The Game Theory of GameStop

Introduction

From reputable Wall Street bankers and hedge fund managers to the average Joe, everyone heard of GameStop over the last weeks. How did this unprecedented phenomenon start? What cause stands at its root? How will this story affect trading and modify its rules? This article explores all these topics, plus giving an insight into the possible future of retail investing.

How did it happen?

GameStop [GME:NYSE] is an American retailer mainly specialized in the sale of video games and consoles, but which also sells other consumer electronics, such as webcams or mouses. The first signs of the GME mania appeared after Citron's Andrew Left said that GameStop is "pretty much in terminal decline", pushing the retail investors from the Reddit group r/wallstreetbets towards a coordinated move against Citron and hedge funds. Melvin ended up being the most affected by the frenzy as investors spotted their short position in GME in its November form 13F filed for Securities and Exchange Commission (SEC), a quarterly report in which the hedge fund disclosed its hand. The investors were trying to short squeeze Melvin for months with no real success. Nonetheless, the stock started to rise after posts of people obtaining tremendous profit from buying call options became public. The public felt that the equity had an unfair valuation given that the hedge funds were betting insane amounts on its decline. In the upcoming days, the growth was further accelerated by tweets of well-known entrepreneurs, including Elon Musk and the venture investor Chamath Palihapitiya, which showed support to the GameStop mania.

With the price growing further and further, the institutions with heavy short positions had to hedge them by buying the security at the market price, hence driving the prices higher. This short squeeze was corroborated with the illiquid character of GME, giving the holders of shorts less room for maneuver in buying shares for hedging. Another process that contributed to the steep rise in the value of GameStop is the Gamma squeeze. Gamma is a Greek that measures the rate of change of delta over the change in underlying, i.e., the first derivative of the delta. Many investors were buying call options, while the brokers took the other end of the transaction and had to sell the stock at the end of the contract. Hence, the market makers needed to hedge their positions by buying the underlying stock. Consequently, this generates an increase in prices, moving the gamma even higher. The last step ultimately creates a gamma squeeze, developing mounting buying pressure.

The saga consequences

Now that this saga has passed, at least for the time being, we analyze it from various standpoints, such as the investors' and hedge funds' perspective, but also the legality component is of major importance.

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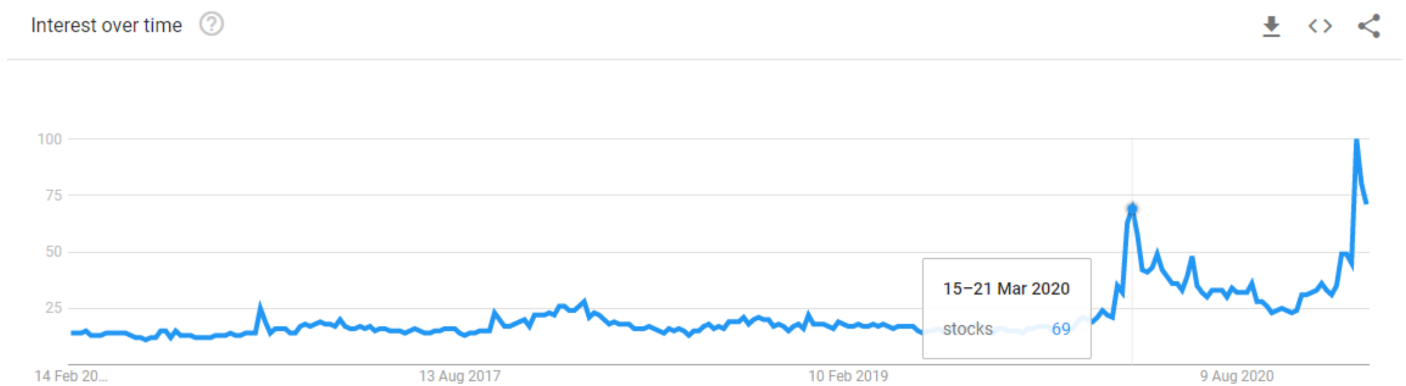
In the last months, trading platforms were readily available to the public, transforming the market into a betting machine for the people bored by the lack of action. During the same period, the healthcare crisis was a hard hit for the sporting industry and the gambling activity associated with it, which was affected by the heavy restrictions from most countries. The crowd became much more interested in stocks (see the picture below). In 2020, the public research of the stock market activity more than doubled, compared to 2019, according to the Google Trends statistics. Although not all net surfers made the step towards online trading, companies such as Robinhood greatly facilitated the access to their platforms, trying to maximize their target audience and profits. It provided a means of investing the population's savings or a method of obtaining the much-needed adrenaline while buying call options or other leveraged products.



Source: Google Trend statistics

This unusual market activity from the retail side puts us in the situation where rational investors become emotional, i.e., partly irrational, and disrupt the fundamental expectations. Thus, we will dive into the analysis of GME investors from a game theory point of view. We will assume each investor has one unit of wealth at the beginning of the period, and each one has the option either to invest in GameStop or to short the stock. Thus, if both investors forecast a stock decline, at period two, they will have a wealth distribution of (1+r,1+r), whereas if they opt to invest, they will both obtain (1+R,1+R), where R and r represent the gains, with R > r. The profit is higher when both people are bullish, and the hedge funds are heavily losing money rather than the situation when a truly overvalued stock declines to its fundamentals. If one investor decides to go long and the other enters a short position, we assume that the demand for GME will not suffice to drive the price up. Contrarily, the funds will manage to maintain their short positions, and the stock will go down. Hence, the bearish investor will earn profits, leaving the other suffering a loss. This allocation makes us think about a prisoner's dilemma where the rational investors will prefer not to cooperate, therefore getting a small or zero profit rather than a bigger one.

When at least some investors turn out to be irrational and massively signal this through social media platforms, also, others are incentivized to follow the irrational ones and make the short sellers go out of their positions. This trading method encourages individual investors to abuse social media platforms trade signals and earn money by moving relatively small and illiquid markets. Even though hedge funds look like victims in this market assault, it

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is worth noticing that either both parties were involved in trading manipulation or none of them. As they used a similar technique with a different form, this battle transformed into a tug of war game.

In the eyes of the regulators, both hedge funds and retail investors were acting in an entirely legal way, even if they are still investigating this matter and have not given a final verdict yet. To protect the stock market from becoming a gamified way to gamble for the masses, the SEC bears the hard job of analyzing the situation and finding a suitable solution for all the parties in the upcoming weeks. They may conclude that stricter regulatory norms are necessary for the small investors, but in this case, there is a risk of going backward in terms of market democracy. On the other hand, if they considered the short-sellers should end up under heavier regulation, the probability of having price inflation for the stocks, as shown in our short-selling article.

Conclusion

All in all, the GME paradigm represents a tipping point for the power of individuals in moving the equity market. The odds of experiencing a comparable situation in the future might not be so low, as we expect other potential investments into equities with more cash benefits granted in March. Yet, the decision of the regulators and the form of the stimulus could impact the capacity of retail to continue bet-trading.

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