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Predicting Value At Risk: An Artificial Intelligence Approach

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EXTENDED ABSTRACT

INTRODUCTION

The purpose of this study is to compare the accuracy of predicting market risk calculation methods of value at risk with the relevance of the artificial intelligence approach. the increasing development of financial markets has revealed the importance of estimating the well-known measure of market risk, risk value more than before. Value at Risk (VaR) is a statistical measure that calculates and quantifies the maximum expected loss from holding an asset or portfolio over a period of time with a certain probability (known confidence level) and is one of the most important market risk criteria that is widely used to manage financial risk by financial regulators and portfolio managers. Macro-level risks have pervasive effects and can have negative effects on the entire financial market.

METHODOLOGY

Therefore, using daily stock price information, the value at risk was calculated and used by parametric methods (variance-covariance method), historical simulation, bootstrap simulation between the time period of 1390 to 1396 Tehran Stock Exchange for statistical sample companies. After reducing the fluctuations of the Bootstrap, Historical and Variance covariance methods using wavelet transformation for model training and forecasting, the method uses every 15 consecutive days as input (the same independent variable) in the RVM model and the 16th day as the dependent variable in It was considered and to evaluate the models, two evaluation criteria named Mean Square Error (MSE), Mean Absolute Value of Error (MAE) have been used for prediction, and communication vector machine algorithm has been used. The RVM algorithm is a non-linear model and it causes the algorithm to become non-linear by transferring data from the input space to the feature space. Gaussian kernel is used for nonlinearization in communication vector machine.

FINDINGS

The results of testing the hypotheses and fitting the relevant artificial intelligence algorithm showed that the artificial intelligence algorithm is an efficient method for predicting daily value-at-risk methods. Also, in the Iranian capital market, risk-value forecasting is done with the semi-parametric bootstrap method with higher power and is recommended for use. Parametric methods (variance-covariance) and historical simulation are in the next ranks.

CONCLUSION

The studies conducted on value at risk have been limited to one industry or with portfolio definition and all listed companies have not been investigated. The widely used variance-covariance, historical simulation, and bootstrap simulation are calculated and they are predicted using artificial intelligence algorithm. In a way, the previous researches have a smaller statistical population and lacks measurement of the effectiveness of the models in practice. The results show that the power of the bootstrap simulation method in predicting the value at risk is greater than other methods, although the parametric method (variance-covariance) with a large difference Partial is placed in the next rank, and the historical method is placed in the last rank of this classification.

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