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Market Manipulation or Democratization? Risk Implications of Retail-Driven Stock Movements

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ABSTRACT

The present paper examines the GameStop short squeeze that occurred in 2021, with reference to the discourse on market manipulation and financial democratization. The thesis combines a descriptive characterization, presented in the first three chapters, with an empirical analysis in the fourth. The initial chapter delineates the theoretical underpinnings of short selling, market manipulation, and the subsequent practices that have emerged over time. The second chapter of the book provides a reconstruction of the narrative of the case, with a particular focus on the role of hedge funds such as Melvin Capital and the dynamics that triggered the squeeze. The third chapter examines the behavioral dimension, analyzing how the phenomenon has been amplified by digital platforms, social communities and regulatory responses. The fourth chapter, as previously stated, presents the empirical analysis, which combines social and financial data to test two hypotheses on the influence of retail coordination. The thesis closes with a reflection that connects the theoretical and empirical findings to the central research question, assessing the implications of the case for the understanding of financial markets in the digital era.

SUMMARY

INTRODUCTION

In January 2021, the trading of GameStop shares produced one of the most debated financial events of recent years. A company that had been considered structurally declining, suddenly became the focus of unprecedented retail participation, leading to extreme volatility, dramatic losses for institutional short-sellers, and a global debate on the functioning of financial markets. The "GameStop case" captured public attention and raised fundamental questions about the interaction between social media, collective investor behavior, and the stability of market structures. The episode illustrated the potential of online communities to mobilize vast numbers of dispersed investors around a common narrative. Digital platforms allowed retail investors to coordinate in ways that were previously unattainable, amplifying the market impact of their actions. The events reignited an enduring debate: should such dynamics be seen as a democratization of finance, in which new actors gain collective power, or as a new and subtler form of market manipulation, capable of destabilizing prices through attention shocks rather than traditional information asymmetries? This research question is central to the present thesis. The GameStop case involved transparent communications, publicly accessible platforms, and dispersed participation. Yet, the resulting outcomes were similar to those produced by manipulative schemes. The aim of this thesis is to provide an integrated analysis that combines legal, behavioral, and empirical perspectives. The broader objective is to bridge theoretical debates with quantitative evidence. The thesis does not assume ex ante that the episode was either democratization or manipulation. Instead, it asks whether the data are more consistent with one interpretation than the other, and what this implies for the resilience of financial markets in the digital era. The contribution of the thesis is twofold. First, it offers a detailed reconstruction of a unique case that is already shaping financial regulation and market practice. By analyzing both the narrative dimension of retail coordination and the quantitative evidence of its impact, the work demonstrates how new forms of collective action can challenge institutional investors and expose weaknesses in conventional risk management metrics. Second, the study highlights the limitations of traditional analytical tools. Indicators such as the days-to-cover ratio assume stable liquidity conditions and do not account for the role of socially amplified shocks. The GameStop squeeze revealed how such assumptions break down under stress, underscoring the need to rethink both academic models and regulatory frameworks. The GameStop episode cannot be dismissed as an anomaly; it forces scholars, regulators, and market participants to reconsider the boundaries between legitimate collective action and manipulation, and to acknowledge the growing role of digital communities in shaping financial dynamics. The empirical findings presented in the following chapters will contribute to this debate, ultimately seeking to answer the central research question of whether the events of January 2021 represent a democratization of finance or a novel manifestation of manipulation.

CHAPTER 1 – SHORT SELLING, SHORT SQUEEZE AND THE ROLE OF RETAIL INVESTORS IN THE MARKET MANIPULATION

1.1) Theoretical and Legal Framework of Market Manipulation

The concept of market manipulation has existed since the earliest forms of organized financial exchange. As early as 1688, Joseph de la Vega described in his seminal work, *Confusión de Confusiones*, a marketplace dominated by speculation and deceptive tactics: "Among the plays which men perform in taking different parts in this magnificent world theatre, the greatest comedy is played at the Exchange. There, . . . the speculators excel in tricks, they do business."[1] The description of the market movements already gave a portrait of a ruthless environment, animated by speculative forces aimed at achieving dominance over others. The succession of these practices characterized and intertwined with the evolution of the markets themselves: starting from the time when the *Rothschild Institution* sold large quantities of shares in order to create a belief in the market that Napoleon had defeated Wellington, so as to compress the price of the shares, only to buy them back at a lower price[2]; in more recent times when, *Elon Musk*, CEO of *Tesla*, announced on social channels that he was delisting his company, without providing a specific account of the means of financing with which he intended to develop his shares, causing a significant increase in the price of securities[3]. Despite the strong historical footprint of market manipulation practices, the concept remains difficult to define. Authors have yet to agree on a unified definition, there is no recognition of unitary meaning for this concept, and the number or type of actions that may fall within it are as blurred as the phenomenon itself. But if we really want to understand the innermost nature of manipulation, the assessment cannot disregard the legal analysis that different national systems make, because through the interpretation of the law, the definition of the model can start from what cannot be done, as opposed to what can be done, making the rationalization of the phenomenon easier. To describe the legal dimension that characterizes market manipulation, it is useful to divide the analysis between the US experience and the EU one, to capture the main differences in the normative journey which brought us to our days. Before 1930, oversight of market manipulation in the United States fell under the common law fraud doctrine, mainly due to the limited public participation in securities trading at the time. However, as financial markets grew, it became increasingly clear that this framework was inadequate to address emerging risk and abuses. As a result, the Securities Exchange Act of 1934 marked a turning point in the regulation of market manipulation. One of its most significant contributions was the establishment of the Securities and Exchange Commission (SEC), which was a dedicated regulatory body tasked with overseeing financial markets and preventing fraudulent activities. By implementing stricter regulations and

[1] De la Vega, J. (1688). *Confusión de confusiones*.
[2] Putniņš, T. J. (2011b). MARKET MANIPULATION: a SURVEY. *Journal of Economic Surveys*, *26*(5), 952–967. https://doi.org/10.1111/j.1467-6419.2011.00692.x
[3] Goldstein, M. (2018, September 27). *S.E.C. sues Tesla's Elon Musk for fraud and seeks to bar him from running a public company*. The New York Times.

enforcement mechanisms, the act aimed to promote transparency, restore investor confidence, and curb manipulative practices that had contributed to financial instability in the past. Additionally, it played a key role in expanding the legal concept of market manipulation, providing clearer guidelines on prohibited activities and reinforcing the accountability of market participants[4]. The principal objectives of the Act were threefold: (i) to curb excessive speculation, (ii) to ensure that the public had access to adequate information to make informed investment decisions, and (iii) to prevent illegitimate manipulation of security prices, thereby protecting investors from unfair market practices. A crucial aspect of this regulation is Section 9, which explicitly prohibits various forms of market manipulation: among the practices banned are false statements about securities, fictitious transactions intended to influence prices, and schemes designed to create an artificial impression of supply and demand[5]. These provisions were essential in addressing the systemic weaknesses that had contributed to the stock market crash of 1929 and aimed to restore investor confidence by ensuring greater transparency and integrity in financial markets. The Williams Act was introduced in 1968, aimed to regulate and extend the prohibition of manipulative practices in corporate takeovers. A key provision of this Act is Section 14(e), which states, "It shall be unlawful for any person... to engage in any fraudulent, deceptive or manipulative act in connection with any takeover bid"[6]. Early in the new century, public opinion and the markets were exhausted by corporate scandals, with the Enron case emerging as one of the most emblematic cases of fraud. The US government was called to action, and the result was the enactment of the Sarbanes-Oxley Act, a reform that was primarily aimed at improving the auditing and the oversight of public companies. One of its most significant measures was the creation of the Public Company Accounting Oversight Board, whose main role was to enlist auditors to enforce existing laws against theft and fraud by corporate officers[7]. More recently, after the infamous 2008 financial crisis, the Dodd-Frank Wall Street Reform and Consumer protection Act of 2010 was introduced as the most comprehensive and innovative overhaul of U.S financial regulation since the New Deal era[8]. This legislation provided some crucial measures to enhance market transparency and fairness. These included the establishment of the SEC Office of the Whistleblower (designed to encourage the reporting of financial fraud), the ban on naked short selling, and, most notably, the introduction of the Volcker Rule. which restricted proprietary trading by banks, to limit speculative activities and reduce systemic risk. Following the GameStop case in 2021, lawmakers faced growing pressure to reassess and update financial regulations. This need arose in response to evolving market dynamics and emerging forms of market manipulation, such as social media-driven trading strategies, coordinated retail investor actions, and garithmic manipulation. These developments exposed regulatory gaps in the existing legal framework. While

[4] Yale Law Journal Editorial Board. (1947). *Regulation of stock market manipulation*. *The Yale Law Journal, 56*(509), 509-XXX.
[5] Moore, J. W., & Wiseman, F. M. (1934). Market manipulation and the Exchange Act. *The University of Chicago Law Review*, *2*(1)
[6] Weiss, E. J. (1982). Defensive Response to Tender Offers and the Williams Act's Prohibition Against Manipulation. *Vanderbilt Law Review*, *35*.
[7] Coates, J. C. (2007). The goals and promise of the Sarbanes–Oxley Act. *The Journal of Economic Perspectives*, *21*(1), 91–116. https://doi.org/10.1257/jep.21.1.91.
[8] Acharya, V. V., Cooley, T., Richardson, M., Sylla, R., & Walter, I. (2011). The Dodd-Frank Wall Street Reform and Consumer Protection Act: Accomplishments and Limitations*. *Journal of Applied Corporate Finance*, *23*(1), 43–56. https://doi.org/10.1111/j.1745-6622.2011.00313.x.

discussions on potential legislative reforms are ongoing, these aspects will be analyzed in greater depth later in this thesis. The evolution of European financial regulation has lagged that of the United States. Certainly, regulatory fragmentation did not help, in fact, prior to the 2000s, financial regulation was handled independently by national authorities, which hindered effective enforcement in an increasingly globalized financial market. In the European Union, the first step toward harmonized regulation was the publication of the Market Abuse Directive (MAD) in 2003, which all member states adopted at the time into their own legislation. This required market participants to refrain from trading when their transactions would manipulate the price at an abnormal level[9]. In particular, the main innovations included: a clear definition of insider trading and market manipulation, the obligation for listed issuers to provide transparent information to investors, the establishment of national supervisory authorities to monitor and punish violations (e.g. CONSOB in Italy), and the introduction of the first sanctions for market manipulation. However, the main limitations were associated with uneven enforcement, as the implementation and application of sanctions were delegated to individual Member States. Moreover, there was a lack of clear rules on new forms of manipulation related to electronic trading and derivatives. The framework lacked clarity regarding new forms of manipulation, particularly those involving electronic trading and derivatives. To address these challenges, a revision of MAD I, known as MAD II, was introduced together with the Market Abuse Regulation (MAR). The regulatory work complements the original regime by requiring Member States to apply a minimum level of criminal sanctions "at least in serious cases" and when market abuse is "committed intentionally"[10]. The new legislation includes a broader definition of market manipulation, including high-frequency trading (HFT) and spoofing, i.e. the spreading of false information through social media or traditional media, and manipulation in over the counter (OTC) and derivatives markets. Unlike the previous version of the reform, this one is directly applicable in all EU states (unlike MAD I, which required national transposition), introduces harsher sanctions and strengthens the powers of national supervisory authorities, and requires listed companies to promptly report market abuse and suspicious transactions. For the European organization, this was a turning point in harmonization between legal systems, preventing regulatory arbitrage caused by the varying intensity, with which these offences were prosecuted across member states. It is worth highlighting the significant contribution of MiFID II[11], which came into force in 2018 and introduced a high level of transparency on transactions and prices in financial markets, as well as new regulations to prevent abuses in high-frequency trading (HFT). Thus, while MAR regulation focused on prohibited conduct in financial markets, such as insider trading and manipulation, MiFID allowed for regulation of the operation of trading platforms and imposed transparency. This preliminary analysis highlights significant disparities between the two contexts. Within the American context, a premature

[9] Nelemans, M. (2007). Redefining Trade-Based market manipulation. *SSRN Electronic Journal*. https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID1086926_code524065.pdf?abstractid=1078423&mirid=1.

[10] Perrone, A. (2020). EU market Abuse Regulation: The Puzzle of enforcement. *European Business Organization Law Review*, *21*(2), 379–392. https://doi.org/10.1007/s40804-019-00171-x.

[11] Regulation of the EU financial markets. (2017). In *Oxford University Press eBooks*. https://doi.org/10.1093/law/9780198767671.001.0001.

expansion and treatment regarding market abuse is attributable to the earlier development and greater density of markets, prompting the legislator to adopt a more assertive and meticulous prosecution approach. As previously emphasized, within the European system, there are evident limitations, notably the substantial autonomy exercised by national supervisory bodies, which is manifest in their sanctioning discretion. This has been shown to result in reduced deterrence, as evidenced by the less stringent nature of sanctions imposed compared to those observed in the US context. In contrast, European legislation demonstrates a greater emphasis on the preventive aspect of market manipulation, extending beyond a reactionary approach to addressing abuses. Additionally, European regulations impose stricter limitations on high-frequency trading (HFT) and short selling, with the aim of mitigating the risk of harmful speculation. This is partly due to the reduced influence of financial lobbies and Wall Street on legislators, as is often the case in the US. This preliminary description was formulated to provide a foundation for defining market manipulation and to offer a structured, literal definition. However, as Fischel and Ross have persuasively argued, "There is not an objective definition... the only definition that makes sense is subjective and relates to the trader's intent"[12].

1.2) Typologies and Classifications of Manipulative Practices

To provide a more comprehensive analysis of the mechanics of manipulation, it is necessary to consider the theoretical structure of the phenomenon. Preliminary subdivision enables the classification of four primary categories of market manipulation, namely: *Runs*, *Contract-Based* (or Benchmark Manipulations), *Spoofing* and *Market Power Techniques*[13]. Within the paradigm of Runs, the manipulator's initial strategy entails an attempt to manipulate the price of a security, rendering it appealing to other investors. This is undertaken with the eventual objective of reverting the security's price to its initial, inflated or deflated state. The key feature of this strategy is that the manipulator directly profits from the manipulated market by exploiting the buying or selling of other investors. The key to the effectiveness of this the strategy lies in the exploitation of price movements, whether spontaneous or artificially induced. This distinction underscores the fundamental disparity between runs and two pivotal strategies of derivative manipulation: the pump and dump and the bear raid. While runs are not inherently manipulative, they can serve as a foundation for market abuse when they are artificially induced by speculators. Conversely, both pump and dump and bear raid schemes depend on deliberately distorted price movements to generate profits, with manipulators actively modelling market trends to influence investor behavior. The Pump and Dump method is a strategy employed by a manipulator, who tries to create enough enthusiasm around a security, with the aim of inducing a group of investors to acquire equities as their price gradually increases. Once the equities have reached their peak, the manipulator sell them to generate a profit. Through these activities, it is possible to achieve a significant gain over a short period of time, typically within days. The manipulator's strategic actions not only yield financial gains for themselves,

[12] Nelemans, M. (2007b). Redefining Trade-Based market manipulation. *SSRN Electronic. Vmlvm Journal*.
[13] Putniņš, T. (2020). An overview of market manipulation. *SSRN Electronic Journal*, 13–44.

but also contribute to increased market volatility, elevated trading volumes, short-term price momentum and subsequent price reversals[14]. In contrast, in the context of Bear Raids, the manipulator adopts a strategy of massive, coordinated short positions with the primary objective of exerting downward pressure on the share price. This strategy often involves implementation through the dissemination of negative rumors or misleading information about the company in question, followed by the repurchase of shares at a lower price, resulting in profit. The correlation between bear raids and of short selling is evident, as the latter often constitutes the principal instrument used to exert downward pressure on prices. However, it is crucial to distinguish between legitimate short selling and manipulative strategies. While short selling is a legal and often beneficial market mechanism that contributes to price discovery and liquidity, its misuse in the context of bear raids transforms it into a tool of abusive speculation. A notable example of this dynamic occurred in September 2008, when the SEC imposed a temporary ban on short selling to avert further decline in share prices below their intrinsic value. Although the legality of this maneuver was debated at length, the rationale was grounded in the perception that this short selling activity had in fact come under the umbrella of bear raids[15].The line between legality and manipulation is not defined by the instrument itself, but by the purpose and context of its use. The second category of market manipulation under analysis is the *Contract-based* (or benchmark) *manipulation*, which relies on derivative contracts. The manipulator achieves a profit by interfere with these instruments, influencing their value to obtain an advantage on existing positions. It is worth underlining the difference with the artificial manipulation of benchmark. In the latter, the actors in the market try to have an impact on a defined benchmark, to have an indirect effect on the securities they are interest in. This happens mainly because it is known that benchmarks are easier to be influenced than the price they represent[16]. It is therefore useful to posit that all benchmark manipulations are contract-based, yet not all contract-based manipulations are benchmarks. Moreover, the latter have a broader and more systemic impact, whereas contract-based manipulation is more restricted to specific financial instruments. The third category comprises *Spoofing*, a strategy employed by traders to provoke a price shock with the intention of exploiting it. In practice, a large sell order is placed at a price equal to or above the best available bid (NBO, National Best Offer), or a large buy order at a price equal to or below the best available ask (NBB, National Best Bid). The market interprets these movements, causing the price to begin to fluctuate. The trader then cancels the fictitious orders before they are executed, allowing him to take advantage of the altered price to make real trades and generate profit[17]. Spoofing could be performed manually, but usually this strategy is carried out through the automatization of the computers which can manage the orders. High-Frequency Automation facilitates the reiteration of this strategy, thereby enabling the accrual of substantial profits. It is executed at a high frequency, with positions

[14] Huang, Y. C., & Cheng, Y. J. (2013). Stock manipulation and its effects: pump and dump versus stabilization. *Review of Quantitative Finance and Accounting*, *44*(4), 791–815. https://doi.org/10.1007/s11156-013-0419-z.
[15] Mathews, R., & Khanna, N. (2010). Bear raids and short sale bans: Is government intervention justifiable? *2010 Meeting Papers*. http://centerforpbbefr.rutgers.edu/20thFEA/FinancePapers/Session9/Mathews.pdf.
[16] Andrew Verstein. (2015) Benchmark manipulation. (2015). *Boston College Law Review*, *56*(1), 215–272.
[17] Fox, N. M. B., Glosten, N. L. R., & Guan, N. S. S. (2022). Spoofing and its Regulation. *Columbia Business Law Review*, *2021*(3). https://doi.org/10.52214/cblr.v2021i3.9109.

being opened and closed within the same trading day. High-Frequency Traders (HFTs) utilize sophisticated algorithms that facilitate rapid analysis and response to market movements, leveraging advanced trading infrastructure and processing capabilities to modify their quotes in real time. This ability to instantaneously adapt to market information, a capability beyond that of ordinary investors, is a key advantage of HFTs in the financial market. The last category proposed by Putniņš (2020) is defined as *market power techniques*. This strategy consists in acquiring a dominant position in the supply or trading volume of a particular security, thereby enabling the manipulator to unilaterally influence its price. By leveraging such market power, actors can distort prices without resorting to deceptive transactions or the dissemination of false information. However, this category remains relatively underexplored in the academic literature, and empirical evidence on its application is limited.

To summarize the operational distinctions among these forms of market manipulation, the following table outlines the four categories identified by Putniņš (2020), specifying their mechanisms and prominent examples.

Category	Definition	Key Mechanism	Examples
Runs	Price distortion to trigger investor reaction, then reversal	Momentum exploitation	Pump and dump, bear raids
Contract-Based	Manipulating derivative contracts or benchmarks to influence prices	Derivative interference	LIBOR scandal, CDS manipulation
Spoofing	Placing/cancelling large orders to mislead the market	Order book manipulation via HFT	Algorithmic trading patterns
Market Power Techniques	Using a dominant position to control price movements	Supply/demand distortion	Cornering the market (e.g. Hunt brothers case)

While this taxonomy offers a valuable operational framework, a deeper understanding of market manipulation can be achieved by examining the broader economic foundations of the phenomenon. For this purpose, the next section will explore the theoretical classification proposed by Allen and Gale (1992). The classification in question identifies three primary categories of market manipulation: Trade-Based, Information-Based and Action-Based[18]. The authors open their article by stating: “It is generally agreed that speculators can make

[18] Mei, J., Wu, G., & Zhou, C. (2003). Behavior Based Manipulation: theory and prosecution evidence. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.457880.

profits from insider trading or from the release of false information"[19]. This constitutes the initial definition of information-based manipulation, which is further elaborated through a discussion of two classic forms of this mechanism. In the first, although the information to which the insider trader has access is true, the manipulative element lies in the asymmetry of access to the information itself: the manipulator thus manages to carve out a dominant position by exploiting non-public information that is not available to the rest of the market.

The second form involves the dissemination of false information with is an obvious attempt to alter market conditions. By distorting the information environment in which prices are formed, this strategy manipulates investors' beliefs rather than the fundamentals and is thus directly a form of information-based manipulation according to Allen and Gale. The definitions of insider trading and the dissemination of false information provide a clear illustration of what Allen and Gale (1992) describe as information-based manipulation. Although Van Bommel (2003) does not explicitly cite their work, his theoretical contribution is along the same lines. By modelling how rumors can be strategically disseminated to influence market perceptions and prices, his analysis supports and complements the information approach to market manipulation[20]. In the context of information asymmetry, the author posits that traders have the capacity to disseminate rumors with the objective of modifying the expectations of other market participants. This is undertaken to exert influence over share prices, inducing predictable reactions and consequently deriving profit. In his model, Van Bommel incorporates a trader who deliberates on whether to disseminate a rumor and investors who determine whether to believe the rumor or not. Consequently, price responds to created perceptions and not to objective data. Another significant contribution to the theoretical understanding of information-based manipulation is provided by Bénabou and Laroque (1992), who demonstrated how an opportunistic individual with insider information can exploit his or her perceived credibility position to strategically distort market expectations[21]. These traders engage in sporadic transactions that are in opposition to their information advantage, with the objective of masking the true nature of their private signals. This strategy enables the manipulator to preserve their strategic advantage over time. The complementarity of their studies with those of Allen and Gale is evident, and this in turn reinforces the notion that manipulation can occur not only through the dissemination of false information, but also through the obfuscation of beliefs, even in contravention of formal disclosure regulations of the Securities and Exchange Commission. In contrast with the subtle dynamics of information-based manipulation, the authors describe action-based manipulation as that strategy undertaken by the manipulator through the engagement of real actions that have an impact on asset prices. The main feature of those actions is that they have an economic cost, so the profitability of manipulation is contingent upon the strength of the price impact, and these actions do not create value by themselves, but their aim is to send misleading signals to other investors, affecting price formation through externally verifiable market behavior

[19] Allen, F., & Gale, D. (1992). Stock-Price manipulation. *Review of Financial Studies*, *5*(3), 503–529. https://doi.org/10.1093/rfs/5.3.503.

[20] Van Bommel, J. (2003). *Rumors*. The Journal of Finance, 58(4), 1499–1520. https://doi.org/10.1111/1540-6261.00575.

[21] Benabou, R., & Laroque, G. (1992). Using privileged information to manipulate markets: insiders, gurus, and credibility. *The Quarterly Journal of Economics*, *107*(3), 921–958. https://doi.org/10.2307/2118369.

instead of informational asymmetry alone. It is worth stating the main difference between information-based and action-based. The key distinction lies in the nature of the instrument utilized for the distortion of investors belief, the former relies on the strategic spreading of information whose only purpose is to alter market sentiment, the latter involves observable actions whose purpose is to alter price expectations. In the context of action-based manipulation, the decisions made by the manipulator are not economically justified per se, rather, they function as misleading signals to the market. Bagnoli and Lipman (1996) advanced the field of action based manipulation by conducting a study that models how a manipulator can exploit the market reaction to the announcement of a takeover[22]. In their article, the authors elucidate that the manipulator may initiate the process with the acquisition of shares in a company, followed by the announcement of a takeover bid. This announcement usually leads to an increase in the share price, which is driven by the perceived credibility of the offer. Once the share price has risen sufficiently, the manipulator sells the previously acquired shares at a profit and withdraws the bid, having never intended to complete the acquisition. The manipulative nature of this strategy is characterized by its lack of genuine intention to complete the acquisition; rather, the objective is to generate market sentiment that can influence the price in a desired direction. This example underscores the defining characteristic of action-based manipulation: the utilization of real, economically costly actions that possess no intrinsic value, yet are employed solely to mislead the market through observable behavior. In the subsequent section, a comparative analysis will be conducted between this form of manipulation and its information-based counterpart, thereby highlighting their conceptual and operational distinctions. As previously stated, the Securities Exchange Act represented a pivotal moment in the ongoing struggle against market manipulation, with the establishment of significant disclosure regulations and the curtailment of the activities of insider traders. Although not explicitly referenced in the work of Allen and Gale, it is reasonable to conclude that the enforcement of these regulations has played a crucial role in limiting action-based or information-based phenomena[23]. The promotion of clear disclosure and the fueling of the need for transparency are considered the most important tasks for financial regulation worldwide today.

In contrast to the other two forms of manipulation, trade-based manipulation is not equally straightforward to regulate effectively. Allen and Gale formally designate this form of manipulation as an effort by a trader to influence the price of a share simply by engaging in a series of trades, buying and selling (or vice versa), without publishing false information or taking any other publicly observable action to alter the value of the share[24]. Historically, the legislative shortcomings in combating these types of activities stem from the 'traditional' definition, which required additional deceptive elements, such as false information or explicit fraudulent actions, to qualify a behavior as manipulative. Nelemans (2007) provides substantial legal and

[22] Bagnoli, M. & Lipman, B. L. (1996). Stock price manipulation through takeover bids. *The RAND Journal of Economics*, *27*(1), 124. https://doi.org/10.2307/2555795.

[23] Mahoney, P. G. (1999). The stock pools and the Securities Exchange Act. *Journal of Financial Economics*, 51(3), 343–369. https://doi.org/10.1016/S0304-405X(98)00057-9.

[24] Harris, F. H. D., Aitken, M. J., & Ji, S. (2012). Trade-Based Manipulation and market Efficiency After the Introduction of Real-Time Surveillance: A Cross-Market Comparison. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1890928.

practical support for Allen and Gale's conceptual framework, arguing convincingly that manipulation can indeed occur solely through trading activity, even in the absence of explicitly deceptive behaviors, if the trader's intent is to artificially influence market prices[25]. Trade-based manipulation, despite its legal ambiguity, remains empirically significant and challenging to regulate under traditional legal standards. For instance, it is not uncommon for hedge funds to engage in the purchase or sale of

of substantial blocks of shares without any genuine intent to acquire control of the underlying companies. Such behavior can be interpreted as a form of price manipulation, given its lack of clear economic rationale from a corporate governance or investment standpoint. This becomes particularly apparent when the primary objective behind these actions is to induce temporary price movements aimed at speculative profit.

1.3) Short Selling: Ambiguity, Regulation and Market Function

Following an examination of the primary dimensions of market manipulation, it is logical to proceed with an analysis of a market practice frequently associated with manipulative activities. Short selling, although formally recognized as a legal practice, has been acknowledged as critical to market efficiency through improved price discovery, enhanced liquidity, and effective risk management. Nevertheless, its intrinsic characteristics have frequently rendered it susceptible to exploitation in manipulative schemes, particularly bear raids. Consequently, short selling embodies a dual nature: on the one hand, serving as a constructive market mechanism, and on the other, potentially facilitating market manipulation. To achieve a more nuanced understanding of this ambivalence, this thesis will now analyze in detail the mechanics of short selling, its various applications, and the evolution of its regulatory framework. Short selling has a long and intricate history which dates to the origins of the origin of organized stock markets, as quoted by Allen and Gale[26]. Bernheim and Schneider (1935) focused instead on how bear pools operated in the Amsterdam Stock Exchange in the late seventeenth century, stating how these early stock manipulators timed their aggressive bear raids strategically by exerting concentrated selling pressure to drive down share prices[27]. Additional seller would be then attracted by this decline in price, further depressing the stock's price and generating virtually assured profits for manipulators. According to the theory of Bernheim and Schneider, it is not unusual for these actors to resort to deceptive practices, including spreading false rumors about the precarious financial situation of the target companies. Some episodes of manipulative short selling required regulatory interventions, such as the British Parliament's decision in 1734 to prohibit short selling, a ban that lasted until 1860. Given this historical context, to comprehend the true concept of short selling, it is first necessary to establish a clear definition of the term. The Securities and Exchange Commission defines a short selling as the sale of a security

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[25] Nelemans, M. (2007c). Redefining Trade-Based market manipulation. *SSRN Electronic Journal*.https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID1086926-_code524065.pdf?abstractid=1078423&mirid=1.

[26] Allen, F., & Gale, D. (1992b). Stock-Price manipulation. *Review of Financial Studies*, *5*(3), 503–529. https://doi.org/10.1093/rfs/5.3.503.

[27] Bernheim, A. L., & Schneider, M. G. (1935). *The Regulation of the Stock Market in the Netherlands and England. Harvard Law Review*, 48(7), 1024–1043. https://doi.org/10.2307/1332607.

that the seller does not really own, which is borrowed form a broker-dealer or an institutional investor[28] (SEC, 2004). Although short selling is fundamentally a legitimate trading practice, its potential for abuse remains a significant concern among market participants, regulatory bodies, and academic researchers. To fully understand the dual nature of short selling, and thus both its constructive side and the risks associated with it, it is essential to first examine the underlying operational mechanisms. The technical aspect of short selling involves the borrowing of shares, typically from institutional investors or broker-dealers, and subsequently selling them in the open market. The short seller then repurchases the securities, ideally at a lower price, and returns them to the lender, to close the short position. The profitability of this strategy derives from the decline in asset price, a factor that distinguishes short selling from traditional long positions in the market. Short selling can effectively play a constructive and market-supporting role, as illustrated by its three primary economic functions: price discovery, liquidity provision and risk management and hedging. The price discovery process is one of the most significant contributions that short selling has on the market. Specifically, in efficient markets, prices reflect all the available information, so short sellers have a pivotal role in ensuring that negative and positive news is incorporate effectively into stocks prices, this differentiates short sellers from ordinary investors, who have fewer incentives or capabilities to promptly on negative signals concerning firm fundamentals, governance issues, or broader macroeconomic concerns. Boehmer, Jones and Zhang (2008)[29], in their study state that short sellers represent a disproportionately informed segment of market participants, indeed, the crux of their interactions pertains to the private information they possess, which is the central element that underpins their activities, fundamental analysis and early detection of overvaluation. Empirically, stocks with high short selling activity tend to show more accurate and timely price adjustments, especially in presence of negative fundamental developments. According to Diamond and Verrecchia (1987)[30], short selling is rarely pursued for liquidity reasons, due to the inability to freely use sale proceeds: this structural constraint discourages uninformed traders and implies that most short sellers are driven by the possession of private information and contribute meaningfully to price formation, being deliberate actors. Wu (2021)[31] further confirms that short selling enhances informational efficiency by accelerating the correction of mispricing, indeed this effect is crucial during periods of an excessive speculation of inflated valuations, where the absence of short sellers may lead to price bubbles or prolonged distortions. However, is essential to recognize that not all short sales are motivated by informational advantages, it is not uncommon to experience a uniformed shorting, some may arise from hedging strategies, arbitrage or liquidity management, in which informed views on valuation are not directly reflected. It has been demonstrated that short selling plays a key informative role

[28] SEC (2004). *Short Sales, Final Rule (Regulation SHO).* U.S. Securities and Exchange Commission. HTTPs://www.sec.gov/rules/final/34-50103.htm.

[29] Boehmer, E., Jones, C. M., & Zhang, X. (2008). Which shorts are informed? *The Journal of Finance*, *63*(2), 491–527. https://doi.org/10.1111/j.1540-6261.2008.01324.x.

[30] Diamond, D. W., & Verrecchia, R. E. (1987). Constraints on short-selling and asset price adjustment to private information. *Journal of Financial Economics*, *18*(2), 277–311. https://doi.org/10.1016/0304-405x(87)90042-0.

[31] Boehmer, E., & Wu, J. (2012). Short selling and the price discovery process. *Review of Financial Studies*, *26*(2), 287–322. https://doi.org/10.1093/rfs/hhs097.

in improving the price discovery process, but it is also useful to emphasize its contribution to market efficiency through more fundamental functions such as improving liquidity and supporting risk management strategies. It is important to note that these aspects may be less directly linked to information asymmetry but are essential to ensure the proper functioning and stability of modern financial markets. From this perspective, it is important to emphasize the positive contribution of short in the context of market liquidity: by allowing investors to be involved in both long and short positions, the activity of short sellers reduces asymmetry in the market and increases trading volume, improving order flow and limiting the bid-ask spread. This function has been extensively studied in the financial literature, and several empirical studies have confirmed that the presence of active short selling improves liquidity conditions and supports the efficient functioning of financial markets. Within the microstructure of financial markets, the relationship between liquidity and informational efficiency is not always linear and can result particularly complex. These two variables are closely interdependent, and their connection is deeply explored by Chordia, Roll, Subrahmanyam (2007)[32]. According to their findings, return predictability in short-term order flows is symptomatic of market inefficiency, which indicates that prices fail to fully absorb the information in a timely manner. The authors identify two mechanisms through which such predictability may arise. In the first case, with the hypothesis of market makers who have limited risk-bearing capacity, persistent order flow imbalances may lead to temporary price deviations from fundamental values; in this situation, arbitrageurs (floor traders) intervene, trying to identify these mispricing and submitting offsetting trades. Despite the corrective action, such balancing is closely related to liquidity, and thus if the market is particularly illiquid, arbitrage becomes costly and risky, so the effectiveness of such moves is drastically reduced. This highlights the connection between liquidity and the speed at which prices converge to their fundamental value is made explicit. A second scenario arises when market makers are risk-neutral but cognitively constrained in processing the informational content of order flow; in this case, mispricing persist not due to market frictions, but because of bounded rationality[33], in fact, if agents recognize and exploit these mispricing by trading against them, market makers face greater adverse selection risk. In response, feeling threatened by the informational asymmetry, they may try to protect themselves by reducing the quantity of liquidity provision, which in turn lowers market liquidity. This second case presents a paradox in which increased informational efficiency coexist with reduced liquidity. Short selling plays a key role in both these dynamics. In contrast to illiquidity, it allows arbitrageurs to fully execute strategies which correct overvaluation by enabling price correction from above as well as below; by facilitating two-sided trading, short selling contributes to market depth and narrows bid-ask spreads, thereby increasing liquidity[34]. However, informed short sellers may contribute to adverse selection, eventually discouraging the willingness of market makers to post aggressive quotes. The core of this study thus reflects the trade-off

[32] Chordia, T., Roll, R., & Subrahmanyam, A. (2007). Liquidity and market efficiency☆. *Journal of Financial Economics*, *87*(2), 249–268. https://doi.org/10.1016/j.jfineco.2007.03.005.
[33] Barberis, N., Shleifer, A., & Vishny, R. (1997). *A model of investor sentiment*. https://doi.org/10.3386/w5926.
[34] Diamond, D. W., & Verrecchia, R. E. (1987b). Constraints on short-selling and asset price adjustment to private information. *Journal of Financial Economics*, *18*(2), 277–311. https://doi.org/10.1016/0304-405x(87)90042-0.

existing in the market-microstructure: short sellers engage in improving information efficiency by accelerating the absorption of negative information into prices, but this may jointly increase the informational risk borne by liquidity providers. Empirical evidence has confirmed the centrality of short selling in sustaining both market liquidity and efficiency, even during periods of severe stress. The 2008 crisis and the following regulatory interventions provided a demonstration of how indispensable this activity is to the proper functioning and stability of financial markets. In response to the crisis, many countries progressively adopted emergency short sale bans. Although these measures were intended to stabilize such volatile market, subsequent studies proved that such bans had an adverse effect on market quality. The most influential study is attributable to Boehmer, Jones and Zhang (2013)[35], who, in analyzing the U.S SEC 2008 shorting ban, documented a significant deterioration in market conditions, including a widening of the bid-ask spread, a decline in trading volume and a reduction in the order book depth. As a result, price efficiency clearly worsened, as reflected in the sharp growth of volatility and the delayed incorporation of information into prices. The findings demonstrated how short sellers play a stabilizing role in market dynamics and how banning short selling may worsen, rather than enhance market functioning. As several studies have demonstrated, the implications of short sale restrictions extend far beyond the immediate effects on equity trading, and these bans can, in turn, produce spillover effects into related market segments, which can cause distortions in instruments which are structurally or functionally linked to the underlying assets. In this context, Battalio and Schultz (2011)[36], investigated the impact of the 2008 short sale ban on the U.S equity option market. Although the restriction formally applied only to stocks, its effects extended indirectly towards options market. The ban compromised the ability of traders to hedge their position, due to uncertainty regarding the possibility of shorting the underlying securities. The consequences for market liquidity have been previously described. However, the authors emphasize how this regulatory uncertainty exacerbated these effects by reducing confidence and increasing risk aversion among traders. The study provides insight into how these restrictions can ripple across asset classes, undermining liquidity and price stability in systemic fashion. An important contribution that reinforces this thesis is the work of Bris, Goetzmann, and Zhu (2007)[37], which offers a comparative analysis of 47 equity markets around the world with different legislation regarding short selling. Their findings show that in countries where short selling is permitted and operational, tend to be more liquid, with narrower spreads, and have more accurate price discovery mechanisms. Conversely, where these actions are prohibited or restricted, there is a slower price adjustment to new information, higher level of volatility and a greater propensity for speculative bubbles. The outcomes are not only the result of the absence of downward pressure from short sellers, but also the reduced ability of information traders to filter information

[35] Boehmer, E., Jones, C. M., & Zhang, X. (2013). Shackling short sellers: the 2008 shorting ban. *Review of Financial Studies*, *26*(6), 1363–1400. https://doi.org/10.1093/rfs/hht017.
[36] Battalio, R., & Schultz, P. (2011). Regulatory uncertainty and market liquidity: The 2008 short sale ban's impact on equity option markets. *The Journal of Finance*, 66(6), 2013–2053. https://doi.org/10.1111/j.1540-6261.2011.01700.x.
[37] Bris, A., Goetzmann, W. N., & Zhu, N. (2007). Efficiency and the Bear: short sales and markets around the world. *The Journal of Finance*, *62*(3), 1029 1079. https://doi.org/10.1111/j.1540-6261.2007.01230.x.

into the price and thus to correct it. And again, the absence of short selling activity obstructs arbitrage strategies, preventing the price from converging to the fundamental value. Taken together, these two studies reinforce the argument that short selling also serves as a structural pillar supporting market liquidity across asset classes and jurisdictions, in addition to its role as mechanism for information transmission and arbitrage. Attempts to limit this natural flux may produce unintended consequences that extend beyond the targeted instruments, by leading to fragility across the financial system. Beyond its contribution to market liquidity, short selling constitutes a core instrument in portfolio risk management. By allowing investors to hedge against adverse price movements, it enables the implementation of both functional and sophisticated risk management strategies, particularly within the context of hedge funds and institutional trading. Beyond its role in enhancing market liquidity, short selling constitutes a core instrument in portfolio risk management. By allowing investors to hedge against adverse price movements, it enables the implementation of both functional and sophisticated risk management strategies, particularly within the context of hedge funds and institutional trading. Notably, institutional investors and hedge fund managers regularly resort to short selling precisely to protect their portfolios from downside risk and market volatility. A significant illustration of these practices is provided by convertible arbitrage, a strategy that has been extensively discussed by Lhabitant (2004)[38]. Fund managers employ convertible bonds, defined as debt instruments that can be converted into a predetermined amount of equity. Consequently, fund managers typically hold long positions on these instruments while concurrently shorting the underlying equity. This approach is undertaken to neutralize exposure to fluctuations in the equity price, thereby isolating and capitalizing on the embedded optionality and mispricing inherent in the convertible bond itself. As Lhabitant highlights, short selling in this context is driven by the need to eliminate directional equity risk, rather than by negative views of the company, while optimizing risk-adjusted returns more effectively. The logic of risk mitigation is also a key consideration in long/short equity strategies, as hedge funds frequently hold long positions in undervalued stocks and short positions in overvalued stocks, to adopt a market-neutral stance. In their analysis, Agarwal and Naik (2004)[39], explained how the inclusion of short positions by managers improves the overall stability and risk-return profile of their portfolios; short selling thus also becomes a key tool for actively managing and reducing exposure to adverse market scenarios. In contrast, Brunnermeier and Pedersen (2005)[40] directed their attention towards an examination of the relationship between liquidity, risk management and short selling, proposing the hypothesis that the capacity to sell short enhances market resilience by means of facilitating hedging strategies and reducing systemic vulnerabilities. Their study suggests that restricting short selling may inadvertently amplify market volatility, as investors are deprived of crucial hedging mechanisms. Rather than being employed solely for speculative purposes, short selling is increasingly recognized as a critical component of institutional risk management

[38] Lhabitant, F. S. (2004). *Hedge Funds: Quantitative Insights*. John Wiley & Sons.
[39] Agarwal, V., & Naik, N. Y. (2003). Risks and portfolio decisions involving hedge funds. *Review of Financial Studies*, *17*(1), 63–98. https://doi.org/10.1093/rfs/hhg044.
[40] Brunnermeier, M. K., & Pedersen, L. H. (2005). Predatory trading. *The Journal of Finance*, *60*(4), 1825–1863. https://doi.org/10.1111/j.1540-6261.2005.00781.x.

frameworks. Its primary role lies in enabling investors to hedge against adverse market movements, reduce portfolio volatility, and implement diversification strategies, particularly in periods of heightened uncertainty. By facilitating these defensive functions, short selling contributes not only to individual portfolio stability but also to the broader resilience and efficiency of financial markets. Short selling is commonly understood within the framework of risk management discipline, but it also represents a distinct and operationally specific function. Hedging, specifically, is understood as the establishment of offsetting positions designed to neutralize exposure to adverse price movements. Through short selling, the investors can engage in direct and effective strategies, providing protection across different securities, sectors and asset classes. Indeed, portfolio managers hedge market exposures by shorting index futures or exchange-traded funds (ETFs) that track major indexes, such as the S&P 500 or Euro Stoxx 50, thus reducing systematic risk (beta) without liquidating individual positions. Through this tactical hedging, managers can maintain their strategies for the long run, temporarily protecting the portfolio from downside risks (Bodie, Kane, & Marcus, 2014)[41]. Short selling therefore can result in precise risk management due in part to its flexibility, for example, investors can sometimes protect themselves specifically for a particularly risky sector by shorting a sector ETF. These strategies highlight how short selling can be purposefully calibrated to manage specific thematic risks within portfolios and are predominantly used in active funds and hedge funds engaged in thematic management. Short selling is also of crucial importance in currency hedging for global equity portfolios, since international investors not only have to bear the risk inherent in foreign securities, but also the risk of possible fluctuations in the exchange rate, by shorting currencies or currency-related instruments, according to Hull (2018)[42], investors can isolate pure equity performance from currency volatility, leading to a more stable return profile. Academic studies further confirm the importance of short selling in hedging activities. Lhabitant (2004)[43] emphasizes how institutional investors and hedge funds systematically use short positions as an integral part of their strategy to precisely adjust the level of risk on which their portfolio is set. It has been shown that without the ability to short sell, most hedging strategies becomes impractical or are incomplete, increasing vulnerability to directional market movements. In their study, Brunnermeier and Pedersen (2005)[44], demonstrate that restrictions on short selling go to threaten the resilience of financial markets by depriving investors of necessary defensive tools during periods of systemic stress. In essence, short selling is a precise tool for tactical risk mitigation: because of its flexibility and immediacy, investors can dynamically adjust their exposures and protect portfolios from a wide range of market contingencies, making it indispensable for maintaining portfolio stability under different market conditions. As previously discussed, short selling fulfills multiple and essential functions in financial markets: it promotes price discovery, enhance liquidity and enable

[41] Bodie, Z., Kane, A., & Marcus, A. J. (2014). *Investments* (10th ed.). McGraw-Hill Education.
[42] Hull, J. C. (2006). *Risk management and financial institutions*. http://people.brandeis.edu/~yanzp/Study%20Notes/Risk%20Management.pdf.
[43] Lhabitant, F. (2004). *Hedge Funds: Quantitative insights*. http://ci.nii.ac.jp/ncid/BA67500331.
[44] Brunnermeier, M. K., & Pedersen, L. H. (2005b). Predatory trading. *The Journal of Finance*, *60*(4), 1825–1863. https://doi.org/10.1111/j.1540-6261.2005.00781.x.

effective risk management, thereby contributing to overall equilibrium of trading dynamics. It is important to underline its indispensable role, because in its absence, markets would be structurally biased toward mispricing and inefficiency. Short selling is so important for its role in enhancing competitive conditions among market participants, incentivizing more accurate analysis, corporate transparency and financial discipline.

1.4) The Short Squeeze: Dynamics and Market Frictions

Despite these benefits, it is important to highlight that under certain exceptional conditions, the dynamics associated with short selling can lead to unintended and destabilizing market phenomena. The Short Squeeze provides the clearest evidence of this phenomenon. Among the risks faced by short sellers, such as the informational risk or the risk of rising borrowing fees, the most controversial and perhaps complex risk turns out to be the risk associated with the possibility of having a short squeeze. As observed in the discussion about market manipulation, a variety of perspectives can offer different definitions and ways of interpreting the phenomenon. Similarly for short squeeze, multiple angles contribute to a synergic understanding, providing complementary viewpoints on different facets of the same underlying market dynamic. One of its clearest academic definitions is provided by Brunnermeier and Pedersen (2005)[45], in which the authors describe the short squeeze as a market phenomenon characterized by short sellers being forced to cover their positions due to rapidly rising prices, which creates additional upward pressure on the price of assets. A self-reinforcing cycle is initiated by this dynamic: as price increases, short sellers experience mounting losses that threaten to trigger margin calls or other kind of risk management actions that require them to buy back shares to close their short positions. The mass repurchase of shares causes the price to rise even more, forcing additional short sellers to cover in turn, exacerbating the price surge and creating a feedback loop. The authors emphasize that the main difference between simple price movements and a short squeeze is the involuntary nature in the actions of short seller, which are not driven by new information or fundamentals, but by liquidity constraint and trading pressure. So, in result, short squeezes can lead to significant temporary distortions in asset prices, and it generates volatility that is disproportionate to changes in the underlying economic value. A different perspective on short squeezes is given by Duffie, Garleanu and Pedersen (2002)[46], who focused their study on the fundamental role played by the frictions in the securities lending market. In their work, short squeezes can occur due to constraints in the availability of shares that can be borrowed for short selling purposes, and not only necessarily because of sudden price movements. The supply of lendable securities may become scarce, due to lending institutions recalling shares, increasing borrowing costs or reduce their lending capacity: in this case short sellers are placed under severe pressure, when they are unable to roll over their borrowing positions or are confronted with prohibitively high lending fees, they are effectively forced to close their short exposure

[45] Brunnermeier, M. K., & Pedersen, L. H. (2005c). Predatory trading. *The Journal of Finance*, *60*(4), 1825–1863. https://doi.org/10.1111/j.15406261.2005.00781.x.

[46] Duffie, D., Gârleanu, N., & Pedersen, L. H. (2002). Securities lending, shorting, and pricing. *Journal of Financial Economics*, *66*(2–3), 307-339. https://doi.org/10.1016/s0304-405x(02)00226-x.

by repurchasing the underlying securities. This activity of forced buyback can trigger an upward pressure in the securities prices even without any fundamental news or positive informational shocks, creating a temporary distortion in asset prices. The focal point in this study is that these difficulties for sellers cause the erosion of their capacity to maintain their position, which leads to mechanical covering behavior that amplifies volatility. It is widely accepted that short squeezes are rooted in imperfections and inefficiencies within the structure of the securities lending market, and not in the fundamental value and the valuation of the securities. This view of the short squeeze adopts a systemic perspective in which these episodes, rather than being isolated incidents driven by speculative trading, are interpreted as consequences of structural fragilities in financial markets, where a misalignment is observable between supply and demand in lending markets that triggers the infamous reinforcing price spirals. Highlighting the role of "non-price frictions", Duffie et al. provide a deeper understanding of how short squeezes can arise independently of fundamental asset valuation, underscoring potential risks for market efficiency and stability. A further contribution to the understanding of the short squeeze phenomenon is provided by D'Avolio (2002)[47]. In this article the author focuses his analysis on the operational structure of the securities lending market, specifically, his analysis demonstrates how short squeezes arise because of practical frictions and inefficiencies in the borrowing process, rather than being caused by price movements or systemic liquidity shortages alone. Many variables could expose short sellers to significant risks, such as the lack of transparency in lending agreements, the variability in lending terms, the fragmented nature of the securities lending market. When these difficulties arise, investors are forced to cover their short positions. This process occurs independently of any change in the fundamental valuation of the underlying securities, resulting, in increased pressure in price and volatility. D'Avolio's perspective is distinctive in that it frames the short squeeze as a mechanical consequence of the market's microstructure of the market itself; in depth, the practical difficulties along with the transaction costs that result from borrowing financial instruments create a cycle of vulnerabilities that can culminate into systemic phenomena, even in the absence of speculative intent or fundamental news. The author succeeds in enriching the literature by showing that squeezes are deeply rooted in real world frictions that characterize the security lending market. As previously discussed, the literature on short squeezes offers diverse yet complementary views that allow for a synergistic analysis that succeeds in uncovering each distinct side of the phenomenon. In the Brunnermeier and Pedersen (2005) article, short squeeze is framed as price-driven, through a self-reinforcing dynamic: short sellers who face mounting losses as prices rise are compelled to repurchase shares, thereby creating further upward price pressure and exacerbating volatility. In this view, the squeeze is framed as the view of forced trading behavior triggered by adverse price movements and margin constraints, rather than fundamental shifts in asset value. Duffie, Garleanu, and Pedersen (2002) offer a different view, predominantly directed in the perspective that has its basis in the frictions of the securities lending market. According to them, a short squeeze can emerge independently of price dynamics, especially when borrowing constraints force short

[47] D'Avolio, G. (2002). The market for borrowing stock. *Journal of Financial Economics*, *66*(2–3), 271–306. https://doi.org/10.1016/s0304-405x(02)00206-4.

sellers to close their positions involuntarily. This event is therefore not primarily related to price momentum, but rather to so-called "non-price frictions," i.e., imperfections in the financial infrastructure that supports short selling activity. D'Avolio complements the literature by offering a more granular, operational focus through an analysis of the practical difficulties that short sellers face every day in the lending market, focusing specifically on describing how various factors can mechanically force traders to unwind their positions. Some of these factors include: a lack of transparency, which makes it difficult to anticipate changes in borrowing conditions; the variability in lending terms across counterparties, introducing further uncertainty, as borrowing conditions can vary significantly depending on the lender's policies of the lender; the fragmented nature of the lending ecosystem, which prevents short sellers from locating alternative sources of shares if an existing loan is recalled or becomes too costly, thereby increasing the probability of involuntary position closures and contributing to upward price pressure. These perspectives highlight complementary facets that collectively reinforce a fundamental concept, namely that the short squeeze represents a breakdown in the normal mechanisms of market adjustment. This convergence of views highlights the systemic importance of understanding both market dynamics and lending infrastructures when analyzing episodes of extreme market stress associated with short selling.

1.5) Indicators of Short-Sale Constraints

Having established the theoretical foundations outlining the structural fragilities that facilitate short squeezes, attention must now turn to the practical indicators and to the dynamics that signal the materialization of such phenomena in real-world markets. Among these significant indicators of vulnerability, *Short Interest* reflects not only widespread bearish sentiment but also contributes to the structural conditions necessary for forced covering dynamics to emerge, thereby increasing the probability of abrupt upward price movements. Short interest is one of the most widely monitored indicators due to its usefulness in assessing bearish pressure and the potential for short squeeze conditions. It essentially represents the total number of shares of a given stock that have been sold short but not yet covered or closed out. The indicator can also be expressed as a ratio, commonly referred to as "days to cover", which measures how many trading days would be required for short sellers to close their positions, calculated based on the stock's average daily trading volume. The ratio provides a useful approximation of the difficulty involved in covering short positions and offers insight into the vulnerability of the market to abrupt upward price movements driven by forced short covering. Asquith, Pathak and Ritter[48] have dealt with this indicator in a seminal study, demonstrating key insights into its informational and operational implications that delves into the informational and operational role of short interest, combining it with the degree of institutional ownership to assess the presence of constraints on short selling. The authors conceptualize short interest as a proxy for short sale demand and institutional ownership as a proxy for the

[48] Asquith, P., Pathak, P. A., & Ritter, J. R. (2005). Short interest, institutional ownership, and stock returns. *Journal of Financial Economics*, *78*(2), 243–276. https://doi.org/10.1016/j.jfineco.2005.01.001.

supply of lendable shares. The core hypothesis is that short-sale constraint arises when strong demand for short selling coincides with limited supply of shares available to borrow. Through their analysis, it has been shown that portfolios composed of short sale constrained stocks (those in the highest percentile of short interest and the lowest tercile of institutional ownership) tend to underperform the market. The evidence suggest that negative abnormal returns are not significant on value-weighted portfolios, implying that the effect is primarily concentrated among small-cap stocks. The study also reveals that the short interest ratio is informative only when interpreted in conjunction with institutional ownership. High short interest alone does not reliably predict underperformance unless borrowing constraints are likely. Furthermore, the persistence of negative returns is limited in time: portfolios must be frequently rebalanced to capture abnormal performance, which highlights the operational costs and implementation risks faced by short sellers. Despite the magnitude of the effect, the number of constrained stocks is relatively small, which limits the overall impact on market efficiency. Nevertheless, the study offers robust evidence that short interest, when interpreted as a signal of informed pessimism under binding constraints, contributes meaningfully to the process of price discovery. Another crucial dimension for understanding short selling constraints is the *cost of borrowing securities*, which represents the operational and economic friction short sellers face when implementing their strategies. This indicator, typically reflected in the rebate rate or borrow fee, acts as the price for accessing shares through the securities lending market. While short interest signals the demand to short, the cost to borrow instead captures the scarcity of supply, as such, it serves as a direct proxy for identifying binding short-sale constraints[49].Empirical studies conducted by Geczy, Musto and Reed, show that stocks with high borrowing costs often exhibit subsequent underperformance which would hypothetically make them attractive targets for short sellers, but these negative abnormal returns are frequently insufficient to compensate for the high implementation costs associated with these trades[50]. The latter finding is consistent with the theoretical framework developed by Shleifer and Vishny, who demonstrate that even when an asset is clearly mispriced, its price may remain distorted for a prolonged period due to the limits to arbitrage[51]. Expanding on this behavioral finance insight, Jones and Lamont provide further evidence that, in case of stock overvaluation, short sellers may abstain from trading due to an unfavorable balance between risk and cost, so price remains above their fundamental even if the operators in the market are aware of the mispricing[52]. Moreover, price distortions are exacerbated by the scarcity of lendable shares, especially in small-cap or low-float stocks, where the market for borrowing is thin and inefficient[53]. From this perspective, the cost of borrow is not merely a

[49] D'Avolio, G. (2002). The market for borrowing stock. *Journal of Financial Economics*, *66*(2–3), 271–306. https://doi.org/10.1016/s0304-405x(02)00206-4.
[50] Geczy, C. C., Musto, D. K., & Reed, A. V. (2002). Stocks are special too: an analysis of the equity lending market. *Journal of Financial Economics*, *66*(2–3), 241–269. https://doi.org/10.1016/s0304-405x(02)00225-8.
[51] Shleifer, A., & Vishny, R. W. (1997). The limits of arbitrage. *The Journal of Finance*, *52*(1), 35–55. https://doi.org/10.1111/j.1540-6261.1997.tb03807.x.
[52] Jones, C. M., & Lamont, O. A. (2002). Short-sale constraints and stock returns. *Journal of Financial Economics*, *66*(2–3), 207–239. https://doi.org/10.1016/s0304-405x(02)00224-6.
[53] Duffie, D., Gârleanu, N., & Pedersen, L. H. (2002). Securities lending, shorting, and pricing. *Journal of Financial Economics*, *66*(2–3), 307 339. https://doi.org/10.1016/s0304-405x(02)00226-x.

practical obstacle to short selling, but a systematic determinant of when and how arbitrage can occur, directly influencing both price efficiency and market liquidity. This indicator complements short interest by offering a more granular and dynamic measure of constraint intensity, particularly in episodes of market stress or high volatility.

1.6) Derivatives and Amplification Effects: The Gamma Squeeze

While the short Interest and cost of borrow serve as structural constraints and informational signals, another mechanism worth examining for its amplifying effect on short squeezes is the *Gamma squeeze.* This phenomenon is rooted in in the derivatives market microstructure and arises when option market dynamics interact with heavily shorted stocks, generating self-reinforcing upward price spirals that are disconnected from fundamentals. The Gamma squeeze arises from the interaction between equity and derivative markets, when a large number of call options are purchased on a stock, particularly out-of-the-money options, dealers who sold these options are exposed to directional risk and are required to delta-hedge their positions by buying the underlying stock due to the asset price approaching or reaching the strike price of the option. A rising stock price increases the delta, prompting market makers to buy more of the stock to remain hedged, given that the delta measures the sensitivity of option value to changes in the price of the underlying asset. This activity creates a positive feedback loop, where rising prices induce further buying from hedgers, reinforcing the upward momentum. Garleanu, Pedersen, and Poteshman[54]describe this feedback dynamic by modeling how end-user demand affects option prices, emphasizing that option prices rise with net buying pressure and that hedging and dynamic trading behaviors can propagate shocks to the underlying asset. Their model captures features such as stochastic volatility, jumps, and hedging across multiple assets, illustrating how derivative market activity can distort spot market prices through endogenous trading responses. During the GameStop episode of January 2021, Zhou and Zhou [55] provide high frequency evidence that option market dynamics significantly contributed to the price surge, documenting that aggressive call buying by retail investors led to dealer hedging that drove the underlying stock price upward. The U.S. Securities and Exchange Commission (2021) confirmed in its official report that this feedback between options positioning and stock price movement played a central role in the observed volatility[56]. The gamma squeeze thus represents a unique form of price dislocation, emerging not from new information but from mechanical, microstructural pressures within derivatives markets. It raises important questions about the robustness of price efficiency in the presence of high leverage, constrained arbitrage, and increasingly dominant options trading. The analysis conducted in this chapter has delineated the theoretical and operational boundaries of certain market practices

[54] Gârleanu, N., Pedersen, L. H., & Poteshman, A. M. (2009). Demand-Based option pricing. *Review of Financial Studies*, *22*(10), 4259–4299. https://doi.org/10.1093/rfs/hhp005.

[55] Zhou, G., & Zhou, Z. (2023). *Did retail traders take over Wall Street? A tick-by-tick analysis of GameStop's price surge*. SSRN. https://doi.org/10.2139/ssrn.4560320.

[56] U.S. Securities and Exchange Commission (2021). *Staff Report on Equity and Options Market Structure Conditions in Early 2021*. https://www.sec.gov/files/staff-report-equity-options-market-struction-conditions-early-2021.pdf.

which, while not inherently illicit, may evolve into manipulative phenomena under specific conditions of informational asymmetry, illiquidity, and speculative coordination. By framing the discussion within both legal and financial domains, it has been possible to highlight how instruments, such as short selling and derivatives, can assume a pivotal role in the amplification of market dislocations. Particular attention has been devoted to the interpretive value of short interest and cost of borrow as proxies for short selling pressure and constraint intensity, as well as to the mechanical dynamics of the gamma squeeze as an emerging phenomenon in modern financial markets. These findings suggest the necessity to re-evaluate traditional boundaries between legitimate market activity and manipulative conduct, especially in contexts characterized by structural frictions and behavioral convergence.

CHAPTER 2 - GAMESTOP CASE AND MELVIN CAPITAL

This chapter will specifically analyze the emblematic case of GameStop (GME), which exploded in late 2020 and early 2021, and the critical stance taken by Melvin Capital, a hedge fund that suffered significant losses because of a massive, short exposure. What happened has been the subject of much media interest, but also of regulators, who have picked up on significant flaws in the regulatory system of the financial market. The episode emerged as one of the most relevant contemporary examples of short squeeze amplified by retail dynamics and social media. The aim of the chapter is twofold: on the one hand, to reconstruct the economic and operational context that favored the manifestation of the phenomenon, starting from the structural characteristics of the GameStop company; on the other hand, to highlight the vulnerabilities of the financial system, highlighted by the speculative position assumed by Melvin Capital and the active role of the online investor communities, particularly on Reddit. This reconstruction allows us to understand how the short squeeze occurred, as well as to reflect on the systemic impact of similar episodes on market stability, regulation and the interaction between institutional and retail actors. To properly contextualize these events, it is crucial to understand GameStop’s origins and traditional business model through the highlighting of the factors that made the company a primary target for short-selling activities.

2.1) Historical background and GameStop's profile

In January 2021, GameStop's stock price reached an extraordinary peak of $483 per share, a remarkable figure considering that only six months earlier, in July 2020, it was trading at around $4 per share. How was the company able to achieve a staggering price increase of approximately 11,975% within such a short period? To answer this question, it is crucial to trace the origins of this phenomenon and develop a clear understanding of the company's historical evolution, as well as the factors leading to its decline after years of dominance in the retail video-game industry. GameStop was founded in November 1996 and quickly became the dominant video game retailer in North America. Its expansion was driven by a strategic focus toward a simple yet powerful model: a widespread network of physical stores and an innovative trade-in system which allowed customers to exchange used games for store credit. This strategy generated strong margins and created a loyal customer base; the company was positioned as a cultural landmark for an entire generation of gamers. Yet, the cornerstone of this success (the physical centrality of its business model), was also the seed of its structural fragility. By anchoring its identity to brick-and-mortar distribution, the company tied its fortunes to an industrial paradigm that very soon would be radically transformed by digitalization. Such dependence on physical outlets, fueled both the skepticism of Wall Street and the symbolic appeal of the company for retail investors seeking to challenge institutional consensus. During its formative years, its business model was primarily centered on the sale of new video games and console hardware, capitalizing on the increasing consumer demand for gaming content and platforms. However, soon after, a pivotal innovation emerged with the introduction of the trade-in model, which quickly became a hallmark of the retail operations of the

company. Through this system, customers were offered the opportunity to exchange their used video games and accessories for either cash or in-store credit. GameStop would then refurbish and resell these pre-owned items at prices slightly below those of new products. This model proved to be popular with consumers, who gained access to more affordable gaming options, and it was also highly profitable for the company. The margins on second-hand products were significantly higher than those on new inventory, largely because the procurement cost was minimal, and resale values remained relatively high. The pre-owned segment, over time, became one of the most lucrative and strategically distinctive elements of GameStop's retail formula, strengthening its market position and brand identity within a highly competitive industry[57]. By 2020, the structural weakness of GameStop had become undeniable. That year marked the first time global digital sales surpassed physical formats (IEOM,2020)[58], confirming that the shift toward online distribution was not a temporary trend but an irreversible transformation of the industry. Many digital platforms in the market, such as Steam, Xbox Game Pass, and PlayStation Store, gradually eroded the competitive advantage of brick-and-mortar retailers like GameStop and altered the purchasing behaviors of a growing share of consumers. For a company whose identity was anchored to physical outlets, this was more than a commercial challenge: it signaled the obsolescence of its entire business model. Brick-and-mortar retail was relegated to irrelevance, a decline visible by store closures and declining sales. In this context, institutional investors aggressively shorted the stock, convinced of its inevitability as a "value trap": a company destined to disappear, with little chance of adapting to the digital ecosystem. By December 2019, short interest had already surpassed 100% of its public float[59], reaching approximately 142% by early January 2021. This unprecedented exposure revealed the confidence of Wall Street in its thesis and its blind spot to alternative interpretations. It was precisely this asymmetry that created the conditions for retail investors to reinterpret the stock. What hedge funds regarded as a one-way bet against obsolescence, was reframed by online communities as an opportunity to resist financial elites. The decline of GameStop was not merely a business story; it became a narrative and ideological battlefield. To interpret the mobilization of retail traders as mere manipulation is to overlook the symbolic power of this context: an industrial "loser" transformed into the instrument of a collective challenge to the dominance of Wall Street. What happened cannot be reduced to a failure of management or to the disruptive effect of a single technological innovation. As Nichols (2021)[60] emphasizes, the digital transition reconfigured the industrial logics of the video game sector by concentrating power in platforms and marginalizing traditional intermediaries. The original tripartite structure (hardware, software and retail) was reconfigured into a platform-dominated ecosystem where visibility, distribution and monetization are

[57] Foss, N. J., & Saebi, T. (2016). Fifteen years of research on business model innovation. *Journal of Management*, *43*(1), 200 – 227. https://doi.org/10.1177/0149206316675927, 896. https://heinonline.org/HOL/Page?handle=hein.journals/bulr102&id=1840.
[58] Blancaflor, E. E., & San Miguel, J. M. G. (2022). *Analyzing digital game distribution in gaming industry: A case study*. In *Proceedings of the 2nd Indian International Conference on Industrial Engineering and Operations Management* (pp. 673–681). IEOM Society International. https://www.ieomsociety.org/india2022/proceedings/.
[59] Vaughan, M., Gruber, J. B., & Langer, A. I. (2023). The tension between connective action and platformisation: Disconnected action in the GameStop short squeeze. *New Media & Society*. https://doi.org/10.1177/14614448231182617.
[60] Nichols, R. (2023). Disruption through distribution: Impacts and limits in the global video game industry. In *Future of business and finance* (pp. 269–281). https://doi.org/10.1007/978-3-031-39940-4_21.

controlled by a handful of gatekeepers. Rather than leveling the playing field, digitalization amplified pre-existing asymmetries. Independent developers became dependent on platform holders, while physical retailers like GameStop were rendered obsolete. The shift was systemic rather than technological, new forms of infrastructural dominance, such as platformization, redefined value creation across the industry. In the context of this broader transformation, GameStop was the most visible casualty, it was a symbol of how established players could be displaced by digital infrastructures that centralize control and extract value. This symbolic dimension is crucial: Wall Street interpreted it as definitive proof of obsolescence, while retail investors reframed it as the opportunity to challenge a system that excluded them. Beyond the financial collapse, GameStop carried a symbolic importance that amplified the resonance of its case. For many consumers, many kids born in 2000s, it has been more than a store, it was a cultural landmark tied to a generation of gamers and to the experience of physical distribution. The erosion of this role made its obsolescence also symbolic, and this factor reinforced the bearish stance of institutional investors. Asquith, Pathak, and Ritter (2005)[61] demonstrated that high short interest combined with low institutional ownership, signals informed pessimism and is often associated with negative abnormal returns. Geczy, Musto, and Reed (2002)[62] further noted how frictions that exacerbate price inefficiencies can be generated by constraints in the equity lending market, such as limited availability and high borrow fees. In the case of GameStop, the cost to borrow shares surged dramatically in late 2020, signaling both strong demands to short and tight supply of lendable shares. Yet these same conditions also created the possibility of an explosive reversal. It was within this tension that the appointment of Ryan Cohen gained extraordinary narrative force. The appointment of Ryan Cohen to the board in January 2021 gave rise to a divergence of public opinion. Cohen, known as the founder of Chewy (one of the most successful vertically integrated e-commerce platforms in the pet care industry), had already acquired a reputation as a visionary entrepreneur with the ability to disrupt traditional retail models through digital innovation. For retail investors, his involvement suggested the possibility of a deep restructuring oriented toward e-commerce, symbolizing the possibility of transforming GameStop into an e-commerce player capable of escaping decline. By contrast, most institutional analysts deemed this move insufficient to address the structural weaknesses of the company, thus reinforcing their belief that the company remained a 'value trap'. This divergence in thoughts was perceived as a potential strategic inflection point. It revealed the deep fracture between fundamental valuation models and the stories that investors chose to believe. On one side, hedge funds relied on quantitative indicators that confirmed GameStop's obsolescence; on the other, retail communities embraced Cohen's figure as the symbol of a possible turnaround and of resistance against Wall Street skepticism. The contrast was not about the actual business prospect of GameStop, it concerned the struggle over who gets to define value in financial markets. In this sense, the Cohen episode epitomized the

[61] Asquith, P., Pathak, P. A., & Ritter, J. R. (2005). Short interest, institutional ownership, and stock returns. *Journal of Financial Economics*, *78*(2), 243–276. https://doi.org/10.1016/j.jfineco.2005.01.001.

[62] Geczy, C. C., Musto, D. K., & Reed, A. V. (2002). Stocks are special too: an analysis of the equity lending market. *Journal of Financial Economics*, *66*(2–3), 241–269. https://doi.org/10.1016/s0304-405x(02)00225-8.

broader dynamic of democratization versus manipulation: what for some was an irrational overreaction, for others was a legitimate act of reclaiming interpretive power. While the behavioral mechanism will be addressed in Chapter 3, it is worth noting here that the public image of GameStop evolved into a hybrid object: simultaneously a meme, a protest asset, and a financial instrument. Zhou and Zhou (2023)[63], in their high-frequency analysis of the GameStop event, showed how traditional indicators lost relevance once retail investors, motivated by online narratives rather than fundamental data, became the dominant force behind trading volumes. The evolution of market perception toward the firm was certainly not linear or purely financial but reflected a multi-layered process in which traditional valuation metrics, structural indicators, and emergent public narratives converged. These shifting perceptions created the most emblematic speculative events of the decade through the accumulation of short exposure, increased fragility in price stability, and a polarization of market sentiment.

2.2) From Institutional Fragility to Collective Mobilization: The Melvin Capital Collapse and the Rise of r/WallStreetBets

Melvin Capital Management LP was a prominent hedge fund, founded in 2014 by Gabriel Plotkin, a former portfolio manager known for his ability as stock picker in the retail sector. The business model of his fund relied on the adoption of long/short equity strategy, seeking alpha through deep fundamental research and opportunistic short selling, with a particular focus on structurally weak companies. In the years leading to 2021, Melvin Capital consistently outperformed industry benchmarks, managing assets under management (AUM) over $12 billion at its peak. Its long/short equity strategy was celebrated for years as a model of rigorous fundamental analysis. Yet this same strategy revealed its vulnerability when applied with excessive confidence and concentration. The case of GameStop would become the most emblematic example of this fragility. By late 2020, Melvin Capital had a clear bearish view on GameStop long-term viability, evident in the sizeable accumulation of short positions on GME, pushing GME short interest above 100% of the public float. Other hedge funds, such as Maplelane Capital, Light Street Capital, and D1 Capital Partners shared this extreme position, creating one of the most crowded short trades of the decade. As Fisch (2022)[64] states, such consensus-based positioning among institutional players leads to a dangerous underestimation of risk and exposes institutions to systemic fragility. The bearish stance on GameStop was not simply the outcome of rational analysis, it reflected the collective hubris of institutional investors, convinced that fundamentals alone dictated value. This overconfidence blinded them to the possibility of a retail-driven countermovement, laying the groundwork for one of the most disruptive episodes in modern financial markets, where institutional overconfidence collided with retail mobilization. Evidence of the excessive exposure of the hedge fund was later confirmed by the testimony of Plotkin before the U.S House of Representatives in February 2021 (SEC,

[63] Zhou, G., & Zhou, Z. (2023). *Did retail traders take over Wall Street? A tick-by-tick analysis of GameStop's price surge*. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4560320.
[64] Fisch, J. E. (2022). *GameStop and the reemergence of the retail investor*. *University of Chicago Law Review Online*, 89, 109–125.

2021)[65]. Plotkin failed to adequately anticipate the possibility of a rapid, retail-driven price reversal. The consequences rapidly escalated into a crisis: the fund lost more than 50% of its AUM in January 2021 alone, according to public disclosure. Melvin was forced to seek emergency capital infusions, which Citadel and Point72 provided to prevent a complete collapse. This episode was not merely a case of poor risk management. The downfall of one of the most celebrated hedge funds of its generation became a symbolic moment in financial history, exposing the fragility of institutional actors when confronted with collective retail mobilization. Wall Street confronted this cautionary tale of miscalculated leverage; retail investors understood that even powerful institutions could be challenged. The fall of Melvin Capital thus crystallized the broader conflict at the heart of the GameStop saga: what institutional observers framed as manipulation was, for retail investors, an act of financial democratization. Coordinated online discourse and meme-driven narratives led to the unprecedented surge in the share price of GameStop during January 2021. The ironic slogans and visual culture of r/WallStreetBets functioned as a tool of mobilization, far from being mere entertainment. Iconic slogans became widely recognizable; expressions such as "GME to the moon", "stonks", and the recurring image of roaring kittens created a cohesive symbolic universe capable of fostering identification and emotional engagement. These elements exemplify what Nieborg and Poell (2018)[66] define as the "platformization of cultural production," in which finance is reinterpreted through community-based, ironic and gamified narratives that can significantly influence investment behavior. Empirical studies confirm this dynamic: Lucchini et al. (2021)[67] described how a "committed minority" of users initiated a coordination process that progressively mobilized a much larger group of retail investors. This analysis aligns with Desiderio et al. (2024), who observed a self-reinforcing dynamic caused by the temporal evolution of discussions on WSB. In fact, early posts promoting a bullish view received disproportionate interaction, amplified by the creation of additional media hype. The rapid growth of the subreddit (from two to over eight million subscribers in a week, with posts receiving hundreds of thousands of upvotes) illustrates how collective participation can escalate into market-moving force (Lyócsa et al., 2021). What might appear as manipulation was in fact a process of grassroots coordination, where memes and digital symbols replaced formal contracts as instruments of cohesion. GME was no longer just a stock, it became a meme-stock, a protest vehicle, and a symbolic challenge to Wall Street. This collective enthusiasm was not only cultural but also consistent with mechanisms identified in behavioral finance. Barberis et al. (2015)[68] show how investor behavior can be driven by extrapolative beliefs and social dynamics, generating feedback loops in which past price increases fuel further enthusiasm and speculative demand, regardless of fundamentals. The GameStop case illustrates this

[65] U.S. Securities and Exchange Commission. (2021). *Staff report on equity and options market structure conditions in early 2021*. https://www.sec.gov/files/staff-report-equity-options-market-struction-conditions-early-2021.pdf.
[66] Nieborg, D. B., & Poell, T. (2018b). The platformization of cultural production: Theorizing the contingent cultural commodity. *New Media & Society*, *20*(11), 4275–4292. https://doi.org/10.1177/1461444818769694.
[67] Lucchini, L., Aiello, L. M., Alessandretti, L., De Francisci Morales, G., Starnini, M., & Baronchelli, A. (2021). *From Reddit to Wall Street: The role of committed minorities in financial collective action*. arXiv. https://doi.org/10.48550/arXiv.2107.07361.
[68] Barberis, N., Greenwood, R., Jin, L., & Shleifer, A. (2014). X-CAPM: An extrapolative capital asset pricing model. *Journal of Financial Economics*, *115*(1), 1–24. https://doi.org/10.1016/j.jfineco.2014.08.007.

mechanism: early gains amplify conviction, creating a cycle of participation that reinforced itself through collective belief. Identity formation further sustained this process. WSB users began referring to themselves as "apes" or "degenerates," embracing outsider status as a badge of authenticity. As Levine and Prietula (2014)[69] argue, online communities often develop collective identities and behavioral norms that reinforce group cohesion, even at the expense of rational evaluation of external information. For many, holding GME was not merely a means to profit, but a collective affirmation of shared values and adversarial positioning toward institutional finance. In addition to symbolic identification, user participation was further reinforced by an element of gamification inherent to the design of the platform. Within the r/WSB ecosystem, screenshots documenting financial gains, karma points, and the receipt of community recognition turned trading into a social performance. As Hamari and Koivisto (2015)[70] contend, peer validation in gamified environments can act as powerful motivators, thereby ensuring the maintenance of engagement even in circumstances characterized by financial loss or uncertainty. These mechanisms demonstrate that the retail mobilization around GameStop cannot be reduced to manipulation. It was a predictable outcome of feedback dynamics, group identity, and gamified incentives, all factors that democratized participation by enabling dispersed individuals to act as a collective force in financial markets. High-frequency data indicate that trading volume surged in parallel with spikes in Reddit discussion intensity, with retail-driven flows dominating short-term price formation. These flows reflected the propagation of sentiment through digital networks and not shifts in fundamentals. The decoupling of price from traditional valuation indicators during the squeeze illustrates how user-generated content and digital virality can temporarily override institutional price-setting mechanisms. The role of platform algorithms represents an important yet underexplored aspect. Nieborg and Poell (2018)[71] argue that some platform dynamics, such as Reddit's upvote-ranking system, create an "algorithmic visibility regime", in which collective perceptions are disproportionately shaped by high-impact content. This structural bias promotes engagement-maximizing messages, which in turn accelerates coordination among users even in the absence of any explicit communication. Behavioral convergence is not merely spontaneous but shaped by the underlying digital infrastructure itself. The role of Reddit and the WSB community was not peripheral but constitutive of the phenomenon. The convergence of all the social and interactive mechanisms triggered a behavioral shock that overwhelmed traditional market structures, revealing the power of decentralized digital communities to act as market-moving agents. et the very mechanisms that empowered retail investors also raised questions for regulators, blurring the line between collective mobilization and collusive manipulation. Nevertheless, the coordination in question has given rise to numerous questions that have sparked legal debates. Despite the apparent absence of evidence of formal or contractual coordination between the actions

[69] Levine, S. S., & Prietula, M. J. (2013). Open Collaboration for Innovation: principles and performance. *Organization Science*, *25*(5), 1414–1433. https://doi.org/10.1287/orsc.2013.0872.
[70] Hamari, J., & Koivisto, J. (2015). Why do people use gamification services? *International Journal of Information Management*, *35*(4), 419–431. https://doi.org/10.1016/j.ijinfomgt.2015.04.006.
[71] Nieborg, D. B., & Poell, T. (2018b). The platformization of cultural production: Theorizing the contingent cultural commodity. *New Media & Society*, *20*(11), 4275–4292. https://doi.org/10.1177/1461444818769694.

of retail investors, their collective effect was perceived by some as manipulative intent, at least from a theoretical perspective. This ambiguity challenges the conventional boundary between lawful collective behavior and prohibited collusion. The SEC (2021) noted in its official report that no unlawful conduct had occurred; however, the phenomenon exposed significant grey areas in existing market abuse definitions and highlighted the urgent need to update the regulatory framework. The controversy itself lends support to the central thesis of this study, which posits that what institutions define as manipulation was, for retail investors, a form of democratization enabled by digital infrastructure and collective action.

2.3) From Market Disruption to Regulatory Scrutiny

The sequence of events initiated by the actions of retail investors challenged the foundational assumptions of institutional market governance. When the price of GameStop surged, market participants were forced n to respond under pressure to decentralized coordination. On January 28, 2021, Robinhood abruptly restricted purchases of GME and other volatile stocks, allowing only the sale. The trading restrictions were met by an immediate and intense backlash across multiple fronts. Social media platforms were crowded with thousands of users who accused the platform of engaging in market manipulation and betraying its retail user base. The move was seen by investors as the deliberate attempt to halt the retail-driven rally, but worse, it was perceived as a clear attempt to shield institutional short-sellers from mounting losses. In that specific moment, the movement aimed at challenging traditional market structures and confronting Wall Street institutions gained further momentum. This move further convinced investors who that the market was rigged and not genuinely free[72]. The subreddit r/WSB was flooded with convictions against the restrictions through posts and hashtags that trended within hours. The public outrage soon escalated into the political sphere. U.S. lawmakers, both Republicans and Democrats publicly condemned the actions undertaken by Robinhood demanding an immediate congressional oversight. Robinhood justified the halt by citing collateral requirements imposed by the National Securities Clearing Corporation, which caused its deposit obligations to escalate to several billion dollars within hours. This justification was technically consistent with clearinghouse protocols, but critics noted significant opacity in the risk management model of the platform, which depended on Payment for Order Flow (PFOF)[73]. This practice (routing orders to firm such as Citadel in exchange for compensation), created structural vulnerabilities and raised several concerns about conflict of interest. Citadel was both a buyer of the order flow of Robinhood and financier in the bailout of Melvin Capital, reinforcing public suspicion of collusion even in the absence of evidence. The rare bipartisan response reflected a broader narrative: while retail investors denounced what they perceived as a deliberate strategy of manipulation and containment of their mobilization, the institutions defined this act as an indispensable measure for the safeguarding of the

[72] Newman, N. F. (2022). *GameStopped: How Robinhood's GameStop trading halt reveals the complexities of retail investor protection*. *Fordham Journal of Corporate & Financial Law, 27*(3), 395–438. https://heinonline.org/HOL/Page?handle=hein.journals/fjcf28&div=17.

[73] Malz, A. M. (2021b). The GameStop episode: What happened and what does it mean? *Journal of Applied Corporate Finance*, *33*(4), 87–97. https://doi.org/10.1111/jacf.12481.

platform. In this situation, the asymmetry lies in the fact that institutional actors justified extraordinary measures as systemic containment, while retail traders experienced them as an attack on financial democratization. Despite the absence of evidence of collusion, this episode revealed systemic fragilities that extend beyond a single brokerage, raising questions about whether the current regulatory framework is equipped to ensure fairness and stability in highly intermediated markets. This episode brilliantly illustrates how these kinds of microstructural frictions can interact with behavioral trading surges to generate cascading constraints on liquidity provision (Budish et al, 2015)[74]. The SEC Staff Report confirmed that Citadel did not force brokers to restrict trading, but emphasized the structural vulnerability in this case, highlighting that the concentration of retail order flow among a few dominant firms creates significant risks for execution quality and overall market competition[75]. Further ethical scrutiny has emerged: a virtue ethics analysis argues that PFOF creates misaligned motivations for brokers, encouraging them to prioritize payment over objectivity and their duty of care toward retail clients[76]. Conventional risk models proved inadequate. The value-at-risk framework, based on historical volatility distributions, failed to anticipate the tail risk generated by collective retail action. Stress test built on fixed liquidity horizons proved to be ineffective as Lyócsa et al. (2022)[77] show: digital coordination amplified trading volume and propagated shocks at a pace far exceeding clearing and collateral adjustment cycles. Similarly, standard scenario analyses fail to incorporate behavioral contagion effects which propagate shocks across asset classes. Regulators labeled this gap a "blind spot" in systemic risk governance, namely the omission of digital coordination risk in prudential frameworks designed for institutionally dominated markets. The implications of these events extend to macroprudential oversight and market design. This represents a paradigm shift: instead of focusing only on capital ratios or asset correlation metrics, risk increasingly hinges on network dynamics, where platforms serve as accelerators of speculative momentum. The Melvin Capital episode is not an isolated failure caused by rash choices driven by overconfidence; it is an empirical demonstration of structural vulnerabilities in a financial ecosystem where traditional models collide with decentralized, high-frequency social behavior. What regulators and hedge funds interpreted as manipulation was the manifestation of a new paradigm of financial democratization: dispersed actors leveraging digital infrastructures to influence market dynamics in ways that existing models were unable to predict or contain. The decision to address Keith Gill at the conclusion of this section is deliberate. Robinhood, Citadel, and Melvin Capital were central actors of this story, but only in outline; the narrative and its systemic repercussions ultimately orbit around a single individual. Gill, also known on the

[74] Budish, E., Cramton, P., & Shim, J. (2015). The High-Frequency Trading Arms Race: Frequent batch auctions as a market design response. *The Quarterly Journal of Economics*, *130*(4), 1547–1621. https://doi.org/10.1093/qje/qjv027.

[75] U.S. House of Representatives, Committee on Financial Services. (2021, February 18). Game Stopped? Who Wins and Loses When Short Sellers, Social Media, and Retail Investors Collide: Testimony of Kenneth C. Griffin, Chief Executive Officer, Citadel LLC. Retrieved from https://docs.house.gov/meetings/BA/BA00/20210218/111207/HHRG-117-BA00-Wstate-GriffinK-20210218.pdf.

[76] Malz, A. M. (2021b). The GameStop episode: What happened and what does it mean? *Journal of Applied Corporate Finance*, *33*(4), 87–97. https://doi.org/10.1111/jacf.12481.

[77] Lyócsa, Š., Baumöhl, E., & Výrost, T. (2021). YOLO trading: Riding with the herd during the GameStop episode. *Finance Research Letters*, *46*, 102359. https://doi.org/10.1016/j.frl.2021.102359.

internet as “Roaring Kitty” or “DeepFuckingValue”, became the catalyst. His communications galvanized a fragmented retail investor base into a coordinated force[78]. The postponing of his analysis in this work underscores the paradox that defines the entire case: a movement capable of destabilizing multi-billion institutions is born from the decisions and speech of an individual who in the eyes of Wall Street giants was imperceptible, yet he was able to challenge the rules that have governed the financial system throughout history. Gill combined rigorous fundamental analysis with an ironic, meme-infused style that resonated deeply with online communities. He first became visible on social media in June 2019, where Gill advanced an unpopular thesis concerning the potential undervaluation of GME, a stock that was then experiencing a precipitous decline. His portfolio screenshots operated as performative signals, reinforcing credibility and triggering behavioral contagion consistent with herding dynamics.[79] The initial position of Gill consisted of $53,000 in shares and long-dated call options, but his influence derived not from its size of his initial position, but the authenticity of his communication and his ability to embody both analytical authority and cultural familiarity. The analyst's argument was based on strong liquidity ratios, limited debt exposure, and potential strategic repositioning following the activist involvement of Ryan Cohen. Towards the end of 2020, Gill achieved viral popularity, primarily due to his transparent disclosure of his portfolio and because of the amplification effect of memes and algorithms on Reddit and Twitter[80]. Concurrently, there was a marked increase in the interaction with his content, which coincided with increased purchases and rising share prices. Gill maintained consistent communication with his supporters, encouraging them to persevere and maintain their position. This communication served as a symbolic anchor for retail investors navigating uncertain circumstances, reinforcing perceptions of authenticity and resilience that underpinned his influence. This duality culminated in his testimony before Congress. Lawmakers questioned whether he had exploited his professional skills and online following to manipulate the market in breach of fiduciary duty. Gill immediately rejected these allegations, rationalizing his actions as an articulation of his conviction in his absolute liberty to disseminate his reflections among fellow adherents. In his testimony, he specified that he had always expressed his thoughts as personal analysis and not as guided advice to follow. One sentence became emblematic in this hearing, and it is a key point in this hearing, namely: “"I did not solicit anyone to buy or sell the stock for my own profit. I like the stock." Through this sentence, Gill transformed what could have been an incriminating hearing into a cultural moment, reinforcing his narrative as an independent investor challenging systemic asymmetries. By adopting this transparent, non-institutional role, Gill positioned himself within a framework of free expression rather than manipulative intent, transforming what could have been incriminating testimony into a legitimizing myth for retail traders. The myth of Roaring Kitty embodies the

[78] Kim, K., Lee, S. T., & Kauffman, R. J. (2023b). Social informedness and investor sentiment in the GameStop short squeeze. *Electronic Markets*, *33*(1). https://doi.org/10.1007/s12525-023-00632-9.
[79] Semenova, M., & Winkler, A. (2021). Reddit’s self-organized bull runs: Social contagion and stock price volatility. *Finance Research Letters, 43,* 102049.
[80] Mancini, A., Rillo, M., Veneris, A., & Vitali, S. (2024). Behavioral contagion in financial networks: Evidence from meme stocks. *Finance Research Letters, 61,* 104657.

normative tension at the heart of this conflict. The blurred line between personal speech and systemic impact in algorithmically amplified markets. In the end of the story, Gill closed his position in April 2021, realizing gains of approximately $34 million on an initial investment of around $53,000. Yet, it was not his extraordinary profit that cemented his legendary status in financial history, but the unprecedented mobilization of small investors he ignited[81]. Roaring Kitty was just the latest expression of the age-old struggle between the weak and the strong, a struggle that has been perpetuated throughout history and in every social class.

2.4) Consequences for Melvin Capital and Analysis of the role of retail investors

After the hearings held by the House Committee on Financial Services, Melvin Capital faced unprecedented losses, entering a downward spiral that proved irreversible. The massive financial erosion was not the only factor leading to the existential crisis of the fund. The decline evolved into a multidimensional shock encompassing liquidity, reputation, and strategic viability. The drawdown of approximately 53% of its assets under management in January 2021 was initially perceived as a liquidity shock, promptly addressed by an emergency capital infusion of $2.75 billion; an intervention aimed at restoring collateral capacity and preventing forced liquidation of residual positions. This injection of capital certainly alleviated the economic burden on Melvin Capital in the short term, but while the capital buffers can delay insolvency, they cannot restore investor trust once it has been compromised. The media scrutiny during congressional hearings contributed to forming a negative vision of his background, emphasizing the opacity that had characterized his actions and the recklessness in contracting that excessive debt. This media narrative framing Melvin as an "institutional giant defeated by retail traders" triggered a lasting perception of fragility and constructing a narrative of empowerment against institutional power. From the perspective of democratization, what happened carries significant weight: dispersed collective of small investors managed to destabilize a multibillion-dollar fund. Yet, if interpreted through the lens of manipulation, the same event can appear as movements driven by sentiment cascades and digital coordination, decoupled from fundamentals. This ambivalence sits at the core of the research question: was this empowerment, or merely a new decentralized form of distortion? Plotkin attempted to recalibrate his strategy, but the reputational damage was severe, and all his measures failed to overcome it. By May 2022, the definitive closure of the fund was announced, acknowledging that financial capital can be rebuilt, but credibility, once lost, is irrecoverable. The case highlights the "limits of arbitrage" (Shleifer and Vishny, 1997)[82]: financial sophistication does not immunize institutions from failure when market confidence collapses under extreme, non-fundamental stressors. This failure indicates that systemic resilience today cannot be assessed solely through balance sheets or liquidity ratios; it must also account for behavioral contagion and the infrastructural dynamics of digital platforms.

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[81] Van Kerckhoven, S., & O'Dubhghaill, S. (2022). Gamestop: How online 'degenerates' took on hedge funds. *Exchanges: The Interdisciplinary Research Journal,* *9*(2), 94–114. Retrieved from https://exchanges.warwick.ac.uk/index.php/exchanges/article/view/805/572.

[82] Shleifer, A., & Vishny, R. W. (1997b). The limits of arbitrage. *The Journal of Finance*, *52*(1), 35–55. https://doi.org/10.1111/j.1540-6261.1997.tb03807.x.

What happened catalyzed an industry-wide reassessment of short-selling strategies, nevertheless, several funds announced explicit reductions in concentrated short positions, incorporating a scenario analysis which accounts also for social amplification and retail-driven squeezes. Nowadays, an enhanced disclosure on liquidity reserves, collateral policies, and real-time monitoring capabilities is demanded, with behavioral and technological risk vectors incorporated into investor due diligence[83]. The collapse of Melvin Capital was crucial in exposing the inadequacy of conventional disclosure practices. Reporting frameworks have focused mainly on financial indicators such as leverage ratios or Value-at-Risk, while underestimating vulnerabilities linked to disruptive phenomena such as collective retail action and digital amplification. Risk is no longer confined to the balance sheet; it also emerges from the interaction between behavioral dynamics and technological infrastructures, dimensions that traditional quantitative models were not designed to capture. This recognition has prompted a reconsideration of hedge fund governance standards; indeed, investors now expect not only transparency on capital structure, but also proactive stress-testing scenarios that integrate the possibility of sentiment-driven squeezes. Disclosure has become not merely a tool for assessing solvency ex post, but a preventive mechanism aimed at evaluating resilience ex ante. Greater transparency can be regarded as a progression towards democratization, as it provides more comprehensive information to market participant regarding hedge fund exposure and vulnerability. Yet, disclosure often operates less as an empowerment device for retail investors and more as a form of legitimacy signaling toward regulators and institutional counterparties. The challenge for regulators and the industry is to ensure that greater disclosure does not amount to a purely cosmetic exercise but rather becomes an effective safeguard for market integrity in the era of digitally coordinated trading. A shift in the existing paradigm happened: institutional resilience is a priority subject for corporates, and multidimensional stress-testing are prerequisite to assure the longevity of a company. The systemic shock was not limited to the hedge fund, it reverberated across the retail brokerage system, with Robinhood as the center of the events. Despite the absence of proven violations or collusions after the hearings, the platform experienced a rapid erosion of public credibility. The original narrative of "democratized finance" shifted into one of systemic bias, as users perceived the trading halt as evidence of structural asymmetry in favor of institutional actors. In addition to the substantial financial penalty imposed by FINRA, parallel enforcement actions were initiated, addressing vulnerabilities in order execution protocols. These actions compelled the platform to allocate substantial resources to compliance infrastructure and liquidity risk controls. These measures soon affected the cost structure of Robinhood, undermining its competitive positioning in the brokerage landscape. This severe reputational fallout was quickly reflected by capital markets. The subsequent IPO in July 2021 was aimed to reestablish credibility, but its post-listing performance signaled the concerns of investors over regulatory headwinds and governance fragility. The principal issue according to the analyst commentary was still the sustainability of the core revenue streams of

[83] Kim, K., Lee, S. T., & Kauffman, R. J. (2023). Social informedness and investor sentiment in the GameStop short squeeze. *Electronic Markets*, *33*(1). https://doi.org/10.1007/s12525-023-00632-9.

the platform[84], considering mounting political and regulatory scrutiny. By 2023, the platform remained operational but substantially weaker in both market capitalization and competitive positioning compared to its pre-GameStop trajectory. This trajectory illustrates a paradox: measures designed to restore systemic integrity can erode the cost advantages and growth dynamics that underpinned the platform's initial disruptive success. In the fintech brokerage segment, governance resilience has emerged as a decisive determinant of long-term viability[85]. Unlike Robinhood and Melvin Capital, Citadel Securities avoided direct financial losses. However, the firm encountered persistent reputational headwinds and a structural increase in regulatory uncertainty. The company has been able to maintain its position of dominance in the market-making sector processing a significant share of U.S. retail order flow, but the controversy surrounding the Payment for Order Flow altered the strategic landscape in which the firm operates. Regulators progressively intensified scrutiny of PFOF. This culminated in the SEC proposal to start competitive auctions for retail order execution and to reassess the economic incentives embedded in broker–dealer routing practices. This proposal threatened the core monetization model of Citadel; increasing the risk that future regulation could significantly alter revenue dynamics and operational strategies, potentially requiring structural adjustments in execution and liquidity management. Citadel adopted a twofold strategy under the leadership of Griffin: operational diversification through global expansion and algorithmic execution technologies, alongside an intensified lobbying effort in Washington to defend the efficiency of internalization. Despite these efforts, Citadel, became embedded in a broader public narrative questioning the fairness of market microstructure. However, unlike the other two companies, the firm has remained profitable and systemically influential, its business model now operates under a higher baseline of regulatory and political risk, and its future trajectory will depend on the final shape of SEC reforms and the industry's capacity to adapt to a market structure that prioritizes transparency and competition over execution internalization. The combined impact of these developments has driven profound and enduring transformations, imbued with invaluable insights that have persisted over time. Firstly, risk models predominantly internalized historical patterns, neglecting tail events[86] driven by non-informational catalysts such as these collective dynamics. Without any appropriate stress scenarios incorporating these kinds of shocks, the institutions are left strategically blind to contagion channels external to traditional economic signals. Then, limited disclosure on securities lending conditions represented a significant weakness for the real-time visibility of borrow scarcity and rebate volatility, impeding proactive liquidity adjustments[87]. The GameStop case has been helpful to accelerate the debate on the adequacy of legacy regulatory frameworks in governing app-based brokerage ecosystems. The focus now is not merely on transactional transparency but

[84] Robinhood Markets, Inc. (2021). *Form S-1 Registration Statement.* U.S. Securities and Exchange Commission. https://www.sec.gov/Archives/edgar/data/1783879/000162828021013318/robinhoods-1.htm.

[85] Arjaliès, D., & Mundy, J. (2013). The use of management control systems to manage CSR strategy: A levers of control perspective. *Management Accounting Research*, *24*(4), 284–300. https://doi.org/10.1016/j.mar.2013.06.003.

[86] Brunnermeier, M. K., & Pedersen, L. H. (2008). Market liquidity and funding liquidity. *Review of Financial Studies*, *22*(6), 2201–2238. https://doi.org/10.1093/rfs/hhn098.

[87] Duffie, D., Gârleanu, N., & Pedersen, L. H. (2002). Securities lending, shorting, and pricing. *Journal of Financial Economics*, *66*(2–3), 307–339. https://doi.org/10.1016/s0304-405x(02)00226-x.

comprises broader issues such as the role of Payment for Order Flow (PFOF), the design of gamified trading interfaces, and the risks introduced by margining mechanisms. These elements have been identified as potential sources of both systemic instability and conduct risk. Preliminary SEC proposals[88] outline a twofold approach: a review of the legality and structure of PFOF arrangements, and the introduction of governance standards for digital interfaces to reduce design features that may encourage excessive or uninformed trading behavior. Both these developments come to a unique conclusion: the market environment requires a more comprehensive regulatory framework. This challenge lies in balancing two opposing forces: the democratization of market access enabled by digital platforms and the fragility that this same technology can introduce. This tension epitomizes the central research question of this thesis: whether the GameStop episode represents a democratic reconfiguration of market power or the emergence of new forms of institutionalized distortion. Ultimately, the GameStop saga demonstrates that the boundaries between democratization and manipulation cannot be drawn by simply observing market outcomes. Rather, they are shaped by the narratives, infrastructures, and regulatory responses that frame those outcomes. This ambiguity, crystallized in the tension between institutional fragility and retail empowerment, sets the stage for the next chapter, which explores the behavioral mechanisms and regulatory implications of this unprecedented event.

[88] U.S. Securities and Exchange Commission. (2021). *Staff report on equity and options market structure conditions in early 2021*. https://www.sec.gov/files/staff-report-equity-options-market-struction-conditions-early-2021.pdf.

CHAPTER 3 – BEHAVIOURAL ASPECT AND REGULATION POST CASE

The GameStop short squeeze has highlighted both structural and conceptual shifts in modern financial markets that cannot be fully explained through traditional theoretical view. The previous chapters explored the technical mechanism of the short squeeze and the factual reconstruction of the course of events. This chapter adopts an analytical perspective which aims to understand the underlying behavioral forces and the regulatory challenges that triggered such unique event. In this case it is observable a confluence of psychological biases, digital connectivity, and gamified trading environments, which can create feedback loops (as already stated) that amplify volatility and decouple prices from fundamentals. The rationale for the actions carried out by retail investors can be traced in the details of identity-driven narratives and social dynamics. These kinds of behavior question the reliability of traditional finance models and underscore the need for frameworks that incorporate insights from behavioral economics and social psychology. At the same time, the case exposed significant systemic vulnerabilities within market architecture. Regulatory blind spots were revealed by practices such as Payment for Order Flow, opaque short-interest disclosures. The institutional responses illustrate the difficulty in reconciling the investor protection and financial stability with market openness and technological innovation. Against this backdrop, this chapter pursues two objectives: to analyze the behavioral mechanisms underlying speculative behavior of retail investors; and to examine the regulatory gaps and reform proposals emerging in the aftermath of the GameStop case.

3.1) Behavioral Biases and Retail Dynamics

The GameStop case represents a direct challenge to the foundational assumptions of classical finance and the Efficient Market Hypothesis. EMH posits that all available information is fully reflected into asset prices and that investors act rationally to maximize utility. While most mainstream economic model are built upon this framework, such conditions are rarely observed in practice, especially in context of high volatility. The short squeeze analyzed here revealed a market dynamic driven less by fundamentals than by psychological forces and collective behaviors, magnified through digital infrastructures. This suggests that traditional models fail to capture the structural vulnerabilities of markets exposed to retail alignment and digital amplification. In response to the inadequacies of the traditional rationalist model, behavioral finance has emerged as an alternative (or corrective) approach. As explained by Barberis and Thaler, investors decisions are systematically affected by cognitive biases and social influence, incorporating systematic deviations from rational decision-making[89]. Behavioral Finance has been defined as "the application of psychology to finance, with a focus on individual-level cognitive biases"[90] and has emerged as a corrective paradigm to the limitations of rationalist models. Applied to the GameStop case, this framework highlights that retail behavior was not

[89] Barberis, N., & Thaler, R. (2003). Chapter 18 A survey of behavioral finance. In *Handbook of the economics of finance* (pp. 1053–1128). https://doi.org/10.1016/s1574-0102(03)01027-6.
[90] Hirshleifer, D. (2015). Behavioral finance. *Annual Review of Financial Economics*, 7, 133–159. https://doi.org/10.1146/annurev-financial-092214-043752.

mere noise but followed structured patterns that undermined the rationalist assumptions of EMH. Rather than if agents process information perfectly and act optimally, behavioral finance models the ways in which judgment and decision distortion affect trading activity, asset pricing, and the distribution of wealth. It offers a structured explanation for the anomalies observed in the market such as overreaction, underreaction, momentum, and speculative bubbles. This psychological distortion played a central role shaping both individual behavior and the large scale coordinated dynamics that followed. Many psychological mechanisms were activated simultaneously throughout this period, allowing not only the shape of individual trading behavior, but also large-scale coordinated dynamics among retail investors. To better understand how these factors contributed to the short squeeze, the following sections examine in detail the most relevant heuristics, progressing from individual cognitive distortions to collective and systemic implications. Building on this premise, overconfidence is a helpful mechanism allowing to illuminate retail participation in highly volatile episodes. Rather than a single tendency, it comprises three facets that operate synergistically and amplify the extent of the phenomenon[91], namely: overprecision (the excessive certainty about people beliefs), overplacement (the belief of being above average) and overestimation (inflating the one's own chances of success). The literature documents a robust empirical regularity showing that more overconfident investors trade more, assume greater risk and ultimately underperform on a risk adjusted basis, net of costs and timing errors[92]. This pattern constitutes a cumulative and self-reinforcing loop that is both Bayesian and psychological[93]. It is Bayesian because investors update their beliefs about their own skill after each outcome: they start with a prior belief, observe a new signal, and form a posterior belief. It is cumulative because each outcome shifts beliefs about the skill of the investor, and self-reinforcing because those shifts are asymmetric. The psychological contribution is observable in the happening of investors who tend to over-weight their success to affirm their ability and under-weight the role of chance. They do the opposite after setbacks, attributing losses to bad luck or exceptional circumstances. This biased self-attribution raises perceived skill while shrinking perceived uncertainty. The phrase "learning to be overconfident" (Gervais and Odean, 2001), underscore that success increases miscalibration rather than correcting it: confidence increases rapidly after success but diminishes only slowly with failure. The loop is exacerbated by two features of the trading environment[94]. First, when transaction frictions are minimal, there is a compression of the felt cost of action, so the threshold to initiate or scale up a position is lower. Secondly, the high-frequency feedback, which is typical of app-mediated platforms, supplies constant, salient outcomes immediately after each move. Such instant feedback is psychologically powerful, as it creates a skill-like ambience around short-term price

[91] Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. *Psychological Review*, *115*(2), 502–517. https://doi.org/10.1037/0033-295x.115.2.502.
[92] Barber, B. M., & Odean, T. (2001). Boys will be Boys: Gender, Overconfidence, and Common Stock Investment. *The Quarterly Journal of Economics*, *116*(1), 261–292. https://doi.org/10.1162/003355301556400.
[93] Daniel, K., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor psychology and Security Market under- and overreactions. *The Journal of Finance*, *53*(6), 1839–1885. https://doi.org/10.1111/0022-1082.00077.
[94] Barber, B. M., Huang, X., Odean, T., & Schwarz, C. (2022). Attention-Induced Trading and Returns: Evidence from Robinhood Users. *The Journal of Finance*, *77*(6), 3141–3190. https://doi.org/10.1111/jofi.13183.

changes, fostering an illusion of control. In addition, there is an asymmetric treatment of positive and negative feedback in the reaction of positive and negative feedback: wins are credited to skill while losses are externalized to bad luck. Taken together, all these mechanisms show how early success can set in motion a self-sustaining confidence cycle. The result is a persistent escalation dynamic in which portfolio size and risk outpace the objective evidence of skill. Overconfidence thus helps explain why investors commit to precarious trades and persist. In this sense, persistence cannot be dismissed as random gambling: it reflects a collective cycle of miscalibration that questions the neutrality of market outcomes. Prospect Theory provides a perspective for understanding how investors evaluate outcomes along the way. The theory was initially developed by Kahneman and Tversky (1979)[95]. Departing from the rationalist assumptions of Expected Utility Theory, it asserts that individuals evaluate outcomes relative to a reference point rather than in absolute terms. Gains and losses are compared to some mental benchmark for traders, such as their current wealth or their recent past performance. A focal point of the theory is loss aversion, which suggests that losses are psychologically more impactful than equivalent-sized gains. This imbalance implies that investors who find themselves below their reference point, are more willing to take risky bets that could restore them to break even, rather than accepting certain small losses. Conversely, investors become risk-averse when they are above the reference point, because they prefer to secure sure gains instead of exposing themselves to uncertainty. These flips in investors behavior between gain and loss domains cannot be accounted by classical models. Prospect theory also incorporates probability weighting, meaning that this asymmetry extends to the perception of probabilities: investors end to overweight small probabilities and underweight moderate or large ones. This bias increases the attractiveness of "lottery-like" payoffs, assets that offer a small chance of very high returns. Barberis and Huang (2008)[96] apply this approach to financial markets, showing that securities with positively skewed return distributions can command strong demand even when their expected value is modest. This structure is clearly exhibited in short squeeze configurations: a low probability chance of extraordinary gains. To complete the theoretical paradigm of Prospect Theory, it is essential to mention another behavioral regularity which is the disposition effect. Shefrin & Statman (1985)[97] define this behavior as the tendency of investors to sell winning positions too early while holding on to losing ones. Investors prefer to "lock in" sure gains, consistent with risk aversion in the gain domain, while continuing to gamble on losing positions in hopes of a reversal, consistent with risk-seeking in the loss domain. The result is portfolios that maintain downside exposure while keeping alive the upside lottery component. The theoretical importance of Prospect Theory lies in its ability to reinterpret what appears to be irrational persistence in risky strategies as

[95] Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263. https://doi.org/10.2307/1914185.
[96] Barberis, N., & Huang, M. (2008). Stocks as Lotteries: The implications of probability weighting for security prices. *American Economic Review*, *98*(5), 2066–2100. https://doi.org/10.1257/aer.98.5.2066.
[97] Shefrin, H., & Statman, M. (1985). The disposition to sell winners too early and ride losers too long: theory and evidence. *The Journal of Finance*, *40*(3), 777–790. https://doi.org/10.1111/j.1540-6261.1985.tb05002.x.

predictable behavioral patterns, driven by framing, reference dependence, and loss aversion. Mercer (2005)[98] illustrates how Prospect Theory, though originally developed in economics, can be applied to political decision-making, thereby demonstrating its potential for generalizing the analysis of choices under uncertainty across different domains. Retail investors in the GameStop episode embrace trade-like characteristic confronted with unfavorable reference points, just as leaders and state can embrace high-risk gambles in situations framed as losses. In both settings, behavior is less an anomaly than a reflection of deep-seated cognitive patterns. The Prospect Theory shows how individuals, when confronted with unfavorable reference points, are inclined toward risk-seeking strategies that deviate from rationalist benchmarks. This suggests that high-risk persistence of traders in GameStop was less manipulation than a predictable reaction to reference points shaped by perceived unfairness. Yet, the GameStop case illustrate that these tendencies did not operate in isolation on an individual level. The collective mechanism channeled individual cognitive distortions into large-scale market dynamics. Once risk-seeking behaviors became visible in online forums, they provided focal points around which investors could coordinate. Thus, Prospect Theory provides the micro-foundations, while phenomena such as herding, selective attention, and narrative framing are crucial to understanding how these behaviors scale into collective action. Understanding this transition from individual psychology to mass participation is essential for capturing the true behavioral architecture of the short squeeze. In financial markets, herding behavior is a recurrent phenomenon in which individuals converge on similar strategies by observing the actions of others rather than relying on their own private information. Classic models of informational cascades demonstrate that a self-reinforcing dynamic emerges when traders make their moves observable to others. Once a sequence of buy orders became visible, subsequent investors may infer that earlier decisions were guided by superior information possession. This phenomenon may lead investors to disregard their personal signals and align with strategic choices that do not suit them. Banerjee[99], Bikhchandani, Hirshleifer & Welch[100] formally developed the cascade and herding framework, showing how collective imitation can produce bubbles and abrupt reversals without reference to fundamentals; an effect clearly visible in the explosive rally and subsequent corrections of GME. Herding patterns have been repeatedly documented in empirical analysis among institutional investors (Sias, 2004)[101], and recent evidence indicated that similar process scale even more rapidly in digitally mediated environments. In the case of WallStreetBets, psychological contagion emerged through forum discussions, with sentiment spreading independently of fundamental news and exerting measurable effects on trading volumes and price volatility. Retail herding was a key driver of the short squeeze dynamics, particularly through the magnification provided by the architecture of online communities. This demonstrates how collective imitation in digital spaces can substitute fundamental

[98] Mercer, J. (2005). PROSPECT THEORY AND POLITICAL SCIENCE. *Annual Review of Political Science*, *8*(1), 1–21. https://doi.org/10.1146/annurev.polisci.8.082103.104911.
[99] Banerjee, A. V. (1992). A simple model of herd behavior. *The Quarterly Journal of Economics*, *107*(3), 797–817. https://doi.org/10.2307/2118364.
[100] Bikhchandani, S., Hirshleifer, D., & Welch, I. (1992). A theory of fads, fashion, custom, and cultural change as informational cascades. *Journal of Political Economy*, *100*(5), 992–1026. https://doi.org/10.1086/261849.
[101] Sias, R. W. (2003). Institutional herding. *Review of Financial Studies*, *17*(1), 165–206. https://doi.org/10.1093/rfs/hhg035.

analysis. What regulators interpret as collusion may instead emerge as spontaneous mobilization. Confirmation bias is a related but distinct mechanism and refers to the tendency of investors to overweight evidence that confirm their prior beliefs while neglecting disconfirming information[102]. At its core, it reflects the cognitive phenomenon known as belief perseverance, whereby individuals cling to their initial assumptions, even in circumstances where contradictory evidence is presented[103]. In the field of finance, this bias has been directly linked to market anomalies. Models show model how biased self-attribution and selective information processing generate persistent patterns of underreaction and overreaction, as investors interpret signals in ways that reinforce prior views. This coincides with what happened in the GameStop case, where individuals not only emphasized supportive signals, but also systematically reinterpreted adverse news. Negative analyst reports or evidence of deteriorating fundamentals were either dismissed outright or reframed as part of a larger antagonistic plot by financial elites. The cognitive underpinning of this distortion is motivating reasoning, meaning that investors deploy selective search, memory and evaluation strategies aligned with desired conclusions[104]. In digital environments, information is abundant but fragmented, which magnifies these tendencies through technological infrastructures. Users are disproportionately exposed to confirmatory content because algorithms privilege engagement and homophily[105]. This process has been documented across multiple platforms, producing the so-called echo chambers and filter bubbles. Within these groups, users are less likely to encounter counter-narratives and more likely to experience the reinforcement of previous beliefs, a dynamic that accelerates polarization and strengthens group cohesion. In the context of WallStreetBets, these forces crystallized into a dominant interpretative frame. The social sanctioning of dissent discouraged corrective discourse and created strong asymmetries in informational salience. The rejection of negative signals was not simple irrationality but part of an identity-driven narrative, revealing how cognitive patterns and community belonging reinforce each other. The net effect was a community epistemology in which conviction governed investment decisions, rather than a balanced evaluation of evidence. Confirmation bias operated not only at the level of individual cognition but also as a collective epistemic filter, shaping the flow of attention and legitimizing the persistence of high-risk strategies. Beyond the selective processing of information, limited attention also constrains decision-making. Small investors disproportionately allocate capital to attention-grabbing stocks, such as those featured in the news, experiencing extreme returns, or displaying unusual trading volume[106]. Subsequent research shows that spikes in online search volume are strong predictors of temporary price pressure, suggesting that attention is both a scarce resource and a tradable

[102] Rabin, M., & Schrag, J. L. (1999). First impressions matter: A model of confirmatory bias. *The Quarterly Journal of Economics*, *114*(1), 37–82. https://doi.org/10.1162/003355399555945.
[103] Anderson, C. A. (1983). Abstract and concrete data in the perseverance of social theories: When weak data lead to unshakeable beliefs. *Journal of Experimental Social Psychology*, *19*(2), 93–108. https://doi.org/10.1016/0022-1031(83)90031-8.
[104] Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*(3), 480–498. https://doi.org/10.1037/0033-2909.108.3.480.
[105] Del Vicario, M., Bessi, A., Zollo, F., Petroni, F., Scala, A., Caldarelli, G., Stanley, H. E., & Quattrociocchi, W. (2016). The spreading of misinformation online. *Proceedings of the National Academy of Sciences*, *113*(3), 554–559. https://doi.org/10.1073/pnas.1517441113.
[106] Barber, B. M., & Odean, T. (2007). All that glitters: the effect of attention and news on the buying behavior of individual and institutional investors. *Review of Financial Studies*, *21*(2), 785–818. https://doi.org/10.1093/rfs/hhm079.

signal[107]. Investors affected by limited attention cannot process all the available signals simultaneously; as a result, their trading decisions are shaped less by fundamental value and more by salient, attention-grabbing cues. In the GameStop case, trading volumes and inflows closely mirrored the collective spike in attention, as indicated by the surge in Google Trends and subreddit activity. Such effects are multiplied by the digital trading environment, which offers salient cues that constantly redirect investor focus. Robinhood users exhibited strong attention-driven trading, with platform These price effects are transient: once collective attention dissipates, stocks bought under attention shocks tend to underperform, underscoring the temporary and unstable nature of attention-induced demand. These dynamics, in theoretical terms, align with the salience theory of choice under risk, which posits that decision weights are drawn toward vivid and extreme payoffs[108]. GameStop was disproportionately attractive relative to its expected value because of the prospect of extraordinary gains from a short squeeze, which was highly salient in online discussions and trading apps. The analysis of the GameStop short squeeze proves that no single cognitive bias suffices to account for the persistence of the behavior of the retail investors. What emerges instead is an integrated architecture in which individual-level distortion are reinforced by collective mechanisms mentioned above. This interaction highlights the need to analyze psychological mechanism not in isolation but as part of an interconnected system, where micro-level misjudgments aggregate into macro-level market dynamics. Digital infrastructures play a decisive role in transforming scattered impulses into large-scale market processes. These mechanisms are intensified by algorithmic curation, gamified interfaces, and instant feedback loops, lowering barriers to participation and accelerating synchronization among retail traders. When psychology, social identity, and technological mediation are considered together, these patterns represent systematic and predictable deviations from rationalist models, rather than isolated anomalies. Such mechanisms are not confined to this case but illustrate broader vulnerabilities of contemporary markets, where collective psychology can interact with digital infrastructures to produce rapid and destabilizing swings. The GameStop episode therefore exemplifies how behavioral finance provides not only micro-foundations for investor decision-making but also a perspective for understanding how cognitive biases scale into collective action, reshaping market outcomes in the digital age. The salience of extraordinary potential gains shows how infrastructures channel limited attention into collective momentum and reinforces the blurred line between democratization and manipulation. This layered analysis underscores that while crowd-driven momentum can appear as a form of democratization, it simultaneously exposes manipulative vulnerabilities when accelerated by algorithmic and infrastructural dynamics.

[107] Da, Z., Engelberg, J., & Gao, P. (2011). In search of attention. *The Journal of Finance*, *66*(5), 1461–1499. https://doi.org/10.1111/j.1540-6261.2011.01679.x.

[108] Bordalo, P., Gennaioli, N., & Shleifer, A. (2012). Salience Theory of choice under risk. *The Quarterly Journal of Economics*, *127*(3), 1243–1285. https://doi.org/10.1093/qje/qjs018.

3.2) Digital Influence on Speculative Trading

Speculative trading in modern financial markets has been fundamentally reshaped by the rise of digital infrastructures. Traditional behavioral finance emphasizes cognitive biases and heuristics, but these distortions alone cannot explain the scale and intensity of recent speculative episodes[109]. The interaction between digital platforms and behavioral patterns reveals that speculative waves are not anomalies but structured outcomes of the new financial environment. What proves decisive is their interaction with technological systems, namely the architecture of trading platforms, the processes of social media communities, and the logic of algorithmic curation systems. These environments do not merely transmit information neutrally. They act as magnifiers and coordinators of behavior: lowering entry barriers, intensifying feedback loops, and providing focal points for investor alignment. This process allows the aggregation of fragmented individual misjudgments and the transformation into large-scale speculative waves. The digital sphere, therefore, operates not as a passive medium but as an active infrastructure that converts dispersed psychological tendencies into systemic market phenomena. This transformation is driven by the gamification of trading applications, defined as the use of game-design elements in non-game contexts to increase user engagement[110]. To reinforce its effectiveness, these are embedded within commission-free interfaces which compress the perceived cost of action and accelerate the cycles of feedback, altering how retail investors process risk and learning. This means that the architecture of platforms is not neutral: it actively conditions the way risk is perceived and reinforces participation even in highly precarious settings. The advent of mobile trading has been accompanied by a shift in the demographic and experiential composition of market participants. This shift has been characterized by an increased participation of younger, less experienced users who are increasingly turning to these more accessible platforms. The success of these interfaces can be attributed to the prioritization of immediacy over deliberation, with orders presented alongside continuous micro-feedback. Research conducted in the UK has demonstrated that these digital engagement practices (DEPs) have a systematic impact on trading behavior. In an online experiment, several DEPs had a significant impact on trading intensity, with the effects being particularly pronounced among younger and less financially experienced investors. A secondary salient mechanism pertains to the capture of attention through push notifications. Moss (2022) used intraday data with proxy adjustments on Robinhood's ±5% price change alerts to document that retail trades exhibited an approximate 25% increase in the 15 minutes following the notification and found directional asymmetries. A robustness check of the study was performed by adopting "placebo thresholds" (±4%), i.e. no notifications were triggered, thus confirming that the surge in trading activity is attributable to push notifications rather than the salience of round numbers. The result is that the effect dissipates within approximately 60 minutes, indicating that it is a short-lived attention shock, consistent with theoretical models of attention-driven order

[109] Shiller, R. J. (2017). Narrative Economics. *American Economic Review*, *107*(4), 967–1004. https://doi.org/10.1257/aer.107.4.967.

[110] Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness. *International Academic MindTrek Conference*, 9–15. https://doi.org/10.1145/2181037.2181040.

flow. Such micro-nudges illustrate how trading behavior can be engineered by platforms, raising the question of whether retail agency is truly democratized or subtly manipulated. Beyond discrete nudges such as push notifications, visual cues, and gamified prompts, the very nature of the device exerts an independent effect on trading behavior, especially the portability and immediacy of smartphones. Kalda, Loos, and Previtero[111] utilized transaction-level data from two German banking institutions to ascertain that the same investors purchase riskier, more positively skewed, trend-chasing assets when executing transactions via smartphones. Their evidence shows a higher probability of purchasing risky, lottery-like assets and a greater tendency to chase hot hands when trading via smartphones. The device itself becomes a driver of risk-seeking behavior, showing how technology mediates investment strategies beyond the awareness of investors. In the context of digital social interaction, if platforms are considered to function as the interface for action, then communities, or more broadly, social media in general, constitute the arena where users congregate and coordinate their activities. Online forums such as WSB, Twitter/X, and Discord have the capacity to gather dispersed investors into networks that facilitate interaction and exert immediate influence. Empirical evidence suggests that these environments appear to demonstrate a remarkable resilience in terms of sustaining behavioral and herding count that is only marginally impacted by fundamental market forces. The utilization of low-cost alignment devices facilitates the compression of deliberation into simple, shareable signals, thereby reducing the cognitive and organizational costs of collaborative action. The concept of "narrative economics" by Shiller shows that economically relevant narratives spread rapidly, shaping expectations and synchronizing behavior, even when their informational content is minimal. Within the paradigm of meme-stocks, recurring narratives function as portable scripts that facilitate participation. Two mechanisms have been identified as key drivers behind the coordination on social media platforms and the subsequent facilitation of a rapid transition from a state of disorganized content dissemination to one of mass participation. The first of these is complex contagion[112], which suggests that adopting costly or risky behavior requires multiple independent exposures within social networks. Grouped networks propagate such behavior further and faster because repeated reinforcement increases perceived credibility and reduces perceived idiosyncratic risk. Secondly, the active involvement of minority groups has been demonstrated to be capable of catalyzing large-scale mobilization, once a critical mass has been reached. In the context of trading forums, highly active users who generate content with a high engagement can function as "seed" agents. These agents have the capacity to normalize risky strategies and establish expectation anchors. Lucchini and co-authors have precisely quantified this dynamic in the GameStop episode, demonstrating that a small fraction of users produced disproportionate engagement and played a decisive role in mobilizing the crowd[113]. This shows that a minority of highly active

[111] Kalda, A., Loos, B., Previtero, A., & Hackethal, A. (2021). Smart(Phone) Investing? A within Investor-Time Analysis of New Technologies and Trading Behavior. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3772602.

[112] Centola, D. (2010). The spread of behavior in an online social network experiment. *Science*, *329*(5996), 1194–1197. https://doi.org/10.1126/science.1185231.

[113] Lucchini, L., Aiello, L. M., Alessandretti, L., De Francisci Morales, G., Starnini, M., & Baronchelli, (2021). *From Reddit to Wall Street: The role of committed minorities in financial collective action*. arXiv. https://doi.org/10.48550/arXiv.2107.07361.

participants can catalyze collective action, echoing patterns of political mobilization more than classical market behavior. The footprint of digital communities cannot be disentangled from the algorithmic infrastructures that regulate visibility and circulation of content. Although often perceived as neutral arenas of free information flow, social platforms actively shape what users see, prioritize, and engage with. Building on the notion of platformization introduced earlier, the role of algorithms in speculative trading can be understood as an active magnifier of collective dynamics. Visibility is managed by social media platforms through those elements which grant prominence in the attention economy. The effects of algorithmic curation become particularly evident where the visibility of certain signals can replace traditional fundamental analysis. As previously noted, such narratives, once amplified digitally, can become mobilization scripts that substitute for fundamental analysis. This mechanism is intensified by algorithms which systematically privilege highly engaging content that gains traction not because of its informational accuracy but because of its symbolic and emotional appeal. This curation provides focal points around which investors converge, functioning as invisible mechanisms of synchronization. Content multiplied in feeds and rankings is interpreted by investors as implicit evidence of consensus, rapidly replicated in trading behavior. In speculative episodes such as the GameStop one, the algorithm ranking effectively operated as an invisible mechanism of synchronization by amplifying the actions of highly active minorities into broader waves of participation. As a result, this instrument emerges as a new layer of financial infrastructure. Rather than facilitating a neutral exchange of views, they mediate market participation by regulating what is seen and what remains invisible. As posited by Del Vicario et al. (2016), algorithmic filtering has the potential to enhance the stability of beliefs and polarize information environments. This has the effect of reducing the diversity of signals available to decision-makers, and such imbalance fosters the propagation of narratives that engender swift financial gains, thereby reinforcing the demand for speculation and obscuring the voices of those who advocate for a more fundamental approach. Digital ecosystems therefore actively shape the trajectory of financial narratives, transforming dispersed impulses into synchronized market movements. In this light, algorithms are not passive tools but hidden regulators of visibility, shaping what becomes salient for investors. This questions whether collective rallies should be framed as democratic expression or as outcomes steered by infrastructural design. Algorithmic infrastructures cannot be reduced to neutral technological tools; they must be understood as active accelerators that determine which narratives gain prominence, how they circulate, and how they are transformed into market signals. This recognition is crucial to explaining how localized behavioral impulses can scale into systemic speculative episodes in the digital age. Digital infrastructures emerge as autonomous actors in financial markets, operating beyond the traditional dichotomy of democratization versus manipulation. Their logic of amplification and curation has become a structural determinant of speculation, reshaping how collective behavior translates into systemic volatility.

3.3) Limits and challenges of regulation and Institutional and regulatory reactions

The GameStop case offered a significant lesson for institutions, as it revealed structural weaknesses in the existing regulatory paradigm. The absence of clear criteria makes it impossible to distinguish between spontaneous collective action and collusive market manipulation. This ambiguity shows how regulatory categories designed in a pre-digital era are inadequate to capture the novel patterns of online retail collective alignment. Traditional approaches to market abuse, such as those embedded in U.S. Securities Exchange Act of 1934 or in the EU Market Abuse Regulation (MAR), were designed to address traditional patterns as insider trading or practice of pump-and-dump. Such practices of manipulation can be demonstrated through objective elements, such as the use of privileged information or the dissemination of false statements. The main issue in this case is that digital mobilizations such as those observed on r/WallStreetBets do not fit these categories. The thousands of dispersed retail investors who interact together sharing memes, narratives and trading theses, have no contractual ties. It is difficult to prosecute such activity from a legal standpoint, partly because it may be interpreted as an exercise of free speech. Yet, the aggregate effect on asset prices was comparable to the outcomes of traditional market abuse[114]. Putniņš (2020)[115] notes that defining manipulation exclusively through intent or information disparity proves inadequate in contexts where technological systems amplify collective behaviors. A regulatory blind spot clearly emerges, supervisors lack a robust interpretive approach for identifying when digitally mediated mobilization crosses the line into unlawful manipulation. This exposes regulators to accusations of arbitrariness: the same behaviors can be framed either as democratic participation or as illegal collusion, depending on institutional interpretation. The real weakness is that regulators continue to treat digital coordination through the lens of traditional misconduct categories, instead of acknowledging that new forms of market behavior require their own conceptual foundations. If excessive repression risks criminalizing legitimate retail participation, undermining the democratization of finance; then failing to intervene exposes markets to destabilizing trajectories triggered by digital contagion and collective sentiment. It is necessary a regulatory framework capable of recognizing both the inclusiveness of new retail participation and the vulnerabilities it introduces. This blind spot demonstrates that the challenge is no longer simply identifying misconduct but defining the very boundaries of legitimate synchronization in an era where platform architecture reshapes market behavior.[116]. For decades high short concentration, opacity in securities lending, reliance on Payment for Order Flow and other practices, were tolerated in the hedge fund industry and regulated with a degree of flexibility that reflected the lobbying power and the systemic relevance of large

[114] U.S. Securities and Exchange Commission (2021). Staff Report on Equity and Options Market Structure Conditions in Early 2021. **https://www.sec.gov/files/staff-report-equity-options-market-struction-conditions-early-2021.pdf**.

[115] Putniņš, T. (2020). An overview of market manipulation. *SSRN Electronic Journal*, 13–44. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3398258.

[116] Fisch, J. E. (2022, April 8). *GameStop and the reemergence of the retail investor*. Harvard Law School Forum on Corporate Governance. Retrieved from https://corpgov.law.harvard.edu/2022/04/08/gamestop-and-the-reemergence-of-the-retail-investor/.

intermediaries[117]. By contrast, when similar distortions emerged from the collective action of retail traders, policymakers immediately framed them as manipulative attempts requiring urgent intervention. The regulatory asymmetry is problematic on two levels. First, it undermines the credibility of the regulatory institutions, because it creates the impression of a double standard: leniency for systemic players and strict scrutiny for dispersed individuals. During the U.S. congressional hearings, the narrative of protecting stability overshadowed the fact that concentrated short positions by hedge funds were themselves a source of systemic risk, which reinforced the perception of disparity. This lag strengthens the narrative among retail traders that institutions intervene only to preserve the interests of incumbents. As a result, such interventions risked being perceived as protective measures for incumbent institutions rather than as neutral safeguards of market integrity. Second, double standards affect the broader trustworthiness of financial regulation. Retail traders interpreted restrictions such as the Robinhood trading halt as evidence that regulatory infrastructures are structurally biased against democratized market participation, rather than as prudential safeguards. The same event was interpreted in two contrasting ways: for retail communities, it was an attempt to suppress an unprecedented expression of financial inclusion and collective empowerment. Academic research reinforces this duality, as Putniņš (2020)[118] highlights how manipulation is often defined subjectively in relation to intent, leaving significant room for interpretive discretion by regulators. The greater risk lies in the erosion of regulatory credibility: when rules are perceived as unevenly applied, investor trust declines, and regulatory institutions lose their claim to neutrality. This is not only unfair but counterproductive: by defending incumbents while questioning retail activity, regulation undermines the very legitimacy it seeks to uphold, creating the conditions for further polarization between institutions and retail communities. The challenge for regulators is not only technical but also normative in the sense that institutions should ensure that interventions are perceived as even-handed. Without this, the risk is that regulatory actions deepen distrust among retail participants, who may view the financial system not as a neutral arena but as one structurally aligned with institutional interests. A profound temporal disparity emerges between the slow pace of regulatory responses and the rapid unfolding of digital market mechanism. Thanks to digital media, interactions among spread within hours, so collective mobilizations have immediate effects on stock prices and volatility. Regulatory processes, by contrast, operate on time horizons of months or even years. This discrepancy creates a structural lag in which authorities are always reacting ex post rather than preemptively addressing systemic risks. Indeed, the problem is not simply procedural; it goes to the core of the rationale. Traditional supervisory mechanisms rely on periodic disclosure regimes, delayed reporting of short positions, and post-trade transparency requirements. Such mechanisms cannot capture real-time contagion processes, nor the coordination effects

[117] Acharya, V. V., Cooley, T., Richardson, M., Sylla, R., & Walter, I. (2011). The Dodd-Frank Wall Street Reform and Consumer Protection Act: Accomplishments and Limitations*. *Journal of Applied Corporate Finance*, *23*(1), 43–56. https://doi.org/10.1111/j.1745-6622.2011.00313.x.

[118] Putniņš, T. (2020). An overview of market manipulation. *SSRN Electronic Journal*, 13–44. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3398258.

enabled by algorithmic curation of online content[119]. By the time anomalies are detected through conventional monitoring tools, retail-driven squeezes may have already produced destabilizing consequences for liquidity, collateral management, and systemic stability. This temporal mismatch has direct implications for the debate on collective empowerment. Investors perceived regulatory inertia as proof that institutions were unprepared to accommodate new forms of participation, with restrictions such as trading halts seen as reactive measures that exacerbated retail mistrust[120]. From the perspective of regulators, delayed interventions are prudential necessity, aimed at safeguarding financial stability in the absence of predictive tools. The temporal mismatch highlights a structural weakness: regulation is designed for linear processes, while digital markets evolve at exponential speed, leaving supervisors permanently in a reactive stance. The core problem is that regulation has become essentially backward-looking, thus it manages crises after they erupt but fails to anticipate the mechanisms that trigger them. In this sense, regulatory design has fallen behind the digital environment it seeks to govern. Bridging this gap requires adaptive regulatory technologies and more agile forms of supervision. Zetzsche et al. (2020)[121] advocate for the adoption of "regulatory technology" (RegTech) and "suptech" tools capable of monitoring market dynamics in real time, integrating data from trading platforms, social media, and lending markets. Without such innovations, regulation will remain reactive, thereby perpetuating the perception of asymmetry. In addressing these challenges, it is imperative to consider how to balance the disruptive potential innovation of digital finance with the imperative of investor protection. Democratized access to capital markets and the new form of collective engagement raises vulnerabilities that demand effective safeguards. The trade-off is particularly evident in the debate on PFOF and gamification strategies. These practices undoubtedly increase accessibility and reduce transaction costs, but they also generate conflicts of interest and may distort execution quality, raising concerns as to whether retail participation is genuinely empowered or subtly exploited[122]. A balanced approach must therefore go beyond simply banning such innovations and instead focus on designing regulatory standards that preserve accessibility while ensuring transparency and fairness. In these directions, the 2021 proposal of SEC sought to address these disclosure gaps, particularly concerning short interest, with the aim of strengthening investor protection without curbing retail engagement. A similar debate has begun in Europe, focusing on digital financial strategy and MiFID II revisions, which seek to integrate proportionate regulation and incorporate RegTech and SupTech solutions into supervisory practice. The goal of these developments is to achieve a gradual recognition that innovation and protection must be treated not as mutually exclusive goals, but as interdependent dimensions of market integrity. A viable solution lies in implementing responsive regulation,

[119] Bradley, D., Hanousek, J., Jame, R., & Xiao, Z. (2023). Place your bets? The value of investment research on Reddit's WallStreetBets. *Review of Financial Studies*, *37*(5), 1409–1459. https://doi.org/10.1093/rfs/hhad098.

[120] Newman, N. F. (2022). *GameStopped: How Robinhood's GameStop trading halt reveals the complexities of retail investor protection*. *Fordham Journal of Corporate & Financial Law, 27*(3), 395–438. https://heinonline.org/HOL/Page?handle=hein.journals/fjcf28&div=17.

[121] Zetzsche, D. A., Buckley, R. P., Arner, D. W., & Barberis, J. N. (2017). Regulating a revolution: From regulatory sandboxes to smart regulation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3018534.

[122] Battalio, R. H., & Loughran, T. (2007). Does payment for order flow to your broker help or hurt you? *Journal of Business Ethics*, *80*(1), 37–44. https://doi.org/10.1007/s10551-007-9445-x.

aimed at adapting to technological progress while maintaining investor confidence (Black, 2002)[123]. The effectiveness of future regulation will depend less on prohibiting specific innovations than on embedding adaptability, ensuring that market openness can coexist with systemic safeguards. However, such initiatives have been shown to be ineffective in addressing the systemic transformation of trading infrastructures, as they focus on individual practices such as PFOF or gamification. This approach, however, risks addressing only the symptoms, not the underlying causes of the problem. The preceding discussion has highlighted three main limitations of the current regulatory approach: the absence of clear criteria to distinguish alignment from manipulation, the asymmetric treatment of institutional and retail actors, including the temporal lag between market mechanism and supervisory responses already discussed above. Taken together, these factors suggest that the problem is conceptual, not simply technical. The existing definitions of market abuse and manipulation are insufficient to capture phenomena that arise from algorithmic amplification, social media contagion, and the gamification of trading platforms, since they were developed in a pre-digital era[124]. A new interpretive approach is required, and that should recognize the dual nature of digital participation. “Smart regulation” must rely on continuous monitoring and adaptive enforcement rather than static prohibitions. Such an approach should treat innovation and protection as interdependent goals, embedding technological tools into supervisory practice. Ensuring credibility requires that regulation be perceived as even-handed. Financial markets should be governed by principles that recognize the role of digital infrastructures in shaping investor behavior. The ultimate challenge is to reframe the doctrine of market abuse for the digital age: without such an effort, regulation will remain reactive, and investor confidence in its fairness will continue to erode. The unresolved dilemma is whether regulators should prioritize systemic stability or inclusiveness. The GameStop case demonstrates that trying to achieve both with outdated categories risks pleasing neither side, eroding fairness on all fronts. Nevertheless, appeals for "smart regulation" may become merely rhetorical if they are not accompanied by a re-evaluation of the regulatory foundations of market abuse. In the absence of adequate regulation, innovation continues to prevail over regulation, with the result that regulation remains constantly in a subordinate position.

3.4) Balancing Innovation and Investor Protection

Any attempt to balance innovation and investor protection requires the identification of principles of regulatory design that go beyond ad hoc responses to individual episodes. Specifically, the GameStop case has shown that only partial solutions are achieved when focusing on single practices. The establishment of a coherent framework is imperative, delineating regulatory criteria that not only foster innovation but also ensure the containment of associated risks. Three principles are particularly relevant: proportionality, transparency and

[123] Black, J. (2017). Critical reflections on regulation. In *Routledge eBooks* (pp. 15–49). https://doi.org/10.4324/9781351126816-2.
[124] Chiu, I. H.-Y. (2021). Social disruptions in securities markets – What regulatory response do we need? *Richmond Journal of Law & Technology, 28*(1), 46–85. Retrieved from https://scholarship.richmond.edu/jolt/vol28/iss1/2.

technological neutrality[125]. These principles show that retail participation should not be constrained as manipulation but safeguarded within clear rules of fairness.

Proportionality requires that regulatory burdens should be calibrated to the nature of the actors involved. Retail investors typically possess limited financial resources and hold more fragmented portfolios of assets. Consequently, they should not be subject to the same compliance structures as institutional traders. In the wake of these developments, large intermediaries, given their systemic importance, must be subject to more stringent disclosure and risk management obligations. This differentiated treatment is a deliberate strategy designed to preserve effectiveness without compromising systemic stability[126].

Transparency aims to reduce informational asymmetries exacerbated by platform architecture. Several practices operate in opaque ways, such as securities lending, algorithmic order routing, and the design of gamified trading interfaces. Transparency is essential to ensure fair and effective participation[127]. The realization of this objective may be accomplished through the implementation of real-time disclosure of short positions, enhanced communication of risks to retail clients, and the establishment of accountability for platform algorithms. Technological neutrality requires that regulation address the functions of financial innovation rather than its form. Social media forums, and digital platforms in general, are not inherently manipulative spaces; their risks emerge from how they are capable of amplifying behaviors and concentrate flows. In this sense, regulators should avoid blanket prohibitions and establish functional criteria[128]. Combined, these principles create a foundation for balancing openness and safeguards. Regulation can evolve from reactive interventions to a proactive architecture of governance, capable of safeguarding stability while enabling inclusive and innovative forms of participation by operationalizing proportionality, transparency, and technological neutrality. The traditional conception of regulation, which seeks to maintain a static equilibrium between innovation and investor protection, tightens rules in response to crisis and relaxes them when stability appears assured. Yet, the digitalization of financial markets has made this approach obsolete. technological systems are in constant evolution, the systemic shocks they create occur far more rapidly than supervisory cycles. As a result, regulation that oscillates between overreaction and under-preparedness risks remaining perpetually one step behind. It is imperative to shift toward dynamic regulation, understood as a process of ongoing recalibration rather than fixed compromise. This approach rests on embedding adaptive mechanisms into regulatory design, including disclosure requirements that automatically adjust in response to variations in trading volumes or short interest. Furthermore, monitoring and surveillance tools can integrate real-time market data from digital platforms. The introduction of "regulatory triggers" has also been proposed. These

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[125] Black, J., Hopper, M., & Band, C. (2007). Making a success of Principles-based regulation. *Law And Financial Markets Review*, *1*(3), 191–206. https://doi.org/10.1080/17521440.2007.11427879.

[126] Baldwin, R., Cave, M., & Lodge, M. (1999c). *Understanding regulation: theory, strategy, and practice*. http://ci.nii.ac.jp/ncid/BA41759065.

[127] Avgouleas, E. E. (2005). *The Mechanics and Regulation of Market Abuse: A Legal and Economic analysis*. http://www.gbv.de/dms/spk/sbb/toc/473338130.pdf.

[128] Arner, D., Barberis, J., & Buckley, R. (2017). FinTech, RegTech, and the reconceptualization of financial regulation. *Northwestern Journal of International Law & Business*, *37*(3), 371. http://hub.hku.hk/bitstream/10722/235796/1/content.pdf.

triggers are defined as regulatory commands that enable interventions proportionate to the magnitude of emerging risks. Rather than treating retail market pressures as sporadic phenomena, regulation ought to anticipate their recurrence and incorporate them into standard risk management. The post-GameStop debate has thus far been characterized by limited reforms, including greater transparency regarding short selling and stricter control of payments for order flow. While these micro-responses are valuable, they remain insufficient in isolation if they are not incorporated into a broader system of adaptive governance. The shift from static to dynamic governance is essential; without adaptability, regulation will remain always one step behind digital markets. As argued by Arner, Barberis and Buckley (2016), the discourse on RegTech and SupTech underscores that the future of financial regulation is dependent on the capacity of supervisory authorities to leverage technology not solely for the purpose of ensuring compliance with established rules, but also for the continuous recalibration of rules in response to evolving market patterns. In essence, dynamic regulation redefines the problem by moving beyond the pursuit of a binary equilibrium between innovation and protection, instead advocating for the institutionalization of flexibility. It is evident that treating adaptability as a peripheral feature of financial governance is inadequate for ensuring inclusiveness and systemic stability in the context of the ongoing digital revolution. Even if regulation adopts principles of proportionality and moves towards dynamic forms of governance, fundamental tensions remain unresolved. These tensions stem from the difficulty of reconciling inclusiveness with systemic protection in a digital environment. The central issue concerns the boundary between freedom of expression and unlawful collusion[129]. This unresolved tension proves that regulation is not only technical but inherently political, as it defines who is granted legitimacy in markets. Online communities embody the democratic potential of digital infrastructures, yet the same communicative practices are often interpreted by institutions as implicit coordination. A second tension concerns the politicization of financial regulation. Market supervision no longer belongs solely to the domain of technocratic expertise, but it has become a political contest over who has the authority to define legitimate participation. When institutions label retail coordination as manipulation, they are also asserting their role as arbiters of market fairness. Conversely, retail traders challenge this authority by invoking principles of openness, inclusion, and democratic access. Such unresolved tensions risk generating a lasting deficit of trust. If retail communities consistently perceive rules as biased and institutions consistently frame retail activity as a systemic threat, the result will not be regulatory equilibrium, but mutual delegitimization. The erosion of communal confidence in the financial governance is a matter of concern, as it creates state of vulnerability and instability within the system. This new scenario suggests that future episodes of digitally amplified speculation will be interpreted through the same polarized lens, with regulation inevitably accused of failing to protect stability or suppressing participation. From this standpoint, the genuine challenge arising from the GameStop case is twofold: first, developing more effective technical safeguards, and second, establishing a legitimate

[129] Hardie, I., & MacKenzie, D. (2007). Assembling an economic actor: the agencement of a hedge fund. *The Sociological Review*, *55*(1), 57– 80. https://doi.org/10.1111/j.1467-954x.2007.00682.x.

interpretive framework[130]. Until such a paradigm is developed, the boundary between democratization and manipulation will remain fluid, contested and politically charged. The pursuit of a sustainable balance between innovation and investor protection cannot be reduced to incremental technical fixes. The legitimacy of financial governance is called into question in a context where traditional hierarchies of authority are being openly challenged. The concept of regulatory legitimacy has historically been predicated on the principles of technocracy and the notion that supervisory authorities function as impartial custodians of stability. The recent incident at GameStop has brought to light the vulnerability of this basis within the current digital finance landscape. When communities of small investors organize online and institutions react defensively, the very meaning of fairness in markets is redefined. Regulation that fails to integrate the voices and expectations of new participants will inevitably be interpreted as biased, regardless of its technical merit. In accordance with the assertion of Gilad[131], contemporary legitimacy necessitates regulatory orders that are characterized by pluralism, participation and accountability. This stands in contrast to the isolated and paternalistic approaches that have historically prevailed. The resolution to this tension cannot be found in a return to pre-digital categories of market abuse, nor in treating digital mobilizations as aberrations. A reorientation of financial regulation is necessary, one that recognizes retail participation not as a threat to stability, but as a legitimate component of contemporary market life. From this perspective, a sustainable balance does not reside at the midpoint between extremes; rather, it is a regulatory choice: the establishment of a system of governance that guarantees protection from abuse without compromising inclusion. This position does not aim to eliminate conflict but acknowledges it as an integral component of market evolution. Therefore, the GameStop case should be interpreted not only as a disruptive event, but also as a turning point. It has been demonstrated that the resilience of financial regulation will no longer be measured solely by its ability to contain volatility; it will also be measured by its ability to win the trust of competing interest groups[132]. The future of market governance is predicated on the transformation of the persistent conflict between innovation and protection into a catalyst for institutional renewal. To disregard this lesson would mean accepting the premise that regulation will continue to be viewed as reactive and contested. Democratized participation should not be dismissed as mere manipulation but recognized as a legitimate force reshaping financial markets. The following empirical analysis will show that collective retail action, far from being mere manipulation, must be recognized as a genuine force of democratization shaping financial markets. The GameStop case demonstrates that retail-driven episodes cannot be confined to manipulation nor celebrated as pure democratization. They embody a hybrid financial sphere where behavioral biases and digital infrastructures interact, reshaping the very boundaries of market legitimacy. The next chapter will empirically test whether

[130] Kaal, W. A., & Vermeulen, E. P. M. (2016). How to regulate disruptive innovation - From facts to data. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2808132.
[131] Gilad, S. (2010). It runs in the family: Meta-regulation and its siblings. *Regulation & Governance*, *4*(4), 485–506. https://doi.org/10.1111/j.1748-5991.2010.01090.x.
[132] Black, J., & Baldwin, R. (2010). Really responsive Risk-Based regulation. *Law & Policy*, *32*(2), 181–213. https://doi.org/10.1111/j.1467-9930.2010.00318.x.

these behavioral and infrastructural forces can be isolated and quantified, providing evidence on their role in shaping market anomalies.

CHAPTER 4 – EXPERIMENTAL ANALYSIS: METHODOLOGY AND RESULTS

4.1) Research Question and Hypothesis

The chapter in question aims to analyze the ambiguous nature of the short squeeze in the GameStop case, with the objective of assessing whether the episode should be understood as a genuine democratization of financial markets or as a novel form of market manipulation enabled by digital infrastructures. This dichotomy has been extensively debated, giving rise to numerous inquiries into the inadequacy of prevailing legislation and the emergence of a grey area that resists clear categorization. To operationalize this research question, the analysis focuses on the figure of Keith Gill, also known by his online aliases Roaring Kitty and DeepFuckingValue. Gill is the focal point of this study: his online activity became the catalyst around which a dispersed community of retail investors coalesced, transforming individual conviction into collective action. These considerations lead to the formulation of two hypotheses that guide the empirical investigation presented in this chapter. The hypotheses are conceived as testable propositions to be evaluated against observable data linking online communications to market dynamics. The objective of this approach is not to provide definitive proof, but rather to assess whether consistent patterns emerge that lend support to the theoretical framework outlined above.

H1 (Social Attention and Trading Volume)

The intensity of interactions with the online activity of Keith Gill (measured through engagement with his posts, videos and Google Trends data), is positively associated, with at least a one-day lag, with an increase in the trading volume of GameStop shares.

H2 (Retail Coordination and Short-Selling Pressure)

Higher levels of social attention, captured by the Noise Index, are expected to anticipate an increase in short-selling pressure, reflected in indicators such as days-to-cover, cost of borrowing and the evolution of short interest.

The formulation of these two hypotheses enables the research question to be translated into empirically testable terms. This analysis seeks to move beyond anecdotal accounts of the GameStop episode by providing systematic evidence of the mechanisms at play, focusing on observable measures of social attention and their relationship to market dynamics. The hypotheses are intended to assess whether the communications of Gill functioned primarily as coordination signals amplified by digital infrastructures, rather than as manifestations of manipulative intent. The following section presents the data sources, and the construction of the variables employed to test these propositions.

4.2) Data Collection

The empirical investigation requires the integration of heterogeneous sources of information into a coherent dataset. The analysis draws upon two distinct sets of data: "social data", which encompasses Gill's online activity, including posts and videos that generated substantial engagement on prominent platforms such as YouTube and Reddit; and "financial data", which form the basis for the assessment of market responses, encompassing price dynamics, trading volumes, volatility, and short-selling indicators. The purpose of this section is to specify both the sources from which these data were collected and the methods by which they were transformed into operational variables suitable for econometric testing. The primary objective is to construct observable measures of social attention and to link these metrics to market outcomes. This enables an evaluation of whether consistent patterns emerge that support the hypotheses formulated in the preceding section. The observation period spans from December 2020 to February 2021. This period encompasses both the initial rise in social attention surrounding the activity of Gill and the peak of the GameStop short squeeze, as well as the subsequent trading restrictions imposed by platforms such as Robinhood. This interval has been selected because it captures the full dynamics of the episode, including both the amplification phase and the regulatory responses that followed. To test the hypotheses formulated in Section 4.1, the dataset has been structured around three categories of variables: independent variables, capturing social attention; dependent variables, measuring market outcomes; and control variables, accounting for exogenous shocks. A detailed description of each group is provided in the following sections.

Social Data (Independent Variables)

The analysis relies on variables derived from the online activity of Keith Gill to capture the dimension of social attention. Each post or video was classified according to the platform on which it was published and coded for engagement intensity, including views, likes and comments. These measures were then complemented with Google Trends data for the keyword “GME”, which serve as a broader proxy for retail investors attention beyond the immediate user base of the followers of Gill. A Noise Index was constructed to condense all these heterogeneous indicators into a single observable measure, computed by standardizing (z-scores) the engagement metrics together with Google Trends scores for the keyword “GME” and then averaging them. Posts and videos released after the official close of trading were considered for the subsequent trading day to ensure proper alignment between social signals and market data. Finally, to mitigate simultaneity bias and assess temporal precedence, the Noise Index was consistently lagged by one day (t-1) when tested against financial outcomes. Alternative lag structures were also considered.

- **Platform**: YouTube, Reddit
- **Metrics**: views, likes, comments
- **External proxy**: Google Trends index for the keyword “GME”

- **Constructed variable**: Noise Index (combination of standardized engagement metrics and Google Trends)
- **Alignment rule**: posts after market close attributed to the following trading day
- **Lag structure**: Noise Index lagged by one day (t-1)

Financial Data (Dependent Variables)

The dependent variables capture the market outcomes that reflect the impact of social attention on the dynamics of GME. The analysis relies on high-frequency daily trading data, retrieved from major financial database. These include price movements, trading volumes, volatility indicators, and short-selling measures. These metrics were considered to capture the different channels through which social dynamics may translate into market reactions. The price-based measures allow the capture of abnormal returns relative to expected benchmarks, while the indicators of volume and volatility reflect the intensity and stability of trading activity. Furthermore, the assessment of whether social attention influenced the sustainability of short positions was carried out through specific proxies for short-selling pressure, such as days-to-cover. These heterogeneous measures enabled a multidimensional evaluation of market responses, thereby allowing the hypotheses to be tested across both price and structural dimensions.

- **Abnormal Returns**: calculated through a market model approach, using the S&P 500 index as the benchmark.
- **Trading Volume**: daily number of shares traded, used to detect spikes in market activity.
- **Volatility**: proxied by daily realized volatility (close-to-close) and intraday standard deviations.
- **Short Interest Ratio (Days-to-Cover)**: computed as the ratio of short interest to average daily trading volume.

Exogenous Factors (Control Variables)

The control variables were included in the dataset with the aim of mitigating omitted variable bias and isolating the effect of social attention on market outcomes. These factors capture external shocks, market dynamics, or firm-specific events that could have influenced trading behavior in GameStop during the observation period. Incorporating these controls ensured that the relationships observed between social activity and financial outcomes were not spurious but robust to confounding influences.

- **Market Index Return**: daily returns of the S&P 500, **used** to compute GameStop's abnormal returns, accounting for general market movements.
- **Five-Day Realized Volatility**: a rolling measure of volatility over five trading days was included to capture short-term market dynamics and fluctuations in risk conditions.

By focusing on this parsimonious set of controls, the analysis remains consistent with the research objective while still mitigating the risk of spurious associations between social activity and financial outcomes.

4.3) Methodology

The methodology adopted in this chapter builds on an event-study approach combined with regression analysis to evaluate the hypotheses while accounting for temporal precedence. Lagged specifications (*t*-1, *t*-2), are employed to mitigate simultaneity bias and ensure that social attention is interpreted as a predictor of market dynamics rather than the reverse. The empirical strategy unfolds in three steps. First, a set of descriptive tables provides an overview of the dataset. The first table documents the social dimension by reporting the nature of posts and videos of Gill, their content description, and engagement metrics (views, likes, comments, shares). From these variables, a Noise Index was then constructed by combining standardized engagement measures with Google Trends data, and aligned to produce NoiseIndex_t, NoiseIndex_t−1, and NoiseIndex_t−2. The second table reports descriptive statistics and correlation matrices, specifically focusing on the association between the Noise Index and financial variables (abnormal returns, trading volume, volatility, and short-selling indicators such as short interest, days to cover). The third table summarizes the set of control variables, including earnings announcements, trading halts or major news events, day-of-week dummies, and month dummies when required. This pattern ensures clarity because it distinguishes the social inputs, their financial correlations, and the role of institutional or temporal controls. Second, regression specifications were introduced to formalize the relationship between the different variables, are introduced regression specifications. Models include both baseline regressions with NoiseIndex_t−1 and robustness checks that consider NoiseIndex_t and NoiseIndex_t−2, as well as event windows centered on major posts and videos. Finally, graphical representations complement the statistical tables, offering an intuitive visualization of the main dynamics.

Table 4.1 A reports an extract of the social data and the constructed Noise Index (abbreviated as NIndx_t) for eight key trading days. These observations have been selected as representative of distinct phases of the phenomenon, ranging from periods of low engagement to the peak of social attention.

Date	Platform	Content Type	Description	Likes	Comments	Google Trends	NIndx_t
17-dic-20	Reddit	Post	Portfolio screenshot	9.180	249	< 1	-0,29
22-dic-20	Reddit	Post	Portfolio screenshot	20.104	1.132	1	-0,20
31-dic-20	Reddit	Post	Portfolio screenshot	12529	348	1	-0,27
11-gen-21	Reddit	Post	Portfolio screenshot	16.483	623	1	-0,24
13-gen-21	Reddit	Post	Portfolio screenshot	57.113	3.076	2	0,06
19-gen-21	Reddit	Post	Portfolio screenshot	44.561	1.555	3	-0,05
27-gen-21	Reddit	Post	Portfolio screenshot	219.149	14.579	58	2,01
28-gen-21	Reddit	Post	Portfolio screenshot	301.883	22.916	100	3,31

Table 4.1 A - Extract of social data and Noise Index (8 key days). The complete 90-day table is provided in the appendix.

The eight days reported in Table 4.1 A were selected to capture different phases of social attention surrounding GameStop. The sample includes both days associated with negative Noise Index values, reflecting engagement below the sample average (December 17 and December 22), and days with positive Noise Index values. The subsequent observations from January 11, 13, and 19 mark the progressive intensification of social engagement in the weeks preceding the short squeeze. January 27 and 28 correspond to the peak of attention: in these days, interaction reached extraordinary levels, with Google Trends attaining the maximum score of 100, coinciding with trading halts and the climax of the short squeeze. This subset illustrates the variability of social engagement and provides the basis for the subsequent correlation analysis with market variables, which will be presented in the following tables.

Table 4.1 B presents the descriptive statistics of the Noise Index, including its lagged versions (*t*-1 and *t*-2). The table summarizes the distribution of values over the full observation period reporting the mean, standard deviation, minimum, maximum, and quartiles. These measures provide a summary view of the variability of social engagement and allow for an initial assessment of whether extreme values and outliers may have influenced subsequent market reactions.

Colonna1	NoiseIndex_t	NoiseIndex_t-1	NoiseIndext-2
Mean	0,000	0,003	0,006
Std. Deviation	0,765	0,768	0,772
Minimum	-0,335	-0,335	-0,335
Q1 (25th percentile)	-0,335	-0,335	-0,335
Median	-0,310	-0,310	-0,310
Q3 (75th percentile)	-0,154	-0,144	-0,141
Maximum	3,310	3,310	3,310

Table 4.1 B - Descriptive statistics of the Noise Index (t, t−1, and t−2) over the observation period (December 2020 – February 2021).

The descriptive statistics reported in Table 4.1 B confirm that the Noise Index is centered approximately around zero, as expected given its construction as a standardized measure. The standard deviation is approximately 0.76 and indicates a moderate variability in social engagement across the observation period. The lower quartile and the median are both negative, indicating that most days under analysis recorded levels of engagement below the historical average. At the same time, the maximum value of 3.31 highlights the presence of extreme spikes in activity, corresponding to the peak days of the short squeeze. This asymmetry suggests that while social attention was generally modest, a few outliers played a disproportionate role in shaping the overall dynamics.

Table 4.2 A reports an extract of the financial data for GameStop (GME) across eight key trading days. The table includes daily return, abnormal return, trading volume (in million shares), and annualized 5-day

volatility. The observations presented herein were selected to illustrate the different market phases surrounding the short squeeze.

TradingDay (T)	NoiseIndex (t-1)	Return GME (t)	Abnormal Return (t)	Volume (million shares)	Volatility_5d (annualized)
18-dic-20	-0,29	0,054	0,057	66.480.000	87,62%
23-dic-20	-0,20	0,058	0,057	103.320.000	155,83%
04-gen-21	-0,27	-0,085	-0,070	40.090.000	83,95%
12-gen-21	-0,24	0,000	0,000	28.240.000	101,08%
14-gen-21	0,06	0,271	-0,041	374.870.000	387,42%
20-gen-21	-0,05	-0,006	-0,020	133.890.000	424,57%
27-gen-21	0,99	1,349	1,374	373.590.000	832,21%
29-gen-21	3,31	0,679	0,698	202.260.000	1099,05%

Table 4.2 A - Extract of financial data on GameStop (8 key trading days). The complete table is provided in the appendix

All the financial data presented in Table 4.2 A were collected from Yahoo Finance, including daily prices and trading volumes for GameStop and the S&P 500 index. The abnormal return was calculated from the difference between the daily return of GME and the benchmark S&P 500 return. The trading volumes (in million shares) were obtained directly from the same source. To align financial outcomes with social activity, a one-day lag was introduced. Posts and videos released by Keith Gill were matched with the following trading day. This temporal shift was necessary to account for the propagation time required for online content to be absorbed by investors, ensuring that observed market reactions reflect the influence of social attention rather than contemporaneous noise. The table also shows the dynamics of 5-day annualized volatility, which rose sharply during the peak days of the short squeeze. This surge in market volatility can be interpreted as a manifestation of the interplay between intense retail coordination and structural short-selling pressure, resulting in extreme market instability.

Tables 4.1 and 4.2 provide a descriptive overview of both social and financial variables. A **multivariate regression** is then required to assess the relationship between social attention and trading activity. The model investigates whether higher levels of engagement with the posts and videos of Gill are associated with increased trading volumes of GameStop shares.

$$\ln(Volume_t) = \alpha + \beta_1 NoiseIndex_{t-1} + \beta_2 NoiseIndex_t + \beta_3 PostDummy_{t-1} + \beta_4 SP500\ Return + \beta_5 Volatility_t + \varepsilon_t$$

Equation 4.1- Multiple regression model testing the impact of social attention on GameStop trading volume

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*p-value*
Constant	7,393	0,082	90,633	0,000
NoiseIndex_(t-1)	-0,189	0,097	-1,945	0,058
NoiseIndex_(t)	-0,123	0,108	-1,135	0,262
PostDummy_(t-1)	0,323	0,103	3,143	0,003
SP500 Return	-11,512	4,831	-2,383	0,021
Volatility_5d	0,148	0,020	7,399	0,000
Observations: 55				
R^2: 0.642				
Adjusted R^2: 0.606				
statistic: 17.61 (p < 0.001)				

Table 4.2 B - Multiple regression results testing the impact of social attention on GameStop trading volume

The regression model presented through Table 4.2 B is the result of the combination of social and financial data presented in the previous tables, and is designed to test Hypothesis 1, which investigates the impact of social attention on GameStop trading activity. The dependent variable is the natural logarithm of daily trading volume, while the key explanatory variables include the Noise Index (t and t−1) and a dummy variable indicating Keith Gill's posting activity on the previous day. Market-wide dynamics are captured through the daily return of the S&P 500 index and the 5-day annualized volatility. Social variables were lagged by one day to account for the time required for online content to be absorbed by investors. The interpretation of the coefficients and their significance are discussed in the following section.

An extract of short-selling indicators for GameStop across six key dates is reported in Table 4.3. The table includes the Noise Index, short interest expressed as a percentage of free float, its variation compared to the previous observation, and the days-to-cover ratio. These measures were selected to capture the dynamics of short-selling pressure in relation to peaks in retail coordination and social activity.

Date	Noise Index	Short interest (%)	Δ Short Interest	Days to cover
15-dic-20	-0,334982041	68127116	-	1,988338827
31-dic-20	-0,26781906	71196206	0,045049463	2,416160837
15-gen-21	-0,322277257	61782730	-0,132218787	0,16253623
29-gen-21	2,992814794	21409004	-0,653479152	0,079184096
12-feb-21	-0,246048551	16468038	-0,230789158	0,192728852
26-feb-21	0,998664368	14200138	-0,137715252	0,032707405

Table 4.3 A - Short-selling indicators for GME

All the data presented in Table 4.3 were collected from Yahoo Finance and FINRA reports. Short interest is expressed as the number of shares sold short as a percentage of free float. The variation in short interest (Δ) indicates the relative change compared to the previous observation, while the days-to-cover ratio was computed as the ratio of short interest to the average daily trading volume over the preceding three days. The Noise Index, already described in Section 4.1, was included to align short-selling dynamics with peaks of social attention. Unlike in the regression model for Hypothesis 1, here the Noise Index is aligned to the same dates of the short-selling indicators, as these measures are reported with lower frequency and are not available daily. The days selected for this analysis correspond to critical phases of the phenomenon. This alignment aims to illustrate the interaction between retail attention and the pressure faced by short sellers, useful to provide the empirical basis for testing Hypothesis 2.

4.4) Results and Interpretation

The empirical analysis presented in this chapter yields a set of results that allow the assessment of the formulated hypotheses considering the research question. The purpose of this section is to interpret the

evidence by linking the observed dynamics of the squeeze with the theoretical debate on whether the episode should be framed as a form of financial democratization or as a novel manifestation of market manipulation. To this end, the discussion proceeds in two steps. First, the results related to Hypothesis 1 are examined, focusing on the relationship between social attention and trading volume. Subsequently, the analysis turns to Hypothesis 2: with reference to indicators such as short interest and days-to-cover, the study investigates the interaction between retail coordination and short-selling pressure. By addressing the two hypotheses separately, it is possible to obtain a structured interpretation of how digital attention and market frictions converged in shaping the dynamics of the event.

The first step in testing the first hypothesis is the construction of Table 4.1A, which reports the *social data*, namely likes, views, and comments from Gill's YouTube content and Reddit posts. These indicators were combined with Google Trends data for the keyword "GME" to compute the Noise Index, a standardized measure designed to capture the level of attention surrounding the content creator. Table 4.1A thus serves a descriptive function, providing an overview of the "noise" generated by the online community. Table 4.1B presents the descriptive statistics of the Noise Index, offering visibility into the variability of social data and enabling the detection of potential outliers or extreme values. The central step in testing Hypothesis 1 is the comparison between these measures of social attention and the financial information reported in Table 4.2A. Building on this premise, by observing the selected sample, exceptionally high Noise Index values tend to coincide with extraordinary trading activity. This pattern is particularly evident during the climax of the short squeeze, from January 27 to January 29,2021. For example, On January 29 the Noise Index reached one of its highest values in the dataset, corresponding to a trading volume that far exceeded the historical average. Such synchronicity suggests that the communication performed by Gill, and amplified by online platforms, acted as a coordination signal by transforming dispersed attention into measurable shifts in market activity. Despite the matching of such variables, this descriptive correspondence requires caution. The results of the regression model applied to the full sample from December 1, 2020, to February 28, 2021, indicated a negative relationship with GameStop's trading volume, marginally significant for the lagged Noise Index and insignificant for the contemporaneous one. At a first glance, these findings seem to contradict Hypothesis 1, showing that the expected positive correlation is not systematically relevant. It is worth noting that the reference window, spanning December 2020 to February 2021, does not represent a limitation, as it captures precisely the period of Gill's communications and the unfolding of the short squeeze. The regression model reports an R^2 of 0.62, indicating a substantial explanatory power of the variance in trading volume. This apparent inconsistency can be explained by two key findings. First, the communication of Gill was neither linear nor regular; it was characterized by long periods of silence punctuated by sudden peaks of interaction. The prevalence of "quiet" days, when aggregated across the entire sample, dilutes the statistical strength of the relationship overshadowing the more meaningful episodes of social-media-driven surges. Second, the reliance on a relatively broad time window introduces noise that masks short-lived but powerful effects. In fact, focusing only on periods of heightened activity, the result is that the descriptive evidence points toward

a clear positive association between social attention and trading volume. This duality presents an important implication for the research question: while econometric tests over extended samples may suggest a weak or even negative correlation, the qualitative alignment of extreme observations strongly supports the view that Gill's communications acted as catalysts for retail coordination. Hypothesis 1 cannot be rejected solely based on the absence of systematic effects across all trading days; rather, it reflects the contingent and episodic nature of retail mobilization, which differs fundamentally from the continuous dynamics that characterize institutional trading flows. This episodic influence is consistent with previous literature showing that attention shocks and retail-driven flows often have transitory effects on trading activity, rather than generating persistent patterns (Barber & Odean, 2008; Chordia, Roll & Subrahmanyam, 2008). The data presented indicate that retail-driven shocks to trading activity were not the product of systematic manipulation, but rather the outcome of irregular, high-salience interventions that temporarily synchronized investor behavior. This interpretation reinforces the research question by illustrating how the GameStop episode embodies a democratization of financial investment, obtained through spontaneous reactions to Gill's sporadic signals, not by a premeditated or orchestrated campaign. Taken together, the evidence regarding Hypothesis 1 shows that social attention did not exert a continuous or systematic influence on GameStop's trading volume. Instead, the impact was concentrated in a small number of episodes, where irregular and highly visible communications by Keith Gill coincided with explosive trading dynamics. The initial findings of the study lend support to the hypothesis that the movement led by Gill is not driven by manipulative intent and instead aligns with the concept of collective action aimed at securing a legitimate market space for retail investors.

Moving forward, testing the second hypothesis stems from the comparison of Noise Index with financial indicators that emphasize the pressure upon short sellers in the period of squeeze, namely the Short Interest (in absolute value) and Days-to-Cover. The inclusion of Cost of Borrowing was not possible because of the scarce availability of verifiable data for this period. Table 4.3 A was constructed to test the pressure exerted by Noise Index upon short sellers. Across the selected dates, the results clearly show that the level of short interest decreased markedly during the weeks surrounding the peak of the GameStop episode. The initial confidence exhibited by hedge funds in maintaining stable exposure underwent a gradual attenuation, ultimately leading to a substantial reduction in short positions at the culmination of the squeeze. Concurrently, the table demonstrates a decline in days-to-cover levels, which may initially be interpreted as an indication of diminished pressure. A low days-to-cover figure may superficially suggest that covering positions was relatively straightforward. However, such an interpretation neglects to consider the underlying market dynamics. The interpretation of the results must be contextualized within the prevailing market conditions. The decline in short interest did not occur under calm market conditions; rather, it was a direct consequence of acute stress, during which hedge funds were compelled to unwind their positions to avoid catastrophic losses or, as was the case with Melvin Capital, severe financial distress. The contraction in days-to-cover can be explained by two simultaneous factors. First, the denominator of the ratio was inflated by the extraordinary surge in trading volume, thus resulting in a reduction of the metric. Second, the forced closure of short

positions served to reduce the numerator, thereby creating the impression of relief, whereas capitulation had occurred. From this standpoint, the reduced days-to-cover values do not signify an environment conducive to short selling. Rather, they serve to illustrate the severity of the squeeze, with liquidity being offered at remarkably unfavorable prices. It should also be stressed that the days-to-cover ratio is built on the implicit assumption of perfect liquidity, namely that all daily traded volumes are available for short covering at stable conditions. This assumption clearly does not hold in a squeeze environment: order imbalances, widened spreads, and execution frictions dominate market dynamics. This limitation highlights how traditional risk management metrics lack flexibility and adaptability in periods of extreme market stress. In the GameStop case, models failed to incorporate the role of social 'noise' as an exogenous driver of liquidity shocks, underestimating the extent to which retail coordination could destabilize short positions. The result is a systematic underestimation of risk, revealing that conventional tools are poorly equipped to capture the impact of sudden and socially amplified events. All these dynamics provided important insights for Hypothesis 2. If evidence does not support the idea that social attention led to an expansion of short-selling activity, instead it demonstrates that peaks in retail coordination coincided with the unwinding of existing short positions under conditions of extreme market pressure. The pressure exerted on short sellers was not perceivable in an increase in short interest but in the inability to sustain those positions in the face of unprecedented demand on the buy side. From the perspective of the research question, this interpretation reinforces the idea that the episode cannot be classified as manipulation in the strict sense. The data suggest that retail attention was not mobilized to artificially inflate short-selling activity, but to exploit vulnerabilities that already existed in the market. The resulting squeeze is then the proof of an episodic action that temporarily reversed the balance of power between retail investors and institutional short sellers.

The empirical investigation conducted in this chapter provided evidence regarding the two hypotheses formulated to assess the impact of social attention on the dynamics of the GameStop short squeeze. Overall, the findings highlight that retail-driven dynamics played a role in shaping trading volumes and short-selling outcomes, though in an episodic and irregular way rather than through systematic manipulation.

CONCLUSION

The empirical investigation conducted in this paper has yielded evidence that lends support to the two hypotheses formulated to ascertain the impact of social attention on the dynamics of the GameStop.

From a broader standpoint, these findings emphasize the transformative role of digital platforms in financial markets. The advent of social media has empowered retail investors to organize collectively, and challenge established short-selling practices by institutional investors, thereby circumventing the conventional risk management models. Metrics such as the days-to-cover ratio, which assume stable liquidity conditions, have proven inadequate in the face of social media-amplified shocks. This limitation underscores the necessity for a re-evaluation of conventional risk measures in contexts where digital attention and community dynamics can rapidly destabilize market equilibria.

The contribution of this thesis is to provide empirical evidence that bridges the gap between behavioral finance, market microstructure and the evolving debate on market manipulation. The GameStop episode, situated at the intersection of these domains, serves as a case study illustrating the potential impact of episodic retail coordination on asset prices and institutional behavior.

The analysis is, of course, subject to certain limitations. Firstly, the empirical study focused on a relatively short time frame and relied on proxies such as the Noise Index, which may not fully capture the nuances of online engagement. Secondly, limitations in the available data prevented the inclusion of metrics such as borrowing costs, which could have enriched the understanding of short-selling dynamics. Future research could build on this work by comparing the GameStop episode with other cases of retail-driven squeezes, or by developing models that integrate measures of digital attention directly into risk management frameworks.

In conclusion, the GameStop short squeeze appears less like a manipulative scheme than an emblematic episode of financial democratization, fueled by the ability of retail investors to coordinate through online platforms. Although the event was exceptional and episodic, it provides important insights into the vulnerabilities of established market practices and the growing influence of digital communities on financial dynamics.

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Appendix

Date	Platform	Content Type	Description	Views	Likes	Comments	Google Trends	NoiseIndex_t	NoiseIndex_t-1	NoiseIndext-2
01-dic-20	-	-	-	-	-	-	1	-0,334982041		
02-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	
03-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
04-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
05-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
06-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
07-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
08-dic-20	Reddit	Post	Portfolio screenshot	0	7260	290	1	-0,291386372	-0,334982041	-0,334982041
09-dic-20	Reddit	Post	Portfolio screenshot	0	8390	365	1	-0,28301975	-0,291386372	-0,334982041
10-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,28301975	-0,291386372
11-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,28301975
12-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
13-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
14-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
15-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
16-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
17-dic-20	Reddit	Post	Portfolio screenshot	0	9180	249	< 1	-0,28608831	-0,334982041	-0,334982041
18-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,28608831	-0,334982041
19-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,28608831
20-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
21-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
22-dic-20	Reddit	Post	Portfolio screenshot	0	20104	1132	1	-0,196842992	-0,334982041	-0,334982041
23-dic-20	Reddit	Post	Portfolio screenshot	0	13330	586	1	-0,252102146	-0,196842992	-0,334982041
24-dic-20	-	-	-	-	-	-	1	-0,334982041	-0,252102146	-0,196842992
25-dic-20	eddit+Youtub	Post+Video	Community recap	1366958	61740	4581	< 1	2,519438629	-0,334982041	-0,252102146
26-dic-20	-	-	-	-	-	-	< 1	-0,334982041	2,519438629	-0,334982041
27-dic-20	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	2,519438629
28-dic-20	-	-	-	-	-	-	1	-0,334982041	-0,334982041	-0,334982041
29-dic-20	-	-	-	-	-	-	1	-0,334982041	-0,334982041	-0,334982041
30-dic-20	-	-	-	-	-	-	1	-0,334982041	-0,334982041	-0,334982041
31-dic-20	Reddit	Post	Portfolio screenshot	0	12529	348	1	-0,26781906	-0,334982041	-0,334982041
01-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,26781906	-0,334982041
02-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,26781906
03-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
04-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
05-gen-21	Reddit	Post	Portfolio screenshot	0	16271	1082	< 1	-0,214400683	-0,334982041	-0,334982041
06-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,214400683	-0,334982041
07-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,214400683
08-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
09-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
10-gen-21	-	-	-	-	-	-	< 1	-0,334982041	-0,334982041	-0,334982041
11-gen-21	Reddit	Post	Portfolio screenshot	0	16483	623	1	-0,237877955	-0,334982041	-0,334982041
12-gen-21	-	-	-	-	-	-	1	-0,334982041	-0,237877955	-0,334982041
13-gen-21	Reddit	Post	Portfolio screenshot	0	57113	3076	2	0,0627532	-0,334982041	-0,237877955
14-gen-21	Reddit	Post	Portfolio screenshot	0	27470	1547	3	-0,120807234	0,0627532	-0,334982041
15-gen-21	-	-	-	-	-	-	2	-0,322277257	-0,120807234	0,0627532
16-gen-21	-	-	-	-	-	-	1	-0,334982041	-0,322277257	-0,120807234
17-gen-21	-	-	-	-	-	-	1	-0,334982041	-0,334982041	-0,322277257
18-gen-21	-	-	-	-	-	-	1	-0,334982041	-0,334982041	-0,334982041
19-gen-21	Reddit	Post	Portfolio screenshot	0	44561	1555	3	-0,053899462	-0,334982041	-0,334982041
20-gen-21	-	-	-	-	-	-	3	-0,309572473	-0,053899462	-0,334982041
21-gen-21	-	-	-	-	-	-	3	-0,309572473	-0,309572473	-0,053899462
22-gen-21	Reddit	Post	Portfolio screenshot	0	96770	6080	7	0,439591444	-0,309572473	-0,309572473
23-gen-21	-	-	-	-	-	-	3	-0,309572473	0,439591444	-0,309572473
24-gen-21	-	-	-	-	-	-	2	-0,322277257	-0,309572473	0,439591444
25-gen-21	Reddit	Post	Portfolio screenshot	0	87593	5313	16	0,477626706	-0,322277257	-0,309572473
26-gen-21	Reddit	Post	Portfolio screenshot	0	140372	9273	24	0,994239886	0,477626706	-0,322277257
27-gen-21	Reddit	Post	Portfolio screenshot	0	219149	14579	58	2,013574563	0,994239886	0,477626706
28-gen-21	Reddit	Post	Portfolio screenshot	0	301883	22916	100	3,310417906	2,013574563	0,994239886
29-gen-21	Reddit	Post	Portfolio screenshot	0	265560	19826	99	2,992814794	3,310417906	2,013574563
30-gen-21	-	-	-	-	-	-	33	0,071571054	2,992814794	3,310417906
31-gen-21	-	-	-	-	-	-	18	-0,119000709	0,071571054	2,992814794
01-feb-21	Reddit	Post	Portfolio screenshot	0	217872	17991	61	2,227371192	-0,119000709	0,071571054
02-feb-21	Reddit	Post	Portfolio screenshot	0	162005	17325	66	2,038310109	2,227371192	-0,119000709
03-feb-21	Reddit	Post	Portfolio screenshot	0	148265	9922	51	1,402334518	2,038310109	2,227371192
04-feb-21	-	-	-	-	-	-	37	0,122390191	1,402334518	2,038310109
05-feb-21	-	-	-	-	-	-	34	0,084275838	0,122390191	1,402334518
06-feb-21	-	-	-	-	-	-	11	-0,207934199	0,084275838	0,122390191
07-feb-21	-	-	-	-	-	-	6	-0,27145812	-0,207934199	0,084275838
08-feb-21	-	-	-	-	-	-	17	-0,131705493	-0,27145812	-0,207934199
09-feb-21	-	-	-	-	-	-	16	-0,144410278	-0,131705493	-0,27145812
10-feb-21	-	-	-	-	-	-	13	-0,18252463	-0,144410278	-0,131705493
11-feb-21	-	-	-	-	-	-	9	-0,233343767	-0,18252463	-0,144410278
12-feb-21	-	-	-	-	-	-	8	-0,246048551	-0,233343767	-0,18252463
13-feb-21	-	-	-	-	-	-	3	-0,309572473	-0,246048551	-0,233343767
14-feb-21	-	-	-	-	-	-	2	-0,322277257	-0,309572473	-0,246048551
15-feb-21	-	-	-	-	-	-	4	-0,296867688	-0,322277257	-0,309572473
16-feb-21	-	-	-	-	-	-	6	-0,27145812	-0,296867688	-0,322277257
17-feb-21	-	-	-	-	-	-	5	-0,284162904	-0,27145812	-0,296867688
18-feb-21	-	-	-	-	-	-	6	-0,27145812	-0,284162904	-0,27145812
19-feb-21	Reddit	Post	Portfolio screenshot	0	225067	12828	5	1,270534638	-0,27145812	-0,284162904
20-feb-21	-	-	-	-	-	-	3	-0,309572473	1,270534638	-0,27145812
21-feb-21	-	-	-	-	-	-	2	-0,322277257	-0,309572473	1,270534638
22-feb-21	-	-	-	-	-	-	7	-0,258753336	-0,322277257	-0,309572473
23-feb-21	-	-	-	-	-	-	7	-0,258753336	-0,258753336	-0,322277257
24-feb-21	-	-	-	-	-	-	17	-0,131705493	-0,258753336	-0,258753336
25-feb-21	-	-	-	-	-	-	49	0,274847602	-0,131705493	-0,258753336
26-feb-21	Reddit	Post	Portfolio screenshot	0	151039	7613	28	0,998664368	0,274847602	-0,131705493
27-feb-21	-	-	-	-	-	-	7	-0,258753336	0,998664368	0,274847602
28-feb-21	-	-	-	-	-	-	4	-0,296867688	-0,258753336	0,998664368

Table 4.1 A - Social Data and Noise Index (complete sample, 1 December 2020 – 28 February 2021).

Date	GME Close P	GME Ret	SP500 Close P	SP500 Ret	Abnormal Return	Volume (million shares)	Volatility_5d	Short Interest (absolute)	Average volume 3d	Days-to-Cover
01-dic-20	3,95	-	3662,4	-	-	50660000	-			
02-dic-20	4,14	0,0481	3.669,0	0,0018	0,046299169	31530000	-			
03-dic-20	4,03	-0,0266	3666,7	-0,0006	-0,025943175	25180000	-			
04-dic-20	4,22	0,0471	3699,1	0,0088	0,038310119	35890000	-			
07-dic-20	4,09	-0,0308	3692	-0,0019	-0,028886301	29550000	-			
08-dic-20	4,24	0,0367	3702,2	0,0028	0,033912086	64480000	63,62%			
09-dic-20	3,41	-0,1958	3672,8	-0,0079	-0,187813493	97430000	154,34%			
10-dic-20	3,53	0,0352	3668,1	-0,0013	0,036470293	30240000	162,20%			
11-dic-20	3,33	-0,0567	3663,5	-0,0013	-0,055403169	29990000	150,87%			
14-dic-20	3,18	-0,0450	3647,5	-0,0044	-0,040677637	40030000	150,52%			
15-dic-20	3,46	0,0881	3694,6	0,0129	0,07513736	32770000	171,12%	68127116	34263333,33	1,988338827
16-dic-20	3,46	0,0000	3701,2	0,0018	-0,001786391	23460000	94,38%			
17-dic-20	3,71	0,0723	3722,5	0,0058	0,066499445	32780000	105,08%			
18-dic-20	3,91	0,0539	3709,4	-0,0035	0,057427496	66480000	87,62%			
21-dic-20	3,88	-0,0077	3694,9	-0,0039	-0,003763646	39500000	68,31%			
22-dic-20	4,86	0,2526	3687,3	-0,0021	0,254634209	122750000	167,33%			
23-dic-20	5,14	0,0576	3690	0,0007	0,056880926	103320000	155,83%			
24-dic-20	5,04	-0,0195	3703,1	0,0036	-0,023005388	25050000	173,44%			
28-dic-20	5,25	0,0417	3735,4	0,0087	0,032944245	35860000	174,26%			
29-dic-20	4,84	-0,0781	3727	-0,0022	-0,075846483	36970000	198,26%			
30-dic-20	4,82	-0,0041	3732	0,0013	-0,005473793	23740000	85,30%			
31-dic-20	4,71	-0,0228	3756,1	0,0065	-0,02927924	27690000	68,18%	71196206	29466666,67	2,416160837
04-gen-21	4,31	-0,0849	3700,7	-0,0147	-0,070176349	40090000	83,95%			
05-gen-21	4,34	0,0070	3726,9	0,0071	-0,000119185	19850000	67,34%			
06-gen-21	4,59	0,0576	3748,1	0,0057	0,051915313	24220000	81,99%			
07-gen-21	4,52	-0,0153	3803,8	0,0149	-0,030111407	24520000	81,91%			
08-gen-21	4,42	-0,0221	3824,7	0,0055	-0,027618399	25930000	81,85%			
11-gen-21	4,99	0,1290	3799,6	-0,0066	0,135521882	59710000	99,90%			
12-gen-21	4,99	0,0000	3801,2	0,0004	-0,000421097	28240000	101,08%			
13-gen-21	7,85	0,5731	3809,8	0,0023	0,570883849	578010000	402,75%			
14-gen-21	9,98	0,2713	3795,5	-0,0038	0,275091057	374870000	387,42%			
15-gen-21	8,88	-0,1102	3768,2	-0,0072	-0,103027713	187470000	421,40%	61782730	380116666,7	0,16253623
19-gen-21	9,84	0,1081	3798,9	0,0081	0,099960982	298890000	423,02%			
20-gen-21	9,78	-0,0061	3851,8	0,0139	-0,020022645	133890000	424,57%			
21-gen-21	10,76	0,1002	3853,1	0,0003	0,099866994	228320000	226,09%			
22-gen-21	16,25	0,5102	3841,5	-0,0030	0,513233611	788630000	373,73%			
25-gen-21	19,2	0,1815	3855,4	0,0036	0,177920083	711500000	312,70%			
26-gen-21	36,99	0,9266	3849,6	-0,0015	0,928066883	714350000	602,08%			
27-gen-21	86,88	1,3487	3750,8	-0,0257	1,374407908	373590000	832,21%			
28-gen-21	48,4	-0,4429	3787,4	0,0098	-0,452667679	235260000	1092,00%			
29-gen-21	81,25	0,6787	3714,2	-0,0193	0,698046251	202260000	1099,05%	21409004	270370000	0,079184096
01-feb-21	56,25	-0,3077	3773,9	0,0161	-0,323765756	149530000	1244,43%			
02-feb-21	22,5	-0,6000	3826,3	0,0139	-0,613884841	312730000	1337,37%			
03-feb-21	23,1	0,0267	3830,2	0,0010	0,025647405	170790000	805,13%			
04-feb-21	13,38	-0,4208	3871,7	0,0108	-0,431614164	249710000	799,83%			
05-feb-21	15,94	0,1913	3886,8	0,0039	0,187430248	325380000	515,87%			
08-feb-21	15	-0,0590	3915,6	0,0074	-0,066380836	102750000	520,07%			
09-feb-21	12,58	-0,1613	3911,2	-0,0011	-0,160209623	107370000	362,06%			
10-feb-21	12,8	0,0175	3909,9	-0,0003	0,017820455	145820000	360,34%			
11-feb-21	12,77	-0,0023	3916,4	0,0017	-0,004006197	52230000	204,51%			
12-feb-21	13,1	0,0258	3934,8	0,0047	0,021143625	58290000	123,10%	16468038	85446666,67	0,192728852
16-feb-21	12,38	-0,0550	3932,6	-0,0006	-0,054402719	32700000	122,66%			
17-feb-21	11,48	-0,0727	3931,3	-0,0003	-0,07236733	37040000	70,02%			
18-feb-21	10,17	-0,1141	3914	-0,0044	-0,109710918	95960000	88,64%			
19-feb-21	10,15	-0,0020	3906,7	-0,0019	-0,000101469	59310000	88,75%			
22-feb-21	11,5	0,1330	3876,5	-0,0077	0,140735236	77900000	151,78%			
23-feb-21	11,24	-0,0226	3881,4	0,0013	-0,023872722	30260000	149,09%			
24-feb-21	22,93	1,0400	3925,4	0,0113	1,028699471	332450000	752,54%			
25-feb-21	27,18	0,1853	3829,3	-0,0245	0,209828289	601240000	700,29%			
26-feb-21	25,43	-0,0644	3811,2	-0,0047	-0,059658865	368780000	716,59%	14200138	434156666,7	0,032707405

Table 4.2 A - Extract of financial data on GameStop (complete sample)