

Quiver Quantitative

Insider Purchases Model/Strategy

Summary

The Quiver Quantitative insider transaction model utilizes a combination of both past academic and industry research to estimate the predictive power of each stock purchase by corporate insiders. By doing so, the model can identify transactions with high predictive power.

Not all trades are created equal, and previous research suggests that investors can earn excess returns by being selective in the trades they consider.¹ For instance, a board member buying a fixed amount of stock every month is likely less indicative than a CFO with a positive track record doubling his prior position. There is valuable information embedded in the trades in identifying potential investment opportunities.

Why Insider Purchases

The SEC Form 4 filings encompass various types of transactions, such as equity and option grants, payment of tax liabilities, and others. Our research, in line with prior academic studies, indicates that open-market insider purchases contain the most informative of these transactions, with insider sales ranking second in predictive power. As such, for the initial phase of our model, we chose to focus solely on insider purchases.

Insider purchases are relatively less noisy than sales, which could be due to several reasons. Firstly, insiders often receive a significant portion of their compensation in the form of equity or options, leading to a higher rate of selling than buying. Additionally, an insider buying their own company's shares carries a lower litigation risk than selling them.² Insiders are well-informed about their company's growth prospects and often purchase their company's stock during periods when they believe the market is undervaluing it. While there may be examples of unusual insider purchasing activity before the announcement of material information that affects the stock price, it is important to note that insiders typically possess valuable knowledge about their company and the industry in which it operates, which is completely legal and encompasses many of the trades deemed relevant by the model.

Data Adjustments

To ensure the accuracy and validity of the model, we impose several data criteria that impact the samples. **Stocks must have at least six months of prior return data**, as well as at least one quarter of fundamental data available from one of our data providers. Insiders must also have at least one previously graded trade to be included in the sample. Potentially aided by the adjustments above, the sample for the Health Care sector was volatile and right skewed in terms of returns and resulted in a decrease in model accuracy for the other sectors. **As a result, Health Care was excluded from the sample and subsequent scoring**. To prevent overfitting to insiders who trade frequently and to avoid being biased towards their company's characteristics, we only use one purchase per insider per month to fit the model. Finally, **insiders who are not associated with the company in any other way**, except for having a large equity stake (10% owners), are excluded from the model. By applying these data criteria, we can improve the reliability and accuracy of the model.

Factors Used in the Model

- **Trade Value** - The log of the dollar **amount purchased**. Higher valued trades have a higher probability of being an informative trade.
- **Consensus** - **Multiple purchases** in the same direction show that insiders are aligned and is correlated with the informativeness of an insider trade.^{1,4,5} We measure this by taking the net **number of unique insiders that have purchased**, that is the number of insiders that have bought the stock less the number of insiders that have sold the stock in the last 90 days.
- **Historical Trade Performance** - Previous trades by a given insider are ranked based on the subsequent performance of the stock after both buys and sells. Trades from insiders that have historically timed their trades well are generally more informative.
- **Insider Trading Frequency** - Counts the number of transactions of a given insider over the past 24 months. Trades from insiders that trade frequently are generally less informative.⁵
- **Holdings Ratio** - The **increase in an insider's position in the stock**. Higher relative increases in an insider's position are associated with a greater probability of the relevance of a trade.⁶

- **Insider Level** - Top executives that are more involved with the day-to-day running of companies may possess greater information about their companies' growth prospects.⁵ We observe that higher level insiders, that may possess more valuable information pertaining to the business, exhibit higher excess returns following their purchases. We group insiders into three classes corresponding to the corporate hierarchy and its roles in day-to-day operations as well as a non-mutually exclusive flag for the insider being in a finance-related role.
- **Momentum** - Insiders are generally contrarian investors and will sometimes purchase their own company's stock following recent stock underperformance that they may feel is unjustified.³ We use the t-statistic of a trend line fitted to the last six months of price history to measure a stock's momentum, adjusted for volatility.¹ We then adjust for the momentum of their respective sector benchmark to net out the effects of overall market rallies and downturns. We find that momentum has a negative correlation to the information of a trade and is one of the most important variables. That is, insider purchases following a period of downward momentum generally have a higher likelihood of being informative.
- **Price-To-Book Ratio** - Insiders are generally value investors and may buy when they believe their company is mispriced.³ These values are binned by pentiles and are observed to have a negative correlation, meaning insider transactions in value stocks generally are more informative compared to those in growth stocks.
- **Company Size** - Size is measured as market cap adjusted to S&P at the time of the filing to adjust for market fluctuations. Trades by insiders in smaller companies generally perform better than those made in larger companies. This may be due to smaller companies having less analyst coverage, thus increasing the information asymmetry between insiders and public markets.
- **Sector** - The sector of a company is an informative indicator, as information asymmetry and subsequent volatility resulting from the coverage of that information can vary by sector.⁵

Model Construction and Performance

A logistic model was used to predict the probability that a given trade is significant. The output of the scoring model is the probability that the trade will deliver strong excess returns in the next one to two months. Parameters were selected based on the fit during the 2009-2016 period. To score purchases made each year, a rolling seven-year historical period is employed to model each year. For example, trades reported in 2018 will be modeled using trades reported from 2011-2017. Therefore, the significance of

variables will vary over time.

The model can generally identify the highest performing trades in the top predicted relevance scores, which we call conviction.

Exhibit 1 shows that higher conviction trades outperform in producing superior excess returns one month after the filing date, in terms of both the mean and median. We should expect the return distribution to have a large positive skew due to abnormally large price increases observed in a portion of the sample. This skew is more apparent in the two-month view, where median returns suffer while mean returns increase in higher conviction trades. The difference in the distribution between the one- and two-month views may be partly due to the two-month view having more observations where an earnings release has taken place, as many high-level executives have a blackout period before earnings releases.

To highlight the performance of the scores, we created equal weighted portfolios and grouped them into four groups based on the level of conviction. Each portfolio is constructed by taking an equal weighted position in every stock that had a trade with a qualifying score in the previous 60 days. The highest conviction group outperformed the other groups for most of the period. However, it is important to note that the highest conviction group underperformed during the recent market turbulence in 2022.

Strategy Methodology

The strategy assigns a value to each company based on the number of trades ranked 9 and 10, with 10 being weighted heavier, over the past 60 days. The value of each trade will decay during this window, with trades reported over 30 days ago will be weighted half as what they would be in the first 30 days. Up to 10 stocks are selected based on this aggregation and equal weighted. The strategy is rebalanced at the start of every week as opposed to daily to increase the ease for users who choose to follow the strategy and to minimize the associated trading costs. The performance of this strategy is shown in Exhibit 3.

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Exhibit 1

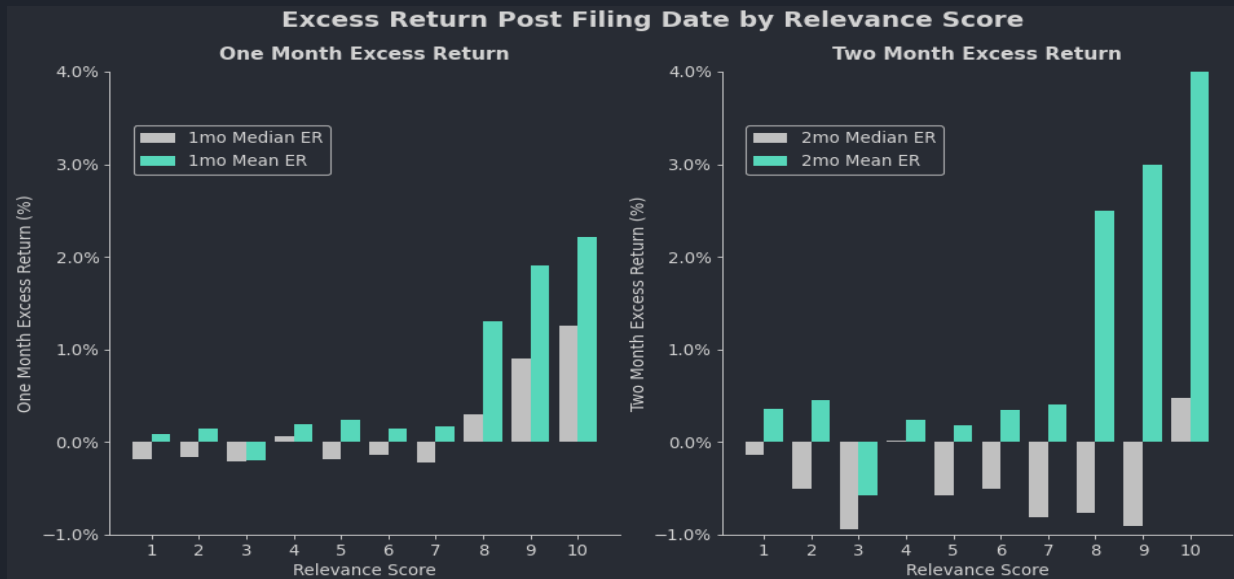


Exhibit 1 shows the returns of purchases, in excess of their respective sector benchmark, scored from 2017-2022. On average, trades scored in the highest deciles outperformed their peers in both one- and two-month observation periods following the filing date of trades.

Exhibit 2

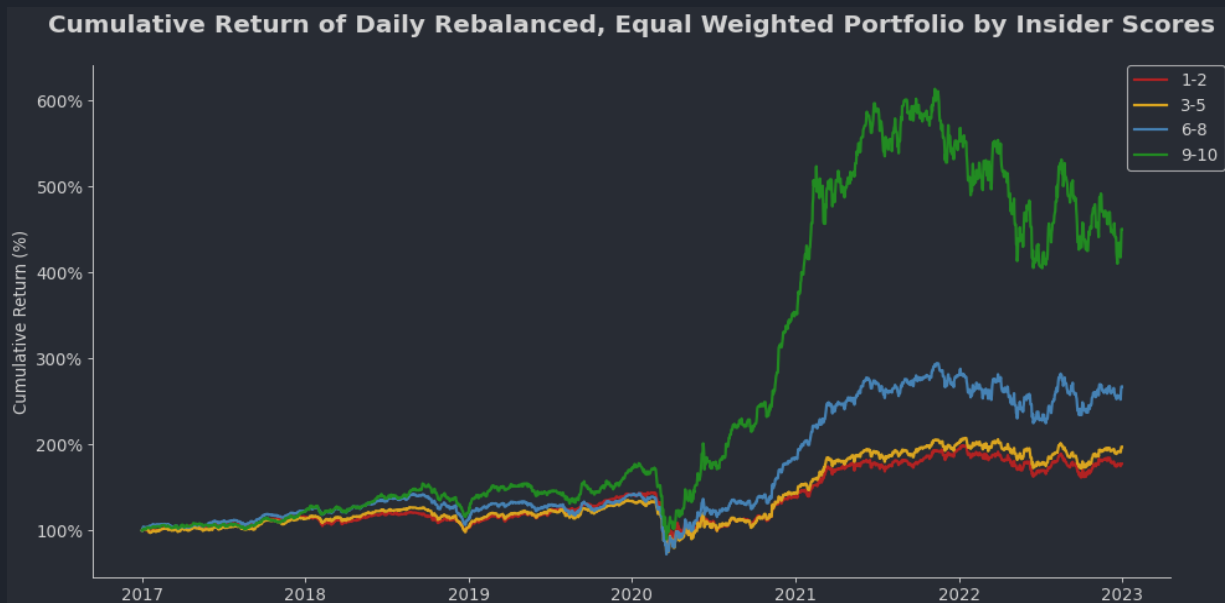


Exhibit 2 shows four equal weighted portfolios comprised of stocks that had an insider trade scored in their corresponding range in the past 60 days. The portfolio containing the highest conviction trades outperformed through the majority of the period tested.

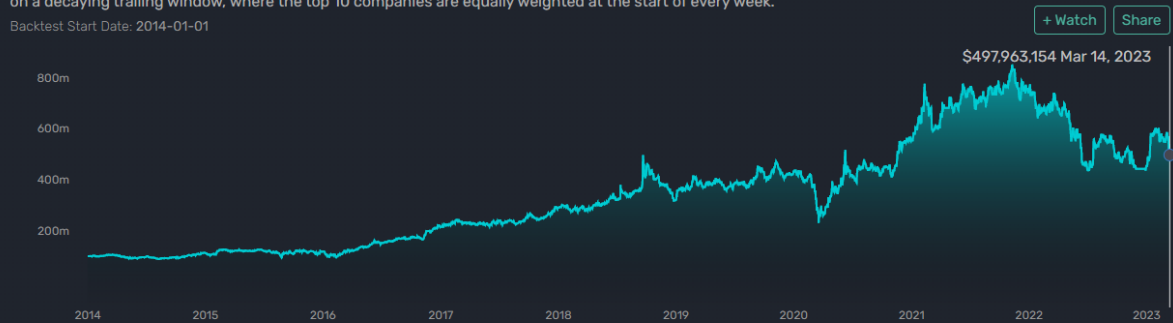
Exhibit 3

Insider Purchases Strategy

Insider Trading

This strategy uses a proprietary model to score purchases made by Insiders within companies based on factors related to the trade, the insider, and the company. Scores are then rolled up to a company level based on a decaying trailing window, where the top 10 companies are equally weighted at the start of every week.

Backtest Start Date: 2014-01-01



Key Metrics[®]

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Return (1d)	Return (30d)	Return (1y)	CAGR (Total)	Max Drawdown	Beta	Alpha	Sharpe Ratio
-0.85%	-13.20%	-28.28%	19.02%	-53.60%	0.99	0.09	0.617

Exhibit 3 displays the Insider Purchases Strategy performance from 2014-01-01 to 2023-03-14.

Citations

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