Stock Market Efficiency and Insider Trading
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Since the U.S. stock market (NASDAQ, American Stock Exchange, and New York Stock Exchange) is an efficient market, it is impossible to outperform the market average without luck. If the market gains twenty percent for the year and an investor earns twenty five percent then the investor's performance is nothing more than pure luck. However, there exists a possible exception, insider trading. Company insiders have knowledge that is only available to themselves and can possibly use this knowledge to outperform the market. This is the claim which will be explored. If upper level executives purchase their own company's stock, then the stock price will increase in the future, at a level above the market. On the other hand, a company in which upper level executives sell some of their stock will see its stock price either fall or under perform the market index.

I. Theory

The efficient market theory states that "prices of securities in financial markets fully reflect all available information." (Mishkin, 1997, 693) It is unrealistic to assume every player in the stock market knows all the relevant information and how to analyze what it means. However, "Economists have shown that efficient markets do not require that all participants have information." (Stiglitz, 1993, 267) It also is not important that all the participants know how to analyze the information and have rational expectations as to what a securities price should be. "Not everyone in a financial market must be well informed about a security or have rational expectations for its price to be driven to the point at which the efficient markets condition holds." (Mishkin, 695) All the efficient market requires is that a few people have the information. When a few participants have the information prices will move as if everyone in the entire

market were well informed. "All it takes is a few people knowledgeable enough to recognize a bargain, and prices will quickly be bid up or down to levels that reflect complete information. And if prices reflect complete information, even uninformed buyers, purchasing at current prices, will reap the benefits." (Stiglitz, 267)

If all information is reflected in a stock's price it is unrealistic to assume an investor can beat the average gains of the entire market, regardless of how much information he or she gathers since all market participants know all the relevant information. If an individual is able to outperform the market then it is a result of luck.

> "You cannot 'beat' an efficient market any more than you can beat the track; you can only get lucky in it. If you are trying to make money in an efficient stock market, it is not enough to choose companies that you expect to be successful in the future. If you expect a company to be successful and everyone else also expects it to be successful, based on the available information, then the price of shares in that company will already be quite high." (Stiglitz, 267)

Under an efficient market, a stock's price moves up and down only when new, unexpected information becomes available. "Because prices in an efficient market already reflect all of the available information, any price changes are a response to unanticipated news." (Stiglitz, 268) Since future news is unknown (whether it will be good or bad), it is impossible to tell which direction the price of a stock is going to move in the future. Therefore, stocks have an equal chance of increasing or decreasing in value, a phenomenon known as a random walk. "An important implication on efficient markets theory is that stock prices should approximately follow a random walk; that is, future changes in stock prices should, for all practical purposes, be unpredictable." (Mishkin, 697) Since the stock market follows a random walk it is impossible for individuals to systematically beat the market. "The randomness of the market has one important consequence: some individuals are going to be successful. However, people have a

desire to believe that their insights, rather than luck, enable them to beat the market." (Stiglitz, 269)

In conclusion, "The efficient market hypothesis assumes all available public information is fully reflected in a security's market price. It also assumes that no individual can have higher expected trading profits than others because of monopolistic access to information." (Finnerty 1976, 1141)

There is, however, a possible exception to the idea that it is impossible to systematically beat the market. This exception comes in the form of insider trading.

Company insiders have information unavailable to the public. These individuals have first hand knowledge of what the company is doing and better information concerning what the future might hold. If there are likely problems for the company in the future, such as poor earnings, slow growth, or lawsuits, then insiders can sell their stock before these events happen. When this information becomes public, the stock's price should decrease. However, this price decrease occurs after the insider has sold his or her shares, thus avoiding the loss. In this case the insider beat the market. On the other hand, insiders know when their company has a bright future, high potential earnings, innovative products being developed, etc. When the future looks bright, insiders can buy shares before the public becomes aware of these facts. The price, later, fully increases to represent the positive information. In both cases, insiders use private information to beat the market.

II. Data

Companies in the analysis have individuals that filed form 4s to the Securities and Exchange Commission (SEC). The SEC requires insiders, anyone who is an executive, officer, on the board of directors, or owns more than 10 percent of a company's stock, to file a form 4

when they buy or sell stock in the company. (Burton, 1998) The data include thirty instances of

insider buying and thirty instances of insider selling, each of which occurred at a different time

period. For each transaction the price at which the insider either sold or bought the stock was

recorded, along with the stock's price after one-month, six months, and one year. The percent

change was then calculated for each period. The Standard and Poor's 500 (S&P 500) index was

used to represent the broad market return, since it is the vehicle which investors use to represent

the market. The S&P 500's percent change was calculated for each of the sixty insider trades at

the corresponding one month, six-month and one-year time periods.

A. Initial Results

The thirty buys and thirty sells were separated into two groups. For each group, the mean

change in the individual stocks and S&P 500 were calculated (see Table 1 below).

Table 1: Insider Buying

	1 Month	6 Months	1 Year
Individual Stocks			
Mean Return	3.97%	21.10%	49.08%
Standard Deviation	7.70%	19.11%	52.25%
S&P 500			
Mean Return	3.24%	16.91%	36.65%
Standard Deviation	3.34%	4.91%	7.06%

It appears, from Table 1, that, on average, inside buyers were able to outperform the market over each period. On average, insiders beat the market by .73 percent over one month, 4.19 percent over 6 months, and by 12.43 percent over one year.

Table 2: Insider Selling

	1 Month	6 Months	1 Year
Individual Stocks			
Mean Return	-0.70%	11.19%	14.46%
Standard Deviation	10.23%	18.98%	35.22%
S&P 500			
Mean Return	0.65%	14.91%	31.41%
Standard Deviation	3.89%	4.27%	5.42%

Table 2 confirms the possible benefit of insider trading. Stocks which experienced insider selling under-perform the market in each of the various periods. In the one month period stocks with insider selling actually produced a negative average net return of -0.70 percent. This is 1.35 percent less than the market return in the initial month following the sales. The stocks also under-perform the market over the six-month and one year time period, by 3.72 percent and 16.95 percent respectively.

These numbers appear to support the theory that an insider can outperform an efficient market. On average all the stocks experienced a gain in price, regardless of the nature of the insider activity. This result is due to a significant rise in the market as a whole. However, the average amount gained by each group differs. The stocks with insider buying outperform the

market during each period. On the other hand, stocks with insider selling produce positive net

gains but under-perform the market, with the one exception (one-month insider selling).

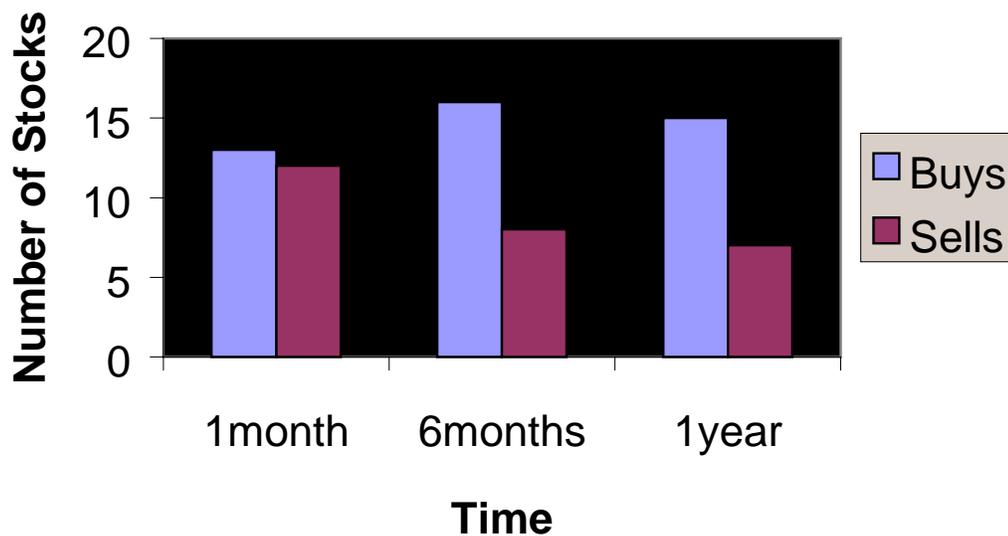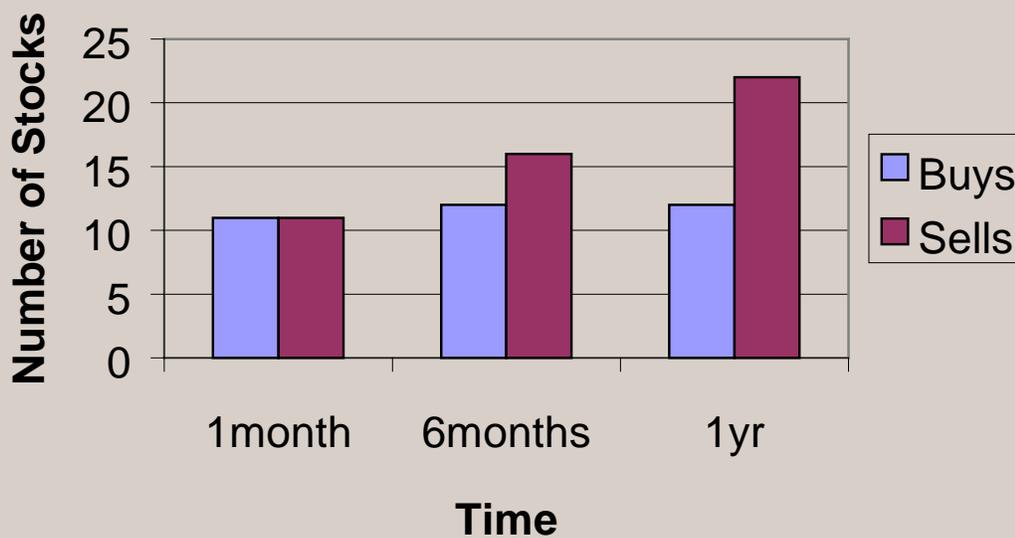## Figure 1: Amount of Stocks that OutPerform the Market

Figure 2: Amount of Stocks that Under Perform the Market

The bar graphs (Figures 1 and 2) compare how many stocks experiencing insider buying and insider selling outperform the market at each period, and also how many under-perform the market at each period.

The bar graphs reveal that there is a consistent decrease in the number of insider selling stocks that outperform the market over time, and a consistent increase in the number that under perform the market. The graphs also suggest that the mean percent changes in the returns are not the result of outliers.

III. Statistical Results

In order to test the statistical significance of the data t-tests were run for each of the six sample periods.

Table 3: Insider-Buying - Two Sample T-Test (assuming unequal variances)

	Percent Change 1 Month		Percent Change 6 Months		Percent Change 1 Year	
Mean	3.97	3.244	21.10	16.91	4.09	36.65
Variance	59.31	11.13	365.34	24.11	2729.85	49.80
Observations	30	30	30	30	30	30
Hypothesized Mean Diff.	0		0		0	
Df	40		33		30	
t-value	0.472		1.162		1.292	
P(T<=t) one-tail	0.32		0.127		0.103	
t Critical one-tail	1.684		1.692		1.697	
P(T<=t) two-tail	0.639		0.254		0.206	
t Critical two-tail	2.021		2.035		2.042	

The above t-tests compare the average returns of stocks which insiders bought at the one month, six month, and one year periods, and the returns of the market during the corresponding periods. The t-tests suggest that the returns from stocks which experienced insider buying are not significantly different from the market return.

Table 4: Insider Selling - Two Sample T-Test (assuming unequal variances)

	Percent Change 1 Month		Percent Change 6 Months		Percent Change 1 Year	
Mean	-0.07	0.65	11.19	14.91	14.46	31.41
Variance	104.68	15.13	360.13	18.25	1240.72	29.35
Observations	30	30	30	30	30	30
Hypothesized Mean Diff.	0		0		0	
Df	37		32		30	
t-value	-0.673		-1.049		-2.605	
P(T<=t) one-tail	0.252		0.151		0.007	
t Critical one-tail	1.684		1.694		1.697	
P(T<=t) two-tail	0.505		0.302		0.014	
t Critical two-tail	2.021		2.035		2.042	

The three t-tests above were run to test the statistical significance of the insider selling and the corresponding market data at the one-month, six-month, and one-year periods. The t-tests for one-month percent change and six-month percent change suggest that the return differences are not statistically significant. However, the return on stocks which experienced insider selling was significantly less then the corresponding market returns.

The t-test results proved to be rather interesting. The fact the statistically significant data came at the one-year period was not surprising. It takes time for the insiders' information to become public. Therefore, it takes time for a stock's price to adjust and reflect this information. The t-tests reveal that at the one-month and six-month periods, stocks bought and sold by insiders do not produce returns above the market. This could result from the fact that the stocks' price movements are due to factors other than the inside information. The data show that inside

information takes a significant amount of time - about one year - to become public and be reflected in the stocks' prices.

While it was not surprising to see the long-run (one-year) returns are statistically significant, it was a surprise to see the one year insider selling returns are significant, rather than the one year insider buying data. Due to the fact that there are numerous reasons other than inside information for insiders to sell shares in their company, it would be expected that the insider selling data would not be statistically significant. Insiders can be motivated to sell shares in their company for all sorts of reasons. For example, insiders may sell shares because they want to diversify their portfolio. Insiders probably do not want all their assets in one basket (their company's stock). In order to diversify their holdings, we expect insiders to periodically sell shares of their company's stock and invest the money in different assets. Insiders might also sell stock because they need an increased capital flow to fund the purchase of a new house or to send a child to college. In both of these cases the insider trades would not be information motivated. On the other hand, why would an insider buy shares in his or her company other than having positive inside information? These considerations imply that the data include cases of insider selling where the insider's goal was not to outperform the market. This should distort the data, and cause them to be statistically insignificant. However this did not occur; the insider selling data are statistically significant, while the insider buying data are statistically insignificant.

Why then, would the one-year insider selling data be statistically significant, while the one year insider buying data is not? One reason may stem from the personalities of insiders. Insiders are individuals who have been very successful, and hold jobs such as Chief Executive Officers (CEO), Chief Financial Officers and various other executive positions. In order to rise

to the executive level an individual must have confidence in themselves and their ability to perform well in the future. This can be seen in Michael Eisner's (CEO of Disney) comment about his ability to face challenges. "No obstacle ever seemed too difficult to surmount." Maybe this confidence, which helped insiders reach the top levels of their profession, also has negative effects on their decision making. Perhaps insiders can become too confident which gives them a false perception about their abilities to run a company, and control the company's future. Insiders may become overconfident if they believe that they can do a better job than anyone else. Since they are running the company they might believe that there is no way that it can fail; if a problem arises, they will be able to find the most appropriate way to handle it. However, these individuals are not perfect, and they are not immune from poor decision making. Situations may arise that they cannot control. Insiders' overconfidence may give them a distorted view of the company's future, hence they might purchase stock in their company when the future is not as bright as they believe it to be. Because of this, the stocks in which insiders purchase do not perform as well as they predict.

A second theory as to why the insider buying data were not statistically significant has to do with the ability to predict disastrous and positive events. Is it possible insiders have an easier time predicting upcoming disasters? Over time all firms are expected to grow, so how are insiders supposed to determine if their company will grow faster than the companies it competes with. For an insider to profit from positive inside information about their company, the insider needs to have an accurate picture of how much the company is going to benefit from the information in relation to the growth rate of the industry in which they compete. In order for an insider to use information such as positive upcoming quarterly earnings, the insider would have to know how the future earnings compare with other companies. Gathering such information on

other companies is tough to accomplish, since it is also often non-public information. As a result, insiders often make trades without knowing how their competitors are going to perform in the future. An insider might purchase stock in its company because of good news, yet the news might not result in a growth rate above its competitors. On the other hand, it is relatively clear what is going to happen to a stock's price if an insider has negative inside information. If a company will experience negative events, then the stock price will likely under-perform. In this case an insider does not need to know what is going on with its competitors.

IV. Conclusion

The initial data suggested that insiders could significantly outperform the market by either buying or selling shares of their company's stock in both the short and long term. However, after statistical analysis was performed on the data it became apparent that insider trading was not so profitable. The data suggest that no form of insider trading, buying or selling, is profitable in the short run (one to six months). After performing statistical analysis, we can conclude that it takes about one year for insider information to become public and reflected in a stock's price. However, not all insider trading is profitable in the long run. Stocks that were sold by insiders under-perform the market after one year. The one-year data for insider buying proved to be statistically insignificant. The inability of insiders to profit from purchasing shares in their own company may be due to their lack of knowledge about competitors coupled with an overconfidence in their ability to manage their company.

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