Online Herding Activity

How WallStreetBets played GameStop Short

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Abstract

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Opinnäytetyön tarkoituksena oli toimia tutkivana työnä kuinka nettifoorumit voivat vaikuttaa laumaantumiseen osakemarkkinoilla. Tapaustutkimuksena on GameStop osakkeen lyhyeksimyynti, koska se keräsi paljon huomiota mediassa. Tapahtuma jatkuu edelleen, mutta tiedunkeruu tätä tutkimusta varten päätettiin lopettaa 28.2.2021, jotta työlle olisi realistinen päättymispiste.

2021 vuoden alussa GameStop osakkeen arvo nousi yllättäen ja rajusti. Agressiivisen markkina-arvon nousun taustalla epäillään olleen nettifoorumin käyttäjät, jotka laumamaisesti sijoittivat varojaan osakkeeseen spekulatiivisessa sekä tarkoituksena myös ”kostaa” suuremmille finanssialan instituutioille.

Opinnäytetyö tutkii tapahtumia laadullisin keinoin ja sitä, miksi ja miten nettifoorumit saattavat mahdollistaa tai tehostaa mm. osakekuplien kehittymisen osakemarkkinoilla. Tietoa kerätään ja tutkitaan kokoomalla tapahtumia kronologisessa järjestyksessä ja lopulta tutkien tapahtuman lähdettä. GameStop-tapaututkimuksessa tutkitaan suhteellisen suuria määriä uusia ja pieniä sijoittajia, jotka jakavat sijoitusneuvoja (vaikkakin toisinaan sarkastisia sekä humoristisia) ja käyvät aktiivista osakekauppaa uusien osakevälittäjien avulla. Opinnäytetyö on lähtökohtaisesti informatiivinen sekä teoreettinen pohjimmiltaan ja pyrkii luomaan pohjaa jatkotutkimustyölle.

Tulokset viittaavat siihen, että spekulatiiviset sekä hohdokkaat sijoitustipit vetävät uusia ja suureksi osin nuoria sijoittajia puoleensa vaikka neuvonantajat eivät olisikaan finanssialan asiantuntijoita. Johtopäätöksenä on, että nettifoorumit voivat mahdollistaa tai tehostaa laumaantumisen, jolloin myös yksityiset sijoittajat kykenevät keskittämään varojaan merkittäviksi voimaksi arvopaperimarkkinoilla.

Avainsanat Online Herding, WallStreetBets, Robinhood, GameStop, Behavioural Finance
Sivut 36 pages and appendices 0 pages

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International Business Abstract

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This thesis is an exploratory study of how online platforms may affect herding activity using GameStop's short squeeze as a case study. The saga continues to unfold so the gathering of new information beyond 28th of February 2021 is limited.

Early 2021 the GameStop stock rapidly increased in price. This aggressive surge is believed to be stemmed from an online forum and their users who invested their capital in a speculative and vengeful manner against the large financial institutions.
The thesis explores through qualitative methods the events of the saga and examine the possible effects and reasons online platforms may contribute to financial bubbles.
Information is gathered and studied by combining the chronological pieces of the event and studying them after which the source of the surge is examined. The GameStop case involves large numbers of relatively new and small retail investors who share investment advice and trade online.
The thesis aims to be more informative and theoretical in nature but provides some foundation for possible future research on the given topic.

Finally, the results appear that new and mostly young investors are drawn into heavily speculative and glamorous investment "tips" despite being shared by their peers. Concluding that online platforms can provide a breeding ground for individuals to concentrate their capital into significant monetary power in the stock market.

Keywords Online Herding, WallStreetBets, Robinhood, GameStop, Behavioural Finance
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1 Introduction

The end of 2020 brought some sense of relief as a year of global confusion; panic and uncertainty got left behind and the prospects for 2021 brightened as vaccines were developed and distributed. The COVID-19 pandemic forced many countries to implement social distancing and even put their countries in complete lockdown. People were confined in their homes restricting outside movement and effectively disabling those businesses requiring the physical presence of the customer such as hospitality, brick-and-mortar stores, tourism, entertainment, activity centers and restaurants etc. Many businesses would suffer heavy financial losses, some shut down their operations and many would try to adapt to this new business environment. (Donthu & Gustafsson, 2020)

Stock markets reflected these concerns of uncertainty starting February 20th, 2020 with a wave of selloffs. One benchmark for U.S. stock market performance, the S&P 500 index lost roughly 35% of its value by March 23rd from its recent highs on February 19th. (Lyócsa, Baumöhl, Výrost & Molnár, 2020).

With the help of fiscal stimulus, stock markets managed to gradually recover in the months that followed (Popina, Barnert, & Galouchko, 2021). The pandemic which confined people into their homes and onto their computer screens along with low interest rates and stimulus checks may have played a part in fueling capital into the stock markets by small-scale investors. (Chohan, 2021) Estimates of retail investors trading share volume jumped from a baseline of 10%-15% to 20%-25% in 2020. The average daily volume of shares being traded in markets increased almost 60% from previous years from $7 billion to $11 billion in 2020 (Roberts, 2020). With time on their hands, cash on hand and inexpensive platforms to trade, a spike in trading activity among small retail investors was not surprising.

In the beginning of 2021 GameStop Corp, a company experiencing falling sales and reporting heavy losses pre-pandemic (Calhoun, 2021), became a target of hedge fund short selling (Greifeld & Wang, 2021; Grant, 2021) making headlines. Stock prices of companies that have falling sales and losing money typically means downward pressure on the price. On December 31, 2020 GameStop's share price stood at $18,84. Less than a month later, the share price

peaked at $347,51 without any fundamental changes in the operations of the company. However, GameStop was not the only company experiencing sharp rises in their share price. The share prices of other companies including AMC Entertainment, Blackberry and Koss Corp spiked as well. What all these companies had in common was an online subforum called WallStreetBets. (Greifeld & Wang, 2021)

As stock prices rose, news coverage focused on whether the perceived value of the business was inflated, i.e. a bubble. What was different is that the stock price rallies were fueled by "little guy" retail investors who managed to outplay the giants of Wall Street by short squeezing them out of their own game for once (Adamczyk, 2021).

1.1 Objectives

Using GameStop as a case study this thesis will explore the potential influence that online platforms can have on financial markets. There is a strong indication that momentum-based investing activity and speculation can sprout from these online platforms which may even overlook or disregard the financial performance of the company. One major contribution of this study is that there has been little research on how online communities of small, even unsophisticated investors operate.

One of the connections to make in this paper is the very presumable link between WallStreetBets forum users and mostly inexperienced primarily Robinhood brokerage mobile-app users. Where a huge portion of WallStreetBets users may be Robinhood markets (financial service provider) users, at least half are new to the stock market. For a long time, "stock tips" have been provided by experienced stock market players. With WallStreetBets, "tips" are being provided by amateurs through social media channels to each other often disregarding financial information and leaving the user to figure out whether the information is factual. This brings about questions of how much of it is out of control reckless and irresponsible and potentially bad for the stability of financial markets or for the individuals who lack investment knowledge. On the contrary such platforms may bring the possibility of doing good deeds if capital is concentrated as such.

1.2 Research question

One of the things that's profoundly interesting in the current technological age and era is how the online communities can act as a breeding ground for herding behavior in the markets. Typically, investors are either independent, small and relatively insignificant groups (in terms of their impact on the markets) or larger organized financial institutions.
In the beginning of 2021, the online communities proved the existence of a middle ground of large groups of independent investors capable of impacting the markets like that of a large financial institutions. It's not fully researched how independent investors become a herd through various online platforms such as Reddit.

How does herding behavior begin on an online platform and how does it find its way to the financial markets ultimately causing an assets market price to rapidly increase. This question is researched and studied through the culture and the actions of the participant on an online platform such as Reddit, where the majority of recent events sprouted.

2 Theoretical Framework

Some of these events would make one wonder "How much is the stock market really reflecting the real economy and how much of if it is just social fabrication? Is this rational behavior, are the markets working efficiently or are they mispricing something?" These are some the fundamental questions about the functioning of the financial markets. In order for GameStop's stock to be trading at such high market prices indicates that someone must have also paid that amount and likely disregarded the fundamentals of the company. Since there were no significant changes in the company financial performance at the time of the price hike, something else must have fueled the change of the price such as greed and revenge of the market participants.

Many studies have been conducted and theories made to explain the efficiency, accuracy, and the randomness of stock markets but no single answer has been concluded. The rational expectations would be that the stock of those companies with optimistic future expectations appreciate in market price while poor expectations depress the market price. A company

that goes bankrupt gets eventually delisted from the exchanges while also making the stock effectively worthless.

Like in all markets, supply and demand are the primary driving forces of direction in the stock markets. Supply and demand alone however do not explain the market participants willingness to transact on any given price. (Kennon, 2021) What makes a certain group of people buy the stock of a company nearly bankrupt? What is the right price to pay in the markets for such a company or any company for that matter? Many of these answers come down to participants own valuations of the company and their own perception and acceptance of risk. However, a multitude of models and levels of risks are involved in calculations that widely differ between the market participants.

There are two opposing views with regards to the behavior of market participants and the overall functioning of financial markets and their prices: the efficient market hypothesis and behavioral finance. (Yildrim, 2017)

2.1 The Efficient Market Hypothesis

Considered as one of the major frameworks for finance is the efficient market hypothesis (EMH) developed independently by Eugene F. Fama and Paul A. Samuelson in the 1960's (Lo, 2007). According to the efficient market hypothesis, stock prices reflect the fundamental value of the company or "*the discounted sum of expected future cashflows*" (Thaler & Barberis, 2003) and where all available information is instantly reflected in the stock price (Nath, 2015).

The EMH states that stock market prices should always reflect all the essential information at the time, meaning information is absorbed instantly by the markets making price fluctuation unpredictable. Thus, in theory market participants should not be able to systematically beat the returns of the market on a risk adjusted basis. (Nath, 2015).
This idea of randomness of the markets was coined as Random Walk Theory by Burton Malkiel in his book "Random Walk Down Wall Street" originally published in 1973 which helped to popularize EMH (Smith, 2020).

“Random walk” means that no future movements or steps can be predicted using those from the past, making the future steps always random and independent from each other. When applied to the stock markets this would translate into future price movements being completely unpredictable, disregarding the utility of forecasting, advisory services, and price charting. (Malkiel, 2011) Malkiel also introduced the idea that in randomness of the markets, blindfolded monkeys throwing darts for stock-picking could yield the same results as those of professional portfolio managers. A test which has been recreated many times and remains a center of criticism where some tests prove and other disprove randomness (Ferri, 2012).

There exists three versions or layers of EMH: the weak form, the semi-strong form, and the strong form where prior forms are incorporated in the latter forms.

The weak form of EMH states that all historical information is already incorporated in the stock prices thus past news or price information cannot be utilized by investors to generate excess market returns. The semi-strong form states that all publicly available current information is instantly and perfectly priced into stock prices. The strong form states that all non-public or insider information is also reflected in stock prices. That is information that has yet to become public if it ever will, will have already been priced in the market. (Fama, 1970)

In order to demonstrate the EMH, there exists a rather famous joke from the field of finance and economics where: Two economists are walking on a busy street and one of them sees a $20 dollar bill laying on the ground and points it out to his friend. As he bends down to pick it up the other one stops him and says “No point picking it up my friend. If it really was a $20 bill and not a counterfeit, someone would have surely picked it up by now.” The joke resembles EMH thinking as it would be futile to pick up the bill as the people (the market) would have already priced in the true value of the $20 bill (as a counterfeit). For investors, any attempts to beat perfectly efficient markets on a risk adjusted basis would be impossible using any information since everything is already priced into the markets and thus nullifying the benefits of the information at hand.

With regard to the different layers of forms, EMH implies that no market bubbles or such anomalies should be possible where potential mispricing is present along with the

assumption of investors having deviated from rational attitudes. (The Investopedia team, 2020)

The only way for an investor to participate in the markets according to EMH is to use a passive strategy of buying an index or a broad “basket” of stocks and hold on to them for as long as possible since there is little use to actively attempt to beat the market (Kennon, 2021). Buying an index fund is a passive form of participating in the market because it involves buying a portfolio of assets instead of actively creating a portfolio by buying individual stocks or other assets.

2.2 Behavioral Finance

Behavioral finance is the study of finance which takes psychology and social sciences into consideration when looking at investor behavior (Shiller, 2003). Where EMH assumes complete rationality, behavioral finance considers it possible for some financial phenomena to be understood with models in which market participants do not behave in a rational manner. (Thaler & Barberis, 2003)

The development of behavioral finance as a field comes from the inability of EMH to properly explain market anomalies and excess volatility where not all market participants act rationally. Anomalies refer to unpredictable or unusual events in the markets such as bubbles, excess volatility, trends or other regular patterns and events that deviate from the assumed models such as EMH (Canady, 2019).

One problem with the idea that all individual investors are rational is the assumption of complete access and incorporation of market information once present which is not the case. As a result, this creates imperfect and therefore irrational or at least error driven decision making. (Sadi, Asl, & Rostami, 2011) Many of the theoretical papers have also demonstrated how irrationality can have substantial long-lived impact on prices in economies where irrational and rational traders can interact. Irrational market participants are also considered as “noise” in the markets. (Thaler & Barberis, 2003)

In behavioral finance market participants do not always act rationally and are influenced by their own multitude of vastly different biases, emotions and are subject to cognitive errors which can lead to wrong decisions making. Biases that form perceptual errors for investors such as overconfidence bias, anchoring bias, hindsight bias, availability bias, loss aversion bias, heuristics, and mental accounting bias subject the individual in irrational market behavior. (Sadi et al., 2011)

Overconfidence bias: a very prominent attribute in the stock markets, is the inflation or overestimation of individuals own perceived information or holding overly optimistic expectations of future probabilities. Overconfidence bias may lead to exaggerated risk-taking while blinding the participant from utilization of complete information. (Sadi et al., 2011) This overconfidence bias may be more prominent in younger, male, low education, and low-income participants (Tekçe & Yilmaz, 2015). Overconfidence has been found to negatively affect investors portfolio and increased trading activity. (Tekçe & Yilmaz, 2015) Lack of financial knowledge and overconfidence may also lead investors into buying overpriced assets with overestimated expectations and eventually selling them at lower prices. This increased trading activity affects the overall trading volume and can also result in asset bubbles in financial markets. (Sadi et al., 2011; Tekçe & Yilmaz, 2015)

Anchoring bias: individuals have the tendency to anchor or get accustomed to a particular reference point that influence their decisions. By holding firm, it is difficult for people to make changes to or resist the urge to act against the accustomed beliefs or existing conditions. For example, the aversion to sell inherited company stock despite the declining market price and possibly poor conditions of an unrecoverable company. (Leković, 2020)

Hindsight bias: is the tendency for individuals to affirm to themselves that they actually knew the actual outcome was just as expected. (Sadi et al., 2011) An investor may anticipate the outcome of his investment and convince himself, regardless of actual outcome that this was as predicted.

Availability bias or availability heuristic is the tendency for individuals to make “mental shortcuts” by relying on past available events or easily accessible information as more probable and by giving more weight to them when accessing probabilities. (Sadi et al., 2011)

EMH assumes rational actors, information that is factual and freely available to all and that it is pointless to try and beat the market, because all this information is already priced in. Behavioral finance assumes irrational behavior at times and that biases exist in how information is perceived and processed. Anomalies like bubbles and herding are ignored by EMH and recognized in behavioral finance.

2.3 Asset Bubbles

Bubbles have been present in human history throughout the times from the Dutch Tulip Mania (1637), the South Sea bubble (1720), the credit bubble (1987), the dotcom bubble (2000) to the real estate bubble (2008) (Picardo, 2020). These are just some of the major bubbles known at least in the western world but throughout the year there may be hundreds of smaller bubbles that may not have any noticeable ripple effects on the economy and not necessarily making headlines.

Bubbles don’t have a clear definition in finance and economics but tend to describe states where asset prices seem to be based on implausible views about the future or where price exceeds the intrinsic value of an asset. Bubbles typically have at least two definitive characteristics which are inflating prices followed by an eventual crash or bubble “burst”. (Kenton, 2020a)

Intrinsic value is essentially a measure or calculation of assets worth today using financial models and calculations rather than the current market price (Kenton, 2021a). Bubbles exist when market prices greatly exceed intrinsic value or in other words, “severe mispricing of the asset.” (Calhoun, 2021) A description that isn’t all that clear and subject to interpretation to this day since no single standard model is used for intrinsic valuation but instead involves numerous different methods of valuation (Kenton, 2021b). If it was any easier to know when a bubble appears and how long it lasts, it would present almost an equal opportunity to profit from the bursting of the bubble and from when it forms.

A commonly used financial model for valuation is the discounted cash flow model (DCF) which uses the weighted average cost of capital (WACC) and the company’s free cash flow.

Part of DCF modelling is the estimation or projection of future revenue streams which are also subject to heavy interpretation due to different expectations and uncertainties of the future. (Kenton, 2021b) Therefore, some may argue that an XYZ company is not in a bubble based on their models and others may disagree based on their models.

$$DCF = \frac{CF_1}{1+r}^1 + \frac{CF_2}{1+r}^2 + \frac{CF_n}{1+r}^n$$

Figure 1. Discounted Cashflow Model (Investopedia, 2021)

Where CF is the estimated cash flow for the given year and r the discount rate or WACC.

$$\text{WACC} = \left(\frac{E}{V} \times Re\right) + \left(\frac{D}{V} \times Rd \times (1 - Tc)\right)$$

Figure 2. Weighted Average Cost of Capital (WACC) (Investopedia, 2021)

In WACC formula, E is the market value of the firms' equity, D market value of firm's debt, V is E added D, Re is the cost of equity, Rd is the cost of debt and Tc is the Corporate tax rate. In general, higher values are generated where a company is generating higher positive cash flow (CF) and the weighted average cost of capital (WACC) is low.

Nobel Prize winning economist Paul Krugman defines a bubble to exist in conditions where investors reason high prices with unlikely and incoherent expectations of the future (Krugman, 2013). Stiglitz defined bubbles when the prices are high *only* because investors expect the prices to be higher in the future whilst disregarding the fundamentals factors which heavily deviate from the current high prices (Stiglitz, 1990).

Inevitably when prices go up, there are people who benefit greatly from price surges, those who buy early and cheap. This can attract more attention, interest, and enthusiasm to buy a piece of the action which in turn increases expectations for further price appreciations. All the enthusiasm will attract attention and demand thus generating another round of enthusiastic price increase. If this feedback loop doesn't get interrupted eventually after numerous rounds of demand and price increases, the loop may end up forming something of

a speculative asset “bubble” in which further expectations for high price increases are supported by a current high price. (Shiller, 2003)

2.4 Herding in the markets

The phenomena of herding – where groups of people act in unison based on signals from others – can also be linked to bubbles and market inefficiencies (De Bondt, Mayoral, & Vallelado, 2013).
Singular herding can simply be defined as the behavior where an individual reacts to and intentionally mimics actions of others. An individual needs to be aware of the actions of other people in order to mimic them. For example, herding happens when an individual decides to change their initial investment decision or make a new one based on the actions of others in the herd. (Bikhchandani & Sharma, 2000) An action of a member of the herd is a signal to other members of the herd to take action.

Information cascades a phenomenon where people make decisions in sequential fashion.
A simplified example would be two restaurants side by side with no customers inside. One has good reviews and the other has bad reviews, but which is which is unbeknownst to the customers. The first two who come by decide to take a risk and go to the one that has better lighting inside. Later as two other customers try to make up their minds about which restaurant to dine in, they decide to go to the one which already has customers inside assuming it to be the better restaurant while in reality it could the worse one. This can snowball into more customers deciding to dine in where others are already dining. (Easley & Kleinberg, 2010) This example isn’t necessarily about the efficiency of the results of such behavior but rather how individuals may replace their own information with external information and herd.

In finance lexicon, the herd is also used to refer to investors or even fund managers who “*charge into risky ventures without adequate information and appreciation of the risk-reward trade-offs and, at the first sign of trouble, flee to safer havens*.” (Bikhchandani & Sharma, 2000) For the average investor there are two reasons to be influenced by herding. One is the idea that others may know something that one doesn’t and the other is the individual inclination to conformity (Bikhchandani & Sharma, 2000).

There are two types of herding behavior: intentional herding and spurious herding. Intentional herding as the name implies is the result of participants intentionally mimicking others as opposed to making decisions based solely on one's own beliefs and may lead to inefficient market outcomes. In intentional herding the participants may abandon the investment *once something unpleasant happens.* Spurious herding on the other hand is where market participants with the same information and set of problems end up making the same or similar decision choices. Spurious herding may end up resulting in herding behavior which is also likely to result in more efficient market outcomes. (Bikhchandani & Sharma, 2000) Inefficient outcomes are more likely to create irrational movements where the herd is more likely to back down and abandon the ship the moment the bad investment becomes apparent to participants. I believe due to the functioning and the nature of the online forums such as WallStreetBets in this case it is more likely to breed intentional herding behavior among its participants thus more likely to lead to inefficient outcomes.

3 Practical Research

3.1 GameStop Corp.

GameStop Corp. is the world's largest omni-channel video game retailing company established in 1996. Headquartered in Grapevine, Texas, GameStop operates in 14 countries and owns approximately 4800 stores with a product line consisting of a wide variety of new and pre-owned video games, video game consoles, collectibles and other accessories. (GameStop Annual Report, 2021)

GameStop came into the media spotlight in early 2021 after being largely invisible. With video-gaming moving largely online, the company has had to adapt its business from selling only video games to a broader range of other accessories.

3.2 Founding of GameStop

The company was formerly founded in 1984 as Babbage's a software retailer company based in Dallas, Texas by two former Harvard Business School students, Gary M. Kusin and James McCurry. In 1994 Babbage's merged with Software Etc., another video game software retailer, creating NeoStar Retail Group. NeoStar filed for Chapter 11 bankruptcy protection two years later (1996) for not being able to secure its bank loans. (ReferenceForBusiness, n.d.)

Later that same year Leonard Riggio the founder of Software Etc. purchased the assets of the struggling NeoStar Retail Group and ended up dissolving it but retaining the name, Babbage's Etc. GameStop was launched in 1999 during the height of the dot.com bubble opening up 20 retail outlets and an e-commerce website gamestop.com.
In late 1999, Babbage's Etc. and GameStop were bought by bookseller Barnes & Noble. (ReferenceForBusiness, n.d.) In 2000, Barnes & Noble acquired Funco Inc, operator of FuncoLand video games stores. In late 2000, Funco, Babbages and Gamestop were merged into GameStop Inc. (referenceforbusiness, n.d.)

In February 2002, GameStop made an initial public offering (IPO) on the New York Stock Exchange with "GME" as their unique ticker symbol. The company raised $325 million in the IPO with a planned opening price range of $17 to around $19 per share. (LATimes, 2002). For the remainder of the thesis I shall mainly refer to GameStop's stock as GME.

Between 2005 and 2010 GameStop expanded both physically and digitally in the video game industry by acquiring Electronic Boutiques Games in 2005 and Micromania from France in 2008. GameStop launched a customer loyalty program in 2010 which secured 10 million members in its first year. During 2010, GameStop also expanded their digital downloadable content (DLC) which was quickly adapted as a new practice by the gaming industry. (GameStop, About GameStop, n.d.)

On 12th of February 2007 GameStop Corp. declared a Two-for-One Stock Split. Each original share of GME was split into 2 shares. Companies do stock splits to make shares cheaper for potential investors. At the time of the IPO in 2002, GME was trading at $19,90 a share.

Before the stock split, the GME shares had risen to $53,00 per share. After the split, these shares traded at $26,50. (GameStop, 2007)

3.2.1 GameStop today and the Stock Price

Even before the COVID-19 outbreak in early 2020, GameStop was struggling financially. Sales for the year ending 31 January 2020 were down 25% and the company reported a net loss of $471 million (Calhoun, 2021). Company management decided to close more than 300 of their underperforming stores. The COVID19 pandemic, social distancing and quarantine measures caused huge problems for their brick-and-mortar retail business and with the growing trend of digital video game purchases, GameStop announced a further closure of 300 more stores in 2020 (Humphries, 2020).

In mid-2020 an investor and the founder of Chewy, Ryan Cohen and an independent and later more famed investor Keith Gill saw potential in GameStop decided to take a stake in GME and joined GameStop’s Board of Directors. Around this time hedge funds had also noticed GameStop but not as a stock to buy but as one to sell short in anticipation of further drops in GME. (Phillips & Lorenz, 2021)

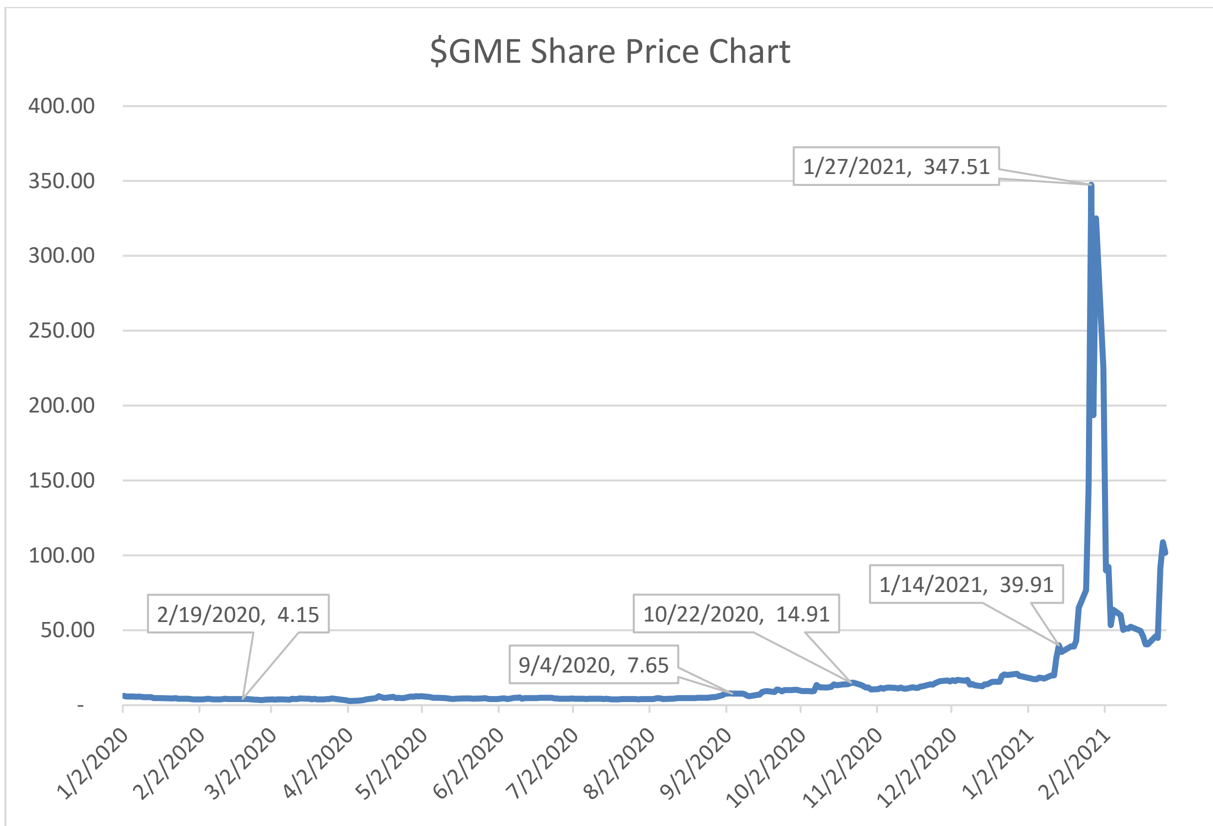

Figure 3. GME stock price data

GME started the year 2020 trading between $3,50 and $6,00 per share until August, when the stock started to rise dramatically. GME finished the year at $18,84 per share. During the first two weeks of 2021 GME traded in a narrow band around $20 a share until mid-January when the stock climbed within two weeks to reach $350 per share or a market capitalization of roughly $24 billion for the business at the peak (Phillips & Lorenz, 2021).

Market capitalization is obtained by multiplying the market price per share by the number of shares outstanding at a given moment in time (Cagan, 2016) The volume of trading in GME alone on 27 January 2021 was higher than at any time in the company's history and forced many brokers to temporarily close trading on GameStop's stock (Chohan, 2021).

Usually such aggressive buying by investors would indicate unexpected positive news from the company would come to public attention to justify a higher stock price. Yet no such major changes had happened within this period. (Calhoun, 2021) The company had been closing stores, (Humphries, 2020) sales fell by 40% over the last two years, cash flow was negative and billion dollars of losses incurred in the preceding two years (Calhoun, 2021).

One thing that had changed within the past few years had been the negative sentiment for the company's future outlook. As a result, investors were shorting GME stock. The short interest or the participants expecting a decline of the share price, was sky high. Short sellers had sold over 60% of all the outstanding shares. WallStreetBets started to take note of this development and started gradually buying GME that namely the hedge funds had started selling short (Thorbecke, 2021).

3.3 Stocks & The Markets

The world keeps changing at a rapid pace as does the world of finance. Recent years have seen an unprecedented number of first-time investors entering the stock markets. The inflow of new investors was partly due to the market dips resulting in more favorable prices (Williams & Young, 2021), lockdown boredom, (Martin & Wigglesworth, 2021; Nova, 2020), and fiscal stimuli provided by the U.S. government for its citizens (Chohan, 2021). In March 2020 many brokerage companies reported records numbers of clients opening new brokerage accounts (Ponczek, 2020) at the same time as stock market indexes were falling.

Access to financial markets and what they have to offer to retail investors has also become easier in the past few years. Commission-free trading and fractional shares enabled investors with smaller accounts to invest to actively participate in the markets without commissions eating into their profits. Prior to these changes, an investment account with $100 balance and $2 commission-fee per trade would already lose 10% of the account balance after just 5 trades in commission fees. An account of this size would not be able to buy 1 share of Amazon in 2020 when the share price exceeded $1,500 unless fractional shares were available. These changes have undoubtedly reduced the cost barrier for small retail investors to actively participate in financial markets.

The markets offer growth possibilities for companies, investors and benefits for the society as a whole. (Arnold, 2009) Companies are able to raise capital for new investments through primary markets and investors can diversify and invest into the companies.

3.3.1 Stocks and Shares

When an individual wants to invest in a company, they can buy shares from a bank, broker or other intermediary. Often the terms “stocks” and “shares” are seen being used interchangeably especially by the media. In this paper we shall use them in a manner consistent with UK practice; shares refer to the equity in a company and stocks as the financial instruments. (Arnold, 2009)

A stock also refers to common stock and it represents an ownership stake in the company. (Cagan, 2016) Stock ownership entitles the owner to a proportion of the company’s assets and profits equal to their represented stock ownership. (Hayes, 2021a) An individual’s ownership stake won’t expire or be taken away from them unless there is a company merger, bankruptcy or other liquidation or they decide to sell their shares.

Stock ownership gives rights to vote in shareholder meetings regardless of the number of shares owned, receive dividends if the company decides to distribute them and the right to sell ones shares to someone else. Voting power increases in proportion to how many shares they own. (Hayes, 2021a)

When companies want to raise money for the first time from the public, they do so by launching an initial public offering, or IPO, and selling stock to the public. Underwriters determine the initial stock price to enter what is called the primary market. The company’s equity capital generated by this sale on the primary markets can then be traded on secondary markets comprised of other investors and institutions. (Beers, 2020) In secondary markets, money flows between buyers and sellers of stocks who trade ownership of shares.

Every publicly traded company has a unique company specific ticker symbol such as “GME” for GameStop along with current market prices. In financial terminology buying or owning a security also refers to a “long” position where the long position is maintained by the investor in the given security such as a stock (Investor.gov, n.d.a).

3.4 Options

In 2020 options trading hit a record of roughly 7,47 billion options contracts which was an increase of 45 percent from the previous record in 2018. This has been partly due to small-time retail traders attempting to make a quick buck on short term options by betting on the future direction of markets up or down. (Phillips, 2021)

Options are financial derivatives that have in recent years become highly popular investment vehicles especially among the new participants in the stock markets (Popper, 2021). Despite their recent growth in popularity among new investors, options are considered to be advanced financial vehicles and are typically not suitable for new investors due to their rather speculative nature and the potential for substantial loss in the wrong hands (or wrong movement). (Downey, 2021) This is partly due to that fact not only do options have expiration date suggesting that one would have to speculate more accurately the future price movements but options are also more sensitive to price changes since a single option contract represents 100 shares (Boylston, Palacios, Tassev, & Bruckman, 2021).

Options are contractual agreements made between two or more parties and are commonly used to hedge or leverage positions in the markets but are also used for speculative purposes betting on the future direction of the markets. (Downey, 2021)

Options belong to a group of securities known as derivatives. This is because they “derive” their price from an underlying asset such as stocks, commodities, bonds or currencies.
A typical stock option contract represents 100 shares of the underlying stock.
There are two basic types of options; call options and put options (Downey, 2021).

An option contract gives the buyer or the holder the right, but not the obligation to buy or sell a stock at a specific price over a specific period of time. Option buyers are limited to the premium of the options which the writer receives for the risk. The option seller or the writer on the other hand may be forced to transact the underlying asset at a given time and at a predefined price. (Downey, 2021)

Buying a call option gives a long position in the underlying asset where you expect stock prices to increase. Buying a put option is considered a short position and gives the owner a right to sell a stock at a specific price over a specific period of time expecting the stock price to fall. Writing or selling a call option without initially owning the underlying assets is considered a “naked call” where the loss is potentially unlimited since the prices of the underlying asset can rise indefinitely. When an investor owns the stock and decides to sell call options on it is referred to as “covered call” where losses are minimized because they already own the underlying stock (Downey, 2021).

Option contracts have a strike price and an expiration date. Using a call option as an example; if the strike price for the stock option is $100 expiring on the Friday of the same week (weekly option) and the underlying stock price is trading on market at $80 per share, the call option is considered to be out of the money (OTM). The call option will never be exercised unless the stock price moves above $100 before the contract expires.

A put stock option with the same exact example would be in-the-money (ITM) and the option buyer could exercise the contract. (Downey, 2021) Option contracts can also be considered as zero-sum games where if one party to the contract wins, the other loses.

OTM stock options further from the strike price will typically trade for cheaper than ITM stock options because the stock (the underlying asset) has to move a further distance in order to become profitable to transact on. Buying a call stock option with a strike price of $100 and an underlying asset price of $80 on the expiration day will eventually become worthless since it would not be beneficial for the buyer to transact the contract to buy stock at $100 when it’s currently priced at $80 on the market. (Mitchell, 2021a)

Options don’t drive the market prices per se but do have the potential of amplifying the movements at times when the market makers are flooded with orders as they may have to start buying shares in order to hedge against losses if prices move in the wrong direction. (Massa & Ponczek, 2021)

3.5 The Market and the Exchanges

Just like there are markets for fruits and vegetables, cars, clothing and fine art there are markets for stocks (stock market) and other financial securities referred to as financial markets where investors can buy and sell these securities and where companies and even governments can raise long-term capital. (Arnold, 2009)

Some of these markets transact physically, like farmer markets, while others such as the stock markets are generally just a network which people can access through their phone or computer. Although a few stock exchanges such as the New York Stock Exchange (NYSE) still has a physical space where investors or at least their representatives can meet face to face on a trading floor and act on securities transactions. (Arnold, 2009)

When people talk about "the markets" they're referring to the secondary markets where investors buy and sell their securities from one another. In primary markets the stocks are created and sold or "floated" to the public. Institutional investors are mostly involved in the primary market transactions when companies are raising capital for the first time. (Cagan, 2016)

In practice, interacting with these markets is a seamless experience although commission fee structure can differ by broker or exchange or where trading may require minimum lot sizes (Hong Kong). From the perspective of retail investors buying and selling shares works the same regardless of currency whether transactions are done on Nasdaq Helsinki, London Stock Exchange (LSE) or New York Stock Exchange (NYSE) and generally this principle is the same with other stock markets as well, with some minor exceptions.

3.6 The Brokers

In their most basic form, a broker such as Nordnet operating in Finland or Robinhood in the U.S. simply fill out the market orders of their clients (Cagan, 2016). They act as agents between buyers and sellers in the stock markets (Arnold, 2009). Typically, a bank or other financial intermediary may also be able to provide these same financial services, but the variety, fees and quality of these services varies widely.

In addition to contacting one another on the behalf of an investor, some brokers also perform a market maker function acting as middleman ready to buy and sell securities on their own behalf. Traditional market makers quote both buy and sell prices that they are willing to transact. (Arnold, 2009) They make their earnings on the spread between bid and ask when trades are executed (Roberts, 2020).

3.6.1 Robinhood Markets, Inc.

Robinhood may be one of the major brokers responsible for disrupting the brokerage-dealing industry by introducing a new and an easy commission-free trading platform essentially forcing other brokers to either follow suit and update their services or continue to disadvantage their clients by overcharging (Roberts, 2020).

Robinhood, was created in Silicon Valley on a plan to ease access to the stock markets by charging no commission fees or minimum account balances, to appeal to younger first-time investors (Roberts, 2015). The app was founded in 2013 (Massa & Robinson, 2020) by Baiju Bhatt and Vlad Tenev, two Stanford University students who were inspired by the “Occupy Wall Street” movement hence the name “Robinhood” derived from folklore hero who stole from the rich and gave to the poor. (Roberts, 2020). When Robinhood was founded in 2014, it was the first solely app-based broker-dealer introduced to the market (Rogozinski, 2020).

The Robinhood-app has a clean and overly simplistic design essentially aimed at “demystifying” the stock market, increasing the allure to younger generation investors. The app screen is green if the markets are open for trade and black if closed or when trading is restricted. The app will also show its users 100 “trending” or popular stocks among other users on Robinhood which one may then choose to follow for future price changes. (Roberts, 2015; Massa & Robinson, 2020)

The commission-free app is still capable of generating revenue from its clients uninvested cash reserves by charging interest from customers who are given a line of credit to invest with (Roberts, 2015). Most of the revenues however come from “payment for order flow” which is the process of routing client trades or orders in return for a fee through the market-

making firms (Roberts, 2020). On 17th of December 2020 the United States Securities Exchange Commission (SEC) fined Robinhood $65 million for allegedly concealing information from customers about sending their orders to high-frequency trading firms which Robinhood supposedly also made most of their revenues from between 2015 and 2018 (Massa & Robinson, 2020).

Two thirds of the revenue from order flows on Robinhood come from option trading. An advanced investment vehicle that Robinhood gives its users an instant access to options which may take days on other retail brokerage platforms. (Massa & Ponczek, 2021)

The controversial topic of “gamification” of investing and trading has also put Robinhood in the spotlight (Massa & Robinson, 2020). The simple design, “Robin’s reward” a digital scratch and win a stock prize (Roberts, 2020), confetti animations congratulating users on their first trade and even a possibility of winning a highly priced stock if they refer the app to a friend bring a game feel to the app. (Massa & Robinson, 2020) Robinhood also sends notifications of price movements and other design nudges that encourage the user to actively trade (Roberts, 2020). On 16th of December 2020 securities regulators in Massachusetts had filed a complaint on Robinhood accusing them of essentially these gamification practices (Massa & Robinson, 2020).

The velocity of option trading at Robinhood app is over ten times that of other retail brokerage platforms. (Popper, 2021) In the beginning of the year 2021 during the skyrocketing of certain names in the stock market there was also a spike in Google search query of “How to trade options on Robinhood.” (Massa & Ponczek, 2021).

Robinhood may also be the most actively used broker among WallStreetBets users. There is no way to actually prove this but there are clear indications when browsing through the WallStreetBets subreddit forum seeing posts with pictures of users using the infamous Robinhood mobile app.

In Rogozinski’s book, “WallStreetBets: How Boomers Made the World’s Biggest Casino for Millennials” he noted how the growth rate of WallStreetBets subscriber count and user growth of Robinhood coincide with one another. Google search trends also showed almost

identically coinciding spikes with the search results of “Wallstreetsbets” and “Robinhood”. (Rogozinski, 2020)

It is worth noting that half of the Robinhood users are completely new to investing and probably don’t have a clear understanding of how the stock market works or how to pick investments (Barber, Huang, Odean, & Schwarz, 2020). Less experienced retail investors are also much more prone to attention grabbing events in the markets (Seasholes & Wu, 2007) like the media coverage of GME**.** Behavioral theories predict that this behavior stems from the fact that markets present an immense amount of investment choices especially for new investors while attention-grabbing events help narrow down the choices for them. (Seasholes & Wu, 2007) The users on Robinhood have increased likelihood of engaging in attention driven speculative trading and thus more are likely to also engage in herding behavior. (Barber et al., 2020)

In 2020 Robinhood had roughly 13 million users (half of which are new) with an average account size of $3.500. In comparison E-Trade’s and TD Ameritrade’s average account size was $100,000 and $110,000 respectively while Charles Schwab’s clients average account was worth around $240,000. (Curry, 2021) The average age of Robinhood clients was around 31 years old compared to Charles Schwab average 51. (CBInsight, n.d.) Statistically both metrics are indications of educational level and of an established personal risk tolerance where *financial* responsibility may be more present with more mature clients.

Robinhood’s design and function has attracted millennials to use it since everything works on mobile, it doesn’t require computer software or phone calls to the broker, just a mobile-app and it is free. (Rogozinski, 2020)

The app has managed to bring about the controversial gamification of investing. (Barber et al., 2020) Whether that is a good thing or not is open to debate.
Removing the friction of placing orders by eliminating commissions also stimulated increased trading activity of Robinhood users (Barber et al., 2020)
Emerging evidence also indicates Robinhood acquiring relatively inexperienced investors. (Barber et al., 2020) Gamification of investing may have the undesired impact of turning investing into more of a speculative game or a casino. “Playing the market” involves an

element of gaming mentality but should also involve rational decision making. Gamification may attract newcomers into financial markets who otherwise aren't familiar at all with investing but also encourage them into more active trading (Barber et al., 2020). This is the kind of situation that does not behave in the way rational EMH suggests.

"We've made gambling on the stock market cheaper than gambling on sports and gambling in Vegas,'' Larry Tabb (Egkolfopoulou & Ponczek, 2021)

3.7 Short Selling

Shares represent an ownership stake in the issuing company. An individual might buy or "long" a given company's stock if they have optimistic expectations about future performance which should be reflected in a higher future share price. Likewise, if someone considers a stock too expensive and has negative expectations about future performance resulting in downward share price pressure, an investor could sell the stock short.
Short selling involves the sale of a stock currently not owned in anticipation of buying the shares back in the future at a lower price. (Investor.gov, n.d.a)

Some financial services companies allow some company shares to be sold short and typically require a special margin account to do so and even then, the investor needs to find shares that are available to be shorted. (Taulli, 2011) Brokers have different ways of providing shares for their clients to short such as borrowing from the brokers own inventory or borrowing from other clients. If there are little to no shares available to short the stock, it may be placed in the "hard-to-borrow" list. Shorting stocks that are hard to come by usually have higher borrowing fees included. (Scott, 2021)

Traditionally capital gains are made when you buy low and sell high. Making capital gains by selling short involves selling at a high price and buying short shares back at a lower price. (Hayes, 2021b)

As an example, if a company XYZ's stock price is currently $100 per share and investor A decides after thorough analysis to sell short 1 share of XYZ's stock at $100. Despite not owning the stock beforehand investor A presses the "sell" on his broker account on the

given stock. The broker notices the sell order and sees that another investor B has 10 shares of XYZ on their account thus the broker is able to borrow one share from investor B and will immediately (attempt to) sell it in the market at that price for investor A.

After the transaction is completed, investor A will have (negative) -1 shares of XYZ stock on their account and proceeds of $100 indicating that they're short that many shares. At some point in the future if the stock price of XYZ has dropped to $80 per share, investor A decides to buy the share back paying only $80 or $20 less for the share price, which investor A also gets to keep as profits from the trade. The bought stock is returned to investor B and investor A's negative stock balance disappears.

The given example did not include possible commission fees and interest payments the investor A may have had to pay for shorting XYZ's stock but the basic idea how short selling works in practice. Investor B's account didn't experience any changes during this time with the magical wonders of digitalization and they may not ever realize that their stocks were sold short and it wouldn't have any effects on his portfolio besides the possibility of receiving interest from investor A.

Clients may be able to tell their broker not to have their shares available for shorting if they wish. Traders who short may also have to pay the margin interest and interest from borrowing the stock which both tend to add up as time passes (Hayes, 2021b).

A trader typically has to have a margin account in order to enter a short sale. Margin accounts allow an individual to borrow money from their broker, who then use the trader's investment as collateral (Hayes, 2021b). Especially when shorting the trader will take some risk that can get out of hand if share prices of the shorted stock increase rapidly. Brokers typically require customers to maintain margins in their accounts, typically 25%, to cover shortfalls and may be asked (margin calls) to put up more cash if stock prices increase rapidly. (Hayes, 2021b)

The price of a stock on the markets cannot go below zero thus limiting the stock owners' risk to their initial investment. However, when selling a stock short, share prices could rise infinitely which could lead to ever increasing losses for short sellers with open positions.

(Hayes, 2021b) This fundamental idea can act as a fuel of fear for short sellers when they are incrementally forced to close down their short positions as the prices keep going up. When this sequence of events take place in a massively shorted stock such as GME this closing of positions happens fast and starts a chain reaction where short sellers are "squeezed out" of their positions as they try to close out their position by buying at higher prices. (Hayes, 2021b)

3.7.1 Volkswagen Short Squeeze 2008

In terms of market events a similar major short squeeze happened on Tuesday, October 28, 2008 with Volkswagen's stock VW after Porsche announced plans to become the dominant shareholder of VW. Volkswagen is a publicly owned automobile manufacturer founded in 1937 and headquartered in Wolfsburg, Germany. VW shares are traded on the Frankfurt stock exchange under the symbol VOW3. Porsche is another automobile manufacturer founded in 1931 headquartered in Stuttgart, Germany. (Baur, 2015)

Prior to 2008 Porsche had been steadily acquiring Volkswagen stock driving up expectations for further appreciation in VW's share price. Hedge funds began shorting VW stock believing the shares were overvalued and anticipating a sharp decline in VW's share price.

On 26th of October 2008 Porsche announced its intention to acquire a massive holding of 43% of Volkswagens shares outright and another 32% in derivative contracts. This put the hedge funds in to an "infinite squeeze" potentially forcing them to buy shares at any price. This unwinding by the hedge funds drove Volkswagen's stock price so high that in terms of market capitalization this made Volkswagen the most valuable company in the world for a brief moment. (Baur, 2015)

In the end, Porsche only acquired a 5% stake in VW. In January of 2010, A group of investment funds decided to sue Porsche SE, for fraud and VW company executives who were believed to be behind the "short squeeze". (Baur, 2015)

3.7.2 GME Short Squeeze

Short interest is an indicator of market sentiment and typically expressed as a percentage of the total number of shares outstanding that have been sold short. When short interest is high, market sentiment for the shares is pessimistic. Stocks with higher short interest may be more prone to short squeezes. (Mitchell, 2021b) Typically, short interest for any given stock is less than 5% of the outstanding shares. In 2019 the short interest for GME was over 25% and kept rising as time went on (Angel, 2021). GameStop stock was sold short over 140% as of January 22, 2021 by mostly large-scale institutional investors (Chohan, 2021). There were 40% more shares sold short than the total number of outstanding shares of GME in the market!

Unless the company issues new shares into the market or decides to “buyback” shares from the market (Cagan, 2016), the number of shares outstanding at any time is relatively stable (Angel, 2021). When the short interest exceeds 100%, it doesn’t mean that all the available shares are sold short because it is possible for the same shares to be lent out multiple times over. (Angel, 2021) The short seller who sells the shares short must also find a buyer. The new buyer can go ahead and let his shares be sold short again thus in essence short interest results in “excess” long positions if this activity is carried forward. 100% short interest would mean 200% long interest. (Mackintosh, 2021)

If prices for the stock GME continued to rise rapidly, investors trying to close short positions face increasing losses on their positions. If the stock of GME is held by retail investors who choose not to allow their stock to be shorted by brokers, there is insufficient supply of GME shares for short sell investors to buy and close their positions further increasing the upward pressure on stock price. This is why the phenomena is called a “short squeeze”.

3.8 David and Goliath

One of the names frequently linked to the skyrocketing GME stock price beginning in late 2020 is WallStreetBets (WSB). An online group of presumably retail investors and speculators have been primarily responsible for the push that started a massive short squeeze in GME’s price and those of other stocks including AMC, Blackberry and Koss.

This short squeeze forced a handful of hedge funds to cover their short positions which resulted in total of billions of dollars in losses for them. (Lee, 2021)

Hedge funds and other financial institutions are considered to have massive monetary capabilities in the financial world where individuals or retail investors decisions on their own have relatively zero effects on the markets. But this time the tables were turned with the "little guy" (retail investors) beating Goliath (hedge funds) at their own game. Hence why this scenario has been noted to resemble the rather biblical narrative of David and Goliath in the financial world (Chohan, 2021; Lyócsa, Baumöhl, & Vŷrost, 2021).

The thing that made this event also interesting is that it seemed to have almost "political" power behind it. What I mean by this is that retail investors at least on WallStreetBets subreddit were gladly taking credit for driving the stock price up and losing institutional investors' money by forcing them to close their positions. (Grant, 2021) Some posts on the subforum have resonated with the "Occupy Wall Street" movement of 2011 wanting specifically to hurt the hedge funds and "beat them at their own game" by hiking the prices up against the institution's short positions (Wells & Egkolfopoulou, 2021). It is notable to point out that while the short squeeze cost certain hedge funds billions of dollars it also created equal profits for other financial institutions who happened to be long on GME before the hike (Wells & Egkolfopoulou, 2021)- This fact was seemingly disregarded for contradicting the actual goals and intent of investors on WallStreetBets.

The saga of GME represents a fascinating and remarkable feat orchestrated by mostly average joe (retail) investors and traders sharing a common interest with assumingly little to no financial background (Chohan, 2021). One thing to point out is that anyone who anonymously browses this particular forum is able to also "participate" so to speak in whatever appears to be the general consensus on the forums such as "buy this stock and short squeeze the hedge funds." When accounts are easy to open and commission free, it is easy for anyone to "chip in" for real.

It should be stated that WSB's sole purpose of existence is not to be a platform of planned operations but rather a hub for speculative ideas and jokes which may unintentionally or intentionally become such operations as the short squeeze did. Herd activity happens when

individual participants decide to act based on information shared by others on the platform. If the herd is large enough, they are capable of manipulating market prices. If large, visible institutional investors do this, they get sued. If a herd of invisible small investors manipulate stock prices, who do you sue?

Market manipulation is the action of artificially tethering with either supply or demand and thus causing dramatic movements in stock prices, up or down. Market manipulation may involve techniques such as spreading false rumors or information about the company, actively making a series of transactions in order to make the security appear as if it was more actively traded than in reality or by rigging quote prices. (Investor.gov, n.d.b)

3.8.1 David: The Retail Investors

Over half of the U.S. equity market is either directly or indirectly owned by American households through retirement accounts, mutual funds or other type of investments making up roughly $29 trillion in worth of equities. (Hayes, 2021c) On Wall Street retail investors are sometimes referred to as “dumb money” (Phillips & Lorenz, 2021) likely referring to the relative lack of experience investing and small portfolios managed as compared to large institutional investors such as hedge funds. Retail investor lack of financial unsophistication could also make them more likely to be subject to behavioral biases. (Hayes, 2021c)

Retail investors typically use traditional online broker firms or banks to maintain their trading accounts and execute market trades. Retail investors typically trade in significantly smaller sizes and pay higher transaction fees than institutional investors. As a result, retail investors often invest in mutual and index funds because of lower fees and the ability to diversify their investment portfolio. (Hayes, 2021c)

One unofficial subgroup of retail investors are young investors that include Robinhood-app users and WallStreetBets traders. WallStreetBets is one of the main names tied to recent skyrocketing stocks, including GME. Can WallStreetBets be linked with the GME short squeeze? At least they like to take the credit for it (Grant, 2021) and media have highlighted this link extensively since the beginning of 2021.

3.8.2 WallStreetBets

WallStreetBets, a name linked to Wall Street financial district in New York was founded by Jaime Rogozinsk in early 2012 for "likeminded people" to share their ideas when it comes to making risky bets on the financial markets (Rogozinski, 2020). WallStreetBets is a subforum or a "subreddit" of a larger online platform called Reddit which contains hundreds of thousands of smaller subforums for any hobby, activity or interest that you could think of. Anyone with a free account can create a new subforum as long as it doesn't violate the rules of the Reddit site. Subforums also contain "threads" of posts made by subscribers which finally contain smaller posts that can make up a discussion within the original post.

In terms of popularity, WallStreetBets subreddit had gained roughly 100,000 subscribers throughout 2012 and 2017 and reached 1 million subscribers by March 2020.
By February 14th 2021 WSB had amassed over 9 million subscribers with its most exponential growth coinciding with the skyrocketing GME stock price at the beginning of 2021 (Wallstreetbets metrics, n.d.)
The actual traffic numbers on WSB may in reality be a lot higher than this. As of November 2019, the subscriber count on WSB was around 750,000 while the traffic on the subreddit was around 2,9 million during the same month or almost 4 times the subscriber count. (Rogozinski, 2020)

WSB is known for their notoriously risky and reckless "YOLO" bets that the users are actively known to partake in and the rather facetious and satirical way they view the world of finance. Users are known to gamble with cheap weekly OTM call options that essentially act as digital lottery tickets. (Boylston, Palacios, Tassev, & Bruckman, 2021)
YOLO is an acronym for You Only Live Once referring to bets where you either win big or lose everything (Rogozinski, 2020). The use of option contracts is especially popular in WSB for their speculative nature, high leverage and the multitude of different strategies using them. (Rogozinski, 2020)

Posts on the site may include gambling with one's retirement funds, 401k or posts of massive returns from relatively small bets or losses of hundreds of thousands of dollars. How much of these kinds of posts are legitimate and how much are jokes is left for the user to

decide. Some posts include pages of long “due diligence” reports of different companies just to end their “company analysis” report with a disclaimer “this is not financial advice, I eat crayons.” The subforums distinguishable logo is a picture of a cartoon baby dressed in a suit and wearing sunglasses, posing arms open like that of the Jordan Belfort from the movie Wolf of Wallstreet resonating well with the self-aware culture associated with WSB.

On the forum a multitude of posts may include the likes of “Casually threw a year’s salary into GameStop”, “Dad’s live savings starting to look like foodstamps instead of retiring on a yacht, sorry dad.”, “YOLO’d my life savings into GME” or “HOLD, DON’T SELL” (Reddit, n.d.) most of which can never be verified as either a joke or not but nevertheless most of them as a collection imply “a good investment” for the uneducated since many users give the impression that much of their funds were truly invested into GME in this case.

Not all WSB users are financially unsophisticated. One notable person who gained a lot of attention in the scheme of things is known as Keith Gill. He is a chartered financial analyst (CFA) going by the name of “DeepF---ingvalue” on WSB and as Roaring Kitty on YouTube where he began posting videos around mid-2020 about the fundamentals of GameStop as a potential investment. Gill realized over $10 million from his investments in GME and supposedly holds more unrealized profits on the stock. (Fox, 2021)

3.9 Goliath: Hedge Funds

Hedge funds are alternative funds that employ strategies such as derivatives to hedge their positions. Despite this, the hedge funds are known to take aggressive and risky investments often employing heavy leveraged positions. Most hedge funds are set up as private limited partnerships offering their investment services to wealthy and financially sophisticated clients. Their sole purpose is to create active returns in all market conditions and being active generating management and profit fees. Hedge funds can invest in almost any type of asset from private and public investments and securities from equity, debt or other derivative investments. (Fernando, Hedge Fund, 2021)

During the surge of GME stock in early 2021, multiple hedge funds with short positions in GME suffered massive financial losses trying to cover these positions as the stock price rose. Melvin Capital founded in 2014 by Gabe Plotkin lost roughly 53% of its $13 billion fund in January from the short squeeze of GME. The fund received emergency cash injections totaling $2,75 billion from Steven Cohen's Point72 Assets Management who also lost 15% of their fund due to the short squeeze in GME. (Kaissar, 2021) Citron Research founded by Andrew Left lost 100% of their short position in GME. By the end of January 2021, losses for short sellers totaled more than $5 billion. (Winck, 2021)

4 Results

Today with the use of internet and social media, news headlines can reach audiences instantly. Anybody from their home can hear about the new hot stocks at any time of day, open their brokerage app and place a bet with just few taps or clicks. Information that is acted on can also be shared instantly. These feedback loops could create conditions for a potential asset bubbles to form.

Some hubs for sharing and spreading this financial information and knowledge are social media platforms such as the WSB subforum, Twitter, YouTube and TikTok. Anybody can access these sites while some of them do not even require an account in order to browse the platform. In many of these platforms making an account is typically free and allows users to post on the platform. Posting rules need to be obeyed but the platform does not provide any guarantees about whether the content of a post is valid or legitimate. The user can receive financial information or even stock tips from any of these social media platforms such as WSB or YouTube where validity of information may be indicated by positive/negative votes of the post or the comment section which both essentially act as community checks. A highly voted post may imply that there is some validity or legitimacy to the post or at least that people approve what the post is about.

4.1 Mechanics of WallStreetBets

How does WSB stimulate herding behavior? The typical chain of events for herding on online platforms such as WSB may start with a small number of posts about a specific stock that the

original posters have invested in and are now showcasing their profits possibly with hindsight glory of their public plans that are now paying off. A number of participants after seeing the profits others have made may themselves then decide to “join in” by buying the stock. This buying demand in larger scale lifts the stock’s price which encourages some of the recent participants to also showcase their profits, starting another feedback loop within the forums.

During times of rapidly increasing stock price such as GME, posts of individuals multiplying their initial investment were rapidly shared and upvoted. When you initially see long lists of threads on the subforum of people making “easy money” in the stock market, you think if other people are making money so can I. This easily creates an illusion or misperception of reality that everyone can make money. Non-participating users are being left out to watch from the sidelines as their peers “200%” on their investments which may feed to their fear of missing out (FOMO) driving their incentive to participate (DeMarzo, Kaniel, & Kremer, 2008).

One important thing to note is the functioning of these subreddits. The forum has a built-in “voting machine” for posts. In a way without sorting, the most upvoted or liked posts by other users will be shown at the top of the page where they are highly visible. This is also the case for posts within threads. The top of the page is the first thing that opens up when someone decides to access the subreddit presenting the most upvoted threads in a given timespan such as the past 24-hour period. In times of mania many of these top posts of the day may be posts of anticipation and prediction of further price hikes or others glamorizing their recently made profits.

Thus, it is not difficult to see how such a simple site can act as a breeding ground for potential feedback loops that could spiral out of control. This is a big concern given the level of speculation is high and information is posted by inexperienced investors. Participants especially the younger and new investors have tendency to imitate (herd) others to avoid being poorer relative to their cohort (DeMarzo et al., 2008).

Such functioning of the site has managed successfully to create an informational cascade in the stock markets at least in the case of GME. Speculators pile in betting on “the same

horse" just because of the public winning streaks of others. A herding activity that successfully distorts the fundamental value of the company and the market price.

There are indications that users on WSB are relatively young and new to investing when observing the coinciding subscriber growth of WSB and Robinhood users (Barber et al., 2020; Rogozinski, 2020). New market participants are also relatively more vulnerable for chasing returns based on stocks with high attention and biases. (Barber et al., 2020)

4.2 WallStreetBets Community Culture

When it comes to operations within the subreddit such as short squeezing the hedge funds from their short position, WSB users are, I hypothesize, participating in something that loosely resembles a situation such as modified prisoner's dilemma. User who decide to participate through the forum can never be fully certain that other participants are also doing their part and not cashing out or "pulling the rug from under them".

The expectations of the WSB community is that if one person decides to sell their position, they will inhibit the whole operation for everyone and potentially ruin it for others. If too many close their GME position at once, the stock price will fall which is good news for the antagonist, in this case hedge funds. If all WSB users stayed in the game, in theory all would win because hedge funds couldn't close their short positions and the GME holders could in theory, collectively drive the price up by holding.

The strategy of WSB participants was to buy as many shares as possible of GME bidding the share price up. Short sellers would be pressured to cover their positions but were unable to find shares to buy. As GME shares were largely held by WSB participants, they could exclusively decide the selling price. This can be considered as a form of market manipulation. However, the fact that the subreddit is public and everyone is essentially anonymous may have saved them from being investigated by regulators (SEC).

Much of the culture of WSB seems to be influenced by another, older bulletin board forum called 4chan. 4chan is a notoriously known image board where almost "everything goes" and anonymous users engage in a kind of free-for all online forum. WSB describes itself as "Like 4chan found a Bloomberg Terminal." Bloomberg Terminal is one of the most sophisticated financial data platforms costing roughly $20,000 per year.

The thesis writer's belief is that the WSB lingo is inadvertently being used as a subtle way to steer one narrative such as position holding. I do not think this was intentional or planned but rather something that evolved over time. In social media platforms every little detail counts in the end as a collective social culture forms, drawing people in and keeping them there including taking monetary actions such as participating in speculative investments.

"GME To the Moon" is one of the slogans WSB users like to use and it has made it to many billboard signs and sticker tags across the U.S. gaining a lot of popularity. Slogans are usually short-lived phrases with a nature of that of "battle-cries" created for a particular occasion. Quoting psychologist Leopold Bellak on slogans as a "phrase which consists of only small number of words using or implying the imperative or hortative; a phrase which is identified with one particular social group at a given time." (Bellak, 1942) Bellak notes how at the time of his research the motivating factors of slogans had not been experimentally determined. Although they may guide emotions and actions (Bellak, 1942)

The slogan "GME to the Moon" implies the hope of a stock's price to skyrocket over and beyond the visible price chart (hence the "moon") thus making astronomical profits for the holder. The GME ticker symbol in this example may be replaced with any other stock ticker such as MU or AMD hence the variability of slogans within the same theme are more likely to become successful (Bellak, 1942). It isn't unheard of for a group of people with similar goals to have such slogans and "labels" when asking for a miracle so to speak.

Another famous slogan or catchphrase is "diamond hands" which is often expressed as the corresponding emojis and expresses the continuity of holding often risky positions rather than closing down highly positive or negative positions. Diamonds are hard to break under pressure. Diamond hands don't break from the "weight" of holding out. "Paper hands" is the term used to describe someone who cannot mentally or financially maintain their financial

position and eventually end up closing it. In WSB, being a paper hand is scorned on the forum in a facetious manner while diamonds hands are idolized.

5 Conclusion

There are strong indications that online platforms can act as herding grounds for pure gamblers, speculators and investors which has the potential of heavily affecting stock prices in most extreme cases. Most of this likely stems from relatively new and young investors who browse these online platforms and can easily be influenced to participate based on the content posted on them.

It is impossible to measure how many of those who decide to participate in any given post after being influenced by it or by fear of missing out (FOMO) to buy a stock or stock options that eventually lose money. There is an incentive to post and share glamorous positive returns and little to none to post mentally and financially painful losses although people share these negative experiences as well sometimes. However, by looking at the forums, there is a strong indication that users are much more likely to post positive as opposed to negative news and results. Making a decision based on a forum post is typically an emotional one that can result in a profit. This may not be the same as making an investment decision rationally based on factual content.

Despite stating the obvious there are reasons to believe that Robinhood and WSB users do not conduct rational investing practices based on financial modelling. It appears as if users view financial markets as short-term speculative casinos. Investment platforms like RobinHood that make it easier for small investors to transact and invest their money is a good thing. However, platforms like WSB mostly contains content based on opinion and not fact shared with inexperienced investors who might know the difference.

The activity online allures the monetary participation of those less experienced who are also less aware of their own risk-tolerance and more prone to participating in herding behavior. Online platforms such as WSB where people hype up activity should never be closed or banned in the end. Although such open places with the popularity of like WSB is from time to time greatly irresponsible. Without solid education the users can have devastating

financial impacts on inexperienced new users who end up losing more than expected and thus potentially risking their own or someone else's financial livelihood.

Despite the current state of free markets and which should be cherished, there is potential to legally use these platforms to manipulate markets if an orchestrated group decides to do so. How can someone's investment behavior be influenced online? How does the herd influence individual behavior? How should herd activity be regulated? The use of social media as a possible collective pooling platform of knowledge, capital and intentions ultimately goes far beyond the extent that of finance and financial markets.

The society is continuing to live in a live social experiment of global social media and its implications. One of the implications has to do with how and how much social media affects the financial system. Social media platforms may quite clearly amplify the effects or the velocity of herding. Individual actions on social platforms may easily influence the actions of others on these platforms like WSB.

There are two distinct perspectives to the event that came from WSB. Does WSB operate according to the principles of the efficient market hypothesis (EMH)? Very doubtfully because decisions appear to be made spur of the moment with limited, even questionable, information. Much of the emotions such as exhilaration and greed present themselves very clearly in the posts. Therefore, behavioral finance is much better suited for exploring this herding phenomenon more deeply.

While individual decisions might not matter very much, when a herd of individuals act, markets can move or be manipulated. But if the herd manipulates markets, what makes their behavior any different from that of hedge funds they want to punish? Future study might also look to use signaling theory, which looks at how individuals with potentially conflicting interests provide honest signals as opposed to cheating.
The information that can be accessed online seems to be endless and how much can be controlled and how much should be controlled in order to retain some form of stability in the financial markets without interfering with the freedom of individual choice are questions that need to be examined in the future.

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