

Insider Trading – Piggybacking Off The 1%

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Introduction

The term “insider trading” often connotes illicit activity when portrayed within conventional media outlets. A simple Google search reveals numerous articles depicting cronies feeding each other information to which only they are privy and using such information to preemptively buy or sell stock in a company before what they’ve learned becomes available publicly.

Insider trading, however, can also refer to the well-defined practice where executives and board members of publicly traded companies buy or sell stock. Critically, this is *not* illegal when carried out according to the laws and regulations defined around the practice. The SEC requires all executives at US-listed public companies to disclose any trading activity conducted in the shares of companies for which they work. This insider buying and trading activity is updated frequently and is publicly available for investors to download from the SEC’s website.

Some investors have developed strategies that track this data, driven by the notion that if an officer of a company is buying stock in their own company, it is an indication that they believe it is a good investment. The converse holds as well - if an officer or executive reports sales of shares in their own company, it could very well be a signal of bad prospects for that company.

Given the above, we investigate the extent to which this sort of insider trading exhibits correlations with the performance of a company’s stock. More specifically, we answer the questions below:

1. Are C-Suite executives generally buyers or sellers of their companies’ stock?
2. Does aggregate insider buying or selling predict future stock market performance?
3. Can metrics be derived from insider trading data in single stocks to reveal a meaningful correlation with the performance of that stock in the public market, either in absolute terms or relative to broad market indices like the S&P 500?

Data

We obtained insider stock trade information from [gurufocus](#)¹, a site that hosts a downloadable version of the SEC’s EDGAR Database. EDGAR maintains a running list of all insider buys and sells reported via Form 4 submissions. Our sample set was isolated to companies with at least one insider trade in the fourth quarter of 2018.

We sourced historical stock price data from Bloomberg² for the period above and one year following our insider trading sample period (10/01/2018 - 12/31/2019).

Data Cleansing

Historical Stock Price Data

We imported the historical stock price data as a DataFrame from a csv file. We dropped unnecessary columns from the data frame and transposed the table so that the dates, which were the columns upon import, became the index - this made the columns the ticker symbols after the transposition. Additionally, we ensured that the index was stored specifically as a datetime object to make subsequent plotting and transformations easier.

All records for 10/01/2018 were undefined upon import, so we elected that since it was only a single random date, it was okay to drop this from our analysis. We removed special characters from cells and converted all values to floats since they were imported as strings.

We imputed NaN values with the column-wise median. We elected not to use special imputation methods (i.e., KNN) as such distance-based methods require more advanced preprocessing than what is within the scope of this project. Additionally, we knew at this stage that insider trading information was also reported daily, hence we determined that no resampling or rolling up to months or quarters was necessary. The cleaned historical stock data was saved as a separate csv file from which to begin our analysis.

Insider Trading Data

We imported the insider trading data as a DataFrame from a csv file. We dropped unnecessary columns and transformed the index to a datetime object for the purposes of smoother plotting and transformations. Additionally, we recast all appropriate columns as integers or floats from strings in order to perform subsequent calculations.

We checked for NaN values and found sixty six (66) within the “Insider Position” field and seven (7) within the “Price Change Since Insider Trade (%)” field. We determined we did not need to impute these NaN values since they occurred within columns which we would not use. The cleaned insider trading data was saved as a separate csv file from which to begin our analysis.

Finally, we do note that there are some very sizable outliers in our dataset, driven by the fact that there are a number of extremely large companies (“Mega-Caps”) in the US stock market (i.e. Apple, Microsoft, Amazon, etc.). To mitigate the effects that these few but large companies had

on our analyses, we made the decision to exclude all companies with a “Market Value Traded” Z-Score of greater than 1.5 in any data set where Market Value was relevant to our findings. Similarly, we excluded any companies where the total Market Value traded was negligible (less than \$100 of net Market Value traded during our sample period). This filtering reduced our sample size from the initial 2,060 companies to 1,533.

Feature Extraction

After initial exploration of both datasets, we determined we ought to create our own, custom data frame to examine the data sets more closely in parallel. More specifically, we constructed a data frame with a ticker symbol index and created custom columns using the insider trading and historical stock price data frames.

Preliminary Findings

One key point of understanding that our analysis reveals is that the total number of trades registered with the SEC and the total number of shares traded are indeed very different measurements and are not tightly correlated. Specifically, the former is simply a measure of how actively insiders are trading, whereas the latter is a measure of the number of shares traded. This difference can be seen clearly in Figures 1 and 2, below.

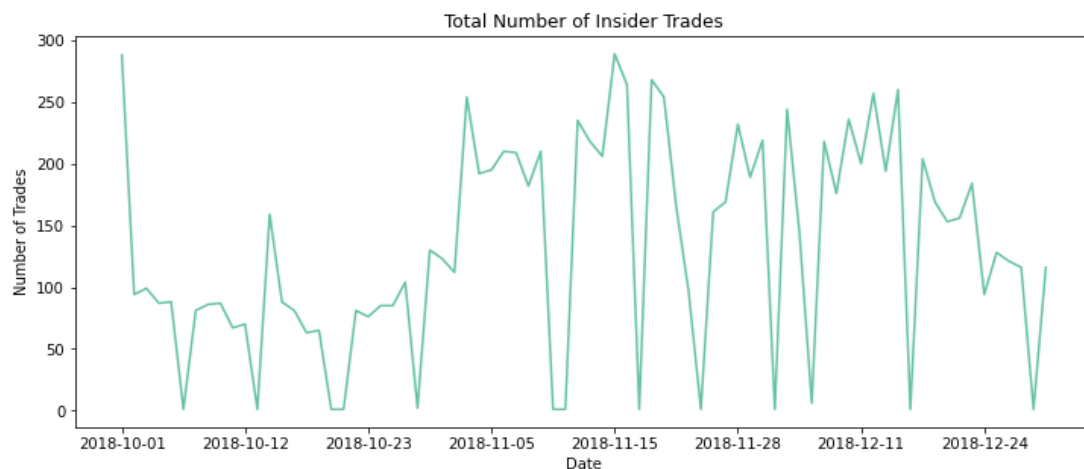


Figure 1 Time series plot of the total number of insider trades executed per day, aggregated across companies within our sample. Results indicate that the total number of trades executed follows no distinct pattern and fluctuates frequently within the sample period.

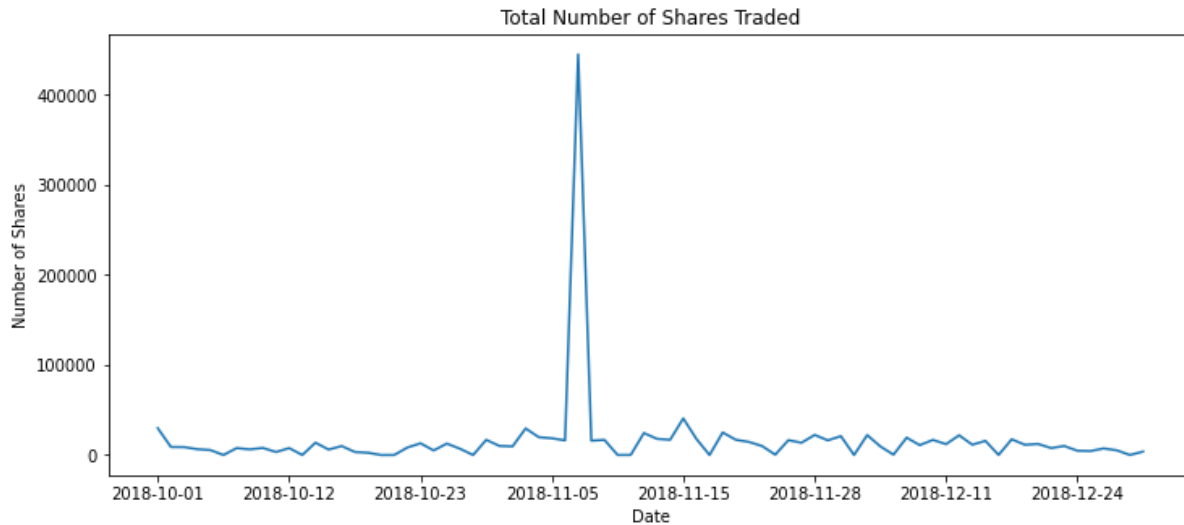


Figure 2 Time series plot of the total number of shares traded per day, aggregated across all companies. The anomalous spike in November 2018 is a result of trades in the shares of a small-cap company, who's shares trade at a very low dollar price.

Related to this finding is the idea that the Market Value of the shares traded is far more informative than the raw number of shares traded. To provide some intuition behind this, if an executive announces they are selling 1,000,000 shares, but those shares trade for \$0.01 / share, the Market Value of this sale is relatively low at \$10,000. On the other hand, if those shares traded for \$10 / share, the Market Value of this sale is significantly higher at \$10,000,000 – likely a significant amount even for generally well-paid executive-level employees.

As a result, we found it very helpful to normalize the data such that we are looking at the trading activity through the lens of Market Value, rather than number of shares traded.

Research Question Conclusions

- 1) While C-Suite executives are very active in trading their company's stock, the vast majority of insider trading activity (measured by Market Value) is comprised of "Sell" Trades

An important finding that is plainly visible in our data is that C-Suite executives are very active in their personal trading activities. Our data set – which, as discussed, is defined as those companies where insider transactions occurred in the 4th quarter of 2018 – contains over 2000 companies with over 10,000 transactions. Figure 3 below shows a breakout of these transactions, stratified by the respective title of each trader.

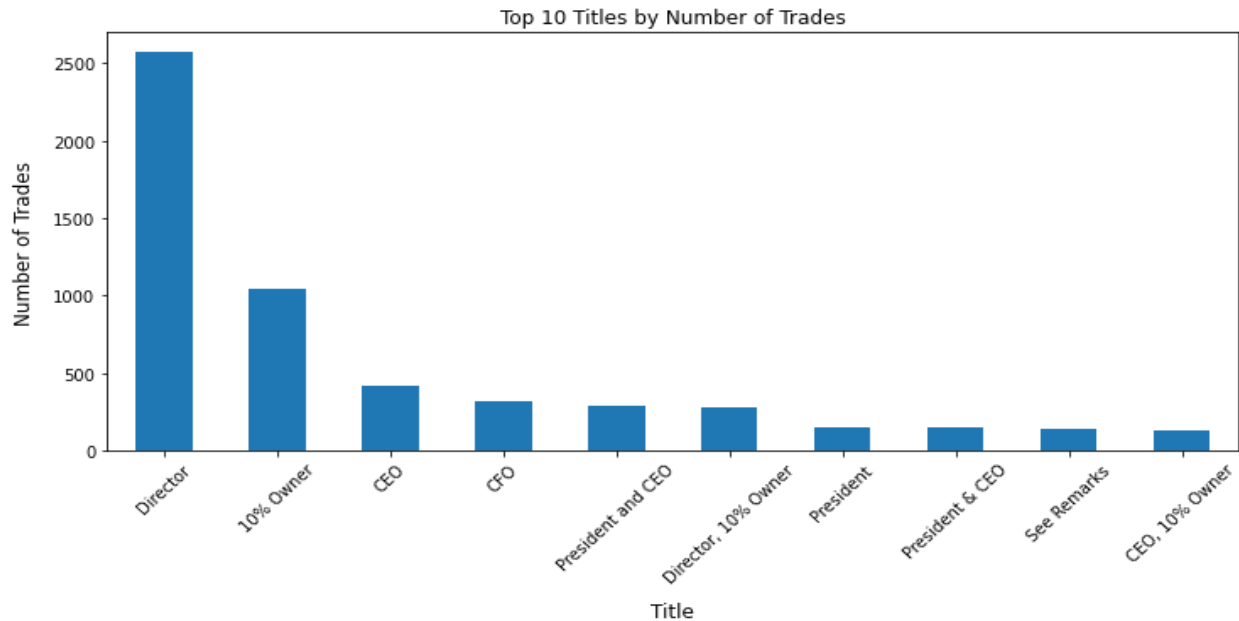


Figure 3 Bar chart plotting the number of Transactions filed into the SEC’s EDGAR database, stratified by Officer Title. This shows how many distinct transactions were registered in our sample period.

Perhaps understandably, our data shows that most trading activity in our data set consists of stock sales. On a netted basis, the data in our data set shows a net sell of \$136,855,122 across the initial 2,060 companies in our data set, or \$335,429 of sales per company on average.

After applying the Market Value Traded filtering methodology discussed in the “Data Cleansing” section, the figure stands at \$38,761,230 of sales, or \$25,284 per company across the 1,533-company sample. This distribution is shown in Figure 4 below.

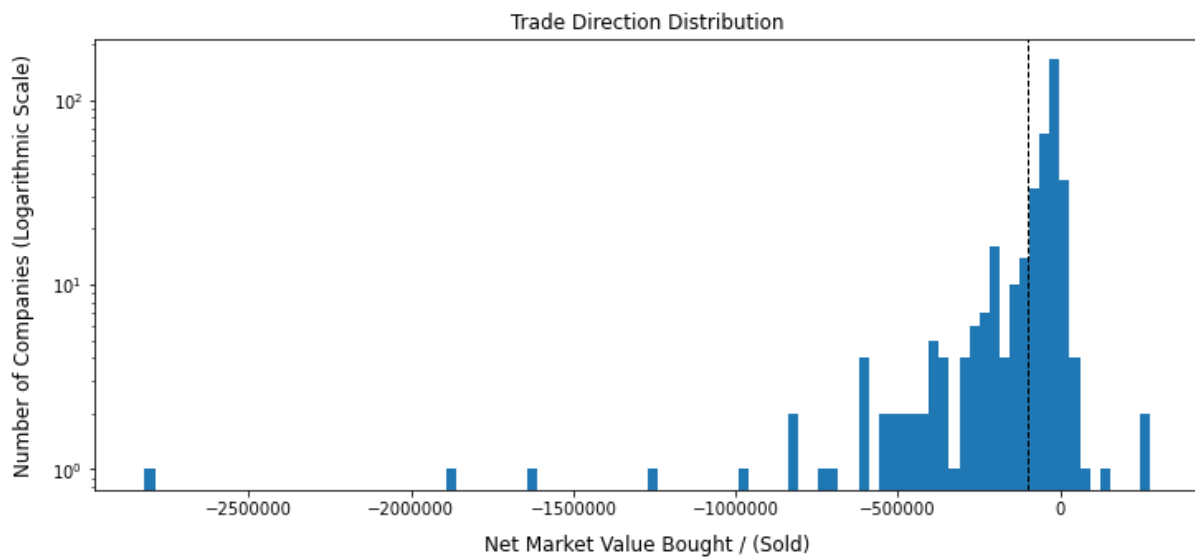


Figure 4 Histogram plotting the total market value bought or sold for each company. The results indicate that most executive trading activities are stock sales.

All the above are likely driven by the fact that a large proportion of executive compensation comes in the form of Equity Grants, Options, and other stock-based packages. As a result, there is some degree of “forced selling” as the recipients of these grants must eventually sell their stock to pay for general living expenses. This indicates that in general, C-suite executives are sellers of their company’s stock more than they are buyers.

2) Aggregate insider buying and selling does not predict future performance of broader stock market indices.

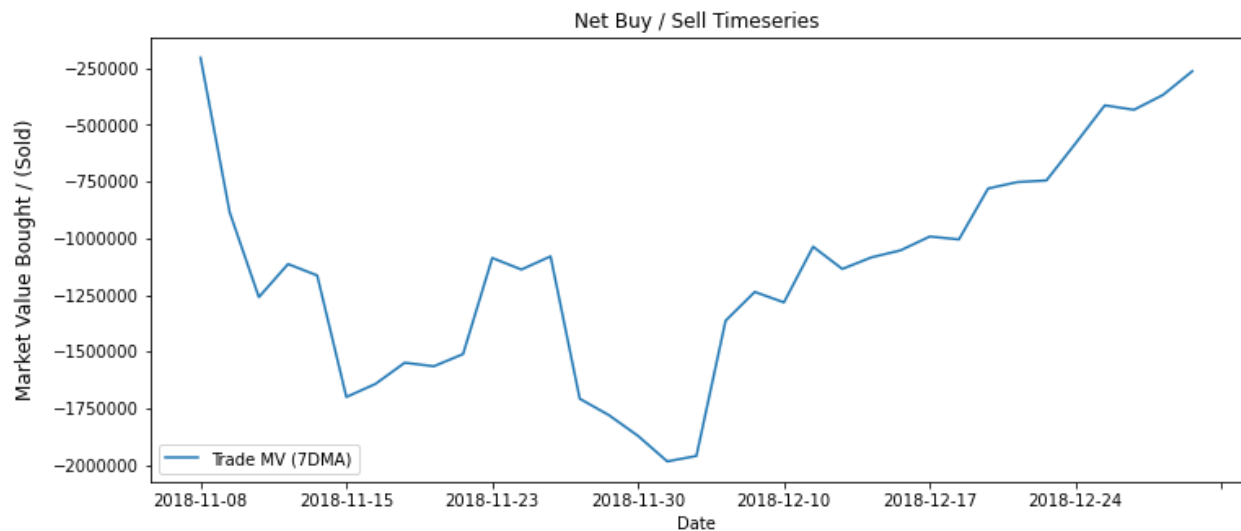


Figure 5 Line chart plotting the net insider buy / sell activity going into year-end 2018. The subsequent year (2019) saw the S&P rise by 30%, but C-level executives were net sellers heading into this strong market.

In 2019, the S&P 500 returned over 30%. Meanwhile, as a collective group, executives did not have a single day in the last 2 months of the year where more Market Value was bought than sold (Figure 5 above).

In other words, going into one of the best stock market years in recent history, C-level executives were net sellers of stock. As such, their relative bearishness or bullishness should not be construed as a signal for future stock market returns.

3) Insider buying and selling does not predict future performance of the respective stocks that are being bought or sold.

Unfortunately, our data does not show any strong relationship between insider buying or selling in specific stocks and the subsequent performance of those stocks. For example, if we run a simple linear regression on all transactions in our sample set, plotted against the 1-year performance of each respective stock vs. the S&P 500, the relationship is not strong (See Figure 6).

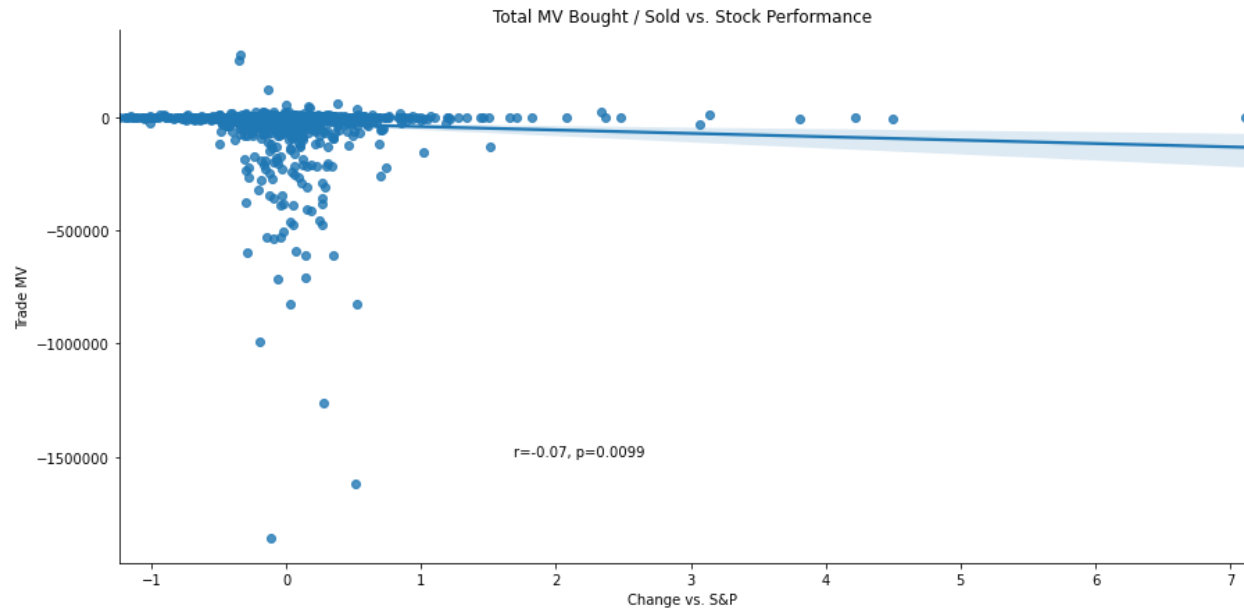


Figure 6 Scatter chart that shows the weak relationship between insider trading activity and stock price performance. Note the previously mentioned skew towards insider sales vs. buys.

In summary, our findings indicate that (1) there is generally more selling than buying from company executives, (2) insider trading in a stock does not show strong correlation with that stock's performance over the following year, and (3) insider trading in aggregate does not show strong correlation with broader stock market performance.

Suggestions for Future Research

Our findings indicate that certain variables derived from insider trading activity do not carry significant predictive power of a stock's public performance or the broader market's performance. There is room for future research to take a more granular approach and potentially uncover more actionable insights than we have in this report.

For example, our stock price interval is daily. This means that if a company's stock price responds immediately following the filing of an insider transaction report, our data would miss that impact, as it only referenced the price from the end of the day. Presumably, this impact would be marginal and not statistically significant, but we were not able to source granular enough data to investigate. The implications of this and related research are large. If successful, one could use insider trading activity to predict some future price of a given stock and purchase, short, or sell accordingly in order to generate a profit.

Similarly, we did not dig into whether different roles (i.e. CEO, CFO, Director, etc.) may have exhibited stronger correlations between trading activity and stock performance than the broad group of C-level executives.

Assumptions, Strengths, and Limitations

Our analysis assumes that the source from which we derived insider trading data accurately and completely captures all insider trading within the United States. We have no reason to believe that it does not at this point in time.

The most notable strength of this analysis is that it is guided by a rather long-standing premise that insider trading activity is indicative of future fluctuations of stock market performance. Additionally, our dataset required almost no imputation of missing values (save for a handful) and we deployed no statistical methods which required any specific distribution of data, which eliminated the need for us to make any large assumptions about our data set.

There are a few limitations to this analysis. Most notably, for the purposes of abiding by a given timeline, we limited the time period within which we would look for correlations to one year from the insider trading period. It is possible that additional or perhaps even stronger correlations exist beyond this timeframe.

Additionally, we used data with a daily frequency - it is possible that additional or stronger correlations exist at different time intervals. As discussed in the previous section, this lack of granularity may have caused us to miss what were statistically significant stock price moves that came in response to Insider Transaction filings.

References

1. <https://www.gurufocus.com/insider/summary>
2. Bloomberg (Excel Addin)
3. <https://www.cnbc.com/2018/11/20/stock-market-dow-futures-negative-as-tech-stocks-sink.html>