

Policies and Technologies for a Sustainable Use of Water in Mexico: A Scenario Analysis

Topic: Applications of water IO

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Water stress in Mexico is intimately linked to agricultural activities as irrigation claims 70% of national water withdrawals. The Mexican mix of irrigation technologies is dominated by flood techniques, utilized in 93% of irrigated land, while alternative drip and sprinkler systems, both with higher application efficiencies, are utilized in only 7% of irrigated land. This paper studies the extent to which public policies can induce the adoption of alternative irrigation technologies to promote a sustainable use of water. The framework is a multi-regional input-output model formulated as a linear program that solves for cost-minimizing allocations of output that are constrained by regional factor availability. The model features endogenous choice among alternative agricultural technologies and determines commodity prices based on factor costs and on scarcity rents for limiting factors of production.

The study defines and quantifies sustainable endowments of water at the regional level and performs a scenario analysis that combines the implementation of water policies with the availability of alternative irrigation technologies. The paper finds that water policies can promote water sustainability although at the expense of increasing the national price of agricultural output. In the scenario in which technology adoption is absent, water sustainability generates an increase of 36% in the agricultural price relative to a baseline. In the scenario in which technology adoption is possible, either the pricing of irrigation water or the establishment of use caps generate enough adoption to support sustainability at increases in the agricultural price smaller than 10%. Water pricing for irrigation water can generate enough public revenue for the government to cover for the total costs of technology adoption, which are computed including the financial costs of upfront investments.