

## Profitability of Organic Agriculture in a Transition Economy: the Case of Organic Contract Rice Farming in Lao PDR

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### Abstract

*Poverty is prevalent among smallholder farmers in transition economies where market failures prevail and where the capacity of the public sector is limited. This study assesses the potential of organic contract farming as a private sector institutional arrangement to reduce rural poverty. Contract farming appears to facilitate market linkages for smallholder farmers to produce organic rice for export markets while providing necessary technical supports. Using an endogenous switching regression model to assess the profitability of organic contract farms and conventional farms in Lao PDR, it was found that organic farmers under contract earn significantly higher profit than conventional farms. The findings also showed that organic contract farming tends to provide the greatest increase in income to farmers with below average performance. These findings suggest that contract farming can be an effective mechanism to facilitate the development of organic agriculture and an effective tool to improve the profitability and raise incomes of small farmers, thereby reducing poverty in rural areas with limited market development.*

### Introduction

Agriculture is the dominant sector of the Lao economy, accounting for nearly half of the country's GDP and employing 77% of the national workforce (UNDP/NSC, 2006). Almost all of the country's agricultural output is produced on small family farms. Despite the importance of agriculture to the national economy, an estimated 87% of the country's poor live in households headed by farmers (NSC, 1999). The vast majority of farmers practice subsistence rice farming and lack access to the incentives and supports necessary to improve their productivity and income. The major constraint to agricultural development continues to be low market integration as the country transitions to a market-oriented economy.

Contract farming has been promoted as a strategy to facilitate Lao PDR's comparative advantage in organic agriculture and connect small farmers to rapidly growing export markets (Setboonsarng et al., 2006; Eaton, 2001). As the majority of traditional crops are produced without the use of agro-chemicals, conversion to organic production requires only marginal improvements on the existing technology. A number of organizations have established contract farming agreements with small farmers to

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produce organic crops for export. This study assesses the profitability of organic rice production under contract and compares the performance of small farmers with and without contract arrangements.

## Data and Methodology

The 2004 household survey covered 585 rice farms (332 contract and 253 conventional farms) in Vientiane Province. The sampled contract farms produced organic Japanese *koshihikari* rice for export under contract with the private sector firm Lao Arrowny Co. Ltd. The contracted farmers receive a premium price for growing Japanese rice and are assisted by the firm on seed, organic fertilizer and technical assistance. In contrast, the sampled conventional farmers primarily planted traditional varieties for consumption or for sale in local markets.

To compare the performance of contract and conventional farmers, this study employs an endogenous switching regression model (Lokshin and Sajaia, 2004) to account for unobservable selection biases in farmers' decision to join the contract:

If  $\gamma Z_i + u_i > 0$ , farmer *i* chooses to join the contract, which is described by  $I_i = 1$ ;

If  $\gamma Z_i + u_i \leq 0$ , farmer *i* chooses not to join the contract, which is described by  $I_i = 0$ ;

Farmer *i*'s profitability with the contract ( $I_i = 1$ ) is  $y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i}$ ;

Farmer *i*'s profitability without the contract ( $I_i = 0$ ) is  $y_{0i} = \beta_0 X_{0i} + \varepsilon_{0i}$ ;

In the model,  $Z_i$  is a vector of farm characteristics that affect farmers' decision to join the contract, including family size, land size, value of production assets, value of consumption assets, value of transportation assets and distance from farm to market.  $X_{1i}$  and  $X_{0i}$  are two vectors of farm characteristics that affect farmers' performance under the contract and without the contract, including farm size, family size and value of production assets.  $y_{1i}$  and  $y_{0i}$  are dependent variables measuring farmers' profitability;  $\gamma$ ,  $\beta_1$  and  $\beta_0$  are vectors of parameters subject to estimation; and  $u_i$ ,  $\varepsilon_{1i}$ , and  $\varepsilon_{0i}$  are three random error terms that follow trivariate normal distribution. After the parameters are estimated, the actual and counterfactual expectations of farmers' performance with and without the contract are calculated.

## Results and Discussion

The simple mean comparison of organic contract and conventional farm characteristics are summarized in Table 1.

**Tab. 1: Farm characteristics of sample farms**

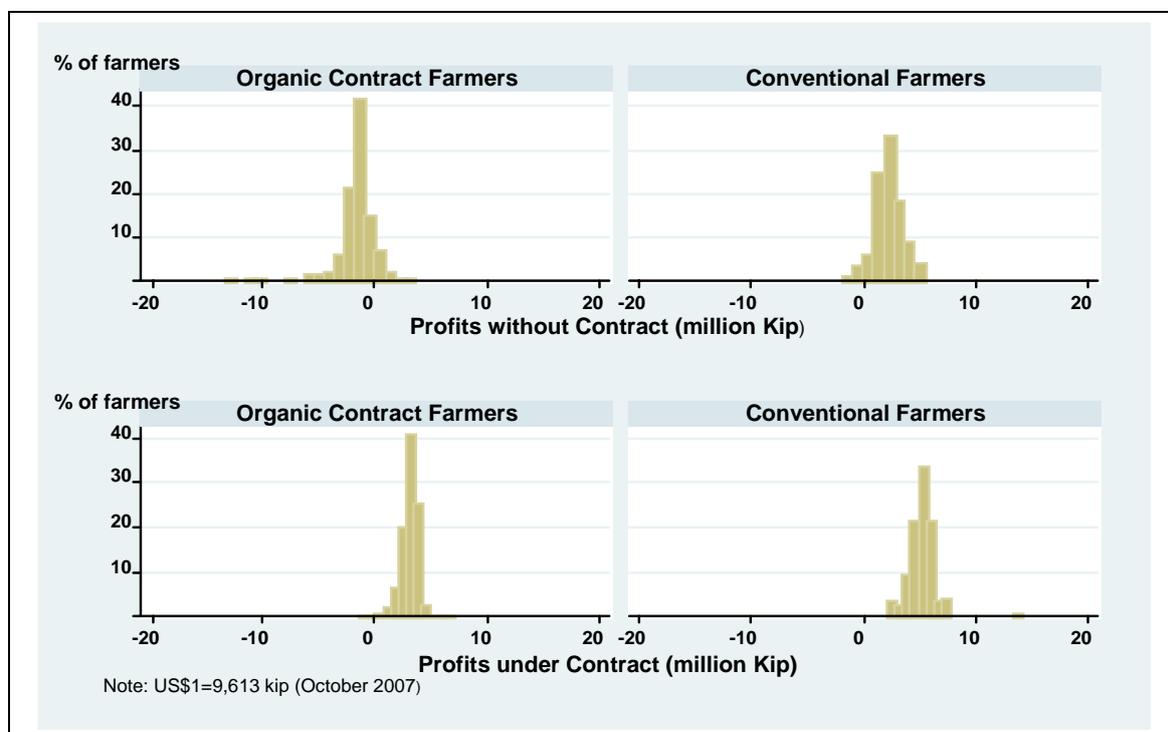
|                                       | Contract | Conventional | p-value |
|---------------------------------------|----------|--------------|---------|
| Plant area (ha)                       | 1.11     | 1.43         | 0.0327  |
| Distance from farm to market (km)     | 20.23    | 22.20        | 0.2224  |
| Seed expenditure (US\$/ha)            | 29       | 8            | 0.0009  |
| Fertilizer expenditure (US\$/ha)      | 85       | 55           | 0.0567  |
| IPM (% of farmers receiving training) | 34       | 24           | 0.1174  |

**Tab. 2: Profitability of commercial rice farming in sample farms**

|                                     | Contract | Conventional | p-value |
|-------------------------------------|----------|--------------|---------|
| Rice price (US\$/kg)                | 0.17     | 0.14         | 0.0000  |
| Rice yield (kg/ha)                  | 3272     | 2603         | 0.0420  |
| Revenue before cash costs (US\$/ha) | 545      | 367          | 0.0008  |
| Cash costs (US\$/ha)                | 234      | 185          | 0.1102  |
| Profit over cash costs (US\$/ha)    | 304      | 182          | 0.0307  |

Table 2 shows the mean profitability of commercial rice farming. Profitability is defined here as revenue less cash costs and does not include non-cash costs such as own labor, own seed, etc. Organic contract farmers are able to sell their rice at significantly higher prices than conventional farmers, averaging US\$0.17/kg versus US\$0.14/kg. In addition to receiving higher prices, organic contract farmers also had significantly higher yields than conventional farmers. The yield difference likely reflects the higher efficiency of organic production under contract, as farmers have better access to seed, organic fertilizer and technical assistance facilitated by the contracting firm (Table 1). As a result of higher yields and the price premium for organic rice, contract farmers have a higher mean profitability than conventional farmers, earning an average of US\$304/ha and US\$182/ha, respectively.

A comparison of the actual and counterfactual profits estimated by the endogenous switching regression reveals more information about the impact of contract farming on farmers' profitability. Figure 1 depicts the distribution of profits of organic contract and conventional farmers under contract and without the contract.



**Figure 1: Counterfactual profitability comparison of organic contract and conventional farmers**

The contract farmers' profits under contract (the southwest graph) are on average higher than their counterfactual profits without the contract (the northwest graph). Joining the contract is estimated to have increased the profits of contract farmers by US\$482. In the case of conventional farmers, the counterfactual profits under contract (the southeast graph) are on average higher than their actual profits outside the contract (the northeast graph). In other words, the profits of conventional farmers would have increased by US\$334 *if* they had joined the contract.

These results provide empirical evidence that organic contract farming tends to be more profitable than conventional farming and that the observed higher profitability is not simply the result of more profitable farms adopting organic contract farming. In fact, it is interesting to note that contract farmers have below average profitability<sup>5</sup> both under contract and without the contract. In other words, contract farmers are less profitable than conventional farmers, both under contract and without the contract (Figure 1). This suggests that contract farming tends to be more attractive and more beneficial to farmers with relatively low performance.

## Conclusions

The sampled organic rice contract farmers earned significantly higher profits than conventional rice farmers under similar agro-ecosystem and socio-economic conditions. The switching regression comparison also indicates that organic contract farming has the greatest benefits for farmers with relatively poor performance. Contract farming of organic products, in this case Japanese rice, appears to capitalize on the comparative advantages of Laotian farmers who have relatively chemical-free land, excess labor, and traditional knowledge of organic practices. By linking to rapidly growing urban and regional markets for organic products, small farmers were able to improve their incomes while using sustainable agricultural practices.

The results of this study suggest that organic contract farming can be an effective institutional mechanism to involve the private sector in reducing rural poverty. The contract arrangement provides farmers with an assured market for their produce and enables them to earn premium prices for high value products. Contract farming appears to be a promising institutional arrangement in rural areas where market failure remains prevalent, particularly in transition economies such as Lao PDR where agricultural production remains primarily subsistence oriented and institutions to facilitate market exchange are in an early stage of development.

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<sup>5</sup> "Average profitability" in this report means the average of the profits of all farmers, irrespective of their actual contract choices, either under the contract or outside of the contract.