# CHAPTER VI

# PRICE-SUBSIDY POLICY ANALYSIS

This chapter is devoted to analyses input and output price policies on rice production in Red River Delta and response of farmers to these policy instruments in input utilization and output supply. The further cost to government, benefits to farmers and country, and cost-effectiveness of alternative price-subsidy policy instruments are also analyzed as the last step of the study. The price-subsidy policy analysis procedure by Puapanichya and Panayotou (1985) is adopted for this study.

## 6.1. Effects of Price-Subsidy Policy Instruments on Input Utilization and Output Supply

Seven alternatives of price-subsidy instruments are considered and analyzed comparatively. In which, three are single-instrument policies for labor price, fertilizer price and price of rice output; three are two-instrument policies which combine two different single-instrument policies; and one is three-instrument combination policy that include all single-instrument policies. The cost effectiveness at 10 percent decrease in input prices of labor and fertilizer and 10 percent increase in rice output price are studied for RCT and MMCT in MHYV Spring rice crop, separately, and for MHYV and THQV in RCT Autumn rice crop, separately.

Table 6.1 and 6.2 presented percentage change in input used and rice production of RCT and MMCT, respectively, in MHYV Spring rice crop. The percentage change in input used and rice production of MHYV and THQV in RCT Autumn rice crop are listed in

Table 6.3 and 6.4, respectively. These percentages are calculated based on the estimated elasticities in the chapter V and selected price policy instruments.

**Table 6.1. Effect of Alternative Price-Subsidy Policy Instruments in Rice Production of RCT in MHYV Spring Rice Crop**

| Selected Price-Subsidy Policies | Response of farmers (Percentage effect on input and output) | | |
|---|---|---|---|
| | Labor use | Fertilizer use | Rice output |
| 1. 10% in wage rate | 17.675 | 3.507 | 4.468 |
| 2. 10% in fertilizer price | 1.703 | 11.703 | 1.703 |
| 3. 10% in price of rice | 19.379 | 15.210 | 4.249 |
| 4. (1) + (2) | 19.378 | 15.210 | 6.171 |
| 5. (1) + (3) | 37.054 | 18.717 | 8.717 |
| 6. (2) + (3) | 21.082 | 26.913 | 5.952 |
| 7. (1) + (2) + (3) | 38.757 | 30.420 | 10.420 |

Source: Computed from Table 5.5

**Table 6.2. Effect of Alternative Price-Subsidy Policy Instruments in Rice Production of MMCT in MHYV Spring Rice Crop**

| Selected Price-Subsidy Policies | Response of farmers (Percentage effect on input and output) | | |
|---|---|---|---|
| | Labor use | Fertilizer use | Rice output |
| 1. 10% in wage rate | 5.847 | 3.519 | 1.713 |
| 2. 10% in fertilizer price | 1.426 | 11.426 | 1.426 |
| 3. 10% in price of rice | 7.272 | 14.945 | 6.752 |
| 4. (1) + (2) | 7.273 | 14.945 | 3.139 |
| 5. (1) + (3) | 13.119 | 18.464 | 8.465 |
| 6. (2) + (3) | 8.698 | 26.371 | 8.178 |
| 7. (1) + (2) + (3) | 14.545 | 29.890 | 9.891 |

Source: Computed from Table 5.5

Table 6.3. **Effect of Alternative Price-Subsidy Policy Instruments in Rice Production of MHYV in RCT Autumn Rice Crop**

| Selected Price-Subsidy Policies | Response of farmers (Percentage effect on input and output) | | |
|---|---|---|---|
| | Labor use | Fertilizer use | Rice output |
| 1. 10% in wage rate | 17.933 | 3.119 | 3.737 |
| 2. 10% in fertilizer price | 1.311 | 11.388 | 0.781 |
| 3. 10% in price of rice | 16.622 | 8.269 | 4.863 |
| 4. (1) + (2) | 19.244 | 14.507 | 4.518 |
| 5. (1) + (3) | 34.555 | 11.388 | 8.600 |
| 6. (2) + (3) | 17.933 | 19.657 | 5.644 |
| 7. (1) + (2) + (3) | 35.866 | 22.776 | 9.381 |

Source: Computed from Table 5.6

Table 6.4. **Effect of Alternative Price-Subsidy Policy Instruments in Rice Production of THQV in RCT Autumn Rice Crop in Hai Phong subdistrict**

| Selected Price-Subsidy Policies | Response of farmers (Percentage effect on input and output) | | |
|---|---|---|---|
| | Labor use | Fertilizer use | Rice output |
| 1. 10% in wage rate | 11.251 | 1.251 | 1.251 |
| 2. 10% in fertilizer price | 0.698 | 21.541 | 1.332 |
| 3. 10% in price of rice | 11.949 | 22.791 | 1.315 |
| 4. (1) + (2) | 11.949 | 22.792 | 2.583 |
| 5. (1) + (3) | 23.200 | 24.042 | 2.566 |
| 6. (2) + (3) | 12.647 | 44.332 | 2.647 |
| 7. (1) + (2) + (3) | 23.898 | 45.583 | 3.890 |

Source: Computed from Table 5.6

In MHYV Spring rice crop, the percentage change in labor and fertilizer used of RCT are higher than that of MMCT. The percentage change in rice output of RCT by affects of

the change in wage rate and fertilizer price are larger than that of MMCT, while the percentage change in rice output of RCT by affects of rice price are smaller than that of MMCT. Among single-instrument price policy, 10 percent increase in rice price highest affects in labor use, fertilizer use and output supply for MMCT with 7.2, 14.9 and 6.7 percent, respectively. For RCT, 10 percent increase in rice price highest affects in labor and fertilizer use of 19.3 and 15.2 percent, respectively, but in output supply that affect is 4.2 percent as second level. Alternative 7 which combine all three single-instrument policies shows highest percentage change in input use and output supply i.e. 38.6 percent of labor, 30.4 percent of fertilizer and 10.4 percent of rice supply for RCT, and 14.5 percent of labor, 29.8 percent of fertilizer, and 9.8 percent of rice supply for MMCT (Table 6.1 and 6.2).

In RCT Autumn rice crop, the percentage change in labor utilization and output supply of MHYV for all areas are larger than that of THQV in Hai Phong, but the percentage change in fertilizer use of MHYV for all areas is smaller than that of THQV in Hai Phong. Three single-instrument combination policy caused the largest change in input use and output supply as 35.8 percent of labor, 22.7 percent of fertilizer and 9.3 percent of rice output of MHYV for all areas, and 23.8 percent of labor, 45.5 percent of fertilizer, and 3.8 percent of rice output of THQV in Hai Phong subdistrict.

## 6.2. Costs, Benefits and Cost-Effectiveness of Price-Subsidy Policy Instruments

### 6.2.1. Costs and Benefits of Price-Subsidy Policy Instruments

Based on the base-line data of input use, output supply and price of input and output in production year 1993 (Table 6.5 and 6.6), the absolute changes in inputs used and rice production are calculated and then converted to costs and value, respectively, using the

corresponding post-subsidy prices. All of these are presented in Table 6.7 and 6.8 for RCT and MMCT in MHYV Spring rice crop. For RCT Autumn rice crop, these indicators are presented in Table 6.9 for MHYV for all areas and in Table 6.10 for THQV in Hai Phong Subdistrict.

**Table 6.5. Base-line Data Used for Calculating Costs, Benefits and Cost-Effectiveness of Price-Subsidy Policy Instruments in MHYV Spring Rice Crop**

| Items | Unit | MHYV Spring Rice Crop | |
|---|---|---|---|
| | | RCT | MMCT |
| Labor quantity | mandays/sao | 8.717 | 10.530 |
| Wage rate | '000D/manday | 5.781 | 5.564 |
| Fertilizer quantity | Kg NPK/sao | 5.923 | 5.964 |
| Fertilizer price | '000D/kg NPK | 3.991 | 4.007 |
| Output quantity | kg/sao | 193.2 | 218.3 |
| Rice price | '000D/kg | 1.186 | 1.165 |

Source: Computed

**Table 6.6. Base-line Data Used for Calculating Costs, Benefits and Cost-Effectiveness of Price-Subsidy Policy Intruments in Autumn Rice Crop under RCT**

| Items | Unit | RCT Autumn Rice Crop | |
|---|---|---|---|
| | | MHYV | THQV |
| Labor quantity | mandays/sao | 8.472 | 7.425 |
| Wage rate | '000D/manday | 5.786 | 6.259 |
| Fertilizer quantity | kg NPK/sao | 5.300 | 6.396 |
| Fertilizer price | '000D/kg NPK | 3.940 | 3.992 |
| Output quantity | kg/sao | 185.9 | 163.3 |
| Rice price | '000D/kg | 1.239 | 2.721 |

Source: Computed

Total benefit is equal to the total of saving in input costs and gains in output value from the pre-subsidy level of production and change in post-subsidy revenue. The difference between total benefit and change in costs is the net benefit to farmers.

**Table 6.7. Estimated Costs, Benefits and Cost-Effectiveness of Price-Subsidy Policy Instruments for Rice production of RCT in MHYV Spring Rice Crop**

| Items | Unit | Selected Price-Subsidy Policies | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Change in: | | | | | | | | |
| Labor quantity | manday | 1.541 | 0.148 | 1.689 | 1.689 | 3.229 | 1.838 | 3.378 |
| Labor expenditure | '000D | 8.018 | 0.770 | 8.788 | 8.788 | 16.800 | 9.563 | 17.575 |
| Fertilizer quantity | kg NPK | 0.208 | 0.693 | 0.901 | 0.901 | 1.109 | 1.594 | 1.802 |
| Fert. expenditure | '000D | 0.747 | 2.489 | 3.236 | 3.236 | 3.983 | 5.725 | 6.473 |
| Total cost (▲C) | '000D | 8.765 | 3.259 | 12.024 | 12.024 | 20.783 | 15.288 | 24.048 |
| Output | kg | 8.632 | 3.290 | 8.209 | 11.922 | 16.841 | 11.499 | 20.131 |
| Revenue (▲R) | '000D | 11.261 | 4.292 | 10.709 | 15.553 | 21.971 | 15.002 | 26.263 |
| Saving on pre-subsidy input (A) | '000D | 5.039 | 2.364 | - | 7.403 | 5.039 | 2.364 | 7.403 |
| Gains on pre-subsidy output (B) | '000D | - | - | 22.914 | - | 22.914 | 22.194 | 22.914 |
| Total benefit TB = ▲R + A + B | '000D | 16.300 | 6.656 | 33.623 | 22.956 | 49.924 | 40.280 | 56.580 |
| Net benefit to farmers NB = TB - ▲C | '000D | 7.535 | 3.397 | 21.599 | 10.932 | 29.141 | 24.992 | 32.532 |
| Government subsidy | '000D | 5.930 | 2.641 | 23.887 | 8.571 | 29.817 | 26.528 | 32.458 |
| Net impact of policy | '000D | 1.605 | 0.756 | -2.288 | 2.361 | -0.676 | -1.536 | 0.074 |
| Cost-Effectiveness | % | 27.066 | 28.626 | -9.578 | 27.546 | -2.267 | -5.790 | 0.228 |

Note: (1) = 10 percent decrease in labor price
(2) = 10 percent decrease in fertilizer price
(3) = 10 percent increase in rice output price
(4) = (1) + (2)
(5) = (1) + (3)
(6) = (2) + (3)
(7) = (1) + (2) + (3)

Source: Computed

Table 6.8. **Estimated Costs, Benefits and Cost-Effectiveness of Price-Subsidy Policy Instruments for Rice Production of MMCT in MHYV Spring Rice Crop**

| Items | Unit | Selected Price-Subsidy Policies | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Change in: | | | | | | | | |
| Labor quantity | manday | 0.616 | 0.150 | 0.766 | 0.766 | 1.381 | 0.916 | 1.532 |
| Labor expenditure | '000 D | 3.085 | 0.751 | 3.836 | 3.836 | 6.915 | 4.587 | 7.672 |
| Fertilizer quantity | kg NPK | 0.209 | 0.681 | 0.891 | 0.891 | 1.101 | 1.573 | 1.783 |
| Fert. expenditure | '000D | 0.754 | 2.456 | 3.213 | 3.213 | 3.971 | 5.673 | 6.430 |
| Total cost (▲C) | '000D | 3.839 | 3.207 | 7.049 | 7.049 | 10.886 | 10.260 | 14.102 |
| Output | kg | 3.739 | 3.113 | 14.739 | 6.852 | 18.479 | 17.852 | 21.592 |
| Revenue (▲R) | '000D | 4.792 | 3.989 | 18.888 | 8.780 | 23.681 | 22.877 | 27.670 |
| Saving on pre-subsidy input (A) | '000D | 5.858 | 2.389 | - | 8.247 | 5.858 | 2.389 | 8.247 |
| Gains on pre-subsidy output (B) | '000D | - | - | 25.432 | - | 25.432 | 25.432 | 25.432 |
| Total benefit TB = ▲R + A + B | '000D | 10.650 | 6.378 | 44.320 | 17.027 | 54.971 | 50.698 | 61.349 |
| Net benefit to farmers NB = TB - ▲C | '000D | 6.811 | 3.171 | 37.271 | 9.978 | 44.085 | 40.438 | 47.247 |
| Government subsidy | '000D | 6.202 | 2.663 | 27.149 | 8.865 | 33.351 | 29.812 | 36.014 |
| Net impact of policy | '000D | 0.609 | 0.508 | 10.122 | 1.113 | 10.734 | 10.626 | 11.233 |
| Cost-Effectiveness | % | 9.819 | 19.076 | 37.283 | 12.555 | 32.185 | 35.643 | 31.191 |

Note: (1) = 10 percent decrease in labor price
(2) = 10 percent decrease in fertilizer price
(3) = 10 percent increase in rice output price
(4) = (1) + (2)
(5) = (1) + (3)
(6) = (2) + (3)
(7) = (1) + (2) + (3)

Source: Computed

Table 6.9. **Estimated Costs, Benefits and Cost-Effectiveness of Price-Subsidy Policy Instruments for Rice Production of MHYV in RCT Autumn Rice Crop**

| Items | Unit | Selected Price-Subsidy Policies | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Change in: | | | | | | | | |
| Labor quantity | manday | 1.519 | 0.111 | 1.408 | 1.630 | 2.927 | 1.519 | 3.038 |
| Labor expenditure | '000D | 7.910 | 0.578 | 7.332 | 8.488 | 15.242 | 7.910 | 15.820 |
| Fertilizer quantity | kg NPK | 0.165 | 0.604 | 0.438 | 0.769 | 0.603 | 1.042 | 1.207 |
| Fert. expenditure | '000D | 0.585 | 2.142 | 1.553 | 2.726 | 2.138 | 3.695 | 4.280 |
| Total cost (ΔC) | '000D | 8.495 | 2.720 | 8.885 | 11.214 | 17.380 | 11.605 | 20.100 |
| Output | kg | 6.947 | 1.452 | 9.040 | 8.398 | 15.987 | 10.492 | 17.439 |
| Revenue (ΔR) | '000D | 9.468 | 1.979 | 12.321 | 11.446 | 21.789 | 14.299 | 23.768 |
| Saving on pre-subsidy input (A) | '000D | 4.902 | 2.088 | - | 6.990 | 4.902 | 2.088 | 6.990 |
| Gains on pre-subsidy output (B) | '000D | - | - | 23.033 | - | 23.033 | 23.033 | 23.033 |
| Total benefit TB = ΔR + A + B | '000D | 14.370 | 4.067 | 35.354 | 18.436 | 49.724 | 39.340 | 53.791 |
| Net benefit to farmers NB = TB - ΔC | '000D | 5.875 | 1.347 | 26.469 | 7.222 | 32.344 | 27.735 | 33.691 |
| Government subsidy | '000D | 5.781 | 2.326 | 24.153 | 8.107 | 29.934 | 26.479 | 32.260 |
| Net impact of policy | '000D | 0.094 | -0.979 | 2.316 | -0.885 | 2.410 | 1.256 | 1.431 |
| Cost-Effectiveness | % | 1.626 | -42.089 | 9.589 | -10.916 | 8.051 | 4.743 | 4.436 |

Note: (1) = 10 percent decrease in labor price
(2) = 10 percent decrease in fertilizer price
(3) = 10 percent increase in rice output price
(4) = (1) + (2)
(5) = (1) + (3)
(6) = (2) + (3)
(7) = (1) + (2) + (3)

Source: Computed

Table 6.10. **Estimated Costs, Benefits and Cost-Effectiveness of Price-Subsidy Policy Instruments for Rice Production of THQV in RCT Autumn Rice Crop in Hai Phong subdistrict**

| Items | Unit | Selected Price-Subsidy Policies | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Change in: | | | | | | | | |
| Labor quantity | manday | 0.835 | 0.052 | 0.887 | 0.887 | 1.723 | 0.939 | 1.774 |
| Labor expenditure | '000D | 4.704 | 0.293 | 4.997 | 4.997 | 9.706 | 5.289 | 9.993 |
| Fertilizer quantity | kg NPK | 0.080 | 1.378 | 1.458 | 1.458 | 1.538 | 2.835 | 2.915 |
| Fert. expenditure | '000D | 0.287 | 4.951 | 5.238 | 5.238 | 5.526 | 10.186 | 10.473 |
| Total cost (ΔC) | '000D | 4.991 | 5.244 | 10.235 | 10.235 | 15.232 | 15.457 | 20.466 |
| Output | kg | 2.043 | 2.175 | 2.147 | 4.218 | 4.190 | 4.322 | 6.352 |
| Revenue (ΔR) | '000D | 6.115 | 6.509 | 6.426 | 12.625 | 12.541 | 12.936 | 19.012 |
| Saving on pre-subsidy input (A) | '000D | 4.647 | 2.553 | - | 7.200 | 4.647 | 2.553 | 7.200 |
| Gains on pre-subsidy output (B) | '000D | - | - | 44.434 | - | 44.434 | 44.434 | 44.434 |
| Total benefit TB = ΔR + A + B | '000D | 10.762 | 9.062 | 50.860 | 19.825 | 61.622 | 59.923 | 70.646 |
| Net benefit to farmers NB = TB - ΔC | '000D | 5.771 | 3.818 | 40.625 | 9.590 | 46.390 | 44.466 | 50.180 |
| Government subsidy | '000D | 5.169 | 3.103 | 45.018 | 8.272 | 50.187 | 48.121 | 53.290 |
| Net impact of policy | '000D | 0.602 | 0.715 | -4.393 | 1.318 | -3.797 | -3.655 | -3.110 |
| Cost-Effectiveness | % | 11.646 | 23.042 | -9.758 | 15.933 | -7.566 | -7.595 | -5.836 |

Note: (1) = 10 percent decrease in labor price
(2) = 10 percent decrease in fertilizer price
(3) = 10 percent increase in rice output price
(4) = (1) + (2)
(5) = (1) + (3)
(6) = (2) + (3)
(7) = (1) + (2) + (3)

Source: Computed

All of the selected price policy instruments for RCT and MMCT in MHYV Spring rice crop generate positive total benefit and positive net benefit to farmers. Among single-instrument policies, 10 percent increase in rice price gives the highest level of the total benefit and the net benefit to farmers of 33,623 and 21,599 Dong per sao in RCT and of

44,320 and 37,271 Dong per sao in MMCT, that higher than in RCT. Alternative 7 with all input and output price subsidy provided the largest total benefit and net benefit to farmers with 56,580 and 32,532 Dong per sao in RCT and with 61,349 and 47,247 Dong per sao in MMCT. Both the total benefit and net benefit to farmers in MMCT are larger than that in RCT (Table 6.7 and 6.8).

In RCT Autumn rice crop, all total benefit and net benefit to farmers are positive. Almost all of policy alternatives in THQV generate higher total benefit and net benefit to farmers than that in MHYV, except from alternatives 1 (10 percent decrease in wage rate), in MHYV generate higher total benefit and net benefit to farmers than that in THQV in Hai Phong subdistrict (Table 6.9 and 9.10).

Cost of government subsidy in MHYV Spring rice crop for MMCT is slightly higher than that for RCT, this cost is smallest in alternative 2 (10 percent decrease in fertilizer price) and highest in alternative 7 (combination of all) for both RCT and MMCT.

In RCT Autumn rice crop, government subsidy for THQV is higher than that for MHYV, except in labor price (alternative 1) government subsidy for THQV is smaller than that for MHYV. The government subsidy is smallest in alternative 2 (10 percent decrease in fertilizer price) and highest in alternative 7 (all combination) for both THQV and MHYV.

Net impact of policy or net benefit to the country are obtained from net benefit to farmers minus cost of government subsidy. In MHYV Spring rice crop for MMCT all net benefit to country are positive, while for RCT this term is negative in alternative 3 (rice price subsidy) and alternatives 5 and 6. In RCT Autumn rice crop for MHYV alternatives 1, 3, 5, 6, and 7 give positive net benefit to country, while for THQV only alternatives 1, 2, and

4 give positive net benefit to the country.

### 6.2.3. Cost-Effectiveness of Price-Subsidy Policy Instruments

Cost-effectiveness is derived by comparing the net benefit to country to the cost of government subsidy. In MHYV Spring rice crop, this ratio for MMCT is almost higher than that for RCT. For RCT, among single instrument policy, subsidy in fertilizer price is most cost-effectiveness, and subsidy in labor price is second cost-effectiveness. For MMCT, subsidy in output price can get most cost-effectiveness, second one is subsidy in fertilizer price. In RCT Autumn rice crop, for MHYV, among single instrument policy, subsidy in output price is most cost-effectiveness, and second one is subsidy in labor price. For THQV in Hai Phong subdistrict, alternative 2 with 10 percent decrease in fertilizer price is most cost-effectiveness, and alternative 1 with 10 percent decrease in labor price is second cost-effectiveness.

The policy makers may not based only on the criterion of cost-effectiveness, but also on distribution considerations, farmers income improvement, production development of targeted crops and products, government budget etc., in order to set up price subsidy policy instruments for rice production. However, the integrated set of policies is beyond the scope of this study, the suggestions from the results of this study should be as follows:

If the government want to increase highest output supply and farmers' income, then among single-instrument policies the subsidy of 10 percent increase in rice price is appropriate. It could bring up highest rice output and farmers' income. But this alternative would spend largest cost of government and cost-effectiveness for RCT in MHYV Spring rice crop and for THQV in RCT Autumn rice crop are negative. However, in these two

cases, positive net benefit to farmers is so much larger than negative net benefit to country as 9.4 times for RCT in MHYV Spring rice crop and 9.2 times for THQV in RCT Spring rice crop.

But, at recent conditions of the economy, the government budget is limited. Therefore, the government subsidy in price of fertilizer (alternative 2) for rice production in the Red River Delta may be appropriate. However, for MHYV in RCT Autumn rice crop the net benefit to the country is negative, but the net benefit to the farmers is positive and larger than negative net benefit to the country as 1.3 times.