The Efficiency of Small Sized Farm Producers in Burkina Faso

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Introduction

In Burkina Faso, there are 2 types of crops: the rain fed crops, which are watered by nature for their growth, and the irrigated ones, which need to be hand watered. Because of the irregularity and scarcity of rainfall noticed over the past 20 years, farmers and the government decided to turn to irrigated crops. Initiatives like the Pilot Private Irrigation Development and Related Activities (DIPAC) and the development of the small village irrigation system (PPIV) initiated in 2001-2003 reflect that trend.

Rice is one of the irrigated crops which has drawn the attention of agricultural researchers, policy-makers and farmers. Therefore, the irrigated rice production increased from 14,267 tons in 1994-1995 to 56,430 tons in 2006-2007, representing an average annual growth rate of 103%.

Questions of the Study

At a time when farmers of rice have decided to expand the acreage of their cultivation areas, we propose to measure the efficiency of the production of irrigated rice. The aim of our study is to find out the effectiveness of the use of resources in rice production and how to improve it. This is relevant because of the scarcity of these resources and the adverse consequences on the environment that their overuse can result in. Moreover, the agricultural world is affected by the weakness of financial and material resources available to farmers: in 2007, the average income of rural households was 820 176 CFAF ($1=500 FCFA).

Data Details and Variables

The data collected provides variables after the clearance of 220 farmers selected randomly from 853. They were collected during the General Census of Agriculture in Burkina Faso held from 2006 to 2010. For our study, we have considered a small sized farm every plot which surface is inferior to 0.25 ha.

The variables used for this study are: production of the farm (the dependant variable), amount of labour used in man, hectares of land cultivated on each plot and the quantity of fertilizer used in grams; the other variables concerned the determinants of the inefficiency.

95.9% of rice farmers own their land parcel, while 4.1% worked on a plot they rented. 98.6% of women leaders working on their own plot.

The average age of the farmer is 42 years and 25% are women. The average age of women producers is 42 while that for men is 43. 42% of producers are less than 39 years old and 13.6% are over 60 years, while the relative majority of producers (44.4%) were between 40 and 50. Moreover, most of them are married (89%) while 5% are single. Compared to rain fed crops, irrigated rice farmers are on average older: the scarcity of irrigated land makes them less accessible to youth. Farmers have an average experience of 9.54 years in the irrigated rice farming practice.

Regarding education level, 67.7% of farmers are illiterate, 9.5% are literate in the national language, and 11.4% went through primary school and the other 10% through Muslim schools.

The average area under cultivation is 0.1 ha, while the average production of 331 kg has an average yield of 3.3 tons per hectare, which is below the world average yield for rice amounting to 3.9 tons/ha (*UNCTAD, 2010*). It varies between 0.050 and 1658 kg. 43.1% of producers have resorted to the use of credit for the productive process. On each plot are employed on average 8.85 persons.

Definition of the Concept of Technical Efficiency

The technical efficiency reflects the ability of a firm to optimize its output for a given level of inputs and, symmetrically, to minimize resource consumption for a given level of production. It reflects the organization of work within the production unit--the ability to organize, motivate and effectively monitor employees and supervisors or the ability to avoid mistakes and bad decisions.

Several methods for estimating the efficiency have been proposed since the pioneering work of Farrell (1957). Thus, two decades later, two main families of methods are competing in how to build the border and therefore to calculate the technical efficiencies: parametric methods and nonparametric methods. The parametric approach assumes that the boundary is represented as an analytic function depending on a finite number of parameters. The problem is to specify that function and to estimate the parameters, either

Econometric Specification: Estimation of Technical Efficiency

The stochastic production frontier is appropriate in measuring the efficiency of farmers in developing countries and particularly in Burkina Faso since the data on production are subject to measurement errors and climatic conditions, as well as plant diseases. In fact, nonparametric methods do not account for errors that may affect the data.

Consideration of the Determinants of Efficiency

Several generations of methods have been proposed in the mid-eighties to isolate the causes of inefficiency in the context of parametric and nonparametric approaches. These methods differ in the number of steps required to research the determinants of technical inefficiency. Coelli, Rao and Battesse (1998) present a detailed review of these methods. The one-step methods to control the impact of environmental variables in directly assessing the economic performance of production units.

Results

- The area of the farm has a positive relationship with the production: 1% increase in the area contributes to 1% increase in production.
- Similarly, the quantity of fertilizers used and production maintain a positive relationship: 1% increase in the amount of fertilizer contributes to 0.04% increase in production.
- The relationship between production and labour is negative: 1% increase in the workforce contributing to 0.03% decrease in production.
- The average efficiency is 53.75%. This implies that with the same inputs, farmers can increase their production by 46.25% in average.

The experience of farmers in irrigation processes, the perceived level of water by the farmer, the status of the parcel and the protection of the parcel are variables that have no effect on farmers' efficiency.

Conclusion

The study reveals that small farmers are not effective in their work: the descriptive analysis of the efficiency scores show that 55% of them could significantly improve their production, provided that they receive a better training in rice farming and that governmental services for rice farmers could be very helpful to them.

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Abstract

Burkina Faso is a developing country in West Africa where the rainfall measurement is feeble and irregular and where farmers have few financial resources to handle this situation.

From 1970 to 2000, the government of Burkina Faso changed its emphasis to irrigated agriculture as a key for food security and self sufficiency in the country. This led to investments in large irrigation projects. This policy of big irrigation projects failed, however, because there were not agreements between the government and the farmers working on these projects.

Moreover, in Burkina Faso there is a change of eating habits as many are turning to rice consumption. Since 2001, one of the new agricultural policy features is the development of small rice farms.

The objective of this paper is to measure the productive efficiency of these small sized farm producers based on the concept of technical efficiency. The proposed methodology is applied to a randomly selected sample of 220 rice growing farms located in Burkina Faso. The data on these farmers had been collected during the first National Census on Agriculture held between 2006 and 2010

A stochastic production frontier approach, based on Battese and Coelli's inefficiency effect model (1995), is used to obtain farm-specific estimates of technical efficiency.

Empirical results show that the estimated mean technical efficiency ranges from a minimum of 6% to a maximum of 99.98% with an average estimate of 53.71%. This result means that a 46.29% increase in production is possible with the present state of technology and unchanged input uses if technical inefficiency is completely removed: that offer to government services ways to work with farmers.

The last step of the analysis consists of the identification of the factors influencing farmers' efficiency differentials on the basis of a one-stage regression approach.

Keywords: *rice, small size, stochastic frontier production function, efficiency*
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