Collaboration in Portfolio Selection and Investment: A Multi-Period Cooperative Game

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Abstract:

A common assumption in traditional portfolio optimization is that a single investor can always act alone to achieve her investment goals. In reality, however, it is more often that she may have to cooperate with other investors, for reasons such as: (i) the investment has to go over a number of time periods, but her funding may not be sufficient over all time periods; and (ii) the risk is probably too high for a single investor to undertake. This gives rise to the problem of cooperation in multi-period investment, where a number of investors wish to cooperate, to pool up the resources they own to make certain investment projects feasible, and to share the risks of loss under some mutually agreeable mechanisms. We can show that similar problems occur not only in financial investment, but also in other situations such as industrial project selection and cooperation, logistics and supply chain management, and stochastic scheduling with outsourcing.

In this talk, we will introduce a cooperative game model to address the problem. In particular, we will describe a min-max risk measure that we have developed for situations involving conservative investors. We will show that the min-max measure may make the investment cooperation problem become a linear production game, and therefore enable the distribution mechanism (the core of the game) to be obtained via solving a dual problem. Interesting and difficult issues that remain open and need further research efforts will be illustrated, and possible extensions to other areas will also be discussed.