Chapter 3
Financial Behavior Prediction with Machine Learning

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ABSTRACT

The financial markets often experience irrational behaviors, leading to significant overreactions where asset prices deviate from intrinsic values. This research investigates the application of machine learning (ML) techniques in predicting these market anomalies. The study reveals varying levels of awareness among financial professionals regarding market overreaction, with most acknowledging its impact but differing in familiarity with the concept. Confidence in ML's ability to predict market overreaction is mixed, with strong support for its use in high-frequency trading and risk assessment. Key factors for effective ML models include historical price data, trading volume, and news sentiment. Challenges such as data availability and model integration complicate implementation. Respondents foresee ML becoming increasingly integral to financial predictions, emphasizing the need for educational initiatives to enhance understanding of behavioral finance principles. The findings suggest a promising future for ML applications in finance, including trading and risk management.

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1. INTRODUCTION

1.1 Background

The evolution of financial markets has led to increasing interest in understanding behavioral biases, particularly market overreactions, and their implications for trading strategies and risk management (Filbeck et al., 2017). Market overreaction refers to asset price movements that exceed rational expectations in response to new information, often leading to temporary mispricing. Predicting such overreactions is crucial for improving market efficiency and optimizing investment decisions (De Meza et al., 2008).

Figure 1. Financial Behavior Prediction with Machine Learning

Source: Author

Machine learning (ML), a subset of artificial intelligence (AI), has emerged as a powerful tool for analyzing financial markets. Unlike traditional statistical models that rely on predefined assumptions, ML techniques autonomously identify complex patterns within large datasets, making them particularly valuable in predicting market behaviors (Mueller & Plug, 2006). However, past research has highlighted certain limitations in ML models, particularly in post-crisis environments. For instance, the 2008 financial crisis revealed the shortcomings of these models, as they struggled to adapt to unprecedented market conditions and exhibited poor predictive performance (Filbeck et al., 2017). Building on this foundation, recent studies have documented the overreacting behavior of ML forecasts, particularly in corporate earnings predictions (Jiang, 2021).

Behavioral finance research underscores the role of psychological factors, including emotions and cognitive biases, in shaping financial decisions (Kubińska et al., 2023). Emotional influences on investor behavior can result in market inefficiencies, which ML models seek to address by leveraging empirical data rather than subjective judgment (Donnelly & Ioannou, 2012). Furthermore, ML applications