

AI-Driven Stock Market Forecasting Using Financial Statement Analysis

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Chapter 1

1.1 Abstract

Traditional stock market prediction methods primarily rely on historical price movements, often neglecting fundamental financial indicators. This research aims to enhance stock trend forecasting by leveraging financial statement analysis and Artificial Intelligence techniques. The study incorporates key financial metrics, including earnings per share (EPS), price-to-earnings (P/E) ratio, book value per share (BVPS), price-to-book (P/B) ratio, revenue growth, and debt-to-equity ratio, to develop a predictive model. The proposed approach seeks to assist investors in making more informed decisions by integrating fundamental financial analysis with AI-driven forecasting models.

1.2 Introduction

1.2.1 Background and Motivation

Stock market prediction is a critical area of financial research, influencing investment strategies, risk management, and economic planning. Traditional forecasting methods heavily rely on technical analysis, which uses historical stock prices and trading volumes to predict future trends. However, these methods often overlook fundamental financial indicators, which are crucial in assessing a company's true value.

Incorporating financial statement analysis into stock prediction can provide deeper insights into corporate performance, financial stability, and market trends. With advancements in Artificial Intelligence (AI) and machine learning, there is an opportunity to develop more accurate models that utilize key financial ratios and fundamental indicators. This approach can help investors, financial analysts, and policymakers make more informed decisions, reducing risks and improving market efficiency.

1.2.2 Problem Statement

Despite the growing application of AI in financial markets, most stock prediction models focus on technical analysis, ignoring valuable financial data found in company statements. Traditional machine learning models often struggle to incorporate non-linear relationships between financial indicators and stock prices.

This research addresses the gap by developing a machine learning-based model that forecasts stock market trends using fundamental financial data. The study explores how key financial ratios such as EPS, P/E ratio, BVPS, P/B ratio, revenue growth, and debt-to-equity ratio impact stock price movement. By integrating AI-driven models, this research aims to improve the accuracy and reliability of stock predictions.

1.2.3 Research Objectives

- Develop an AI-driven model to forecast stock prices using financial statement data.
- Identify key financial indicators that influence stock price movements.

Chapter 2

2.1 Literature Review

2.1.1 Introduction

Financial statement analysis is essential for investors as it helps assess a company's financial stability, profitability, and potential growth. More importantly, it allows investors to determine whether a stock is priced, an attractive investment opportunity, or overvalued. This enables informed decision-making regarding stock valuation, risk management, and investment strategies. By analyzing financial statements, investors can distinguish between undervalued and overvalued stocks, anticipate financial distress, and understand market trends. Recent advancements in Artificial Intelligence have further enhanced the accuracy and efficiency of financial analysis. While technical analysis primarily benefits speculators, financial statement analysis remains crucial for long-term investors. This research explores the significance of financial analysis in predicting investment opportunities based on companies' financial statements.

2.1.2 Review of Key Studies

1 .Financial Statement Analysis and Earnings Forecasting

Financial statement analysis and earnings forecasting are critical components of investment decision-making. According to Monahan (2017), these analyses, particularly with an emphasis on accrual-based earnings over cash flows and dividends, play a pivotal role in predicting stock returns. Monahan introduced econometric models and panel-data approaches to enhance the accuracy of financial forecasts but highlighted the persistent dominance of the random-walk model. This raises concerns about the effectiveness of complex forecasting methods in real-world financial markets.

2 .Estimating Stock Price Based on Financial Statements Using Machine Learning Approaches

Kunathananon (2022) explored stock price estimation using financial statement data and machine learning techniques, specifically Long Short-Term Memory (LSTM) networks. His study demonstrated that LSTM models effectively capture intricate financial patterns and dependencies, significantly improving predictive accuracy. However, he emphasized the necessity of proper data preprocessing and feature selection to optimize model performance.

3 .Stock Price Prediction Based on Financial Statements Using SVM

Heo and Yang (2016) investigated the application of Support Vector Machines (SVM) for stock price prediction using financial statements. They analyzed key financial indicators such as Earnings Per Share (EPS), Book Value Per Share (BVPS), and Net Profit Growth Rate (NPGR). Their findings indicated that while SVM models provided reliable short-term stock predictions, their accuracy declined over time due to market efficiency constraints, aligning with the Efficient Market Hypothesis (EMH).

4 .Using SVM with Financial Statement Analysis for Stock Prediction

Similarly, Han and Chen (2007) applied SVM to financial statement-based stock forecasting and found that integrating multiple financial ratios improved predictive performance. However, they emphasized that careful parameter tuning is necessary to avoid overfitting, ensuring that models remain generalizable and effective across different market conditions.

References

- Kunathananon, T. (2022). *Estimating stock price based on information from financial statement using machine learning approach* (Master's thesis, Chulalongkorn University). Chula Digital Collections. Retrieved from <https://digital.car.chula.ac.th/chulaetd/5818>
- Monahan, S. J. (2017). Financial statement analysis and earnings forecasting. *Foundations and Trends® in Accounting*, 12(2), 105–215. <https://doi.org/10.1561/14000000036>
- Heo, J., & Yang, J. Y. (2016). Stock price prediction based on financial statements using SVM. *International Journal of Hybrid Information Technology*, 9(2), 57-66. <https://doi.org/10.14257/ijhit.2016.9.2.05>
- Han, S., & Chen, R.-C. (2007). Using SVM with financial statement analysis for prediction of stocks. *Communications of the IIMA*, 7(4), Article 8. <https://doi.org/10.58729/1941-6687.1059>