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Water Options in California: Effective Management of Supply-Side Risk

Richard Howitt
University of California - Davis

Jeffrey Williams
University of California - Davis

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WATER OPTIONS IN CALIFORNIA: EFFECTIVE MANAGEMENT OF SUPPLY-SIDE RISK

Richard Howitt, Department of Agricultural and Resource Economics, University of California, Davis, One Shields Avenue, Davis, CA 95616, howitt@primal.ucdavis.edu, 530-752-1521
Jeffrey Williams, Department of Agricultural and Resource Economics, University of California, Davis, One Shields Avenue, Davis, CA 95616, williams@primal.ucdavis.edu, 530-754-7625

In California, the tremendous spatial and temporal variation in precipitation suggests that flexible contractual arrangements, such as option contracts, would increase allocative efficiency of water over time and space. Under such arrangements, a water agency pays an option premium for the right to purchase water at some point in the future, if water conditions turn out to be dry. The premium represents the value of the flexibility gained by the buyer from postponing its decision whether to purchase water. In California, the seller of existing option arrangements is often an agricultural producer who can fallow land, in the event that a water option is exercised.

In this analysis we determine the theoretical value of transferring water uncertainty from one party to another at several locations in California, given current water prices and the spatial and temporal distribution of water year types in the state. (Preliminary analysis covers northern California; future analysis will incorporate southern California.) We use tools from finance theory and output from CALVIN, an economic-engineering optimization model of the California water system. CALVIN runs the current configuration of the California water system over historical hydrological conditions, to generate water's imputed price at different locations during different seasons. We analyze within a mathematical programming framework whether increased trading among water agencies across time as well as space would result in significant gains from trade. Finally, we explore reasons why previous theoretical calculations of option value in the western United States have far exceeded option premia on existing bilateral contracts.

Contact: Kristiana Hansen, University of California, Davis, hansen@primal.ucdavis.edu, Department of Agricultural and Resource Economics, University of California, Davis, One Shields Avenue, Davis, CA 95616, 530-754-8522, 530-752-5614