

## **A Portfolio Comparison of a Kelly Criterion with Markowitz Model: A Case Study with KOSPI 200**

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### **Abstract**

Both the academicians in schools and the practitioners in a finance industry, to some degree with suspicion, have paid much attention to a Markowitz' portfolio model. But it has been said that it has a pronounced deficiency that if  $E_i$  and  $\sigma_i^2$ ,  $i=1, 2$  are the expectation and variance of 1 and 2, then if  $E_1 < E_2$  and  $\sigma_1^2 < \sigma_2^2$ , according to a mean-variance criterion, the model does not allow decision makers or investors to take either of them. But when  $F_1(x) < F_2(x)$  for all  $x_i$ , there are explicit instances where he/she will select the second portfolio over the first. Since the Markowitz considered only the first and second moment in his portfolio model, the incompleteness of the model is understandable. Since a Kelly criterion takes higher moment information when he/she constructs a portfolio with an objective function of maximizing an expected geometric mean of a portfolio, denoted by  $E \log X_N$  where  $X_N$ : a terminal value of a portfolio, it is expected that the Kelly criterion generates a performance of an investment portfolio better than a Markowitz model; a higher return and less risk with the Kelly criterion. So we constructed a portfolio optimization model with the Kelly criterion and Markowitz model of a portfolio to look to the results of the two models. For this study, we used data on the weekly stock prices of the companies listed in KOSPI 200 in a Korean stock market. As will be presented, the Kelly criterion yielded a better performance of the portfolio with higher expected return and less risk than the Markowitz model.

### **Keywords**

Kelly criterion, Markowitz' Portfolio, KOSPI200

### **Biography**

**Kim, Gyutai** received a Ph.D. from Industrial and System Engineering at Auburn University, AL. with a major in Engineering Economics advised by Dr. Park, Chan S. in 1994. And he began his academic career in the Department of Industrial Engineering at Chosun University in March of 1995. His current research areas include the applied theories of the Kelly criterion and real options pricing, an economic evaluation of an R&D investment projects, and the applications of the Industrial Engineering tools to a service engineering field. He published the papers in International Journal of Production Economics, The Engineering Economics, Journal of Manufacturing Systems, International Journal of Advanced Manufacturing Systems, etc.

**Jung, Suhee** is currently a Ph.D. candidate in the Department of Industrial Engineering at Chosun University. She received both a bachelor and master degree from Industrial Engineering at Chosun University in 2004 and 2007, respectively. Her research areas of interest are a derivation of intrinsic stock value, an application of control charts to an investment decision making, and a Bayesian theory in finance. She has published a number of papers in Korean academic journal and presented a numerous papers in many international and domestic academic conferences.