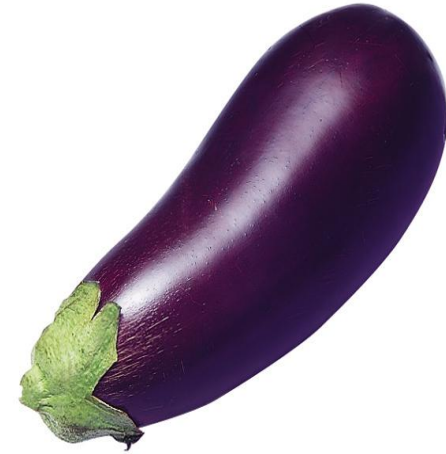


PRODUCTIVITY AND TECHNICAL EFFICIENCY OF EGGPLANT FARMS IN SELECTED PROVINCES OF THE PHILIPPINES: A STOCHASTI PRODUCTION



Cesar B. Quicoy



Outline of Presentation

- **Rationale**
- **Objectives of the Paper**
- **Methodology**
- **Results and Discussion**
- **Summary and Conclusion**
- **Recommendations**

Rationale

- . In spite of various program of the government, poverty especially in the rural areas remains widespread
- With rural population of about 3%, this means that the per capita rural incomes continue to fall and rural poverty could increase.
- This situation was partly due to financial and economic crisis and weather disturbances
- Globalization and market liberalization
- These development create an environment for improved and sustained economic growth

Rationale

- Major changes should include improvements in the production and marketing of produce of the eggplant
- In production, there is a need to increase efficiency and productivity to reduce the cost per unit of production.
- Increasing efficiency is anchored on the use of the factors of productions and on the management of the production activities.

Objectives of the Paper

- **Assess the factors that influence farm level technical efficiency of eggplant in major producing province of the Philippines.**
- **Specifically, it sought to:**
 - **Describe the socio-economic characteristics of the sample eggplant farmers**
 - **Assess the effects of selected factors on production fo eggplant;**
 - **Determine the major factors that affect the technical efficiency of producing eggplant; ; and**
 - **Provide recommendations as inputs to policy advocacy to enhance the efficiency of eggplant production.**

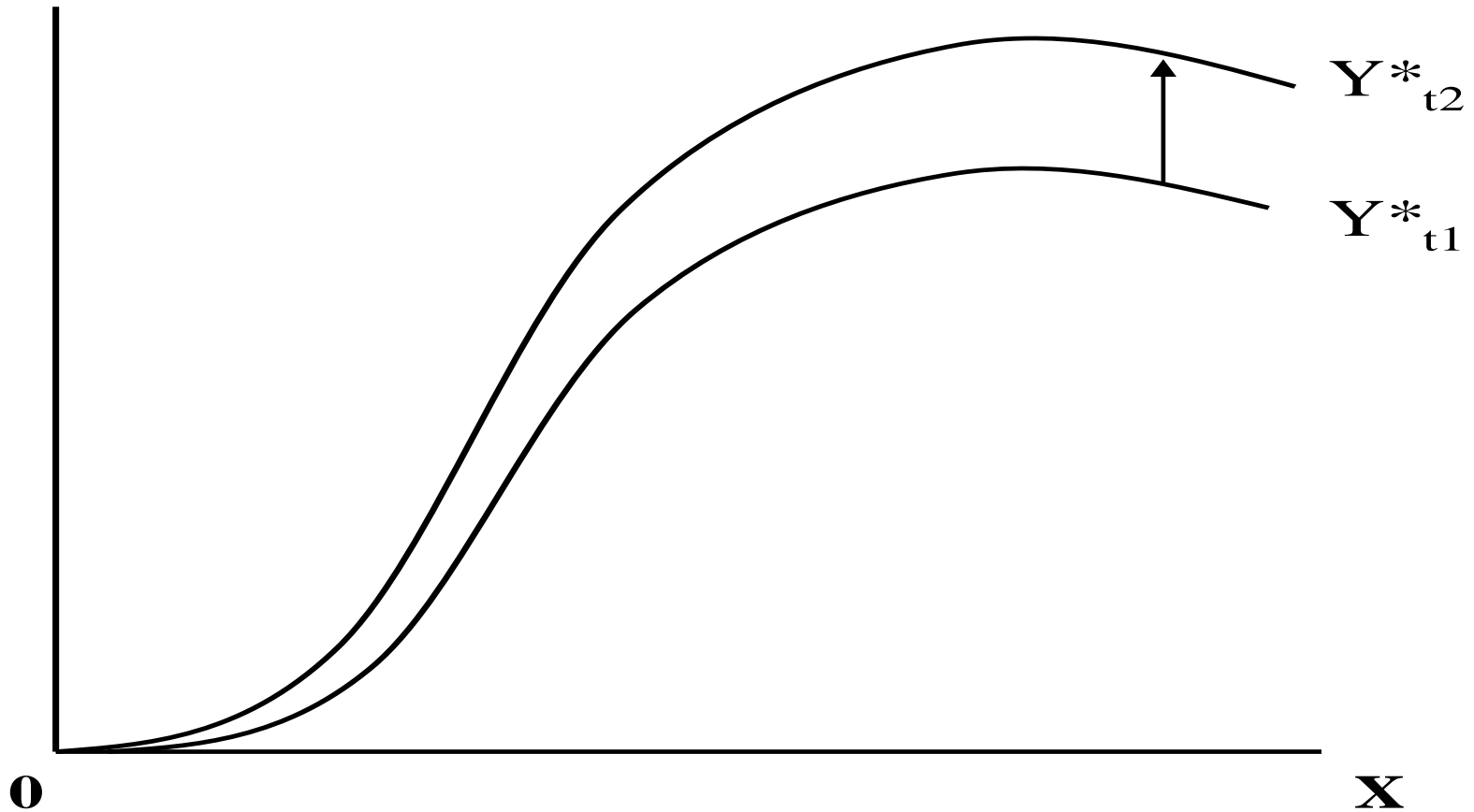
Methodology

Types of Data and Method of Data Collection

- **Primary data were collected through farm surveys conducted in Pangasinan, Batangas, and Quezon in 2009. A total of 104 eggplant farmers were interviewed.**
- **Survey was funded by DA-BAR**

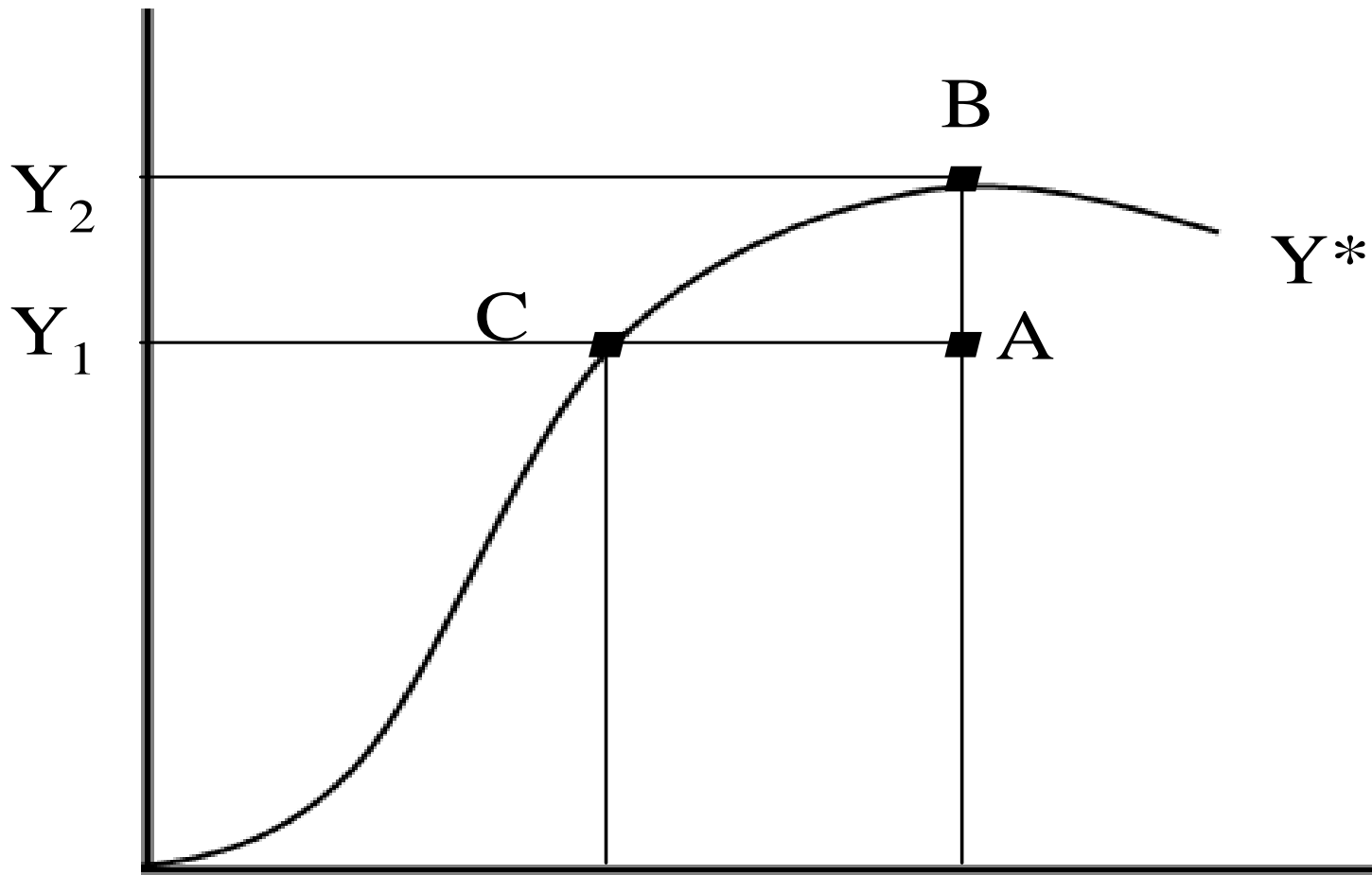
FRAMEWORK

$$Y = F(X)$$



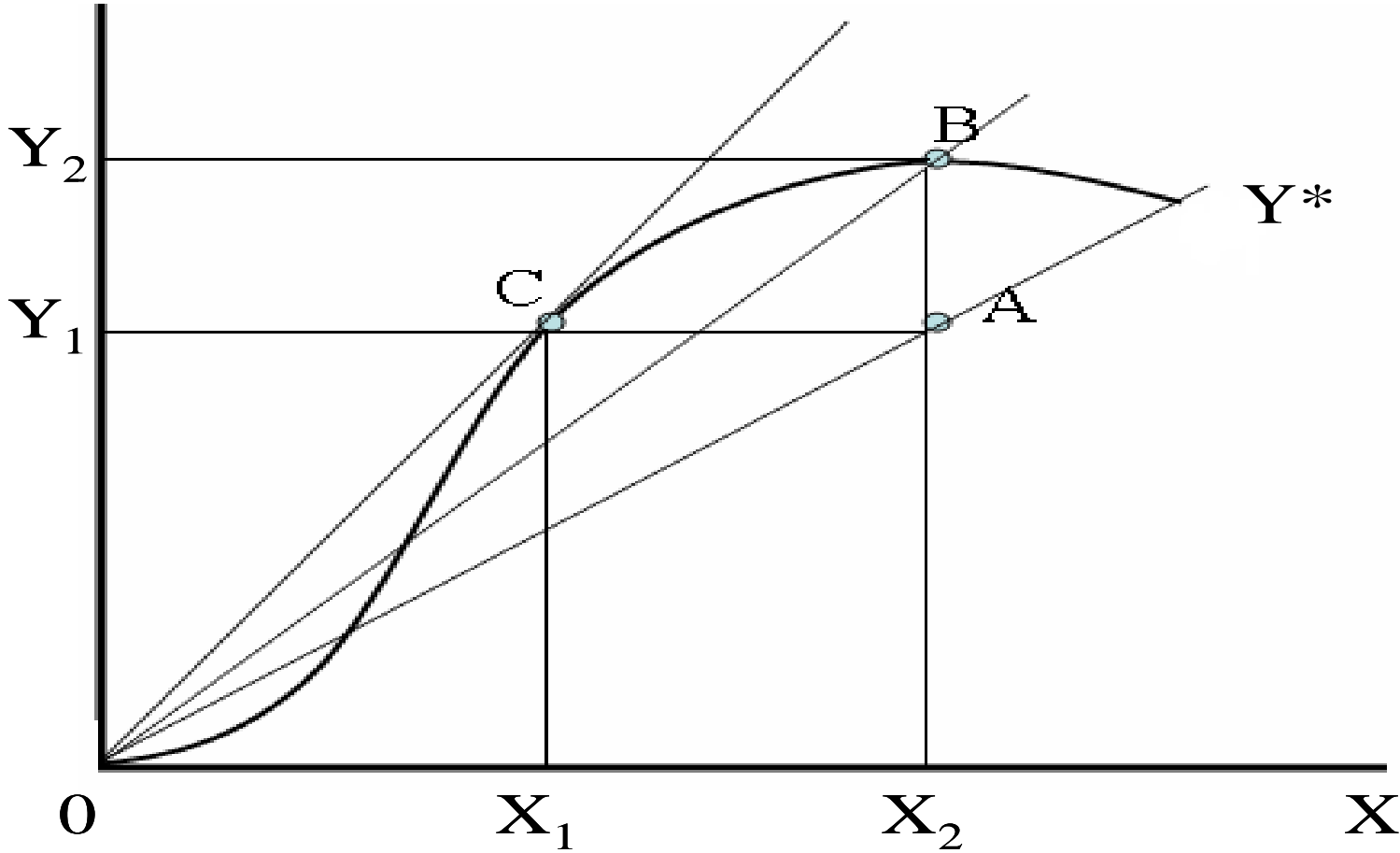
FRAMEWORK

$$Y = F(X)$$



FRAMEWORK

$$Y = F(X)$$



Methodology

Sampling Procedure

- Stratified random sampling was employed with the major growing provinces

Analytical Tools

- Descriptive analysis with the aid of tables and graphs were used to examine the behavior of regional domestic production, domestic prices and other characteristics of eggplant production in the Philippines.
- The stochastic frontier production function was used to determine the efficiency in the use of resources.

Methodology

Analytical Tools

The stochastic frontier production function was used to determine the efficiency in the use of resources.

$$\ln Y = \ln A + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + V_i - U_i$$

| | | | |
|--------|----------------|---|---------------------------------|
| where: | Y | = | Production of eggplant (kg) |
| | X1 | = | Labor (man-days) |
| | X2 | = | Amount of Pesticide (Pesos) |
| | X3 | = | Fertilizer (Pesos) |
| | X4 | = | Seeds used (Pesos) |
| | V _i | = | Random errors of the output |
| | U _i | = | Technical inefficiency effects. |

Methodology

Analytical Tools

The technical inefficiency effects U_i is defined by

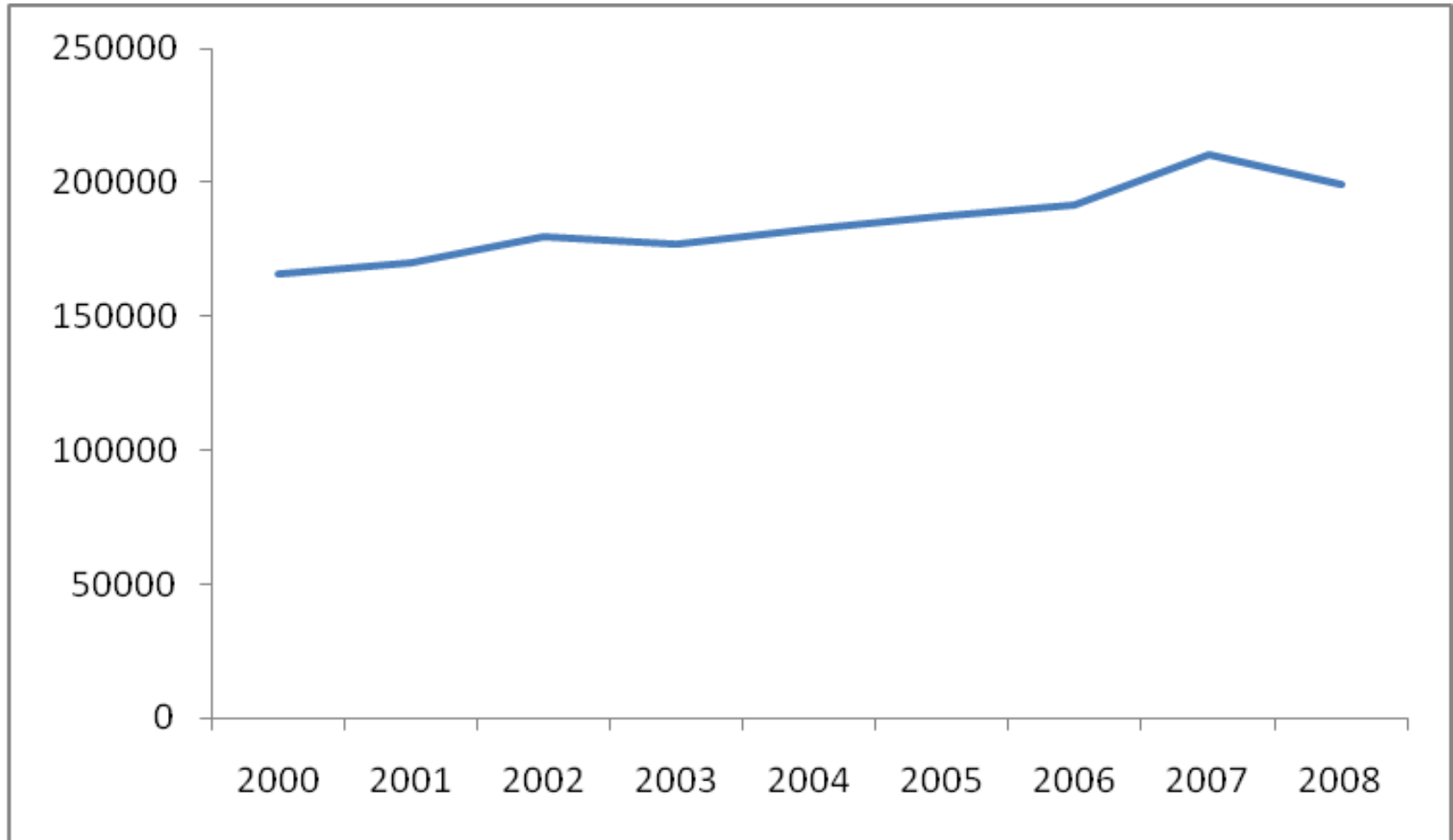
$$U_i = Z_1 + Z_2 + Z_3 + Z_4 + Z_5 + Z_6 + Z_7 + Z_8 + Z_9$$

Results and Discussion

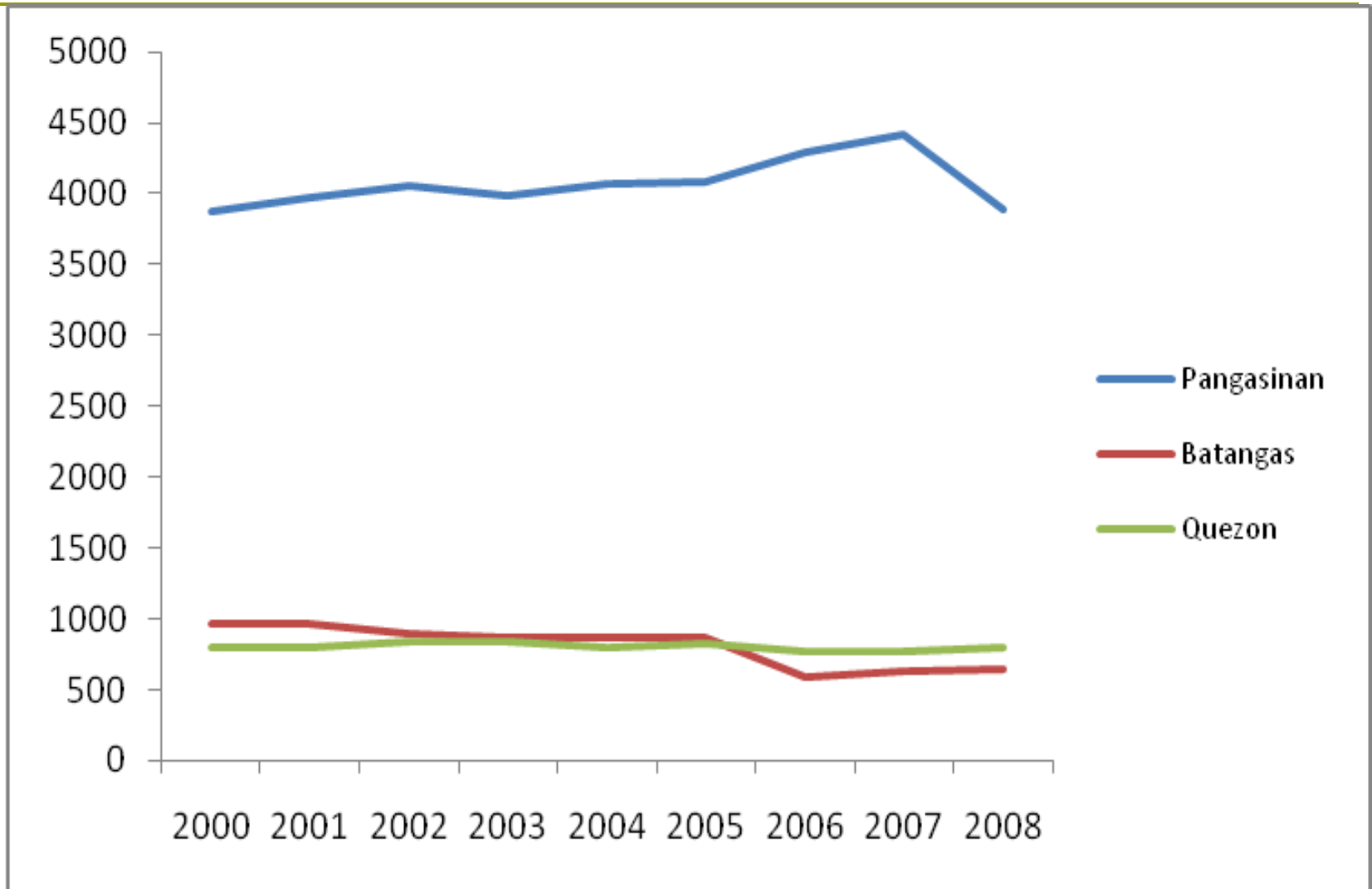
DISTRIBUTION OF RESPONDENTS BY PROVINCE

| PROVINCE | NO OF SAMPLES | PERCENTS |
|-----------------|----------------------|-----------------|
| PANGASINAN | 47 | 45.19 |
| BATANGAS | 30 | 28.85 |
| QUEZON | 27 | 25.96 |
| TOTAL | 104 | 100 |

■ Eggplant production in metric tons, Philippines, 2000-2008



Results and Discussion



Results and Discussion

AVERAGE HOUSEHOLD SIZE OF THE RESPONDENTS, BY PROVINCE, SELECTED PROVINCES, PHILIPPINES, 2009

| MEAN/NUMBER | PANGASINAN | BATANGAS | QUEZON | ALL |
|-------------|------------|----------|--------|------|
| Mean | 5.04 | 4.53 | 4.26 | 4.69 |
| Number | 47 | 30 | 27 | 104 |

Results and Discussion

Distribution of respondents by educational attainment

| EDUCATIONAL ATTAINMENT | PROVINCE | | | | | | ALL | |
|---------------------------|------------|---------------|-----------|---------------|-----------|---------------|------------|---------------|
| | Pangasinan | | Batangas | | Quezon | | Number | % |
| | Number | % | Number | % | Number | % | | |
| Elementary Undergraduate | 2 | 4.3 | 7 | 23.3 | 4 | 14.8 | 13 | 12.5 |
| Elementary Graduate | 6 | 12.8 | 6 | 20.0 | 4 | 14.8 | 16 | 15.4 |
| High school Undergraduate | 6 | 12.8 | 5 | 16.7 | 4 | 14.8 | 15 | 14.4 |
| High school Graduate | 17 | 36.2 | 7 | 23.3 | 12 | 44.4 | 36 | 34.6 |
| Vocational Undergraduate | 0 | 0 | 1 | 3.3 | 1 | 3.7 | 2 | 1.9 |
| Vocational Graduate | 3 | 6.4 | 1 | 3.3 | 1 | 3.7 | 5 | 4.8 |
| College Undergraduate | 5 | 10.6 | 2 | 6.7 | 0 | - | 7 | 6.7 |
| College Graduate | 8 | 17.0 | 1 | 3.3 | 1 | 3.7 | 10 | 9.6 |
| TOTAL | 47 | 100.00 | 30 | 100.00 | 27 | 100.00 | 104 | 100.00 |

Results and Discussion

Primary Occupation

| OCCUPATION | PROVINCE | | | | | | ALL | |
|------------|------------|-----|----------|-------|--------|-------|-----|-------|
| | Pangasinan | | Batangas | | Quezon | | No. | % |
| | No. | % | No. | % | No. | % | | |
| Farmer | 47 | 100 | 30 | 100 | 27 | 100.0 | 104 | 100.0 |
| TOTAL | 47 | 45 | 30 | 28.85 | 27 | 25.96 | 104 | 100.0 |

Results and Discussion

Educational Attainment - Spouse

| EDUCATIONAL ATTAINMENT | PROVINCE | | | | | | ALL | |
|---------------------------|------------|--------------|-----------|--------------|-----------|--------------|------------|--------------|
| | Pangasinan | | Batangas | | Quezon | | No. | % |
| | No. | % | No. | % | No. | % | No. | % |
| Elementary Undergraduate | 2 | 4.3 | 7 | 27.3 | 4 | 14.8 | 13 | 12.5 |
| Elementary Graduate | 6 | 12.8 | 5 | 16.7 | 4 | 14.8 | 15 | 14.4 |
| High school Undergraduate | 2 | 4.3 | 4 | 13.3 | 2 | 7.4 | 8 | 7.7 |
| High school Graduate | 18 | 38.3 | 9 | 30.0 | 12 | 44.4 | 39 | 37.5 |
| Vocational Graduate | 2 | 4.3 | 0 | - | 0 | - | 2 | 1.9 |
| College Undergraduate | 3 | 6.4 | 0 | - | 2 | 7.4 | 5 | 4.8 |
| College Graduate | 8 | 17.0 | 2 | 6.7 | 2 | 7.4 | 12 | 11.5 |
| None | 6 | 12.8 | 3 | 10.0 | 1 | 3.7 | 10 | 9.6 |
| TOTAL | 47 | 100.0 | 30 | 100.0 | 27 | 100.0 | 104 | 100.0 |

Results and Discussion

Ecologically Sensitive Practices

| FA RM PRACTICE | PROVINCE | | | | | |
|-------------------------|------------|-------|----------|-------|--------|-------|
| | Pangasinan | | Batangas | | Quezon | |
| | Yes | No | Yes | No | Yes | No |
| IPM | 6.48 | 93.6 | 0 | 100.0 | 0 | 100.0 |
| Composting | 65.9 | 34.1 | 6.7 | 93.3 | 7.4 | 92.6 |
| Azolla | 6.4 | 93.6 | 0 | 100.0 | 0 | 100.0 |
| Crop Rotation | 57.4 | 42.6 | 50.0 | 50.0 | 7.4 | 92.6 |
| Cover Cropping | 46.81 | 53.19 | 0 | 100.0 | 3.7 | 96.3 |
| Chemical Pest Control | 95.7 | 4.3 | 96.7 | 3.3 | 100.0 | 0 |
| Mulching | 4.5 | 98.3 | 3.3 | 96.7 | 0 | 100.0 |
| Biological Pest Control | 8.5 | 91.5 | 43.3 | 56.7 | 0 | 100.0 |

Results and Discussion

Distance of farm to major infrastructure

| RESPONSE | PROVINCE | | | | | | ALL | |
|---------------------------|------------|--------|----------|--------|--------|--------|------|--------|
| | Pangasinan | | Batangas | | Quezon | | Mean | Number |
| | Mean | Number | Mean | Number | Mean | Number | | |
| In kilometers | | | | | | | | |
| Barangay Road | 0.51 | 47 | 3.37 | 30 | 0.12 | 27 | 1.23 | 104 |
| Nearest Bank | 6.70 | 47 | 8.70 | 30 | 7.03 | 27 | 7.36 | 104 |
| Nearest Public Telephone | 4.32 | 47 | 7.23 | 30 | 5.51 | 27 | 5.47 | 104 |
| Nearest Medical Clinic | 3.39 | 47 | 6.41 | 30 | 6.33 | 27 | 5.02 | 104 |
| Nearest Hospital | 7.50 | 47 | 7.33 | 30 | 7.12 | 27 | 7.35 | 104 |
| Nearest Elementary School | 1.11 | 47 | 0.63 | 30 | 0.73 | 27 | 0.87 | 104 |
| Nearest Secondary School | 3.51 | 47 | 6.20 | 30 | 6.06 | 27 | 4.95 | 104 |
| Nearest Tertiary School | 7.70 | 47 | 8.20 | 30 | 7.09 | 27 | 7.69 | 104 |

Results and Discussion

Average Farm Size

| PROVINCE | MEAN | NUMBER |
|---------------|------|--------|
| Pangasinan | 1.07 | 47 |
| Batangas | 0.41 | 30 |
| Quezon | 0.90 | 27 |
| Average/Total | 0.84 | 104 |

Results and Discussion

Primary Crop Planted

| PRIMARY CROP PLANTED | PROVINCE | | | | | | TOTAL | |
|----------------------|------------|-------|----------|-------|--------|-------|-------|-------|
| | Pangasinan | | Batangas | | Quezon | | No. | % |
| | No. | % | No. | % | No. | % | | |
| Eggplant | 18 | | 15 | 46.7 | 25 | | 58 | |
| Rice | 17 | | 2 | 6.7 | 1 | | 20 | |
| Corn | 12 | | 0 | 0 | 0 | | 12 | |
| Vegetables | - | | 13 | 43.3 | 1 | | 14 | |
| Total | 47 | 100.0 | 30 | 100.0 | 27 | 100.0 | 104 | 100.0 |

Results and Discussion

Source of Water

| WATER SYSTEM | PROVINCE | | | | | | TOTAL | |
|---------------|------------|-------|----------|-------|--------|-------|-------|-------|
| | Pangasinan | | Batangas | | Quezon | | No. | % |
| | No. | % | No. | % | No. | % | | |
| Piped Water | 2 | 4.3 | 29 | 96.7 | 25 | 92.6 | 56 | 53.8 |
| Artesian Well | 33 | 50.2 | 1 | 3.3 | 2 | 7.4 | 36 | 34.6 |
| Pump Well | 12 | 25.5 | 0 | - | 0 | - | 12 | 11.5 |
| Total | 47 | 100.0 | 30 | 100.0 | 28 | 100.0 | 104 | 100.0 |

Results and Discussion

| SOURCE OF LIGHTING | PROVINCE | | | | | | TOTAL | |
|--------------------|------------|-------|----------|-------|--------|-------|-------|-------|
| | Pangasinan | | Batangas | | Quezon | | No. | % |
| | No. | % | No. | % | No. | % | | |
| Electric | 45 | 95.7 | 30 | 100.0 | 26 | 96.3 | 101 | 97.1 |
| Kerosene | 2 | 4.3 | 0 | - | 0 | 0 | 2 | 1.9 |
| Coleman | 0 | 0 | 0 | - | 1 | 3.7 | 1 | 0.9 |
| Total | 47 | 100.0 | 30 | 100.0 | 217 | 100.0 | 120 | 100.0 |

Results and Discussion

| TYPE OF WALL | PROVINCE | | | | | | TOTAL | |
|--------------------|------------|-------|----------|-------|--------|-------|--------|-------|
| | Pangasinan | | Batangas | | Quezon | | Number | % |
| | Number | % | Number | % | Number | % | | |
| Concrete | 35 | 24.5 | 21 | 70.0 | 21 | 77.8 | 77 | 74.0 |
| Wood | 11 | 23.4 | 5 | 16.7 | 4 | 14.8 | 20 | 19.2 |
| Bamboo | 1 | 2.1 | 4 | 13.3 | 2 | 7.4 | 7 | 6.7 |
| Total | 47 | 100.0 | 30 | 100.0 | 27 | 100.0 | 104 | 100.0 |

Results and Discussion

| TYPE OF HOUSE | PROVINCE | | | | | | TOTAL | |
|----------------|------------|-------|----------|-------|--------|-------|-------|-------|
| | Pangasinan | | Batangas | | Quezon | | No | % |
| | No | % | No | % | No | % | | |
| Permanent | 39 | 83.0 | 20 | 66.7 | 22 | 81.5 | 81 | 77.9 |
| Semi-permanent | 8 | 17.0 | 10 | 33.3 | 5 | 18.5 | 23 | 22.1 |
| Total | 47 | 100.0 | 30 | 100.0 | 27 | 100.0 | 104 | 100.0 |

Results and Discussion

| TYPE OF TOILET FACILITY | PROVINCE | | | | | | TOTAL | |
|-------------------------------|------------|-------|----------|-------|--------|-------|-------|-------|
| | Pangasinan | | Batangas | | Quezon | | No. | % |
| | No. | % | No. | % | No. | % | | |
| Open Pit | 2 | 4.3 | 0 | 0 | 0 | - | 2 | 1.9 |
| Semi-Flush | 24 | 51.1 | 28 | 93.3 | 26 | 96.3 | 78 | 75.0 |
| Flush | 17 | 36.2 | 1 | 3.3 | 1 | 3.7 | 19 | 18.3 |
| None | 4 | 8.5 | 1 | 3.3 | 0 | 0 | 5 | 4.8 |
| Total | 47 | 100.0 | 30 | 100.0 | 27 | 100.0 | 104 | 100.0 |

Results and Discussion

Maximum Likelihood Estimates of the Stochastic Frontier Production Function for Eggplant Farms, selected provinces, 2009

| PARAMETER | MODEL 1 | MODEL 2 |
|------------|----------|----------|
| CONSTANT | 0.206 | -1.377 |
| Labor (MD) | 0.813*** | 0.754*** |
| Fertilizer | 0.172 | 0.338*** |
| Pesticide | 0.218 | 0.417*** |
| Seeds | 0.201 | 0.176 |
| Location | | -0.104 |
| Age | | 1.750*** |
| Area | | 0.365 |
| Tenure | | 0.94 |

*** significant at 1% alpha

Results and Discussion

Maximum Likelihood Estimates of the Stochastic Frontier Production Function for Eggplant farms in selected provinces of the Philippines, 2009

| PARAMETER | MODEL 1 | MODEL 2 |
|-----------------|---------|----------|
| EDUCATION | | -0.763 |
| OFF FARM INCOME | | 0.154*** |
| SIGMA SQUARED | 2.135 | 2.372 |
| Gamma | | |

Results and Discussion

Table 6. Elasticity of Production and Returns to Scale

| VARIABLE | ELASTICITIES |
|-----------------|--------------|
| Labor (MD) | 0.754 |
| Fertilizer | 0,338 |
| Pesticide | 0.417 |
| Seeds | .0176 |
| RETURN TO SCALE | 1.685 |

Results and Discussion

Table 7. Decile range of frequency distribution of T.E. Of eggplant farmers

| DECILE RANGE | FREQUENCY | PERCENTAGE |
|--------------|-----------|------------|
| 0.01 – 0.10 | 1 | 0.83 |
| 0.11 – 0.20 | 1 | 0.83 |
| 0.21 – 0.30 | | |
| 0.31 – 0.40 | 1 | 0.83 |
| 0.41 – 0.50 | 3 | 2.50 |
| 0.51 – 0.60 | 6 | 5.0 |
| 0.61 – 0.70 | 19 | 15.83 |
| 0.71 – 0.80 | 19 | 15.83 |
| 0.81 – 0.90 | 53 | 44.17 |
| 0.91- 0.99 | 17 | 14.17 |

Summary and Conclusion

- **For eggplant production:**
 - **Labor and Pesticides were directly related to yield which implies that if labor and fertilizer will be increased by 1%, yield of eggplant will increase by 0.15% and 0.25%, respectively**
 - **Location dummy is significant which implies that Pangasinan had higher yield compared to other provinces**

Summary and Conclusion

PREDICTED FARM SPECIFIC TECHNICAL COEFFICIENT

RANGE 0.079 – 0.887

MEAN 0.5143

IN THE SHORT RUN, THERE IS A SCOPE FOR INCREASING EGGPLANT PRODUCTION BY 48%

THE DECILE RANGE SHOWS THAT ABOUT 60% OF THE FARMERS HAD TE EXCEEDING 50%

Eggplant exhibit an increasing return to scale (1.685) which means that if inputs will be increased by 1%, yield will increased by more than 1%.

Recommendations

- One of the problems of eggplant farmers in the study areas is seasonality of production which contributed to price fluctuation. Prices are high during lean months and very low during the peak months. During this peak months, farmers got a very low price for their produce due to over supply and sometimes could not even recover their cost of production. This over supply during peak season could be overcome by production planning and the shortfall could be increased by off-season planting. This could be in the form of staggered planting.
- There was high utilization of inputs as evidenced by the relationship between inputs and yield. The high input utilization may be caused by the access of farmers to capital.

THANK YOU!

