Price Impacts of Block Trading on the NYSE

by

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1. Introduction

In an efficient market, prices reflect underlying values. This insures the proper allocation of new funds to the most productive areas of the economy. Additionally, individual investors benefit by knowing that prices at which they trade are not subject to forces which have little or nothing to do with the underlying value of the company.

Extensive empirical tests which tend to support the efficiency of the stock market have been carried out in the past.[1] Until recently, however, no tests have been carried out to assess directly the impact of institutional investors on the efficiency of the stock market.[2] The purpose of this paper is to examine the extent to which block trading by institutional investors contributes to or detracts from efficient markets. A block trade can be defined as a transaction involving a larger number of shares than can readily be handled in the normal course of the auction market.

2. Reasons for Price Movements in Individual Securities

(a) Information

In a perfectly efficient market where there are many small buyers and sellers each having equal access to information and where there are no transaction costs, prices of securities change (at any moment of time) only in response to new information[3] about the expected return of the security or about its riskiness or because of a widespread change in investors' risk-return preferences. A new piece of information establishes a new price level for the stock, which tends to be maintained until additional information warrants another price change.[4] In and of themselves, transactions have no discernable effect on market prices since there are many other investors willing to buy or sell small amounts of the security at very close to the prevailing price.

(b) Distribution Effect Due to Different Investor Preferences for a Given Security

In a less ideal market made up of relatively few investors in a particular security, trading may produce a discernable price change if the expectations or preferences of the marginal seller of the security are different from those of the marginal buyer.[5] For example, a large seller may find it difficult to distribute his shares because there is no one willing to hold the number of shares he did at the same price.[6] Stated differently, the equilibrium price of a security may be changed by the actions of large investors.

Empirically, the price change due to this type of distribution effect is distinguished from the price change due to new information by the effect on rate of return. Under the information effect, the expected rate of return after the transaction is different from that before the transaction only if the new information concerns a change in the riskiness of the stock. Under the distribution effect, the expected rate of return must increase in the case of sales to convince less willing buyers to hold the security and must fall in the case of purchases to convince less willing sellers to part with the security.

The distribution effect due to different investor preferences depends not only on the number of investors in a single security but also on the substitutability of one security for another. Willing buyers come not only from investors with new capital but also from investors holding other securities. The existence of a distribution effect of this type implies securities are less than perfect substitutes.[7]

In any short run analysis, distribution effects due to different preferences for a given security are likely to be difficult to observe. The higher rate of return that one would expect to observe in the long run to compensate a buyer for accepting the stock, is unlikely to be large. It will be difficult to distinguish price changes due to new information from those due to changes in preference of the marginal holder solely on the basis of observed rates of return before and after the transaction.

(c) Distribution Effect Due to Short Run Liquidity Costs

In the short run, trading in a less than perfectly efficient market may have a temporary effect on price even if willing buyers or sellers exist. This can occur because of the difficulty (i.e., cost) of finding the willing investors. To the party initiating the trade, liquidity costs can take the form of an explicit commission or a price away from the equilibrium price (lower in the case of sales; higher in the case of purchases).

The commission or price movement compensates intermediaries for their services: (1) Communicating among investors the desire to buy or sell. (finding the "other side.") (2) Inventorying securities when the other side cannot be found immediately. (3) Clearing trades and keeping records.[8]

If transaction costs are not levied separately (as in the case of principal trades in the over-the-counter market), the market price of the security may deviate from its equilibrium value to compensate the dealer, or the party providing the services of the dealer.[9] On a sale by an investor, the security may be sold to the dealer at a price below what the dealer believes to be the equilibrium price. The dealer receives a gain by reselling the security at its equilibrium price, or at some price between what he paid and the equilibrium price. On a purchase, the price behavior is reversed: the dealer sells at a price above equilibrium so that he may receive a gain by repurchasing at a lower price.

Conceptually, the price impact described here is of a different nature from that produced by differences in investor preferences. The latter involves a change in equilibrium price associated with a change in expected rate of return and is not inherently a temporary effect. By contrast, the price impact produced by short run liquidity effects involves a transaction away from the equilibrium price (for small transactions) rather than a change in the equilibrium price. Expected rate of return is altered only temporarily, since the price is expected to return to equilibium fairly quickly.

If the full costs of transacting are levied separately, one need not observe a market price movement as the result of transaction costs.[10] In a free market the dealer that positions stock (or finds another party to position for him) can choose to charge for his services either through a commission or by buying the stock at a different price from that at which it is sold. If commissions are fixed, he can raise/lower effective commissions by buying in at less/more that he sells out.

3. The Data

The New York Stock Exchange (NYSE) collects information on all block trades over 10,000 shares carried out on the Exchange. This information is made public by Vickers and data for a subsample of NYSE stocks covering the period July 1, 1968 to September 30, 1969 are utilized in this study.[11] This subsample contains 225 stocks selected randomly[12] and 177 stocks selected because they have certain characteristics such as being involved in mergers, experiencing large price changes, and the like. The sample of blocks consists of 7,009 blocks in the 402 stocks.[13]

The total sample of blocks is classified in Table 1 by sign of difference between block price and previous trade (tick) and by dollar value.[14] Blocks less than $1 million in value are not used in the analyses described

TABLE 1

NUMBER OF BLOCKS IN SAMPLE
CLASSIFIED BY DIRECTION OF PRICE CHANGE
FROM PRIOR TRADE (TICK) AND VALUE OF BLOCK

	Tick		
Value of Block	Minus	Zero	Plus
Less than $1 million	1830	1626	1354
$1-2 million	603	425	247
$2-5 million	421	171	99
Over $5 million	175	38	20
Subtotal over $1 million	1199	634	366

in this study.[15] This reduces the underrepresentation of high priced stocks in the sample, which occurs because the NYSE definition of a block trade uses a cutoff based on number of shares (10,000 and over) rather than dollar value. By eliminating blocks less than $1 million, only stocks selling for $100 and over are underrepresented relative to the others.

4. Block Trades Classified by Tick

Whether a block is purchased or sold is an ambiguous concept -- there is a buyer and seller in every trade. For this study, blocks are classified into three groups: those that traded below the previous trade price (minus tick), those that traded at a price equal to the previous trade price (zero tick) and those that traded at a price above the previous trade price (plus tick). Detailed analysis of trading by both buying and selling parties in the case of a small sample of blocks indicates that these tick classifications identify quite closely the active and passive sides of a trade.[16] Disscussions with market-makers and institutional traders also tend to support this classification scheme. It is, therefore, convenient and reasonably accurate to think of blocks on minus ticks as being initiated by sellers and blocks on plus ticks as being initiated by buyers.[17] Blocks on zero ticks might be initiated by either side and are not analyzed in detail. The fact that 1,199 blocks traded on minus ticks and only 366 traded on plus ticks substantiates the comment by market professionals that "blocks are sold, not bought."

There are several reasons for separating minus tick and plus tick blocks in the analyses. To the degree that these categories correspond to trades initiated by a seller and trades initiated by a buyer, respectively, both the information and distribution hypotheses suggest that the price effects associated with these categories ought to be in opposite directions, on the average. Combining these categories would obscure the price effect of interest. Furthermore, blocks initiated by a buyer may differ from those initiated by a seller in other respects. For example, blocks are sometimes actively solicited in the course of a merger or takeover situation. In this connection, it should be noted that the sample of stocks used in this study contain more than the normal number of stocks involved in transfers of control.

Perhaps of even more importance is the point that a distribution effect due to liquidity costs may be of much less significance in the case of blocks initiated by a buyer that those initiated by a seller. The reason for this is that, while block positioning firms will frequently buy for their own account a portion of a block initiated by a seller, market makers rarely go short to facilitate a block purchase actively sought by a buyer.[18] On blocks in which a market maker takes no position, there is little incentive for him to attempt to negotiate a price away from equilibrium.

5. Price Effects Within the Day of the Block Trade

Under the distribution hypothesis, prices tend to return (relative to the market) toward their prior levels following a block trade. Thus, prices of minus tick blocks should rise after the block and prices of plus tick blocks should fall after the block. The speed with which prices return distinguishes the liquidity cost version of this hypothesis from the distribution effect due to differences in marginal preferences. The price movement associated with the former version should be of short duration, whereas the latter version should produce a gradual return of prices. Under the information hypothesis, no particular price movement (relative to the market) is expected, on the average, after the block.

For convenience in all the analyses, trading days are numbered with reference to the day of the block trade, which is considered day zero. For example, mean price movement on day +1 for a sample of blocks refers to the average price movement on the first trading day following each block, irrespective of the calendar dates on which the blocks occurred.

The data available for the within-day analyses are the closing price on day -1, the closing price on day zero, the price of the last trade before the block, the price of the block trade, and Standard and Poors' Composite Index. Using these data, Figures 1 and 2 present mean price changes for minus tick blocks and plus tick blocks greater than $1 million. For each block, the price changes are calculated as follows:

$$E_1 = \frac{PB + D_0 - P_{-1}}{P_{-1}}$$

$$E_2 = \frac{P_0 - PB}{P_0}$$

$$E_3 = \frac{PB - PPB}{PPB}$$

$$M = \frac{I_0 - I_{-1}}{I_{-1}}$$

where

PB = price of block

PPB = price of last trade before block

P_t = closing price on day t

D_t = dividend (if any) paid on day t

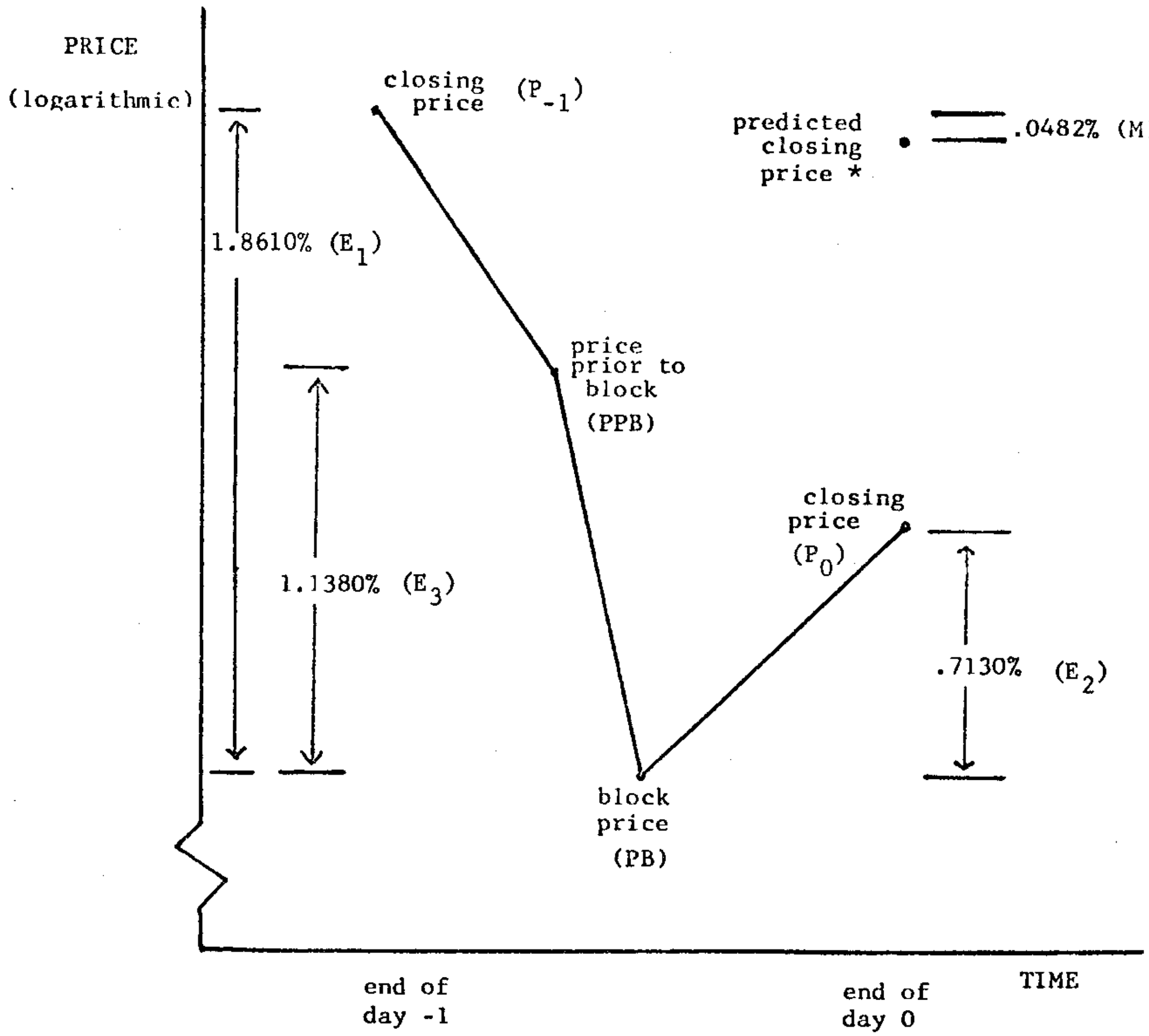
I_t = market index at close of day t

For minus tick blocks (Figure 1), the mean price decline between the closing price on day -1 and the block price (E_1) is 1.86 percent.[19] (The median decline is 1.64 percent.) The major component of the 1.86 percent decline is the 1.14 percent average size of the minus tick (E_3). Subsequent

Figure 1

MINUS TICK BLOCKS

AVERAGE PERCENTAGE PRICE DIFFERENCES BETWEEN SELECTED PRICES IN THE PERIOD FROM THE CLOSE OF TRADING ON DAY -1 TO THE CLOSE OF TRADING ON DAY 0

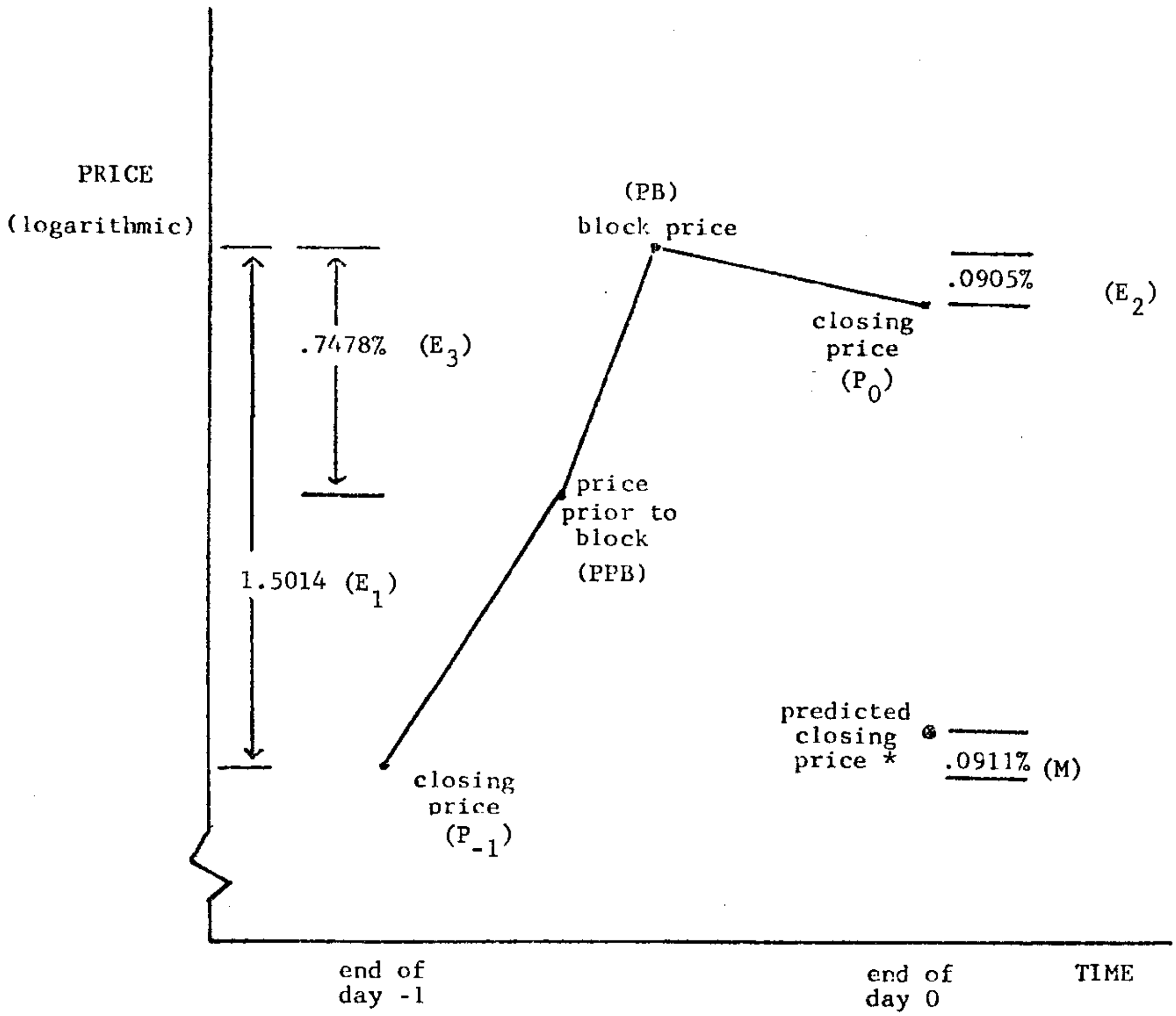


* Closing price if stock's price had changed by same percentages as market index.

Figure 2

PLUS TICK BLOCKS

AVERAGE PERCENTAGE PRICE DIFFERENCES BETWEEN SELECTED PRICES IN THE PERIOD FROM THE CLOSE OF TRADING ON DAY -1 TO THE CLOSE OF TRADING ON DAY 0



* Closing price of stock's price had changed by same percentage as market index.

to the block (E_2), the average price movement is a rise of .71 percent.[20] (The median rise is .55 percent). If the stock's price had changed by the mean percentage change in the market index (M), price on day zero would have fallen about .05 percent. The important point in these numbers is that price, on the average, tends to rise relative to the market following a minus tick block. This pattern supports the distribution hypothesis. The mean price rise is slightly more than one commission.[21] On the average, the buyers of these blocks saved one commission and the sellers (the side initiating the transactions) paid an extra commission. The price return (about 142% on an annual basis) is too large and too swift to reflect a permanent higher rate of return accruing to new and less willing holders. Instead, it appears to reflect payment for providing short run liquidity. The results, therefore, tend to support the liquidity cost version of the distribution hypothesis.

The existence of a price recovery, on the average, from the block trade to the day's close indicates that knowledge of a minus tick block is of potential value. The mean price recovery is not large enough to provide a trading profit to a nonmember of the NYSE. An arbitrage transaction would require the purchase of the block at the block price and its sale at the close. Such a transaction would involve two commissions. In addition, there are the interest costs of tying up funds. Members of the NYSE, and particularly specialists, could profitably act on such a price recovery, however. Specialists would incur clearing charges on two trades, amounting only to about .14 percent of the value. Other members might be required to pay floor brokerage as well as clearing charges, the total for two trades amounting to about .37 percent.[22] The immediate profit (usually unrealized) of purchasers of blocks is protected, therefore, from arbitrage by non-members. However, it may be shared with the specialist.[23]

There is uncertainty about the sign and size of the price change after the block trade. Of the sample of minus tick blocks analyzed, 64% experienced a price rise, 22% experienced a price decline and 14% experienced no price change subsequent to the block trade. While the average subsequent movement is a recovery of .71%, the standard deviation is 1.62%. There is some correlation, although weak, between the price movement following the block (E_2) and the price change from day -1 to the block (E_1), which explains some of the variations in the price recovery.[24] In addition, the block trading firm and the specialist may have information on the identity of the seller(s) and buyer(s), on whether they positioned some of the block, and on other factors not publicly available that may explain much of the variation. Thus, these parties may be in a position to benefit from the subsequent price move. By permitting others to arbitrage the price recovery at less cost and to have access to the relevant information, one might reduce the liquidity costs of block trading. This goal could be reached, at least to some extent, by eliminating fixed minimum commissions and by permitting competing market makers.[25]

It was noted earlier that market makers or other investors rarely act as dealers by taking a short position in blocks initiated by a buyer. Therefore, there is much less reason to expect a distribution effect based on liquidity costs for plus tick blocks than for minus tick blocks since one must deal directly with the permanent holders of the stock. The results shown in Figure 2 seem to confirm this. For plus tick blocks, the mean initial price rise (E_1) is 1.50 percent and is of the same order of magnitude as the mean initial price fall of minus tick blocks.[26] However, there is no marked price decline subsequent to the block trade (E_2).[27] Furthermore, the relation across blocks between the price movements before and after the block is not significant.[28]

For plus tick blocks, the price movements within the day of the block trade are consistent with the information hypothesis.

6. Price Effects in Closing Prices

(a) Measurement Technique[29]

The effect of a block trade on closing market prices is measured by comparing actual closing prices of the stock with closing prices one would have expected had the stock's price changed by the same percentage amount as a market index (Standard and Poor's Composite Index). Thus, if the market drops by one percent on the day of a block trade, but the stock itself falls by three percent, the effect of the block trade on that day is measured as a two percent drop. More precisely, the current impact on day t for a particular stock is given by

$$U_t = \ln\left(\frac{P_t + D_t}{P_{t-1}}\right) - A - B\ln\left(\frac{I_t}{I_{t-1}}\right)$$

where P_t, D_t, and I_t are defined in the previous section. A and B are parameters peculiar to each stock and reflect the "normal" relation between that stock and the market.[30] Estimates of A and B were calculated for every stock, but sample runs showed that the findings were unchanged under the assumption that A=0, B=1 for each stock. All analyses presented below incorporate this assumption.

It is also desirable to present the cumulative effect of current impacts over a period around the block trade. If day m is the first day of this period, the impact index on day t for a particular stock is given by

$$S_t = e^{\Sigma_{j=m}^{t} U_j}$$

where U_j is the current impact for this stock. The impact index is approximately equal to the value of one dollar invested at the succession of rates represented by the current impacts for days m, m+1,...,t. This can be seen by using the fact that ln (1+r) $\cong$ r, for small r. Thus,

$$\ln S_t = \Sigma_{j=m}^{t} U_j$$

$$\cong \Sigma_{j=m}^{t} \ln(1+U_j)$$

$$\cong \ln [\pi_{j=m}^{t}(1+U_j)]$$

(b) Price Effects of Minus Tick and Plus Tick Blocks

Tables 2 and 3 present means and standard deviations, across blocks, of the current impact (U_t) and the impact index (S_t). The tables also give the proportion of negative values of U_t. The mean of S_t over time from Tables 2 and 3 is shown graphically in Figures 3 and 4, respectively. Table 2 and Figure 3 are based on data for 1121 blocks on minus ticks; Table 3 and Figure 4 are based on data for 345 blocks on plus ticks.[31] Only blocks over $1 million are considered. The period of analysis is 41 consecutive trading days around the day of each block (day zero).

Minus tick blocks would be expected to have, and do have, a negative impact on day zero and plus tick blocks a positive impact. For stocks in which blocks traded on minus ticks (Table 2 and Figure 3), closing price on day zero relative to closing price 20 days earlier shows an average drop of 2.02 percent relative to the market.[32] Much of this average decline (1.15 percent) occurs on the day of the block. Closing price on day zero for stocks having blocks on plus ticks (Table 3 and Figure 4) is, on average, 5.14 percent (relative to the market) above closing price 20 days before the block. The average impact on the day of the block is a rise of 1.29 percent. On day

Table 2

CROSS SECTIONAL RESULTS FOR 1121 BLOCKS ON MINUS TICKS

Day (t)	Current impact (U_t) Mean	Current impact (U_t) Proportion negative	Current impact (U_t) Standard deviation	Impact index (S_t) Mean	Impact index (S_t) Standard deviation
-20	-0.0006	0.5424	0.0201	0.9995	0.0227
-19	-0.0005	0.5067	0.0204	0.9992	0.0303
-18	-0.0003	0.5219	0.0212	0.9992	0.0367
-17	-0.0003	0.5103	0.0205	0.9991	0.0427
-16	-0.0008	0.5361	0.0192	0.9986	0.0471
-15	0.0051	0.5397	0.0205	0.9989	0.0517
-14	-0.0012	0.5397	0.0181	0.9978	0.0538
-13	-0.0009	0.5201	0.0198	0.9971	0.0574
-12	-0.0009	0.5397	0.0195	0.9964	0.0596
-11	-0.0001	0.4960	0.0196	0.9964	0.0624
-10	-0.0005	0.5219	0.0194	0.9963	0.0674
-9	-0.0003	0.5406	0.0203	0.9962	0.0706
-8	0.0003	0.5112	0.0196	0.9967	0.0740
-7	-0.0004	0.5210	0.0199	0.9965	0.0764
-6	0.0003	0.5236	0.0279	0.9973	0.0837
-5	0.0002	0.5165	0.0192	0.9976	0.0858
-4	0.0002	0.5245	0.0200	0.9980	0.0877
-3	-0.0021	0.5807	0.0194	0.9961	0.0897
-2	-0.0029	0.5879	0.0205	0.9935	0.0929
-1	-0.0033	0.5789	0.0218	0.9905	0.0949
0	-0.0115	0.7386	0.0248	0.9798	0.1002
1	-0.0001	0.5022	0.0214	0.9797	0.1014
2	-0.0007	0.5174	0.0227	0.9792	0.1024
3	0.0010	0.4960	0.0211	0.9803	0.1043
4	0.0004	0.5040	0.0209	0.9808	0.1055
5	0.0004	0.5067	0.0205	0.9813	0.1060
6	0.0003	0.5049	0.0200	0.9819	0.1088
7	-0.0001	0.5112	0.0206	0.9819	0.1095
8	0.0004	0.5174	0.0204	0.9824	0.1095
9	0.0006	0.4915	0.0200	0.9830	0.1096
10	0.0002	0.5183	0.0204	0.9833	0.1103
11	-0.0007	0.5343	0.0198	0.9827	0.1117
12	0.0007	0.5076	0.0276	0.9836	0.1146
13	0.0002	0.5254	0.0189	0.9839	0.1161
14	0.0005	0.4942	0.0197	0.9847	0.1192
15	-0.0001	0.5370	0.0210	0.9848	0.1216
16	-0.0009	0.5352	0.0190	0.9843	0.1244
17	-0.0002	0.4996	0.0192	0.9842	0.1255
18	-0.0002	0.5290	0.0195	0.9842	0.1270
19	-0.0002	0.5094	0.0196	0.9842	0.1279
20	0.0002	0.5022	0.0189	0.9844	0.1278

Table 3

CROSS SECTIONAL RESULTS FOR 345 BLOCKS ON PLUS TICKS

	Current impact (U_t)			Impact index (S_t)	
Day (t)	Mean	Proportion negative	Standard deviation	Mean	Standard deviation
-20	0.0005	0.5362	0.0240	1.0007	0.0251
-19	-0.0004	0.5449	0.0230	1.0005	0.0329
-18	-0.0005	0.5536	0.0229	1.0001	0.0424
-17	0.0012	0.5101	0.0227	1.0015	0.0465
-16	0.0027	0.4812	0.0218	1.0045	0.0506
-15	0.0026	0.4696	0.0212	1.0072	0.0539
-14	0.0007	0.5072	0.0183	1.0081	0.0567
-13	0.0000	0.5478	0.0211	1.0083	0.0598
-12	0.0014	0.5130	0.0204	1.0100	0.0649
-11	0.0006	0.4899	0.0186	1.0109	0.0664
-10	0.0009	0.4899	0.0191	1.0121	0.0698
-9	0.0003	0.4986	0.0215	1.0127	0.0737
-8	0.0001	0.5420	0.0208	1.0130	0.0772
-7	0.0008	0.5101	0.0201	1.0139	0.0784
-6	0.0009	0.5362	0.0217	1.0151	0.0808
-5	0.0045	0.4725	0.0296	1.0203	0.0894
-4	0.0007	0.4696	0.0227	1.0212	0.0909
-3	0.0030	0.4986	0.0250	1.0246	0.0958
-2	0.0036	0.4783	0.0277	1.0288	0.1015
-1	0.0072	0.4029	0.0279	1.0371	0.1113
0	0.0129	0.3072	0.0274	1.0514	0.1213
1	0.0023	0.4783	0.0264	1.0545	0.1268
2	-0.0003	0.5362	0.0195	1.0545	0.1290
3	0.0002	0.5333	0.0192	1.0549	0.1312
4	0.0010	0.5043	0.0211	1.0557	0.1299
5	-0.0007	0.5565	0.0233	1.0550	0.1304
6	0.0011	0.5072	0.0196	1.0567	0.1356
7	0.0004	0.4928	0.0196	1.0575	0.1399
8	0.0001	0.5159	0.0208	1.0575	0.1401
9	-0.0008	0.5565	0.0199	1.0565	0.1388
10	-0.0012	0.5391	0.0201	1.0552	0.1397
11	0.0007	0.5188	0.0209	1.0562	0.1424
12	-0.0013	0.5217	0.0202	1.0551	0.1436
13	0.0008	0.4986	0.0194	1.0563	0.1468
14	-0.0007	0.5130	0.0225	1.0558	0.1488
15	0.0015	0.4638	0.0212	1.0578	0.1519
16	-0.0007	0.5362	0.0198	1.0571	0.1514
17	-0.0000	0.4812	0.0189	1.0571	0.1520
18	-0.0003	0.4957	0.0185	1.0569	0.1519
19	-0.0013	0.5420	0.0191	1.0558	0.1548
20	-0.0010	0.5246	0.0187	1.0552	0.1578

Figure 3

CROSS SECTIONAL RESULTS FOR 1121 BLOCKS ON MINUS TICKS

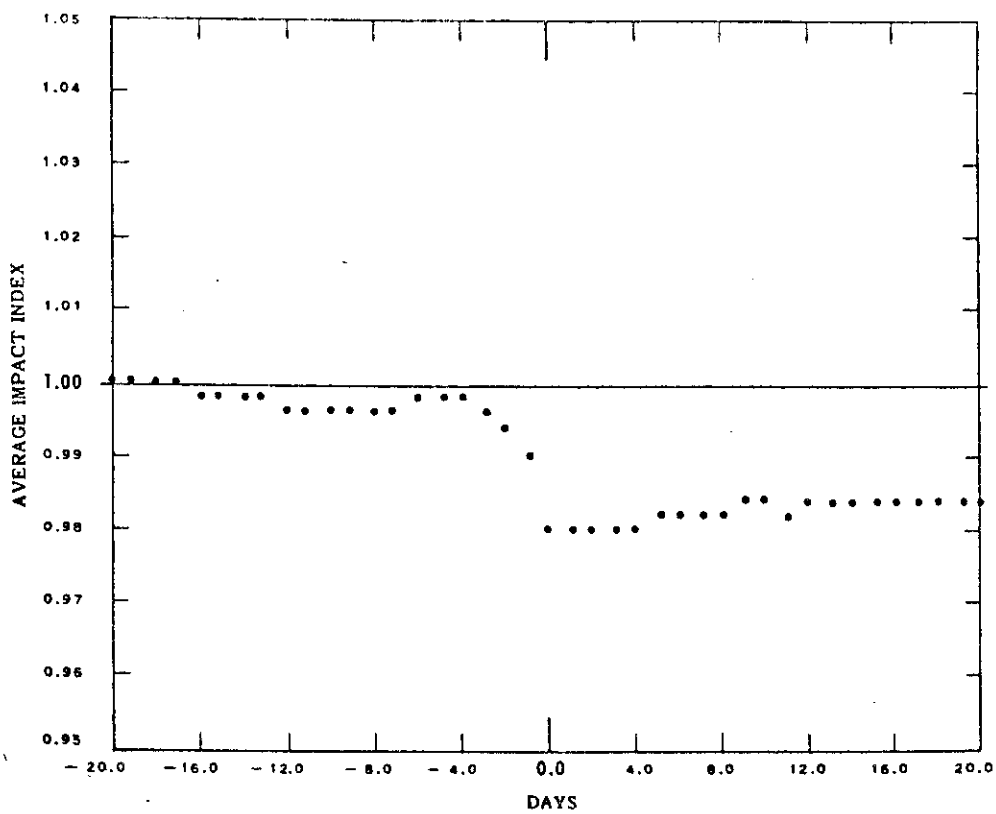
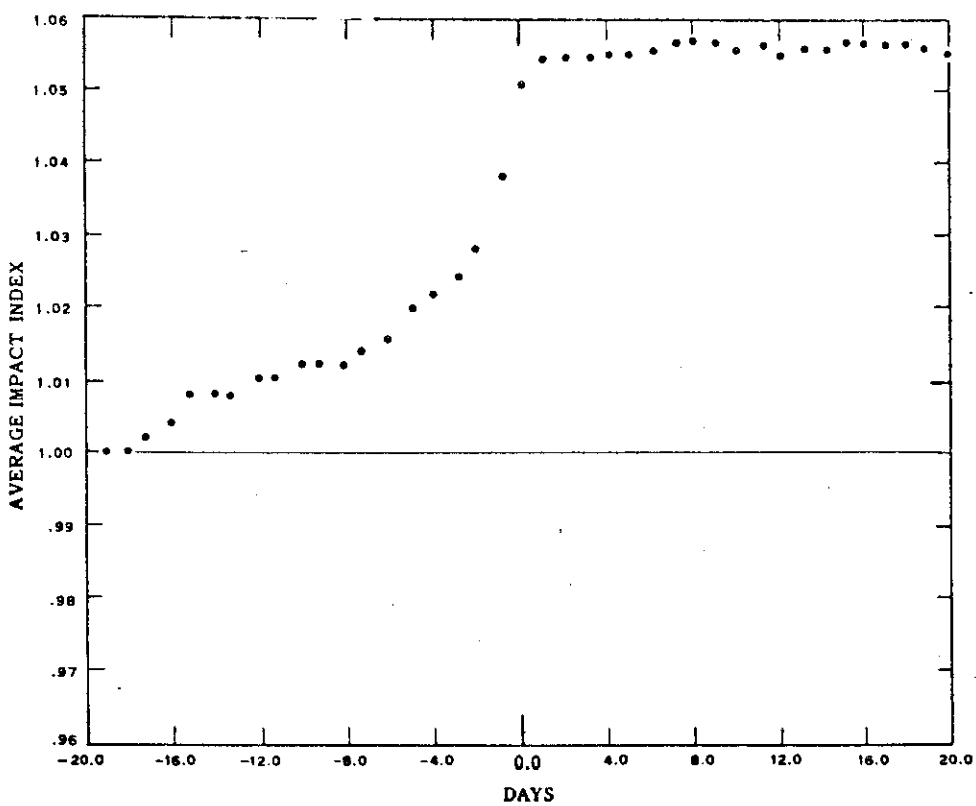


Figure 4

CROSS SECTIONAL RESULTS FOR 345 BLOCKS ON PLUS TICKS



zero, 74 percent of the blocks on minus ticks have a negative impact and 69 percent of the blocks on plus ticks have a positive impact.

Because the price impacts on day zero are, to a large extent, predetermined by the classification of blocks by tick,[33] the analysis is concerned not only with price change on day zero, but also with the pattern of prices before and after the block trade. Table 2 and Figure 3 show that a new (lower) level of prices tends to be established for minus tick blocks after the block trade. Prices recover slightly 10 days after the block (about .25 percent) but are still below the original level of prices by more than 1.50 percent. Conversely, plus tick blocks tend to establish a new higher level of stock prices, as shown in Table 3 and Figure 4. In both cases, the new level is established rather quickly, and there is little drift after day 10. These results do not show evidence of a change in rate of return subsequent to the block, reflected in a subsequent rise or fall of prices, that would support the existence of a distribution effect. Prices seem to experience a once-and-for-all rise or fall depending on whether the block was purchased or sold. Such a pattern is consistent with the information hypothesis. However, further tests tend to support the liquidity cost version of the distribution hypothesis.

(c) Relation of Price Effect to Dollar Value of Block

An implication of the distribution hypothesis is that the size of the price impact should be correlated with the size of the block. If different securities are imperfect substitutes, the larger the block the greater the price change required to induce other investors to hold this quantity of the stock. In addition, the value of the block affects liquidity costs in terms of the costs of locating the other side and in terms of the potential inventory costs that market makers might be requested to bear. Under the information hypothesis, on the other hand, block trades are associated with price changes only because they happen to accompany the disclosure of new information, which changes the equilibrium price of the stock. If the significance of new information about companies is not correlated with the dollar value of blocks, one would under this hypothesis not expect a systematic relation between the size of the price adjustment and the value of the block.

To test the relation between size of block and size of price effect, current impact on day zero (U_0) is regressed on block value (V). Separate regressions are run for minus tick blocks over $1 million and plus tick blocks over $1 million. In the results shown below, U_0 is in percent, V is in millions of dollars, and the numbers in parentheses are t values.

Minus tick blocks (1199 observations):

$$U_0 = -.767 - \underset{(7.26)}{.129}\,V \qquad R^2 = .042$$

Plus tick blocks (366 observations):

$$U_0 = .951 + \underset{(2.72)}{.131}\,V \qquad R^2 = .020$$

The regression results tend to support the distribution hypothesis, particularly in the case of minus tick blocks where the relation between price impact and block size is more significant. The regression coefficient is of the proper sign in both cases.[34] The fact that a less significant relation is observed for plus tick blocks, in which market makers take a position much less frequently, indicates that the distribution effect is one based on liquidity costs. This is consistent with the findings described in section 5 above. The results indicate that an increase of $1 million in block size results, on the average, in an increase in price effect of about .13 percentage points.

Put in dollar terms, this means that if the size of a block of $50 stock were to go from 20,000 shares to 100,000 shares, for example, the price effect would be increased by about $0.25 per share.

If information is the result of analysis rather than of the release of data by corporations, one may argue that the above regression results are not support for the distribution hypothesis. Institutions with greater resources than the general public would be expected to carry out more research, and block trading may occur as a result of information gathered in this way. Furthermore, the size of the block may reflect the importance of the research results. Such reasoning does not account for trading that occurs because of cash needs or cash surpluses. In addition, as noted below, the absence of a significant relation between the price effects and sizes of secondary distributions has been cited by Scholes [7] as strong evidence in favor of the information hypothesis and against the distribution hypothesis. Therefore, one must either regard the current study's findings as supporting the opposite choice between the competing hypotheses or dismiss the test (in both cases) as having no power to distinguish between these hypotheses.

(d) <u>Price Effects of Trailing and Leading Blocks</u>

A second test of the distribution hypothesis involves a classification of blocks by the pattern of blocks before and after the block trade being analyzed. If the distribution hypothesis is correct, prices would tend to return to their original level after a block trade. Blocks may, however, be followed by additional blocks that may put additional pressure on prices and prevent them from returning to their prior level. As a result, the flat pattern of post-block prices in Figures 3 and 4 is consistent with either the information hypothesis or the distribution hypothesis.

In order to distinguish further these hypotheses, interday price behavior is examined for subsamples of blocks for which no additional blocks over $1 million occurred in the stock during days 1-10. Blocks meeting this criterion are termed "trailing" blocks. There are 591 trailing minus tick and 150 trailing plus tick blocks.

On the average, the price of trailing minus tick blocks recovers by .62% within 10 days and 1.1% within 20 days.[35] This evidence supports the distribution hypothesis. As is the case with other analyses, plus tick blocks exhibit a different pattern. The price maintains its new level as in Figure 4.[36]

The findings for trailing minus tick blocks are subject to the same criticism as the test based on the relation between size of block and price effect; namely, that blocks may signal the existence of information. The majority of blocks are minus tick blocks, and under the information hypothesis are associated with unfavorable information. Therefore, choosing blocks for which no subsequent blocks occurred amounts to choosing blocks followed by less bad news than usual. Therefore, the price recovers.[37]

There are several counterarguments. First, although the number of blocks is heavily weighted in favor of minus ticks, the average price effect for all blocks includes the greater average absolute price effect of plus tick blocks. The average U_0 for all blocks over $1 million is -.34%, and the average number of such blocks following minus tick blocks within 10 trading days is .96. Under the information hypothesis, a typical minus tick block should discount subsequent bad news in the amount of (.96) (-.34%) = -.32%. As shown above, the average price recovery of trailing minus tick blocks is considerably greater than this. Second, if the analysis of trailing blocks excludes more bad news than usual, the average price of trailing plus tick blocks should rise also. This does not happen.

Third, there is a possibliity that minus tick blocks cluster so that more than the average amount of bad news follows a typical minus tick block. Therefore, in the absence of subsequent blocks, the price recovery would be greater than the average price effect of all blocks. There appears, however, to be no tendency for minus tick blocks to cluster. The frequency of minus ticks among blocks that follow a minus tick block within 10 days is slightly less than the frequency of minus tick blocks in the population as a whole (.52 versus .55; recall that the total population includes zero tick blocks). On the other hand, there is a tendency for plus tick blocks to cluster. First, the frequency of following blocks is greater. On the average, 1.33 blocks follow a plus tick block within 10 days. Second, the following blocks are plus ticks with a greater frequency than blocks in general (.33 versus .17). The fact that trailing plus tick blocks show no price return in spite of this apparent clustering indicates that during the period analyzed the market did not anticipate additional blocks.

As a further test of the possibility that minus tick blocks may cluster, "leading" minus tick blocks are analyzed separately. A leading block is (arbitrarily) defined as one for which no blocks over $1 million occur in that stock during the previous three trading days. If the same information gives rise to a cluster of blocks, for whatever reason, and there is no distribution effect one would expect leading blocks to exhibit substantially larger current impact on the day of the trade than other blocks that follow. This behavior is not apparent in the data; the average day zero current impacts of leading and nonleading blocks are almost identical (-1.16% and -1.11%, respectively).

Thus, when a sample of blocks unaffected by subsequent blocks is chosen, the pattern of price movement subsequent to the block tends to support the distribution hypothesis in the case of minus tick blocks. As before, this hypothesis is not supported in the case of plus tick blocks, which indicates that the distribution effect for minus tick blocks reflects liquidity costs.

(e) Serial Independence of Price Changes

There are indications of price trend in the mean current impacts previous to the block trade. Mean U_t tends to turn negative for minus tick blocks (Table 2) and positive for plus tick blocks (Table 3) about three days before day zero. This pattern may be due to serial correlation in the price of each stock or simply to the averaging process if some blocks have an impact before day zero. To distinguish between these alternatives, current impact on day zero is regressed on current impact on day -1. The results, with t values in parentheses, follow.

Minus tick blocks:

$$U_0 = -.011 + \underset{(3.59)}{.113}\, U_{-1} \qquad R^2 = .011$$

Plus tick blocks:

$$U_0 = .012 + \underset{(2.79)}{.132}\, U_{-1} \qquad R^2 = .021$$

The tendency toward positive serial dependence indicated by these results is clearly not strong.[38] The serial dependence (if any) which does exist need not imply market irrationality or be inconsistent with the random walk hypothesis. The prices used in the regressions are conditioned on the subsequent occurrence of a block. Unless market participants are aware of the impending block, serial dependence of price changes before the block trade is not exploitable in trading.

The regression results imply that the major cause of mean price drift before day zero is due to different timing of impacts for different blocks. Such differences are probably due to some blocks being "shopped" (described to potential buyers or sellers on the other side) less expertly than others. If the news is out that a large block is for sale, price may drop prior to the transaction of the block itself.

Subsequent to day zero, there is no market trend in the mean current impact. The mean price recovery noted in the case of trailing blocks on minus ticks depends on considering only blocks for which no subsequent blocks occurred. If an investor could predict the subsequent occurence of blocks, he could make profits by buying immediately after a trailing block on a minus tick. Since the subsequent occurence of blocks is not known, however, the investor can only expect the level post-block pattern shown in Figure 3.

7. Comparison of Price Effects of Block Trades and Secondary Distributions

A secondary distribution is similar to a minus tick block trade in the sense that both involve sales of a large quantity of stock. Secondaries are handled much like new issues and cannot be carried out as quickly as block trades. Secondaries are useful when a block of stock is to be distributed widely (perhaps because no institutional buyer is available). It is interesting to compare Scholes' [7] principal findings concerning price effects of secondaries with those described here for blocks, since Scholes employs many of the same techniques as used in the present study. Unlike the present study, however, Scholes finds no evidence of a distribution effect.

Scholes calculated essentially what this study has termed current impact (U_t) and impact index (S_t) for 272 nonregistered NYSE secondaries in 1961-65.[39] His results on the behavior of mean S_t for 25 days before and 14 days after the secondary are roughly similar to the pattern in Table 2 and Figure 3 except that the prices of secondaries tended to fall further for a few days after the offering. For the secondaries, mean S_t on day -1 is .995. On day zero it falls to .989. For the next few days mean S_t falls further, reaching .975 on day five and has the same value on day 10. In Table 2, in comparison, mean S_t is .991 (rounded) on day -1, falls to .980 on day zero, and is .983 on day

10. In neither case is there a pattern of price recovery following day zero. In regressing size of current impact on day zero (U_0) on size of secondary, Scholes does not find a significant relation.[40] As noted earlier, the evidence for minus tick block trades, on the other hand, shows a significant relation between U_0 and size of block.

The difference in these empirical results appears to be due to differences in institutional arrangements for handling large sales through secondary distributions and through block trades. In a secondary, the underwriter usually takes the entire issue at risk and is not constrained in the commission he charges. Contrary to Scholes' belief, commissions on secondary distributions are significantly higher than normal NYSE commissions.[41] In a block trade the entire issue is rarely positioned and a single commission is charged the buyer and the seller.[42] As a result, a price recovery is necessary to convince buyers to take over some of the underwriting function, at the very least to offset the commission they are compelled to pay under the UYSE rules. A liquidity cost therefore exists in secondary distributions, but appears in the form of higher commissions, whereas in the case of block trade it appears in the form of a price recovery.

8. Summary and Conclusions

The purpose of the preceding analyses was to investigate whether the price effects accompanying block trades can be ascribed to a change in the underlying value of the stock (information effect) or to a temporary deviation of prices (distribution effect). Separate analyses were conducted for blocks over $1 million trading on minus ticks and on plus ticks.

For plus tick blocks, the evidence indicates that price effects reflect changes in the underlying value of the stock. It was noted that a number of stocks in the sample were involved in mergers or takeovers. More fundamentally, there is little reason to expect a distribution effect based on liquidity costs for blocks that are actively purchased, since market makers in blocks and other investors rarely go short.

The majority of blocks, however, trade on a minus tick. These blocks produce evidence, although not uniformly strong, of some form of distribution effect. Within the day, closing price showed a significant average reversal from the block trade price. This price recovery, approximately equal to one commission, is consistent with a temporary discount necessary to bring in willing buyers quickly. The analysis of inter-day price effects, which found that price impacts are associated with the size of the block and that prices of trailing blocks tend to recover also supports the distribution hypothesis. These findings imply that the pressure of institutional trading is a significant factor in the observed price effects of block trades.

The evidence tends to support the liquidity cost version of the distribution hypothesis, and there is little evidence on whether differences in marginal preference are operative. This conclusion is based on a number of pieces of evidence the most important of which is the rapid price recovery of minus tick blocks on the day of the block. The price recovery of trailing blocks, the effect of the size of the block, and the difference in the effect for plus tick blocks, however, all point to the same effect. The short period covered makes it difficult to determine whether differences in marginal preferences are important. The market may be perfect in this latter sense and still be subject to the costs found in this paper of bringing willing buyers and sellers together quickly.

There are several practical implications of the findings. First, they suggest that, under the present structure of markets, the actions of institutions do indeed affect market prices, at least temporarily. Second, they imply that the efficiency with which large blocks are sold is worthy of examination. There appears to be a cost to the seller over and above the commission charge, which is particularly evident in the within-day price return. This cost may be reduced if more investors are given the opportunity and the incentive to participate in blocks. Elimination of the fixed minimum commission and permitting and encouraging competing specialists would be steps in the right direction.

Third, the effect on market price is at a cost to the institution itself. The institution typically sells at the low price during the 41 day period analyzed. The judgment by the institution that the stock should be sold is not vindicated by the price behavior of the blocks analyzed, since the price does not on the average fall below the closing price on the day of the block. There is, in fact, a price recovery on the day of the block trade averaging more than .70 percent. This amount, which can be considered an inducement to bring in buyers, plus the commission charge of about .60 percent makes the transaction costs to the seller quite high. Such costs can be justified if alternative investments can be identified that will prove to outperform the stock sold. Available evidence on the investment skill of mutual funds lends little credence to this being the typical situation.[43] Absent the ability to identify superior alternatives, high portfolio turnover, even when effected through block trades, can be costly to the beneficiaries of the portfolio.

FOOTNOTES

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[1] See [3] for a review of theory and empirical work.

[2] See [4] and [7]. The latter work is an important precursor to the present paper, in terms of both underlying issues and analytical techniques.

[3] The term "information" has a broad meaning in this context and refers to all news which might affect a particular stock. This includes general economic news as well as specific news such as an earnings report.

[4] The new equilibrium level may be a moving one. For example, a no-dividend stock should show price increases or decreases over time in order to reflect retention of earnings.

[5] It is not necessary to assume different access to information, only that different investors interpret given information differently or have preferences for risk-return combinations which differ.

[6] For exposition of this theory of a downward sloping demand curve for shares, see [5] and [6].

[7] Because of the cost, legal restrictions and general reluctance to sell short, one might expect purchases to have a greater price effect than sales.

[8] Commission rates on exchanges also cover the costs of research and other services, but it is not clear that, at present, these services are directly related to the carrying out of transactions.

[9] An investor might be willing to accept a security if the price discount is great enough and he would collect the "fee" for positioning the stock rather than the dealer.

[10] However, prices could deviate from their equilibrium by as much as the transaction cost before an investor found it profitable to trade the security.

[11] The data supplied are the date, the price of the block, price of immediately preceding trade, number of shares, whether block was crossed (i.e., whether same broker acted for both sides). The price information used in the analyses was taken from the Standard and Poor's ISL daily price tapes.

12 The random sample consists of an exhaustive sampling of the largest 27 publicly held NYSE stocks (about 35% of the total market value of all NYSE stocks) and a random sample of 198 from the remaining stocks. For a detailed description of the sample, see [8], especially Vol. 4, Chap. X, Appendix A.

13 About 600 blocks are excluded because the data contains errors or are incomplete.

14 When blocks occur, they tend to be an important fraction of total exchange volume on that day. For each block, the ratio of the number of shares in the block to total NYSE volume in that stock on that day was calculated. The average value of this ratio by size category of block is:

Less than $1 million	33.6%
$1-2 million	45.9
$2-5 million	60.0
Over $5 million	69.3

15 As noted in the following section, the analyses also excludes blocks on zero ticks.

16 The active side is the side of the block trade with fewer parties. When the active side is buying, the tick tends to be positive; when the active side is selling, the tick tends to be negative. See [8, Vol. 4 p. 1588]

17 It would have been desirable to select randomly a "control group" of trades, classify them in the same way as a block trade, and carry out the same analyses as for block trades. However, resource and data limitations prevented this.

18 Interviews and detailed examination of a smaller sample of blocks emphatically support this point.

19 The standard error of the mean of E_1 is .068 percent. By standard statistical techniques, this implies that the mean of E_1 is significantly different from zero. However, Fama [1] and others have pointed out that a stable Paretian distribution of price changes, with characteristic value below 2.0, may lead to upward bias in standard tests of significance (which assume normality). No adjustment for this bias is made in the current study.

20 The mean rise is significantly different from zero. The standard error is .047 percent. Since some blocks occur at the close, the mean of E_1 understates the average price recovery over transactions following the block.

21 The commission on 10,000 shares of a $40 stock was .62 percent of the total value of the transaction after the volume discount instituted on December 5, 1968.

22 Floor brokerage on 100 shares of a $40 stock is $3.60. Clearing charges are $2.75.

23 The Institutional Investor Study [8] reports that block trading firms have difficulty in keeping specialists from "breaking up" a block. Typically an arrangement allowing the specialist to participate or benefit in some way from the block trade is reached. See pp. 1598-1601.

24 The relation is negative as expected. For 1199 minus tick blocks, the simple regression results are as follows (t value in parentheses):

$$E_2 = .449 - \underset{(7.25)}{.142}\, E_1 \qquad R^2 = .042$$

25 As we indicate below, we do not intend to imply that block trading has introduced inefficiencies into the market place. To the contrary. Block trading is considerably more efficient than the use of secondary distributions. We only suggest that market efficiency could be greater.

26 The average rise is significantly different from zero. The standard error is .127 percent.

27 The slight average decline shown (.0905 percent) is not statistically significant. The standard error is .099 percent.

28 For 366 plus tick blocks, the simple regression results are as follows (t value in parentheses):

$$E_2 = .026 - \underset{(1.90)}{.775}\, E_1 \qquad R^2 = .010$$

29 The general technique described in this section was first employed in [2].

30 Estimates of A and B are generally obtained by fitting the following regression to time series data for the particular stock and for the market:

$$\ln R = A + B \ln M + u$$

where: R = investment relative for that stock
M = investment relative for a market index
u = disturbance

For example, see [2], p. 4.

31 Daily price data were available only through September 30, 1969. In order to have price data for 20 days after the block, it was necessary to exclude 78 minus tick blocks and 21 plus tick blocks that occurred within 20 trading days of September 30, 1969.

32 That is, the average impact index is set at 100.00 percent on day -21. By day zero, it has fallen to 97.98 percent.

33 Compare the average sizes of the ticks (E_2) in Figures 1 and 2 with the average current impacts on day zero in Tables 2 and 3.

34 Including non-block dollar trading volume on the same day or alternatively monthly dollar trading volume as an additional independent variable does not materially alter the size or significance of the coefficient.

35 On day -1 the average impact index is .9881. On day zero it falls to .9772 and recovers to .9834 and .9879 on days 10 and 20, respectively.

The amount of the recovery depends on the definition of blocks. If blocks with subsequent blocks of any size over 10,000 shares are excluded (rather than only those with subsequent blocks over $1 million), the recovery is larger and more swift. The sample size in this case is 320. The impact index values for days -1, 0, 10 and 20 are .9924, .9819, .9921 and .9956, respectively.

36 On day -1 the average impact index is 1.0337. On day zero it rises to 1.0469. On day 10 it is 1.0468 and on day 20 it is 1.0452.

37 We are grateful to William Beaver for his suggestions on this point. It should be noted that there can be no counterarguments if the information hypothesis is made tautologically true. It is easy to argue, for example, that block trades _are_ news.

38 It is doubtful whether the regression coefficients would remain significant if adjustment were made for non-normality.

39 This is the sample from [7] that is most comparable to the block trade sample. Registered secondaries are not comparable since the advance announcement presumably leads to discounting of any price effect before the offering date.

40 For example, Scholes's regression for 345 registered and unregistered secondaries of U_0 (his E_{i0}) against the logarithm of the dollar value of the secondary (V) gave the following results, where the number in parentheses is a t value. (No regression was run for the unregistered issues taken separately.)

$$U_0 = -.0022 - \underset{(0.53)}{.0042} \ln V \qquad R^2 = .0009$$

Scholes, however, was able to group secondaries by type of institution selling. His analysis of price effects by type of seller produced results consistent with the information hypothesis. Similar data were not available for the block trades analyzed in the present study.

41 He assumes 2 commissions to be the typical charge to the seller. (The buyer pays no commission.) During the period studied by Scholes this would be about 2%. The NYSE, in its booklet _Marketing Methods For Your Block of Stock_, reports that during the period 1942-1959 (1140 observations) the cost of using a secondary distribution was on the average 4.84 times as large as the minimum commission. An analysis by one of the authors of 56 NYSE secondaries offered in the period July 1967 to June 1970 finds the average cost to be 4.47% of the value of the offering. Since the minimum commission was about 1%, this corroborates the figures of the NYSE.

42 On the portion positioned, the block trader usually collects two commissions since he charges a commission when he sells the stock out of inventory. However he often benefits even when he does not position because he acts as broker for both sides.

43 For recent findings on the investment performance of mutual funds, see [4].

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