by OP, which is assumed lower than the selling price (The Government handling costs of rice storage and transaction are not included in this diagram. It is possible to show the situation of government deficits on rice accounts). Note that the world market price is OW, which is located below government purchase price OP.

In the initial situation covering the period before 1975, the year Korea reached self-sufficiency in rice, imports of rice are indicated by quantity BC with a foreign exchange cost equal to the area of BHJC; domestic production is shown by quantity OB. The effect of introducing Tongil rice, plus effecting changes in other agricultural production conditions can be seen as resulting in self-sufficiency in rice. The net effect of this is shown in the diagram. There is no change in consumer surplus and the increase in producer surplus equals the area OKFE. The incidence of research benefits is shown to fall more on producers than on consumers. This finding contrasts with Park's analysis in which the benefits exclusively fall on consumers. Indeed, the available data indicate that the market price of rice has risen at a rate faster than that of government purchase price. There is no evidence for a drastic decrease in the consumer rice price following increased domestic yields in rice.

More importantly, the real benefits of R&E expenditures did not lie so much in benefiting producers or consumers as in saving the cost of foreign exchange used for imports of rice. Our analysis clearly shows this. As a result of attaining self-sufficiency, the import saving is equal to BC in quantity and to the area BHJC in dollars.

To summarize, although our analysis is qualitative in nature, there are two important findings that emerge from it:

-- Producers (farmers), as compared with urban consumers, benefited more from the adoption of the improved agricultural technology. The critical factor contributing to this has been government pricing policy.

-- The previous estimate of economic returns from rice research is unreliable. It failed to recognize the gains in producer surplus, and overestimated consumer gains. Moreover, it totally overlooked, perhaps, a much larger benefit in foreign exchange savings. Because the previous study ignored the differences in input uses between the two varieties, the estimate of the economic return on rice research in Korea is likely overstated.

V. Further Suggestions

Among other things, one important caveat in the preceding model must be noted. That is, our analysis has failed to separate net effects of R&E investment from those of other factors that collectively or independently cause a shift downward of the supply curve (see Figure 1). Clearly, some factors such as fertilizer and chemicals are complementary in input