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PREDICTIVE AND STATISTICAL PROPERTIES OF INSIDER TRADING*

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INTRODUCTION

“INSIDERS” are officers, directors, and owners of ten per cent or more of the common stock of the companies listed on the New York and American Stock Exchanges. The Securities and Exchange Commission (the SEC) requires that insiders keep the Commission informed regarding transactions in the common stock and convertible securities of the respective companies. The interest of the SEC in trading by insiders stems in part from the belief that insiders should not exploit their special opportunities to know about developments in their companies for personal profit through short-term trading. Further, the Commission feels that information on trading by insiders should be fully disclosed to the investing public because of light which such trading might cast upon the company’s future prospects.

There is also wide-spread interest in the investment community in trading by insiders because of the prevalent belief that insiders have valuable private information which bears upon their company’s prospects and that knowledge of the trading by insiders will permit valid inferences regarding future movements in the prices of stocks. Because of the interest by the SEC and the investment community in insider trading, we have undertaken this study. The subject has been studied before in many ways, but none of the preceding studies has been definitive and the additional methods of analysis seemed promising. Opinions are somewhat polarized. Academic studies have found virtually no evidence of profitable exploitation by insiders of their special knowledge and no value to outsiders in data on trading by insiders. Others believe that insiders often make extraordinary profits and that knowledge of their trading is valuable. Both the SEC and investors should be interested in which opinion is correct. The methods and coverage of this study differ from those of earlier work, as do our conclusions. We show that proper and prompt analysis of data on insider trading can be profitable, although almost all earlier academic work has reached the contrary conclusion. The first

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section of this report comments on some methodological problems; the second deals with the statistical properties of insider trading; the third, with various promising kinds of analyses; the fourth summarizes our findings.

SECTION 1. SOME METHODOLOGICAL PROBLEMS AND COMMENTS

Studies of insider trading are based on data published by the SEC for all listed companies in its Official Summary of Stock Transactions.¹ The Summary is a complete record of transactions of at least 100 shares in the stock of their own companies (or convertible securities) by the directors, officers, and owners of ten per cent or more of the outstanding shares. The Summary is compiled from month-end reports of insiders and is in print approximately five weeks after the last transaction. The basic data, however, are frequently filed by the insiders with the stock exchanges within a few day of the transaction. Regulations require that information be filed with the exchanges within ten days of the end of the month in which the trading takes place.

A methodological problem arises from imprecision in specifying the date of transactions. During 1951-1962, the Summary gives only the month rather than the actual date of individual transactions. The possible error caused by this imprecision can be substantial, for the average variation from month to month in the price of a stock is approximately 6 per cent. Furthermore, the closing price for the month is an average of 5 per cent greater than the lowest daily closing price and 5 per cent less than the highest daily closing price. Unfortunately, most of the empirical studies have used data from this period with a loss in precision and a consequent tendency to create the impression that insiders made less money on their transactions than they actually did. In the absence of an exact date of purchase or sale, the investigator has assumed that the transactions were made at the average price for the month, at the price prevailing at the middle of the month, or at the price at the end of the month. But the price on the day the insider actually made his transaction has consistently been more favorable to him than the price on the aforementioned dates. This fact emerges clearly from a study reported in Section 3-A. All occasions were noted on which three or more insiders (net) bought stock during a month. The price on the date of the last insider transaction during the month was compared with the price six trading days after the end of the month.² On 32 of 36 occasions, the price on the sixth trading day after the end of the month was higher than the price actually

¹ U.S. Securities and Exchange Commission, *Official Summary of Stock Transactions and Holdings of Officers, Directors, and Principal Stockholders* [hereinafter cited as *Summary*].

² The comparison was with the price six trading days after the end of the month because "outsiders" could by that time have learned about virtually all insider trading in the previous month.

paid. But on only 19 of the 46 occasions on which three or more insiders sold was the price higher on the sixth trading day after the end of the month. A difference at least as great as this would occur fewer than one in ten thousand occasions if insiders did not consistently execute trades at more favorable prices than the price on the sixth trading day after the end of the month.

There are a number of other difficulties in interpreting data on trading by insiders. Transactions of members of the family of the insider do not have to be reported. It would be possible for insiders to tell their families to act in anticipation of some unusually favorable or unfavorable event, thereby evading detection. Manne emphasizes another profitable arrangement whereby insiders of different companies exchange valuable information about their respective companies.³ Since insiders are required to report transactions only in their own companies, we would have difficulty in detecting these activities.

Further, the Summary is bulky and difficult to analyze. The Summary of the 1930's came in three sections, and frequently was over 70 pages long. There have been occasions on which the transactions of insiders were reported two or more years after the actual transaction. Another obstacle to refined analysis has been locating price and dividend information to match the dates of insider transactions. As a result of these difficulties, those who have insisted on accurate observation have been forced to limit severely the number of companies and years subjected to study.

A majority of scholars considering the profitability and utility of data on insider trading have reached negative conclusions. For example, Smith, in summarizing his frequently-quoted monograph, states: "Furthermore, the several tests suggest, without definitely answering the question, that the performance of insiders of large companies . . . may have been definitely inferior to that for the aggregate of listed companies."⁴ And Wu notes "there is very little evidence that a definite relationship exists between insider transactions and subsequent price movements," and concludes "from these cross-section data, there is no sufficient evidence to prove that insiders in these 50 companies as a group had outperformed the market."⁵

This view, however, is opposed to a belief common in Wall Street. Shaw observes that "logic does indicate that corporate officers and directors know more about the future of their own companies than other observers, and this logic has been clearly enough demonstrated in practice to make the study of

³ Henry Manne, *Insider Trading and the Stock Market* 164 (1966).

⁴ Frank Percy Smith, *Management Trading, Stock-market Prices, and Profits* 141 (1941).

⁵ Hsiu-Kwang Wu, *Corporate Insider Trading, Profitability, and Stock Price Movement* 114-15 (unpublished Ph.D. dissertation in University of Pennsylvania Library, 1963).

insider transactions a useful tool for other investors.”⁶ Harriet West concludes in the *Encyclopedia of Stock Market Techniques* that when officials of a company are buying their own stock on a decline, an outsider can safely assume that the outlook is as good or better than when he first purchased his stock.⁷

The major newspapers publish summarized reports of the large transactions of insiders so that their readers can gain indications of possible price movements. Finally, the Insider Report, The Indicator Digest, Drew Associates, Value Line Investment Survey, Stanford Investment Management, Inc., and the Consensus of Insiders base their advice in part on the transactions of insiders.

This paper contains information which tends to corroborate the view of the stock market advisers. We have noted (Section 3-A) for example, that insiders have superior ability to “predict” large price changes in their stock. In Section 3-B, we demonstrate that intensive insider buying in a month typically signals performance which is favorable relative to the market in the next six months and conversely for intensive selling. Section 3-C, on the other hand, provides an example of a commonly held belief about insider trading that is not confirmed by our investigation. We test the contention that there are companies in which insiders are consistently successful and find little support for it.

SECTION 2. STATISTICAL PROPERTIES OF INSIDER TRADING

In order to provide a framework for these studies, we devote this section to an analysis of some statistical properties of data on insider trading. Other investigators may find this section useful. The data we analyze here are insider trades from January, 1950 to December, 1960 of a stratified random sample of 105 New York Stock Exchange companies. The major kinds of information reported in the Summary are month and year of transaction, the relationship of transactor (Director, Officer, etc.), nature of ownership (Direct, Indirect, etc.), size of purchase, and month-end holding.

We record simply as an example one of the most famous set of trades by insiders, the transactions by insiders of the Texas Gulf Sulphur Company in April, 1964. Recall that on April 16, the company announced a major mineral discovery. Some key dates and closing prices are October 1, 1963—16-4/8; December 2, 1963—19-1/8; February 3, 1964—22; April 1, 1964—26; April 13, 1964—30-7/8; April 16, 1964—36-3/8; April 30, 1964—52-7/8; and December 31, 1964—51-7/8. The Summary indicates that four insiders

⁶ Robert Shaw, Most Revealing Record of Buying and Selling by Insiders, 109 Magazine of Wall Street 498 (1962).

⁷ Harriet West, in *Encyclopedia of Stock Market Techniques* 818 (1965).

TABLE 1
INSIDER TRADING IN TEXAS GULF SULPHUR COMPANY, APRIL 1964

Issuer Security Reporting Person Indirect Account ^a	Date	Transaction and Ownership Symbol ^b	Aggregate Transactions		Month-End Holdings of Security Traded
			Bought	Sold	
Texas Gulf Sulphur Co.					
Common					
F G Coates	D				30
as Trustee		4-16-64	2	2000	7100
David M Crawford	O	4-16-64		530	530
Charles F Fogarty	OD	4-11-64		400	
		4-16-64		400	
		4-21-64		100	
		4-22-64		100	3505
Trusts for children		2			500
Thomas S Lamont	D	4-16-64		1000	
		4-17-64		1200	12900
Beech Corp		4			1030
Piermont Corp		4			349

^a The D and O entered in the Reporting Person column are abbreviations for Director and Officer.
^b The 2 and 4 in the Ownership column indicate that the securities are beneficially owned indirectly through a holding company, and the 4 indicates the same with the added proviso that figures reported represent the proportionate interest of the person making the report.

Source: U.S. Securities and Exchange Commission, Summary, May, 1964.

and some associates just prior to, at the time of, or shortly after the announcement of the discovery made purchases which proved highly profitable.

The most striking statistical property of insider trading is the extremely great variation in the number of shares bought and sold. This can readily be seen from means and variances of the algebraic size of insider transactions in each of the 105 companies. The ratio of the standard deviation to the mean (the coefficient of variation) ranges from 1.1 to 45.4 with a median of 11.3. By contrast, the coefficient of variation of the monthly volume of trading of the industrial companies in the Dow Jones averages is typically about 0.4.

Table 2 contains in columns 2 to 4 some measures of variation for 30 stocks in our sample. Notice that 15 of the 30 coefficients of variation are greater than 5. The average absolute variation between consecutive transactions is greater than three times the mean absolute size of transaction in 22 cases.

One cause of variability is that different kinds of insiders typically trade in significantly different numbers of shares. Thus, during the period covered by this study, directors made 1305 transactions with a mean purchase of 244 shares. Principal stockholders of more than ten per cent of the outstanding

TABLE 2
SELECTED DATA ON INSIDER TRADING

Company Name	Algebraic Mean	Co-efficient of Variation	Ab-solute Mean	Co-efficient of Variation without regard to sign			Number of Transactions
				Sale	Purchase	Purchase-Sale	
Allied Chemical	-	+ 5.09	959.0	5	5	6	37
Amalgamated Leather	+	+ 2.21	225.1	0	1	2	78
American Can	+	+ 41.70	729.2	6	6	7	46
American Smelt & Refining	+	+ 4.91	548.4	1	10	9	43
American Zinc, Lead & Smelt	+	+ 3.71	1731.9	11	17	16	107
Bethlehem Steel	+	+ 3.41	554.2	0	2	3	14
Butte Copper	-	- 17.76	501.5	4	3	3	14
Callahan Zinc-Lead	+	+ 2.14	13795.1	1	5	5	17
Calumet & Hecla	+	+ 45.38	683.4	3	3	4	47
Coty	+	+ 1.96	3145.6	8	22	22	18
DuPont	-	- 5.11	1629.3	60	15	15	3
Eastman-Kodak	-	- 7.29	1523.1	2	2	3	21
General Foods	+	+ 4.18	750.5	22	25	25	48
General Realty & Utilities	+	+ 7.53	2957.6	5	7	7	16
Goodyear Tire & Rubber	+	+ 7.77	1152.3	97	15	16	17
International Harvester	-	- 12.96	916.9	11	18	18	60
International Nickel of Canada	-	- 5.38	1089.8	4	5	5	15
Lehigh Valley Coal	+	+ 1.63	2020.5	0	2	2	9
Potomac Electric	+	+ 1.15	176.2	2	3	3	24
Public Service of Colorado	+	+ 1.92	165.1	0	0	0	26

TABLE 2 (Continued)
SELECTED DATA ON INSIDER TRADING

Company Name	Algebraic Mean	Co-efficient of Variation	Ab-solute Mean	Co-efficient of Variation without regard to sign	Sale Sale	Sale-Purchase	Pur-chase Sale	Purchase Purchase	Number of Trans-actions
Union Electric	+ 791.2	+ 2.85	1023.5	2.11	0	2	1	12	16
Washington Gas & Light	+ 111.8	+ 4.12	257.2	1.55	2	2	2	11	18
Delaware & Hudson	- 879.6	+ 3.83	1203.6	2.71	2	3	3	13	22
Great Northern R.R.	+ 163.8	+ 7.44	811.4	1.14	30	17	18	19	85
Gulf Mobile & Ohio R.R.	+ 96.1	+ 1.63	155.5	0.63	0	3	3	22	29
Kansas City Southern R.R.	- 590.3	- 4.11	730.7	3.27	23	11	10	5	50
Illinois Central R.R.	+ 2710.0	+ 8.78	3483.7	6.80	10	3	3	25	42
Louisville & Nashville R.R.	+ 142.2	+ 2.80	281.4	1.12	6	2	3	12	24
Reading Co.	+ 7802.3	+ 4.88	8493.8	4.46	7	3	3	20	34
St. Louis—San Francisco R.R.	- 648.2	- 2.34	786.3	1.85	7	12	12	19	51

shares made 1077 transactions with a mean purchase of 863 shares. Comparable results were noted by Smith using data from 1936-1938; thus these differences are apparently stable.⁸

Transactions are heterogeneous in character. There are 100 instances of gifts with an average size of 2195 shares. There are 326 exercises of rights with a mean "purchase" of 1001 shares.

Statisticians recommend stratification for reducing the variance of estimates when the component groups are heterogeneous. Such techniques at best might reduce the variance by a factor of five. It would still be next to impossible to say anything useful about what constitutes an unusual volume of insider trading in stocks.

Investment advisers have dealt with the problem by analyzing the number of different buyers and sellers rather than the volume of trading. Thus, the Value Line Investment Survey measures insiders' interest by cumulating the difference between the number of insiders who bought and sold in the month.⁹ This figure is divided into the number of officers and directors in the company to compute the "Index of Insider Decisions." The Consensus of Insiders relies on a "one-man-one-vote theory." They periodically report the ten stocks for which the number of insiders who were net buyers exceeded by the largest number those who were net sellers.

Since certain trading schemes based on the number of transactions will be examined below, it seems desirable to consider the statistical properties of the distribution of buyers and sellers in a month. Table 3 contains the joint frequency distribution of the number of buyers and the number of sellers in a month for the 3,370 company months in the sample. By adding entries in the table, it is possible to construct the distribution of total insider

TABLE 3
JOINT FREQUENCY DISTRIBUTION OF NUMBER OF BUYERS AND NUMBER OF SELLERS
IN A MONTH

Number of Buyers	Number of Sellers						Total
	0	1	2	3	4	5 or more	
0		838	179	63	22	31	1,133
1	1,308	226	46	15	8	7	1,610
2	313	52	19	6	1	2	393
3	92	22	6	2	0	0	122
4	40	9	2	1	1	1	54
5 or more	41	9	6	2	0	0	58
Total	1,794	1,156	258	89	32	41	3,370

⁸ Frank Percy Smith, *supra* note 4 at 102.

⁹ Letter from Value Line Investment Survey to James Lorie, Oct. 19, 1965.

transactions in a month. In 2,146 company months, there was only one insider transaction; in 718 months, there were two transactions; in 253, there were three; and in 118, there were four. One insider transaction during the month is 2.99 times as likely as two transactions, which is 2.84 times as likely as three transactions, which is only 2.14 times as likely as four transactions.

By subtracting entries, it is possible to calculate the frequency distribution of the number of net buyers or sellers (Table 4). It is apparent that there were three or more net buyers in approximately 5.9 per cent of all months when there are non-option and non-gift transactions. There were three or more net sellers approximately 4 per cent of the time. These numbers allow us to construct control bands that will filter out unusual instances of insider trading for further scrutiny.

TABLE 4
FREQUENCY DISTRIBUTION OF NET BUYERS^a

Number of Net Buyers	Company Months	
	Number	Per Cent
More than 3	94	2.8
3	105	3.1
2	337	10.0
1	1367	40.6
0	248	7.3
-1	890	26.4
-2	195	5.8
-3	73	2.2
Less than -3	61	1.8
Total	3370	100.0

^a The term "net buyer" refers to the number of buyers minus the number of sellers. Thus, in 94 months, buyers exceeded sellers by more than 3 and in 61 months sellers exceeded buyers by more than 3.

We shall follow this approach in some of our own work reported in Section 3-B. Throwing away completely the magnitude of the transaction, however, seems to us to be inefficient. One solution is to weight transactions of different sizes by scaling factors. For example, a purchase of between 100 and 500 could be weighted by 1 and a purchase between 500 and 1000 by 2, etc., with an upper limit of 10, say, for purchases above 4500. Transformations based on the logarithm or square root of sizes of transactions may also be appropriate. On the other hand, it is necessary to take with a grain of statistical salt such headline reports as "Insiders Buy 5-1/2 Times More Stock Than They Sell During the Hectic Three-Day Period in May."¹⁰

Such reports are also suspect at some times, since they fail to take account of a strong seasonal tendency in options. There was a total of 916 option transactions in our sample and 408 of these transactions occurred during the

¹⁰ Wall Street Journal, Sept. 24, 1962, at 6, col. 3.

first three months of the year. This number is 6.8 standard errors away from its expectation of 229, if option transactions were distributed uniformly. It turns out that option buying accounts for 70 per cent of the total purchases in our sample. Therefore, in compilations treating the exercise of option as purchases, we should expect the early months of the year to show relatively greater buying.

The predictive implications of the exercise of insider options have never been explored. This appears to us to be an oversight, since other convertible securities such as warrants, convertible bonds, stock rights, and call options have been studied in some detail. In most of the models presented in these studies, the value of the convertible security depends on the expected price of the common stock into which the security can be converted in the future. When expectations concerning the future price worsen, the value of the convertible security will decrease. For example, we would not pay much for a one-year option to purchase the common stock of a company at 100 when we expect the price of the company to move from 20 to 10 in the next six months. Regulations throughout the period of the study require that an insider hold the common stock he obtains through exercising the option for at least six months. If an insider felt that the price of his stock six months in the future would be permanently greater than the stock price prevailing thereafter, he would tend to exercise the option.

Reasoning similar to this leads us to conclude that the exercise of an option is a bearish event. But this view apparently is not accepted on Wall Street or by the academic community. For example, Perry Wysong treats options as equivalent to purchases in his *Consensus of Insiders*. The Investors Statistical Laboratory lumps purchases and options together in their aggregate figure for total insider trading in a month. And Glass, in his suggestive Ph.D. thesis which we consider below, takes a similar tack.¹¹

To test an implication of our theory that options are bearish, we examined all occasions in our sample when the same individual made both option and non-option transactions in a company during the same month. It is very rare for an individual to be both a buyer and a seller in the same month. In fact, in our sample, the odds were about 5 to 1 that an insider with two transactions in a month made two sales or two purchases rather than a sale and a purchase or a purchase and a sale. Thus, if insiders with option trading tended to make purchases during the month in which he exercises his option, we would conclude that options are similar to purchases.

In the entire sample of 8277 transactions, there were only 31 company months in which an insider's option transactions coincided with a purchase

¹¹ Gary A. Glass, *Extensive Insider Accumulation as an Indicator of Near-Term Stock Price Performance* (unpublished Ph.D. dissertation in Ohio State University Library, 1966).

or a sale by the same person. On 25 of these occasions, the non-option transaction was a sale, on 6 occasions it was a purchase. Although the sample is small, the results are significant.

Finally, we can extend the test by comparing the number of non-option purchases and non-gift sales by other insiders in that company month when one or more individuals makes option transactions. There were 1688 sales and 1104 purchases on these occasions. There are significantly more sales than purchases in conjunction with option purchases. Thus we conclude that these two tests tend to corroborate our theory that options are more similar to sales than to purchases.

We turn to a striking property of continuity in insider trading. The successive insider transactions tend to be either purchases or sales. Long runs of consecutive insider purchases or sales in a company are a frequent occurrence. In our entire sample of 3973 purchases and 3277 sales, the odds in favor of a purchase followed by a purchase were three times as great as a purchase followed by a sale. Furthermore, the odds in favor of a sale after a sale were twice as great as after a purchase, even though the unconditional odds in favor of a purchase were 1.2:1.

A breakdown of the number of purchases following purchases, sales following purchases, and sales following sales is contained in columns 5 to 7 of Table 2. Since the number of sales following purchases is within 1 of the number of purchases following sales, the reader can calculate the odds of continuation of purchases and sales for each of the 30 companies. For each of these 30 companies, a purchase is more likely after a purchase than after a sale.

The importance of this phenomenon is that one purchase indicates that other purchases are likely to follow. The first purchase tells more than subsequent ones. A change in direction from selling to buying tells us the new fact that future purchases are to be expected, whereas a sale followed by a sale merely confirms our preceding expectations concerning the direction of insider activities. Therefore, the change in direction of activity probably is of importance in deducing insiders' expectations concerning their stocks.

Some additional confirmation of this inertia can be seen from Table 3. Consider a situation in which you know that there have already been x buyers and y sellers in a month. The chances that the next transaction will be a purchase increases as the ratio x/y increases. For example, if there is already one buyer and one seller in a month, the odds that the next transaction will be a purchase are $52/46 = 1.13$. If there are two buyers and one seller, the odds in favor of a purchase are $22/19 = 1.16$. If there are three buyers and one seller, the odds are $9/6 = 1.5$. By focusing on an entry high in any column in Table 3 and calculating the ratio of the number in the same row but one column to the right to the number in the same column but one row

below, the reader may verify the phenomenon for other initial values of the buyer-seller ratio.

Now that we know some salient feature of our insider trading data, we turn to several analyses of the predictive power of data on trading by insiders. In all cases, we exclude from consideration the exercise of options or rights and gifts.

SECTION 3-A. INSIDER FORECASTS OF LARGE PRICE CHANGES

Do insiders buy before the announcement of good news and sell before bad news? There is controversy about the answer. West points out examples in which "because of new management, new products, diversification, favorable legislation, technological advances, etc., a successful metamorphosis was taking place. Meanwhile, prior to public recognition of such transformations, insiders were quietly accumulating their own stocks in the open market."¹² There were numerous other examples in which insiders sold near the highest prices reached by a "growth" stock.¹³ After the sales by insiders, we are led to surmise that a violent price decline inevitably follows.

Fischer rejects this view in his 706-page thesis. He finds that "specific corporate developments and important news releases have apparently little, if any, influence on overall insider transactions."¹⁴ And Driscoll in his careful M.B.A. thesis found "a lack of speculative interest of insiders in connection with unfavorable dividend action."¹⁵ Our own limited study of mergers, dividend reductions and increases, and earning increases, etc., also failed to uncover systematic exploitation of confidential information by insiders. For example, insiders were net buyers in the six months previous to 17 of 30 randomly selected dividend omissions during 1961-1964. Unfortunately, analysis of insider trading around such events in isolation from the price movements of the company can never reveal whether insiders profited from their information. For example, the price of a stock frequently increases consistently before and after the announcement of a dividend reduction and a decrease in earnings.

To resolve this problem, we have analyzed insider trading before large price changes in a stock, defined as changes of 8 per cent or more. The frequency of these changes obviously varies with the volatility of the stock. In our sample, approximately 10 per cent of all monthly changes were 8 per

¹² Harriet West, *supra* note 7 at 811-812.

¹³ *Id.*

¹⁴ Monroe Carl Fischer, *The Relationship Between Insiders Transactions, the Price of the Common Stock of Their Respective Companies, the Standard and Poor's Stock Price Index, and Price Stability* 212-13 (unpublished Ph.D. dissertation in American University Library, 1965).

¹⁵ Thomas E. Driscoll, *Some Aspects of Corporate Insider Stock Holdings and Trading Under Section 16(b) of the Securities Exchange Act of 1934, ch. 6* (unpublished M.B.A. thesis in University of Pennsylvania Library, 1956).

cent or more and these changes accounted for approximately 30 per cent of total absolute variation in prices.

Insiders are superior forecasters of large changes (Table 5). An investor choosing randomly between buying and selling stocks would find that the ratio of large increases to large decreases following his purchases (ratio A) was equal to the ratio of large increases to large decreases following his sales (ratio B). We analyzed in three ways insider transactions before changes. First, we analyzed the last transaction in the six months before a large change. If the last transaction was a purchase, the chances of a large increase were 71 out of 100. If the last transactor sold stock, the chances of a large decrease were 53 out of 100 (Table 5-A). In other words, the odds in favor of a large increase were 2.5/1 after a purchase and 1.1/1 after a sale. Differences between ratios at least as great as those observed would occur in a sample substantially less than 1 in 10,000 occasions if the universe from which it was selected had ratios of equal magnitude.

TABLE 5
INSIDER TRADING IN SIX MONTHS PRIOR TO LARGE CHANGES IN PRICE*
(Number of Occurrences)

Part	Type of Insider Activity	Price Change	
		Increase (Number of Changes)	Decrease (Number of Changes)
A. Last Transaction	Purchase	212	86
	Sale	89	79
B. Number of Purchases Minus Number of Sales	Positive	197	81
	Negative	81	67
C. Number of Shares Purchased Minus Number of Shares Sold	Positive	210	116
	Negative	86	51

* There were 40 occasions when the number of purchases minus the number of sales was zero and 3 occasions when the number of shares purchased minus the number sold was zero.

The second kind of analysis was of the number of purchases and sales in the six months prior to the large price change. The odds in favor of a large increase were about 2.2 times as great when the number of purchases was greater (Table 5-B).

The third inquiry dealt with the volume of purchases and sales in the six months prior to the large price changes. The evidence is much weaker than for the other two kinds of data, but again the skill of insiders in forecasting large price changes is demonstrated (Table 5-C). There is a loss in information from aggregating the volatile figures on the volume of purchases and sales.

SECTION 3-B. PRICE MOVEMENTS AFTER INTENSIVE INSIDER ACTIVITY

We have already alluded to the theory that the number of different insider purchasers or sellers in a month serves as a measure of the extent of interest by insiders in a stock. Here, at last, we find agreement. Investment adviser West states: "Insider accumulation deserves further investigation if it consists of persistent purchases by several insiders over a period of time."¹⁶ Rogoff, in his Ph.D. thesis, reports: "The probability of a successful forecast of direction of price change of a stock seems to be related to the number of its net buyers or sellers in a month."¹⁷ Finally, Glass concludes: "Through the criterion of extensive insider *accumulation*, an investor could have determined a limited group of securities for which a fair probability existed that sufficient price appreciation would occur to cause the group as a whole to significantly outperform the Dow Jones Industrials over the near-term. . ."¹⁸

Rogoff reports on a study of all stocks which in 1958 met the following criteria:

- (1) They were purchased by three or more insiders within one month.
- (2) They were sold by no insiders in the month of intensive purchasing.
- (3) At least two purchasers increased their holdings by more than 10 per cent.

The 45 stocks meeting these criteria outperformed the market by 9.51 per cent in the six months following the period of "intensive" purchasing.¹⁹

Rogoff also considers the number of occasions that companies in which there was an excess of two or more buyers or sellers outperformed the market. The odds in favor of an advance relative to the market during the next six months are approximately 2.1 times as great in months in which there were two or more net buyers as when there were two or more sellers.²⁰ Differences this large would occur by chance less than 1 in 10,000 occasions.

Glass calculated for 14 selected two-month periods the relative performance of companies for which there was intensive insider buying during 1961-65. Glass included options as purchases rather than excluding them as Rogoff did (or counting them as sales as we might advise). Instead of choosing companies in which there were two or more net buyers or sellers, Glass chose the eight companies for which there was the greatest excess of buyers over sellers. Glass found that the companies he selected outperformed the market by an average of about 10 per cent during the next seven months. Despite

¹⁶ Harriet West, *supra* note 7 at 810.

¹⁷ Donald L. Rogoff, *The Forecasting Properties of Insiders' Transactions* 100 (unpublished D.B.A. dissertation in Michigan State University Library, 1964).

¹⁸ Gary A. Glass, *supra* note 11.

¹⁹ Donald L. Rogoff, *supra* note 17 at 15.

²⁰ *Id.* at 96.

these differences in coverage, definitions, and technique, he reached conclusions similar to those of Rogoff.

The results of Rogoff and Glass are suggestive but not decisive. The stocks meeting their criteria may have been more volatile than the stocks in the Moody Index, and this greater volatility could have accounted for their superior performance in a rising market.

Furthermore, Rogoff assumed that the insiders executed their transaction at a price prevailing on a mid-month Friday, and Glass used the first trading day in the next month. But under the present system of reporting, the earliest an investor could be confident of finding out about insider trading would be six trading days after the end of the month. As we reported in Section 1, however, the insider actually buys at more favorable prices (lower) than this latter price on about 75 per cent of all occasions. Assuming that transactions are made with equal frequency throughout the month, the price on a mid-month Friday is an average of $14\frac{1}{2}$ days closer to the actual date of the transaction than is the sixth trading day after the end of the month. A similar argument limits, though not as severely, the utility of Glass's conclusions.

To test the importance of the relationship between intensive insider trading and subsequent price movements in stocks, we chose 30 stocks at random from those included in Rogoff's thesis. Calculations of month-end prices from January 1961 to June 1964 were made for these stocks and for the Dow Jones Industrials on all occasions on which there were two or more insiders buying or selling. There were 315 such occasions. During this period, intensive buying and selling, as measured by Rogoff's procedure, were not useful predictors of stock performance in the subsequent six months (Table 6, Part A).

To gain further information concerning the possibility of utilizing data based on insider trading, we studied a sample of stocks for a period for which the exact dates of purchase and sales were available.²¹ For each transaction, the price on the exact date of the transaction and the price six trading days into the next month were determined. Percentage changes in price were computed over the next six months. These changes were compared to changes in the Dow Jones Industrial Average over the same period.

Data based on this procedure indicate a strong relationship between insider trading and price movements (Table 6, Parts B and C). Furthermore, there appears to be an opportunity for investors to profit from knowledge of trading by insiders. Thus, when the number of buyers exceeded the number of sellers by at least two, the probability was about 0.60 that the stock would outperform the Dow Jones Industrials during the six months after

²¹ To keep the computations manageable, we did not consider those occasions on which 2 buyers and 0 sellers or 2 sellers and 0 buyers made transactions.

TABLE 6
 PRICE MOVEMENTS RELATIVE TO THE MARKET OF STOCKS WITH INTENSIVE INSIDER TRADING
 (Based on Price Changes During Six Months Subsequent to Insider Trading)

Part	Period	Prices as of Specified Date	Type of Intensive Insider Activity	Price Movements Relative to Market	
				Advance (Number of Cases)	Decline (Number of Cases)
A	1961-1964	End of Month	Excess of 2 or More Buyers	52	82
			Excess of 2 or More Sellers	77	104
B	1963-1964	Exact Date	Excess of 2 or More Buyers*	36	19
			Excess of 2 or More Sellers**	43	81
C	1963-1964	Six Trading Days After End of Month	Excess of 2 or More Buyers*	34	21
			Excess of 2 or More Sellers**	45	79

* Months with 2 buyers and 0 sellers are excluded.

** Months with 2 sellers and 0 buyers are excluded.

the sixth trading day following the end of the month in which the trading took place. When sellers exceeded buyers by two or more, the probability was about 0.64 that the stock would perform worse than the Dow Jones Industrials in the following six months. The probability that such relative frequencies would occur by chance is substantially less than 1/100,000, assuming that intensive insider buying and selling transactions were independent of future price movements of individual stocks. Insider transactions were slightly more successful when measured from the actual date of the transaction than when measured from six trading days after the end of the month (Table 6, Parts B and C).

During 1963 and 1964, the market rose substantially. The possibility exists that companies in which there was intensive insider trading were more volatile than other companies. More volatile companies would be expected to perform better than the averages during a market rise. To test this theory, we measured the volatility of each stock in which there was intensive trading in 1963 or 1964. The measure of volatility we chose was the regression coefficient in the regression relationship between the rate of return on an individual security and the rate of return on the Fisher index.²² This number measures the expected ratio of the companies' percentage change in price to the market's percentage change in price. This measure of volatility is highly correlated with other measures such as the mean absolute deviation and the variance.

The median regression coefficient for all companies on the stock exchange is approximately 0.95. If the companies in which insiders made intensive transactions were more volatile than the market, more than half of the coefficients for these companies should be greater than .95. In fact, the results show that during 1963, 41 had coefficients greater than 0.95 and 43 had coefficients less than 0.95. Thus, we would conclude that the volatility of the companies in which there was intensive insider trading was not significantly greater than that for all listed companies and that the higher rates of return for these companies apparently were not attributable to their volatility.

SECTION 3-C. DIFFERENCES AMONG COMPANIES IN THE CONSISTENCY OF PROFITABILITY OF TRADING BY INSIDERS

In the preceding sections, we discussed the relationship between different measures of insider trading and subsequent price movements in stocks. In this section, we consider differences among companies in the profitability of trading by their insiders. Such differences might arise from differences in the volatility of prices, policies concerning trading by insiders, the importance of options or other things. It would be profitable for outsiders to be able

²² For a description, see Lawrence Fisher, *Some New Stock-Market Indexes*, 39 J. Bus. 191 (1966).

to identify companies whose insiders consistently trade on the basis of apparently superior prescience regarding developments in their companies. To test the existence of such companies, we again draw on work by Rogoff. For each of the 98 companies in his sample, Rogoff presented several measures of the performance of insiders. For each company, Rogoff gave (a) the proportion of months during which stock bought by insiders performed better than the market or stock sold by insiders performed worse, (b) the probability of observing an equal or greater number of successful predictions if the chances of a successful prediction were 0.5, (c) the mean rate of return relative to the market of stock bought by insiders, and (d) the mean rate of return relative to the market of stock sold by insiders. Rogoff's data cover the period from 1957-1960.

Using data from 1961-1964, we calculated numbers comparable to Rogoff's for each of 30 companies chosen at random. We compared the profitability of trading by insiders in the same companies in both periods. As far as we can detect—and we tried many approaches—there is no tendency for insiders of individual companies to trade with superior success during consecutive time periods. For example, the rank correlation between the proportion of correct predictions in the two periods is $-.01$. Only 8 of the 15 companies with the highest proportion of successful forecasts in 1957-1960 were among the 15 most successful during 1961-1964.

We also studied differences between the predictive power of purchases and of sales. Successful forecasts of changes in one direction only could occur because of a strong trend in the price of a stock. Successful forecasts of changes in both directions are stronger evidence of forecasting ability. There were 11 companies in which both selling and buying insiders outperformed the market in 1957-1960. Six of them were among the 15 companies whose insiders traded least successfully in 1961-1964.

Further study is needed before we can reject the conventional view of consistency of ability. It also might pay to examine the transactions of individual insiders to see if any pattern of consistency occurs. Our reported results, however, give no indication that these more microscopic studies will be valuable.

CONCLUSION

This study indicates that proper and prompt analysis of data on insider trading can be profitable, although almost all previously published studies have reached the contrary conclusion. When insiders accumulate a stock intensively, the stock can be expected to outperform the market during the next six months. Insiders tend to buy more often than usual before large price increases and to sell more than usual before price decreases. We have been

unable to find companies in which the insiders are consistently more successful in predicting price movements than are insiders in general.

There is a pervasive continuity in insider trading. Long runs of consecutive insider purchases or sales in a company are a frequent occurrence. The odds in favor of a purchase followed by a purchase are three times as great as a purchase followed by a sale. A change in direction of activity from purchase to sale, or vice versa, is of importance in deducing insider expectations concerning their stock.

There has been difficulty in previous studies of insider trading in securing accurate information on prices and dates of transactions. This lack of precision has tended to create the impression that insiders are less successful in their trading than they actually are. In the absence of an exact date of purchase or sale, the investigator has assumed that the transactions were made at the average price for the month, or at the price prevailing at the middle or at the end of the month. But, the price on the day the insider actually made his transaction has consistently been more favorable to him than the prices on the aforementioned date.

The Securities and Exchange Commission and the stock exchanges should be encouraged to provide faster and more complete dissemination of insider trading data.