Tenure and Technical Efficiency Among Philippine Rice Farmers

Jeffrey D. Michler  
Department of Agricultural Economics  
Purdue University, West Lafayette, IN  
Email: jmichler@purdue.edu

Gerald Shively  
Department of Agricultural Economics  
Purdue University, West Lafayette, IN  
Email: shivelyg@purdue.edu


Copyright 2012 by Jeffrey D. Michler and Gerald Shively. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.
**Tenure and Technical Efficiency Among Philippine Rice Farmers**

Jeffrey D. Michler and Gerald Shively  
Department of Agricultural Economics, Purdue University

---

**Introduction**

- Formalized property rights regime is insufficient to generate an effective land sales and rental market (Palawan 1988; Binswanger et al. 1995).
- Empirical studies have focused on the effect of secure tenure contracts, combined with formalized property rights, and on access to credit and land rental markets.
- We use an unbalanced panel data from the Philippines to test whether formalized property rights have transitioned into efficient land sales and rental markets.
- Additionally, we test for security of land tenure contracts.
- Unlike most nations in Asia, which underwent land reform in the wake of WWII, the Philippines only underwent extensive land reforms in 1988.
- As opposed to previous, popular movements for land reformulation, the goal of the post-Marcos land reforms was to formalize property rights so as to allow land sales and land rental markets to operate more efficiently.

---

**Hypothesis:**

1. Formalized property rights coming from land reforms in the late 1980s have led to efficient land sales and rental markets in Southern Palawan Province.
2. Tenure security is not an issue that in time persistent effects due to tenure status do not exist.

**Summary Results:**

1. Evidence from the study rightly shows farmers on owned parcels are more efficient than on rented parcels. This does not support our hypothesis. Land rental and sales markets are not allocating land efficiently.
2. Evidence shows no time persistent effects due to tenure type. This supports our hypothesis. Land contracts appear to be secure.

---

**Hypothesis and Summary Results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Technical Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Cumulative TE</td>
<td>712</td>
</tr>
<tr>
<td>TE of transfer parcels</td>
<td>252</td>
</tr>
<tr>
<td>TE of parcels always owned</td>
<td>531</td>
</tr>
<tr>
<td>TE of parcels always rented</td>
<td>129</td>
</tr>
</tbody>
</table>

---

**Production Results**

1. Labor, fertilizer, and pesticide all have positive and significant effects on yield.
2. Interaction terms for labor/fertilizer and labor/pesticide are negative and significant labor is a substitute for fertilizer and pesticide.

**Efficiency Results**

- Tenure has a positive and significant effect on efficiency. Farmers who own the parcels they work on are more efficient than farmers who rent the parcel in question.
- Households who own a small percentage of their farm are more efficient than households who own a large percentage. We speculate that this is due to the high opportunity cost of renting additional parcels. Inefficient farmers will not seek to expand their farm by renting parcels.
- Households working small or large farms tend to be more efficient than those working medium sized farms. We speculate that this is due to the existence of insufficient land rental markets.

---

**Model and Data**

Using Stochastic Frontier Analysis (SFA) we test two questions (Aigner et al. 1977)

1. How does technical efficiency affect whether a parcel is owned or rented?
2. Over time, are parcels that are always owned more efficient than parcels that are always rented out?

- We modeled the production of rice at a parcel level using the translog function:
  
  \[ y = \beta_0 + \beta_1 \ln x_1 + \beta_2 \ln x_2 + \ldots + \beta_k \ln x_k + \sum \gamma_i j_i t_i + \eta(i,t) \]

- Technical efficiency of production for the \( i \)th parcel in the \( j \)th year is defined by (Kumbhakar and Lovell 2000):
  
  \[ \eta(i,j) = \frac{y(i,j) - \tilde{y}_j}{\tilde{y}_j} \]

- 2\$ - Parameters of farmer and parcel characteristics, including tenure
- Data come from a longitudinal study (1995-2002) conducted of two farming villages in the southern part of Palawan Province, Philippines.
- Parcel-level panel consists of 746 observations from 210 parcels (Shively and Zeller, 2003).

---

**Model and Data**

Using Stochastic Frontier Analysis (SFA) we test two questions (Aigner et al. 1977)

1. How does technical efficiency affect whether a parcel is owned or rented?
2. Over time, are parcels that are always owned more efficient than parcels that are always rented out?

- We modeled the production of rice at a parcel level using the translog function:
  
  \[ y = \beta_0 + \beta_1 \ln x_1 + \beta_2 \ln x_2 + \ldots + \beta_k \ln x_k + \sum \gamma_i j_i t_i + \eta(i,t) \]

- Technical efficiency of production for the \( i \)th parcel in the \( j \)th year is defined by (Kumbhakar and Lovell 2000):
  
  \[ \eta(i,j) = \frac{y(i,j) - \tilde{y}_j}{\tilde{y}_j} \]

- 2\$ - Parameters of farmer and parcel characteristics, including tenure
- Data come from a longitudinal study (1995-2002) conducted of two farming villages in the southern part of Palawan Province, Philippines.
- Parcel-level panel consists of 746 observations from 210 parcels (Shively and Zeller, 2003).

---

**Conclusions**

- Our results provide mixed evidence regarding the effects of tenures on technical efficiency.
  1. We find evidence of allocative inefficiency in the market for land in our sample.
  2. If farmer \( j \) rents parcel at time \( t \), that farmer will demonstrate greater technical efficiency than if the same farmer \( j \) was renting the same parcel at the same time \( t \).
  3. Yet, given a time invariant tenant arrangement, tenure no longer matters in the technical efficiency equation.
  4. If parcel \( i \) is owned at all time \( t \) regardless of which farmer \( j \) farms the parcel, that farmer would be more efficient if parcel \( i \) was rented at all time \( t \).
  5. These two findings present an apparent paradox.
  6. Legally well-defined property rights have not resulted in efficient allocation of land while legally ill-defined tenure contracts have resulted in secure tenure arrangements.
  7. It is surprising that our results support Binswanger and Binswanger’s (1999) doubt regarding the effectiveness of market driven land reforms.

---

**References**


For Further Information

Please contact the authors. The paper is based on a working paper of the same title. The paper can be accessed at:

An electronic version of this paper is available at: [Link to the electronic version]