

MODELING LABOR USE OF FARM HOUSEHOLDS IN THE RED RIVER DELTA, VIETNAM

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INTRODUCTION

- In Vietnam, rural labors occupied about $\frac{3}{4}$ of the total labor force (GSO 2010). Characteristics of rural labors:
 - Seasonal characteristics & low productivity
 - Diversified use both on- and off-farm activities
- Problems
 - Surplus of rural labors and low opportunity costs of rural labors
 - Difficulty in the transfer of labor from farm to non-farm employment.
- Objectives for this work were to:
 - Develop a model for labor use of farm households
 - Examine the significance of changes in off-farm wage rates and the effects of prices changes.

THEORETICAL MODEL

- Labor migration for jobs was recognized as having parallels with the transfer of goods (spatial equilibrium model)
- A combination of a spatial equilibrium model, reflecting the transfer of labors, with the requirement to transfer given the number of labors (or time of labors) led to a nonlinear, integer programming model
- In the case of labors (time of labors), if $X = 1$ labors is used in the household farming (the knapsack), while if $X=0$ it is not
- It was also assumed that each household had a supply of labors and a demand for labors in farming and non-farming activities

THEORETICAL MODEL

$$\text{Max } Z = w'X + P'Q - P'_d D - C'_t X$$

subject to

$$Q = f(X, D)$$

$$p'_d d - p'_q q \leq 0$$

$$C'_t X \leq c_t$$

$$X \text{ is } \{0, 1\} \text{ and } Q, D \geq 0$$

Where: Z is the total profit obtained from a household; X is a vector of zero-one variables indicating the labor used on- or off-farm; Q and P are vectors of outputs and the output prices; D and P_d are vectors of the level of inputs used by a household and the input prices; C_t is a vector of transaction costs of labor (having an off-farm job and distance to working place); c_t is the total transaction costs of a household that can be paid; w is the wage rate.

EMPIRICAL MODEL

Assumptions:

- Combined knapsack model, spatial equilibrium model, household model and non-linear programming
- Maximisation of the total profits/net benefits/income of a household
- Markets for labour exist

MATHEMATICAL MODEL REPRESENTATION

$$\text{Max } Z = \sum_{i=1}^m \sum_{s=1}^S \sum_{t=1}^T p_{ist} Q_{ist}^s + \sum_{i=1}^m w_i L_i^o - \sum_{i=1}^m \sum_{t=1}^T C_{it}$$

Subject to

Production outputs $Q_{ist}^c + Q_{ist}^s \leq a_{ist}^* F_{ist}(l_{ist}^{f*}, l_{ist}^{h*})$ for all $i = 1. \dots m.$

$s = 1. \dots S.$ and $t = 1. \dots T$

Home consumption $Q_{ist}^c \leq \bar{q}_{ist}^c$ for all $i = 1. \dots m.$ $s = 1. \dots S.$ and

$t = 1. \dots T$

Family labor

$$\sum_{s=1}^S \sum_{t=1}^T l_{ist}^f a_{ist}^* - L_i^f \leq 0 \text{ for all } i = 1. \dots m$$

Total labor

$$L_i^f + L_i^o \leq \bar{L}_i \text{ for all } i = 1. \dots m$$

$$X_{ij} l_{ij}^f - L_i^f \leq 0 \quad \text{and} \quad X_{ij} l_{ij}^o - L_i^o \leq 0$$

Other constraints include:
 Labor for peak time
 Total costs
 Constraints on transaction costs of labors

LABOR OF FARM HOUSEHOLDS

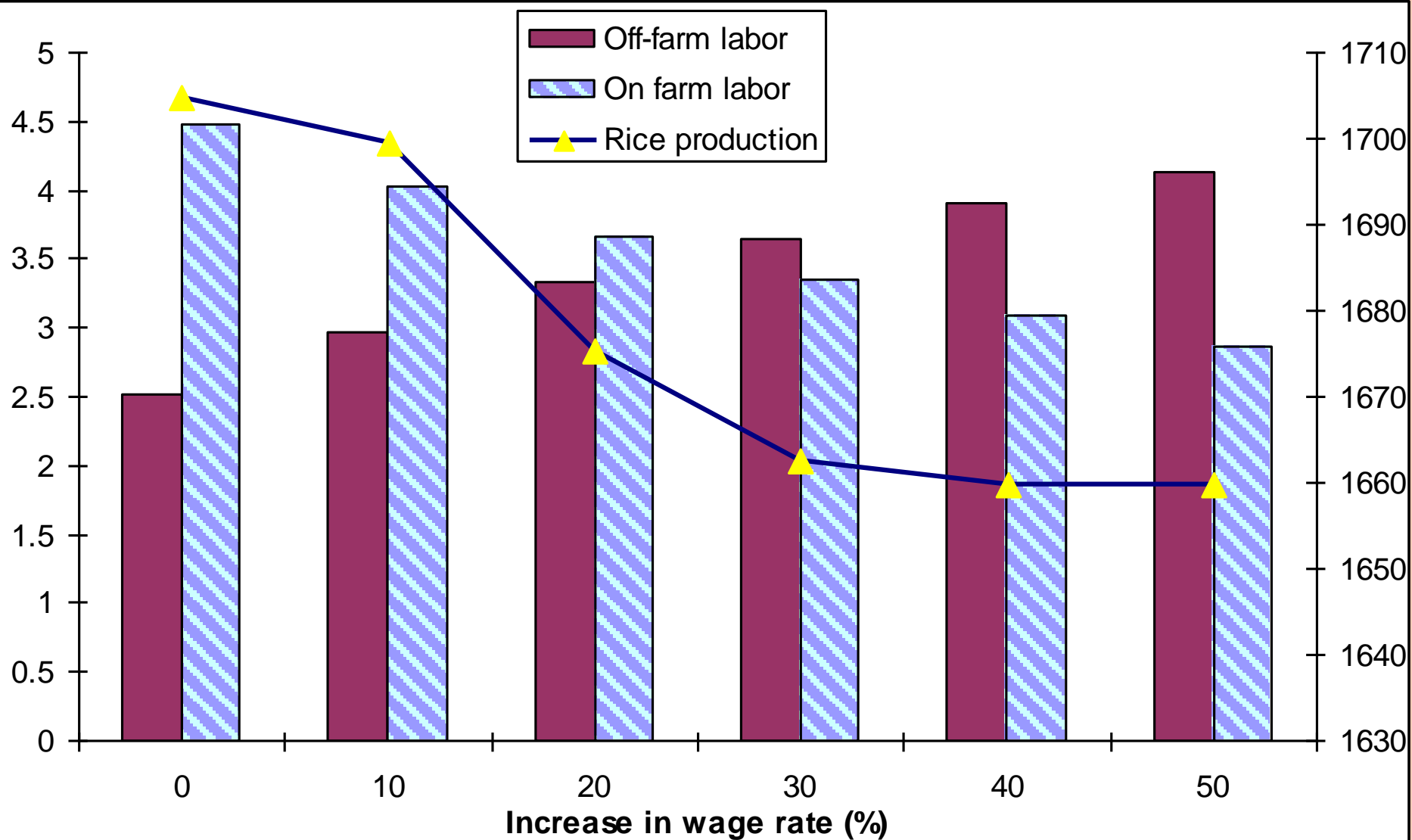
| | “Pure’ farm households | ‘Mixed’ farm households | Average |
|---|------------------------|-------------------------|---------|
| Labors involving in farming only (labors/household) | 1.39 | 0.92 | 1.21 |
| Labors involving in on-farm and off-farm activities in non-peak time (labors/household) | 1.08 | 1.86 | 1.40 |
| Of which: | | | |
| + Temporary off-farm jobs (%) | 42.6 | 24.7 | 32.9 |
| + Permanent salary (%) | 16.7 | 17.7 | 17.1 |
| + Trade and services (%) | 10.2 | 22.0 | 16.4 |
| + Local officers (%) | 3.7 | 11.3 | 7.9 |
| + Handicraft (%) | 24.1 | 19.4 | 21.4 |
| + Retired (%) | 2.8 | 3.8 | 3.6 |
| Labor involving non-farm activities only (labors/household) | 0.96 | 1.28 | 1.08 |

LABOR USED IN RICE CROPS

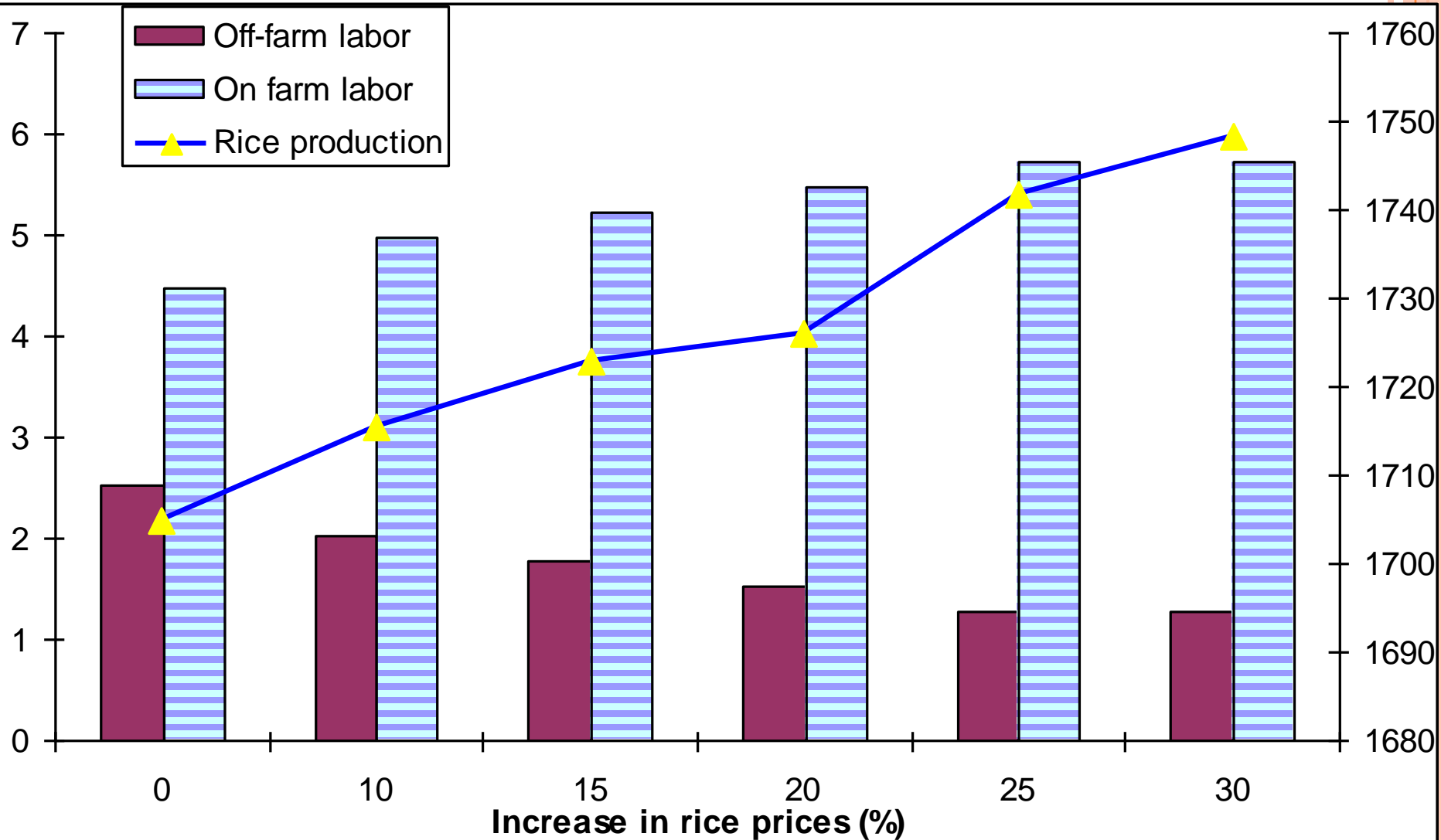
Unit: days/household/season

| Items | 'Pure' farm households | 'Mixed' farm households | Average |
|-----------------------------------|------------------------|-------------------------|---------|
| Family labors | 37.8 | 38.0 | 38.1 |
| Of which: | | | |
| + Land preparation | 1.0 | 1.6 | 1.3 |
| + Transplanting | 13.3 | 14.8 | 14.0 |
| + Spraying pesticides. herbicides | 4.3 | 4.2 | 4.2 |
| + Spraying fertilizer | 3.6 | 2.4 | 3.1 |
| + Weeding | 2.4 | 2.2 | 2.3 |
| + Harvesting | 13.3 | 12.7 | 13.1 |
| Hired labors | 2.7 | 3.1 | 2.9 |

IMPACTS OF WAGE RATES



SIMULATION OF CHANGES IN RICE PRICES



CONCLUSIONS

- **The increase in labor wages (opportunity costs of labor) may help farmers to have more profits in both on- and off-farm employment**
- **Rice production seems to be decreased but rice fields are likely to be remained as wages increase**
- **As the price of rice increases, farmers have incentives to involve in farming and increase their labor input. However, land is limited, so the level of family labors used may not increase more (after a certain level).**
- **An adequate policy should be considered.**

Thank you for your
attention