January 29, 2024
2:00pm-3:00pm
KAP 414

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The set-valued Bellman's principle: A look at the mean-risk problem and model uncertainty

Abstract: Dynamic programming and the Bellman's principle are tools widely and successfully used to tackle stochastic optimal control problems in financial mathematics as well as in other fields. In the recent years, a counterpart of the Bellman's principle has been studied for problems such as those with multiple or set-valued objectives or for games.

In the first part of this talk, we will discuss time consistency and Bellman's principle in the context of the mean-risk problem. The mean-risk problem is an approach to portfolio selection that is naturally bi-objective -- an investor wants to maximize expected mean return and at the same time minimize risk. Despite this, the problem is usually treated in the literature in its scalarized form as a single-objective problem and as such is known to be time inconsistent. In our work we were able to show that the mean-risk problem in its original bi-objective form is in fact time consistent (in a sense appropriate for bi-objective problems). We also derive a counterpart of the Bellman's principle appropriate for the bi-objective problem, the set-valued Bellman's principle.

In the second part of the talk, we will move to considering model uncertainty for dynamic problems with multiple objectives. Our focus will be on the robust approach, where one wishes to optimize under the worst case scenario. We will consider the appropriate problem formulation and how this set-up impacts the set-valued Bellman's principle.

Zoom Link: USC Math Finance Colloquium

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