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How to Anticipate Correlation Breakdowns

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ABSTRACT

In the last couple of years, we observed a multiplication of papers on the subject of correlation breakdowns, namely the fact that the correlations between the returns of large assets classes tend to increase in times of stress. We question the strategies of anticipation of a change in correlation, meaning how to anticipate a correlation's rupture. The problem is a multi-objective combinatorial optimization model, it consists in finding solutions while respecting constraints that optimize the objective function which is to maximize the return of a portfolio on the one hand and to minimize the risk on the other hand. Therefore, we are interested in optimizing a portfolio with two objectives. This model allows us to anticipate the period of a correlation break.

The problem has been implemented on CPLEX with the C++ language, by performing simulations on 9 daily frequency assets of chimie_Sant from 01/11/2010 to 28/10/2019, in order to calculate, for each pair of securities, the correlation, then to predict the existence or not a break of correlation. It is observed that the constraints of the model give the choice of each weighting on each security. Also if the correlation's coefficient changes there will be remarkable evolutions on the value of the optimality, with the outcome of the model we can anticipate the change of the correlation.

KEYWORDS Correlation breakdowns; Multi-objective combinatorial optimization; Portfolio diversification

JEL C44, C61, G11