Portfolio optimization of Stock, Oil and Gold returns: A Mixed Copulabased approach

Sukrit Thongkairat, Woraphon Yamaka and Nopasit Chakpitak

Abstract. This paper applies the concept of copula based GARCH to the problem of finding the efficient frontier associated with the risk-return portfolio optimization model. Various families of the mixed copula structures, both Elliptical and Archimedean copulas, are proposed to deal with the complicated dependence structure in the financial portfolio. We then apply these mixed copula models to investigate the portfolio risk composed of stock, oil and gold returns and also compare the mixed copula with the conventional copula in order to show the better performance of the mixed copula in terms of the lowest AIC and BIC. The empirical results show that, compared with traditional methods, the mixed Gaussian and Student-t copula model describes the dependence structure of the portfolio return series more successfully. Finally, we apply the best fitted model to do the Monte Carlo simulation for constructing the efficient frontier and find the optimal investment using the minimized variance and tangency portfolio approaches.