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Self-reliance Policy in Edible Oil and the Social Profitability of Pakistan's Oilseed Crops

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1. INTRODUCTION

Like many other South Asian countries the advent of the green revolution has led to increased productivity of many cash and food crops in Pakistan and a noticeable movement towards food-sufficiency, especially in case of wheat. One unintended outcome of these achievements has been the neglect of the oilseed and edible oil sector at all levels of research and government.

With a widening in the edible oil deficit, Pakistan has become increasingly dependent on imported edible oils. At an annual average growth rate of 9.6 percent, Pakistan's edible oil imports have risen from 466.94 million kg. in 1980-81 to 1045.95 million kg. in 1991-92. By contrast the import costs during this period have risen from Rs 2.62 billion to Rs 10.2 billion showing an annual growth rate of nearly 13 percent. This unhappy state of affairs has been the result of not only of the rapidly accelerating pace of edible oil demand but also of deceleration in the growth rate of domestic production [Government of Pakistan (1992)].

In the context of Pakistan's vulnerable external sector, its rapidly increasing population and urbanisation, numerous studies have called for a major breakthrough in the domestic production of oilseeds. The rationale of increasing oilseed production is to avoid the development of a full-blown crisis with serious implications for the external sector and food security [FAO (1986); Sharif (1989) and USAID(1984)]. Working under the shadow of such a scenario, successive Pakistani governments have been striving for a policy of self-reliance in edible oil through various price as well as non-price measures.

For an economic evaluation of such a policy, which is driven by foreign exchange considerations, there is a need to look at the social profitability of

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expanding domestic oilseed production.[1] It is the contention of this paper that an expansion of oilseed output will make economic sense only if the social benefits of oilseed production (net foreign exchange savings) outweigh the social opportunity cost of producing a marginal unit of oilseed, or domestic factor cost at shadow prices.

The primary objective of this study therefore, is, to evaluate the social profitability of Pakistan's oilseed sector. In particular, the paper examines: the net social profitability (NSP) of various traditional as well as non-traditional oilseeds; determinants of net social profitability of oilseed crops; sensitivity of the net social profitability to changes in the economic environment faced by the oilseed sector; and the net social profitability of oilseed production on fallow lands.

The issue whether the net social profitability of oilseed crops is positive or not has important implications for society. For the oilseed growers, however, it is the financial (private) rather than the net social profitability which determines the decision to produce oilseeds. The present study, therefore, also addresses the questions of the financial profitability of oilseed production and its major determinants. Before proceeding into the results and discussion, an explicit statement of methodology and data sources seems to be inevitable and is in order.

2. SOCIAL PROFITABILITY OF OILSEEDS: METHODOLOGY AND DATA SOURCES

Assuming constant returns to scale, zero elasticity of input substitution, and no externalities, the net social profitability (NSP)[2] of an activity producing a tradable output Xi can be given as:

$$NSP_{xi} = (P_{xi} O_{xi} - M_{xi} C_{xi}) ER^{s} - (L_{xi} W^{s} + K_{s} I^{s} + D_{xi} R^{s}) \quad \ldots \quad (1)$$

Where, O_{xi} is the per unit output of commodity xi evaluated at the international farm-gate price of P_{xi}. M_{xi} is the per unit direct as well as indirect traded input requirements evaluated at international input prices C_{xi} . ER^{s} is the shadow exchange rate. L_{xi} is per unit labour requirement evaluated at the shadow wage rate W^{s}. K_{s} is per unit capital requirement evaluated at the shadow price of capital I^{s}.

[1]Given that oilseeds constitute the most important input in edible oil production, this study assumes that existence of social profitability in oilseed production is both a necessary and sufficient condition for achieving self-reliance in edible oil production.

[2]According to this formulation, the net social profitability assumes that domestic and traded inputs are expressed in terms of the contribution of direct as well as indirect primary factors of production. For a succinct treatment of the topic, see Pearson (1976).

D_{xi} is land requirements evaluated at the shadow price of land R^*.

Thus the first term on the right-hand side of (1) constitutes net social benefits or net foreign exchange savings arising from per unit domestic oilseed production. The second term, which is the sum of the direct plus indirect cost of the domestic factors of production, represents the domestic social cost of producing a unit of oilseed. Consequently, it is beneficial for society to expand oilseed production if the social benefits or net foreign exchange savings exceed the domestic social cost of production, i.e., if the $NSP_{xi} > 0$. The fulfilment of this condition also implies that the domestic oilseed sector exhibits comparative advantage in the production of oilseed *xi*.

To assess the net social profitability of oilseeds, the data on oilseed yields, international oilseed prices, input requirements; and per unit cost of the inputs for the year 1987 is derived from Mahmood (1991).

The estimation of the net social profitability of oilseed crops, as outlined above, depends on the decomposition of oilseed production costs into traded and nontraded cost components. To break down the oilseed production costs into traded and nontraded costs we treat domestically produced tradable inputs as traded inputs.[3] The domestic cost of distributing imported inputs is also divided into domestic and foreign cost components. The nontraded inputs, requiring tradable inputs for their production, are further decomposed into traded and nontraded inputs. This procedure, therefore, divides the total cost of oilseed production into: (a) direct and indirect contribution of the traded and/or tradable inputs; and (b) direct and indirect contribution of the primary factors of production. In the presence of factor and product market distortions the decomposition of oilseed production costs into traded and nontraded components is, however, not a sufficient condition to generate reliable estimates of net social profitability. What is required is an evaluation of traded and nontraded costs at shadow rather than market prices. For traded or tradable inputs/outputs this transformation is accomplished by evaluating the imports (exports) and the importables (exportables) at their c.i.f. (f.o.b.) prices.[4] Appendix 1 provides a breakdown of oilseed production cost into domestic and foreign cost components.

Like other developing countries, there are reservations regarding the distortion free functioning of factor markets in Pakistan. As noted earlier, therefore, any

[3]This assumes that the incremental output will be traded. This decomposition follows the line of argument advanced by, among others, Corden (1966); Little and Mirrlees (1972) and Pearson (1976).

[4]For details on the transformation of market prices into shadow prices, see Bruno (1967); Little and Mirrlees (1974); Gittinger (1982); Amachree (1988); Ahmed, Coady and Stern (1988) and Mahmood (1991).

welfare measure, such as net social profitability, must evaluate the contribution of primary factors at shadow rather than at market prices. Appendix 2 provides the conversion factors for labour, land, capital, and foreign exchange. The conversion factor is the ratio of shadow price of a primary factor of production to its market price. To evaluate the contribution of a productive factor at shadow prices, the conversion factor is multiplied with the market value of the factor [Mahmood (1994)].

3. NET SOCIAL PROFITABILITY OF OILSEEDS: RESULTS

Estimation of (1), on the basis of the above methodology, provides the estimates of net social profitability of traditional as well as nontraditional oilseeds. Table 1, which is based on Appendix 3, summarises the results in this regard. These results also provide a ranking of the oilseed crops on the basis of net social profitability.

Table 1

Net Social Profitability (NSP) of Oilseed Crops
(Rs /40 Kg.)

Cottonseed	172.94	(1)
Soybean	61.42	(2)
Rapeseed/Mustard	53.36	(3)
Sunflower (Irrigated)	45.51	(4)
Sunflower (Rainfed)	43.53	(5)

Source: Appendix 3.
Note: The figures in parenthesis indicate the ranking of oilseed crops on the basis of net social profitability.

According to the estimates of net social profitability (NSP), the pursuit of a policy of self-sufficiency in oilseed production can be regarded as a desirable objective in terms of increasing the society's welfare. As Table 1 indicates, the NSP of oilseed crops ranges from Rs 172.94 per 40 kg., for cottonseed, to Rs 43.53 per 40 kg., for rainfed sunflower. In terms of ranking of the oilseed crops, cottonseed enjoys the highest NSP among the given oilseed crops. Sunflower grown under rainfed conditions exhibits a relatively lower NSP as compared to irrigated sunflower, largely owing to relatively lower yields under rainfed conditions.

Though cottonseed exhibits the highest NSP, it is a by-product of seed cotton which is essentially a fibre crop. Consequently, in the context of Pakistan's drive for edible oil self-sufficiency, availability of cottonseed is constrained by supply and demand conditions in the domestic as well as international markets of cotton fibre.

Another traditional oilseed crop which exhibits positive NSP is rapeseed/mustard, with NSP of Rs 53.36 per 40 kg. A bulk of rapeseed/mustard is crushed and consumed at village level. Although the indigenous varieties of rapeseed/mustard are not perfect substitutes for improved varieties of rapeseed/mustard, such as *Canola*, village level production of rapeseed/mustard oil helps in reducing the existing production-consumption gap in edible oils.

In the case of nontraditional edible oils both soybean and sunflower oils exhibit positive NSP. There are, however, concerns regarding soybean's potential to crowd-out some other crops, such as, millet, sorghum, and maize. Nevertheless soybean is a short-duration crop and can be grown on fallow lands in between wheat and cotton as a "catch" crop. An added advantage of soybean is its nitrogen fixing property which enhances soil fertility and thus contributes to sustainability of the agriculture sector.

Though production of rainfed as well as irrigated sunflower exhibit positive NSP, the irrigated farmers show relatively higher NSP as compared to their rainfed counterparts. One of the major reasons for this divergence in NSP is due to higher irrigated sunflower yields. However, despite the existing observed yield differentials between irrigated and rainfed sunflower, it is the contention of this paper that an expansion of sunflower production is vital to bridge the staggering edible oil deficit. Like soybean, sunflower is also relatively speaking a short duration crop and fits well into the existing cropping pattern without crowding-out other crops.

Thus it is evident from the above estimates that Pakistan's endeavour to strive for self-reliance in edible oil can be defended on economic grounds. The practical use of these estimates, however, depends to a large extent on how realistic are the assumptions that underlie the estimation of NSP. To address such concerns, the inevitability of sensitivity analysis must be obvious.

4. SENSITIVITY ANALYSIS

Table 2 provides the elasticity estimates with respect to various parameters of the NSP model, such as cost of labour, capital, land, and foreign exchange, oilseed yields; international farm-gate prices of oilseeds, and shadow price of labour, capital, and foreign exchange. In the context of this paper, the NSP elasticity is defined as proportionate change in the NSP of an oilseed crop caused by a one percent change in the value of a given parameter [Mahmood (1994)].

Table 2

NSP Elasticities

Variables	Sunflower (Irriged)	Rapeseed/ Mustard	Sunflower (Rainfed)	Soybean	Cottonseed
Ic	–1.44	–0.89	–1.32	–1.00	–1.33
Lc	–0.87	–0.58	–0.76	–0.53	–0.35
Kc	–0.44	–0.35	–0.55	–0.31	–0.56
Dc	–0.58	–0.49	–0.91	–0.43	–0.15
YI	2.79	1.90	2.96	1.88	0.96
Ip	4.07	3.09	4.26	3.07	0.66
SER	2.63	2.20	2.94	2.07	1.99
SWR	–0.67	–0.41	–0.54	–0.38	–0.29
SPK	–0.38	–0.30	–0.48	–0.26	–0.54

Source : Appendix 3.

Where, Ic = Import or Foreign cost; Lc = labour cost; Kc = capital cost; Dc = land cost; YI = crop yield; Ip = international oilseed farm-gate price; SER = shadow exchange rate; SWR = shadow wage rate; SPK = shadow price of capital.

The NSP elasticities, as Table 2 indicates, with respect to costs of foreign exchange, labour, capital, and land are negative. Similarly, changes in the shadow prices of the domestic primary factors are negatively related to changes in the NSP estimates. On the other hand, changes in oilseed yields, international oilseed farm-gate prices, and shadow exchange rate are positively related to changes in the NSP of a given oilseed.[5]

According to the above estimates, the elasticity of NSP with respect to import cost varies from –0.89 for rapeseed/mustard to –1.44 for irrigated sunflower. For rainfed sunflower and soybean, the elasticity coefficient is –1.32 and 1.0, respectively. In other words, with the exception of rapeseed/mustard and soybean, the remaining two oilseed crops are relatively more sensitive to changes in import costs, such as, cost of farm machinery, fuel, fertiliser, pesticides, etc. For example, in case of sunflower one percent increase in the per unit import cost will cause NSP of irrigated sunflower to decline by 1.44 percent.

[5]In the case of cottonseed, it is the changes in the seed cotton yields which cause the NSP of cottonseed to change.

Unlike the relative sensitivity of import or foreign exchange cost to the NSP of oilseeds, the elasticity of NSP with respect to changes in the cost of domestic factors of production is relatively inelastic. For labour cost, the elasticity ranges from 0.35 for cottonseed to –0.87 for irrigated sunflower. In the case of capital cost, the elasticity coefficient varies from –0.56 (cottonseed) to –0.31 (soybean). This result implies that the NSP of cottonseed is relatively more sensitive to changes in unit capital cost than a change in the labour cost. Given the capital-intensive nature of cotton ginning, the above result is not unusual. Similarly, the elasticity of NSP with respect to land cost is inelastic. In this case the elasticity coefficients for all oilseeds is less than one. In view of the elasticities of NSP with respect to changes in the domestic factor costs, it can be concluded that a moderate rise in domestic factor costs will not affect the direction of the net social profitability measure.

Per acre oilseed yield is an important variable in determining the degree of net social profitability of an oilseed crop. As the sensitivity analysis indicates the changes in oilseed yields have positive and significant impact on the NSP of the oilseed crops. With the exception of cottonseed, the elasticities of NSP with respect to oilseed yields range from 1.88 for soybean to 2.96 for rainfed sunflower.

In the case of cottonseed it is an increase in seed cotton yield, other factors being constant, which translates into a rise in cottonseed production. Consequently, an increase in seed cotton yield leads to higher cottonseed production, which in turn raises the NSP of cottonseed by increasing the net social benefits and lowering the net social cost of oilseed production (see Appendix 3). For cottonseed, the elasticity of NSP with respect to cottonseed yield is close to unity, i.e., a one percent rise in seed cotton yield will increase the NSP of cottonseed to close to one percent.

Another important variable which determines the degree of net social profitability of oilseeds is the international farm-gate prices for these crops. With the exception of cottonseed, the elasticities of NSP with respect to international farm-gate prices range from 4.26 for rainfed rapeseed/mustard to 3.07 for soybean. The NSP of cottonseed is relatively insensitive to changes in the international mill-gate prices for cottonseed. In fact, the NSP of cottonseed is more responsive to changes in the international lint prices than the international mill-gate price for this crop.

In the case of factor prices, changes in the shadow exchange rate significantly affect the NSP for all oilseeds. The elasticity coefficients in this case range from 2.00 for cottonseed to 2.94 in the case of rainfed sunflower. On the other hand, the estimates of NSP for all oilseeds are relatively insensitive to changes in the shadow price of labour and capital as the elasticities of NSP with regard to labour or capital do not exceed one.

5. NET SOCIAL PROFITABILITY OF OILSEEDS ON FALLOW LANDS

In the presence of land scarcity and possibilities of potential competition between crops, there have been suggestions to use fallow lands for oilseed production in irrigated as well as rainfed areas of Pakistan. The reason for this argument is that the use of fallow lands, while raising oilseed production also enhances the NSP of the oilseeds. Table 3 provides the estimates of NSP of oilseed crops grown on fallow lands.

Table 3

NSP of Oilseed Crops on Fallow Land

Oilseed	NSP	% Change in NSP
Sunflower (Irrigated)	71.87	+57.92
Rapeseed/Mustard	79.72	+49.40
Sunflower (Rainfed)	83.09	+90.88
Soybean	87.78	+42.92
Cottonseed	199.54	+15.38

The use of fallow land for oilseed production causes the NSP of oilseed crops to rise. As Table 3 indicates, the maximum improvement in the estimates of NSP takes place in the case of rainfed sunflower, where the NSP increases by over 90 percent. For cottonseed, this figure is only 15 percent, as land plays only a minor role in determining the NSP of cottonseed. The use of fallow lands under rainfed as well irrigated conditions can, however, only be recommended if such a policy is in compliance with the basic principles of sustainable agriculture.

6. SOCIAL VS. PRIVATE PROFITABILITY OF OILSEEDS

The issue whether oilseed crops in Pakistan exhibit positive NSP or not has important welfare ramifications in the context of Pakistan's macroeconomic stability, resource allocation, and sustainable economic growth. For oilseed growers, however, it is the financial profitability and not the social profitability which determines the decision to plant oilseeds. The existence of social profitability in oilseeds production, as indicated by the positive NSP coefficients, however, does not necessarily imply private or financial profitability. For example, even though Pakistan exhibits positive NSP in oilseeds production, it may not be in the individual farmer's interest to grow oilseeds due to financial losses caused by oilseed production. Under such conditions, it becomes important to look at the extent of financial or private profitability of oilseed production.

The estimates of private profitability, which are based on Appendix 1 are presented in Table 4. These estimates are based on market prices rather than shadow or economic prices.[6]

Table 4

Private Profitability of Oilseeds

Oilseed	Financial Profitability (Rs/40 Kg.)
Cottonseed	72.05
Rapeseed/Mustard	37.58
Soybean	32.58
Sunflower (Rainfed)	26.68
Sunflower (Irrigated)	24.61

Source: Appendix 1.

Table 4 shows the highest private profitability for cottonseed. The private profitability of rapeseed/mustard comes after cottonseed and is followed by soybean. Though there is not much difference between commercial profitability of sunflower crops grown under irrigated and under rainfed conditions, the profitability of rainfed sunflower is slightly higher as compared to irrigated sunflower. The higher profitability of rainfed sunflower is due to the relatively low cost of producing sunflower on rainfed lands, which is more than enough to offset the relatively higher yields enjoyed by the irrigated farmers. A comparison between the NSP and the private profitability of oilseeds indicates that for all oilseeds, the level of net social profitability exceeds the per unit estimates of private profitability.

7. CONCLUSIONS AND POLICY IMPLICATIONS

This paper has been an attempt to evaluate the rationale of Pakistan's policy of self-reliance in edible oils by estimating the net social profitability of producing traditional as well as non-traditional oilseeds. The major conclusion emerging from this study is that the production of major oilseeds, such as cottonseed, rapeseed/mustard, soybean, and sunflower is socially profitable, i.e., the social

[6]Financial profitability is arrived at by subtracting total costs from total oilseed revenues. Where all input as well as output prices are measured at market prices.

benefits of producing oilseeds, expressed in terms of net foreign exchange savings, are greater than the social opportunity cost of oilseed production, expressed in terms of domestic factor cost. A ranking of the given oilseeds demonstrate that cottonseed exhibits the highest NSP (Rs 4.32 per kg.), followed by soybean, (Rs 1.55 per kg.), rapeseed/mustard, (Rs 1.33 per kg.), irrigated sunflower, (Rs 1.14 per kg.), and rainfed sunflower, (Rs 1.08 per kg.). Consequently, a drive to expand oilseed production for self-reliance in edible oils is an efficient way of saving scarce foreign exchange. Although this study has employed the NSP as a welfare measure, it understates the extent of welfare gains as it ignores the external benefits associated with oilseed as well as edible oil production.

Although cottonseed exhibits the highest NSP, its potential to bridge the widening edible oil deficit is rather restricted because cottonseed is a by-product of seed cotton and farmers decision to plant cotton depends on conditions in the market for lint rather than the demand for cottonseed [Mahmood (1994)]. The self-reliance policy in edible oil, therefore, must aim at increasing the productivity as well as the area under non-cottonseed oilseed crops, while, at the same time, relying on cottonseed as a stabilising factor in an overall strategy for self-reliance in edible oil. Any approach to raise oilseed production through area expansion schemes, however, needs to be pursued with great caution and must look into the possible crowding-out effects on other competing crops. Similarly, the use of fallow lands for oilseed production, which enhances the NSP coefficients, needs to be scrutinised in terms of effects of such a policy on land fertility and its implications for the sustainablity of the agriculture sector. Given that the possibilities of expanding oilseed production through area expansion and fallow land utilisation schemes are limited, efforts should be directed at enhancement of productivity of soybean, sunflower, and appropriate varieties of rapeseed/mustard.

Among various factors which determine the NSP of oilseeds, changes in international farm-gate prices for oilseeds, oilseed yields, the shadow exchange rate, and changes in import cost of oilseed production are most important. In view of the existence of considerable gaps between actual and potential oilseed yields, an integrated programme for oilseed productivity enhancement is vital to consolidate the NSP of oilseed production in Pakistan. Continued efforts to raise oilseed yields have an exclusive significance because the government or the oilseed growers can do little to maintain the NSP of oilseeds in the wake of a decline in the shadow exchange rate, falling international farm-gate oilseed prices, or an increase in the import cost of oilseed production. An important policy implication emerging from this study is that any future strategy to increase oilseed production, must concentrate heavily on various possibilities to increase oilseed yields. In this context, the urgency of a yield-increasing technological package (or packages) may not be underestimated.

For an individual oilseed grower, however, it is the private profitability of oilseeds that matters in decisions regarding oilseed production. The study, while confirming the positive private profitability of oilseeds, also points to the existing positive divergence between social and financial profitability of oilseed crops. The latter conclusion is important for it points to the existence of implicit taxes on the oilseed sector which may be acting as a disincentive to grow oilseeds. Policies to bring private profitability of oilseeds at par with their social profitability, though difficult to implement, can work as a stimulant to increase oilseed production. Acknowledging the difficulties in removing sectoral and economy-wide distortions, this study emphasises the need to design and implement integrated oilseed yield enhancement programmes for existing as well as future potential oilseed growers.

Appendices

Appendix 1

Oilseed Costs (Rs/Acre)

Crops	Import Cost	Labour Cost	Capital Cost	Land Cost
Sunflower (Irrigated)	683.386	642.107	211.876	320.00
Rapeseed/Mustard	493.86	500.067	197.229	320.00
Sunflower (Rainful)	397.649	355.288	168.225	320.00
Soybean	640.837	526.524	197.458	320.00
Cottonseed*	–196.67	79.90	83.70	26.60

Source: Mahmood [20, Appendices 3, 4, and 5, pp. 245–254].

Notes: The distribution of per acre cost into foreign, labour, capital, and land cost is based on the cost decomposition scheme developed by [Mahmood (1991), pp. 162-77 and pp. 245-254]. Total per acre cost is comprised of expenditure on: tractor; bullock; seed; fertiliser; pesticides; irrigation; labour; interest; tubewell and land. The cost of production data is from FAO (1986) and Agricultural Prices Commission (1987).

*Cottonseed data relates to the production of 40 kg. of cottonseed rather than per acre cost of production. The cost of producing 40 kg. of cottonseed is derived by adding local transport cost, and processing cost to cost of producing 60 kg. of seed cotton. From this cost is then subtracted the value of 20 kg. of cotton lint, a by-product of seed cotton. For a detailed discussion on the cost breakdown for cottonseed and the underlying methodology, see [Mahmood (1991), pp. 250-254].

Appendix 2

Conversion Ratios for Primary Factors

Conversion Factor for Primary Factors	Conversion Ratio[1]
Labour (CRL)	0.75
Capital (CRK)	1.16
Foreign Exchange (CRF)	1.168
Land[2] (CRD1)	1
Land[3] (CRD2)*	0

Source: [Mahmood (1991), pp. 154-55]

Notes: [1]Conversion factor or ratio is defined as the ratio of the shadow price of the productive factor to its market price. For a detailed discussion on the estimation of these shadow prices, see Mahmood (1991), p. 139–55.

[2]In this case the shadow price of the land is same as its market price.

[3]This is a situation when there is no alternative productive use of land, i.e., the shadow price of land is zero.

Appendix 3

Net Social Profitability of Oilseeds

Items	Unit	Sunf. (Irri.)	R/Must. (Rainfed)	Sunf.	Soybean	Cotton-seed
I_c	Rs per Acre	683.38	493.86	397.65	640.83	–196.67
L_c	Rs per Acre	642.11	500.08	355.29	526.52	79.90
K_c	Rs per Acre	211.88	197.23	168.23	197.46	83.70
D_c	Rs per Acre	320.00	320.00	320.00	320.00	320.00
Y_l	40 kg. per Acre	12.14	12.14	8.09	12.14	1*
P_s	Rs /40 Kg	158.65	141.05	158.65	161.47	98.10
DL_c	Rs /40 Kg	12.18	12.18	12.18	12.18	12.18
DK_c	Rs /40 Kg	2.67	2.67	2.67	2.67	2.67
CR_l	Value	0.75	0.75	0.75	0.75	0.75
CR_k	Value	1.16	1.16	1.16	1.16	1.16
CR_f	Value	1.168	1.168	1.168	1.168	1.168
CR_{d1}	Value	1	1	1	1	1
CR_{d2}	Value	0	0	0	0	0
NSP	Rs /40 Kg.	45.51	53.36	43.53	61.42	172.94

Source: I_c, L_c, K_c, D_c, from Appendix 1. Y_l from Mahmood (1991) Appendix 1. P_s, DL_c, and DK_c is derived from [Mahmood (1991), pp 168-69]. CR_l, CR_k, CR_f, CR_{d1} and CR_{d2} from Appendix 2.

*To keep symmetry, we assume cottonseed "yield" as equal to 1 or 40 kg.

Note: The net social profitability of oilseeds is measured as follows,

$$NSP_{xi} = [(P_s \times CR_f) - (I_c \times CR_f)/Y_l\ ] - [(L_c \times CR_l + K_c \times CR_k + D_c \times CR_{d1})/Y_l - (DL_c \times CR_l + DK_c \times CR_k)]$$

Where,

I_c = Per acre foreign or import cost, expressed in domestic currency at official exchange rate L_c, K_c and D_c are per acre costs respectively of labour, capital and land,

Y_l = Per acre yield

P_s = International farm-gate price in Rs per 40 kg. of seed at official exchange rate

DL_c and DK_c Labour and capital costs of distributing 40 kg. imported seed.

CR_l,CR_k, and CR_f Correction factors for labour, capital and foreign exchange respectively.

CR_{d1} and CR_{d2} = Correction factors for land at opportunity costs equal to market or zero price respectively.

REFERENCES

Ahmad, E., D. I. Coady and M. Stern (1988) A Complete Set of Shadow Prices for Pakistan: Illustration for 1975-76. *The Pakistan Development Review* 26:1.

Agricultural Prices Commission (1987) *Support Price Policy for Non-traditional Oilseed Crops 1987-88.* Islamabad: Agricultural Prices Commission.

Amachree, O. S. M. (1988) *Investment Appraisal in Developing Countries.* Brookfield: Avebury.

Bruno, M. (1967) The Optimal Selection of Export-promoting and Import-substituting Projects. In *Planning the External Sector: Techniques, Problems, and Policies.* New York: United Nations.

Corden, W. M. (1966) The Structure of a Tariff System and the Effective Protection Rate. *Journal of Political Economy* 74:3.

Food and Agriculture Organisation (1986) *Pakistan National Oilseed Development Project.* Rome: Food and Agriculture Organisation.

Gittinger, J. Price (1982) *Economic Analysis of Agricultural Projects.* Baltimore: The John Hopkins University Press.

Little, I. M. D., and J. A. Mirrlees (1974) *Project Appraisal and Planning for Developing Countries.* London: Heinemann.

Mahmood, A. (1991) Assessing the Comparative Advantage of Pakistan's Oilseed and Edible Oil Industry. Unpublished Ph. D. Dissertation, University of Manitoba, Canada.

Mahmood, Amir (1994) Food Deficit, Indigenisation Policy and the Comparative Advantage of Pakistan's Edible Oilseed Crops. Department of Economics University of Newcastle, Australia, February. (Occasional Paper No. 197.)

Pakistan , Government of (1992) *Economic Survey.* Islamabad: Finance Division.

Pearson, S. R. (1976) Net Social Profitability, Domestic Resource Cost, and Effective Rate of Protection. *The Journal of Development Studies* 12:4.

Sharif, M. (1989) Edible Oil Supply and Demand Situation in Pakistan. Islamabad: Ministry of Food and Agriculture. (Mimeographed.)

USAID (1985) *How to Improve Market Stability, Lower Import Costs and Foreign Exchange in the Edible Oil Trade.* Islamabad: United States Agency for International Development.

Zaidi, I. A. S. (1984) The Changing Oilseed Sector in Pakistan. Hauge: Institute of Social Studies. (Unpublished M.A. Research Paper.)

Comments on
"Self-reliance Policy in Edible Oil and the Social Profitability of Pakistan's Oilseed Crops"

The subject of the paper, under review, is quite interesting and important in the situation obtaining in Pakistan. During 1992-93 the edible oil import bill, amounting to US$ 500 million, was the fifth highest item of imports. The authors address an important question and provide useful insights about the social and private profitability of various oil seed crops grown in Pakistan i.e., cotton seed, soybean, rapeseed/mustard and sunflower. The approach followed by the authors is quite simple and aims at estimating the net profitability of various oilseeds. They have also attempted a sensitivity analysis of the profitability of various oilseeds in response to changes in the prices of various inputs and outputs as well as yields.

Based on the input and output prices and other data for 1987, net social profitability (NSP) of various oilseed crops, as estimated by the authors, is tabulated below:

Net Social Profitability Oilseed Crops

	(Rs/40 Kgs.)
Cottonseed	172.94
Soybean	61.42
Rapeseed/Mustard	53.36
Sunflower (Irrigated)	45.51
Sunflower (Rainfed)	43.53

Based on the NSP coefficients tabulated above, the authors observe that pursuance of a self-reliance policy in oilseed production can be regarded as a desirable objective to increase social welfare. Cotton seed ranks the highest in terms of NSP among the oilseed crops. The authors argue that soybean, a short duration crop, can be grown on fallow lands in between wheat and cotton plantation. Nitrogen fixation property of soybean to enhance soil fertility, is also cited as an added advantage of growing this crop. It is also argued that sunflower, like soybean a relatively short duration crop, would fit well into the existing cropping pattern without crowding out existing crops.

Empirical results no doubt provide positive estimates of NSP for various oilseed crops, but these are based on obsolete input and output price data relating to 1987. Since then prices of various inputs involved in the cultivation of various oilseed crops as well as the output prices (domestic as well as world) have experienced significant changes, not all necessarily in the same direction and proportion. Thus, results and policy prescriptions may not be tenable now and would need careful updating. The methodology, followed by the authors, does not take into consideration the profitability of the competing crops, a serious omission, which could undermine the policy judgement based on the present results. This dimension needs to be incorporated in the analysis if the policy objective of self-reliance in oilseeds has to be critically and objectively examined and addressed. This is important as the competing crops may have higher comparative advantage, social as well as private, than the oilseed crops under reference.

Contrary to the authors judgement and prescription about the fitting of soybean and sunflower crops in the existing rotations on account of their short duration these crops have failed to find favour with the farmers who have not been able to adjust these into their production plans.

The mid-term review of the National Oilseed Development Project (NODP), launched in 1987-88 with the assistance of the World Bank, has identified a number of constraints which have hindered the satisfactory progress. These, *inter alia*, included that sunflower crop, with hybrid seed taking more than 110 days to mature, did not fit into the existing rotations. Other important constraints have been the unsatisfactory arrangements for procurement of the produce and lack of effective coordination between various Federal and Provincial agencies.

Soybean also, it may be pointed out, has not adjusted well into the main cropping patterns. Contrary to the authors' view it is not possible for the crop to fit between wheat and cotton, as the turnaround time between these two crops is too short to permit successful cultivation of soybean. The crop has shown some potential in the hilly areas of NWFP but has not made much progress in the wheat-cotton and wheat-rice zones of the country.

The domestic resource cost for sunflower reported at 1.033 suggests a problematic situation. Similarly, why the private profitability of some of the oilseed crop is less than their social profitability is beyond my comprehension as domestic prices have been protected through high import duty. The oil yield obtained from one hectare of cotton crop through the production of cotton seed quoted at 10 kgs in the paper is too low to be true.

The sensitivity analysis as carried out and reported in the paper does not provide new insights. It is but natural that higher prices of inputs should lead to lower profitability while higher output prices have positive impact. Thus, it is no wonder that increases in input prices reduces profitability of various oilseed crops. However, what is interesting in this context is the wide variation in the resulting NSP coefficients of various crops. The inter-crop differences in response of profitability to changes in the input and output prices should have been explained in greater detail by appealing to the underlying differences in the technical coefficients of these crops. However, the authors have chosen to ignore this aspect for reasons best known to them.

To promote oilseed production in the country, there is a need to address various technical and economic constraints which have hitherto hindered progress. The important ones in this context include the development of a sound technological package and its widespread propagation, provision of inputs including quality seed and effective arrangements for procurement of the produce. Unless and until the technical and institutional constraints are satisfactorily overcome the progress in the matter cannot be achieved.

Before closing, I would like to express my gratitude to the management of the Pakistan Society of Development Economists for the kind invitation to attend their annual Conference and discuss an interesting paper. I also compliment the authors for focusing their attention on an important sub-sector of Pakistan's agriculture.

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