

# Land Rental Market and Agricultural Production Efficiency: A Bayesian Perspective

Haoran Yang<sup>1</sup>

---

*Bayesian Young Statisticians Meeting (BAYSM), Milan June, 5-6, 2013*  
*Paper no. 44*

---

<sup>1</sup> Junior Researcher of Center for Development Research (ZEF), University of Bonn, Bonn, Germany. Supervisor: Prof. Dr. Joachim von Braun, Center for Development Research (ZEF), University of Bonn, Bonn, Germany  
yhaoran@uni-bonn.de

## Abstract

In this study we used a generalized true random effect (GTRE) stochastic frontier model to estimate the impact of land rental market on agricultural production efficiency in rural Chongqing, China. In estimation we used Bayesian methods of inference to investigate this impact after we provide complete descriptions of land institutions and land rental market environment in the study area. Empirical results showed that the land rental market hardly has impact on technical efficiency. Explanations and implications of this result were presented afterwards.

**Keywords:** land rental; transaction cost; technical efficiency; frontier analysis.

## 1 Introduction

The share of agricultural sector in China's GDP is declining over the last thirty years, while people who use to live on agriculture didn't decrease proportionally, which is one of the reasons of persistent rural-urban inequality in China. Economic theory suggests that a functioning land rental market can improve agricultural production efficiency and raise income of farmer, while land rental market in developing countries like China never function properly. This leave us the questions that if land rental market can promote agricultural productivity in China and then which factors may affect the functioning of land rental market. These are the research questions which we are going to address in this paper.

## **2 Land institutions and land rental market development**

In this section we introduce land institutions which affect land rental market in China, including household responsibility system, agricultural tax and quota reform, and household registration system (hukou).

## **3 Data**

This section describes data sources and variables in production function.

## **4 Land Rental Market and Agricultural Production Efficiency: Descriptive Analysis**

This section analyses land market environment and its impact on agricultural productivity. We present successively other evidences which may have implication on the relationship between land rental market and agricultural productivity.

## **5 Research Methodology**

In this section we used a stochastic frontier analysis to test the hypothesis that land rental market can improve agricultural productivity. We employed the GTRE model proposed by Colombi et al.[1] which can incorporate time varying technical efficiency and persistent technical efficiency in the same model. We have built a hierarchical Bayesian procedure to estimate the models parameters and measure the impact of land rental market on agricultural technical efficiency. The reasons why we used Bayesian procedure are its straightforward to impose curvature constraints suggested by economic theory [2] and it holds good property for small sample size [3].

## **6 Empirical Results and Conclusions**

This section presents empirical results of analysis. We have found that there is no significant impact of land rental market on agricultural technical efficiency, and if there is any, a slightly positive effect was found in empirical results. The possible explanations are, on the one hand, persistent technical efficiency account for most parts of total technical efficiency which make time varying land rental market participation as an explanatory variable insignificant in estimation, and on the other, land rental market incompleteness impedes the efficiency enhancing effect of land rental market.

## References

- [1] Colombi. Roberto, Martini. Gianmaria, Vittadini. Giorgio. A Stochastic Frontier Model with short-run and long-run inefficiency random effects. Department of Economics and Technology Management Working Paper, University of Bergamo, Italy; 2011.
- [2] ODonnell. Christopher J, and Coelli. Timothy J. A Bayesian approach to imposing curvature on distance functions. *Journal of Econometrics*; 2005; 126(2); pp. 493-523.
- [3] Tsionas. Efthymios G, Kumbhakar. Subal C. Firm Heterogeneity, Persistent and Transient Technical Inefficiency: A Generalized True Random-Effects Model. *Journal of Applied Econometrics*; 2012; 25(9); pp.1-23.