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Cooperation under uncertainty: assessing the value of risk sharing and determining the optimal risk-sharing rule for agents with pre-existing business and diverging risk attitudes

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Abstract— The allocation of risk among the cooperating parties in a shared project is an important decision. This is especially true in the case of large infrastructure investments. Existing risk allocation methods are either simplistic or do not consider the effect of the agents' pre-existing businesses. In this paper, we model and analyse the effect of risk sharing when two agents want to co-develop an energy infrastructure project in an uncertain environment. The cooperating agents have a pre-existing risky business, and the new common project has a deterministic initial cost but random revenue potential. Our analysis shows that the optimal risk-sharing rule depends not only on the agents' risk aversions but also on the volatility of the common project profit, the volatilities of the agents' pre-existing businesses and the correlation of each agent's pre-existing business with the common project. An illustrative example based on energy infrastructure is used to show the implications of the sharing rule for partners.

Index Terms— Energy infrastructure investment; Risk sharing; Cooperation; Contracts; Uncertainty; Risk averse agents

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