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DERIVATION OF THE IRRIGATION WATER DEMAND FUNCTION: A GREEK EXPERIENCE

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EXTENDED ABSTRACT

The management of irrigation water in Greece is a quite important issue for two main reasons: (a) agriculture contributes highly to the country's GNP and (b) irrigated agriculture is by far the major water-consuming sector, accounting for more than 80% of the country's total water consumption. As a consequence, any change in the economics of irrigated agriculture is also of national importance. The implementation of the Water Directive of the European Union is the most apparent future cause of such a change, particularly as far as a potential reform on irrigation water pricing is concerned.

In relation with the above, the present paper aims mainly at examining the role of water pricing as an instrument for the control of irrigation water use. This is done through the derivation of an irrigation water demand function based on real data from a typical agricultural area in Northern Greece. Once estimated, the demand function can next serve at evaluating the efficiency of any particular water pricing policy, by considering not only the reduction of water consumption due to pricing but also the impact of each policy upon crucial factors of the agricultural production (e.g. farm income and agricultural employment).

The methodological approach that is employed in order to derive the water demand function is based on the profit maximisation hypothesis. With this approach the decision-maker's objective is to maximise profit estimated as the gross margin of the farm. To achieve this a linear programming model is formulated, in which the acreages of the most common crops cultivated in the study area form the set of decision variables. Various relationships, concerning agricultural policies, local cultivation practices and market conditions and transactions, constitute the set of constraints of the employed model.

The results of the study, quite innovative for Greek conditions, are positively compared to those from similar studies abroad. The water demand curve was calculated for a range of price levels from a zero one, which describes the present situation, up to 0.20 €/m^3, a price above which water consumption becomes null. The analysis shows that price rising can lead to important water savings, but at the expense of severe reductions in farm income and a significant loss of rural employment. Such a decrease of the water demand requires also a drastic change in the distribution and type of crops.

As a conclusion, the study shows that, under the current circumstances, water pricing alone cannot be considered as a proper instrument for the control of water use in Greek agriculture. Nevertheless, a limited use of such a policy could be successfully combined with more popular alternative lines of action, like the application of water-saving technologies.

Key words: irrigation water, water demand function, water pricing, linear programming