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TABLE VI—DETAILS OF PER BENEFICIARY ADDITIONAL NET INCOME AND ANNUAL LOAN INSTALMENT

(*Rs.*)

Particulars	Small farmers	Marginal farmers	Agricultural labourers	Village artisans
1. Differential in family income	1,589·27	1,683·40	1,077·78	362·92
2. Differential in family consumption expenditure	333·11	388·72	213·56	228·92
3. Additional net family income over consumption expenditure	1,256·09	1,294·68	864·22	134·02
4. Amount of annual loan instalment	819·00	741·00	820·00	720·00
5. Net saving after paying loan instalment	437·09	553·68	44·22	—585·98

The situation regarding village artisans might have resulted mainly because the scale of finance to them was relatively low, as a result of which it could have been difficult for them to effect adequate improvements in their respective occupations.

CONCLUSIONS

The supply of finance at lower interest rate has enabled the beneficiaries to improve upon their production activities and income levels. It has further served as a means of strengthening their capital base, generating additional employment and ameliorating economic conditions of the rural weaker section. The additional money income generated through the use of bank finance has been adequate for the payment of annual loan instalments in a majority of the cases.

We, therefore, recommend that the present strategy of supplying lower interest rate finance may be executed on a wider scale in order to generate additional employment and income to the weaker sections of the rural society.

SUBSIDY VERSUS PRICE SUPPORT TO FERTILIZER INDUSTRY: A THEORETICAL FRAMEWORK

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In developing countries the growth in fertilizer consumption could be enlarged by supply push[1] which in its turn influences the expansion of distribution system and efforts to generate sustained cultivators' demand. In a country like India, where every third kilogram of fertilizer used is imported,[2] how can such a supply push be used prudently is a question relevant to sustain an increasing level of fertilizer supply year after year.

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The author is grateful to Dr. Gunvant M. Desai for introducing him with this problem.
1. Gunvant M. Desai, "Commentary: The Fertiliser Question", *IFPRI Report*, Vol. 2, No. 3, September 1, 1980.
2. Projections of fertilizer consumption and estimates of fertilizer production clearly reveal that in absolute terms, the import requirement of nitrogenous fertilizers alone would be of the order of 1·1 to 1·4 million tonnes of nutrient during 1980s. See "Fertiliser Situation in India" (Supplement) *Fertiliser News*, Vol. 26, No. 12, December 1981, p. S. 29.

In the short run, there are three alternatives with policy makers: Firstly, meet the gap between demand and supply with imports of fertilizers; secondly, support the retention (supply) price of fertilizer for industry at higher level; lastly, subsidise the input (variable capital) to the industry for greater fertilizer production.

The objective of this paper is to present an analytical framework for an economic evaluation of the above alternatives. Figures 1 to 3 give graphic representations of the framework within which the effects of subsidised input and retention price support to the fertilizer industry are examined.

SUBSIDISED VARIABLE INPUTS TO INDUSTRY

Self-sufficiency in fertilizer supply can be achieved by lowering prices of inputs to the production of fertilizers. Figure 1A shows a fertilizer production function with a given technology and Figure 1B shows a derived demand function for variable capital input. The additional input needed for required level of fertilizer production F_1, at which imports could be substituted by additional domestic supply is C_0C_1. At a price of capital input PC_0, the industry can optimize fertilizer production at $\bar{F}$ level, but is producing only F_0 units of fertilizer using C_0 inputs. The required level of fertilizers F_1 can be achieved by lowering the input price from PC_0 to PC_s. The cost to the policy makers in this operation would be the burden of subsidised inputs to the industry. The benefits would be: (*i*) net effect of lower input cost in production process to the industry; and (*ii*) net saving of foreign exchange because of resource diversion from imports to industry. These cost and benefits are worked out in detail using Figure 1 as follows:

The cost to the government is the total burden of subsidy for variable inputs in producing required fertilizer F_1 is equal to C_1 $(PC_0 - PC_s)$.

The industry will benefit in two ways. Firstly, it could produce fertilizer at a lower cost and secondly, there would be a net addition to its revenue due to higher input use. The first of the above is saving in cost while using input at C_0 at reduced price, which is equal to C_0 $(PC_0 - PC_s)$. The second is revenue from added production minus added cost at subsidised price. This is equal to $[PF_d(F_1 - F_0) - PC_s\ (C_1 - C_0)]$.

The net saving of imports is equal to revenue generated due to added fertilizer production at international price minus added variable input cost at unsubsidised rates, or $= [PF_I(F_1 - F_0) - PC_0(C_1 - C_0)]$.

The benefit-cost ratio (BCR) is as follows:

$$BCR = \frac{[(F_1 - F_0)(PF_I + PF_d)] - [(C_1^* - C_0)(PC_0 + PC_s^*)]}{(C_1^* - C_0)\ (PC_0 - PC_s^*)}$$

where PF_I = import price of fertilizer,

PF_d = domestic retention price of fertilizers = sale price to farmers,

PC_s^* = subsidised price of input for industry at which total production of fertilizer is equal to total demand,

PC_0 = actual input price for the industry,

C_0 = input use to produce F_0 fertilizer,

C_1^* = level of input at subsidised price PC_s.

Figure 1: Input Subsidy to Industry

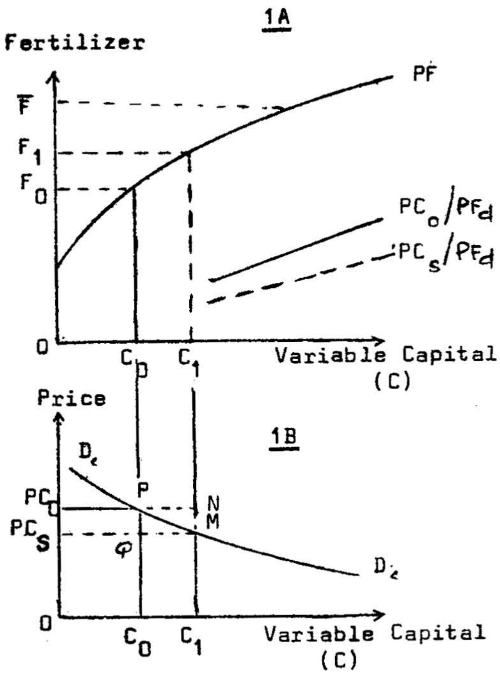


Figure 2: Higher Retention Price to Industry

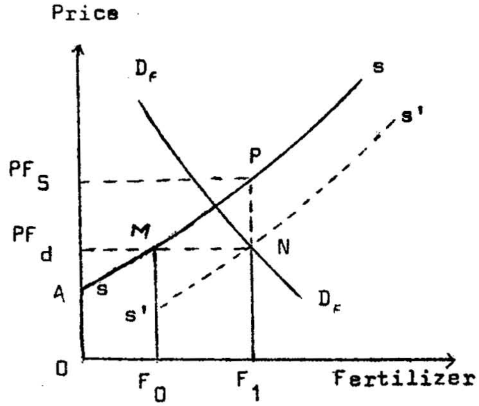
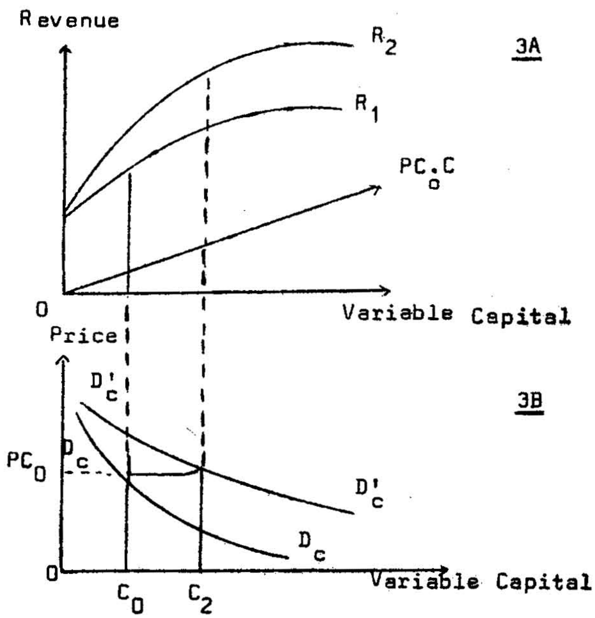


Figure 3: Effect of Higher Price on Input Use



The variables marked * are unknown in the above equation; their derivation is presented in Appendix (A).

HIGHER RETENTION PRICE TO THE INDUSTRY

Figures 2 and 3 give the effect of higher retention prices on supply of fertilizer. SS is the domestic fertilizer supply curve and DD is the demand curve. At fertilizer price PF_d cultivators demand F_1 units of fertilizer but the industry can only produce F_0 units. Consequently, F_0F_1 units of fertilizer are imported. If policy makers offer a retention price of PF_s while the cultivators' purchase price of fertilizer is maintained at PF_d, the industry could supply additional F_0F_1 units of fertilizer.

The higher retention price will result in a cost to the government but will generate additional benefits to the industry and net savings in foreign exchange.

The total cost to the policy makers will be the difference between the cost of purchasing fertilizer at a higher price PF_s and the revenue earned from their sale at PF_d to cultivators. Or the net cost is F_1 ($PF_s - PF_d$).

The total benefit to the industry is additional revenue on F_1 units due to the price difference between PF_s and PF_d less the cost of additional fertilizer production, *i.e.*, area NMP.

Or net benefit to the industry[3] = $F_1(PF_s - PF_d)$ — area NMP

$= F_1(PF_s - PF_d) - F_1(PF_s - PF_d) +$ area MP PF_s PF_d

$=$ Area MP PF_s PF_d.

Net savings due to reduced imports are equal to revenue generated due to increased domestic supply minus cost of additional input used by the industry due to higher retention price of fertilizer. The first component is equal to $PF_I.(F_1 - F_0)$. The second component can be arrived at from Figure 3. Due to a shift in the revenue function (because of higher fertilizer price), the industry now will be using C_0C_2 more variable input; hence the added cost is equal to $PC_0(C_2 - C_0)$.

The benefit-cost ratio from price support to the fertilizer industry is:

$$BCR = \frac{\text{*Area MP } PF_s\, PF_d + PF_I\,(F_1 - F_0) - PC_0\,(C_2^* - C_0)}{F_1(PF_s - PF_d)}$$

where PF_s^* = higher retention price for fertilizer (to the industry),

C_2^* = level of input use by the industry due to higher retention price of fertilizer.

Other variables are already defined.

The variables marked * are unknown in the above equation. The way these are computed is given in Appendix (B).

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3. The total sale proceed at F_1 level of production and PF_s price would be divided between the cost to and the surplus of the industry respectively as area PF_1OA and area $PAPS_s$. However, at PF_d price and F_1 level of production, the surplus of and cost to the industry would be area $MAPF_d$ and area NF_1OAM respectively. Hence the additional cost to the industry due to price support is equal to area PF_1OA — area NF_1OAM = area PNM. The net benefit to the industry is equal to area $PAPF_s$ — area $MAPF_d$ = area $MPPF_dPF_s$.

EVALUATION OF OPTIONS

The two alternatives have to be evaluated with regard to the long-term policy options. One such long-term option is generating additional capacity of fertilizer production. The total cost to the government in this case would be the present worth of the entire capital investment for the additional capacity. The social benefit would be: (*i*) the present worth of the net additional revenue generated by the industry due to increased fertilizer production throughout its life time and (*ii*) present worth of the net saving of foreign exchange.

The short-term gains should also be weighed against the long-term policy options of either improving the productivity of existing fertilizer industry or improving physical and institutional infrastructure, such as the irrigation and basic research systems. These long-term measures would shift upwards the production function in the fertilizer industry and agriculture.

APPENDIX

ESTIMATION OF UNKNOWN VARIABLES

(A) PC_0/PC_s, the ratio of actual and subsidised input prices, and at these prices the ratio of variable input usage at which the industry will produce F_1 units and actual level of input use at which industry is producing F_0 units, *i.e.*, C_1/C_0 can be arrived at by simultaneously solving the fertilizer production function $F = f_a(C)$ and the input demand function $C = f_k(PC)$, where F, C and PC are respectively fertilizer production, input use and price of input and 'a' is the production elasticity of input and 'k' the price elasticity of input.

The ratio C_2/C_0 can be calculated from the revenue function generated from the above fertilizer production function. The marginal revenue function $\partial F/\partial C$ could be equated with constant input price PC_0. Using fertilizer retention prices PF_s and PF_d respectively in the revenue function at PC_0 input price, the ratio of input use would approximately equal C_2/C_0.

(B) The area MP PF_s PF_d (in figure 2) $= \int_{PF_d}^{PF_s} F_d\ (PF)$

where F is the supply of fertilizer related to its price PF, in a functional form $F = f_b(PF)$ with 'b' as the price elasticity of supply. PF_s/PF_d, the ratio of retention prices of fertilizer at the fertilizer supply level F_1 and F_0 respectively can also be calculated from the above function.