

Risk allocation with liquidity considerations

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Abstract

Consider some portfolios of risky assets and the aggregated portfolios generated by combining these portfolios. A risk allocation game is a cooperative game derived from this setting, where a player is a portfolio and the payoffs are determined by the risk of the portfolio. The risk of a portfolio is measured by a coherent measure of risk for a given future point in time. In this paper we consider risk allocation games with liquidity constraints, where for each state of nature a given Liquidity Policy (requirements on the liquidity of the portfolio) and random Marginal Supply-Demand Curves (corresponding to the order books of the assets at the given future point in time) determine the value of a portfolio. We define the resulting transferable utility game and show that it coincides with the class of totally balanced games. It follows from our results that even with liquidity considerations there is always a stable way to allocate risk (no coalition of the players would object it). However, also in this setting Young's (1985) characterization of the Shapley value holds, that is the natural fairness requirements of Stability, Symmetry and Incentive Compatibility about a risk allocation rule can not be satisfied at the same time, one has to give up at least one of them.