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The Impact of Retail Trading Apps on Market Liquidity and Stock Price Volatility

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ABSTRACT:
This thesis investigates the impact of mobile-first, gamified retail trading platforms (for example, Robinhood) on market liquidity and stock price volatility. Against the backdrop of surging retail investor participation, it synthesizes academic research, behavioral finance theories, and empirical analyses to examine how these platforms influence market dynamics. The study is comprehensive literature review to assess changes in liquidity and volatility. Regulatory and policy perspectives are also explored to contextualize these developments within the broader financial ecosystem. Findings made indicate that retail trading apps have democratized market access and, under stable market conditions, have contributed positively to overall liquidity. However, the results also suggest that during episodes of speculative or herd-driven trading, these platforms can increase price volatility. Overall, the study highlights a nuanced dual effect: retail trading apps enhance market participation and liquidity on one hand, while raising volatility risks on the other. This thesis undescores the need for balanced regulatory frameworks. This comprehensive assessment shines light on the evolving role of individual investors in market stability and informs debates on regulatory policy.

KEYWORDS: Retail trading apps, Market liquidity, Stock price volatility, Behavioral finance, Payment for order flow, Meme stocks

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1 Introduction

Retail trading apps, such as Robinhood, Webull, and E-Trade, have transformed the way retail investors can trade in the 21st century. These mobile-first apps enable individual investors to trade stocks, options, and other financial instruments directly from smartphones. Robinhood was the first brokerage to enable zero-commission trading conveniently on smartphones (Barber et al., 2021). Offering features like real-time market data, fractional shares, leverage, cryptocurrency trading, and zero-commission trades, retail investors have transitioned away from traditional banks and brokers that prioritize desktop interfaces.

The rise of retail trading and financial awareness, especially after Covid-19 pandemic, has grown the influence of social media platforms such X (prev. Twitter) and Reddit's WallStreetBets. These media platforms have created a platform for launching for new trends, groups and financial influencers. Democratizing access to trading in financial markets, retail trading apps have expanded the role of retail investors as a market participants. Social media has also enabled retail traders to have collective actions, which can disproportionately influence prices, particularly for "meme stocks" such as GameStop and AMC. Coordinated buying done by retail traders can inject significant short-term liquidity and cause episodic bubbles and subsequent corrections. Notably targeting high short-interest stocks as seen in the meme stock bubble (Allen et al., 2023). Furthermore, Kalda et al. (2021) find the ease of performing trades on smartphones increases the probability of executing trades on lottery-type stocks by 67 %. Hence, the introduction of retail trading apps increases market liquidity and stock price volatility.

Market liquidity has experienced dual effects. The influx of retail participants has improved trading volumes and liquidity in the U.S markets (Abudy, 2020). The concentration of retail trading to specific stocks, however, has led to liquidity fragmentation (Hüfner et al., 2022). This highlights the importance of market makers. Additionally, we need to evaluate how the rise of accessible retail trading effects market

efficiency and stability. Retail trading apps have expanded investment opportunities to a wider audience and increased liquidity in specific markets, they also carry notable risks and limitations. Their gamified design and connection with social media have decreased returns for retail traders and increased volatility as well as systemic risks (Yelagin, 2024). By examining recent studies, this thesis explores the impact of retail trading apps on market liquidity and stock price volatility.

1.1 Purpose of the Study

The purpose of this thesis is to examine existing academic research on the impact of retail trading apps has on financial markets. This thesis examines market liquidity and stock price volatility, analyzing theoretical frameworks, academic research, and regulatory insights. Evaluating whether gamified trading platforms, mainly Robinhood, improve market efficiency or amplify systemic risks through speculative trading and herd behavior. Therefore, the first hypothesis is:

H1: Retail trading apps improve baseline liquidity in retail-favored stocks.

I will categorize key themes, including the role of zero-commission trading, social media, and behavioral biases. Covering retail investors' influence on liquidity provisioning and the impact on volatility dynamics. Additionally, I identify possible gaps in the literature. Such as the long-term effects of retail-driven liquidity fragmentation and the adequacy of existing regulatory frameworks in addressing platform-induced market instability. Coupled with the rise of social media communities, these apps have amplified retail investors' collective influence on market dynamics. Especially during events like the 2021 meme stock frenzy. However, their impact on market liquidity and stock price volatility remains contested. Hence, the second hypothesis is:

H2: The gamified features of retail apps and social media-driven trading increase stock price volatility.

The hypotheses are based on existing literature that mainly characterizes retail investors as noise traders prone to behavioral biases such as herding and overconfidence. These tendencies often lead to suboptimal returns compared to institutional traders (Barber et al., 2021). This framework motivates examining how these biases, amplified by gamified trading apps and social media, manifest in distinct price movements for retail-favored stocks. Covering also effects on returns and the difference between retail to retail and retail to institution trades. Thesis will analyze studies about how and why retail investors influence liquidity and volatility. With attention also on price discovery side and whether democratized retail participation distorts market efficiency through speculative trading.

1.2 Structure of the study

This thesis is structured into seven chapters. Chapter one introduces the study's purpose, context, and core hypotheses. Chapter two reviews key market participants, market makers, institutional investors, and retail investors. Chapter explains how their interactions shape liquidity, price discovery, and mechanisms such as payment-for-order-flow (PFOF). Chapter three examines retail trading apps, tracing their evolution, particularly after COVID-19, and addressing the regulatory landscape, market surveillance tools, and compliance challenges. Chapter four incorporates behavioral finance concepts like herding and the greater-fool theory to contextualize retail investor decision-making and collective behavior. Chapter five explores market dynamics, focusing on microstructure and transaction costs as a basis for evaluating trading apps' influence on market operations. Chapter six, the core analysis, synthesizes evidence to assess the hypotheses, showing how retail apps affect liquidity, volatility, leverage, and information efficiency, while integrating theory with recent empirical studies. Chapter seven concludes by summarizing findings, discussing implications for stability and regulation, and highlighting future research directions.

2 Market participants

In financial markets, numerous participants play a fundamental role in shaping price formation, liquidity, and overall market stability. The complex interactions between these entities influence market efficiency, promoting either stability or volatility (see Figure 1). A thorough understanding of these various actors is essential for understanding the market dynamics and its implications on retail trading apps. In this thesis however, we are not going to cover all the participants in detail, as their role related to retail trading apps is less significant.

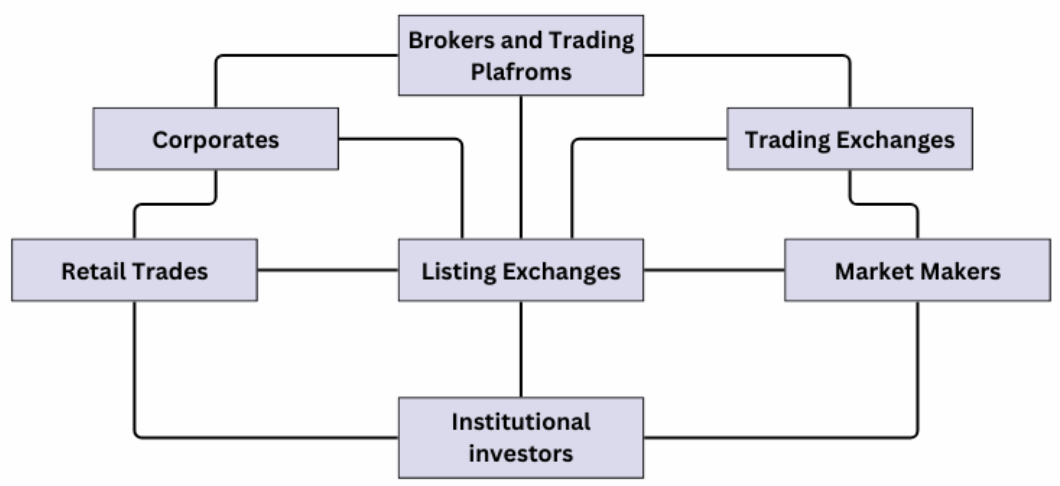

Figure 1 Market participants (Investor.gov, 2025)

Institutional investors, including hedge funds, asset managers, mutual funds, pension funds, and insurance companies, serve as cornerstone entities within financial markets. With the primary objective of managing large capital, these investors adopt strategic investment approaches to optimize long-term returns (Fama, 1970). According to Fama institutional investors are still unable to beat the market long term. Their large-scale operations exert a deep influence on the market. Higher institutional ownership is associated with more efficient price discovery, indicating that institutional investors play an important role in incorporating information into prices (Chen et al., 2015). According to Chen firms make calculated decisions based on in-depth research. The strategies are often guided by quantitative modeling, and macroeconomic indicators, allowing for a

comprehensive approach to capital allocation. They utilize complex trading algorithms and data-driven decision-making rather than do reactive decisions.

In contrast, retail investors who engage in the market individually, typically participate in short-term speculative trading and are frequently influenced by behavioral biases (Barber et al., 2021; Eaton et al., 2022). Lacking the extensive resources and expertise of institutional investors, these individuals often employ less-informed trading strategies. The evolution of retail trading applications has increased market accessibility for average people, leading to greater participation and an enhanced influence on stock price volatility and liquidity. However, previously trading behaviors characterized by herding tendencies and momentum chasing have contributed to and the formation of speculative bubbles (Greenwood & Nagel, 2009).

Market makers, including high-frequency trading (HFT) firms, play a pivotal role in maintaining liquidity and facilitating efficient price discovery. Market makers continuously quote bid and ask prices and enable seamless transactions with reduction in price disruptions. Thereby enhancing overall market efficiency (Menkveld, 2013). The dominance of algorithmic trading in modern markets has further strengthened the role of HFT firms. While their presence supports liquidity under normal conditions, excessive reliance on algorithmic strategies can amplify volatility during periods of market stress. Menkveld (2013) points out that in 2012 HFT firm Knight Capital almost collapsed after a $440 million loss in less than an hour due to faulty HFT software.

Regulatory bodies, such as the U.S. Securities and Exchange Commission (SEC), oversee market participants to ensure fairness, transparency, and financial stability. These organizations enforce policies to prevent market manipulation, insider trading, and systemic risks. Mechanisms such as circuit breakers and trading halts are implemented to mitigate excessive volatility and maintain orderly market operations (Subrahmanyam, 2013). As financial markets continue to evolve, regulatory frameworks must adapt to emerging challenges. These include the advancements in algorithmic trading and the rise

of decentralized finance. A thorough understanding of market participants and their interactions provides a good foundation to understand the implications of retail trading and new fintech platforms.

2.1 Market Makers

In modern markets, the role of market makers has grown increasingly. For instance, during the 2021 meme stock phenomenon, coordinated retail buying overwhelmed traditional liquidity provisioning mechanisms (Harren, 2024). This forced the market makers to contend with unprecedented order flow imbalances and fragmented liquidity. Modern market makers such as Citadel, Virtu Financial, and Jane Street mostly employ algorithmic strategies. Firms use real-time data and machine learning to optimize pricing, manage inventory risk, and mitigate adverse selection (Menkveld, 2013; Subrahmanyam, 2013). With efficient quotes, traders can't exploit the pricing inefficiencies.

Market makers provide and sustain liquidity, enabling the operation of trading platforms. By continuously providing bid and ask quotes, they ensure instant trade execution for smaller investors, particularly in securities with limited natural buyer-seller parity (Harren, 2024; Eaton et al., 2021). Market makers absorb the order flow imbalances by maintaining inventory and profiting from the bid-ask spread. Without market makers, buyers and sellers would not be perfectly synchronized and, as a result, there may be no counterparties available when traders demand liquidity (Venkataraman & Waisburd, 2005). By updating price quotes in response to real-time supply and demand, market makers contribute to efficient price formation. As noted by Fama (1970), in efficient markets, when new information is released, prices will adapt to reflect all available information. These events include for example, earnings announcements and inflation data.

2.1.1 Payment for order flow

The rise in popularity of retail trading apps has altered market dynamics by increasing retail investor participation. From the perspective of this thesis, it is essential to understand the factors that have enabled the rise of retail trading applications. These companies must cover the cost of commission-free trading. As noted by Eaton et al. (2021) commission-free trading is reliant on payment for order flow (PFOF), where liquidity-providing HFTs pay retail brokers a fee for the ability to act as market maker on their orders off-exchange. According to Seth (2020) Robinhood received payment-for-order-flow from five different companies in 2019, an average of $0.00026 per trade, or $0.50 per trade for options contracts. As of 2020, over 75% of its total revenue came from market makers (Sack & Roantree, 2021). PFOF arrangement, detailed in studies like Bryzgalova et al. (2023), has enabled a surge in retail trading, with PFOF becoming a key revenue stream for the companies. Market makers use the less informed payment order flow to earn a profit by capturing the spread between the bid price and offer price (Sack & Roantree, 2021). However, Hu and Murphy (2024) highlight that during the high volatility 'meme stock" events, concentrated retail order flow can become highly impactful. Causing significant challenges for market makers in managing volatility and potential losses.

The relationship between retail trading platforms that utilize PFOF and market makers, introduces fundamental conflict of interest. According to Ernst and Spatt (2023), retail market making is concentrated, with the top two firms holding 60% market share in both equity and option markets. Research shows mixed results in terms of costs benefits for retail traders. Retail brokers who collect PFOF revenues may prioritize routing orders through the market makers that offer the highest rebates rather than those who prove the best execution prices. This arrangement is worsened during periods of high volatility, such as the 2021 meme stock phenomenon as mentioned earlier. In 2020, the SEC charged Robinhood for failing to disclose PFOF-related conflicts of interest, which led to $34.1 million in combined losses for retail investors (SEC, 2020). Empirical evidence from European regulators strengthens this argument. Spain's CNMV states (2022) that PFOF

often results in worse execution prices. According to their research, 86% of PFOF-executed trades underperformed compared to alternative trades, with an average trade price €1.09 higher per €1,000 traded. However, some studies also argue that retail traders may receive narrower bid-ask spreads than traditional exchanges, mostly in high-liquidity securities. Suggesting that off-exchange executions by wholesalers provide cost savings to retail investors (Dyhrberg et al., 2025).

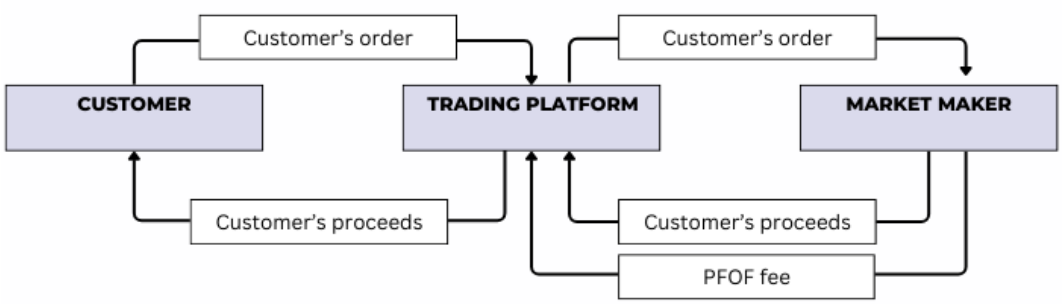

Figure 2 Payment for order flow process

These findings highlight the complicated relationship between trading platforms' profit motives and their obligation to secure best possible execution price. Conflict that regulatory bodies like the EU have wanted to resolve by banning PFOF entirely by 2026 (European Securities & Markets Authority, 2024). Proponents argue that PFOF subsidizes zero-commission trading, democratizing market access for retail traders despite potential hidden costs.

2.2 Institutional Investors

Institutional investors are among the most significant actors in modern financial markets, yet they are hard to define with a single, universally accepted definition. Institutional investors play a vital role in understanding the broader market implications of retail trading platforms, a central focus of this thesis. Their diversity is evident: while most manage significant funds on behalf of clients, investment objectives vary greatly with different regulatory constraints and operational approaches. Institutional investors usually include hedge funds, mutual funds, insurance companies, and pension funds.

Institutional investors have seen a sharp rise in assets under management and trading activity over the past century (Kelley, 2005).

These investors differ meaningfully from retail investors, who trade individually for personal gain. Institutional investors leverage significant resources, sophisticated strategies, and extensive market analysis to optimize long-term returns. Kelley (2009) notes that assets with larger institutional ownership are priced more efficiently. With large capital, institutional investors greatly impact market dynamics, including liquidity and price volatility. Kelley (2007) also states that institutional trades are likely to supply liquidity because institutions trade in the opposite direction of the market.

Having significant capital to manage, their trading is often executed in blocks, which can significantly alter market liquidity. Research by Rubin (2007) suggests that higher institutional ownership enhances liquidity. This is demonstrated by narrower bid-ask spreads and increased market depth (Rubin, 2007). This occurs because their large frequent trades attract additional market activity, allowing for better price discovery. However, the relationship is nuanced; large trades can also temporarily reduce liquidity by exerting price pressure, particularly in less liquid stocks (Kini & Mian, 1995).

Research suggests that institutional investors help align prices with fundamental values over time by arbitraging away price discrepancies and exploiting information advantage. Institutional investors also often have private access to information inside the companies and market participants, which can raise concerns about favored treatment.

Institutional investors also contribute to efficient capital allocation by channeling large pools of capital toward productive investment and shorting companies they find overvalued. Through activities such as participating in IPOs, purchasing corporate bonds, or taking equity stakes, these investors supply firms with funding for operations and growth. This process can lower the cost of capital for companies with strong

fundamentals, as informed institutional trading drives their prices up toward fair value (Piacentino, 2012).

Despite their generally positive influence on efficiency, there is debate over whether institutional investors stabilize or amplify market volatility. On one hand, the significant capital and long-term orientation can provide a stabilizing force. Many institutions, such as pension funds are contrarian in nature. Trying to buy undervalued assets and sell overpriced ones, which counteracts price swings. Research on mutual fund herding finds that even when institutions trade in the same direction, it often moves prices in a stabilizing manner, bringing prices closer to fundamentals rather than away (Wermers, 1999).

2.3 Retail Investors

Retail investors, also known as individual investors, are non-professional market participants who trade securities for their personal accounts. Unlike institutional investors who manage significant sums of capital, retail investors typically transact in smaller volumes and invest their own funds (Investopedia, 2024). In regulatory terms, retail investors are defined as natural persons investing for personal or household purposes, distinguishing them from professional or institutional clients (U.S. Securities and Exchange Commission, 2021). Retail investors are seen as uninformed, overconfident investors with poor risk management and ability to destabilize the financial market (Grinblatt & Keloharju, (2009); Barber & Odean, (2011)). With the rise of commission-free trading platforms and mobile-based brokerage services, the influence of retail investors on market liquidity and price discovery has grown. This growing influence is a key focus of this thesis.

Historically, ownership of securities has been relatively diversified. In the 1950s, retail investors owned over 90 % of US listed stocks (Davis, 2009). Davis also states that in 2010s, retail investors owned directly less than 30 % of US stocks, showing significant decrease in direct retail ownership. However, the rise of retail trading apps, such as

Robinhood and Trading212, may reverse the trend. With lowering barriers to entry and enabling real-time engagement with financial markets, this shift has intensified discussions on the role of retail investors for market volatility. Particularly in instances of collective action driven by social media discussions and algorithmic trading (Barber et al., 2021). Additionally, Pagano et al. (2021) suggests that the surge in retail investor participation has altered traditional market dynamics in destabilizing manner. Straining liquidity provision and the overall efficiency of price formation.

Retail investors are a highly diverse group, ranging from casual participants who invest in mutual funds and exchange-traded funds (ETFs) to active traders who frequently buy and sell stocks, leveraged ETFs, options, and cryptocurrencies. Retail investor's motivation to participate varies greatly. Ranging from long-term wealth accumulation, passive income generation, and speculative trading to engagement in financial markets as a form of entertainment. Last of which rose again in popularity during the Covid-19 pandemic, as people had more free time and money to speculate in the financial markets. Financial research suggests that retail investors often show cognitive biases, such as overconfidence, herd behavior, and loss aversion. All of which can lead to suboptimal investment decisions and heightened market volatility (Barber & Odean, 2013).

One of the defining characteristics of modern retail investing is its increasing reliance on digital platforms. The shift from traditional brokerage services to mobile-based apps has reduced costs, improved accessibility, and accelerated transaction speeds. These advancements have also introduced new challenges, including increased exposure to market manipulation, misinformation, and the psychological effects of constant trading availability. The role of social media in influencing retail investor behavior has become particularly noticeable. With platforms such as X, Reddit's WallStreetBets, and TikTok serving as key channels for market sentiment and investment trends, retail investors even deliberately participate in pump and dump schemes (Warkulat & Pelster, 2024).

This rapid increase of retail trading applications has fundamentally transformed financial market behavior, creating both opportunities and challenges for market participants. As financial markets continue to evolve, understanding the implications of retail trading apps on market stability becomes essential.

3 Retail Trading Apps

The term retail trading apps describes retail trading platforms that are accessible from smartphones. The mobile-first user face allows individuals to buy and sell stocks and other securities with ease. Tierney (2022) noted that retail trading apps often gamify the trading experience. This means that they use design elements like simplified graphics, celebratory animations, leaderboards and push notifications promoting users to trade. He also states that gamified features can encourage excessive trading, and platforms learn what prompts people to trade excessively. In Malhotras (2020) study of popular mobile brokers, she found that ease of app usage was the most important feature in attracting retail investors. Above even the quality of investment information or security features. In short, retail trading apps are designed to democratize finance, but they also intentionally engage users to keep them trading actively. Empirical evidence shows that this leads to an increase in trading volumes.

3.1 History and evolution post Covid-19

Fintech has emerged as a significant and disruptive force in the global financial sector, driven by technological advancements and evolving consumer expectations, particularly since the 2008 financial crisis (Lee & Shin, 2018; Gempesaw et al., 2022). Robinhood was launched in 2013, which pioneered the zero-commission model and started leveraging mobile-first design and behavioral nudges (e.g., confetti animations for trades) to attract first-time investors. Competitors followed closely, integrating social features such as community-driven stock picks and real-time sentiment tracking. This shift also reflected other broader societal trends: the gamification of finance, and the rise of fintech. Retail investor trading volume has also been increasing from 10% of domestic equity trading in 2010 to 23% in 2021 (Gempesaw et al., 2022)

The democratization of financial markets has been a steady process, evolving from the exclusivity of 19th-century stock exchanges to the digital inclusivity of the 21st century. As outlined earlier, retail investor participation surged in the mid-20th century with the

rise of mutual funds and pension systems (Lounsbury & Glynn, 2001). However, the true inflection point arrived in the 2010s with the arrival of commission-free trading apps. These platforms removed traditional barriers such as high fees, complex interfaces, and informational asymmetry. Major U.S. brokers saw customer trading volumes jump by 20–40% immediately after adopting zero-commission models (Greenwich Associates, 2020).

The popularity of trading apps significantly rose during the Covid-19 pandemic. As stated earlier, eliminating trading commissions in these trading apps has encouraged more frequent trading. It is no coincidence that retail trading apps became a household phenomenon during the COVID-19 pandemic, when people had more free time and money. In Q2 2021 Robinhood saw a monthly active user (MAU) growth of 109 % to 21.2 million users (SEC, 2021). During the covid-19 pandemics, governments and central banks around the world injected liquidity to markets and stimulus to consumers. For example, the United States disbursed over $800 billion in direct payments. A recent study estimates that roughly $100 billion of U.S. stimulus checks was invested in stocks, helping fuel the 2020–2021 retail trading boom (Greenwood et al., 2022).

3.2 Regulatory Landscape and Market Surveillance

As covered before in this thesis, the rise of retail trading has had its negative implications too. In January 2025, the SEC announced that Robinhood needed to pay $45 million in penalties to settle charges of violating over ten securities law provisions (SEC, 2025). The violations included failures in suspicious activity reporting, identity theft protection, cybersecurity, recordkeeping, and compliance with short-sale regulations. This incident shows the importance of robust compliance and regulatory oversight (SEC, 2025). The primary purpose for regulating trading platforms is to safeguard investors' interests. However as covered later, studies argue that this is not the case. Regulatory agencies have started employing advanced data analytics and surveillance tools to examine trading patterns to detect anomalous order flows (Di Maggio et al., 2021). These tools enable regulators to identify potential market manipulation and other forms of

misconduct more effectively. Global organizations such as the International Organization of Securities Commissions (IOSCO) have highlighted the importance of robust market surveillance and the adaptation of regulatory frameworks to the digital trading environment (IOSCO, 2022).

Regulators monitor retail trading apps also for abusing behavioral weaknesses, which can lead to outcomes that harm investors and potentially disturb the markets. U.S regulatory bodies such as the SEC and the Financial Industry Regulatory Authority (FINRA) have strengthened their scrutiny of digital engagement practices (DEPs) deployed by brokerages. In 2021, SEC began examining the effects of DEPs in 2021 (Boldt, 2023; SEC Investor Advisory Committee, 2023). Motivated by concerns that gamification elements, such as celebratory animations, push notifications, and leaderboards could unconsciously prompt excessive trading and risk-taking (Boldt, 2023; SEC Investor Advisory Committee, 2023). Boldt (2023) further suggests that integrating financial education tools within these digital interfaces may serve as an effective solution to mitigate such risks.

As highlighted by the IOSCO (2013) the designs and incentive structures within financial markets can influence participant behavior. Leading to increased risk and market vulnerabilities. The IOSCO (2013) Securities Markets Risk Outlook underscores the importance of understanding how new technologies, incentive mechanisms, and behavioral factors that can affect trading patterns and decision-making. With new fintech innovations, the SEC, FINRA, and international agencies are actively establishing new rules and surveillance measures. This effort is essential to maintain a balance between innovation, investor protection, and market stability (IOSCO, 2013).

4 Behavioral finance

While the efficient market hypothesis and modern portfolio theory provide a solid framework for financial markets, observations can reveal inconsistencies. Behavioral finance tries to address gaps in existing theories by adding psychological insights to the mix, recognizing that all investors are shaped by cognitive biases and emotions. Empirical studies show that retail investors trade excessively and, as a result, earn lower net returns than a simple buy-and-hold strategy. Inghelbrecht and Tedde (2024) find that overconfident retail investors tend to trade more frequently. However, they don't discover evidence to support that overconfident investors perform worse than rational investors. Despite that, Barber and Odean (2013) argue that undervalued stocks deliver superior future returns, and retail investors tend to be net buyers of stocks with high prices relative to fundamental value. They also note that systematic biases, such as the disposition effect, familiarity bias, and overprovision, tend to make investors sell winners too quickly and hold losers too long.

Traditional utility theory assumes that individuals show consistent risk aversion. In contrast, prospect theory suggests that people evaluate potential outcomes relative to a reference point, often the purchase price, and display loss aversion. This means that traders view losses as psychologically more impactful than equivalent gains. This asymmetry can cause investors to retain losing stocks too long in hopes of avoiding realized losses. The theory also includes prematurely selling of winning stocks to secure gains. This behavior is known as the disposition effect as identified by Shefrin and Statman (1985) and further explored by Odean (1998). Social media platforms have amplified this effect, as retail traders are drawn into collective actions and strategies (Pelster & Gonzalez, 2016). One of which is known as "diamond hands," which encourage holding volatile positions regardless of market stresses. These online platforms foster overconfidence and exposure to fear of missing out (FOMO). Leading investors to overestimate their ability to trade and interpret information (Pelster & Gonzalez, 2016). This overconfidence further distorts decision-making.

Daniel et al. (1998) argue that overconfidence drives under- and overreactions to news. For instance, during the 2021 AMC stock frenzy, retail traders dismissed fundamentals, relying instead on collective narratives broadcasted through Reddit and Twitter. Participants of this phenomenon called themself “Apes”.

Retail traders often use mental shortcuts and simplifications to compile complex information, but this can lead to predictable mistakes. For example, Barberis et al. (1998) note that the representativeness heuristic can lead investors to rely on stereotypes. Occasionally this causes them to overreact to a short period of strong performance by assuming a company is fundamentally sound. This overconfidence can cause investors to overestimate the accuracy of their private information (Daniel et al., 1998). They find that this can cause them to overweight their own findings and trade excessively, contributing to market overreactions and increased volatility. Similarly, anchoring bias can lead investors to give too much weight to an initial piece of data, such as the starting price (Cen et al., 2010).

These individual-level biases do not necessarily cancel out in aggregate and can have market-level implications. Barber et al. (2021) define herding as a situation where the number of traders owning the same stock increases considerably. They conclude that in Robinhood, herding episodes are predicted by different attention measures, such as returns, volume, and short interest. This herding behavior can amplify market movements and contribute to bubbles or crashes. While retail trading apps can lower barriers to entry and increase market participation, it can also exacerbate behavioral biases. (Kalda, 2021) found that ease of executing trades with a few taps on a smartphone may encourage more impulsive System 1 thinking and less deliberative System 2 analysis. Information presented on simplified mobile interfaces inevitably affects traders' limited attention. Potentially leading to concentrated trading in a narrow subset of highly visible stocks and fostering herding behavior (Barber et al., 2021). These

factors can lead to excessive trading based on heard sentiment and incomplete information.

Behavioral biases can be a significant source of price movements that are not justified by changes in fundamental value. Schmitt and Westerhoff (2017) show that herding can lead to imbalanced excess demand, driving price changes and causing high volatility. Market liquidity is also affected with popular stocks having increased liquidity. As mentioned earlier, sudden sentiment-driven shifts in security demand can overwhelm the capacity of market makers, particularly in less liquid securities. This can lead to briefly widened bid-ask spreads or even short periods where liquidity evaporates as market makers step back from uncertainty (Baker & Wurgler, 2006).

Furthermore, the disposition effect can reduce the supply of shares on the market for trading. When investors are reluctant to sell losing stocks, this can influence market depth and liquidity. However, empirical evidence of this specific relationship is less instance. Contrariwise, during panic, which is normally driven by the fear and loss aversion dimensions of the above behaviors, herding can manifest itself as a flight toward perceived safety. Drain in liquidity from the riskier segment of the market towards less risky assets. Therefore, the collective action of behaviorally biassed retail traders, enabled through easy-to-use trading platforms, can contribute to excess volatility and market liquidity.

Explanation of all these behavioral patterns and their implications for the market is particularly relevant given the multiple roles of market participants. The classical explanation is prone to implicitly assuming that individual investors are "noise traders" who fall victim to sentiment and bias. Wheater institutional investors are immune to this is more problematic. As noted by Bebchuk et al. (2017) institutional investors are also managed by people and, therefore, are subject to their own agency problems and potential behavioral biases. They note that incentive structures are one of the key drivers for agency problems with institutional investors. However, sophisticated institutions can

leverage predictable patterns occurring from retail investors' behavioral biases (Daniel et al., 1998).

5 Market Dynamics

Financial markets operate as complex systems that are influenced by the interaction of various forces, including liquidity, volatility, leverage, and efficiency Market dynamics are shaped by participants' behavior, ranging from institutional and retail investors to market makers and regulators. Putri and Tanno (2024) state that regulatory reforms - including reforms to tax policies, financial regulations and monetary policies can influence on market conditions. As retail trading apps lower barriers to market entry, their influence on market dynamics has become more noticeable. Algorithmic trading and high-frequency trading (HFT) have influenced transaction speeds and volumes. While these innovations enhance efficiency and liquidity, they have also sparked concerns regarding market stability and fairness. (Putri & Tanno, 2024).

5.1 Market microstructures and Transaction costs

The rise of retail trading apps has not only influenced market participants' behavior but has also altered the fundamental microstructure of financial markets. A critical aspect of this microstructure is the cost of trading, which directly impacts liquidity and volatility. To fully understand the impact of retail trading apps, it is essential to examine key concepts such as the bid-ask spread, maker-taker fees, and slippage, which can be hidden from retail traders themselves.

The bid-ask spread is the most immediate and visible transaction cost, but still not often visible on the trading apps. It represents the difference between the highest price a buyer is willing to pay (bid) and the lowest price a seller is willing to accept (ask). A narrower spread indicates higher liquidity and lower costs for traders, as they can execute trades closer to the market's true price. Foucault, Pagano, and Roell (2013) highlight that the bid-ask spread compensates market makers for the risks they undertake. Thse can include inventory risks mentioned before and the risk of trading with better-informed counterparts. The influx of retail order flow, particularly through

wholesale market makers via PFOF arrangements, has been shown to narrow spreads for high-volume and liquid stocks. PFOF provides a steady stream of uninformed order flow that market makers can profit from (Sack & Roantree, 2021). However, as Venkataraman and Waisburd (2005) note, during periods of extreme volatility or concentrated buying in specific stocks (e.g., meme stocks), this same order flow can lead to adverse selection. Causing market makers to widen spreads significantly to mitigate potential losses.

As mentioned before the maker-taker fee model is a rebate system used by many exchanges to incentivize liquidity provision. Liquidity "makers" who place limit orders (providing liquidity) typically receive a small rebate, while liquidity "takers" who place market orders (consuming liquidity) pay a fee. This model is essential to understanding the economics of modern exchanges and high-frequency trading (Menkveld, 2013). However, the rise of PFOF in retail trading effectively bypasses this public exchange model. Retail orders are routed to wholesale market makers off-exchange, meaning retail traders are neither makers nor takers in the traditional sense. This has raised concerns that the public price discovery process on exchanges is diminished, as a significant portion of retail order flow is internalized without ever interacting with public limit order books (Ernst & Spatt, 2023).

Slippage refers to the difference between the expected price of a trade and the price at which the trade is executed. It is most common with large market orders or in illiquid markets where a single large order can move the price. For retail traders, slippage can be a hidden cost, especially when engaging in momentum trading or attempting to enter highly volatile stocks. The gamified nature of trading apps can encourage users to use market orders for speed, increasing their exposure to slippage. This happens particularly during the trading sessions driven by social media rallies (Tierney, 2022).

6 The Impact of Retail Trading Apps on Market Liquidity and Stock Price Volatility

The impact of retail trading has been extensively examined in academic literature. However, the implications of the recent surge in retail trading applications on financial markets have not been as thoroughly studied. One reason is the contemporary nature of this phenomenon. The discussion about the topic has grown in recent years as the implications of the apps have become real. While often praised for democratizing finance, this technological and behavioral evolution raises critical questions about its impact on core market functions and stability. Baig et al. (2022) emphasize the importance of stability in financial markets. It plays a vital role in the development of economic activity. With stable markets, capital can be allocated more efficiently, positively effecting the whole economy. This chapter explores the theoretical channels through which these apps might influence markets and their participants, more particularly about market liquidity and stock price volatility.

6.1 Market Liquidity

Market liquidity refers to the ease with which securities can be bought or sold without meaningfully impacting the price (Bianchi et al., 2022). As stated earlier, high liquidity allows for smoother transactions and lower bid-ask spreads, benefiting institutional and retail investors. The rise of retail trading apps has introduced new sources of liquidity, yet concerns remain about the quality and stability of this liquidity. As retail investors often engage in momentum-driven and short-term trading that may create temporary imbalances. Empirical studies suggest that improved retail participation correlates with considerable market liquidity improvements. For instance, by supplementing the order book, Foucault et al. (2011) found that retail order flow reduces bid-ask spreads in less-

followed stocks. Thereby retail trading lowered transaction costs.

Figure 3 Number of Robinhood user positions in S&P 500 stocks and S&P 500 index. (Robintrack, Goldman Sachs Global Investment Research, 2020)

The number of Robinhood users who hold stocks included in the S&P 500 index surged in early 2020. It almost doubled in two months when the S&P 500 index recovered sharply from its March 2020 lows. According to Ozik et al. (2021), in the first two months of 2021, trading activity increased by over 80% in retail-favored trading platforms. Through retail trading apps introduced liquidity when it was most needed, supporting the first hypothesis of this thesis. However, collective actions of retail traders have been linked to liquidity imbalances. According to Barber et al. (2021), brokerage outages on Robinhood affected popular stocks, resulting in a 0.72 basis-point reduction in quoted spreads and a 0.25 basis-point decline in volatility. These results suggest that Robinhood's momentum-driven traders intensify inventory risks for market makers. This is consistent with behavioral models where herding amplifies liquidity fragmentation (Barber et al., 2021). On the contrary, outages at traditional brokers like TD Ameritrade correlated with wider spreads, implying that more sophisticated retail investors often act as contrarians, stabilizing markets (Kaniel et al., 2012).

Hüfner et al. (2022) studied how retail investors affect stock liquidity and crash risks. They analyzed the liquidity of stocks mostly held by retail investors. The liquidity analysis was done by calculating the annual average of returns divided by daily dollar trading volume (AMIHUD). This is called the illiquidity measure. The study found that during the Covid-19 pandemic, stocks with high retail participation showed 17% higher liquidity and 24% lower crash risk compared to institutional-dominated equities (Hüfner et al., 2022). They also found that retail investors readiness to buy during sharp declines offset institutional selloffs, positioning them as liquidity providers. Abydy (2014) studied how retail investors trade based on different liquidity levels as buyers and sellers. He conducted a study using the Ratio_sellert variable to measure the daily ratio of retail investors acting as sellers. The results indicate that retail investors are more likely to sell when the bid–ask spreads and illiquidity are higher. Thus, retail investors tend to sell in lower liquidity conditions but require higher liquidity when buying. These findings challenge the narrative that retail activity intrinsically destabilizes the market, highlighting how context-dependent these effects are.

The longevity of this liquidity surge remains questioned. However, the growth in popularity of retail trading apps has not slowed in the 2020s (Robinhood, 2025; TD Ameritrade, 2025). Structural factors such as the commission-free model and behavioral design features have become the norm for the sector, suggesting a permanent impact. Retail trading apps have also shown they can evolve, bringing constantly new features to the market. Investors themself believe in this as Robinhood's market cap grew to 43 billion dollars in March 2025 (Nasdaq, 2025). Household liquidity buffers have also grown significantly in OECD economies post-2008. Supporting the sustained retail engagement, as investors increasingly treat liquid assets as a hedge against economic uncertainty (Cava & Wang, 2021).

Perez et al. (2022) noted retail participation positively contributes to market liquidity and the depth of order books. Perez et al. (2022) also highlight that a broader retail investor base contributes to more resilient markets, as these participants often have different

trading patterns than institutional investors. Retail trading can also bring additional liquidity to unpopular markets where small to mid-cap stocks may not attract significant institutional attention. This improved liquidity can lead to new and cheaper funding sources for companies.

6.2 Stock price volatility

The rise of retail trading apps has introduced new dynamics to stock volatility, mainly through mechanisms such as ease of executing trades, leveraged trading, and sentiment-driven retail behavior. Volatility refers to the level and frequency of price variations of a security over time. . It also indicates the potential risk associated with a security's price fluctuations. Investors and traders generally use volatility to analyze historical price movements and to understand potential future trends. Historical stock price volatility is calculated:

$$\sigma_{i,t} = \ln\left(P_{i,t}^{\text{high}}\right) - \ln\left(P_{i,t}^{\text{low}}\right) = \ln\left(\frac{P_{i,t}^{\text{high}}}{P_{i,t}^{\text{low}}}\right) \quad (1)$$

Where $\sigma_{i,t}$ is the volatility of stock i on day t.

$P_{i,t}^{high}$ and $P_{i,t}^{low}$ are the highest and lowest prices of stock i on day t.

Foucault et al. (2011) studied a French stock market reform that raised retail trading costs and observed that affected stocks' daily return volatility dropped substantially. The drop exceeded 20 basis points; however, it's important to note that this data does not account for the impact of retail trading apps, which are a relatively new phenomenon. Empirical evidence from recent data still confirms these effects. Eliner and Kobilov (2023) analyze trading by social media-aware retail investors and find that stocks in the top quintile of social-media attention are traded nearly four times as frequently as other stocks. Later in the thesis, I will cover liquidity effects more in detail.

6.2.1 Effects of leverage on volatility

The use of borrowed capital to increase exposure to financial markets can significantly amplify price movements. Many retail trading platforms offer margin trading and leverage derivatives, enabling users to take larger positions than their capital allows. According to Davydov and Peltomäki (2022), demand for leverage set a record after Covid-19 pandemic, with margin debt in the U.S and globally hitting an all-time high. They also note that in 2020, leverage on Robinhood grew more than five times. Robinhood and some other retail trading platforms allow customers to access leverage right after account opening. While this leverage can enhance returns, it also increases the risk of margin calls and forced liquidations. Forced short position covering and liquidations can lead to extreme price swings and market instability. In the first quarter of 2020, Robinhood users traded at noticeably higher rates than customers of traditional brokerages. Relative to average account sizes, they exchanged nine times as many shares as E-Trade users and 40 times as many as Charles Schwab users (The NewYork Times, 2020). Additionally, Robinhood investors traded 88 times more risky options contracts than Schwab customers when adjusted for account balances.

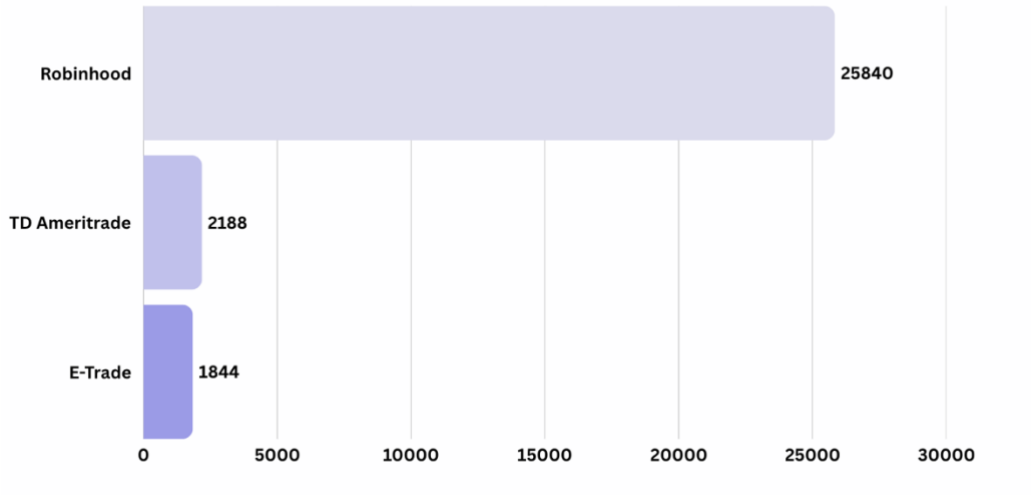

Figure 4 Options contracts traded for every dollar in the average customer's account (New York Times, 2020).

6.3 Traditional Perspectives

Traditional market microstructure theory suggest that higher participation improves liquidity by diversifying options for traders and expanding the pool of counterparties. Thereby reducing bid-ask spreads and enhancing market depth (Chordia et al., 2001). This aligns with the first hypothesis, which posits that retail trading apps improve baseline liquidity in retail-favored stocks. Fama's (1970) Efficient Market Hypothesis further indicates that retail investors, as marginal participants, contribute to price discovery without destabilizing the market. Empirical studies validate the hypothesis stating that retail influx can narrow spreads in highly liquid markets. For example, during periods of sustained retail engagement in large-cap stocks. Baig et al. (2022) document improved liquidity metrics, such as lower bid-ask spreads and higher market depth. These findings reflect similar dynamics observed in a study by Stoffman (2014), where increased participation improved price efficiency when trading activity was diversified across investor groups.

However, as noted by Stoffman (2014), approximately 25% of trading activity involves individuals and institutions, a similar share occurs solely between retail traders, and about 14% takes place between institutions. Stoffman points out herding to be one exoplanetary factor as mentioned in a previous chapter. Also, suggesting that prices decline when institutions sell shares to individuals and increase when institutions buy from them. (Stoffman, 2024; Sias et al., 2001). In essence, regressions reveal that prices align with the direction of institutional trading, with individuals providing liquidity to meet institutional demand.

6.4 Efficient market hypothesis and liquidity provision

The Efficient Market Hypothesis (EMH) suggests that the prices of assets in financial markets always reflect all available information. As a result, it is believed that investors cannot consistently achieve returns that surpass the average market performance over the long term. However, the growing influence of retail investors, who often trade based

on sentiment, has challenged traditional views of market efficiency. The influx of uninformed trading may lead to temporary mispricing. This creates opportunities for arbitrage but also increasing short-term inefficiencies. Recent empirical findings highlight these concerns. Baig et al. (2022) demonstrate that retail trading increases market volatility, especially during periods of market stress. Using advanced local projection methods, they demonstrate that a one-standard-deviation shock to retail trading leads to a continuous increase in both range-based and volatility measures. The effects were more substantial during the pandemic than in more stable markets. Their analysis suggests that in times of market turmoil, synchronization risk with informed traders may rise, reducing their willingness to counteract mispricing introduced by retail flows. This withdrawal amplifies the impact of uninformed trades on market stability. Understanding how retail trading apps impact liquidity provision and market stability within this framework is essential for evaluating their broader implications on market efficiency.

6.5 Market Volatility in the Era of Trading Apps

It it essential to recognize wheater the heightened participation facilitated by retail trading applications has contributed to a structural increase in overall market volatility. To evaluate this, we can examine the historical volatility of a broad market index, such as the S&P 500 or Russel 2000.

Most frequently used metric of expected volatility is the CBOE Volatility Index (VIX), which reflects the market's expectation of 30-day volatility. Empirically analyzing the VIX alongside the adoption timeline of retail apps reveals insightful patterns. Unfortunately, detailed monthly data for Robinhood’s MAU after 2020 is not publicly available. Only quarterly data exists, which limits the possibility of running a detailed monthly regression analysis. However, the period from 2017 to 2019 was characterized by historically low volatility. In early 2020 COVID-19 pandemic caused a massive, short spike in the VIX to almost record levels (Figure 5 shaded area). This surge was driven by unprecedented macroeconomic uncertainty.

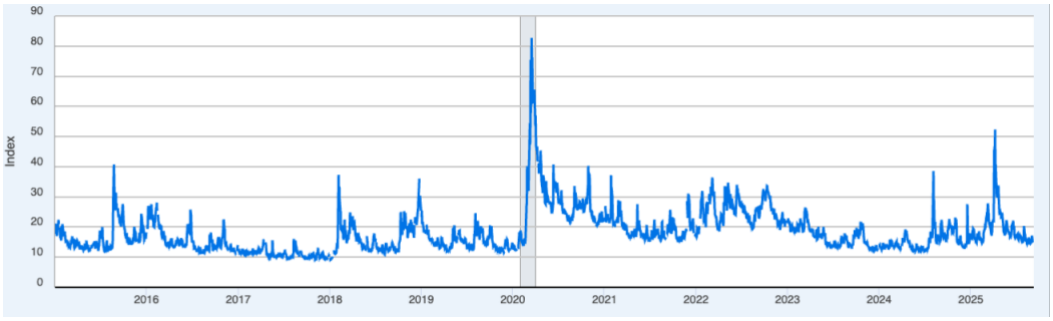

Figure 5 Historical Volatility of the S&P 500 Index (CBOE VIX), 2017-2024 (Chicago Board Options Exchange Via Fred, 2025).

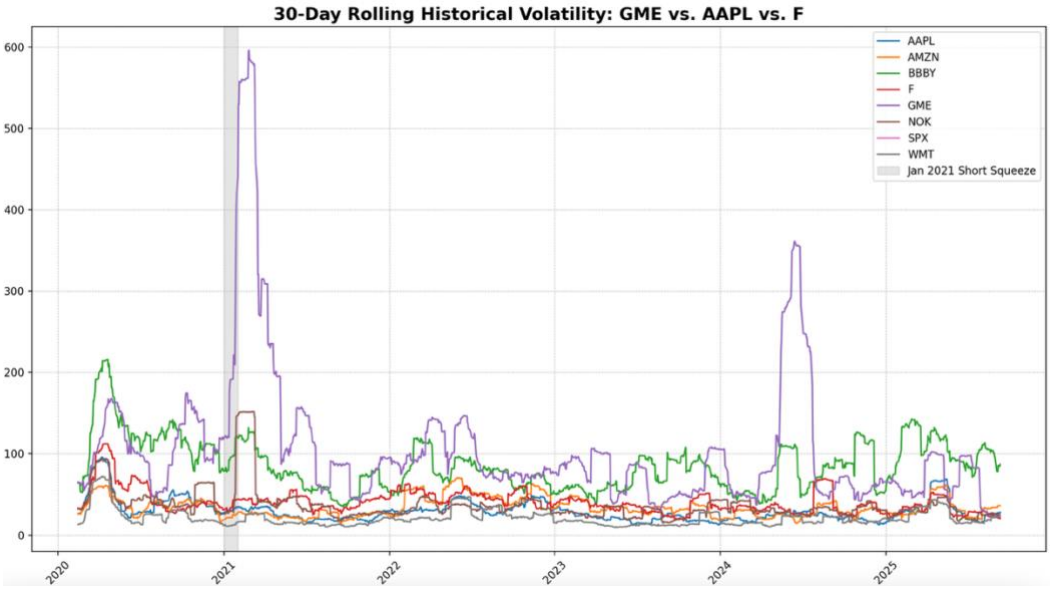

Figure 6 30-Day Rolling Historical Volatility: GME vs. AAPL vs. AMZN vs. BBBY vs. F vs. NOK vs. SPX (SP&500) vs. WMT (Data: Yahoo Finance, 2025)

However, the subsequent period (2021-2024) provides more direct evidence, colliding with the second hypothesis. The volatility during the meme stock phenomenon was more pronounced in specific stocks rather than the broad market. As Figure 5 illustrates, while the S&P 500's volatility saw elevated periods corresponding to these events (e.g., early 2021), it has not sustained a permanently higher level. This stock-specific nature of the volatility is further evidenced in Figure 6. The figure shows the 30-day rolling historical volatility for meme stocks GameStop (GME), Bed Bath & Beyond (BBBY), and Nokia (NOK), compared to large-cap stocks Apple (AAPL) and Amazon (AMZN), the auto

stock Ford (F), the retailer Walmart (WMT), and the S&P 500 index (SPX). GME, a main meme stock, showed extreme and sustained increase in volatility, far above the more stable levels of large-cap stocks and the broader market index. These points suggest that retail trading apps can cause significant episodic and stock-specific volatility, while their impact on overall market volatility may be more muted. The stabilizing presence of institutional investors and market makers in large-cap indices likely absorbs much of this noise (Baig et al., 2022; Hüfner et al., 2022) Preventing it from permanently elevating systemic volatility.

6.6 Behavioral and Structural Critiques

Retail trading apps, as noted by Eliner and Kobilov (2023) can amplify behavioral biases outlined in prior chapters, such as overconfidence and herding colliding with first hypothesis. Features like push notifications and fractional shares encourage frequent, small-scale trades, potentially fragmenting order flow further. Payment-for-Order-Flow (PFOF) models, which are central to zero-commission apps, may distort liquidity provision. Ernst and Spatt (2023) argue that PFOF incentivizes brokers to route orders to wholesalers rather than public exchanges. For example, Robinhood users can't decide whether their orders are routed or not. This can reduce price competition and widening spreads for retail-driven stocks. Concentrated trading can also exacerbate adverse selection risks, prompting market makers to recalibrate liquidity provision (Venkataraman & Waisburd, 2005). During the 2021 meme stock frenzy, AMC and GameStop were prime examples of this phenomenon.

Second hypothesis suggests that gamified app features and social media-driven trading amplify short-term volatility. This is supported by robust empirical evidence when examining at the hypothesis from the behavioral standpoint. Studies link gamification elements such as confetti animations and DEPs to impulsive trading behavior, creating momentary demand shocks (Boldt, 2023; Tierney, 2022). Boldt (2023) also highlights how Robinhood can send notifications and emails such as "Start Trading Today". Kalda et

al. (2021) study reveals that with smartphones, where these gamified features are mostly seen, increases buying best performed securities by 12 %.

The economic impact of these incentives is also substantial. Yelagin (2024) showing that with gamification features collectively increasing retail traded volume by 22.53 % while decreasing retail returns in a study by 27.32 %. Showing how much excess liquidity these apps can facilitate. Tierney (2022) argue that today's regulation of brokers primarily serves the narrow interests of institutions. A main goal is to provide two essential goods for the market: liquidity and price discovery.

During the 2021 Meme stock frenzy, retail traders on Reddit's r/WallStreetBets started buying shorted stocks. Warkulat and Pelster (2024) argue that WallStreetBets's meme stock traders exhibit a higher stock volatility, larger concentrated portfolio weights, and negative profits. Indicating that meme stock attention encourages speculative trading behavior that harms investors and causes large volatility spikes in the markets. These dynamics align with Stoffman's (2014) findings. He found that returns correlate negatively with one-sided trading activity when individuals are buying in masses from institutions. However, Stoffman (2014) found that this dynamic is inverse the other way around. Returns rise when institutions buy from individuals, suggesting that institutional arbitrage can counteract retail-driven noise. In retail-dominated stocks, such stabilizing forces are can often by absent.

While institutions often stabilize prices through informed trading, stock dominated by retail-only trading may see amplified price swings that subsequently reverse. In markets driven by "noise" rather than fundamentals, prices can overshoot and reverse, as contrarian or institutional traders step in.

To test this, Stoffman (2014) categorizes each day by the share of volume traded retail-to-retail (HH), retail-to-institution (HI/IH), and institution-to-institution (II).

$$\sigma_{i,t} = \alpha_t + \gamma_1 HH_{i,t} + \gamma_2 HL_{i,t} + \gamma_3 \Pi_{i,t} + X'_{i,t}\delta + \epsilon_{i,t} \quad (2)$$

Then, he regresses the high-low return on these shares, controlling for market-wide volatility and lagged returns. He finds a significant positive coefficient on HH whereas HI/IH and II are near zero or slightly negative (Stoffman, 2014).

Other recent studies highlight how nuanced liquidity effects are. While Bai et al. (2022) find improved liquidity in large-cap stocks due to retail participation, they also observe deteriorating conditions in small-cap "meme stocks" during social media-driven frenzies. They also find a negative impact on the stability of the markets, confirming Stoffman's (2014) findings about the effects of retail-to-institutional and retail-to- retail trading. This divergence highlights the role of market context: benefits of liquidity provided by retail trading apps materialize in stable conditions but may reverse during speculative episodes.

7 Conclusions

This thesis examined the impact of retail trading apps on market liquidity and stock price volatility. I explored how democratized retail participation reshapes financial market dynamics by covering theoretical frameworks, academic studies, and regulatory insights. Focusing on two hypotheses: (1) retail trading apps improve baseline liquidity in retail favored stocks (H1), and (2) gamified app features and social media-driven trading increase stock price volatility (H2). Additionally, this thesis covered different market participants and how these relationships are tied to retail trading.

Previous studies indicate that stock prices tend to follow the movements of institutional investors. Retail trading apps on the other hand, enhance liquidity in specific contexts, particularly through increased trading volumes and diversified participation. Studies demonstrate that retail investors can act as liquidity providers during market stress, offsetting institutional selloffs and narrowing bid-ask spreads. However, as stated before, liquidity improvements are not universal. Concentrated retail trading in "meme stocks" has created fragmentation, making it difficult for market makers to manage order flow imbalances. Additionally, payment-for-order-flow (PFOF) arrangements, can often result in worse execution prices. This highlights trade-offs between accessibility and market efficiency.

Despite its strengths, this thesis faces key limitations. The actual trading costs for retail investors including bid-ask spread, market makers fees, and slippage, are more nuanced than standard theoretical models suggest. Academic literature indicates that bid-ask spread bias can misrepresent liquidity, especially in stocks favored by retail traders. Unknown exchange fee structures and slippage during volatility events can further erode net returns for retail participants. Future research should employ transactional data to better quantify these hidden costs. Research should focus particularly on episodes of elevated trading app activity or market stress. Additionally, historical volatility indices

such as VIX reveals that periods of high volatility often correspond with the rise of retail trading applications.

Behavioural biases found in traders and amplified by gamified interfaces drive speculative trading and herding. Events like the 2021 meme stock frenzy illustrate how collective retail actions generate extreme volatility. Features like push notifications and fractional shares encourage impulsive trading adding, leading to worse returns for traders and short-term volatility. Empirical evidence confirms that retail-dominated stocks display higher volatility during speculative episodes, though this effect weakens in stable market conditions. The findings highlight the dual role of retail trading apps: democratizing market access while introducing systemic risks. From a theoretical perspective, behavioural finance frameworks such as herding, loss aversion, and the greater fool theory explain why retail investors' actions deviate from rational actor models. Market microstructure theories highlight the stabilizing potential of diversified participation, provided liquidity is evenly distributed. Regulators face challenges balancing innovation with investor protection. For other market participants, the rise of retail trading apps requires adaptive strategies. These can include leveraging retail sentiment data, following social media phenomena or recalibrating liquidity provisioning during volatility spikes.

This thesis contributes to the literature by connecting behavioural finance and market microstructure analysis. Offering a comprehensive view of retail trading apps' impact based on existing literature. With fintech and trading apps are continuously evolving, more empirical studies should be created, as future research can address gaps identified in this study. While trading apps enhance liquidity under stable conditions, their design and social media integration amplify volatility during speculative episodes. Policymakers, institutions, and investors must pay attention to this contrast to promote resilient and inclusive markets.

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