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Choice of Technique Under Price Distortions: A Case Example of Jeopardized Agricultural Sector

by

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Introduction:

The point this paper is trying to make is that questions of agricultural mechanization and labor migration should not be addressed independently from the over-all incentive structure within the agricultural sector and (in a dynamic sense) the linkages between agriculture and other sectors of the economy. Empirical evidence indicates that prices in the Egyptian agriculture are subject to large distortions that manifest themselves in large discrepancies between private and social profitabilities, and between sectoral and social profitabilities.

Some comparative static analysis was adopted to test for the consistency of the pattern of protection applied to agricultural commodities. The continual practice of bias against agricultural sector and heavily taxing it via price controls has made it relevant to raise the question of how do Egyptian planners view the role of the agricultural sector.

The period of transition the Egyptian economy has experienced since the mid-seventies has presumably had an impact on the relative contribution of the agricultural sector to GNP and balance of payments.

Moreover, the substantially high rates of growth achieved in other non-agricultural sectors compared to agriculture has led to a belief from the policy makers that there is likely higher potential for development in the non-agricultural sectors.

This has resulted in continual application of measures that are biased against agriculture.

The decline in relative importance of agriculture, however, due to the existence of other balance of payments resources is not a long term condition. This argument is substantiated by the uncertainity associated with the new sources of foreign exchange earnings and their strong correlation with political considerations. The deprivation of the agricultural sector of the indogeneity of the key policy variables as well as the fragmentation of policy making attributed to the distribution of the agriculture related responsibilities among a number of ministries seems to have started a declining of the functions of the agricultural sector.

Functions and role of the agricultural sector as percerved by Egyptian economic planners will presumably be reflected in public investment policies, price incentives, and subsidy policies and should be regarded as a context for analyzing questions of choice of technique, mechanization and labor migration.

General Characteristics of the distorted Market Structure In Egyptian Agriculture:

According to Schultz, government can intervene to alter market incentives in agriculture, in three different ways. (1) Governments may apply neutral economic policies with respect to the opportunity cost of agricultural production. Governments, on the other hand, can apply policies which either overvalue or undervalue agricultural production. Very few countries meet the first classification. Typically, however, high income developed countries overvalue agricultural products, whereas low income LDC'S undervalue them.

Egyptian agriculture is a typical case of governmental intervention. However, objectives, procedures and level of intervention vary from one crop to the other (2).

Although government intervention started in the early 1930's the idea of agriculture being a basic source to finance economic development was largely begun in the 1960's.

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(1) See: Schultz, T.W., "Constraints on Agricultural Production," Distortions of Agricultural Incentives, Schultz, T.W., editor. (Bloomington; Indiana University Press, 1978).
Schultz, T.W., "On Economics, Agriculture and the Political Economy, "Decision Making In Agriculture, T. Dams & K. Hunt editors. (Lincoln; University of Nebraska Press, 1977).

(2) Malcolm D. Bale & Ernst Lutz, "Price Distortions in Agriculture and Their Effects: An International Comparison," American Jour. of Ag. Econ., Vol. 63, No. 1, Feb., 1981, pp. 8-22.

In 1961, cotton trade was nationalized and intervention by a system of government monopolies, exchange controls, price differentials, and compulsory delivery quotas on the export crops to maintain supplies. The initiation of the public sector and the emphasis on the role of the State has affected both the agricultural and industrial sectors.

Generally for most of the crops and particularly for major field crops the market intervention was designed to maintain rural incomes by guaranteed minimum prices and at the same time to extract a surplus to pay for a consumer subsidy program to maintain urban incomes (1).

Agricultural Pricing and Subsidy Policy

Prices of major agricultural crops in Egypt are set at a relatively lower level compared to international (second best) alternatives (2). This is an indirect taxation to agricultural sector through the economic surplus transferred outside agriculture to other sectors of the economy. The method adopted for pricing is a full cost approach that presumably gives no attention to demand in the price determination.

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(1) Khalid Ikram, Egypt: Economic Management In a Period of transition, A World Bank Country Economic Report, the Johns Hopkins University Press, Baltimore and London, 1980. PP. 203-209.

(2) This is done via a higher committee that belongs to the cabinet that includes Ministers of Finance, Economy, Industry, Planning, Supply and Agriculture.

Prices of inputs and outputs are set in two parallel markets. There are the free village markets (which reflects supply-demand transactions within the village), and the marketing system through which the State Bank purchases crops and disburses inputs on behalf of the government.

Through the period 1965 - 1970 all cotton, 27 per cent of the wheat, 66 per cent of the rice and 57 per cent of the onion crop on average were delivered at prices determined by the government. Since then the list has grown to include other crops such as sesame, groundnuts, broad beans and lentils. In 1977 wheat quotas were dropped and farmers have increased the area in response to a price increment.

As an attempt to partially offest the impact of the intervention through price system the government pays some direct and indirect subsidies to the farmers. Agriculture is given a direct subsidy for pest control, fertilizers, gypsum, improved seeds, fodder, fuel oil and diesel and many minor items. Some other indirect subsidies are given to the farmers through importing some inputs at a relatively subsidized rate of foreign exchange (1).

Data of Table 1 indicate the four categories of sector specific agricultural subsidies through the period 1978-1981. These categories are input subsidies, pest control operations, and subsidies to agricultural projects. The first two groups namely the input subsidies

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(1) This applies to fertilizers, pestsides, and in part to agricultural machinery.

Table 1

Government Subsidies to the Agricultural Sector

1978 - 1981

(L.E. Million)

Subsidies	1978	1979	1980	1981
I- Input Subsidies				
Domestic Production of fert.	15.269	19.491	44.819	56.412
Stabilizing domestic price of fert.	16.500	-	12.300	8.805
Stabilizing prices for imported fert	-	42.568	33.031	36.049
Commission for fert. importing companies.	0.242	0.223	0.144	0.072
Fodder.	-	-	-	7.625
Others (Sugar Cane Producers)	0.900	1.000	0.993	1.447
Total	32.911	63.282	91.287	104.613
II- Pest Control Operations				
Cotton	29.379	30.600	48.400	47.200
Rice	-	-	2.100	0.975
Onion	0.030	0.030	0.015	0.015
Others (including coya beans)	0.028	0.028	0.053	1.101
Total	29.437	30.658	50.568	49.291
III- Subsidies to Ag. Projects				
Certified Seeds	1.300	1.300	1.300	1.600
Ag. Extension	0.290	0.290	0.290	0.290
Others	0.020	0.020	0.020	0.020
Total	1.610	1.610	1.610	1.910
Fertilization Projects				
Gypsum Transport	0.700	0.700	1.000	1.250
Others	0.130	0.130	0.393	0.423
Total	0.830	0.830	1.393	1.673
Gross Total	64.788	96.380	144.858	157.487
Index	100	149	224	243

Source: Ministry of Agriculture, Internal Marketing Section.

and the pest control operations account for 96-98 percent through this period. The government does not pay a direct subsidy to mechanization, though, the low interest rates for the loans farmers get for purchasing machinery also yields a subsidy. In addition, major inputs like fuel oil, and diesel are subsidized.

Ramifications of the Agricultural Price Policy: A Review of Relevant Literature

Under such pricing and subsidy policies in agriculture, prices lost much of their economic allocative function, as conflicting signals were sent to producers (1). The simultaneous use of many policy instruments which turned in many cases to have a net effect the converse of original objectives has led to intransparency in the price system. Attempts at corrections were conducted on partial and *ad hoc* bases which has led to more even confusion.

The problems of the incentive structure have manifested themselves in many forms. Unwillingness of farmers to stick to the proposed crop rotation, prices for some by-products (straw) have exceeded those of the main product, and selling inputs in the informal markets or allocating them to different crops are examples of the inefficiency of the incentive structure.

A systematic categorization of the likely ramifications of the market distortions is: 1) effects of efficiency of resource allocation and resource transfers; 2) impact on income and income distribution among sectors and within the agricultural sector; 3) effects on demand; 4) effects on supply; 5) effects on government revenues; and 6) effects on the balance of payments.

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(1) Kalid Ikram, *Ibid*, P. 208.

Recent literature demostrates that markets in agriculture are highly distorted. Bent Hansen (1968), Hindy (1975 & 1980), Khedr and Clark (1979), Caddihy (1980), Nassar (1978 & 1980), Ikram (1980), Korayem (1979), Ahmed Hassan (1979), Abd El Fadiel (1975), and Imara (1981) have done work that concluded that the Egyptian agricultural sector is indirectly taxed via price system. Part of this literature has confined its objectives showing the discrepancy between private and social profitablilities (1). Another part has focussed on efficiency considerations. In this respect the impact of the economic surplus transferred outside agriculture has been investigated. A third part has discussed only income distribution implications and the last part has estimated nominal and effective rates of protection for different crops. In the context of comparing private and social profitability a new line of thinking has been suggested that accordingly gives emphasis to sectoral versus social profitability (2).

Based on the above cited empirical evidence, one can argue that the agricultural sector has been subsidizing other sectors of the economy.

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(1) Ingram has produced some work based on the Khedr & Clark study (1979) with some modification through treating clover as a traded commodity he concluded that the ranking of the rotations has not changed from the original study: See: James C. Ingram and Tarek Moursi, "Treating Berseem as a Traded Good In the Claculation of Social Returns", ADS Project, Economic Working Paper No. 18.

(2) Ministry of Agriculture, Food Systems Development In Egypt, Agri-Business Seminar, Bank of Ameraica, Cairo & Misr America Inter. Bank, Dec. (7-9) Cairo, 1981.

For economists who are believers in the dualism theories of growth it might sound natural that in a developing economy like the Egyptian one agriculture should to some extent bear the burden of development. It must be noticed, nevertheless, that there is a tradeoff between developing other non-agricultural sectors and shrinkage agriculture when the surplus is large enough to affect economic efficiency and lead to a disincentived agricultural sector.

Comparative Static Analysis: Consistency of Protection Policy to Agricultural Products:

Since the mid-sixties the agricultural sector has based its argument for raising farm prices for major field crops on the notion of the large discrepancy between private and social profitability. The allocative repercussions of such distortions notably with respect to allocative efficiency considerations were major concern to agriculture. Surprisingly, however, this argument does not seem to be working in the process of determining farm prices.

A close look at Tables 2 and 3 would indicate the confused and confusing agricultural pricing policy and its impact on social cost of producing major crops. The domestic resource costs (DRC) in Table 2 indicate the social cost of producing four major field crops through the period 1965-1976. The social cost of producing rice and maize has been fluctuating. Conversely, the social cost of wheat and cotton were more stable in their pattern since the DRC analysis has shown cotton to be socially inexpensive to grow and wheat to be socially expensive over the period.

Nominal and effective rates of protection have been calculated for the same commodities through the period 1965-1976 as shown in Table 3. The partial and *ad hoc* domestic pricing policy was

Table 2

Domestic Resource Costs For Main Egyptian Crops

Crop / Year	1965	1970	1975	1976
Rice	0.72	1.16	0.28	0.56
Maize	1.40	0.86	3.80	1.80
Wheat	4.30	1.90	3.40	3.70
Cotton	0.21	0.39	0.26	0.25

Source: William Cuddihy, Agricultural Price Management in Egypt, IBRD, Staff Working paper No. 388, 1980.

$$DRC = \frac{\text{Cost of Non Tradeable inputs (opportunity cost of Land + Capital + labor)}}{\text{Social Revenue} - \text{(cost of Tradeable inputs)}}$$

Table 3

Nominal & Effective Rates of Protection by Commodities

Crop	Year	1965	1970	1975	1976
Rice	N	0.70	1.30	0.30	0.55
	E	0.62	1.43	0.27	0.53
Maize	N	0.84	1.03	0.79	0.88
	E	0.86	1.02	0.90	1.03
Wheat	N	1.20	1.20	0.90	1.00
	E	1.10	1.10	1.30	1.30
Cotton	N	0.66	0.69	0.45	0.65
	E	0.62	0.62	0.44	0.68

Source: William Cuddihy, Agricultural Price Mnagement in Egypt, IBRD, Staff Working Paper No. 388, 1980.

N = Nominal Rate of Protection for the i th comodity $= \frac{P_i d}{P_i b}$ 1 = Subsidy, 1 = Tax

Where:

$P_i d$ = domestic farm-gate price of the i th Commodity.

$P_i b$ = Border price of the i th commodity, being the foreign price X the official rate of exchange adjusted for internal trade and transport margins to the farm-gate with further adjustments for processing equivalence.

E = effective rate of protection for the i th Commodity $= \frac{Va_i^d}{Va_i^b}$

Where:

Va_i^d, Va_i^b = Value added in the i th activity at domestic and at broder price with adjustments for equivalance to the farm gate.

inconsistent as well, and did not show any particular pattern of protection either in the nominal or in the effective sense. The continual use of price and subsidy policies independently as two inconsistent policy instruments has led the economy to go back and forth between subsidizing and taxing crops.

Khedr and Clark of 1979 did some calculations and comparisions of private social profitabilities for nine different crop rotations (1). Economic surplus transferred from agriculture was calculated.

Similar analysis was conducted here using the 1980 and 1981 data. The analysis was done with the objective of comparing private and social profitabilities which may give in a comparative static sense some indication about the direction of the discrepancy. This consequently can answer a lot of questions related to efficiency and equity. Furthermore, it can give some idea about the government budget implications of the pricing and taxation policies within the agricultural sector.

Comparisons of the economic surplus transferred from agriculture to the other sectors of the economy in the three years indicate that it has increased for almost all rotations between 1979 and 1980. It has decreased, however, in 1981 in view of raising the farm prices of some crops and in view of raising the agricultural subsidies which increased from about L.E. 65 million 1979 to about L.E.145 million in 1980 and then to L.E 158 million in 1981.

A closer look back to the data of Table 4 shows a change in the economic surplus in ways favoring clover rotations; clover + cotton; clover + rice; clover + soybeans + nili maize; and clover + maze. Rotations of wheat, namely wheat + rice and wheat + maize

Table 4

Private and Social Profitabilities of Selected Rotation

1979 to 1981

(L.E. / Feddan)

Crop Rotations \ Year	1979				1980				1981		
	Private Profitability.	Social Profitability.	Economic Surplus	%	Private Profitability.	Social Profitability.	Economic Surplus	%	Private Profitability	Social Profitability.	Economic Surplus
Clover + Cotton	112.1	470.9	358.8	24	147.3	645.2	497.9	22.8	301	755	454
Clover + Rice	260.6	415.5	154.9	63	118.4	169.8	51.4	69.7	328	550	222
Clover + Maize	255.4	256.2	0.8	99.7	177.2	338.1	160.9	52.4	378	415	37
Wheat + Rice	88.3	293.6	205.3	30	74.8	208.8	134.0	35.8	83	384	301
Wheat + Maize	83.1	134.3	51.2	62	133.5	377.2	243.7	35.4	134	249	115
Onion + Maize	97.3	882.0	784.7	11	100.5	1329.5	1229.0	7.6	--	--	--
Beans + Maize	118.6	92.2	(26.4)	129	133.4	349.7	216.3	38.1	198	365	167
Clover + Soybean + Nili Maize	126.7	109.5	(17.2)	116	115.5	408.1	292.6	28.3	236	302	66
Sugar Cane	129.4	533.2	403.8	24	58.9	737.1	678.2	8.0	--	--	--

(--) Not available & ( ) Negative

Source: Compiled and Computed From Appendix Tables (1), (2) and (3).

became unfavorable to the farmers in 1981.

Role of Agriculture As Viewed by Egyptian Planners In A Period of Transition:

The question of how Egyptian planners view agriculture is becoming extremely important. Key agricultural policy decisions are made exogenously (1).

The data of Table 5 indicate some structural changes that have occurred in the Egyptian economy through the last two decades. The relative share of agriculture in the national income, agricultural exports, imports and investments as percentages of the national equivalents have under gone dramatic changes through the period 1960-1979.

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(1) The Ministry of Agriculture does not have final say about farm prices of major crops. Agricultural labor is not something which the MOA gives emphasis to in terms of studies, data and for coordination with other Ministries. The coordination between Ministries of Agriculture and Irrigation is not as high as should be. Irrigation and drainage programs should be much more efficiently coordinated within the agricultural sector. Plans regarding land reclamation and rehabilition are the responsibility of another distinct ministry. There must be joint planning, because prices of inputs or outputs, supply and demand for a particular product should not be distinguished on the basis of old vs. new lands. The subsidy policy for the consuming sector is done in the Ministry of Supplyes. The determination of prices and subsidies at the consumer level would presumably feed back to their equivalents at the farm level, notably with respect to nontraditional crops. The MOA has been assigned the title of Ministry of State for Agriculture and Food Security. The Ministry is not doing much as far as Food Security,and being a Ministry of State would confine its functions to extension and research.

Table 5

Agricultural Income, Exports, Imports and Investments as percentage of their equivalents at the National level* (1960 - 1979).

(L.E. Million)

Income				Exports			Investment		
Years	National Income	Agricultural Income	%	National Exports	Agricultural Exports	%	public investment.	Agricultural investment.	%
1960	1357	401	24.5	188	161	85.4	224	38	16.9
1965	1811	519	28.6	220	197	89.3	327	70	21.4
1970	1922	551	28.7	241	211	87.3	257	38	14.8
1975	2476	761	30.7	284	221	77.8	636	49	7.7
1979	4583	917	20.0	445	221	49.6	1176	93	7.9

* Previous data are in real terms.

Source: The National Bank of Egypt, The Economic Bulletin, Cairo (different issues).

The agricultural income as a percentage of the national income has decreased from 29.5% in 1960 to 20% in 1979. The share of agricultural exports from the total exports has diminished from 85.4% to 49.6% through the same period. Moreover, the share of agricultural investment of the total investments has fallen from 16.9% to 7.9%.

Since mid seventies some liberalization measures have been adopted. This has not been meant to withdraw the state from active intervention. There was no radical change, but certinly there was a redefinition of priorities and a series of cumulative changes which finally became a major change (1). The opening of the economy since 1974 has been accompanied by a large gross capital inflow (2).

Rates of change of GSP, National Consumption and Gross Investments

Data in Table 6 show some comparisons of some macro-variables indicating the structural changes that have occurred in the Egyptian economy through the period 1970-1979.

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(1) See Arab Republic of Egypt, Domestic Resource Mobilization and Growth Prospects for the 1980's. Document of the World Bank, 1980. PP.2-4. Henery J. Bruton, "Egypt Development in the Seventies".
The Center for Development economics, Williams College, Williamstown, Research Memorandum Series, Massachusetts, July, 1981.

(2) In six years (1974-1979) total cumulative gross foreign capital inflows (including direct foreign investment) amounted to 19.5 billion.
Mobilization and Growth, IBRD, op. cit., P.3.

Table 6

Selected Macroeconomic Variabler, Egypt 1970 - 1979

(L.E. Million)

Item / Years	1970/71	1974	1975	1976	1977	1978	1979	Average Annual Rate of grouth	
								1970-74	1974-78
GDP-Constant 1975 Factor prices	4005	4588	5061	5521	5907	6532	7065	3.5	9.2
Agriculture	1357	1434	1469	1491	1448	1528	1587	1.4	1.6
Industry	690	806	888	948	1012	1068	1180	4.0	7.2
Petroleum	65	120	149	265	350	427	471	16.6	37.3
Electricity	39	60	69	77	86	103	107	11.4	14.5
Construction	225	157	242	233	263	336	347	9.4	20.9
Distribution	682	868	1036	1233	1383	1602	1812	6.2	16.5
Service	947	1143	1208	1274	1365	1468	1561	4.8	6.5
Consumption	2140	3972	4445	5536	6614	8119	10681	7.8	19.6
Gross Investments	415	730	1724	1889	2399	3034	3796	15.2	42.8

Source: Henry J. Bruton, Egypt's Development in the seventies, The Center for Development Economics, Research Memorandum Series, Williams College, Williamstown, Massachusetts, RM-84. June, 1981. (Appendix).

Data of the previous table indicate the following:

A) There are new sources of foreign exchange earnings which have increased dramatically since 1974.

B) Most of these sources are for services, such as workers remittances, tourism, Suez Canal and shipping.

C) Comparison of percentage rates of growth before and after 1974 shows that the rates which have been achieved before 1974, increased dramatically after 1974, notably with respect to worker remittances and tourism.

Choice of Technique Under Market distortions

Previous analysis indicates that the significance of the agricultural sector has been changing in the minds of the policy makers.

Egyptian agriculture is a typical example of a price distorted market. The distortions are not only disfavoring agriculture but they ar also inconsistent. Nominal and effective rates of protection did not show a consistent pattern of protecting major field crops. Moreover, in view of some structural changes in the Egyptian economy following 1974, the relative importance of agriculture has been deteriorating in the minds of Egyptian planners.

In the light of these facts, one could argue that the question of choice of technique as an optimization question would be very difficult to address. Prices of neither inputs nor outputs are efficient indicators reflecting relative scarcities of inputs. With relatively highly subsidized capital compared to labor, allocative inefficiency then occurs. Appropriate technology in this world would be one which seeks technical convenience.

Some economists, however, would argue that in a price distorted world where first best solutions are non-existent, one should, for practical considerations, look to international prices to indicate a second best solution. Decisions related to choice of technique could be made from border prices for exports and import substitutes.

If we accept to talk about so-called appropriate technology in a distorted world this should be tempered with the awareness of the quality of recommendations we are suggesting. These suggestions one would argue should be taken as very rough indicators. Since there is no reason to believe that all international FOB or CIF prices are necessarly Pareto Optimal.

Issues like choice of labor vs. capital intensive techniques, mechanization and agricultural labor migration should not be addressed independently of the whole issue of the incentive structure in agriculture.

The GDP at constant factor prices (1975) has increased from L.E. 4005 million in 1970/71 to L.E. 7065 million in 1979. Average annual rate of growth before 1974 was 3.5% which has drastically increased to 9.5% following 1974. The breakdown of GDP by sector and calculating the average annual rate of growth for the five years before and after 1974 shows a drastic change specially in the petroleum, construction, distribution, electricity and industrial sectors. The rate of growth, however, achieved in agriculture was relatively low.

The change was not only confined to GDP. Drastic changes have occurred in the national consumption and gross investments before and after 1974. Average annual rate growth of consumption has increased from 7.8% over the period 1970-74 to 18.6% over the period 1974-78. Public investments, on the other hand, space needed have expanded with

an average annual rate of growth of 15.2% over the period 1974-78 which has jumped to 42.8% through the period 1974-78.

Rates of Change of Balance of Payments Current Account Components:

Data of Table 7 present some indicators about the structural change of the components of the current account of the balance of payments before and after 1974. These comparisons presumably give indications about the degree of openness of the economy and the relative significance of each item in the composition of the current account.

Table 7

Balance of payments current account in Egypt 1971 - 1979

Million U.S. Dollars)

Item / Year	1971	1974	1975	1976	1977	1978	1979	Percentage Rates of growth 1971-74	Percentage Rates of growth 1974-78
Trade Balance	-294	-1796	-2755	-2679	-2521	-3299	-4163	82.7	16.4
Exports	950	1671	1566	1609	1992	1984	2512	20.7	4.4
Imports	-1244	-3467	-4321	-4288	-4513	-5283	-6675	40.7	11.1
Services (Net)	- 92	169	285	1083	1277	2077	2559	-	86.1
Shipping	12	20	58	97	153	124	167	18.5	57.8
Suez Canal	-	-	85	311	423	514	589	-	-
Worker Remittances	6	189	365	755	896	1761	2214	215.4	74.7
Torism	72	265	332	464	728	702	601	54.3	27.6
Currant Account	- 386	-1627	-2470	-1596	-1265	-1272	-1604	61.5	- 6.3

Source: Central Bank of Egypt

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Appendix

Item \ Rotation	Clover + Cotton at (78) Prices	Clover Cotton at (79) Prices	Clover + Rice	Clover + Maize	Wheat + Rice	Wheat + Maize	Orions + Maize	Beans + Maize	Say Beans + Maize	Sugar Cane
Equivalent Internetional Prices Per Ton In The Farm	12.21	12.21	12.21	12.21	136.761	136.761	140.55	128.097	187.73	23.36
Gross Revenue Per Feddan at Inter. Prices	146 .52	146.52	293.04	293.04	191.869	191.869	1058.482	122.565	152.436	799.356
Average Cost Per Feddan. Tradable inputs at Int. Prices .	83.87	83.87	83.87	83.87	104.62	104.62	283.506	77.427	90.00	266.169
Net Revenue at Int. Prices	62.65	62.65	209.17	209.17	87.249	87.249	774.976	45.138	62.436	533.187
Equivalant International Price Per Ton In The Farm	719.001	719.001	143.39	100.847	143.39	100.847	100.847	100.847	100.847	-
Gross Revenue Per Feddan at Int. Prices	617.965	617.965	319.186	169.180	319.186	169.186	169.186	169.186	169.186	-
Average Cost Per Feddan. Tradable inputs at Int. Prices	209.715	209.715	112.864	122.159	112.864	122.159	122.159	122.159	122.159	-
Net Revenue at Int.Prices	408.25	408.25	206.322	47.027	206.322	47.027	47.027	47.027	47.027	-
Net Revenue of The Rotation at Int. Prices	470.90	470.90	415.492	256.197	293.571	134.276	882.003	93.165	109.463	533.187
Nat Revenue of the Rotation at Farm Prices	112.101	166.671	260.553	255.363	88.320	83.130	97.266	118.570	126.713	129.439
Ratio of net Revenues	4.205	2.825	1.595	1.003	3.320	1.620	8.451	0.780	0.864	4.119
Economic Surplus Transfared From Agriculture .	358.799	304.229	154.939	0.834	205.251	51.146	26.737	26.405	17.250	403.748

Source : Hassan Khedr & Paul Clark, "Policy Study on Pricing and Taxation of Major Alternative Agricultural Crops", Economic Studies Unit, Ministry of Economy & Ford Foundation, 1979

Item \ Rotation	Clover + Cotton at (78) Prices	Clover Cotton at (79) Prices	Clover + Rice	Clover + Maize	Wheat + Rice	Wheat + Maize	Onions + Maize	Beans + Maize	Say Beans + Maize	Suge Cane
Equivalent Internetional Prices Per Ton In The Farm	12.21	12.21	12.21	12.21	136.761	136.761	140.55	128.097	187.73	23.36
Gross Revenue Per Feddan at Inter. Prices	146 .52	146.52	293.04	293.04	191.869	191.869	1058.482	122.565	152.436	799.3
Average Cost Per Feddan. Tradable inputs at Int. Prices .	83.87	83.87	83.87	83.87	104.62	104.62	283.506	77.427	90.00	266.1
Net Revenue at Int. Prices	62.65	62.65	209.17	209.17	87.249	87.249	774.976	45.138	62.436	533.1
Equivalent International Price Per Ton In The Farm	719.001	719.001	143.39	100.847	143.39	100.847	100.847	100.847	100.847	-
Gross Revenue Per Feddan at Int. Prices	617.965	617.965	319.186	169.180	319.186	169.186	169.186	169.186	169.186	-
Average Cost Per Feddan. Tradable inputs at Int. Prices	209.715	209.715	112.864	122.159	112.864	122.159	122.159	122.159	122.159	-
Net Revenue at Int.Prices	408.25	408.25	206.322	47.027	206.322	47.027	47.027	47.027	47.027	-
Net Revenue of The Rotation at Int. Prices	470.90	470.90	415.492	256.197	293.571	134.276	882.003	93.165	109.463	533.
Nat Revenue of the Rotation at Farm Prices	112.101	166.671	260.553	255.363	88.320	83.130	97.266	118.570	126.713	129.
Ratio of net Revenues	4.205	2.825	1.595	1.003	3.320	1.620	8.451	0.780	0.864	4.11
Economic Surplus Transfared From Agriculture .	358.799	304.229	154.939	0.834	205.251	51.146	26.737	26.405	17.250	403.7

Source: Hassan Khedr & Paul Clark, "Policy Study on Pricing and Taxation of Major Alternative Agricultural Crops" Economic Studies Unit, Ministry of Economy & Ford Foundation, 1979

Rotation	Unit	Yield of the main Product	Yield of the Secondary Product	Price of the Main Product	Price of the Second Product	Gross Revenue Per Feddan	Cost of Production	Rent	Total Cost Per Feddan	Net Re Per.Fe
T. Clover +	Hasha	2.00	-	54.00	-	108.00	37.89	-	37.89	70.1
Cotton	M .K.	7.18	6.00	47.24	2.42	353.70	215.75	60.73	276.48	77.2
Total	-	-	-	-	-	461.70	253.64	-	314.37	147.3
Sugar Cane	Ton	33.829	-	15.27	-	517.03	388.05	70.12	458.17	58.86
P. Clover +	Hasha	4.0	-	54.00	-	216.0	73.820	43.20	117.02	98.98
Rice	Ton	2.455	6.5	81.29	2.08	213.09	153.64	40.00	193.64	19.45
P. Clover +	Hasha	4.0	-	54.0	-	216.00	73.82	43.20	117.02	98.98
Maize	Ardab	13.17	7.6	17.2	2.54	245.82	127.60	40.0	167.6	78.22
Total	-	-	-	-	-	461.82	201.42	83.20	264.62	177.20
Wheat +	Ardab	9.23	8.64	13.20	11.00	216.88	112.93	48.62	161.55	55.33
Rice	Ton	2.455	6.50	81.29	2.08	213.09	153.64	40.00	193.64	19.45
Total	-	-	-	-	-	429.97	266.57	88.62	355.19	74.78
Wheat +	Ardab	9.23	8.64	13.20	11.00	216.88	112.93	48.62	161.55	55.33
Rice	Ton	2.455	6.50	81.29	2.08	213.09	153.64	40.00	193.64	19.45
Total	-	-	-	-	-	429.97	266.57	88.62	355.19	74.78
Wheat +	Ardab	9.23	8.64	13.20	11.00	216.88	112.93	48.62	161.55	55.33
Maize	Ardab	13.17	7.60	17.20	2.54	245.82	127.60	40.00	167.60	78.22
Total	-	-	-	-	-	462.70	240.53	88.62	329.15	133.55
Beans +	Ardab	5.64	4.9	30.86	4.9	198.06	103.90	38.98	142.88	55.18
Rice	Ton	2.455	6.5	81.29	2.08	213.09	153.64	40.00	193.64	19.45
Total	-	-	-	-	-	411.15	257.54	78.98	336.52	74.63
Beans +	Ardab	5.64	4.9	30.86	4.9	198.06	103.90	38.98	142.88	55.18
Maize	Ardab	13.17	7.6	17.20	2.54	245.82	127.60	40.00	167.60	78.22
Total	-	-	-	-	-	443.88	231.50	78.98	310.48	133.40

Table (2) : Continued .

Rotation	Unit	Yield of the Main Product	Yield of the Secondary Product	Price of the Main Product	Price of the Second Product	Gross Revenue Per Feddan	Cost of Production	Rent	Total Cost Per Feddan	Not Reve Per.Fedd
Onion +	Ton	8.332	-	42.065	-	350.49	284.34	44.32	328.66	21.83
Maize	Ardab	13.17	7.6	17.20	2.54	245.82	127.60	40.00	167.60	78.22
Total	-	-	-	-	-	596.31	411.94	84.32	496.26	100.05
Lentils +	Ardab	2.69	3.88	47.03	10.07	165.58	117.00	37.00	154.00	11.58
Maize	Ardab	13.17	7.60	17.20	2.54	245.82	127.60	40.00	167.60	78.22
Total	-	-	-	-	-	411.40	244.60	77.00	321.60	89.80
T. Clover +	Hasha	2.00	-	54.00	-	108.00	37.89	-	37.89	70.11
Soya Beans +	Ton	1.116	-	206.88	-	230.88	173.90	36.47	210.37	20.51
Nili Maize	Ardab	8.910	7.6	17.20	2.54	172.55	112.67	35.00	147.67	24.88
Total	-	-	-	-	-	511.43	324.46	71.47	395.93	115.50
T. Clover	Hasha	2.00	-	54.00	-	108.00	37.89	-	37.89	70.11
Potatoes	Ton	8.02	-	78.80	-	631.98	425.31	48.55	473.86	158.12
Nili Maize	Ardab	8. 91	7.6	17.20	2.54	172.55	112.67	35.00	147.67	24.88
Total	-	-	-	-	-	-	-	-	-	253.11

Assumptions : 1- Prices and Production is of 1980 execpt . for Wheat - Beans - Onions - Lentils its was for 1981 - 82 .

2- Summer and Nili Potatoes labor cost has been increased by 30% in 1981 compared to 1980 . Same increment was applied to cost of fertilizers .

3- Cost of production for wheat, Lentils, Beans , Onion , T. Clover and P. Clover has Been increased by L.E. 5 ,8 , 12, 14,5 , and 8 respectivelly Compared to those of 198 1 .

Rotations	Unit	Main Product. Yield	Price Unit	Value of Main Product.	Value of Secondary	Value of Total Production Per Feddan	Total Costs	Net Revenue Per Fed.
T. Clover	Ha	2.0	54.0	108.0		108.0	37.89	70.11
cotton (lint + seed).	Metic Kentav	8.33	98.37	819.42	-			
	Metric Ardab	5.84	16.92					
Cotton Total				918.23	14.52	932.75	357.7	575.05
Gross Total						1040.75	395.59	645.16
P. Clover	Hasha	4.00	54.00	216.00		216.00	117.20	98.98
W. Rice	Ton	1.59	197.18	313.57	13.52	327.09	256.25	70.84
Total						543.09	373.27	169.82
P. Clover	Hasna	4.00	54.0	216.0	-	216.0	117.02	98.98
Summ. Maize	Ton	1.84	220.42	405.57	19.30	424.87	185.71	239.16
Total						640.87	302.73	338.14
Wheat	Ton	1.38	158.21	218.32	95.04	313.36	175.37	137.99
Rice	Ton	1.59	197.18	313.57	13.52	327.09	256.25	70.84
Total						640.45	431.62	208.83
Wheat	Ton	1.38	158.21	218.32	95.04	313.36	175.37	137.99
Summ. Maize	Ton	1.84	220.42	405.57	19.30	424.87	185.71	239.16
Total						738.23	361.08	377.15
Bean	Ton	0.87	266.0	231.42	24.01	255.43	144.92	110.51
Rice	Ton	1.59	197.18	313.57	13.52	327.09	256.25	70.84
Total						582.52	401.17	181.35
Bean	Ton	0.87	266.0	231.42	24.01	255.43	144.92	110.51
Summ. Maize	Ton	1.84	220.42	405.57	19.30	424.87	185.71	239.16
Total						680.30	330.63	349.67

Table (3) : continued .

Rotation	Unit	Main Product			Value of Secondary Product	Value of total per fedd.	Total Costs	Net Revenue Per. Fed.
		Yield	Price Unit	Value of Main Product.				
Onion	Ton	8.332	211.38	1761.21	-	1761.21	670.86	1090.35
Summ. Maize	T n	1.84	220.42	405.57	19.30	424.87	185.71	239.16
Total						2186.08	856.57	1329.51
Lentils	Ton	0.43	381.18	163.90	39.07	202.97	157.50	45 .47
Sum. Maize	ton	1.84	220.42	405.57	19.30	424.87	185.71	239.16
Total						627.84	343.21	284.63
T. Clover	Hasha	2.00	54.0	108.0	-	108.0	37.89	70.11
Soya Bean	Ton	1.116	-	265.0	-	295.74	210.37	85.37
Nili Maize	Ardab	1.84	220.42	405.57	19.30	424.87	172.25	252.62
Total						828.61	402.51	408.10
T. clover	Hasha	2.00	54.0	108.0	-	108.0	37.89	70.11
Sum. Potatoes	Ton	8.02	172.17	1380.80		1380.80	652.86	727.94
Nili Maize	Ton	1.84	220.42	405.57	19.30	434.87	172.25	252.62
Total						1913.67	863.00	1050.67
Nili Potatoes	Ton	7.04	172.17	1212.07		1212.07	572.24	639.83
Cotton	Metric Kentar	7.18	98.37	706.29	14.52	720.81	357.70	363.11
Total						1932.88	929.94	1002.94

1) Value of Main Product by Interational Prices - 1980 .
2) Value of Secondary Product by Local Prices - 1980.
3) Value of T. & P. clover Product by domestic Prices .
4) Rice extration factor about 65% From baddy rice per Ton .
5) The Costs by domestic Prices except the cost of fertilizers & Pestisides by International Prices .
6) The Costs included the Agr. Prosses until the crop har-vest and didn't include the Preparation, Transportation , and grading co

Until the exports to Alex' .

Table 4

Economic Surplus, Private and Social Profitabilities of different Rotations, 1980

Rop Rotation	N.R.F (L.E.)	N.R.F (L.E.)	N.R.F/ N.R.F	Economic Surplus. (L.E.)
1) Onion + Maize	100.500	1329.510	13.820	1229.010
2) Sugar Cane	58.860	737.050	12.580	678.190
3) T. Clover + Cotton	147.330	645.160	4.380	497.830
4) T. Clover + Summer	-	-	-	-
Potatoes + Nili Maize	253.110	1050.670	4.150	797.560
5) Nili Potatoes + Cotton	245.870	1002.940	4.080	757.070
6) Wheat + Rice	74.780	208.830	3.750	134.050
7) T. Clover + Soybeen				
+ Nili Maize	115.500	408.100	3.530	292.600
8) Lentils + Maize	89.800	284.630	3.170	194.830
9) Wheat + Maize	133.550	377.150	2.820	243.600
10) Brood Bean + Maize	133.400	349.670	2.620	216.270
11) Broad bead + Rice	74.630	181.350	2.420	106.720
12) P. Clover + Maize	177.200	338.140	1.910	160.940
13) P. Clover + Rice	118.430	169.820	1.430	51.390

(1) The Crop Rotations are ranked acording to the ratio (N.R.E / N.R.F).

(2) N.R.F: Net Revenue to the farmers.

(3) N.R.E: Net Revenue to the Economy.

Table 5

Economic Surplus, Private and Social

Profitabilities of different Rotations 1977 & 1981

Crop Rotation	Private and Social Profitabilit,	1977 (L.E.)	1981 (L.E.)
1) T. Clover + Cotton	Private P.	131	301
	Social P.	441	755
2) T. Clover + Soy bean + Nili Maize	Private P.	170	236
	Social P.	200	302
3) P. Clover + Maize	Private P.	210	378
	Social P.	262	415
4) Wheat + Maize	Private P.	138	134
	Social P.	240	249
5) Wheat + Rice	Private P.	117	83
	Social P.	535	384
6) Broad bean + Maize	Private P.	98	198
	Social P.	(299)	365
7) P. Clover + Rice	Private P.	169	328
	Social P.	557	550