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Economic inefficiency and shadow prices of inputs: The case of vegetable growing farms in Uzbekistan

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Abstract

This article was devoted to an overall estimation of the economic inefficiency of the sample of vegetable growing farms in Uzbekistan. Because our analysis is based at the farming system level, we have been able to estimate the allocative (price) inefficiency of vegetable producers. Another significant finding of this study is that we have shown the economic inefficiency of each input under consideration. We have also applied a technique that calculates shadow prices of land and labor (for which no price information was available) using existing price information for diesel input under existing production inefficiencies. We found relatively large inefficiencies in the production of vegetables, both technical and allocative, whereas technical inefficiency played a relatively major role in overall inefficiency. As the model's results show, seed is economically the most inefficiently used input in producing vegetables. We found a possible cost savings if farms followed best-practice farm groups, which were used for the construction of frontier.

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1. Introduction

Uzbekistan has a favorable agro-climatic condition that is suitable for the production of a variety of vegetable crops and fruits, famous in Central Asia (CA) and abroad. While cotton has been the main agricultural crop since the last century in Uzbekistan, the country is also a significant producer and supplier of vegetables to other parts of the Former Soviet Union [FSU] (Djalalov, 2006 and Azimov, 2006). Following independence of the country in 1991, Uzbekistan's external market affairs with other FSU countries collapsed.

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This, and other factors, such as environmental degradation (e.g. water scarcity, increased soil salinity) and the state led grain policy, greatly influenced the cropping pattern. Uzbekistan lost its previous vegetable production volume, which was sustained because the state quota was given to the large state and collective farms. Vegetable yields also went down in the initial years of independence, illustrating a similar trend with other FSU countries. There are also other obstacles associated with the decrease of vegetable productivity. Abbasov, 2005 stated that some of the constraints for production include the insufficient supply of organic fertilizers, fuels and plant protection technologies. Buriev et al., 2005 listed other relevant factors that adversely affected vegetable yields, including limited access to irrigation water, the use of obsolete technologies and inadequate mechanization. Olimjanov and Mamarasulov, 2005 linked low vegetable productivity with the existing poor functioning institutions, emphasizing that the fall in vegetable production led to the decrease in the consumption of vegetables and caused nutrition deficiencies among the rural and urban population, whose vegetable consumption amounts were below the set norms. The decline also overlapped with policies related to agriculture (e.g., price control, subsidized credit and low priced irrigation provision). Some policies were directly related to institutional reforms, such as land reforms and farm restructuring. Since the vegetable sector enjoys the best prospects for attracting foreign investment and also because of food security reasons at the national level, the state is keen in the development of the profitable and competitive vegetable sector. Thus, it is interested in improving the competitiveness of vegetable farms. It is noted that, over the two decades after independence, the prices of vegetable crops increased, but more notably, the prices of resource endowments increased more relative to the prices of vegetables. Because of existing state quotas, input prices were only partially liberalized. It should be mentioned that partial liberalization leads to decreases in allocative efficiency (AE), because of resource diversions (Murphy et al., 1992). It should be noted that inputs for strategic crops were delivered by state owned organizations, while farmers who grew other crops had to buy the same inputs on the market for higher prices. This is a major cause for the existence of allocative inefficiency (AI) in crop production (refer to the price theory for further discussion). Taking this into account, the goal of this study is set to conduct an economic efficiency (EE) of vegetable growing farms (VGFs) in Uzbekistan. Measurements of EE reflect the ability of producers to achieve both technical efficiency (TE) and AE (cost minimization). Efficiency analysis is based on VGFs, because cost information only exists for VGFs that are free in their farm operations, in comparison to cotton and grain producers. Efficiency scores are calculated at the vegetable farming level (VFL), because the objective of this study is to see TE and AE at the farm system level, not at the crop specific plot level. Because of this objective, the homogenous output level is constructed for each VGF by valuing vegetable production in monetary terms. Because of the utilized technique (i.e., duality), the term 'technical inefficiency' (e.g. TI) rather than 'efficiency' (e.g. TE) is appropriate and used in the study. The methodology introduced in this study allows for the derivation of the shadow prices of inputs, such as land, labor and other inputs. The important thing is that these shadow prices are obtained under the existence of production inefficiencies in vegetable production which permits farms to function below the full TE level. Moreover, the implicit prices derived in this study may be helpful to the continuing discussion on land and labor reforms in the country.

2. Methodology

2.1. Empirical model specification of economic inefficiency

We employ the directional input distance function (DIDF) model, because of its flexibility in the estimation. Our approach is non-parametric, which uses the data envelopment analysis (DEA) technique. It measures the directional distance between each observation and the relevant frontier. AI is calculated by

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