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ATTITUDES TOWARD RISK AND OPTIMAL USE OF INPUTS IN MAIZE PRODUCTION IN THE MEKONG DELTA

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CONTENT

1. INTRODUCTION

1.1 The statement of problem

- Agricultural production is usually faced to risks.
- So farmers have to make decisions on production in an uncertain environment.
- Risk-averse farmers are often less willing to adopt innovations to improve their productivity and income.
- Understanding the farmer’s attitudes toward risk is very important in order to understand the farmer's behavior, planning production management, technology transfer and building supportive policies in agriculture.

1. INTRODUCTION
1.2 Research objective

Measuring attitudes toward risks, and then, the test relationship between farmers' risk attitudes and optimal use of inputs in maize production in the Mekong Delta.

2. THEORETICAL BACKGROUND, METHOD AND DATA
2.1 Theoretical background

2.1.1 Overview of risk and attitudes towards risk

- Risk refers to a situation where probabilities can be attached to the occurrence of events which produce different outcomes of a decision making process (Ellis, 1993)

- Risk attitude is understood as a psychological emotion, related to the individual's interpretation in making decisions about risk.

- Risk attitude is the general tendency of a person to seek or avoid risk in different situations.

2. THEORETICAL BACKGROUND, METHOD AND DATA

2.1 Theoretical background

2.1.2 Attitude towards risks and optimal use of inputs in production

- Risk attitude is expressed by the caution in making investment decisions, use of resources for production activities.

- Risk-averse farmers often use inputs that are below the optimal level, which will not be able to maximize profits. (Yesuf and Bluffstone, 2009).

2. THEORETICAL BACKGROUND, METHOD AND DATA

2.2 Theoretical background

2.2.2 Attitude towards risks and optimal use of inputs in production

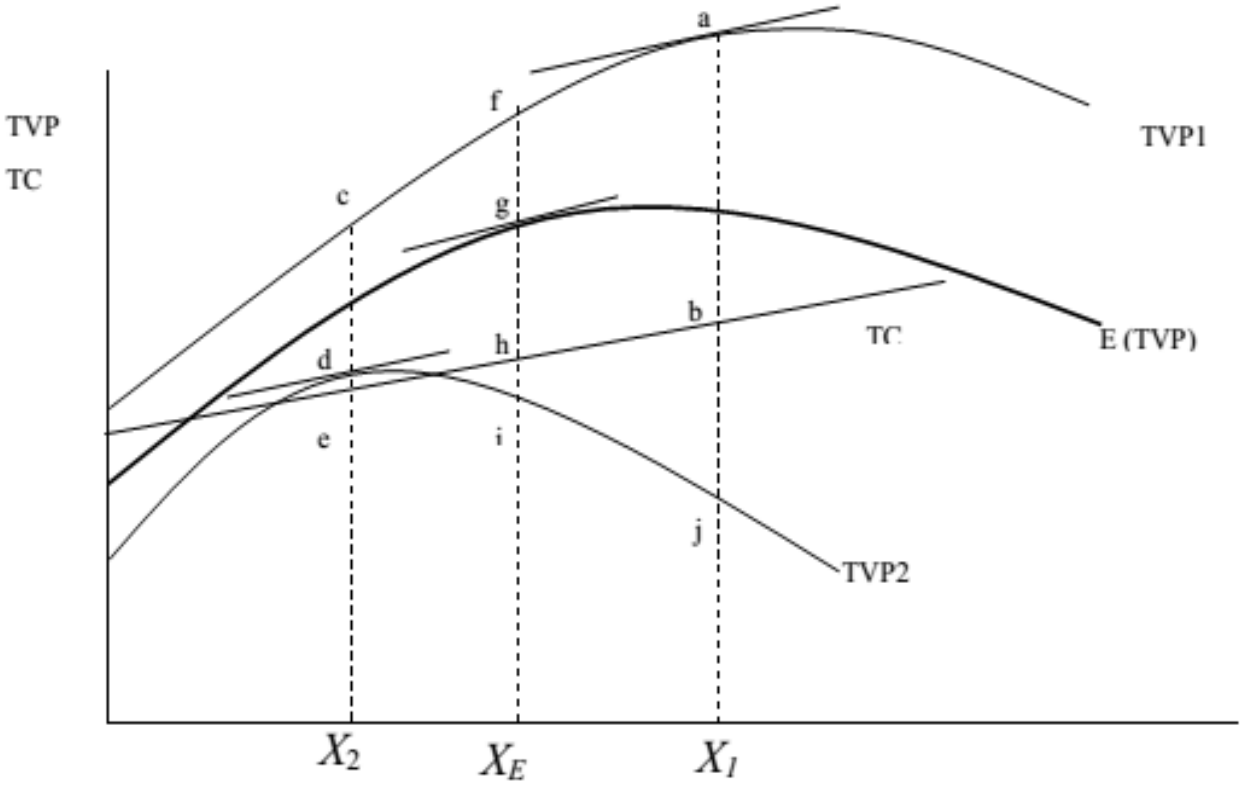

Figure 1. Production decisions under risk

Source: Ellis (1993)

Ellis's theoretical model of the relationship between input use under conditions of uncertainty and risk attitudes:

Risk-averse farmers use low levels of inputs to ensure the safety of their income.

Input uses with safe outcomes are typically less than those with maximum expected outcomes.

2. THEORETICAL BACKGROUND, METHOD AND DATA
2.2 Estimation methods

2.2.1 Measuring the attitude towards risk

- The experimental method developed by Eckel and Grossman (2002) was used to measure the risk attitudes of maize farmers in the study area.
- The coefficient of risk attitude is determined by the Constant Partial Risk Aversion (CPRA).
- Each respondent was asked to play 3 lottery selection games.

2. THEORETICAL BACKGROUND, METHOD AND DATA
2.2 Estimation methods

Table 1. Game 1 to preliminarily determine risk attitude

Unit: VND thousand

Questions	Reward A	Reward B Probability: 50 – 50		Switch point
		Head (High payoff)	Tail (Low payoff)	
Questions 1: How old are you?*	100	100	0	1*
Questions 2: what grade are you in?	90	100	0	2
Questions 3: How many years of experience do you have production?	70	100	0	3
Questions 4: How much is the production area?	55	100	0	4
Questions 5: How much is the productivity?	25	100	0	5
Questions 6: Who do you sell products for?	15	100	0	6
Questions 7: What is the selling price?	05	100	0	7

Source: Calculated from survey data

2. THEORETICAL BACKGROUND, METHOD AND DATA
2.2 Estimation methods

Table 2. Games 2 to determine risk attitude

Unit: VND thousand

Options	Head (Low payoff)	Tail (High payoff)	Expected return	Standard deviation
A	50	50	50.0	0.0
B	45	60	52.5	7.5
C	35	90	62.5	27.5
D	20	125	72.5	52.5
E	10	140	75.0	65.0
F	00	150	75.0	75.0

Source: Calculated from survey data.

2. THEORETICAL BACKGROUND, METHOD AND DATA
2.2 Estimation methods

Table 3. Game 1 to preliminarily determine risk attitude

Unit: VND thousand

Options	Head (Low payoff)	Tail (High payoff)	Expected return	Standard deviation
A	100	100	100	0.00
B	80	120	100	28.28
C	70	140	105	49.50
D	30	200	115	120.21
E	10	240	125	162.63
F	00	250	125	176.78

Source: Calculated from survey data.

2. THEORETICAL BACKGROUND, METHOD AND DATA
2.2 Estimation methods

2.2.2 The test optimal use of inputs in production and attitude towards risks

- On the basis of Ellis' theoretical model (1993) and related studies on the relationship of risk attitudes and input decisions used in production.
- The optimal input level determined at the marginal value productivity of each input is equal marginal fators cost (MVP=MFC).

2. THEORETICAL BACKGROUND, METHOD AND DATA
2.2 Estimation methods

2.2.2 The test optimal use of inputs in production and attitude towards risks

From the Cobb-Douglas production function logarized on two sides, with the following form:

$$\ln Q_i = \alpha_0 + \alpha_1 \ln X_1 + \alpha_2 \ln X_2 + ... + \alpha_n \ln X_n + \varepsilon_i$$

Distribution efficiency coefficient (k) is calculated based on the condition of maximizing profits in the use of input factors (MVP = MFC).

$$k = \left(\alpha_i \times \frac{Q}{X_i}\right) \times \left(\frac{P_Q}{P_{Xi}}\right)$$

The conditions for maximizing profit on input is k=1.

2. THEORETICAL BACKGROUND, METHOD AND DATA

2.3 Data collection

- The surveyed farmers were randomly selected from the list of maize farmers provided by the Commune People's Committee.
- The survey collected information from 126 maize farmers in the study area.

3. REASEARCH RESULTS

3.1 Farmer's characteristics

- The results of the survey show some common characteristics of the maize farmers in the study area, shown in Table 4.

Table 4. Quantitative characteristics of maize farmers

Quantitative characteristics	Mean	Standard deviation
Age of household head (Age)	51.10	11.95
Years of schooling of the household head (Education)	5.08	2.79
Number of people in household (Household size)	4.21	1.42
Number of labor in the household (labor)	2.48	1.43
Numbers of labor in household participating rice production (labor)	2.32	0.99
Years of experience in maize production (Experience)	11.05	8.54
Area (1.000m^2)	5.27	3.36
Income from hybrid maize production (million VND/year)	39.95	32.66
Total income of farmer households (million VND/year)	47.99	44.43

Source: Calculated from survey data.

3. RESULTS AND DISCUSSIONS

3.2 Farmer's attitudes toward risk

- Results of Game No. 1 are shown that most of farmers decided to choose switch points with safe characteristics.
- This initially shows that most of the farmers maize production in the area have a common feature of being risk aversion.

Table 5. The results of games 1

Switch point	Frequency	Proportion (%)
1*	05	3.82
2	07	5.56
3	04	3.17
4	14	11.11
5	22	17.46
6	12	9.52
7	67	53.17

Source: Calculated from survey data.

3. REASEARCH RESULTS

3.2 Farmer's attitudes toward risk

- Results of Game No. 2 are shown in Table 6.
- Results of Game No. 2 is used to determine the coefficient of attitude towards risk of each farmer.

Table 6. The results of games 2

Choice	Head (Low payoff)	Tail (High payoff)	Risk attitude classification	Risk coefficient
A	50	50	Extremely averse	>10
B	45	60	Severely averse	10 - 1,00
C	35	90	Intermediate	1,00 - 0,62
D	20	125	Moderate	0,62 - 0,18
E	10	140	Slight to Neutral	0,18 - 0
F	00	150	Neutral to loving	<0

Source: Calculated from survey data.

3. REASEARCH RESULTS

3.2 Farmer's attitudes toward risk

- Based on the farmers' choices when participating in the game.
- A farmer's decision to choose option "B" means that they will be indifferent between options "A" and "B", as well as between options "B" and "C".
- The risk coefficient for partial risk *r* is determined by solving the equation for the indifference between the two adjacent options with the CPRA utility function.
- The results of Game No.2 also showed that most of the farmers maize production in the study area are risk-averse.

3. REASEARCH RESULTS

3.2 Farmer's attitudes toward risk

- The study also considers whether the attitude towards risk changes when the pay-offs increase which is provided from Game 3.
- Although the games were organized differently, the results of the farmer' distribution of attitudes towards risk were almost similar among all games.

Table 8. The results of games 2 and 3

Choice	Risk attitude	Games 2		Games 3	
		Frequency	Proportion (%)	Frequency	Proportion (%)
A	Extremely averse	62	49.21	63	50.00
B	Severely averse	25	19.84	21	16.67
C	Intermediate	17	13.49	16	12.70
D	Moderate	08	6.35	11	8.73
E	Slight to Neutral	03	2.38	02	1.59
F	Neutral to loving	11	8.73	13	10.32

Source: Calculated from survey data.

3. REASEARCH RESULTS

3.3 Using optimal inputs and attitude towards risk

- Research results show that, about two thirds of the maize farmers are risk averse. 20% of farmers are neutral to risk while households with risk-loving attitude account for 11%.

- The output coefficient elasticities of each input was estimated from the production function combine with the profit-maximizing condition in using inputs (*MVP=MFC*) as the basis for calculating the allocative efficiency coefficient (*k*) of each input.

3. REASEARCH RESULTS

3.3 Using optimal inputs and attitude towards risk

Table 9. Allocative efficiency coefficient (*k*) of the inputs

Inputs	Coeffic-ient (*k*) on sample	Allocative efficiency coefficient (k)			Difference		
		Risk-loving (1)	Risk neutral (2)	Risk aversion (3)	(1)-(2)	(2)-(3)	(1)-(3)
Seed	9,068***	6,887	8,469	9,591	-1,582ns	-1,122ns	-2,705ns
Nitrogen	3,355***	3,011	2,127	3,763	0,884**	-1,637ns	-0,753ns
Phosphate	1,807***	3,043	1,060	1,823	1,983***	-0,762ns	1,221*
Potassium	3,734***	5,072	2,683	3,820	2,389*	-1,137ns	1,252ns
Pesticides	0,002***	0,004	0,001	0,002	0,003**	-0,001ns	0,002ns
Labor hired	1,684***	1,666	1,210	1,823	0,456**	-0,613*	-0,157ns
Farmer's labor	0,193***	0,287	0,196	0,177	0,091ns	0,019ns	0,109**

Source: Survey results in the study area.

*Note: ***, **, *, and ns indicate the level of significance at 1%, 5% and 10%, respectively*

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4. CONCLUSION

- We find that most farmers maize production in the study area are risk-averse.
- In particular, the proportion of risk-averse farmers is estimated at 69% while that of the risk-loving ones accounts for only 11%.

4. CONCLUSION

- The result test of the relationship of farmers' risk attitudes and optimal use of inputs in production, which do not clearly see the relationship of attitudes to different risks and the decision to use optimal inputs of the farmers.
- In general, most of farmers are unable to choose the optimal levels of inputs.

✓ Inputs purchased from outside, which were used closer to the optimal level for the group of “Risk neutral” farmers compare with groups farmers other.

✓ However, available input in the farmers was used over more than optimal level, they tend to used closer to optimal inputs level corresponding with attitude toward risk-loving increases.

4. CONCLUSION

- The limitation of this study may be due to the unsatisfactory sample size.
- Therefore, the authors suggest that the study should be conducted on a larger sample size, which would likely yield more significant results.

Thank you for your attention!