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Efficiency of Water Use in Groundwater Markets: The case of Peninsular India

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Abstract

In the hard rock areas of India, overdraft of groundwater is resulting in cumulative interference and thus leading to negative externalities, increasing cost of groundwater irrigation and causing welfare losses. Groundwater markets are slowly emerging as niche markets. They are believed to have the potential to improve water distribution and to mitigate water scarcity by stimulating more efficient use. The effect of groundwater market introduction on the efficiency of water use is studied in this paper using Data Envelopment Analysis (DEA). A sample containing three categories of farmers was collected to test the hypothesis of more efficient water use. The first category consists of farmers who only use the water of their own tube wells for irrigation and are thus not selling or buying groundwater. This is the control group. The second category consists of farmers who apart from using the water from their wells for irrigation also sell part of the water to neighbouring farmers. This group is called ‘water sellers’. The third group contains farmers who buy all or part of the water they use for irrigation. This group is called ‘water buyers’. From each category 30 farmers were included in the sample.

The calculated subvector efficiencies for water use show that water buyers use water most efficient. But also water sellers are more efficient in their water use than the control group. Differences in average efficiency between these groups are shown to be significant using a Kruskal-Wallis test. This finding confirms that groundwater markets can add to improving efficiency of water use. Moreover results indicate that the existence of groundwater markets offers resource poor farmers, who do not have the capacity to invest in their own well, the opportunity to benefit from the improved agricultural productivity created by irrigation. In the light of proposed changes in groundwater legislation and policies for improving water use efficiency these empirical results provide crucial information to policy makers.

Keywords: Data Envelopment Analysis, groundwater markets, India, water use efficiency