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WATER AGENCIES' DISTRIBUTION AND INEFFICIENCY UNDER DIFFERENT DECISION RULES

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Water management organizations often distribute water among members according to a political decision function (e.g., voting, historical delivery, etc.) -- not economic functions of willingness to pay or shadow values. As a result, scarce water supplies are lost to some members and found by others, leading to, respectively, over-conservation or over-use of water by the members.

We find analytical equilibria with a two-player, game-theoretic model of optimal water distribution under economic (base case) and different political allocation rules (historic allocation, land-values, population, agricultural intensity) to measure the theoretical distortion of each allocation compared to the base case. We then simulate model with n-players to examine the effects of heterogeneous types and interactive influences with different parameter values. We compare these results to the actual allocation of water between the 26 members of the Metropolitan Water District of Southern California to estimate the distribution of costs and benefits to MWD members under MWD's political allocation mechanism.

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How Inefficient Are Rules for Distributing and Pricing Water
at the Metropolitan Water District of Southern California?
Can We Improve on Them?
(*Extended Abstract*)

David Zetland

The Metropolitan Water District of Southern California (MWD) is a wholesale cooperative mainly concerned with distributing both treated and untreated water from the State Water Project (SWP) and Colorado River Aqueduct (CRA) to its 26 member agencies, who then redistribute the water to customers or other water agencies.

In this paper, I demonstrate how the rules governing the quantity delivered and the price charged in MWD-member transactions decrease overall efficiency. I develop inductive models of quantity and price separately to reflect the fact that quantity and price are not jointly determined: Quantity can be a function of administrative allocation, not price; price is often a function of projected, not actual, quantity demanded.

For quantity, I use an analytical model to show how water allocation via preferential rights leads risk-averse managers to underinvest in productive infrastructure. I also argue that the mere presence of preferential rights—even if they are not exercised—can create the same effect.

For price, on the other hand, I show how MWD's current price schedule distorts signals to conserve scarce water. The resulting increase in base demand and conveyance capacity leads to higher volatility of quantity demanded. Misallocated resources and mismatched supply and demand create inefficiency and pressure for expensive solutions that do not address the root causes of the problem.

I conclude with a qualitative discussion of how markets might replace decision rules to increase efficiency in quantity and price, while maintaining MWD's present engineering and organizational structure. Although this paper is explicitly concerned with efficiency (ensuring that scarce water supplies end up with those who value them most), equity considerations are never far from the surface. The current rules for deciding quantity and prices are fair to some and not to others; MWD's institutional structure could be the foundation of a framework combining efficiency while transparently addressing equity. I suggest evolutionary steps to take MWD in the right direction.

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