

An LSP-based approach for investment decision making: Case of US stocks selection

Milica Zukanović¹[0000-0003-3650-8327] and Aleksandar Rakićević¹[0000-0002-8917-7229]

¹ University of Belgrade– Faculty of Organizational Sciences, Jove Ilića 154, 11000 Belgrade, Serbia {milica.zukanovic, aleksandar.rakicevic}@fon.bg.ac.rs

Abstract. Investment decision making is one of the topics that attracts a remarkable attention, due to the complexity of the problem and potential financial reward attached. It is a challenging task characterized by the countless number of factors, difficulty to identify the most informative ones and their nonlinear influence on stock market movements. Different types of criteria were developed for evaluation of stock market investments based on macroeconomic analysis, financial analysis, statistical analysis, technical analysis, sentiment analysis etc. Further, a large number of linear and non-linear methods have been used to search for favourable patterns and detect investment opportunities, from expert-based approach to machine learning approach.

Logic Scoring of Preference (LSP), introduced in 1973 by Dujmović [1], is a soft computing decision method based on graded logic aggregation. The LSP method is a sophisticated nonlinear model appropriate for the expert-based decision-making. The method can be implemented in few steps, that are easy to understand, and provides a structured framework for decision-makers [2]. For this reason, there is a wide field of potential applications, including finance. This study continues research on the logic-based methods for investment decision making [3-4].

In our research, we used the LSP-based aggregation model to develop a decision-making model for stock selection on US stock markets. The proposed model is defined based on an expertise of a financial professional. The model uses different types of criteria (financial ratios) to discover attractive investment opportunities (stocks). Financial ratios are structured in four silos (groups) based on the aspect of financial analysis: valuation, cash flow, business activity and liquidity ratios. Each group contains two ratios that are first aggregated within the group, before further aggregation of groups. In the first group (valuation) we identify earnings per share to price and enterprise value growth rate. The second group (cash flow) contains the ratio of operating cash flow to total assets and free cash flow yield. The third group (activity) includes the ratio of net operating assets to total assets and asset turnover ratio. Finally, the fourth group (liquidity) of ratios consists of cash and cash equivalents to total assets and working capital to total assets.

The proposed model is evaluated on US stock market data. The dataset used in this study comprises values of financial ratios for S&P500 companies. The data covers a period of eleven years, from December 2012 to December 2023 with quarterly reports for each company on an annual basis. After preprocessing of

data, which involves handling missing values, adjusting for corporate actions, and aligning the data set for consistency and accuracy, the final dataset consists of approximately 18,000 observations.

As the first proposed application of LSP method in financial/investment analysis this model contributes to an overall knowledge, but also pavs way for more efficient (automatized) investment decision making.

Keywords: Logic Scoring of Preference, Aggregation model, Investment decision making, Stock market, US stocks selection.

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