

A NETWORK FORMULATION OF COMPETING DEMANDS FOR WATER AND ENERGY: TRANSACTION COSTS, PROPERTY RIGHTS, AND RENTS

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Overview

Using a variational inequality approach, this paper investigates transaction cost and economic rent consequences of choosing between market and command-oriented institutions in light of their respective network structure.

Methods

Network formulation and variational inequality analysis capture competing demands for energy and water against spatial features and precedence constraints.

Results

Transaction cost theory predicts that if property rights are designed to allow for the emergence of water markets, there exists a rent-minimizing equilibrium between competing demands for irrigation water and electricity-generating flow. A decentralized, network formulation of the resource-allocation problem sensibly captures transaction cost, property rights, and institutional considerations not otherwise reflected under a neoclassical lens.

Conclusions

As Coase has suggested, where transaction or bargaining costs are significant, the choice of property rights impacts economic efficiency. As water flows across jurisdictions, property rights change, impacting both the availability of water and its economic benefit across competing demands that are distributed over both time and space. Unlike conventional neoclassical formulations, network models explicitly reflect transaction costs between agents as arcs, and therefore provide an alternative basis for comparing institutions.

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