait for the player to respond.

While a teletype keyboard is similar in many respects to a typewriter keyboard, a teletype has no backspace key, nor is it possible to erase what is typed. For these reasons two characters, an "up arrow" (↑) and a "left arrow" (←), are used as standard delimiters for inputs to the computer. An "up arrow" is typed by holding either shift key down while striking the letter "N", and is used to culminate a numerical input. Similarly, a "left arrow," typed by holding the shift key while striking the letter "O", is used to "delete" or "erase" the string of characters that precede it.

To transmit a number (one or more characters) to the computer, wait until the teletype is standing idle, then type the entire number followed by

either an "up arrow" to allow the computer to process the number, or a "left arrow" to "erase" the number. Upon receiving either delimiter, the computer will re-position the teletype for the next input or the corrected input. Characters typed before the computer is ready to accept a player's input will be ignored by the computer. The computers control the spacing and positioning of the teletype: pressing any of these control characters on the keyboard may result in an "error" message. Integers and the two arrow delimiters are the only teletype characters that the players will use while inputting numbers.

To begin the game, each teletype is activated by typing an "up arrow." An "up arrow" response is required after each and every inputted number, such as player identification numbers and numbers in the forecast and trading arrays. An "up arrow" is also used as a signal to the computer at several points as indicated below.

III. Period for Reflection

Following the investors' summary report, the players will be given time to study the reports and prepare their forecasts and trading arrays. The time limit on this period is set prior to the game, usually to ten minutes. This waiting period may be terminated by an "up arrow" on any teletype, if all players have completed their forecast and trading array forms. A bell will sound and a slash \oslash will be typed on each teletype when the period is half over. When one minute remains in the period two bells will sound and a second slash appear. At this time, all players should be completing their forecast questionnaires and trading arrays. When time expires the teletype will request the first forecast questionnaire by typing the message "player number."

IV. Inputting Forecast Questionnaires

To insure secrecy, no player should enter his forecast questionnaire until all players have completed these and have placed them in the boxes provided at the terminals.

The three players assigned to each teletype may input their forecasts in any sequence, However, only the players assigned to a teletype station may use that station. After the player number request, a player types his identification number, immediately followed by an "up arrow." If there are less than three players assigned to the teletype during a particular game session, an asterisk (*) is typed in place of the absent player's identification number and "up arrow" delimiter, causing the player's questionnaire to be skipped.

Each player's forecast questionnaire will follow an "up arrow" delimiter after the player's identification number. The questionnaire inputted must be the same as that written previously. It appears in the following format:

FORECAST QUESTIONNAIRE FOR STOCK A.

PLEASE SUBMIT FORECASTS.

PLAYER NUMBER *

PLAYER NUMBER 3†

FORECAST	MEAN	S.D.
S.I. DIV.	49†	9†
L.T. DIV.	55†	15†
S.T. PRICE	500†	50†
L.T. PRICE	485†	INPUT ERROR
	485†	
	455†	40† INPUT ERROR
		40†
		55†

First the mean, and then the standard deviation for each forecast variable are inputted, each immediately followed by an "up arrow" to signal the close of the entry. Dividends are forecasted in cents per share. Prices are given in dollars. Standard deviations for each variable are in the same units as the variable.

Since the computers are 12 bit machines, any number larger than 4095 will not be accepted. Any combination of integers and non-integer characters (letters, decimal points, commas, etc.) is illegal. Hence, decimal numbers cannot be used. (Also negative numbers are illegal.)

For example, to input a dividend forecast of \$15.30 per share, "1530 ↑" is typed. \$.70 per share is inputted as "70 ↑." Similarly, a price of \$400. is "400 ↑." Only prices to the nearest dollar are considered.

After the third player has completed his forecast questionnaire, all three players will be asked to verify that their proceeding forecast arrays have been correctly typed. Each player will type the words "yes" or "no" when his player number appears. The format looks as follows:

ARE ALL FORECASTS CORRECT?

PLAYER 1 YES
PLAYER 2 NO
PLAYER 3 YES

PLEASE SUBMIT COMPLETE QUESTIONNAIRE AS REQUESTED
PLAYER NUMBER 20

If a player responds "no", the player's entire forecast questionnaire sequence will be repeated, so that he may correct whatever error was made.

V. Trading Session

When all forecast questionnaires are in, the teletypes will request trading arrays. Again, all players' forms should be completed before any player inputs an array to the computer. The trading array format is as follows:

MARKET IS OPEN. PLEASE SUBMIT TRADING ARRAYS.

PLAYER NUMBER 1↑

STOCK	****OFFER****		*****BID*****	
	PRICE	SHARES	PRICE	SHARES
A	300↑	5↑	275↑	5↑
B	350↑	3↑	250↑	4↑
C	300↑	5↑	300↑	5↑

In addition to the character restrictions that applied to the forecast questionnaires, two other limitations are placed on the trading arrays. First, prices cannot exceed 819. Second, only transactions of five shares or less are permitted. (These limitations are necessary to avoid the problems created by a transaction value exceeding \$4095.)

If no bid or offer is to be made, a price of zero is inputted with a corresponding number of zero shares. The computer will interpret either a "0" followed by an "up arrow" or a single "up arrow" as zero. Each specialist will input each of the four trading inputs for his stock as zero, since his position will be determined later. However, a specialist participates as a regular trader on the other two stocks. Any player may elect to make no bid or offer, but complete arrays are desirable, as is explained in the discussion of trading strategy.

Again, as in the forecast questionnaire, an absent player may be bypassed by typing an asterisk after the player number request. Also, a verification of accuracy is made after all three players' trading arrays have been inputted, similar to the check following the forecast questionnaires. Again, each player will type a "yes" or "no" after their player

numbers, with the trading array repeated for those players typing "no."

Finally, the excess demand function is outputted to each specialist. The same procedure of input clarification and rubout are used as before; however, the specialist must select one of the six given alternatives as the market closing price. After each specialist has selected his stock's price, the market is closed, and the next quarter begins.

SPECIALIST EXCESS DEMAND FUNCTION FOR STOCK A.

PRICE	SHARES	OPTION
302	1025	SELL
1538	1021	SELL
1469	1004	SELL
1470	3171	BUY
1535	3188	BUY
3197	198	BUY

*Means specialist
buy at 30 ✓*

MARKET CLOSING PRICE IS 302

MARKET IS CLOSED.

VI. Report Teletype

Since a large amount of information is processed during the course of one trading session, a report teletype is used to collect the most important variables and display them to the players. During the course of the game, a complete record of the economic and market variables is kept at this teletype in compact format, and automatically updated after each trading session. The format of the record is as follows:

107	74	0	40	20	10	50	20	150	30	30
		307	61		480	16		290	12	
110	75	1	40	20	10	50	20	150	30	30
		315	47		470	17		300	20	
110	78	25	30	20	20	70	30	140	20	30
		310	42		475	16		310	45	

Each two lines of the report correspond to one quarter. The lines can be broken into four fields. The first two figures make up the first field and are the G.N.P. and prevailing interest rate levels for the quarter. The quarter number is given beneath these two figures on the second line.

The remaining three fields are identical and correspond to firms A, B and C. The first line of each field shows the gross sales, operating margin, earnings per share and dividends per share of each firm. The second line gives the stock price and, when relevant, the trading volume of each stock and whether a split or reverse split has occurred. Prior to the game, summary reports for the previous twelve quarters will be listed on the report in order to acquaint the players with the recent history of the traded stock. All players may refer to this teletype at any time as an aid in making their calculations for forecasts and trading decisions.

VII. Stock Splits and Reverse Splits

In order to keep stock prices in a reasonable range, if during the course of the game a stock's closing price rises above \$650, a 2 for 1 stock split takes place, with the stock's price falling in half. Similarly, if a stock's closing price falls below \$200 a 1 for 2 reverse split occurs, with the stock's price doubling. Portfolios are adjusted accordingly, doubling

or halving the number held. When an odd priced stock is split or a share holding with an odd number of shares is reverse split, the dollar value of the residue is added to the player cash holdings. Stock splits and reverse splits are announced at all teletype stations if either action takes place.