PORTFOLIO CONSTRUCTION

Solving Asymmetric Variational Inequalities via Convex Optimization

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Using duality, we reformulate the asymmetric variational inequality (VI) problem over a conic region as an optimization problem. We give sufficient conditions for the convexity of this reformulation. We thereby identify a class of VIs that includes monotone affine VIs over polyhedra, which may be solved by commercial optimization solvers.

In this paper, our contributions are as follows:

1 Using duality, we reformulate any such VI as a single-level, and many-times continuously differentiable optimization problem, even if the associated cost function has an asymmetric Jacobian matrix.

2 We give sufficient conditions for the convexity of this reformulation. We thereby identify a class of VIs, of which monotone affine (and possibly asymmetric) VIs over polyhedra are a special case, which may be solved using widely available and commercial-grade convex optimization software.

3 In addition, we note that the VI problem may be viewed as a special instance of a robust constraint, and that robust optimization therefore subsumes the VI problem.

eliminate the risk of experiencing investment losses.

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