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The Influence of Social Media on the Stock Market

Metropolia University of Applied Sciences
Bachelor of Business Administration
International Business and Logistics
Bachelor's Thesis
1 October 2022
Abstract

In recent years, social media platforms have become part of the daily lives of almost all young adults. At the same time, the number of young retail investors who want to become active on the stock market is increasing. The reasons for seeking another source of income lie in rising inflation rates and salary cuts, not least intensified by the corona pandemic. The fact that social media platforms are often used as a source of stock market information leads to the question of how social media and the information published on them find their way into stock markets and how they influence their prices.

Results show that retail investors form the bridge through which information from social media enters the stock market environment. Due to the subjective nature of social media content and psychological characteristics of retail investors, prices on the stock market can deviate from their fundamentals and generate abnormal returns and thus belong to the field of behavioral finance. The psychological characteristics of retail investors can be traced back to phenomena such as limited attention and investor sentiment.

In the case of the GameStop short squeeze, it was the initiation and collusion via social media that led to the magnitude of the event and demonstrated social media’s impact on securities to such an extreme extent for the first time. The GameStop event can be seen as a new sub-form of financial bubbles because, unlike previous bubbles, it was inflated on purpose and with exactly this intention.

Keywords: social media, stock market, behavioral finance, GameStop, retail investors
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1 Introduction

GameStop, Robinhood and Elon Musk - Until early 2021, no one would have been able to answer what a struggling video game seller, a stockbroker named after a medieval hero and the richest man in the world have in common. But they all played central roles in one of the biggest stock market events in history, when in January 2022 the market price of GameStop stock shortly skyrocketed by more than 2700%. The event, which caused billions of dollars in losses for some players, originated and was driven by social media and brought the topic of such platforms in connection with financial markets into the conversation for the first time on such a scale. While financial markets and their theories have been studied for hundreds of years, social media have only become a relevant topic in recent years. Although the influence of digital platforms has been widely studied and analyzed in many other areas and industries, the relationship between social media and financial markets is still a young topic of research.

While social media platforms are already fully integrated into the daily lives of most young adults, they are also gaining momentum among the older generations. At the same time, since the outbreak of the corona pandemic, increasingly younger adults are being drawn to the stock markets. While the average age of a retail investor was 48 before 2020, it has since dropped to 35 (Charles Schwab, 2021). Not only by spending more time at home and looking for new hobbies, but also for financially impacted people due to the pandemic, it drives a large part of new investors to the stock market in the hope of a potential extra source of income. In addition, above-average inflation rates are devaluing people's money faster, so they are looking for ways to invest it. The fact that these new and inexperienced retail investors use social media on a daily basis leads them to use these platforms as a source of stock market information and supposed investing recommendations from self-proclaimed experts. Unrestricted
space for such content can now be found on almost all social media platforms. This is precisely why it should be important for both older and young adult generations to understand the influence social media and its content can have on the stock market.

The thesis aims to understand how social media and the information published on them find their way into stock markets and how do they influence their prices. The focus is to get an overview of how social media and the information published in them find their way into stock markets and how they influence their prices.

Furthermore, the question will be addressed as to what position the nature of social media takes in already existing and recognized financial theories. Does the existing theory help us understand the new element or is there a gap? In order not to lose the connection to practice, the GameStop event will serve as a unification of financial theories and social media in reality. To this end, special focus will be placed on the questions of what role social media played in the event and whether a new type of financial bubble was thereby encountered.

The paper consists of seven main sections. The literature review is intended to provide a collection of relevant and established financial literature on the topic. The research methodology is followed by chapters on the nature of social media and factors that have contributed to a new era of investing. Chapter six will go into more detail about the GameStop event. All findings and further suggestions are presented in the conclusion.
2 Methodology

This chapter is dedicated to the research methodology of the thesis. The utilized methods and approaches to answer the research questions are explained in more detail here, with a particular focus on the chosen research design and data collection method.

2.1 Research Approach

Before conducting the study, a research approach was developed that would best serve the research question with answers. In this particular case, a literature review combined with a case study was chosen.

The literature review is used to collect and review existing information on a specific topic. It should indicate which outcomes exist in the already published literature about a topic and which do not. Moreover, not only a list of existing sources should be listed, but it should be assessed to what extent the presented information and arguments fit to the research questions. In the case of finance theories mainly literature was picked up, which either concerns the school of efficient markets or behavioral finance. These two theoretical fields under the concept of financial literature supported two different perspectives on the workings of financial markets and were both significant to better understand and answer the research question later on. The case study of the GameStop event was intended to bridge the gap between the topics of financial literature and social media in order to best answer the research question. The analysis of the still very recent event is intended to apply the results of the literature review to a real-life case to current market conditions. This was hardly possible in the past, as social media have only been present on the stock market in this form for a few years.
2.2 Research Design

Malhotra (2010) explains that research design is to explain the already established research approach in more detail and to help ensure that the research was conducted effectively and efficiently. There are three different research designs with different scopes and methods: exploratory descriptive and causal (Figure 4). Exploratory research is particularly useful in the early phases of research topics. It helps to make a question easier to understand. "It is not used in cases where a definite result is desired" (Sreejesh, et al., 2014, p. 31). Rather it is intended to provide space for answering the research questions and in this way to provide a basis for further or deeper research into the topic. Descriptive research is used to describe conditions such as market characteristics or functions. It is used to describe characteristics of research relevant groups or products as well as to make estimates and predictions. "Causal research is used to obtain evidence of cause-and-effect (causal) relationships" (Malhotra, 2009). Just like descriptive research, causal research requires precise structuring and planning.

<table>
<thead>
<tr>
<th>Exploratory</th>
<th>Descriptive</th>
<th>Causal</th>
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<tbody>
<tr>
<td>Objective:</td>
<td>Discovery of ideas and insights</td>
<td>Describe market characteristics or functions</td>
</tr>
<tr>
<td>Characteristics:</td>
<td>Flexible, versatile</td>
<td>Marked by the prior formulation of specific hypotheses</td>
</tr>
<tr>
<td></td>
<td>Often the front end of total research design</td>
<td>Preplanned and structured design</td>
</tr>
<tr>
<td>Methods:</td>
<td>Expert surveys, Pilot surveys, Case studies, Secondary data: qualitative analysis, Qualitative research</td>
<td>Secondary data: quantitative analysis, Surveys, Panels</td>
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Figure 1. Comparison of basic research designs (Malhotra, 2009)

In the thesis, exploratory research was used to discuss and understand the intersection of financial markets and social media. The fact that little research has been done on the intersection of social media and financial markets makes it
necessary to structure the thesis in a way that is as broad and unrestricted as possible. The research questions themselves are accordingly wide-ranging and as unrestricted as possible, and therefore provide room for the answers.

2.3 Data Collection

The information for the paper came from secondary data. This refers to data that has already been published by another institution or person. The advantages of secondary data are the enormous time savings compared to primary data. Often it is not necessary to obtain primary data for a topic or subfield of research, because it is already available. Furthermore, the researcher usually does not have sufficient resources to conduct a comprehensive and accurate primary data search (Sreejesh, et al., 2014).

For the topic area of financial theories, books, journal articles and other scientific publications were used. Due to the high age of this subject area and the far-reaching establishment of the existing sources, a costly acquisition of primary data was not necessary. For the chapters on social media and the GameStop case study, news articles, blog entries and non-textual sources such as videos were utilized. As the topic of social media in financial markets has only become relevant in the last few years, there are almost no scientific publications or similar.
3 Literature Review on Financial Theory

Just as financial markets are centuries old, research into financial theories has been going on for many years. Since then, a major point of discussion has been which financial theory best describes the stock market and breaks down its functionality. While advocates of efficient markets theory believe that markets have always integrated all available information into their prices, advocates of the behavioral finance camp believe that in the stock market, behavioral and psychological factors influence prices. In the following chapter, the two theories will be discussed in more detail focusing exclusively on information that is relevant to the further course of the research.

3.1 Efficient Market Hypothesis

Two ambassadors of efficient markets theory are the economists Eugene Fama and Burton Malkiel. Much of the content on efficient markets comes from their research and publications. Their perspective can be summarized in the following anecdote: A finance professor and a student are walking together, when they discover a 100$ bill lying on the floor. While the student tries to pick the bill up, the professor says: "Don't bother. If it really was a $100 bill, it wouldn't be there. The market is efficient." This story is intended to explain that new information arriving on the financial markets is immediately absorbed by the market. So there is no "free value" lying around on the stock exchange due to absent processing of new information (Anspach, 2021). A new twist will be given to the story to integrate the topic of the thesis: “On the following, the student (12,000 followers on Twitter, member of multiple investment group chats) tweets a public message stating that he found a 100$ bill including the location where he found the money. After the tweet, he picks the bill up just to realize that it is indeed 100$. While keeping this extension in mind, we continue to take a look at the central vision of efficient markets.
The core message of Fama's work is basically very simple. He argues for the existence of efficient markets. Fama calls a market efficient as long as the prices fully reflect the available information (Fama, 1970). In other words, it is impossible to beat the market, because all stocks are being traded at their fair value. As a result, it is impossible to gain profits from selling overvalued stocks and buying undervalued stocks. As simple as the key result of Fama's may sound, many complex research and analyses are based on this subject. So, in order to understand the position and impact of social media and provide scientifically correct counterarguments, we must first address how exactly to understand and interpret the efficient markets theory. Fama assumes that financial markets are, in other words, markets for information. Consequently, these markets are informationally efficient if the market price reflects all available information. Thus, as soon as a new piece of information becomes available, traders will bid up (or bid down) the price until it again reflects all the information. This informational efficiency is the product of competition, low entry costs and low information costs on financial markets. In this way Fama assigns a precise and testable meaning to the generally vague designation "efficient" (Cochrane, 2013). Associated with that, voices such as "a crash on the stock exchange proves the falsity of efficient markets" or "the crash was not expected" are the wrong approach to the criticism of the theory. "An informationally efficient market can have economically inefficient runs and crashes, so long as those crashes are not predictable" (Cochrane, 2014). On the contrary, if you could predict a run or a crash in the market, then the market would be predictable and no longer efficient.

In general, Fama distinguishes three variations of efficient markets in his work: weak, semi-strong and strong form. The weak form describes the type in which all historical prices are included in the price of the share. Therefore, an investor cannot gain any advantage by analyzing the historical prices, as these data are already included in the current price of the stock. In a semi-strong form efficient market, besides historical prices all publicly available information is included in the present price of a stock. In this case an investor could not gain any results
through reacting to fundamental public company announcements, as this information is incorporated into the price immediately. Last, the strong form of efficient markets is reached when the price of a stock reflects both public and private information. In this market, not even an individual with insider information could gain a competitive advantage on a company’s stock price (Fama, 1970).

The well-known economist Burton Malkiel has also published numerous works on the subject. Malkiel's results and views are consistent with the Efficient Markets Hypothesis. In his book “A Random Walk Down Wall Street” published in 1970, he states that price movements are random and therefore unpredictable. To illustrate this, Malkiel conducted an experiment with his students in which he had them determine the daily price changes of an imaginary stock by tossing a coin. The price movement of this diced share was documented in a chart (Figure 1), with the x-axis representing the trading days and the y-axis displaying the stock price.

![Figure 2](image-url)  
Figure 2. Hypothetical stock chart of the “coin flip” experiment executed by Burton Malkiel and his students (Malkiel, 2016) (Malkiel, 2016)
"The chart ... looks remarkably like a normal stock price chart and even appears to display cycles" (Malkiel, 2016, p. 95). The purpose of the exercise was to show that this chart resembles the course of a real stock because they both are randomized in their price changes. In the generated chart, the price changes are random because you cannot predict the flip of a coin. According to the efficient market theory, the stock prices are also unpredictable because news is by definition unpredictable, and therefore price changes on the stock market, which is a market of information, must also be random and unpredictable (Malkiel, 2007).

3.2 Behavioral Finance

The efficient markets theory has faced a lot of resistance in the past. Many critics counter the efficiency of financial markets by integrating psychological and sociological factors into financial market pricing. The bottom line is that it is the individual himself who makes the decisions to buy and sell in the market and thus influences the prices. In this section, this research field will be dealt with in more detail. It must be said, however, that behavioral finance, in contrast to efficient markets theory, is not a single unified theory, but rather a collection of theories and research. Behavioral finance deals with all influences that can affect the behavior of investors. At this point, only literature related to the research question will be considered.

A milestone in behavioral economics was reached via the so-called prospect theory (1979) by Kahneman and Tversky. The concept examines the behavior of individuals under risk and presents a basic critique of the conflicting utility theory. Fundamentally, the results show that individuals value gains and losses differently. This is due to different effects that contribute to the phenomenon (Kahneman & Tversky, 1979).

The first effect, called the certainty effect, states that people weight outcomes that are merely probable differently from outcomes that are achieved with
certainty. This fact leads to a risk-averse attitude toward certain gains over merely probable larger gains and a risk-seeking attitude toward merely probable losses over certain smaller losses (Kahneman & Tversky, 1979).

Another effect is described as the isolation effect. "This tendency ... leads to inconsistent preferences when the same choice is presented in different forms" (Kahneman & Tversky, 1979, p. 263). In other words, people tend to look for differences rather than commonalities among different options. In financial markets, this means that stocks which generate some form of "stand-out" effect are more likely to be noticed and therefore preferred by individuals (Boyce, 2022).

Figure 2 illustrates the concept of Kahneman and Tversky graphically. According to the findings of prospect theory, the value (Y-axis) of gains and losses (X-axis) for individuals is shown.

Figure 3. Value function under Prospect theory (Berejikian, 2002, p. 171).
One of the main insights is that the value function is much steeper for losses than for gains. This means that people lose a higher amount of subjective value when facing a loss than they would increase subjective value with the same amount of gain.

Various other articles and research are focused on another factor related to financial markets: attention. There are thousands of potential stocks that an individual investor can buy and sell. This is logically too much to process. "Human beings have bounded rationality. There are cognitive- and temporal- limits to how much information we can process" (Barber & Odean, 2008, p. 786). Attention plays a vital role in this decision process. Measured through indicators like abnormal trading volume, extreme one-day returns and news, Barber and Odean (2008) conclude that individual investors show an attention-driven buying behavior. Many investors only buy stocks from a selection of attention-getting stocks. Attention thus forms the selection criterion for a potential buy list, personal preferences then determine which stock exactly from this selection is bought. Furthermore, Barber and Odean (2008) have found that the selling behavior of attention-seeking investors differs substantially from the buying behavior. While attention plays an important role in new stock purchases, people tend to sell only stocks they own. So-called short sales of shares hardly take place as a rule. This means that investors only consider a very small number of shares when selling, namely only those they own themselves. However, this phenomenon is generally only to be assumed to be the case for average retail investors. Professional investors or institutions also routinely sell shares. They therefore do not have limited buying and selling selections as individual investors do. The resource attention is clearly greater for them since they invest more time in the search for shares due to their professional position. Moreover, institutions and professionals usually have complex search and filtering engines that make the search more effective.

Limited attention on stock exchanges leads investors to apply a category-learning behavior. Due to the lack of ability to process all individual company-specific
information in the market, investors tend to process market- and sector-wide information instead. This characteristic in combination with other psychological factors leads to various implications regarding asset-return correlations (Peng & Xiong, 2006). Such effects of limited attention on various conditions and elements of financial markets have been demonstrated in a number of articles over the past years:

Hirshleifer et al. (2007) find that stock price reactions to corporate earnings announcements depend on the number of earning annunciations from other companies on the same day. Distracting news thus affect the limited attention of shareholders. Corwin and Coughenour (2008) find that limited attention changes liquidity in the form of transaction costs in financial markets. In their Distracted Shareholder Hypothesis, Kempf et al. (2017) find an influence of limited attention on the probability of announcing events like merger news, CEO news and stock returns.

A different field in behavioral finance deals with the nature and influence of investor sentiment in stock markets. In their article note Baker and Wurgler (2007) state that "investor sentiment ... is a belief about future cash flows and investment risks that is not justified by the facts at hand" (Baker & Wurgler, 2007, p. 129). In other words, investor sentiment is not based on evidence from the market and company fundamentals but on irrational and disjointed perceptions. This theory arises from the lack of explanation of several historical events such as the Great Crash of 1929 or the Internet bubble. All of these events have in common that they work against the theory of efficient markets and sentiment is therefore supposed to provide explanation by incorporating cognitive biases. A vital component is to develop a method to measure and interpret sentiment. Baker and Wurgler (2007) therefore developed their own Sentiment Index. This index is based on market proxies such as trading volume, dividend premiums and other values. With the help of this index, the two professors were able to capture the effects of sentiment on the stock market. The Sentiment Seesaw (Figure 3) illustrates the effect of sentiment on company stocks. The y-axis represents the
value of a share, while the x-axis displays the type of share, meaning how difficult a share is to value or arbitrage. The solid line $P^*$ is supposed to illustrate the value of a share on the basis of fundamental company data. The two dashed lines indicate high sentiment and low sentiment phases respectively.

Figure 4 The Sentiment Seesaw (Baker & Wurgler, 2007, p. 133)

During low sentiment phases, it can be seen that safe stocks are overvalued, while speculative stocks are traded below their fundamental value. The opposite is true for positive sentiment. Safe, easy-to-arbitrage stocks are undervalued while difficult-to-arbitrage stocks are significantly inflated.

A similar theory deals with the impact of social mood on stock markets. Social mood is determined by non-economic variables and related psychological influences. Especially when making decisions under risk, psychological factors such as emotions play a certain role. In his article, Rapp (2019) summarizes various research on proxies that influence social mood. He finds that numerous irregular events have a psychological influence on social mood. The mood seems to be varied by factors like weather, sports conditions or hours of sunshine. Such
influences can therefore have an indirect impact on the stock market, as they change the social mood, which in turn is propagated by investors in the stock market. Social mood has a positive effect on the markets. If the mood rises, the values on the stock exchange also rise. The same is true for decreasing social mood (Nofsinger, 2005).

At this point, however, a distinction must be made between the similar theories of investor sentiment and social mood. "While sentiment is a concept of behavioral finance, mood is a concept that originates in psychology" (Rapp, 2019, p. 8). Price changes on the stock market can logically not influence the weather, which would then influence the social mood. It is external factors that drive the social mood and only finds its way into the stock market through emotion-driven events. Investor sentiment however is formed only by market relevant data and events in conjunction with their perception by the investor (Rapp, 2019).

3.2.1 Bubbles

In the past periods, there have been many events in financial markets which apparently could not be explained by the theory of efficient markets. The phenomenon of so-called bubbles goes beyond a fair valuation of assets and incorporates terms from the field of behavioral finance. Also in the present it is of interest to many to understand bubbles and to recognize them early. The effects of the "bursting" of such bubbles can be seen in the well-known world financial crisis with its climax in 2008. Brunnermeier and Oehmke (2012) define the general concept of bubbles as a mispricing of assets. They further state that not every mispricing is directly a bubble, but that these mispricings are accompanied by certain attributes in order to be perceived as a bubble. At this point, a distinction should be made between rational and speculative bubbles. Rational bubbles are defined by the rational deviation of the stock price from the fundamental value of the asset (Blanchard & Watson, 1982). This bubble is therefore still driven by rational expectations of investors despite mispricing. In contrast, there are speculative bubbles. In this phenomenon, a bubble is
ultimately composed of heterogeneous investor beliefs (Scheinkmann & Xiong, 2003). Speculative bubbles presuppose that investors have different perceptions of things and are driven by psychological or social influences and phenomena (Brunnermeier & Oehmke, 2012). In the following section, we will focus more on this form of bubbles and their connection to behavioral finance theories.

To better understand the occurrence of speculative bubbles, one should take a look at how they can arise and on which factors they can depend. Brunnermeier and Oehmke (2012) link the emergence and growth of speculative bubbles to investor overconfidence. These optimistic investors buy the assets and thereby drive up the price of the stock. Meanwhile, pessimistic investors may try to depress the price of the stock by taking short positions. However, as noted earlier, the tendency of individual investors to buy usually outweighs the tendency to sell (Barber & Odean, 2008). This has the consequence that the pessimistic investors can no longer compensate, since they have to incur losses through their short position in connection with rising prices (Miller, 1977). In models, this increase in the price of the stock can even exceed the value range of the most overconfident investor (Brunnermeier & Oehmke, 2012). In addition, it can be noted that such extraordinary mispricings on asset markets can occur as a product of the fact that people tend to predict the outcomes of relevant events optimistically biased (Armor & Taylor, 2002). Such events can be, for example, "... new or emerging markets, the outbreak or end of a war, the adoption or the spreading of an innovation or of a new technology, and others" (Fenzl & Pelzmann, 2012, p. 57).

A well-known example of the emergence of a bubble as a result of a key event was the dot.com bubble in the early 2000s. The development of this bubble mainly resulted on the revolution of new business models through the internet and the associated overconfident and optimistic estimation of the profits of these companies (Fenzl & Pelzmann, 2012).

Sornette and Woodard (2009) state that financial bubbles have their origin in imitation and herding. The large amount of information and data about companies and markets makes it almost impossible for individuals to absorb everything in a
limited amount of time. Consequently, imitation of other actors is being resorted to. They adopt the so-called herd behavior and follow with their decisions those of others in the market.

The study of bubbles includes not only how they develop, but also how to detect a bubble at an early stage and when it bursts. Various frameworks for detecting bubbles link to previously discussed indicators from the field of behavioral finance. Nofsinger (2005) found that positive social mood contributes to increased investor optimism. And speculative bubbles are fed by optimistic investors. Thus, elevated social mood provides the perfect environment for bubbles to grow. It therefore makes sense to watch for events that drive social mood up if one wants to detect bubbles.

Pan (2020) concludes that investor sentiment is related to bubbles. More specifically, he states that sentiment peaks before the climax of a bubble, in other words, the bursting of the bubble. Based on this, the previously mentioned sentiment index (see page 7) can be used to identify a bubble burst at an early stage. If the sentiment index has reached a disproportionately high value compared to historical values, this can be an indicator that the bubble is about to burst.

Another method looks at the behavior of mutual funds, especially those run by young managers. The result is that funds with young investors focus on technology stocks during the peak of a bubble. As a consequence, these mutual funds receive above-average returns from technology stocks as the bubble rises, leading to a dominance of tech stocks in the fund's overall portfolio. With the bursting of such a bubble, the funds would incur above-average losses and hence extend the downward spiral. Young managers have no better skills to find good performing tech stocks than older managers of funds. However, young managers overweigh them, which makes them more vulnerable to crashes. These insights can be used to identify when a technology bubble may have reached its peak (Greenwood & Nagel, 2009).
Greenwood and Nagel (2009) also set a temporal framework. Given the fact that investors who have already experienced the bursting of a bubble will not participate again in associated potentially risky trends. A new bubble can therefore only grow again with the next generation of investors and the funds that invest in overpriced stocks. (Greenwood & Nagel, 2009). This point can be combined with the insight that "... financial memory should be assumed to last, at a maximum, no more than 20 years. This is normally the time it takes for the recollection of one disaster to be erased" (Galbraith, 1993). In conclusion, one could consider the last major burst bubble to be the great recession after 2008 and thus expect a new bubble to emerge in the current decade.
4 Social Media

Answering the research question requires one to look at the substance of social media as well. Compared to the age of capital markets and theories, social media with its launch in 1997 is still a young field (boyd & Ellison, 2007). Nevertheless, their constant growth and relevance in progressively more areas can hardly be overlooked. Therefore, in the following chapter, the nature of social media as well as their functionality and relevance will be described in more detail. It will give an overview of this media industry and related topics that are of importance for the research question and the following chapters.

4.1 Definition, History and Categorization

There are countless definitions and explanations for various social media sites and categories. Boyd & Ellison’s (2008) research includes one of the first comprehensive collections of historical definitions and explanations for SNSs (social network sites). It can be stated that the origin of the term social media originates from the expression of SNSs. Fundamentally, SNSs can be described as web-based networks that offer diverse services to people. In addition to the ability to create public (or semi-public) profiles on a platform, users can create a list based on other users with whom they share a connection. Furthermore, they can view and traverse the lists created by other users. How exactly these lists and connections are defined depends on the social media site in question. It becomes clear that the original idea of the first social media networks was to connect with people and to connect with “friends of friends” through the connection lists of others. Over time, however, social networks have evolved to include a wide range of services and features that make them what we know them to be today (Miller, et al., 2016).

A more current and looser definition sees social media as a “colonisation of the space between traditional broadcast and private dyadic communication, providing people with a scale of group size and degrees of privacy that we have
termed scalable sociality” (Miller, et al., 2016, p. 9). Media such as radio, television and newspapers are described as traditional broadcast. Dyadic communication describes the one-to-one exchange by telephone. Social media, which stands between the two categories, contains characteristics of both. On the one hand the almost unrestricted access and audience as with traditional broadcast media, and on the other hand the private communication between two or more individuals as with dyadic communication (Miller, et al., 2016).

The history of social media does not begin with the founding of Facebook, as many people always think. In fact, even before the platform with the blue icon, there were applications that initiated the establishment of social media. SixDegrees.com, founded in 1997, was the first reported site to include several of the social media features we know today. The site did not last long, but it was a milestone for a new generation of connecting with people and was ahead of its time. In the years around the turn of the millennium, multiple social media sites were created that resembled the SixDegrees.com model. Another milestone was reached in 2002 with Friendster, which was initially conceived as a dating platform. “While most dating sites focused on introducing people to strangers with similar interests, Friendster was designed to help friends-of-friends meet, based on the assumption that friends-of-friends would make better romantic partners than would strangers” (boyd & Ellison, 2007). The platform reached a user base of 300,000 in the U.S. without radio or TV advertising, before gaining popularity in countries such as the Philippines, Singapore, Malaysia, and Indonesia before eventually being cancelled. In the years after 2003, increasingly more social media sites entered the market in various categories. Many of them became highly successful and are still popular today, for example LinkedIn (2003), Myspace (2003) or Yahoo! 360 (2005). “Most [of the social media sites] took the form of profile-centric sites, trying to replicate the early success of Friendster or target specific demographics” (boyd & Ellison, 2007, p. 216). At the same time, user-generated content pages were also created, including YouTube (2005).
the United States, there was a storm of social media platforms in other places around the world in the early 2000s. Nonetheless, the platform that shaped a new era of social media was also to have its origins in the United States. In 2004, Facebook was designed exclusively for users who were at Harvard University, before it was made available to several high schools and eventually to the rest of the world (boyd & Ellison, 2007). Over the years, the company continued to grow and add numerous features to its model. Even in 2022, Facebook is still the world's largest social media platform with almost three billion users (Walsh, 2022).

Over the years, more platforms have been created, which can be divided into further subcategories under the umbrella of the term social media, depending on their purpose. There are now professional networks that serve exclusively at the entrepreneurial and career level. Such platforms as LinkedIn or Xing give users the opportunity to learn more about jobs and companies, as well as to network and socialize with other professionals. On applications such as YouTube, visitors can consume videos and post comments. Other platforms including Facebook and Instagram serve the general masses to publish pictures and videos, maintain contacts and stay in touch with friends and family. Especially social media "veterans" like Facebook nowadays offer such a wide range of functions that one could divide the social media site into multiple subcategories. Another socially particularly important medium are so-called microblogging sites. "Microblogging' is the general term for the concept of posting very short status updates as popularized by services like Tumblr and Twitter" (Fiander, 2012). Users can post and respond to small, mostly word-limited posts on such sites. Twitter is in this respect also a useful tool to analyze which topics are currently of relevance on the net and get a lot of reaction. This monitoring of the relevance of posts has even been integrated by another social media site as part of its business model. Users of the platform Reddit have the possibility to upvote or downvote posts. The more votes a post receives, the higher it is displayed on the homepage for other users. This allows viewers to see at a glance which topics and opinions are
currently trending on the web. Sites like Reddit belong to the category of social news and bookmarking sites (Kietzmann, et al., 2011).

Naturally, there exist also deeper classifications of social media platforms. However, a further elaboration of social media into certain groups is not necessary for the progression of the paper (Kaplan & Haenlein, 2010).

4.2 Social Media for Businesses

The enormous growth and potential of social media has not passed companies by either. Social media offers completely new opportunities compared to traditional broadcasting media (TV, radio, newspapers). "A key business component of social media is that it now allows consumers to evaluate product, make recommendations to contacts or friends, and link current purchases to future purchases through status updates and twitter feeds" (Forbes, 2013). Companies can achieve an exchange of information through social media that was not possible to this extent before this era. Everyone who has internet access can share their opinion on company actions publicly, and even as let their friend lists know. In this way, social media users can not only see the public opinions of others, but also see how others process information and form a more complex picture. For companies, in turn, social media opens a new door to opinion gathering. In an internal company meeting, individual opinions on certain topics can be collected, but via social media, the board of a company obtains a much more complex picture of the company and potential customers, which actions and decisions play a primary role for the public (Cade, 2018). However, in order to be successfully present on social media, companies must ask themselves what goal they are pursuing on social media, which platform is most suitable for this goal, and what effect actions on social networks have on the audience.

To get an extensive overview for firms of the main functionalities of social media Kietzmann et al. (2011) designed the so-called "Honeycomb of social media" (Figure 5). With the help of this figure, it is possible to identify and compare which
functional blocks are in the spotlight for the respective social media site and which implications of the functionality these blocks hold for companies. The framework lists seven main points of social media activities: Identity, Conversations, Sharing, Presence, Relationships, Reputation and Groups. Each one of these activities forms an independent purpose. For example, a fundamental block is the identity element. This describes the extent to which a user discloses data about himself, but also how he wants to be perceived. Therefore, in addition to conventional information such as civil name, age or profession, data can also be included that reflects thoughts, interests and feelings. The extent of this self-disclosure differs on each platform, such as the last-named factors, can be revealed both consciously and unconsciously. One way to indirectly indicate this in social media is by reacting to postings or articles in certain interest areas, which in turn can be seen and interpreted by other users (Kaplan & Haenlein, 2010). The topic of privacy and what information one reveals about oneself publicly or to the social media company has often been a big debate in the past. The social media giant Facebook has been accused several times in the last ten years of passing on personal data of its users to third parties, which in turn played a decisive role in political events such as the Brexit campaign or the 2016 US elections (TechRepublic Staff, 2020).
The topic of data privacy and which information is processed in which way by social media sites plays a significant role for companies. If a platform publishes data about virtual activity, private content or other of its users, this can bring real consequences for companies - even on an economic level. In the past, there have often been debates and scandals about social media sites and the processing of user data. The social media giant Facebook has been accused several times in the last ten years of passing on personal data of its users to third parties, which in turn played a decisive role in political events such as the Brexit campaign or the 2016 US elections (TechRepublic Staff, 2020).

In addition, the honeycomb of social media can also be applied to the social media platforms (Figure 6). With the help of the shading, one can see which functionalities are in the foreground on the respective social media site. This, in turn, helps companies that want to project a presence on the web to determine...
which platform is best suited to their intentions and goals, depending on the features that are at the centre of importance on each site.

Figure 6. Contrasting the functionalities of different sites (Kietzmann, et al., 2011, p. 248)

Companies that intend to show what they stand for and what they are can pursue this goal on LinkedIn, among others. Since the block identity plays a central role on this platform, it offers companies the opportunity to introduce themselves to the business world and provide all the necessary information about themselves. As already indicated, this can happen consciously and unconsciously, even from the perspective of companies. In addition to the companies’ own identities, other users can also share their opinions about companies in the form of testimonials, ratings and subscriptions, which indirectly contributes to the identity and the
reputation of a business. This is why the functional block reputation also has a key impact on LinkedIn.

If a company aims to share content and knowledge related to the businesses, the focus is on the sharing functionality. Content sharing platforms such as YouTube enable companies to publish videos for customers, and to obtain a public opinion on the contributions through the comment function and to conduct discussions. The SAP Analytics channel of the software company SAP, for example, uses YouTube to publish product instructions and help videos for its own software. In September 2021, the company Apple hosted a live broadcast on YouTube in which new products and features were presented. The broadcast has reached more than 20 million views to date (Apple, 2021). So whether for educational purposes or marketing strategy, the intention to share content on platforms such as YouTube can serve many purposes for companies and reach a large audience. It is often the case that companies are present on more than one platform, as they pursue different functional purposes on social media at the same time.

The influence that postings on social media can have has already been analyzed several times. A study looked at the purchase behavior of products bought by shoppers based on social media. The results have shown that companies can achieve higher sales with product-related activity of users on social media. In addition, it was found that users prefer to use social media platforms such as Twitter due to the faster rate of new information being posted (Forbes, 2013).

4.3 Social Media in Behavioral Finance

To understand the influence of social media on financial markets and related events, it is necessary to clarify the relationship between social media and behavioral finance. In an inefficient market, price determination is influenced by psychological and sociological factors. This assumption obviously existed before the emergence of social media, in a time when information was communicated
for example through one-way communication such as newspaper articles. With activities on social media, information now also gets a human response, which is not the case with TV or newspapers. Depending on the platform, users can comment, like, share and perform other actions on a post from a company. As a result, even to a neutral observer, a piece of information is almost always delivered in a package together with human opinions.

Analyzing big data for trends and opinions in the field of behavioral finance is called sentiment analysis. Big data are data sets that are "... almost impossible to manage and process using traditional data management tools - due to their size, but also their complexity" (Halevi & Moek, 2012, p. 3). In the chapter on behavioral finance, we have already addressed the issue and theory of investor sentiment and the similar phenomenon of social mood. Since social media big data reflects the complex behavior of society (expressed by user activities on certain topics, interactions with each other, comments and other actions), it is the perfect tool for sentiment analysis. In the following section, we will look at sentiment analysis within social media. In this way, we will determine the role of social media platforms in the field of behavioral finance and which factors are important in this context. Bukovina (2016) found that two factors are at the forefront for this purpose:

The first is the fact of limited investor attention. Retail investors logically do not have the capacity to follow all market actions the entire time and are not able to obtain all publicly available information about a company, in other words they have cognitive and temporal limits (Barber & Odean, 2008). In addition, compared to institutional investors, private individual investors usually do not have the professional databases, complex analytical algorithms and staff to conduct such actions. For these reasons, retail investors tend to draw their information from social media forums and communities and base their investment decisions on it. They let other experts and communities do the research and only consume the results and indications. Figure 7 visualizes this transmission process of information demand and attention between social media capital markets and
stock prices. Retail investors, which are part of the capital markets, draw part of their information from social media, which is shown in the figure with an arrow. Since it must be assumed that social media is not the only source of information, the arrow is shown as a dashed line. Stock prices are influenced by capital market activity, which also includes retail investors. And since retail investors trade based on social media content, stock prices are ultimately also influenced by social media. The rectangle "research" simply indicates that data from capital markets as well as from social media must be included in order to analyze the connections (Bukovina, 2016).

Figure 7. Transmission mechanism – Attention (Bukovina, 2016)

The second factor looks at the connection between investor sentiment on social media and capital markets (Figure 8). Retail investors, being a part society, obtain some of their market-related information from social media. "To be specific, social media enable us to create, share and respond to existing information. Such a combination of reactions is a valuable source of data mostly about opinions, emotions or social mood shared by the social media audience" (Bukovina, 2016,
However, it must be assumed that retail investors are only partially impacted by sentiment and are also aware of the fundamentals. Furthermore, it is expected that sentiment is not exclusively formed in social media but also from other sources. These two conditions are indicated by dashed arrows in the chart. The next transmission step takes place in the capital markets, which have retail investors as a component and thus also bring sentiment into them. Finally, the price of stocks is formed by the trading of institutional as well as retail investors, whereby sentiment gets its influence on prices through the latter (Bukovina, 2016).

Figure 8. Transmission mechanism – Sentiment (Bukovina, 2016)

The illustrations above present a general guideline of the stations through which social media have an influence on stock prices. The following selected findings are intended to provide concrete forms of impact and insight into the precise ways in which social media bring their influence to bear on capital markets in various categories.
A central link in the question of the interplay between social media and behavioral finance is the published content, in other words, the information itself. Investors all agree on the value of information, yet this does not necessarily apply to the interpretation of the information. Even the most professional and well-informed analysts do not always agree on the valuation of companies (Tetlock, 2015). If someone has the same amount of public data, it can be interpreted differently by each individual, and thus adopt a psychological or sociological influence. Besides, a high density of reporters on the web leads to the repetition of information. Repeated information is perceived by some investors as fundamentally new information, which influences the perception of assets. This means that a market player who perceives the same information about an event several times on different channels subconsciously interprets it as new content and thus obtains a distorted overall picture of an event. Such phenomena also contribute to the fact that social media generates a higher return volatility compared to traditional news channels (Jiao, et al., 2020).

Facebook is utilized by millions of users every day. For years, The platform contains an emotional parameter that evaluates the data from its users calling it Gross National Happiness Index (GNH). "Facebook's GNH measure is an attempt to estimate the aggregated mood and well-being of the Facebook population, applying automated sentiment analysis to the status updates of millions of Facebook user" (Wang, et al., 2014, p. 484). Karabulut (2013) concludes that trading volume and return volatility on the US stock market can be predicted using this index. This proves that sentiment, monitored in the form of the GNH index, has an impact on the behavior of stock prices. Further research with the index extends its applicability to 20 international markets and comes to the same conclusion. It is found that sentiment on Sundays, when the stock markets are closed, has an impact on stock returns on Mondays. This suggests that sentiment even successfully shows an impact on capital markets over time (Siganos, et al., 2014).
Further findings are provided for financial blogs, such as SeekingAlpha.com. They play an infomediary role for retail investors by offering a wide selection of investment articles from bloggers. Posts on blogs can cause market reactions and are associated with abnormal returns. Affected for this are securities with high information asymmetry and bearish market conditions. Information asymmetry is common among private investors for reasons of limited attention and lack of technical requirements. Therefore, they prefer to rely on opinions and recommendations from blogs. The influence of financial blogs increases even more when they are buy recommendations or when the companies have low institutional shareholdings. The reason that retail investors are listening to more voices on the web at times of price declines is because they are looking for ways to make returns or compensate for losses during bearish market conditions (Ricket, 2016).

In financial markets, the hunt for the latest and most relevant information plays an immense role in not missing out on anything. With statistically 229 million daily users on Twitter, it makes it all too unthinkable for an investor to get all the information on a certain topic (Kemp, 2022). Especially with the presence of stock companies on microblogging sites like Twitter, the processing and general amount of information moves to the dimension of big data. It is important to understand that big data cannot be found exclusively in social media, but in all kinds of media that contain the functionalities "sharing" and "conversations" defined by Kietzmann et al. (2011). Google offers a function that allows users to analyze how many times the topic of interest has been viewed on any web page in the search engine by simply searching for words or terms. One can even filter and compare by regions, categories, time intervals and other criteria. Nevertheless, analyzing big data from social media is a focus for many organizations. The reason is that many social media sites are specially designed to capture and highlight trends and popular opinions (Bukovina, 2016). Sites like Twitter have the characteristic that hundreds of news items are posted every second, while other media such as newspapers only have an issue once a day.
These time intervals are already much too old for information about stock market events, as this usually requires up-to-the-minute material. In addition, Twitter outperforms solutions like Google queries and news media. Financial terms appear on Twitter days and weeks before they are captured by google queries, which shows how efficient social media can be compared to other methods (Mao, et al., 2011).

Sprenger et al. (2014) analyzed 250,000 tweets with stock content. Their results show a correlation between Twitter sentiment and abnormal stock returns and trading volume. To be more precise, a positive twitter sentiment ("bullishness") has a higher impact on stock returns compared to message volume and thus indicating that the content itself and its quality are more important than quantity (Sprenger, et al., 2014). Similarly, Sprenger et al. (2014) study over 400,000 S&P 500 (U.S. stock market index) stock-related tweets and distinguish between good and bad news. In this way, a more detailed examination of the market reaction to qualitatively different information, as well as different categories, is possible. For instance, the results show that positive news is often incorporated early in stock prices due to leaks before the official announcement. Negative news, on the other hand, comes as a surprise and is therefore only incorporated into stock prices on the same day. In addition to these different appearances caused by qualitatively different information, categorically different news events can also have an influence on stock prices. "Having analyzed a broad array of various news categories, our results suggest that many news categories truly surprise the market (e.g., M&A or Earnings), while others (such as Product Development or Joint Ventures) rarely contain new information that moves the market" (Sprenger, et al., 2014, p. 820). As a side effect of these findings, Twitter authors who generate above average returns with their investment content are recognized more through retweets and reactions. This leads to the conclusion that the voice of selected users has an increased weighting on Twitter and thus a stronger influence on Twitter sentiment and stock returns (Sprenger, et al., 2014). A study with similar content suggests that also the social ranking of users can have an
influence on stock returns. During his term as the U.S. president, more than 500 tweets by Donald Trump relating to stock companies were evaluated and analyzed. Results indicate that positive and negative tweets have different effects on companies depending on the category (media firm or non-media firm) showing that the personal opinion of influential persons on stock companies can generate abnormal returns (Ajjoub, et al., 2021).
5 New Age of Investing

Over the years, like other industries, stock markets have changed according to the current conditions of technology and society. To be able to answer the research question appropriately, it is necessary to understand which relevant factors prevail in the present and how they shape the stock market world of today.

5.1 Retail Investors

Bukovina (2016) himself concluded that social media is in fact a tool for measuring the behavior of society based on indicators such as sentiment or attention. However he stated that a necessary factor that must always be represented are retail investors, who bring their information from social media into the stock prices through their presence and significance in capital markets.

In the last few years, we have seen the share of retail investors in US equity volume increase rapidly with currently approaching the 25% mark. While the share was still 10% in 2010, the curve has been rising faster since 2019 (Bloomberg Intelligence, 2021). Institutional players are meanwhile also trying to analyze and predict the actions of these private shareholders in detail. With a market share of almost a quarter, retail investors have developed from a niche player into a crucial factor that must be taken seriously. The reasons for the growth of private investors do not come by chance but are composed of a variety of factors.

5.1.1 Information Access

The stock market was not always as accessible to private investors as it is today. Especially when it came to obtaining information on shares, interested individuals usually had only a few options. You had to be deep in the material of trading with securities and be well networked to keep up. In the past the stock market was regarded as a kind of "closed" society in which it was difficult for ordinary citizens
to enter. However, the emergence of social media has drastically changed this image. Since almost everyone now owns a smartphone or has internet access, they can freely obtain information about the stock market and shares at any time. This has significantly lowered the barrier to entry into the world of the stock market for many private individuals, which is why they are now more likely to consider getting involved. Today, social media have become so integrated into people's everyday lives that gaining information is one of the biggest reasons why people use social media (Kemp, 2022).

5.1.2 Smart Brokers and the Corona Pandemic

If a private investor wanted to buy a $60 share in 1960 in the U.S., he would have had to pay an additional $6 in commission on top of that (Jones, 2002). At that time, it was thus completely unprofitable for private investors to regularly invest small amounts in shares if they had to pay an additional 10% on top of the purchase price each time. Although the trading fees decreased continuously in the following decades, new times arrived in 2013. With the start-up broker Robinhood for private investors, the generation of commission-free trading was offered to private investors. If you want the society to like something, make it free. Even though Robinhood's trades are not completely free, but involve a minimal charge, many other brokers followed the company's lead and caught up with the new trend for retail investors. This state of no trading fees for investors means that they are much freer in their investment decisions. In the past, an investor might have ruled out buying several different assets from different companies in order to avoid paying multiple commission fees. This concern is taken away from a retail client today with providers such as Robinhood or ETrade. In addition, these so-called smart brokers are designed to make trading as attractive as possible for retail investors. Besides commission-free trading, they offer options such as fractional shares or setting up savings plans with low deposit amounts. The aim is to make investing accessible to people from all income groups. Smart brokers such as Robinhood or Trade Republic also target private individuals who are new to the world of shares. The interfaces of the mobile apps and web
versions of the brokers are very minimalist and "easy-to-use". At first glance, the user generally only sees the company's share performance and whether the price is currently rising or falling, highlighted in red or green. More indicators and complex chart views are usually not available or only hidden. For these reasons, many experts criticize these companies and accuse them of downplaying stock trading and not presenting the risks involved sufficiently before buying a share (Darbyshire, 2021). Nevertheless, the number of users has increased enormously from year to year. While the platform registered around 500,000 users in 2015, there were already 22.5 million individual users in 2021, according to the company (Tuwiner, 2022).

The outbreak of the corona pandemic was an accelerator of retail investment growth. The financial firm Charles Schwab, which bears the name of its founder, has found that while the median age of a pre-2020 investor is 48. This contrasts with a generation of investors averaging 35 years of age, most of whom began trading at the onset of the corona pandemic (Charles Schwab, 2021). A generation that grew up with social media and for several reasons decided to start investing with COVID-19. Some tried to compensate wage cuts or short-time work with investing, others made use of the surplus of free time. With the outbreak of the pandemic, a new group of younger and mostly completely inexperienced investors was driven onto the stock market, the so-called Gen-I (Generation Investor).
6 Case study: GameStop Corp.

To confirm how social media and the information published on them find their way into the cosmos of the stock market, we need to take a closer look at real cases and events in which both factors played a combined role. One of the most extreme cases to date took place in the spring of 2021 around the shares of the video game retailer GameStop. If someone had bought $10,000 worth of GameStop shares on January 4, 2021, they would have been worth $250,000 on January 28 (Chaumont, et al., 2021). In the first month of 2021, GameStop stock experienced one of the largest so-called short squeezes in the history of the stock market. This phenomenon was the first case to display the significance and power of social media and its users on the stock market. By analyzing this event, it should become clear whether it was just a one-time exception and the stock market will continue to run its usual course or whether such events can be repeated due to new conditions and technologies around the stock market and introduce a new era of trading. Along the GameStop case, various drivers of behavioral finance and related theories will be addressed.

6.1 Company situation

To examine the event for behavioral patterns and influences, it is necessary to mention the players and actors around the GameStop short squeeze and what actions made the difference in detail. The GameStop company is therefore at the centre of the event. Its business model revolves around the worldwide sale of video game and PC entertainment software in its physical stores and online shop. In 2020, however, new trends are weakening the company's sales strategy. Games are increasingly available for download from the internet, displacing CD versions and calling into question the very purpose of video game retailers like GameStop. Factors such as these are weakening the company, which has also been reflected in GameStop's share price. In the preceding years, including 2020, the stock experienced a steady downward trend. Contrary to these seemingly
clear indications, in July of the same year a U.S. private investor named Keith Gill began publishing videos about the stock. After a detailed analysis of the company and the market, Gill came to several conclusions. According to company reports, GameStop had enough cash at the time to pay off its outstanding debt. More significant to the self-educated equity analyst, however, is the fact that a substantial portion of the company’s shares are being held in short positions, which means it is being bet on a further stock price decline, if not bankruptcy, for the company. The holders of these short positions were institutional hedge funds, such as the investment company Melvin Capital, which is located in the United States.

6.2 Reddit

Keith Gill brought further content after his first contribution to the GameStop share. Over time, his views and analysis of the stock gained recognition and other private investors began to buy long positions in the stock. Throughout the course of events, Gill himself bought 200,000 shares of GameStop stock. In addition to Twitter and YouTube, the self-proclaimed analyst was also active on another social media site, Reddit. The platform was founded in the United States in 2005 and is now one of the largest social media sites in the country (Kemp, 2022). On Reddit, users can publish contributions such as texts, images, videos and links without significant restrictions. Other users can then vote the posts up or down, which means they can gain or lose additional relevance. The more upvotes a post receives on Reddit, the higher it appears on other users’ homepages. Reddit also offers space for comments, discussions and topical sections, so-called subreddits, in which users can exchange views on specific topics. One of these subreddits is called ‘wallstreetbets’. This group provides users, private investors, with the opportunity to share their experiences on the stock market. It is a large pool of subjective information from investors with various levels of knowledge and intentions. With 36%, the largest proportion of Reddit users are between 18 and 29 years old, which suggests that there are also many newcomers to the stock
market who do not yet have years of experience in the financial markets (Pew Research Center, 2021). As interest in GameStop continues to rise in the second half of 2020, Gill regularly posts excerpts of his stock gains with GameStop on his Reddit account. In parallel, he posts YouTube videos that go into more detail about his motivations. His conviction leads more and more people join on buying the share, which causes the price of the stock to rise day by day. There is talk of achieving a short squeeze. Because while the price of the GameStop share continues to rise, the hedge funds are still sitting on their short positions in the billions. The speculators on Twitter assume that the institutional investors will have to back out at some point in order to avoid further losses, which can go on indefinitely in the case of short selling. This means that not only the retailers are buying GameStop shares, but also the hedge funds, which are buying back their shares. The latter speculation is confirmed when the stock reaches its all-time high of $120 on January 28 after days of drastic increases (pre-market price even significantly higher).

There is no question that such an outsized increase in the price of the stock is far away from the fundamental data of the company. Although there were small impulses from the corporation at the beginning of 2021, such as the appointment of new members to the board, these in no way justify this rise in the share price. It must hence be assumed that the jump in the GameStop share was not caused by regular market trends and news, but by behavioral patterns and events. If one looks at such events in detail, you can quickly see connections between actions on social media and reactions on the market.

For the very first time, the share came into the focus of some in 2019. Professional investor Michael Burry bought a stake in the company because he believed, like Keith Gill, that the stock was undervalued. Burry became known during the financial crisis around 2007, when he was one of the few who realized the scandal surrounding the U.S. housing market and bet against it. In the movie "The Big Short" his person plays one of the main roles and is portrayed as a character who looks behind the scenes and swims against the tide. Although
Burry did not become active on Reddit after his purchase of GameStop shares, the news itself caused quite a stir among the "Redditors". In addition, Keith Gill, who was not only active on Reddit, but was already invested in GameStop at the time and was able to record share price gains. Up to this point, this information does not carry anything unusual. Some investors consider a stock undervalued after extensive analysis and buy shares. The price moves in favour of Burry and Gill, which can thus make price gains. This in turn generates additional interest from other retailers, as Gill also regularly posts his profits on Reddit. This changes as in 2020 the information of short positions of hedge funds in GameStop starts spreading. Later depicted as a battle of ‘David (retail investors) versus Goliath (hedge funds)’, the stock becomes a battlefield in January 2021 between the institutional investors with their short positions and retail investors who want to push them out of the stock with buy positions on the asset (McDowell, 2022).

According to Ricket (2016) financial blogs can provide abnormal returns. Wallstreetbets’, which serve as Reddit's financial blog, are the perfect platform for this. If one reads through the course of the subreddits, the person will quickly notice that the information is never written objectively by the authors. It is a mixture of satirical, optimistic, ironic and often superficial comments. This condition has also led to a high asymmetry of information on GameStop, because between the actual news about the company, there are also many irrelevant or repetitive messages. According to Jiao, et al. (2020) this leads to the fact that the same information is processed as new material and thus for many, often young and inexperienced, investors an over-euphoric picture of the share has created.

Both bullish sentiment on Twitter and the public position of the author has a positive influence on stock returns (Sprenger, et al., 2014). This could be observed in the example of GameStop. Michael Burry had already proven his abilities to many investors through his actions during the financial crisis, which is why he encouraged a reaction by buying GameStop shares. The most decisive effect from a single action, however, was probably that of multi-billionaire Elon Musk after his comments on Twitter about the events surrounding the video
retailer. On January 26 at 16:08 New York time, Musk posted the words "Gamestonk!!" and a link to the subreddit wallstreetbets (Gambrell, 2021). Immediately after the post, the stock made a huge jump (Figure 9). The Tesla CEO alluded to the term 'stonk' which is ironically used for stocks during the GameStop event. Although Musk made no indication of buying significant shares of the stock, the price jumped. Through his reputation and status as an "alternative" businessperson alone, which is taken as a role model by many young people, Elon Musk was able to artificially push GameStop's share price even higher.

Figure 9. GameStop share price of January 2021 (Gambrell, 2021)

6.3 Just a regular bubble?

The theory of market bubbles has already been explained in a prior chapter in detail. Now it has to be clarified whether the GameStop event is an ordinary bubble or whether the given conditions create a new phenomenon or mode of emergence to be considered for future events on financial markets.
Bubbles can refer to different categories and markets. So there have been many bubbles in the past involving several individual companies and assets in a certain category. In the case of GameStop, however, this is only partially true. While the video retailer's short squeeze was the most popular candidate, Reddit traders also drove up the share price of the companies Blackberry and AMC Entertainment, among others. The term "meme stock" is now used to describe the securities of companies that are targeted by retail traders on the Reddit platform and cause a price jump. Consequently, GameStop is not a single-stock bubble, but one can speak of a meme stock bubble. However, this form of bubble differs from past occurrences of bubbles. Normally, the affected stocks in a bubble have their context in the industry or category. The dot.com bubble around 2000, for example, involved only stocks of then Internet companies, while the housing bubble around 2006 in the United States, which ended in a global financial crisis, involved the real estate and mortgage markets. But the companies that became meme stocks do not have this link. GameStop sells video games and consoles, AMC Entertainment is a theatrical exhibition company, and Blackberry is a Canadian company that became famous by selling its mobile phones. So to know the binding point of meme stocks, one has to analyze how reddit traders choose their targeted companies. According to Jaime Rogozinski, co-founder of the subgroup 'wallstreetbets', the stocks that fall into the scheme are those of companies that are shorted by large hedge funds and thus slowly bleed out in favour of the institutional investors (Suleymanova, 2022). According to Anderson (2021), private shareholders are no longer interested in simply making profits, but in practicing so-called expressive trading. "An expressive trader does not trade for profit but rather to send a political message or produce a social or aesthetic effect" (Anderson, 2021, p. 1). The focus is no longer on the fundamentals of a company, but rather on a social or political form of expression. With the help of social media, such an action is possible through two-way communication and coordination. Financial groups like ‘wallstreetbets’ additionally offer a pool of young people who are active in the stock market. Of course, it can be assumed that not all of the traders involved took part in the
GameStop rally in order to set a sign against reckless hedge funds. Certainly, people also jumped on, which simply saw the profit through the drastically rising prices. Also the hedge funds, which wanted to limit their losses, had to buy. But all this only reinforces the effect and the intention of the expressive trader, rising prices.

It can therefore be assumed that the meme stock bubble is indeed different from all previous speculative bubbles. According to Brunnermeier and Oehmke (2012), speculative bubbles ultimately have their origin in investors' different perceptions of things, which are driven by behavioral influences. In the dot.com bubble, the price rose because investors had poor perceptions of the success and value of the internet companies. But GameStop's price went up because investors were united in a common goal. All were aware, even though the stock may have been undervalued before, that the current skyrocketing price was not backed by fundamentals or company news. The creation of a bubble was therefore well understood, and even more, it was part of the "plan".

A classic bursting of the bubble cannot yet be assumed. Although the peak of the meme stock bubble has already been reached and experienced a heavy drop after, the share is still flying high compared to the values before the events. While the price of a share was still just over $1 at the end of May 2020, it was still at $34.30 exactly 2 years later. The other prices of the meme stock companies affected also continue to experience irrational prices.

Indicators such as heightened social mood and investor sentiment also offer financial bubbles room to grow and can help to detect when they are about to burst (Pan, 2020). Especially at the beginning of the GameStop rally, such behavior could be observed on the market. The AAII investor sentiment index is derived from a regular survey of investors and their sentiment towards the market. Historical data from the chart of bullish sentiment shows that at the end of 2020, the market reached a level of 55.84% (12.11.2020), which was last breached in 2018. Chronologically, this increased investor sentiment was just before the
beginning of the GameStop share price increase, which suggests that it contributed to the emergence and partial burst point of the bubble Figure 10).

Figure 10. Chart comparison between US Investor Sentiment index and GameStop Corp. share price (YCharts, 2022)

Conclusively, it can be said that this is a new form of bubble, as the motives and circumstances of the event are new. A unified and conscious alliance of investors to inflate selected shares and a precise coordination via social media has not existed in this form before. Nevertheless, there are also similarities to the general pattern of a bubble. The fact that financial bubbles have their origins in imitation and herding can also be seen in the meme stock bubble (Sornette & Woodard, 2010). It was not until there were well-known pioneers like Michel Burry and Keith Gill that the masses were persuaded and imitated the actions of professionals to buy GameStop.
6.4 The Short Squeeze and Similar Events

The result of the GameStop race ended in a so-called short squeeze. It was the climax of the price increase, forcing the institutional investors involved to incur large losses. The short squeeze originally resulted from the forced intervention of hedge funds. They held big short positions on GameStop shares and thus firmly assumed that the share price would fall. However, due to the attention and intervention of retail traders, exactly the opposite happened and the share price rose dramatically. Such a situation leads to the fact that the short seller must decide whether he continues to pay the interest on the borrowed shares and hopes that the price falls or whether he closes the short position by buying the securities despite the increase and thus closes the position to avoid even higher losses. In the case of GameStop, most hedge funds chose the latter, closing their positions by buying back the stock. In this way, the hedge funds added billions of dollars in additional purchases to the already rising share price caused by retail investors. This caused the price to jump 1,743% at the peak of events compared to the beginning of January 2021. The end result was enormous for the hedge funds involved. Melvin Capital lost a total of $7 billion in the process through shorts of GameStop and AMC Entertainment and had to be bailed out by other funds with a $3 billion package for the time being before having to dissolve 1 year later due to the massive losses. Other hedge funds such as White Square Capital or Citron Capital also suffered losses of up to 100% of their short positions (Mathis, 2021).

The occurrence of short squeezes in markets is very rare. The last comparable case of a single share occurred in 2008 around the security of the German car manufacturer Volkswagen. In the midst of the global financial crisis, the company's stock became the target of many short sellers, due to high debt and other factors. At that time, many shares of the company were owned by Porsche SE and the German government. After Porsche announced that it had acquired 31% of the shares in addition to its existing 43%, the price began to rise. The
addition of further securities to the VW share meant that only 6% of shares were still in free circulation. The problem was that 13% were on loan to short sellers. The price then rose, so the short sellers had to close their positions by buying, as in GameStop, to avoid further losses. The 13% demand for a 6% supply of securities thus briefly made the car dealer's stock the world's most valuable security, before the group itself ended the short squeeze by selling its own shares (International Banker, 2021).

The "Infinite short squeeze" of the VW share caused a comparable price jump to GameStop, but the event in 2008 was not triggered by social media and retail investors. A similar reaction on the stock market after movements on social media could be observed on Twitter in the past. Tesla CEO Elon Musk is regally active on the microblogging platform. He often comments on his own companies and the market tends to respond directly. On August 7, 2017, Musk tweeted that his stock would go private when it reached the $420 mark. Fearing that he would not be able to buy shares publicly in the future, Musk's news triggered a buying storm that sent the price up 7% and left short sellers with massive losses. Tesla stock received a similar reaction on May 1, 2020, after Musk tweeted that he considered Tesla’s stock price being too high, it fell 10% directly after (Bishop, 2021). Although many of these outbursts following Musk's comments were short-lived, they still show the influence that well-known and popular people can have via social media.
7 Conclusion

The specific aim of this research was to understand how social media and the published information on them find their way into stock markets and how they can influence stock prices. With the goal of recognizing and identifying intersections, the research looked at both the material of financial markets and the nature of social media. The GameStop case, as one of the first links between the two topics to such an extent, was used to relate the thesis to real-life events. The research questions were successfully addressed and answered and provided the topic with several results.

Firstly, the influence of social media in financial markets takes place through retail investors. These are part of capital markets and at the same time consumers of content on social media. Through their presence in both of these cosmoses, they form a bridge over which the transfer of content from social media into the world of capital markets and thus also the stock market takes place.

Second, social media content can influence the price of stocks, regardless of their fundamentals. For this reason, social media can be assigned to the behavioral finance camp in the world of financial theories. Due to the specific characteristics of social media platforms, as well as psychological factors among retail investors, information from social media receives a subjective note before it reaches the market. With the specific characteristics of social media is meant that they always allow a space for human interaction for the published information. Users on social media use functions such as commenting or upvoting on content. In this way, objective information published on an online platform is transformed into a package of human emotion and reaction before it is transferred from the retail investor to the markets. The psychological factors of retail investors refer to the influence of limited attention and investor sentiment. Retail investors have cognitive and temporal limits to how much information they can absorb (Barber & Odean, 2008). Therefore, each individual has a unique level of information in terms of quantity and interpretation. The latter is influenced by factors such as
current investor sentiment, recent social mood of the investor and society, the type of social media site used and the category of information.

Third, in the case of GameStop, social media played the role of information exchange and consultation. Although it has been individuals who created the impulses for the event, it was reaching a large and appropriate audience through social media that led to the scale of the event. Through the ability of platforms such as Reddit to be divided by interest groups, the information was largely absorbed by retail investors, who became involved in the movement by buying the stock. It can be noted that communication, collusion and execution on this scale could not have been achieved without social media. It was the mix of social media functionalities and behavioral finance influences that drove the GameStop short squeeze.

Finally, considering the case of the GameStop stock bubble together with the other traded meme stocks, this can be seen as a new (sub-) form of a financial bubble. While in all previous bubbles their inflation was not intentional, in the case of the meme stock bubble exactly that was targeted. The retail investors were well aware that the exploded price was no longer based on company fundamentals but was due to arrangement on social media. On its platforms, not only the agreement took place, but also the manifestation of the motives.

The research provided is an introduction to the still young topic of the connections between social media and financial markets. Further research can therefore be conducted on the questions of what influence social media can have on other financial markets such as crypto markets or currency markets. Furthermore, the present paper only presents an overview of the different points of contact between social media and the stock market. Therefore, a deep dive into the explicit influence of specific social media sites and the comparison of their degrees of impact is also recommended.
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