Title:

## Modeling Contracts and Incentives in Agricultural Cooperative Supply Chains

Abstract:

In agricultural marketing co-operatives (co-ops), a group of farmers or growers collaborate under a single cooperative organizational structure to process and market their products. The trade-offs faced within the supply chain are often different to those faced by traditional investor-owned firms. For example, most co-ops pledge to take all product produced by farmers, rather than being able to place specific orders with suppliers. Further, operational and financial decisions become inseparable because capital investment decisions are linked to the co-op's economic transactions with its members. This is particularly true for so-called proportional investment co-ops, where farmers' equity is required to be in proportion to their patronage. That is, farmers who supply a greater quantity of the given product are required to supply a proportionately higher amount of equity for the co-op. Supply yield uncertainty adds another dimension to the difficulty of coordinating the supply chain. In this talk we consider contracts and incentives in the agricultural supply chain. We present two specific models. The first is a game-theoretic model when farmers' efforts lead to higher quality. The second is a Markov decision process wherein the decisions of processing quantity interact with the financial decisions of retained earnings and short-term loans.

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