

Talking points

Contributions

We show that cliques of traders tend to provide insight into pertinent company news.

A group of traders trading on the same dates, more likely than not involves company specific news.

Hypergraphs allows us to express trading cliques, without an important loss of information

The algorithm that we will present will rely on two main insights.

Trade classification

And novel detection techniques, involving identifying substructures in graphs.

Insider Trading

Stewart and Samuel Waksal example:

When it was rumored that an important drug produced by the company would not be passing FDA trials, Waksal and Stewart both sold a large portion of their shares in IMClone. Waksal dumped 5.5 million dollars worth of his shares just days before the announcement. Acting on Waksal's information, Stewart dumped a substantial portion of her shares and made over 250,000 dollars on the sale.

What is so great about Hypergraphs?

In picture (a) we have a three clique of traders because t_1 , and t_2 share a particular sequence, t_2 and t_3 share a particular sequence, and t_1 , t_3 share a particular sequence. Now imagine that they all shared the same sequence. With a graph we would still have 3-clique, we could not have just one edge, for t_1, t_2 and t_3 .

What this means is that graphs vs. hypergraphs tell us something very different in terms of trading cliques.

Dataset

To construct the hypergraph take a tunable parameter t which will be the length of the longest common subsequence of trade dates between two traders. If $t = 5$, then that means that a two or more traders will only be part of a clique if they have a sequence of 5 dates in common.

The sequence does not need to be consecutive, but it is in chronological order.

We build two hypergraphs for each company, one for purchases of a stock and one for the sale of a stock.

When we use different values of t we can build different hypergraphs. The image shown is a distribution of the number of edges when $t = 5$. When $t = 2$ for example, we would expect a larger number of edges, and larger clique sizes on average.

- Just a quick note on complexity: Will return to this point when discussing trade classification.

Identifying the highest profiting trader

The main thing to take from this is that the use of hypergraphs allows us insight into the idea that higher profiting traders tend to be a part of the same trading cliques.

For each insider in these purchase and sale networks, we look at the average profit per transaction. So, we have the **signed normalized dollar amount** from the transaction, we total them, and divide by the number of dates.

Signed Normalized Dollar Amount

- To accomplish this, we take the share price, divide by the dollar volume and multiply by the total number of shares traded. This way the profit still serves as a reliable measure.

Insights

The biggest insight we get from this, shows that insiders who have similar profit trade at the same time; they share a trading clique.

Trade Classification

Traders are classified as either routine or opportunistic based on their past trading history.

It is important to distinguish routine trades for liquidity and diversification, from trades that opportunistically timed to make money.

Ex:

Jim Jeffries, a member of the Board of Directors at ABC Corporation, buys stock in the same calendar month every year. One day, he hears rumors about an unfavorable audit of ABC Corporation. He is told that the report is about to be made public and proceeds to sell a large number of his shares the next week. The price of the stock during that week drops 3 %, he incurs a 3% loss on the sale. Once the news is made public, ABC Corporation's stock plummets 12.5%. Had he sold later, he would have lost 12.5 % on the sale. Jeffries clearly used his inside information about the firm to make a trade that would mitigate his losses but the sale still results in a loss. The fact that Jim broke his usual trading patterns stands out even though he did not make a profit on the sale.

Opportunistic trades

We use a categorization scheme to classify trades as informative or non-informative. This scheme is based on a study that Goldberg et. al uses in his application of the automated detection system SONAR. **Articles are based on pertinence and timeliness**

These trades are informative, and tend to predate important company news and market behavior.

Combing trade classification and trading cliques

These shared dates tell us two things. The first, that the sequence of dates are likely related to company news, since a number of insiders in the same company are trading at the same time. The second, since their trades are opportunistic, we can assume the news is significant enough to pay attention to. In most cases, the trade does not coincide with a grant date or the end of the fiscal year. Since we already constructed purchase and sale hypernetworks for each company, we aim to find smaller structures within the same network that allow us to identify cliques of opportunistic traders.