

Environmental – economic modelling of main crops in Mazandaran province

Abstract

Agricultural policies cannot be analyzed essentially in a laboratory, but they must be analyzed before, during or after the policy action using Mathematical Programming (MP) models. In this study, an environmental – economic model for sustainable use and respond to environmental goals in agricultural sector is developed. To create this model, a combination of Positive Mathematical Programming (PMP) and Metafrontier (MF) Model were used. In addition, various indicators of sustainability were considered in the model. This model is used to evaluate increased prices of chemical fertilizers and poisons, and combine them with direct payments in the province of Mazandaran. In order to avoid bias caused by the investigation of farmers with different attributes and behaviors in a pattern, initially, farmers whit using cluster analysis were classified in terms of sustainability to homogenous gropes and then each of these groups are divided into classes in terms of size and finally considered a model for each group. The results showed that the policy of increasing prices of chemical fertilizers had the greatest impact on improving sustainability index. While applying this policy, combined with the policy of direct payments showed smaller effects due to the distribution of this payment between all inputs and not merely reflected in the increased consumption of chemical fertilizers. In addition farmer's reaction according to the degree of sustainability and farm size were different in diverse regions. The average energy technological gaps ratios vary between 0.49 and 0.88 in the region and the possibilities of improving this index through price scenarios are more likely.

Keywords: Environmental–economic modelling, Positive mathematical programming, Metafrontier model, Mazandaran province



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