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The rise of high-frequency trading: financial market friend or foe?

صعود التداول عالي التردد: صديق للسوق المالي أم عدو؟

Abdelhak Guennoun¹, Belkacem Korichi², Rim Guennoun³

¹ University of Tamanghasset (Algeria), guennoun.abdelhak@cu-tamanrasset.dz

² University of Tamanghasset (Algeria), okacemkorichi@gmail.com

³ LUEDLD, University Kasdi Merbah Ouargla (Algeria), guennoune.rim@univ.ouargla.dz

Abstract:

High-frequency trading (HFT) has emerged as a powerful force in the financial markets over the past few decades. HFT is a type of trading that uses powerful computers and advanced algorithms to execute trades at lightning-fast speeds. While some argue that HFT has made the financial markets more efficient and has reduced spreads and transaction costs, others claim that it has contributed to market instability and has given an unfair advantage to large institutional traders over small investors. In this post, we'll take a closer look at the rise of HFT, explore its pros and cons, and discuss whether it's a friend or foe to the financial markets.

Keywords: High-frequency trading, financial markets, traders, investors.

JEL Classification : G12, G14, G18

Corresponding author: Guennoun Abdelhak, aguennoun89@gmail.com

مستخلص:

برز التداول عالي التردد (HFT) كقوة مؤثرة في الأسواق المالية على مدى العقود القليلة الماضية، التداول عالي التردد هو نوع من التداول الذي يستخدم أجهزة الكمبيوتر القوية والخوارزميات المتقدمة لتنفيذ الصفقات بسرعة البرق، وبينما يجادل البعض بأن (HFT) جعلت الأسواق المالية أكثر كفاءة وخفضت من فروقات الأسعار وتكاليف المعاملات ، يدعي آخرون أنها ساهمت في عدم استقرار السوق المالي وأعطت ميزة غير عادلة لكبار المتداولين على المتداولين الصغار في هذا المنصب ، وبدورنا سوف نلقي نظرة فاحصة على صعود وتطور (HFT) ، واستكشاف إيجابياته وسلبياته ، ومناقشة ما إذا كان صديق أم عدو للأسواق المالية.

الكلمات المفتاحية: تداول عالي التردد، أسواق مالية، متداولين، مستثمرين.

I. INTRODUCTION

High-frequency trading (HFT) is an advanced trading technique that uses powerful computer algorithms to analyze and execute trades at an incredibly high speed. These trades are typically carried out in less than a second, with some being executed in microseconds. (HFT) is computer determined trading; the algorithm makes important decisions such as timing, price, or in many cases, executing the entire order without human interaction. HF trading is widely used by pension funds, mutual funds, and other investor driven institutional traders to divide large trades into several smaller trades in order to manage market impact and risk(McGowan, 2010).

This type of trading has become increasingly popular in recent years, with the rise of electronic trading platforms and advancements in technology. HFT firms use complex algorithms to analyze market data and identify profitable trading opportunities(High-Frequency Trading (HFT), n.d.). These

algorithms are designed to make split-second decisions based on market conditions, news events, and other factors. HFT has become a controversial topic in the financial world, with some seeing it as a valuable tool for improving market liquidity and others viewing it as a threat to market stability. Proponents argue that HFT provides liquidity to the market, reduces bid-ask spreads and transaction costs, and increases market efficiency. However, critics argue that HFT creates an uneven playing field, giving advantages to firms with faster technology, and can lead to market instability and flash crashes. As HFT continues to evolve, it will be interesting to see **how regulators and market participants respond to its growing influence?**.

II. History and development of high frequency trading

High-frequency trading (HFT) is algorithmic trading characterized by high-speed trade execution, an extremely large number of transactions, and a very short-term investment horizon. HFT leverages special computers to achieve the highest speed of trade execution possible. It is very complex and, therefore, primarily a tool employed by large institutional investors such as investment banks and hedge funds. Complex algorithms that are used in high-frequency trading analyze individual stocks to spot emerging trends in milliseconds. It will result in hundreds of buy orders to be sent out in a matter of seconds, given the analysis finds a trigger(*High-Frequency Trading (HFT)*, n.d.).

According to the SEC, high-frequency traders are “professional traders acting in a proprietary capacity that engage in strategies that generate a large number of trades on daily basis that HFT are often characterized by: (1) the use of extraordinarily high-speed and sophisticated computer programs for generating, routing, and executing orders; (2) use of co-location services and individual data feeds offered by exchanges and others to minimize network and other types of latencies; (3)

very short time-frames for establishing and liquidating positions; (4) the submission of numerous orders that are cancelled shortly after submission; and (5) ending the trading day in as close to a flat position as possible (**Chordia et al., 2013**).

High-frequency trading (HFT) has experienced a remarkable evolution over the decades, transforming financial markets through the power of technology and automation. From the computerization of order flow to the advent of electronic communication networks (ECNs) and the impact of regulatory changes, this part delves into the significant milestones that shaped the landscape of high-frequency trading(**McGowan, 2010**):

- 1- Computerization of Order Flow and the Rise of NASDAQ: In the mid-1970s, the New York Stock Exchange introduced the designated order turning system (dot), followed by Super dot in 1984. These innovations facilitated the electronic transfer of buy and sell orders, replacing the traditional floor-based trading. Simultaneously, in 1971, NASDAQ emerged as the world's first electronic stock market, revolutionizing trading by allowing dealers to compete in providing quotes for securities.
- 2- Program Trading and the Role of Automation: With the proliferation of computer technology, program trading gained popularity in the 1980s. This strategy involved the execution of orders for buying or selling a portfolio of stocks valued at over \$1 million. Program traders could leverage computer algorithms to automate trading decisions, allowing for faster execution and interactions between the equity and futures markets.
- 3- The Emergence of Electronic Communication Networks (ECNs): Towards the late 1990s, electronic trading venues known as ECNs emerged, expanding the

landscape of high-frequency trading. These computer systems facilitated the trading of financial products, such as stocks and currencies, outside traditional exchanges. Authorized by the U.S. Securities and Exchange Commission's Regulation Alternative Trading Systems, ECNs provided increased access and after-hours trading opportunities for individual investors.

- 4- Decimalization and Algorithmic Trading: A significant turning point came in 2001 when stock exchanges transitioned from fractional pricing to decimalization. This shift reduced the minimum stock tick size and further encouraged algorithmic trading. With narrower spreads, algorithmic traders could split orders, leveraging their algorithms to execute trades faster and at better average prices, thereby enhancing liquidity in the market.
- 5- Regulation National Market System (Reg. NMS): In 2005, the SEC implemented Regulation National Market System (Reg. NMS), a series of initiatives designed to modernize and strengthen equity markets. Reg. NMS promoted a national market system, imposing rules such as the Trade Through Rule, the Access Rule, the Sub-Penny Rule, and the Market Data Rules. These regulations aimed to ensure fairer and more efficient trading by mandating electronic posting and immediate execution of market orders at the best available price.
6. High-Frequency Trading Today: High-frequency trading firms, including certain hedge funds, have leveraged the structural changes brought about by Reg. NMS. These firms actively participate in the market by continuously posting two-sided quotes on hundreds of stocks. They also exploit momentary lags between exchanges, taking advantage of price differences for profitable trades.

III. high frequency trading participants:

High-frequency trading (HFT) is a rapidly evolving field that involves the participation of various types of players who engage in automated trading strategies with lightning-fast speed include:

- **Proprietary Trading Firms:** These are privately-owned trading firms that utilize their own capital to conduct high-frequency trades. They employ sophisticated algorithms and trading strategies to capitalize on small price discrepancies in the market. These firms focus on executing trades at incredibly high speeds(Cartea et al., 2015)
- **Hedge Funds:** Some hedge funds incorporate HFT strategies into their trading activities to generate quick profits. They typically have dedicated teams consisting of quantitative analysts and traders who develop and implement HFT algorithms. These algorithms enable them to execute trades rapidly and exploit market opportunities(*What Is a Hedge Fund?*, n.d.).
- **Market-Making Firms:** Market makers play a vital role in providing liquidity to the market. These firms continuously quote both buy and sell prices for a specific set of securities and profit from the bid-ask spread. HFT market-making firms leverage advanced technology and algorithms to efficiently manage their market-making activities, ensuring smooth trading operations(*Market-Making and Proprietary Trading: Industry Trends, Drivers and Policy Implications*, 2014).
- **Brokerage Firms:** Many brokerage firms have HFT divisions that facilitate high-speed trading for their clients. These divisions provide access to HFT infrastructure, sophisticated algorithms, and trading platforms. This enables individual traders and institutional investors to engage in HFT strategies and

capitalize on market movements swiftly(*What Is a Brokerage Firm?*, 2018).

- **Exchanges and Trading Platforms:** Exchanges and electronic trading platforms serve as the foundation for HFT activities. They offer high-speed connectivity, low-latency trading systems, and co-location services to attract HFT participants. These platforms generate revenue by charging transaction fees to HFT traders for utilizing their services(Cartea et al., 2015).
- **Technology Providers:** Companies specializing in providing technology solutions cater to the needs of HFT players. They offer high-speed data feeds, execution platforms, and algorithmic trading tools that enable HFT participants to operate effectively. These technology providers constantly innovate to meet the demanding requirements of HFT players in a rapidly evolving industry(top et al., n.d.).

It's important to note that the composition of the HFT landscape is subject to change as market conditions, regulatory policies, and technological advancements evolve. Players may enter or exit the market based on these factors, and the roles of various participants may shift over time.

High-frequency traders primarily consist of proprietary trading firms that utilize their own capital for trading purposes rather than acting as agents. Their success hinges on the utilization of exceptionally fast and sophisticated quantitative and algorithmic computer programs for generating, routing, and executing orders. To achieve this, low latency is crucial. Low latency refers to the minimal time that elapses between order entry, execution, and transaction processing. HFT firms require rapid delivery of market data from trading center servers to their own servers, swift decision processing within their trading engines,

speedy access to trading center servers, and prompt order execution by the trading centers(Michael, 2011).

To minimize network latencies, market operators offer speed-sensitive market participants the option to install their trading engines in close physical proximity to the market operator's systems. This co-location of servers near the matching engine of the trading venue reduces network delays between the trading venue and the market participants' servers. Other distinguishing characteristics of HFT firms include real-time data analysis to generate automated trading decisions and very short timeframes for establishing and liquidating positions. Consequently, these firms submit numerous orders that are often cancelled shortly after submission, resulting in cancellation rates exceeding 80% in some cases. Additionally, HFT firms aim to end the trading day with a delta-neutral position, minimizing the carrying of significant, unhedged positions overnight(Michael, 2011)

IV. The impact of HFT on the stock market

The impact of High-Frequency Trading (HFT) on the stock market has been a topic of debate for many years now. There are those who believe that HFT provides liquidity to the markets and helps keep them efficient, while others argue that it creates instability and undermines market confidence.

IV.1. The pros of HFT

High-frequency trading (HFT) uses complex algorithms and powerful computing technology to execute trades at high speeds, in fractions of a second. This technique has revolutionized the trading landscape and has many advantages over traditional trading methods. One of the most important benefits of HFT is the increased liquidity it provides to the market. By executing trades at lightning speed, HFT companies can respond to changes in the market instantly and provide liquidity to buyers and sellers. This helps reduce bid-ask spreads, which are the differences between the highest price the buyer is willing to pay

and the lowest price the seller is willing to accept. Another advantage of HFT is the improved efficiency it brings to the market. The use of sophisticated algorithms and computer systems allows traders to quickly and accurately process huge amounts of data, allowing them to identify market trends and opportunities that are difficult or impossible to identify using traditional trading methods.

HFT has led to a significant reduction in trading costs, which benefits both investors and traders. HFT companies operate on very small profit margins and are constantly looking for ways to reduce costs, which ultimately benefits the end consumer. This has been a driving factor in the move towards lower trading fees and commissions in recent years, which was found in a study (Hendershot et al., 2011) where he concluded that algorithmic trading reduces trading costs and increases the informativeness of offers and prices. Surprisingly, the revenues of liquidity providers also increase with algorithmic trading. This is consistent with algorithmic liquidity providers having market power as they deliver their algorithms. Also (Ben Ammar et al., 2020) concluded that HFT activity can be determined by the observed intraday patterns in the liquidity of stocks by the positive effect of HFT on liquidity mainly due to the reduction of negative selection costs caused by asymmetric information among market participants. It is the same conclusion reached in a recent study by (Boehmer et al., 2021; Megarbane et al., 2017).

In a recent study conducted by (Karkowska & Palczewski, 2023), contradictory results were obtained regarding the impact of high-frequency trading (HFT) on market liquidity. The researchers found that an increase in HFT activity had varying effects on market liquidity depending on the specific conditions examined. In some instances, an increase in high-frequency orders was associated with a decrease in market liquidity, indicating a potential negative effect. However, in other scenarios, an increase in the presence of high-frequency traders

was found to improve market liquidity, suggesting a positive impact.

Overall, the pros of HFT are numerous, and it is clear that this technique has had a positive impact on the trading landscape. However, it is essential to consider the potential downsides and risks associated with this approach to ensure that the benefits are not outweighed by the negatives.

IV.2 The cons of High-Frequency Trading

While High-Frequency Trading (HFT) has revolutionized the financial markets, it has also come with its fair share of cons. The stock market has evolved hand in hand with advancements in information and communication technology. While these technological developments have brought numerous benefits, they have also introduced new risks for investors. One significant change has been the emphasis on speed in stock exchanges, where displaying and processing incoming orders at the same price is of utmost importance. This focus on speed has given high-frequency (HF) traders a distinct advantage over slower traders. This advantage can create a sense of unfairness when HF traders compete with slow traders for the same profit. While some argue that slow traders should avoid competing with HF traders to avoid such unfairness, the reality is that it is challenging for slow traders to avoid being taken advantage of, particularly when they place large orders. Slow traders may find themselves in a situation where their only solution is to hold investments over longer time horizons and reduce their trading frequency. However, this approach comes at the cost of sacrificing some of their trading freedom, while HF traders can freely compete with any investor they choose. (Dalko & Wang, 2020).

The high-frequency trading (HFT) strategy, characterized by a large number of trades executed within extremely short timeframes, significantly increases the frequency of price reversals and volatility risks. This phenomenon, commonly known as spoofing HFT, contributes to heightened intraday price volatility (Zhang, 2010). Research has consistently shown

that short-term volatility systematically rises with an increase in AT and/or HFT intensity. The actions of HF traders in response to significant selling pressure can exacerbate market volatility within a short period. Additionally, HFT activity has been found to contribute to long-term volatility. The intense competition among HF traders for liquidity during market turbulence often leads to a drying up of available liquidity and further amplifies short-term volatility(Boehmer et al., 2021).

There are instances where the magnitude of volatility on a short timescale reaches exceptionally high levels, negatively impacting the functioning of the market. A prominent example illustrating this is the Flash Crash in 2010, which serves as a compelling case supporting the argument. Subsequently, the deterioration of market quality and the emergence of instability become evident as a consequence of these volatile market conditions(Kirilenko et al., 2017; Ye et al., 2013).

One notable downside of high-frequency trading (HFT) is its potential to facilitate market manipulation. HFT traders can exploit their speed advantage to gain an unfair edge over other market participants and exploit market inefficiencies. This can result in unfair advantages and manipulative practices. A classic example of market manipulation is a "bear raid," where a trader enters a large short sale order with the intention of driving the price down. Other investors observing the price drop may interpret it as an indication of negative information and follow suit, further pushing the price downwards. If the price reaches a certain threshold, it can trigger additional selling from stop orders and margin accounts, causing further price decline. The manipulator then buys back the stock at a lower price to cover the short position and realize a profit(Angel & McCabe, 2013).

In modern times, perpetrators of illegal manipulation may employ computer algorithms to identify situations where such

abusive activities can be most profitable. They may specifically target scenarios where there are limited visible buy orders in the market. These manipulative practices are illegal and can significantly disrupt market integrity and fairness. Regulators and market participants strive to detect and prevent such activities to maintain a level playing field and protect investors from unfair practices. Indeed, high-frequency trading (HFT) carries the risk of contributing to market crashes. One factor is the automated nature of HFT systems, which can experience malfunctions or errors that result in significant losses. The speed and volume at which HFT trades occur can amplify the impact of such malfunctions, potentially triggering a chain reaction of adverse events in the market.

Furthermore, HFT can also contribute to a reduction in market liquidity, which is the ease with which securities can be bought or sold without significantly impacting their prices. HFT's rapid trading and short holding periods can lead to a decrease in available liquidity as orders are executed swiftly. In times of market stress or volatility, this reduced liquidity can exacerbate the impact of selling pressure, potentially intensifying market crashes. It is important to note that HFT alone is not solely responsible for market crashes, as numerous other factors and market participants contribute to such events. However, the speed, volume, and potential for malfunctions associated with HFT can amplify the risks and impact of market downturns.

V. The ethical debate surrounding HFT

The rise of High-Frequency Trading (HFT) has been a topic of discussion for years, and it's not just about the financial implications. There is also an ethical debate surrounding HFT.

Some argue that HFT is unethical because it gives those who have the fastest and most advanced technology an unfair advantage. They believe that the market should be fair and accessible to all, not just those who can afford the best technology.

Therefore, (Sobolev, 2020) conclude that the financial industry may lack moral leadership. It makes empirical and theoretical contributions to the 'business ethics as practice' theory and examines management and regulatory applications. Others argue that HFT is simply the evolution of the market, and that those who want to succeed need to adapt to the changing landscape. They believe that HFT is just a part of the market, and that it's up to individual traders to decide whether or not they want to use it. Additionally, there are concerns about the potential for market manipulation through HFT. With the ability to make trades at lightning-fast speeds, it's possible for HFT traders to manipulate the market in their favor, potentially causing harm to other traders and the public. Overall, the ethical debate surrounding HFT is complex and multi-faceted. While some view it as a necessary evolution of the market, others believe that it undermines the principles of fairness and accessibility. As the market continues to evolve, it will be important to continue this discussion and ensure that the market remains fair and accessible to everyone.

VII. Regulations of HFT and its future

High-frequency trading (HFT) has been a topic of much debate and controversy in the financial industry in recent years. On one hand, it has been recognized for its potential benefits such as increased market liquidity and reduced bid-ask spreads. On the other hand, it has faced criticism for potentially contributing to market instability and amplifying market crashes.

In response to these concerns, regulators around the world have implemented various measures to regulate HFT. For instance, in the United States, the Regulation National Market System (NMS) was introduced in 2005. This regulation aimed to enhance competition among exchanges and improve market transparency. Similarly, Europe introduced the Markets in Financial Instruments Directive (MiFID) in 2007, which aimed to regulate HFT activities and promote fair and orderly markets.

However, the effectiveness of these regulations remains a topic of ongoing debate. Some argue that the complex nature of HFT makes it challenging to regulate effectively. They believe that stricter regulations could stifle innovation and hinder market efficiency. Balancing the need for stability and oversight with the desire for competition and innovation poses a significant challenge for regulators (*Spoofing and Disruptive Trading Practices – Overview | Perspectives & Events | Mayer Brown*, n.d.) (Scopino, 2020).

Looking ahead, it is expected that regulators will continue to closely monitor and adjust regulations related to HFT as the industry evolves. It will be crucial for regulators to strike the right balance, ensuring market stability while fostering healthy competition and innovation. Given the rapid advancements in technology that impact trading practices, HFT is likely to remain a contentious issue. Therefore, market participants should remain engaged and well-informed about the ongoing discussions and developments in HFT regulation.

IX. Conclusion:

The rise of high-frequency trading has been a major topic of discussion among investors, traders and regulators alike. While some argue that HFT brought more liquidity and efficiency to the markets, others assert that it created a more volatile and unstable trading environment.

So, is HFT a friend or an enemy? The answer is not so obvious. On the one hand, HFT undoubtedly increased market

efficiency and reduced transaction costs. It has enabled traders to react quickly to market news and changes, which has tightened supply and demand spreads and improved liquidity. On the other hand, HFT has also been blamed for creating flash crashes, exacerbating market volatility, and causing unfair advantages for the few who have access to faster and more advanced trading techniques.

Ultimately, whether HFT is a friend or an enemy depends on your point of view and your position in the market. For individual investors, it may not have a significant impact on their investment strategies. However, for large institutional investors and traders, the effects of HFT may be more pronounced.

In conclusion, while HFT has both advantages and disadvantages, its prevalence is expected to continue. The future of HFT will rely on ongoing technological advancements, regulatory adaptations, and the ability of market participants to strike a delicate balance between innovation and stability.

References :

1. Angel, J. J., & McCabe, D. (2013). Fairness in Financial Markets: The Case of High Frequency Trading. *Journal of Business Ethics*, 112(4), 585–595.
2. Boehmer, E., Fong, K., & Wu, J. (Julie). (2021). Algorithmic Trading and Market Quality: International Evidence. *Journal of Financial and Quantitative Analysis*, 56(8), 2659–2688. <https://doi.org/10.1017/S0022109020000782>
3. Cartea, Á., Jaimungal, S., & Penalva, J. (2015). *Algorithmic and High-Frequency Trading*. Cambridge University Press.
4. Chordia, T., Goyal, A., Lehmann, B. N., & Saar, G. (2013). *High-Frequency Trading* (SSRN Scholarly Paper No. 2278347). <https://doi.org/10.2139/ssrn.2278347>
5. Dalko, V., & Wang, M. H. (2020). High-frequency trading: Order-based innovation or manipulation? *Journal of Banking Regulation*, 21(4), 289–298. <https://doi.org/10.1057/s41261-019-00115-y>
6. *High-Frequency Trading (HFT)*. (n.d.). Corporate Finance Institute. Retrieved June 13, 2023, from

- <https://corporatefinanceinstitute.com/resources/equities/high-frequency-trading-hft/>
7. Karkowska, R., & Palczewski, A. (2023). Does high-frequency trading actually improve market liquidity? A comparative study for selected models and measures. *Research in International Business and Finance*, 64, 101872. <https://doi.org/10.1016/j.ribaf.2022.101872>
 8. Kirilenko, A., Kyle, A. S., Samadi, M., & Tuzun, T. (2017). The Flash Crash: High-Frequency Trading in an Electronic Market. *The Journal of Finance*, 72(3), 967–998. <https://doi.org/10.1111/jofi.12498>
 9. *Market-making and proprietary trading: Industry trends, drivers and policy implications* (CGFS Papers No. 52). (2014). Bank for International Settlements. <https://www.bis.org/publ/cgfs52.pdf>
 10. McGowan, M. (2010). The Rise of Computerized High Frequency Trading: Use and Controversy. *Duke Law & Technology Review*, 9(1), 1–25.
 11. Megarbane, N., Saliba, P., Lehalle, C.-A., & Rosenbaum, M. (2017). *The Behaviour of High-Frequency Traders Under Different Market Stress Scenarios* (SSRN Scholarly Paper No. 3021829). <https://doi.org/10.2139/ssrn.3021829>
 12. Michael, C. (2011). High-frequency trading- Better than its reputation?-. *Deutsche Bank Research*, 01–07.
 13. Scopino, G. (Ed.). (2020). Disruptive Trading Practices. In *Algo Bots and the Law: Technology, Automation, and the Regulation of Futures and Other Derivatives* (pp. 326–334). Cambridge University Press. <https://doi.org/10.1017/9781316691250.016>
 14. *Spoofing and Disruptive Trading Practices – Overview | Perspectives & Events | Mayer Brown*. (n.d.). Retrieved June 14, 2023, from <https://www.mayerbrown.com/en/perspectives-events/publications/2021/08/spoofing-and-disruptive-trading-practices>
 15. top, B. to, Name, T. V., Tel. +1 312 379 0050, D., & tverga@hfttech.com, E. (n.d.). *HFT Technologies—CME Group*. Retrieved June 14, 2023, from <https://www.cmegroup.com/content/cmegroup/en/partner-services/hft-technologies.html>
 16. *What Is a Brokerage Firm?* (2018, July 17). GOBankingRates. <https://www.gobankingrates.com/investing/brokerage/what-is-brokerage-firm/>

17. *What is a hedge fund? | Hedge fund definition - UBP.* (n.d.). Retrieved June 14, 2023, from <https://www.ubp.com/en/glossary-asset-class/hedge-funds>
18. Ye, M., Yao, C., & Gai, J. (2013). *The Externalities of High Frequency Trading* (SSRN Scholarly Paper No. 2066839). <https://doi.org/10.2139/ssrn.2066839>