

Insider Trading and Stock Returns

Introduction: Does Insider Trading Affect Stock Returns

Individual and corporate investors are constantly trying to find ways to 'beat' the market. Consequently, there are vast quantities of financial data waiting analysis. A particularly interesting portion of this data is insider trading. Whenever a company official or beneficial owner trade shares of their company, they are required to report the transaction in an SEC form 4. This information is then made public. It is common to see financial headlines highlighting insider transactions and then claiming that it is indicative of returns which will exceed the market. In this paper, we would like to employ econometrics to find how accurate this assertion is.

Investment firms seek to find market inefficiencies which they can exploit to generate larger returns than the market. If insider trading does positively effect stock returns, insider trading information will be important in realizing excess returns. In the long run, this information would be used to create more efficient markets through the implementation of more accurate investment models. This is not a simple task since many scholars and professional investors employ diverse methods to achieve high returns resulting in mostly efficient markets. Market inefficiencies are not immediately obvious.

Improving the market is one of many ways this examination may positively impact investment research. For example, even if it is shown that there is no statistically significant correlation between insider trading and stock returns, we are eliminating some of the noise in financial markets caused by insignificant data. Determining valuable information is only half of

the problem with investing; we also need to learn what information may be misleading or uninformative.

Debates about insider trading are commonplace with little consensus about the true effects on stock returns. As a result, large amounts of literature on the subject is available. Most of the studies have been focused on illegal trades (that is, trades not disclosed in an SEC form 4) and the liquidity and volume arising from those illegal inside trades; however, we found a few studies that focused on effects of legal insider trading. One of these—“INSIDER TRADING EFFECTS ON STOCK RETURNS AROUND OPEN-MARKET STOCK REPURCHASE ANNOUNCEMENTS: AN EMPIRICAL STUDY” (Raad, Elias, and H. K. Wu-1995)—attempted to see if there was a relationship between return and insider trading coinciding with the time of repurchase announcements. This study found that there is a correlation between insider trading (around repurchase programs) and returns. As we perform our analysis of insider trading in the general case, we may want to keep this fact in mind (for controls). Qiang, and Lo conducted a study in which they showed that insider trading is more likely to occur around voluntary disclosure of information. By voluntary disclosure we mean disclosing information above and beyond what is required by the SEC.

Other studies about insider trading seem to focus on how illegal (i.e. undisclosed), insider trading affects stock returns. Sugato, and McConnell (1999) examined the effects of a confessed insider trader, and showed evidence that insider trading affects price discovery differently than normal ‘uninformed’ trading. Cornell and Sirri likewise studied a specific example of insider trading, but like the previous study, the authors examined a confessed illegal insider trader while we seek to examine legal disclosed insider trading and its effects on stock returns.

Current literature has given us a lot to consider, but continued research is necessary. One reason we need to continue our research is because most of the current literature deals with specialized cases such as inside trading coinciding with repurchase programs, voluntary disclosure of information, or specific examples of illegal insider trading whereas we seek to find the effects of insider trading in the general case. Second, markets continually adapt to new information in a variety of ways, so it should be unsurprising if information revealed by one study is soon absorbed by the markets resulting in entirely new relationships; therefore, there ought to be regular updates in the literature. All things considered, our research will give valuable insights into financial markets and give new and updated information to an already rich field of study.

Data:

All insider trading information is available through the SEC form 4, and many organizations have collected the information and offer various screeners to filter results and view data. Information regarding return, shares outstanding etc, are publicly available through the exchanges on which the companies are traded. Share repurchase information is also publicly available through the annual reports of each individual company. For our research, we will primarily be using Ycharts as our source for collecting and filtering data. Our data include all companies with a market cap of at least 500 million; in addition, to eliminate outliers and focus on pertinent data, we will include only those companies whose annual return for the last twelve months is less than 250%, have experienced at least some insider trading on both buy and sell side (although net trade may be zero), and who have not increased share count by more than 25%. These parameters leave quite a bit of room for variation and give us a decent sample size to work with. After selecting for these filters, we obtained a sample of 426 stocks on which to

perform analysis. We have included a summarization of the data below. Return is calculated as a fraction of increase $\frac{\text{current_price}}{\text{price_one_year_ago}} - 1$ and insider trading is calculated as net insider shares traded divided by total outstanding shares $\frac{\text{InsiderSharesBought} - \text{InsiderSharesSold}}{\text{total_share_count}}$. In addition to these variables, we also include data on stock based compensation, and amount of insider ownership. Last of all, we included information on share repurchase programs as this may be useful for a control variable.

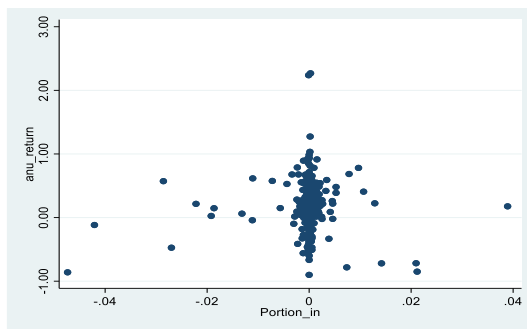
Data Summary:

variable	Obs.	Mean	Std. Dev.	Min	Max
Buy_Back	426	52.55	2038.5	-2.8	32340
Insider_buy	426	2.9152	29.6	.001	373.1
Insider_sold	426	3.22	37.12	.002	527.37
Shares_Outstanding	426	298.7	785.9	6.4	10430
Stock_comp	426	106.2	540.4	0	6703
Inside_owner	426	6.75	50.8	.1057	1126
Annual_return	426	.1913	.345	-.9	2.26

Research Design:

Before doing a regression, we created a scatter plot with total annual return on the Y-axis and the ratio of shares outstanding to net insider shares traded on the X-axis.

Data Visualization:



As can be seen, net insider shares are centered very narrowly around zero, which for large companies should be expected. Also, most returns are about -10 to 30 percent, again, this is to be expected. This data looks consistent with what we would expect, but no trend is immediately apparent to the naked eye, so from here we will do a basic bivariate regression of the data of the form:

$$\text{Anu_return}_{\text{company}} = \beta_0 + \beta_1 \text{InsiderRatio}_{\text{company}} + \varepsilon_{\text{company}}$$

This model is a very basic one, and while it will give us a great overview of what we are likely to see as we continue analyzing data, it is insufficient by itself to give the whole picture. We will likely want to control for additional variables, check for Gauss Markov assumption violations such as the presence of heteroskedasticity and endogeneity.

It has been shown (Raad, 1995) that both insider trading and returns are correlated with share buybacks. This makes our bivariate regression biased because some of the effects on return due to buy backs will incorrectly be attributed to insider trading, thus including the amount spent on share buyback programs is almost certainly necessary in our analysis.

As mentioned, heteroskedasticity is also a concern, running the Breusch-Pagan test indicates that there is heteroskedasticity present. With null hypothesis being constant variance, we found a P-value of .0009, meaning there is essentially zero chance that the null-hypothesis holds; therefore, we reject the null hypothesis that we have constant variance concluding that there is likely heteroskedasticity. To compensate for this, we will run Feasible Generalized Least Squares on the data, and will show the results hereafter. Auto-correlation is unlikely to be an issue since we are using cross-sectional data without any obvious sources of clustering.

Last of all, there is always a possibility of reverse causality or other sources of endogeneity that cannot be controlled for, and we will analyze whether stock based compensation will be a valid instrumental variable for insider trading, the intuition behind it being that as officers are compensated more with company shares, they will have excess shares that they may want to sell to diversify their wealth. Also, we will consider the amount of company stock owned by insiders as a possible instrument.

Empirical Results:

Running the initial bivariate regression shows little to no correlation between annual return and insider trading

Results from bivariate model:

Variable	Coefficient	Std. Err	t-Statistic	P> t
Inside_ratio	.591	.627	.94	.346
Constant	.191	.0167	11.43	.000

We see above that we have a t-statistic of .94 resulting in a P-value of .346. This means that, at least for our bivariate model, we do not have evidence suggesting that insider trading has any causal effect on annual return, and it further suggests that the model has essentially zero predictive power.

Despite the uninformative nature of this initial regression, we note that it has already been shown that there are reasons to believe that this regression may display violations of assumptions inherent in OLS regression, so we now will seek to correct these errors.

One source of bias may be due to omitted variables. If we are to assume the findings of Raad and Wu continue to hold, we know that share repurchase programs are correlated with both return and insider trading activity, thus it is reasonable to suppose that the estimates we found previously are inaccurate.

Next, we will run a second regression, this time it will be multiple regression of the form:

$$\text{Return}_{\text{company}} = \beta_0 + \beta_1 \text{InsiderTrading} + \beta_2 \text{ShareRepurchase} + \varepsilon_{\text{company}}$$

and we get the following results:

Results from multiple regression model:

Variable	Coefficient	Std. Err	t-statistic	P> t
Inside_ratio	.593	.627	.95	.344
Buy_back	$-7.78 * 10^{-6}$	$8.21 * 10^{-6}$	-.95	.344
Constant	.1951	.0172	11.31	.000

Once again, we see that this model seems to lack any sort of predictive power; furthermore, the t-statistic remains essentially unchanged, with an only slightly improved P-value. On a different note, it may be surprising that buy-back has a negative coefficient with an identical probability of significance. This indicates that share repurchase programs do not effect returns even when controlling for insider trading.

As shown previously heteroskedasticity is present, so we will correct this by running generalized least squares on the data. The results are as follows:

Results from FGLS:

Variable	Coefficient	Std. Err.	t-Statistic	P> t
Transformed_insider	.90	.761	1.19	.23
Transformed_buyback	$-7.81 * 10^{-6}$	$8.19 * 10^{-6}$	-.95	.341

Here we have a slightly improved t-statistic, but still below our target of at least 2. To make informative claims about insider trading, we must find additional ways to improve our model.

We now turn our attention to instrumental variables. It is important to keep in mind here that instrumental variables create a biased (but consistent) model, thus our estimate is less accurate. Our sample size is small enough that the biased nature of instrumental variables should cause concern; therefore, we will need to be particularly critical of instrumental variables.

We consider two potential instruments. The first is the ratio of shares owned by insiders to shares outstanding. If insiders own large amounts of company shares they may be more prone to sell shares in an attempt to diversify their wealth, and this will lead to correlation between insider trading and shares held by insiders. As for the exclusion requirement of instrumental variables, we cannot see how high ownership in a company by insiders will lead to abnormal results. With this in mind, pending further analysis, ownership by insiders is a potential instrument. The second potential instrument, mentioned earlier, is total compensation given to company employees in the form of stocks. Intuitively, it would make sense that this may be a good candidate for an instrumental variable because once again, large stock compensation will result in higher ownership by insiders and thus insiders may be more prone to sell excess shares. One argument against the use of stock compensation as an instrument may be that when employees have more stock, they will be incentivized to work harder in the hopes of better performance by the company which will result in higher stock returns. This is, after all, one argument often made in favor of compensating employees with stock. This makes the second of the two variables somewhat shaky, and if we must use instruments we would much rather use the first.

We will now empirically analyze whether these two candidates qualify for instruments by regressing insider trading on each of them. The results are as follows.

Test for Insider Ownership as an instrument:

Variable	Coefficient	Std. Err.	t-statistic	P> t
Owner_ratio	-.016	.019	-.84	.4
Constant	.0011	.001	.9	.367

Test for Stock based compensation as an Instrument:

Variable	Coefficient	Std. Err.	t-statistic	P> t
Stock_comp	$1.57 * 10^{-7}$	$2.4 * 10^{-6}$.07	.948
Constant	.00043	.001	.33	.743

We can see here that neither candidate seems to be correlated very strongly with the ratio of insider traded shares to shares outstanding, which means neither candidate should be used as an instrument. In fact, stock compensation is so highly uncorrelated that it produced a t-statistic of 0.07. Clearly, we would not want to use this as an instrument even if we were certain that the exclusion condition held true. Ownership of stock by insiders did have a higher t-statistic

compared to compensation in the form of stocks, but still it is well below our minimum target of 2, thus it must also be rejected.

Conclusion:

Our research shows there is no evidence suggesting insider trading has a significant effect on stock returns. This should not come as a surprise because, as noted, there has been significant research on the subject, and any significant information regarding stock returns should quickly be incorporated into investment models. This means, that if there was a serious relationship between insider trading and returns, it would quickly be discovered and exploited until stocks automatically incorporate the information into their prices. This reasoning may help explain why we do not see a statistically significant effect of buyback programs on return. If Raad and Wu were correct in claiming that stock buy backs can positively effect returns, it may be possible that this information is incorporated into markets already.

The inability of our models to reject the null hypothesis that insider trading does not affect returns does not necessarily mean that insider trading does not affect return, only that we cannot reject the possibility at the .05 confidence level. After running FGLS, we did see a t-stat of 1.19, which corresponds to about a .23 p-value. This means there is about a 77% chance that insider trading has a non-zero effect on returns. Future studies may further reveal the true relationship exhibited between these two variables, and we are certain that this topic will continue to be a source of academic literature.

On a slightly different note, it may have been surprising to some that the instrumental variable candidates, upon further analysis, failed to meet the relevance requirement. This shows just how complex the financial markets are. Many things that we intuitively believe to be true,

may turn out to be false. Econometrics can be a powerful tool to identify when our intuition fails. We can turn to econometrics to confirm or reject intuition.

In any event, we believe that our research is valuable. We have evidence to suggest that insider trading has no effect on stock returns, but as was just noted, we cannot say this for certain. Even if insider trading does influence stock returns, those effects are minimal. This indicates that we either need to look for additional variables to include in our model to see the effect of insider trading, or it may indicate that entirely new approaches are necessary as we seek to find and exploit market inefficiencies. As is often the case, additional study is necessary.

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