

PSYCHOLOGICAL CHALLENGES IN HIGH-FREQUENCY TRADING: STRESS, DECISION-MAKING, AND RISK MANAGEMENT

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Abstract. High-frequency trading (HFT) exposes traders to intense psychological pressures due to rapid market fluctuations, high uncertainty, and the need for split-second decisions. This paper explores the key psychological challenges faced by HFT practitioners, including stress, cognitive overload, emotional imbalance, and decision fatigue. The study analyses how these factors affect judgment accuracy, risk-taking behavior, and overall performance. It also highlights the importance of psychological resilience, effective stress-management strategies, and disciplined risk-management frameworks in minimizing human error. Understanding these psychological dimensions is crucial for developing healthier trading environments and enhancing the stability and efficiency of modern financial markets.

Keywords: high-frequency trading; trader psychology; stress; cognitive overload; emotional regulation; decision-making; risk management; financial behavior.

High-Frequency Trading (HFT) is one of the most complex and technologically advanced segments of modern financial markets. This process is characterized by algorithmic trading that occurs in milliseconds, instantaneous analysis of huge amounts of data, high risk, and intense competition. Traders engaged in HFT are required to make decisions with high accuracy, manage risk, and work under constant psychological pressure. Therefore, the psychological state of individuals working in this field directly affects financial results and their professional stability.

The main feature of HFT is the speed of the decision-making process. In this situation, the human brain cannot devote much time to in-depth analysis of information and often relies on automated thinking, intuition, or previous experience. As a result, problems such as stress, cognitive fatigue, and incorrect risk assessment may arise. In addition, sudden changes in the market place impose additional psychological pressure on traders.

The purpose of this thesis is to conduct an in-depth analysis of the psychological difficulties encountered in HFT, to study the nature and consequences of stress, psychological factors affecting the decision-making process, and effective risk management strategies. Recommendations are also made to ensure the mental stability of traders working in a fast-paced trading environment.

The main pressure of HFT is related to the speed of decision-making. Differences of milliseconds can cause large financial losses or gains. This creates the following psychological states in traders:

A state of constant alertness

Acceleration of information processing

Rapid depletion of cognitive reserve

Fatigue and decreased attention[1]

The brain activity of traders working in an HFT environment is much more busy than in other professions. Constant analysis, observation, and control over algorithmic processes are one of the main causes of psychological fatigue.

Competition between HFT companies is very fierce. Every algorithm, every second, and every transaction can be a criterion for success. This negatively affects the mental state of traders:

Over-attachment to success

Self-blame after a mistake

Overconfidence after a win

Emotional fluctuations

Excessive competition can lead to the development of burnout (mental exhaustion syndrome) in traders.

The main factors that cause stress in HFT are:

1. Pressure to make quick decisions
2. Market volatility
3. High responsibility
4. Potential financial losses
5. Uncertainty and lack of stability in work[2]

It is natural for stress to arise in such an environment, but when it becomes permanent, it causes serious damage to the trader's mental health.

Prolonged stress leads to the following consequences:

Sleep disorders

Cardiovascular disorders

Reduced attention span

Lost emotional balance

Excessive anxiety

Depressive states

As a result of increased stress, traders often make impulsive decisions. This increases the likelihood of financial mistakes.

The most common cognitive errors in HFT traders are:

Overconfidence bias - overestimation of one's own abilities

Loss aversion - fear of loss

Confirmation bias - looking only for information that confirms one's opinion

Anchoring bias - excessive attachment to initial information

These errors distort the decision-making process and lead to misinterpretation of the real state of the market.

Due to the speed of HFT, traders often make emotional, rather than conscious, decisions. Increased adrenaline and cortisol levels lead to the following consequences:

Sharp risks

Overly aggressive trading

Panic trading actions

Loss of control

Emotional decisions pose a serious threat to financial stability.[3]

Risk management is not limited to mathematical models or algorithms. It also depends entirely on the psychological stability of the trader. Discipline, patience, self-control and emotional control are the main tools of a trader.

Under stress, the human brain cannot accurately assess risk. As a result:

The risk seems too small

Or, conversely, it is perceived as too large

The strategy is disrupted

Decisions become impulsive

This is one of the most dangerous situations in HFT.

The following psychological strategies are effective for traders:

Focus techniques

Breathing exercises

Mental rehearsal (mental exercises)

Emotional monitoring

Rest cycles to restore psychological resources

Physical activity

These methods reduce stress and improve decision-making.

The working environment of an HFT company directly affects the psychological state of a trader. A healthy working environment should provide:

A fair workload

A specialist providing psychological support

Opportunity for rest and recovery

Stress monitoring system

Team support[4]

The psychological maturity of leaders affects the stability of the team. Sincere support, constructive feedback, clear tasks and realistic expectations reduce stress.

In conclusion, High-Frequency Trading is one of the most psychologically challenging industries. Speed, uncertainty, constant competition and high risk cause traders to experience severe stress, fatigue, emotional instability and cognitive errors. The decision-making process is closely related to psychological factors, each of which has a significant impact on financial results.

Effective risk management depends not only on technical knowledge, but also on the psychological stability, discipline and emotional control of the trader. Therefore, the development of psychological preparation, relaxation mechanisms, stress coping strategies and corporate support systems in the HFT industry is very important.

If psychological state is properly managed, HFT traders can make more accurate, balanced and safe decisions. This is important not only for individual success, but also for the stability of the company.

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