



Who Wins the Market: The Swift or the Smart?

Both speed technology and information are vital trading inputs.

The stock market, as we have recently seen with the GameStop furore, can be a bit of a rollercoaster. Investors are at work trying to use both better information and ever faster trading algorithms to profit from the market.

Speed and information are an interesting pair. Remember, an important reason why people trade is that they want to realise their information into to make a profit. That information could be a tweet or something far more fundamental, like a careful analysis of a company stock.

Of course, not all information is the same, but a lot of information has a common feature: It is time sensitive. Time sensitivity might be due to an upcoming public announcement, for example. So, speed becomes paramount to a trader, because waiting around or delaying due to connectivity means that the previously valuable information has now become public and, hence, stale. Traders also compete with others, including some who may share similar information. If the trader who has important, perhaps private information, doesn't act on it quickly, odds are that another trader has the same data and will buy or sell accordingly. Once that trade is made, it's like sharing that once private information with the market, making that data less valuable.

Ideally, a trader would have very good information

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and very fast trading speed. But of course, neither comes freely. Trading firms exert resources in order to get good quality information. They buy data, hire people to do the research or buy dedicated computers to process data. Good quality information does not come cheap.

Likewise, trading quickly is expensive. A superfast network connection is **mandatory** for quick access to markets. Depending on the market structure, a large well-trained (and expensive) execution team to implement trading strategies might be required. Also, compliance and due diligence are included in the speed component of trading. More employees in the back office to improve the risk management process translates into faster execution.

A fast trader always has a stronger incentive to acquire more information. Likewise, a more informed trader has a stronger incentive to become faster. That's why the combination of speed and information is important. But is one more important than the other, and how should traders best invest in their own speed or information infrastructure?

Investing in speed or information

In a forthcoming **article** in *Management Science*, **Shiyang Huang** and I created a model to unbundle investors' acquisition of speed and information. We uncovered the implication of speed and information

acquisition for price discovery.

The model helps create a framework to determine when speed and information are complementary or substitutes for one another. The answer is that they can be both, depending on the level of each technology. When both are relatively poor, they complement each other. An increment in speed (or information) technology incentivises investors to acquire more of both speed and information. But when they are relatively advanced, they can substitute for one another. An advancement in an already fast speed technology reduces investors' demand for information and vice versa. More empirical evidence is needed to work out this difficult, intertwined relationship.

We also considered the implications for the overall market quality. The financial market has two pillar roles: To allocate the resources to whomever needs it the most and to aggregate or reflect information. Such a "price discovery" function is affected differently by information and speed technology. Investing more in the information technology unearths the truth in greater detail, adding to the amount of price discovery, while investing more in the speed simply hastens the price discovery process.

For example, suppose a true price is 100. Good information will tell you 90 in a week's time, but combined with faster speed technology, you will get to 90 in a single day. When market participants can freely choose how much to invest in each technology, our model predicts an intriguing effect: Advances in information technology could actually hinder the overall amount of price discovery. This happens when information technology complements speed technology. In this case, the improved information technology also prompts more demand for speed, thus more people uncover 90 in one day. But with the understanding that many others have arrived at the same price on the same day, the rest probably will no longer be interested in acquiring further information. That is, the price discovery process will never fully reveal the truth of 100, stopping just at 90.

Price discovery is vital because it sets a value that allows a firm to show the market what its worth is. The recent example of GameStop's dizzying market highs and lows shows how damaging it can be for a firm if the market isn't involved in price discovery. Rather than the crazy trading pressure of the last couple of months, GameStop executives would hope for normal market conditions in which to consider actual investment opportunities. The market going wild for the stock is costly for GameStop, because it will have to wait for this mania to go away before it can act on any real investment opportunity.

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Quality of the stock market

Our work is important for people who are curious about how technology has reshaped the markets in terms of market quality and especially price discovery. More information leads to more precise estimates of stock value – a more precise reflection of the truth. But in the current market environment, information needs to work with speed.

After all, advances in speed technology affect the way the market aggregates information. If speed becomes standard, plentiful and cheap, the first effect is that everyone will want to acquire information only in the short run, which means competition will heat up across the board. In a very short period, it creates a glut of fast traders, crowding the market. This, unfortunately, means that everyone gets a smaller slice of the pie because traders won't have the incentive to spend their resources on information over the long run. It's easier to become faster through technological innovation than it is to become smarter.

Our work ultimately provides a cautionary tale of how the disruptive effects of technological advancement might hinder the price discovery function of financial markets.

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