

STOCHASTIC DIFFERENTIAL EQUATION MODELING FOR GOLD DATA WITH YUIMAGUI

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Abstract

In this study, GOLD data versus USD is investigated by Stochastic Differential Equation Modeling (SDEM). First of all, Square Root Process, Geometric Brownian Motion (GBM), Vasicek Model (VAS), and Cox-Ingersoll-Ross (CIR) models have selected from the most preferred models in finance. Then, the parameters of the mentioned SDE models have estimated using the quasi maximum likelihood method. Secondly, It has been given the p-value for the Kolmogorov-Smirnov test that checks if the empirical and theoretical distribution are the same to see the goodness of fit of the model. Accordingly, all selected models fit well with the given data. After that, model selection has been made among these 4 compatible models according to AIC and BIC criteria. Therefore, for the given data, the VAS model is the most appropriate model according to both criteria. Finally, by using the VAS model, which has been chosen as the most appropriate model, and applying Euler-Maruyama Approximation Method future simulation trajectories of 100 steps between 25.04.2022 and 25.04.2023 have been obtained. Gold opening data with the symbol GC=F between 02.01.2020 and 25.04.2022 have obtained with the help of <https://finance.yahoo.com/> link, with the YUIMAGUI interface of the RSTUDIO program and all results have also made by using YUIMAGUI. These results are also corroborated by graphical representation.

Keywords: stochastic differential equation , quasi maximum likelihood, Euler-Maruyama approximation method, square root process, CIR, GBM, VAS, YUIMAGUI.

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