Advances in Economics, Business and Management Research, volume 211
Proceedings of the 2022 7th International Conference on Financial Innovation and Economic Development (ICFIED 2022)

Analysis of GameStop's Stocks Fluctuation

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ABSTRACT
The stock price of GameStop started to fluctuate drastically over the last nine months. What happened to GameStop? What were the causes that made the GameStop price change? This paper analyzed the main reason for the sixteen times stock prices since the beginning of the year for GME.

***Keywords*：** *GameStop, stock price, call option, put option, short base*

1. INTRODUCTION

GameStop Corp. (GME), a Texas-based video game and consumer electronics seller, operates over 5,000 retail stores in North America, Europe, Australia, and New Zealand. The company's global family of brands includes GameStop, EB Games, Micromania, ThinkGeek, and Game Informer® magazine which is a leading print and digital video-game publication. At the end of 2020, the company's shares were priced at around $19. But its stock prices started to rise in January 2021, reached near $500 on an intraday basis, but then shed 80% of its valuation over the week from 1st, Feb to 5th, Feb, going out at $63.77 on Friday.

2. EXPLANATION OF TERMINOLOGY

2.1. Call options and put options

Call options are financial contracts that give the option buyer the right, but not the obligation, to buy a stock, bond, commodity, or other asset or instrument at a specified price within a specific period [1].

A call option may be contrasted with a put option, which gives the holder the right to sell, but not the obligation, the underlying asset at a specified price on or before expiration [2].

2.2. Strike price

The strike price is the price at which the buyer of a call option has the right to purchase the futures contract, or the buyer of a put option has the right to sell a futures contract. This is also referred to as the exercise price [3].

2.3. Premium

The premium is the price that option sellers charge the option buyer for the option [4].

2.4. Example of how the option works

GameStop's price was $350 a share at some time. Some person 'A' told the option sellers that he wanted to buy call options "for a month at price $380". And the seller charged the buyer $7.5 for each share. It means that he thought the stock price would go more than the sum of $380+$7.5=$387.5 one month later, so he would make money from that. After he bought the call options, he had the right, not the obligation to buy the stock at $380 one month later. This '$380' is called 'strike price', and '$7.5' is called the premium.

2.5. Short base

A person, say, 'A' borrows stocks from another person 'B' and sells it immediately. After a certain amount of time, 'A' returns the same number of stocks by buying them at a lower price, as 'A' assumed in the beginning, to 'B' and gets his money with interest back [5].

3. PERIODS OF THIS EVENT

Period 1 (Before this event happened):

There was a large "short base" in the news circulating on social media.

Period 2 (In mid-January):

GameStop price began an extraordinary up-move, reaching near $500 on an intraday basis.

Period 3 (In February):

The valuation of the stock shed 80% in the first week from 1st February to 5th February. The stock went out at $325 on Friday, 29th January, and went out at $63.77 on 5th, February.

A total graph

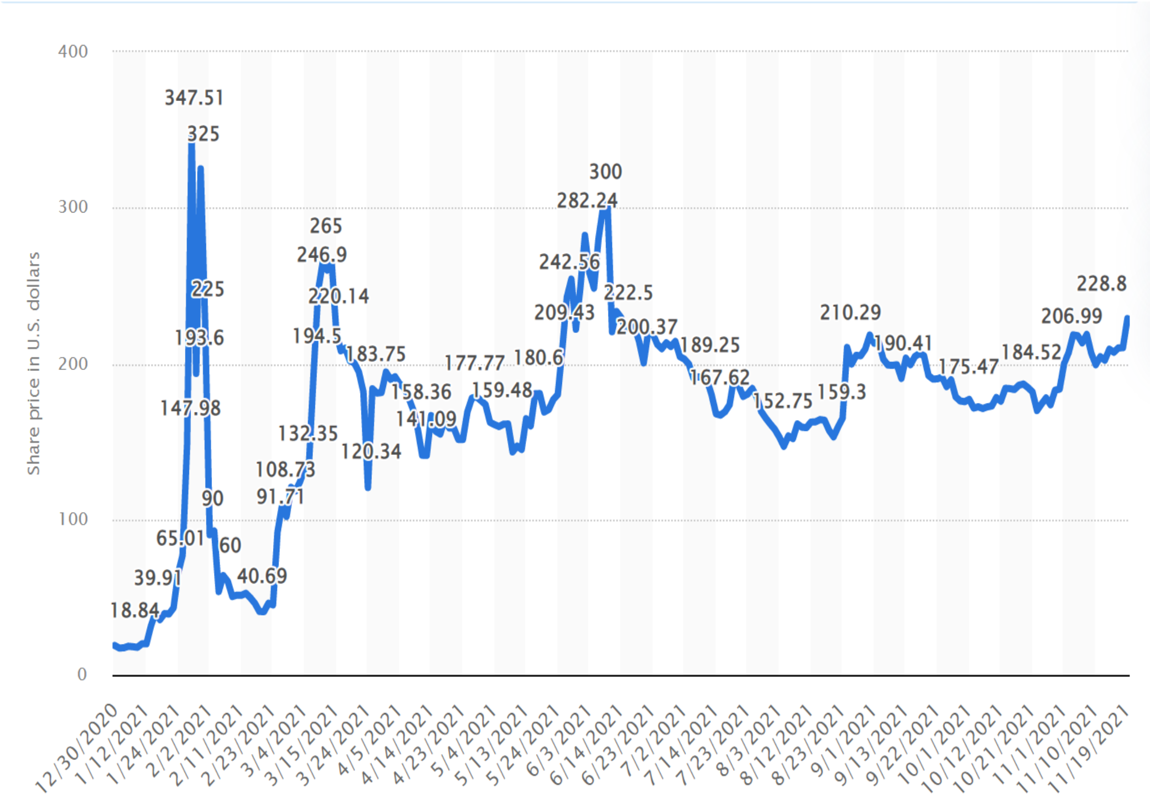


Figure 1 Stock Prices in about a Year [6]

Through this figure, we can see that from the end of January to the beginning of February 2021, the stock price soared from about $40 to about $350, and then plummeted to about $40. Next, this paper will try to analyze the reason.

4. ANALYSIS OF EACH PERIOD

Period 1:

GameStop is a physical-store based company and their way of running contradicted the trend at that time, which was Internet-based. So, investors thought the price would go down in that near future which made social media believe that there must have been a large, short base at that time.

Period 2:

The first reason is that retail investors wanted to squeeze these 'short base' owners, so they chatted through Reddit message boards and decided to buy the stock to avoid losing money. In that way, they forced the short sellers to buy the stock. Their movement pushed the price to move up even more.

The second reason in this period is that options trading supercharged the move. The selling of call options was influenced mostly for this reason. As the stock price was being pushed up by retail investors, the option sellers had to buy the stock to avoid the case that the stock price would go more than the sum of premium and strike price. Therefore, the action of option sellers coming in and buying the stock exaggerated the upward move.

Period 3:

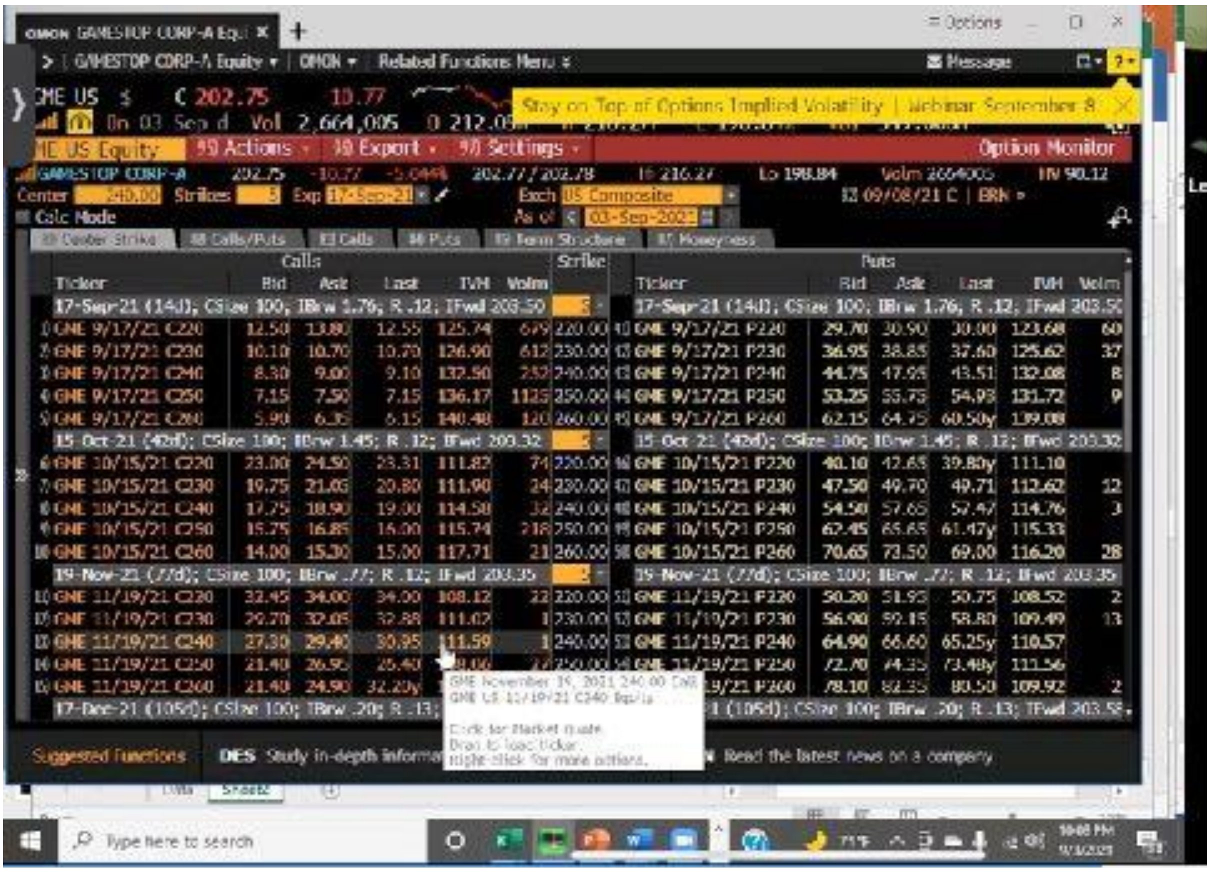
The volume of the stock did not match its real value, and as a result, it fell to about $60 on February 5th.

5. DIRECT EVIDENCE OF THE FLUCTUATION

Figure 2 Annualized STDEV of Returns

There is a graph of GameStop stock rolling standard deviation of annualized return, which was done by calculating three months' rolling STDEV of returns and annualizing it. Compared with SPX and QQQ, whose STDEV was about 50%, this number of GameStop was about 500%, almost 10 times higher. This means that the return of GameStop stock was highly uncertain.

6. GAMESTOP RECENT OPTION PRICING EXAMPLE



Picture 3 Strike Price, Current Price, and the Price of the Option of GameStop

Above is a screenshot taken on 3rd September, the line that was slightly highlighted tells that the strike price was $240, the current price was $202.75, and the price of the option was about $29， which means that if the holder of this call option wanted to make profits, the price on 19th November should be 240+29=269 dollars. That is a huge move from the current price of $202.75, so, likely, the investors would not make money. We can focus mostly on how to calculate the number $29 for the call option. There is a number 111.59 in the graph, which means that if the change of Gamestop stock price was normally distributed, its annualized variability should be about 110%. Then, we can calculate that the standard deviation over one year was $202*110%, which was about $220. Therefore, the standard deviation in these two and a half months was $202*111%*[(2.5/12) ^0.5], nearly $110. The strike price was $240, and we make an approximation that E[s(T): s(T)>$240] = $320 (E stands for expectation), which means that the option paid 80 dollars off. Together with normal distribution possibility, we assume the probability that the stock price went to more than $240 is 35%. So, the option price went to about $29.

7. CONCLUSION

Gamestop stock fluctuation indicated that a stock can not only be influenced by economic reasons, in this case, the retail-store based company but can also be influenced by investors' operations, such as short selling and options trading. It can be hard to predict such behaviors, but there are many ways to show this fluctuation afterward and to find reasons.

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[6] Figure 1 Statista Research Department, Nov 22, 2021, Daily stock price of GameStop Corporation from December 30, 2020, to November 19, 2021 https://www.statista.com/statistics/1199882/gamestop-daily-stock-price/