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Agricultural Market Reforms in Egypt: Initial Adjustments in Local Input Markets

by

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ABSTRACT

The high use of modern inputs in Egypt's agricultural system well before the reforms has been very favorable to the development of private markets, particularly in the fertilizer sector. The level of adoption being very high, the usual demand constraints did not operate and traders' entry was facilitated by the size of the market. The response of the private sector has been strong, however, only where mutually consistent policies have signalled the commitment of the government to the reform process. Wherever that credibility has been in doubt, for example in the seed sector, the response has been slow. Controlled seed prices and lack of information on the cost of production of seed by the public sector are the main factors explaining this slow response.

In the fertilizer sector, the reduction in subsidies has been initially accompanied by a reduction in use, but by 1993 fertilizer use has returned to its 1991 levels. A shift in the use of different nutrients has been observed, however, with a considerable increase in the use of nitrogen fertilizer, and a substantial decline in previously heavily subsidized potash and phosphates. The fertilizer distribution system has been characterized by a rapid increase in the number of licenses, as a result of increased incentives and less rigid licensing requirements for fertilizer dealers, wholesales, and retailers. Even though the mark-up over cost is still rather small, and the price differentials between the private and public sector prices and between regions tend to disappear, the margins between purchase and sale prices of both large distributors and merchants are increasing, perhaps the signal of an emerging concentrated market structure.

The effect on crop production has been positive in most cases, with increases in production and yields. Higher nominal prices of fertilizers and pesticides did not translate into higher real prices. There is some evidence that the ratio between foodgrain prices and the prices of fertilizers, pesticides, and labor have gone up, pointing indirectly to some evidence concerning improvement in average farmer's income, to the extent that changes in the cost of other inputs like land and equipment do not exceed these gains.

1. BACKGROUD OF INPUT MARKET REFORMS

Reforms of agricultural input market in Egypt took place within one of the most productive agricultural systems of the world. With a cultivated area of about 6.2 million feddan, Egypt has a cropping intensity of 1.91; a result of a combination of very favorable conditions to intensive agriculture, such as fertile soil, plentiful water, and a mild climate.

The use of modern inputs in Egyptian agriculture has a long history. Nitrates from Chile were introduced in 1902, while the domestic production of phosphate fertilizer began in 1936 and that of nitrogen fertilizer in 1951. The growing food demand, the excellent climatic conditions, the availability of irrigation water, the need to improve soil fertility consequent to the stoppage of alluvial silt after the erection of the High Dam, and the diffusion of modern high yielding varieties contributed to the continuous increase in production and use of fertilizers (El-Fouly, 1993).

The diffusion of high yielding varieties and of modern technologies has increased yields and accelerated the demand for inputs such as fertilizers, pesticides, and machinery. Comparison with the rest of the world shows extremely high uses of fertilizers and machinery (see Table 1).

Table 1--Comparative use of modern technology in year 1990

Region	Fertilizer Use (kg/ha)	Tractors in Use (per hundred thousand hectares)	Harvester/Threshers in Use (per hundred thousand hectares)
Egypt	372	2029	90
USA	42	1101	154
Japan	350	40434	24413
African	3.3	52	6
World	28.4	548	82
Developed countries	38.0	112	193
Developing Countries	22.1	178	10

Source: FAO Agrostat. Data refer to 1990.

Nitrogen fertilizers supply about 80 percent of total fertilizer use in Egypt (see Table 2). The high growth of the 1960's has levelled off in the following two decades, but it was still sustained for potash in the 1980's. About 90 percent of nitrogen consumption and 96 percent of phosphates is supplied by domestic production, whereas potash is entirely imported (see Table 2).

Table 2--Production, use, and growth rates of fertilizer in Egypt

	1961-90	1960s	1970s	1980s
Production as percentage of use				
N	61	53	37	89
P	113	140	140	96
K	--	--	--	--
NPK	67	51	51	87
Use of fertilizer as percentage of total				
N	83	85	86	78
P	16	15	14	19
K	1	0.4	1	3
Growth rate of fertilizer use				
N	5.1	5.3	5.3	2.7
P	6.8	-3.3	10.0	5.4
K	15.9	-2.4	12.8	18.8
NPK	5.5	3.9	5.9	3.5
Fertilizer use rates in kg per feddan				
N	73.9	39.2	62.4	112.7
P	15.6	6.8	10.4	27.5
K	1.7	0.2	0.5	4.1

Source: FAO, AGROSTAT

Subsidies on fertilizers and pesticides grew rather dramatically in real terms over the 1970's, and started to decline during the 1980's. The decline accelerated after 1988 (see Figure 1). In nominal terms fertilizer subsidy to PBDAC, the major parastatal involved in input distribution, was about LE 183 million in 1988/89 and dropped to LE 33 million in 1992/93 (see Table 3).

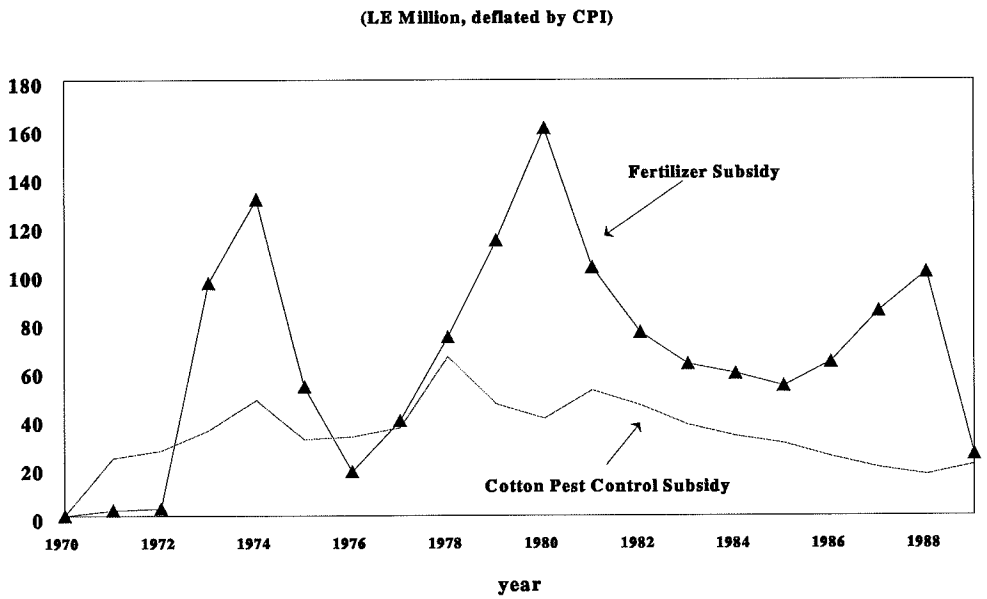
Table 3--Fertilizer Subsidy to PBDAC since 1988/89 (le million)

Year	PBDAC Subsidy LE Million
1988/89	183
1989/90	176
1990/91	194
1991/92	76
1992/93	33

Source: Field Survey, Tranche VI, MALR, 1994

During the past two decades, the GOE has taken exclusively upon itself the burden of producing, importing, and distributing most of the modern technology. In spite of tremendous increase in input use, however, agricultural growth in the decade preceding 1986 stagnated. Policy reforms began in 1980's within the Ministry of Agriculture (see Wally et al. 1993), but it was not until 7 or 8 years later that the first positive signs of liberalization of input and output markets, as well as the lifting of some acreage controls started to have an impact on agricultural growth. After 1986, the production growth of major crops such as wheat, maize, and rice was impressive (see Goletti, Ousmane, and Sil 1994). Liberalization of agricultural inputs took place within this promising environment for agricultural growth.

Figure 1: Fertilizer and Cotton Pest Control Subsidy



2. EVOLUTION OF REFORMS AFFECTING INPUT MARKETS

It is useful to understand the sequence of reforms affecting agricultural input markets in Egypt in order to put the effects of reforms in a more general context. The process of reform of agricultural markets is a complex one, characterized by many decisions being taken at the same time. The effort is, however, to identify the most critical turning points of the process in order to derive useful lessons.

First, even before specific reforms of agricultural input markets were put in place, an enabling policy environment was created. The sustained effort by the Ministry of Agriculture since the early 1980's was mostly responsible for the implementation of reforms. Without such an effort, it would have been rather difficult to implement reforms in face of the opposition of various parastatals that were directly affected by the reform process. This aspect of consistent political support is critical for the success of reform, because it relates to the credibility of the government as a reforming agent. Only when such credibility is established, would the private sector be confident enough to come forward and actively participate in the reform process.

Second, an enabling policy environment would not be sufficient to ensure the success of reforms, unless the structural conditions of the economy allow the emergence of an efficient private sector. When markets are very thin and the use of agricultural inputs is very low, market reforms will have much more difficulty taking effect, as is the experience in most Sub-Saharan Africa. Risk of adoption, high transaction costs, and low incentives for marketing will seriously limit the development of a thriving private sector in such a context. In the case of Egypt, the structural conditions of the agricultural sector facilitated the liberalization process. Well developed infrastructure, extremely high use of modern inputs, and very intensive agriculture facilitated a fast response of the private marketing system.

Third, even before allowing the private sector to be actively involved in the distribution system of agricultural inputs, some pricing reforms were put into effect. Subsidies to fertilizers and other chemicals were reduced; there was an effort at bringing the ex-factory prices of fertilizer closer to border prices. Other subsidies, such as those on credit, electricity, and fuels were also reduced. These steps in public pricing of inputs reduced the scope of rent seeking and thus facilitated subsequent reforms.

Fourth, output markets were liberalized before input markets. Acreage controls in some major crops were lifted shortly after 1986. Once production of major crops such as wheat, maize, and later rice, started to increase very dramatically, then input subsidies were reduced. Interestingly, the increase in input prices was lower than the increase in output prices as will be seen in the next section.

Fifth, the opening up of the marketing system allowed the participation of various marketing agents in the distribution system. Once price response in output markets was

already under way, and input subsidies were being reduced, the government allowed other parastatals, coops, and the private sector to participate in fertilizer delivery activities which were previously controlled by only one parastatal.

Sixth, many previous quota restrictions were eliminated and the private sector was allowed to participate in fertilizer import and export. This opening up to trade in fertilizer was accompanied by a more general trade liberalization whereby quota restrictions were converted to tariffs, and tariff rates were lowered.

Seventh, major restructuring of parastatals in most cases took place during the last part of this process, once pricing reforms were fully under way, and the private sector was allowed to participate in the distribution system. PBDAC was transformed into a purely agricultural credit institution, and plans to change the Central Administration of Seeds (CAS) into an inspection agency for seeds have been approved.

Finally, the overall process of reform can be characterized as a jagged process, where the reduction of control has not been uniform across inputs and outputs, but numerous remnants of the old system are still in place. While liberalizing several aspects of input and output markets, some pockets of protection were maintained (for example control over some fertilizer [illegible]ticides application, cotton seed, some machinery production and importation). Some of these pockets of protection were maintained because of political bottlenecks or economy-wide links; a typical case is the cotton sector where opposition to market reforms is still strong today in view of the repercussions affecting both the agricultural and industrial sector. Some other pockets of protection were kept to control the health and environmental hazards resulting from an irresponsible marketing of pesticides. The main danger, however, is that previous reforms may be reversed and the persistence of these still heavily protected areas could compromise the success of a partial approach to liberalization.

The system of controls of input and output markets has been largely dismantled over the period 1986 to 1993. During the first phase of this period (1986 to 1989) the reform process was very slow, but it gained momentum after 1990. Reforms of output markets were started before input markets and are still to be completed. Output market reform was first concerned with the main grain crops - wheat, maize, and rice - and is only slowly extending to cotton and sugarcane. The production effects were very visible for the main grains, wheat and maize; in the first period of reforms, a tremendous growth in acreage and production of these two crops came at the expense of berseem and cotton. In the second phase of the reform process (1990 to present), rice witnessed the most spectacular marketing growth, reflected in a liberalization of price controls. Both rice and wheat processing are still heavily dominated by public parastatals, with the technologically most advanced mills controlled by these parastatals. Decontrols in marketing of inputs has proceeded very fast and has been accompanied by a fast growth of the private sector and a virtual elimination of the input distribution function of the main parastatal involved in input distribution, namely the PBDAC. It is estimated (see IFDC, 1993) that the participation of the private sector in fertilizer distribution rose from virtually zero in 1990 to almost 80 percent by 1994.

3. MARKET REFORMS IN FERTILIZERS, SEEDS, AND AGRICULTURAL EQUIPMENT

Input subsidies are often introduced to encourage the adoption of modern technology. When agricultural technology is not well developed and markets are thin, there is a rationale for this approach. However, as the modern technology spreads and modern input use increases, input subsidies have often been used in the past as a way to compensate farmers for lower output prices, a situation that characterized Egypt up to 1986.

The argument that a heavy government role is necessary because of slow adoption rate is obviously inapplicable for Egypt, as the country's agriculture is very intensive and characterized by the use of a broad range of modern technology, as the figures in Table 1 show.

Since the reform began, the government has made a sustained effort in reducing subsidies on the most important agricultural inputs, namely fertilizers, cotton pest control, agricultural equipment, and agricultural credit. Fertilizer and pesticide subsidies started to decline already at the beginning of the 1980's (see Figure1), but after the reform the decline was more sustained. Subsidies on fertilizer production and distribution have been drastically reduced in the second phase of the reform period from 1990 to 1993 (see Table 3). Most pesticides are imported and used on cotton.

The general effect of reforms have affected the marketing system participants, the prices, and the use of agricultural inputs. A brief description of some of the these effects is presented in the following paragraphs.

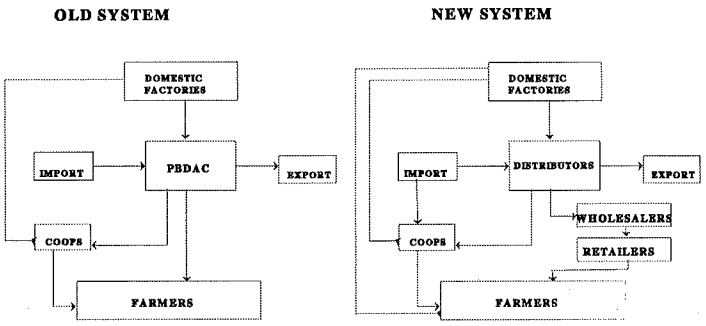
Fertilizers.

Before 1990, the importation of fertilizers was done by the General Organization for Agricultural Price Stabilization (GOAPS) on behalf of PBDAC, the distributor of fertilizers. In 1989, a plan to allow the participation of other agents other than PBDAC in the distribution of fertilizer was implemented, and since 1990, factories have been allowed to distribute either directly to farmers or to cooperatives and other channels (for example the Egypt Agricultural Organization, EAO).

Overall, the major change in the fertilizer sector has been the breaking up of the PBDAC monopoly and the emergence of the private sector in the distribution system. Moreover, together with the private sector, another important actor has emerged in the distribution of agricultural inputs: the cooperative sector. The functions that in the past were centralized in the hands of PBDAC are now decentralized among a wide variety of marketing agents including distributors, wholesalers, retailers, and cooperatives. Given the opening of external trade to these various agents, it is possible to envisage an emerging future configuration of marketing channels that will completely take over the current marginal presence of PBDAC and EAO. The old and the emerging marketing channels are those

depicted in Figure 2. Whereas in the old system PBDAC was in charge of the overall distribution of inputs, in the new system the major agents are the private and the cooperative sector both competing with each other to deliver inputs to farmers.

Figure 2--Fertilizer marketing channels



After the opening of marketing to the private sector and to cooperatives, the two most important sets of measures of policy reforms have been those affecting prices and uses of fertilizers.

In 1988 fertilizer price subsidies started to be reduced. Retail prices increased and subsidies were virtually eliminated by 1992, with the exception of potash. However, even in the case of this nutrient the amount of subsidy was reduced. Significantly, the private sector was allowed to buy from domestic factories in 1990/91 at fixed ex-factory prices, but was allowed to sell at market prices. Imports from the private sector were also allowed, but tariffs on phosphates and nitrogenous import of 30 percent were imposed.

The fixed ex-factory prices of domestic factories were established on the basis of border prices, in order to ensure the competitiveness of domestic production. In turn, border prices were established on the basis of long term behavior of international prices in order to avoid the short term violent fluctuations that have affected international markets in recent years because of distress sales of fertilizers such as those of Libya and CIS countries. International prices were characterized by a declining trend in the past few years, and high variability (see Figure 3). Based on these calculations, ex-factory prices were set within very close margins of border prices (see Table 4), suggesting that the Egyptian fertilizer market is now in line with international markets.

Table 4--Calculation of fertilizer border equivalent prices (January 1993)

Product	Urea Abu Qir (bulk)	Urea Talkha (bulk)	AN Abu Qir	AN Talkha	GTSP
World Trade Prices (US$/MT)	130	133	116	116	180
Border Price (LE/MT)	433	433	386	386	599
Loading	-8	-8	-10	-10	2
Transportation	-8	-12	-8	-8	
Bagging	20	20	-2	-2	
Nutrient Adjustment					-111
Sub Total	437	443	366	366	491
Loss (0.5%)	2	2			2
Quality Adjustment				-40	-49
BP Equivalent	439	445	366	326	444
Ex-factory	450	458	395	345	416
Margin Ex-factory to BP (percent)	**2.5**	**1.2**	**7.9**	**5.8**	**-5.5**

Source: Field Survey, Tranche VI, MALR, 1994

Nominal domestic fertilizer prices have increased in the period of reform. However, real prices have declined substantially in the six- year period (1986 to 1991) relative to the pre-reform period 1980 to 1985 (see Table 5). Even the ratio of fertilizer prices to crop prices has declined substantially in these periods.

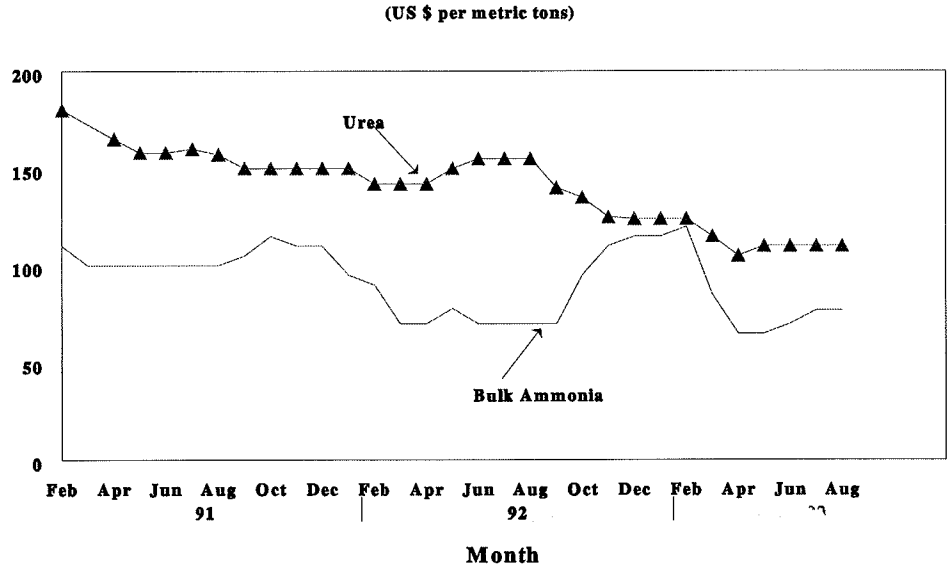
Consumption of fertilizer has also grown continuously during the reform period, with only a sudden dip in 1991/92 when the private sector started to be heavily involved in the distribution of non-subsidized fertilizer. However, in the following year 1992/93 there is evidence that fertilizer consumption was again on trend.

Table 5--Effect on prices, consumption, and use rates of fertilizer nutrients during reform

Item	Average 80-85	Average 86-91	% Change
Fertilizer Nutrient Prices (Deflated LE/MT)			
N	191.15	116.86	-38.87
P_2O_5	149.19	103.47	-30.64
K_2O	85.81	51.54	-39.93
NPK	182.11	113.02	-37.94
Fertilizer Nutrient Consumption (MT)			
N	626	802	28.09
P_2O_5	135	182	35.40
[illegible]	13.8	26.4	91.22
NPK	775	1011	30.69
Fertilizer Nutrient Use Rate Cultivated Area Kg/Feddan			
N	106.20	130.80	23.16
P_2O_5	22.88	29.84	30.42
K_2O	2.34	4.32	84.80
NPK	131.42	164.97	35.52
Deflated NPK: Farm Crop price Ratios			
Wheat	2.50	1.26	-49.49
Rice	2.15	1.37	-33.22
Cotton	4.05	2.38	-41.30
Maize	1.89	1.24	-34.30
Sugarcane	13.31	9.30	-30.15

Source: IFDC, Fertilizer Policy Impact study, 1993.

Figure 3--International prices of nitrogen fertilizers



Seeds

The GOE has prepared legislation to change the structure and function of the Central Administration of Seeds (CAS) from a seed production and distribution agency to a seed inspection agency, with the distribution and production functions transferred mostly to the private sector. Since 1992 a National Seed Council (NSC) was established to discuss privatization issues. The reorganization of CAS and the privatization of its activities encountered difficulties in the implementation stages, because only one seed company with former Pioneer Misr was formed using Ministry of Agriculture and Land Reclamation (MALR) plants. Among the major barriers to the entry of the private sector in the seed business included issues related to seed prices that still remained unresolved. At prices that prevailed until 1992/93, private companies could not operate with a profit.

Certified seed prices were still controlled by the government. Moreover, the bid for privatization has been very slow because too little is known about the production and operation cost of seed processing plants currently with MALR. This is compounded by the presence of a redundant number of employees in public plants. The German Technical Assistance Agency (GTZ) is now examining the cost of seed production and its benefit to

farmers. One major issue is the high replacement[1] ratios of seed by farmers. Rates of about 80 percent are not uncommon in Egypt for rice and wheat, versus a 20 percent replacement ratio in USA. This wastage is also linked to the bad storage practice of seeds by farmers, inducing losses, and spread of diseases.

Since the production of cotton seed is done in the gin, the privatization of cotton seed production is linked to the issue of privatization of cotton gins. The result of current practices is that the cost of cotton seed per feddan in Egypt is equal to the cost in USA, but with much lower quality seeds. There is a large scope for technological improvement. Consequently, a rate of 60-70 kg/feddan is currently used, while with good seed a rate of 10-20 kg/feddan would be enough. That cost saving could be obtained by allowing cotton gins to be involved in the seed distribution, stimulating a substantial improvement in quality.

Whereas, in the past, the private sector was allowed only to distribute vegetables seeds, now the sector can also distribute maize seeds. However, there is a widespread concern that current prices fixed by the government do not cover costs. Notwithstanding a very favorable disposition of public sector companies toward privatization, the private sector has responded very cautiously. Cooperatives still continue to be very active in seed distribution.

Farm Equipment

Given the small size of land-holdings, mechanization has spread through the use of hired-services provided by cooperatives. In 1982, about 90 percent of farmers were using tractors for ploughing, but only 2 percent owned tractors.

Most local manufacturers are public parastatals and have a privileged relationship with foreign companies. The major manufacturer, El Nasr and Company (NASCO) had licensing arrangement with manufacturers of Rakovica tractors in former Yugoslavia and Universal tractors in Romania. It assembles 3000-4000 tractors in the range of 60-65 hp range. Diesel machinery are produced by Helwan Diesel Engine Company, a public sector enterprise, that assembles vertical diesel engines under license from the Deutz Company of Germany.

Local manufacturing was heavily protected in the past and mostly concentrated in the hands of parastatals. Small producers were discriminated against, especially by preventing them from importing spare parts and denying them institutional back-up. On the marketing side, credit constraints were limiting the development of large markets for domestic private producers (Khan 1993).

In August 1992, GOE announced new tariffs for 106 commodities including a 50 percent tariff on 10-85 hp machinery. Given that similar machinery is produced within the country, the tariff still represents a protection of domestic production, even though it is a step

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[1] The replacement ratio is the ratio of seed purchased or obtained from sources external to the farm and the total amount of seed used in the new crop. The higher is the replacement ratio, the lower is the amount of seed coming from previous own crop.

forward with respect to the previous quota system. The decree listed 78 prohibited imports (such as clothes, carpets, furniture, soap, chickens, etc.), while all remaining machinery could be imported. In 1993, the government reduced further the number of goods banned from importation to only 3 (poultry, textiles, and ready-made garments). Many farmers still prefer the importation of tractors and other machinery from Eastern Europe, mostly because of price advantages with respect to Western and Japanese technology, which is of better quality.

4. STRUCTURE, CONDUCT, AND PERFORMANCE OF INPUT MARKETS UNDER REFORM

The major actors in the new distribution system of fertilizers are: i) factories, ii) distributors; iii) wholesalers; iv) retailers; and v) cooperatives. Since 1991, the role of PBDAC has rapidly been reduced until its current virtual absence from the distribution of inputs and its transformation into a rural bank providing mostly credit services.

The market structure is evolving; currently, the pattern of evolution is highly hierarchical. Large dealers have been the first to respond. There are now three main distributors controlling the fertilizer distribution system. Unlike other countries that have liberalized [illegible] sector (see Ahmed 1993), reforms have proceeded in a top-down approach, in the sense of large dealers being the first to respond, followed by wholesalers and retailers.

The big dealers have a thick network which includes wholesalers all over the country. They extend credit to wholesalers. Storage facilities are quite limited. The private sector mostly operates with a rapid turnover. They often use storage facilities of PBDAC, mostly because there is the advantage of obtaining credit there more easily.

In 1991/92, factories started to sign contracts with distributors. During the first two years of operations, the number of contracts declined from 76 to 39; the number of private dealers also contracted from an initial estimated 30-40 to less than 20 (see Dealers Survey, Tranche VI, MALR, 1994, 1993). It seems that this concentration is still proceeding, with most sales currently concentrated in the hands of 3-4 dealers.

Large dealers sell most of the fertilizers lifted from domestic factories to other dealers or to merchants. Only 7 percent was sold directly to farmers in Summer 1992 and it increased to 13 percent in the Winter of 1992/93 (see Dealers Survey, Tranche VI, MALR, 1994, 1993). Merchants have become increasingly dependent on distributors, as the amount coming from them rose from 60 to 40 percent in the two seasons mentioned above.

Distributors are able to get a discount of 2 percent with respect to the ex-factory price, if they commit to a minimum monthly tonnage from the factories.

Merchants' sources are increasingly identified with distributors instead of factories or parastatals. Their average purchases are much smaller than for dealers - over the year 1992/93 the average merchant purchase was 1,037 metric tons, whereas for distributors it was about 9 times more. In lower Egypt, the average quantities dealt with are smaller suggesting that there may be more competition (see Table 6).

Table 6--Average Purchases by fertilizer distributors and merchants

	Summer 1992	Winter 1992/93
Distributors	8500	9700
Merchants		
Upper Egypt	758	1095
Middle Egypt	1156	865
Lower Egypt	534	319
All country	718	1356

Source. Survey data, Tranche VI, MALR, 1994

Competition and Barriers to Entry

Licensing of fertilizer dealers is perceived by private agents as too exacting. It consists of three main requirements related to business, technical, and storage aspects. Dealer particularly dislike the technical requirement that the manager of a licensed shop should belong to the Association of Agricultural Engineers, thus limiting the participation of traders who do not have the education credentials. The impression obtained from personal interviews is the complaint by fertilizer dealers regarding the requirement of storage facilities to be located at a certain distance from inhabited areas, a requirement rather difficult to meet within the Egyptian environment.

In spite of these perceived obstacles, the number of licensed traders has increased tremendously; in June 1993 there were 1,059 license holders for trading in fertilizer and insecticides, 64 percent above the previous year. In February 1994, the estimated number of licensed fertilizer dealers was around 1,500.

Presently, there seems to be ample competition in the sector. The number of participants is increasing and price margins are quite low, but the danger of barriers to entry may become serious in the future, if dealers are able to organize themselves into cartels. There is anecdotal evidence that attempts to limit competition by members of the private sector themselves could take place in the future. For example, licensing schemes that would prohibit the easy entry of outsiders into marketing of fertilizers and fixing of marketing margins are two hypotheses already voiced among some exponents of the private sector. This is a clear attempt by insiders to exclude competition from outsiders. However, it is still very difficult to say how effective these attempts at enforcing similar arrangements may be in the future. The only remark at this stage is that the system is still in a fluid state that could evolve in any one of several directions.

Even though cooperatives are still perceived as an inheritance from a system of state controls, the sector is currently operating without the heavy subsidies that it was receiving in the past. There is some indication that the current system of cooperatives may be unable

to compete with the private sector. The role of cooperatives could indeed quite rapidly decline. It does not appear that there is any strategy to find a new role that may preserve their function. It seems that many of these cooperatives are the offspring of bureaucracy, and not the expression of voluntary farmers' association. As such, they are mostly incapable of operating in a business environment.

Price Margins.

Because of the smaller volumes, merchants prices are greater than the prices of distributors. However, the margins between purchases and sales prices are smaller for merchants, indicating a higher degree of competition among merchants. Moreover, the margins for both distributors and merchants are increasing over time. This seems to indicate an increasing market power of large distributors (see Table 7). Whereas private trader margins are increasing, the competition between private and public sectors seems to have reduced the margins between prices paid by farmers in private and public sectors (see Table 8).

Table 7--Margins of fertilizers sales by distributors to merchants and merchants to farmers, 1991-93

Type of fertilizer	Summer 1991	Winter 1991/92	Summer 1992	Winter 1992/93
Distributor Margins			(Percent)	
Urea	3.0	2.4	4.6	3.4
AN	2.8	1.9	3.9	2.6
SSP	5.7	5.0	3.1	7.8
Three Types	3.1	2.3	4.0	4.9
Merchants' margins				
Urea	1.5	2.1	3.2	3.6
AN	2.4	2.3	3.4	3.3
SSP	5.7	4.9	5.8	5.2
Three Types	2.6	2.6	3.6	3.6

Source: Field Survey, Tranche VI, MALR, 1994

Integration of Input Markets

Geographically, it also seems that market integration is taking place. The average prices of fertilizers in Upper Egypt are generally smaller than the national averages, even though the difference between regional and national prices are declining over time. The margins between private and public sector prices were particularly high in Middle and Upper

Egypt during the 1992 Summer, but they seem to have declined quite substantially in the 1992/93 Winter with respect to the previous season (see Table 9). Both the margins between public and private prices, and the margins between regional and national prices are converging toward very small numbers.

Table 8--Fertilizer Prices Margins

Type of Fertilizer	Margin Between Prices Paid by Farmers in Private and Public Sector	Margin between Sales to Farmers and Purchase Prices paid by Distributors	Margin between Sales to Farmer and Purchase Prices Paid by Merchants
		(percent)	
Summer Season 1992			
Urea	4.1	4.1	3.2
AN	4.8	6.9	3.4
SSP	3.9	6.6	5.8
Average	4.2	[illegible]	3.6
Winter Season 1992-93			
Urea	1.9	5.1	3.6
AN	0.9	3.3	3.3
SSP	0.7	9.8	5.2
Average	1.5	6.2	3.6

Source: Field Survey, Tranche VI, MALR, 1994

Table 9--Average prices along marketing chain

	Margins of Prices, Private Sector Above Public Sector				Margin of Regional Private Sector Prices Above National Private prices		
Summer	Upper Egypt	Middle Egypt	Lower Egypt	Total Sample	Upper Egypt	Middle Egypt	Lower Egypt
Urea	7.5	4.9	3.8	4.1	2.32	4.71	-2.52
AN	7.2	10.3	0.3	4.8	-0.72	4.52	-1.60
SSP	-0.5	16.2	2.2	3.9	-3.97	6.78	0.09
Average	6.4	8.4	2.1	4.2	-0.79	5.33	-1.36
Winter	Upper Egypt	Middle Egypt	Lower Egypt	Total Sample			
Urea	-1.0	5.2	1.9	1.9	-2.02	1.77	-0.33
AN	4.4	-1.5	2.2	1.0	3.9	-0.07	-0.96
SSP	0.6	2.5	-0.4	0.7	-2.82	0.77	0.29
Average	1.0	2.5	1.2	1.5	-0.31	0.82	-0.33

Source: Field S[illegible]che VI, MALR, 1994

Mo[illegible]y, price differences among various governorates are quite substantial in the private sector. The percentage difference between maximum and minimum governorate prices in the private sector seems also to have declined across the two seasons (See Table 10).

Table 10--Regional distribution of fertilizer prices paid in the private sector (prices in LE per 50 kg sack)

	Summer 1992			Winter 1992/93		
	Urea	AN	SSP	Urea	AN	SSP
Sohag	24.45	21.60	10.24	24.65	21.98	11.00
Aswan	-	20.00	10.00	-	22.00	15.00
Assuit	24.79	18.45	9.50	23.62	20.79	9.53
Aena	26.00	20.03	9.50	24.07	21.50	10.91
Giza	24.58	22.00	-	23.49	20.61	10.84
Minya	24.33	19.79	9.41	25.01	20.45	10.34
Benisuef	25.00	21.96	11.69	24.29	20.35	10.10
Fayoum	25.80	21.79	11.13	25.81	21.10	10.09
Alex	24.14	25.00	11.00	25.79	-	11.00
Behira	23.12	21.98	10.89	23.28	21.71	10.39
Daqialis	23.33	18.00	9.58	25.09	19.66	10.36
Dametto	24.06	18.25	9.27	24.36	20.25	10.01
Gharbys	23.32	19.61	9.81	24.24	20.06	10.15
Ismalya	26.00	20.53	10.92	26.00	21.00	11.00
Kofr.sheekh	22.78	19.20	10.03	24.93	20.21	10.14
Menoufya	23.86	20.87	10.77	25.13	20.48	10.49
Kolyobia	22.50	20.50	10.88	-	21.44	11.00
Sharkhis	24.10	19.27	10.16	24.46	20.38	10.34

	Summer 1992			Winter 1992/93		
	Urea	AN	SSP	Urea	AN	SSP
Max	26.00	25.00	11.00	25.81	22	15.00
Min	22.15	18.00	9.27	23.28	19.66	9.53
%	17.38	38.88	26.10	10.86	11.90	57.39

Source: Field Survey, Tranche VI, MALR, 1994

Constraints and Incentives Facing Private Traders

The private sector has responded very strongly to reforms in the agricultural input sector; mostly so in the fertilizer sector, less in the pesticides sector - since the latter was already relatively liberalized - and still slower in the seed sector.

Considerable is the speed with which the private sector has responded in the distribution of fertilizers. From a situation where virtually all distribution was controlled by one parastatal in 1990, in 1994 it is reported that almost 80 percent was in the hands of private sector marketing agents.

The incentives provided by a profitable business have attracted many operators and, given the non-enforceability of licensing requirement at the retail and wholesale level, it has given rise to a very rapid increase in the participation of traders in the distribution of fertilizers.

Why has the private sector reacted so rapidly to the implemented reforms? First, the level of input use was already very high in Egypt, even before the reforms took place. Agriculture in Egypt is very intensive, and the yield of several crops is very high. Farmers are generally dependent on modern technology, including high yielding varieties, fertilizers and pesticides, modern agricultural equipment, as well as irrigation. As it is, agriculture in Egypt is not viable without such modern technology. Therefore, a sustained demand for these inputs is there for supply-side agents to operate. The case of fertilizers is clear cut. Most farmers know what they need. Traders need very little training in terms of specific knowledge of the product. The entry costs are very low, at least for traders dealing with small quantities.

Second, the reform process was considered credible, as the government supported its reform program through a series of mutually consistent policies (exchange rate, input and output market reforms, elimination of parastatals, etc.). This credibility convinced the private sector that the opening of marketing was not temporary, but was there to stay.

The result of the participation of the private sector has been a rapid increase in the number of marketing agents who have established themselves throughout Egypt. The mode of operation in the trade of fertilizers is characterized by quick turnover and by a very low level of investment in storage by the private sector. Credit cost being high, long term storage is not a profitable proposition for marketing agents. Operating costs for merchants were obtained in the survey of merchants and dealers sponsored by the MALR and USAID for the monitoring of the reform process. By assuming an interest cost of 18 percent, or 1.5 percent per month, such as in 1992, an examination of the major components of the merchant cost indicates that with operating costs equal to 1.9, 2, and 2.5 percent for Urea, AN, and SSP respectively, the mark-up over cost would be rather small, between 1.3 and 2.5 percent (See Table 11). That also suggests that a policy of seasonal discounts by domestic factories may have important effects in terms of private sector storage (see IFDC, 1993).

Table 11--Work-up of fertilizer merchants operating costs (LE/MT)

Item	Urea	AN	SSP
Merchant purchase price	450	400	200
Estimated Cost			
Labor	1.50	1.50	1.50
Storage	.50	.50	.50
Interest	6.75	6.00	3.00
Total operating cost if fertilizer held for:			
One month	8.75	8.00	5.00
Three months	23.25	21.00	12.00
Six months	45.00	40.50	22.50
Break-even percentage mark-up if fertilizer held for:			
One month	1.94	2.00	2.50
Three months	5.17	5.25	6.00
Six months	10.00	10.13	11.25

Source: Field Survey, Tranche VI, MALR, 1994

5. INITIAL RESPONSE BY FARMERS

The share of the private sector in fertilizer purchases by farmers has increased rapidly after liberalization of marketing in 1991/92, from 30 to 53 percent of the total, a remarkably high growth given the short period of time (See Table 12). There is a large variation of private sector participation among governorates (See Figure 4) that cannot be directly explained in terms of regional variation (say lower Egypt versus Upper Egypt).

Table 12--Market share of fertilizer sales to farmers by private sector merchants (percent)

Fertilizer type	Summer 1992	Winter 1992/93
Urea	35	57
AN	25	47
SSP	24	54
Total	30	53

Source: Field Survey, Tranche VI, MALR, 1994

Figure 4--Farmers' purchase of fertilizer from private sector

Farmers have increasingly used the private sector; however, their preference was still with the old system of supply from the public and cooperative system. The degree of dislike for the private sector is nevertheless declining over time. Whereas 25 percent of farmers in the Summer 1992 season were indicating the private sector as a first choice for a supplier of any input, that percentage rose to 32 in the following season (see Input Survey, Tranche VI, MALR, 1994, 1993).

Farmers have expressed their preference for fixed prices to negotiated prices, so they would rather stay with the public sector, which supplied them fertilizer at lower prices. Another important reason for preferring public sector to private sector is the availability of credit. Whereas the coops give about 30 percent credit on total input purchases, the percentage is only 10 for merchants (See Table 13). Unlike the fertilizer market, where the private sector has taken over most of the distribution system, there is still an important role of cooperatives in the seed market. The role of the private sector appears somewhat important for vegetables, soybeans, sesame, rice, fava beans and berseem, whereas it is still negligible for maize and cotton (See Table 14).

An additional source of dissatisfaction with the private sector is the supply of pesticides that are not suited to their needs. This is an issue that deserves further attention from the government in the light of its health and environmental consequences.

Over time, the difference between prices paid by farmers to private and public sector has declined. The farmers have adapted to the new distribution system. Current reforms in fertilizers have initially been accompanied by a reduction of input use by farmers. However, this initial decline was soon eliminated, with use of fertilizer in 1993 returning to the same level as in 1991.

More importantly, there was a shift in use. Nitrogen fertilizer use increased considerably and the use of previously heavily subsidized potash and phosphates declined substantially. The implication of this in terms of balanced use of different nutrients has yet to be determined.

The effect on production has been positive, given that both production and yields have increased. There is some evidence that farmer's income has not declined. For example, higher nominal prices of fertilizers did not translate into higher real prices. However, informal interviews point to a squeezing of farmers' income during the accelerated phase of input reforms.

Table 13--Purchases of fertilizers and other inputs by farmers

Item	Upper Egypt	Middle Egypt	Lower Egypt	Total
		(percent)		
Purchase from private merchants				
Summer	59	45	46	47
Winter	67	62	67	66
Pay cash:				
Summer	100	84	88	90
Winter	98	87	84	87
Purchase from coops				
Summer	2	25	53	39
Winter	38	41	46	44
Pay cash:				
Summer	100	90	65	69
Winter	81	87	62	70
Problems with purchasing any input				
Summer	13	20	30	25
Problem:				
Input unavailable	9	39	43	40
Quality of Pesticide	0	30	28	26
Prices unstable	27	22	21	21
Spare parts unavailable	36	4	21	19
Winter season	10	30	33	28
Problem:				
Input unavailable	75	74	61	65
Prices unstable	50	50	69	63
Bad packaging	0	29	5	11

Source: Field survey, Tranche VI, MALR, 1994.

Table 14--Percentage of purchases of crop seeds by farmers

	PBDAC	Private Merchants	Coops	Other Farmers	Own Previous Crop
Sumer 1992					
Maize	19	8	29	2	42
Cotton	40	1	59	0	
Sorghum	47	47	0	6	
Rice	45	15	35	6	
Other Crops	50	50	0	0	
Winter 1992/93					
Wheat	24	8	39	2	27
Fava Beans	18	28	13	10	32
Berseem	4	39	4	15	38

Source: Field Survey, MALR, 1994, October-November 1992, January - March 1993.

Note: Other crops includes sesame, soybeans and vegetables.

Small farmers have found the new system somewhat penalizing, as they have to pay higher prices than before, even though the availability of the input is more prompt, and there is a bigger choice among different suppliers (retailers), in terms of bagging services, and transportation services. It is not clear if the access to these services has improved the farmers' income, particularly the income of the farms less than 5 feddans in size.

5. IMPLICATION FOR AGRICULTURAL INPUT POLICY

Most of the reforms affecting agricultural input and output markets have already been implemented. The most notable exceptions refer to cotton and sugarcane. Processing of grain and fertilizer is still in the hands of public companies, mainly because of high fixed costs. Possible privatization of these activities are envisaged in the medium to long term.

In the transition period, one of the main tasks of the government is to monitor the movement of agriculture towards the desirable outcomes of the reform - increased economic efficiency, a competitive environment, an open economy, and higher and sustainable growth of agricultural productivity and income. By assisting in the formulation of better policies, the monitoring function will facilitate the emergence of a thriving private sector, and help those farmers and agricultural workers who are penalized by the current reforms.

In order to guide the monitoring and decision making process a few problems need to be addressed and further researched.

The Impact of Reforms on Farmers.

The private sector involved in marketing has welcomed most of the reforms implemented by the government in both agricultural input and output markets. These reforms have allowed the participation of the private sector to a degree unthinkable just 3 or 4 years ago. The private sector has reacted with suspicion initially, especially in product markets. For commodities such as wheat and rice, traders are still hesitant to discuss their business in detail, partly because of the common and universal reticence of traders to do so, and partly because of past policies characterized by heavy intervention and a distrust of the merchants. Input markets have reacted more promptly, raising the expectations of big dealers who already had experience with international fertilizer and pesticide markets. Most marketing agents think that reforms are moving in the right direction. However, there is concern that the pace of reform is too rapid and raises social and political tensions that might compromise the success of reforms. It is clear that parastatals are the big losers. There is a widespread notion that farmers are also losing in the process of reform. In spite of productivity gains, the evidence on farmer's income is very scanty, but the anecdotal evidence [illegible] marketing agents is that farmers may be suffering quite a bit from input market reforms. This may be the case especially for small land-holders who have difficult access to modern inputs and credit. The emergence of a private sector of marketing agents may well have left the small farmers in an institutional vacuum, given that the old cooperative system cannot function anymore under the pressure originating from liberalization and reduction of subsidies.

Role of Cooperatives in the Context of Liberalized Input Markets.

The development of rural institutions that meet the need of small farmers and complement the private sector will be critical to the success of the overall reform process. Cooperatives and private sector are the most important marketing agents in the delivery of agricultural inputs. The role of cooperatives, however, is ill-defined. Their presence is more an inheritance from a past system characterized by bureaucratic control than a real expression of the needs and interests of farmers. It appears extremely important to identify those situations in which cooperatives have been successful in promoting the well being of their members and in raising productivity. There are at least three areas where cooperatives seem to have an important role to play. The first is agricultural mechanization, in the form of rental services to a huge number of farmers who cannot afford to buy tractors and other equipment. The second area is seed production, multiplication, and distribution that would allow economies of scale and specialization to benefit a large number of farmers. The third area is extension of credit facilities to its members to facilitate their access to agricultural inputs such as fertilizers. Especially in the area of credit, it seems that there is already an accumulation of experience on which to build. Since cooperatives give more credit to farmers than merchants, there is perhaps some comparative advantage based on information cost that could be further improved to foster efficiency and competition in the system. It will be necessary to understand the constraints to the development of an efficient cooperative system that is able to compete with the private sector. Innovative institutional arrangements could be devised to meet those needs of farmers that are now only partially met by the private non-cooperative sector. The main challenge will be to transform the cooperative system

from a system dominated by a bureaucratic mentality into a system able to provide services to farmers and functioning as a business enterprise.

The Need to Encourage Competition Within the Emerging Private Sector.

The rapid development of a private marketing system seems to be proceeding thus far without undue difficulties. However, there are indications that the system may evolve toward an oligopolistic structure. The increasing margins of merchants and distributors, the potential threat of collusive behavior by private distributors, the promotion of licensing schemes by insiders to prevent the entry of outsiders are some signals whose future development has to be closely watched. The government needs to monitor this process and ensure that barriers to entry and exit are removed so that a competitive environment develops. Such barriers can be established either through regulations enforced by the public sector or by tacit collusive behavior of the private sector. It is necessary to keep a vigilant eye on the marketing system to detect and prevent these negative tendencies. The in-depth study of marketing costs will shed further light upon this complex issue and help to monitor and guide the reform process to make sure that it actually leads to lower transaction costs and consumer prices.

The Role of the State in the Context of Liberalized Input Markets

In the new environment characterized by competitive markets a new role for the government has to be defined. Whereas in the past, parastatals were heavily involved in the production, trade, and distribution of most agricultural inputs, the system is increasingly dominated by the private sector.

In the case of fertilizers, parastatals will continue to be heavily involved in production. However, it is possible that privatization of production may be a feasible option in the next few years, especially in light of the apparent comparative advantage of some domestic factories in the production of nitrogen fertilizers. The role of the government in the fertilizer sector appears increasingly to become that of a monitoring agency, as well as the provider of information services that facilitate the production, marketing, and trading of fertilizers in domestic and international markets. Available projections of fertilizer requirements and availability based on current capacity of domestic factories show a growing need for imports of nitrogen and phosphates fertilizers in the coming years. A main issue then becomes a question of whether Egypt should continue its dependence on international markets or increase its domestic production capacity. Both the government and the private sector will have to be involved in such important decisions that affect Egypt's future supply of fertilizers. Relevant information on the fertilizer sector will have to be collected, organized, and analyzed to facilitate this decision making process, and the government may be in the best position to lead this task of providing information.

In the case of seeds, the GOE has endorsed the legislation that would transform the CAS primarily into an inspection and extension agency, while production and distribution will be taken by the private sector. Research into new varieties as well as new methods to raise the efficient use of available varieties will be an enterprise that could generate innovative collaborative arrangements between the private and public sector. There is the

need to explore whether the current price policy regarding seeds gives sufficient incentives to the private sector to encourage it to participate in the production, multiplication, and distribution of seeds. Even after setting the right incentives, on the basis of available evidence, it is doubtful that the seed sector will be privatized in the foreseeable future. The public sector could, however, facilitate both seed distribution and the research effort of the private sector by providing the legal environment that insures quality control and protection of patent rights.

In the case of pesticides, the major role of the government will be in the setting and enforcing of safety and environmental protection rules. Its involvement in the production, distribution, and application of pesticides will be increasingly transferred to the private sector. Even in this case, however, a useful service will be that of providing the relevant information on pesticide types, requirements, and characteristics in order to counteract unscrupulous behavior on the part of some merchants.

For agricultural machinery, the main issue will be to eliminate the protection of domestic industry and allow the importation of any type of foreign machinery, in view of the already high level of mechanization of Egyptian agriculture. Subsidies to promote agricultural mechanization should be eliminated. It is necessary, however, to understand how market reforms are affecting agricultural mechanization in Egypt. The high levels of mechanization may well be a result of past policies of heavy subsidization. On the other hand, heavy protection of domestic industry may also have limited the range of international technology available to farmers. In light of comprehensive reforms affecting agricultural credit, imports of agricultural machinery, fuel costs, and the predominant small-holding structure of land tenure, it is difficult to predict the effects on the level and structure of mechanization. This issue is particularly relevant in view of its links to rural wages, industrialization, and agricultural productivity.

In general, for all inputs, one of the most important future functions of the government is that of providing information to raise market transparency and competition. It is very important for the government and the private sector alike to have access to reliable and prompt market information related to prices, trade flows, marketing costs, marketing channels, production, and incomes, as well about new technology potentials and limitations. In most of these areas, the available information is often scanty and unreliable. Moreover, an appropriate information system will help policymakers design and implement better policies to facilitate the development of the private sector. Particularly needed will be information concerning: a1) input qualities; a2) demand for modern inputs; a3) prices; a4) assessment of future demand and supply.

6. FUTURE RESEARCH NEEDS

The previous section on policy issues suggests the need to provide relevant information to improve the reform process. The research tasks that could be organized around the main policy issues are described in the following paragraphs.

Impact on farmers.

To answer the question about the benefit to farmers of the current reform process, it

is necessary to examine the impact of reforms on cost of production and subsequently on farmers' income. So far, very little is known about this issue. Official statistics indicate that aggregate production and productivity have gone up. The ratio of product prices to chemical prices have gone up. However, other costs of production have gone up too, for example mechanization, credit, land rental, seeds, fuel, electricity. Thus, the net effect is not clear. Moreover, it is important to understand the differential effect that these reforms have had over various group of farmers. A hypothesis that needs to be tested is that small-holders have been penalized by reform. Effects of reforms on income of small and medium farmers, the backbone of family farms, warrants a particular attention.

Promoting competitive input markets.

The evidence of increasing concentration in the fertilizer sector is still very limited. More information is needed on the cost of transactions of different marketing agents. Marketing margins and their determinants should be explained in order to identify the most serious obstacles to entry and exit. More is known about fertilizer markets than about other inputs. It is necessary to investigate other input markets such as mechanical equipment, seed, feed, and pesticide markets.

Institutional development and the role of cooperatives.

By examining the current structure of the cooperative sector, one could better understand the performance of various cooperatives in the provision of agricultural inputs. The objective is to identify those successful cases and distinguish between technical efficiency - that could be based on location specific factors - and economic efficiency. A study on the transaction costs of various cooperatives and their comparison to the private sector could shed some light on these important issues. The purpose would be to understand the role that cooperatives may play in providing services to small-holders while complementing the private sector distribution system. Identification of constraints in achieving high levels of efficiency would enable policymakers to formulate policies for a sustainable cooperative institution in rural Egypt.

Financing the emerging input distribution systems: institutional needs.

In the past, most of the financing of input distribution systems was done by PBDAC. With its restructuring and conversion into an agricultural bank, its role in financing the distribution of major modern inputs has declined. One of the major difficulties of farmers in a recent survey was with credit availability from the private sector. Up to this moment, it is not clear how the overall financing of the new marketing system is proceeding. How much does it come from personal funds, and how much from institutional channels? What is the state of access to credit of different marketing agents and farmers? The role of PBDAC, commercial banks, large distributors, and cooperatives is critical in this respect. It is known that traders have very quick turnover of their stocks. No investment in storage is made because of very high cost of credit. It would be useful to understand the extent of credit constraints that different agents in the distribution system - from farmers to factories - face in their operations, so that appropriate policies to improve the efficiency of present input delivery systems could be improved. Given the aversion of farmers for price variability - as expressed repeatedly in a recent input supply survey by the MALR, 1993 - it is also important to explore alternative financial instruments and institutions that could reduce such

variability. By exploring the performance of various marketing agents, one could derive useful lessons.

Fertilizer demand and prospects for imports.

In recent interviews with somefertilizer dealers (February 1994), a concern was expressed that too little is known about domestic demand of fertilizer, particularly about location specific factors, income factors, as well as the importance of factors other than prices. In addition to seasonal aspects, credit constraints, and other domestic factors, the presence of an unstable international market complicates the planning of domestic production and imports. Major decisions related to investment in new domestic production capacity will depend on the outlook of fertilizer demand in Egypt and the world in the next 10 years.

Private sector response in the seed sector.

Even though the government has approved legislation to encourage private sector participation in the production, multiplication, and distribution of seeds, the response of the private sector so far has been limited. More information is needed on the constraints and incentives to the private sector. The persistence of price policy inconsistent with the general trend tow[illegible]tion has to be evaluated vis à vis other factors such as cost of production, the return from investment in research and development, etc.

Agricultural mechanization under reform.

Agricultural mechanization in Egypt is very high, in spite of a small average farm size. This was partly the result of heavy subsidization in the past. In the new liberalized environment, it would be useful to know the reaction of farmers and traders. Are the higher prices of equipment and rental services affecting their level of use and their cost of production? Is the market reform making available a broader range of products from international markets? Are there important effects on productivity of and demand for labor?

7. CONCLUSIONS

Egyptian agriculture is one of the most liberalized sectors of the Egyptian economy. Within agriculture, input markets have gone a long way in the direction of market reforms. To date, the private sector in the distribution system has responded rather well. Real prices of fertilizers and pesticides have gone down, productivity has improved, and agricultural production of major crops has gone up. The distribution system has grown rapidly with many different marketing agents, particularly the private sector and cooperatives.

There are several lessons from the sequence of reforms in input markets in Egypt. First, one of the main reasons why the response of the private sector in the distribution system was encouraging was because the use of modern inputs was already at very high levels. In the case of fertilizers, Egyptian farmers had some of the highest application levels in the world, suggesting their knowledge of the technology. Second, input market reforms started to be implemented only after some output market reforms were already in effect and production of major crops started to improve. Third, marketing reforms allowing the private sector to participate in the distribution system, together with the opening up of trade to

private sector, were introduced later in the sequence of reforms after some price policy measures, such as the reduction of subsidies, were adopted. At the same time, the rapid reduction of operations of the main parastatal, PBDAC, involved in the previous system led to a restructuring of that parastatal and its conversion into an institution devoted primarily to agricultural credit. The last step in the sequence of reforms might be a privatization of some plants and enterprises still in the hands of parastatals, such as fertilizer factories, seed production and multiplication plants, and agricultural equipment production plants.

However, reforms already underway need to be brought to their completion. The private sector is still very cautious in responding to market reforms in the seed sector. One could point to policy measures to raise seed prices and to improve the current high replacement rates of grain seeds and the distribution of cotton seeds. Tariffs on some fertilizers and machinery imports are still very high, and the subsidies on fuel and electricity could be reduced further.

The reforms raise a few problems concerning the role of the government in a post-reform period, as well as specific policy issues that will have to be resolved in the medium term.

Of immediate concern is the evaluation of the effects of current reforms on farmers' income. It is not yet clear that farmers have profited from current reforms. What is important to note is that the elimination of input subsidies has not resulted in a collapse of input demand and agricultural production. But it is essential to know if farmers are actually benefiting from the policy changes and, if so, how. What is happening to income of small and midsized farms warrants particular attention.

In the medium term, the prospect of fertilizer demand, and the competitiveness of the distribution system will need to be evaluated in order to improve the productivity of the input delivery system. The performance of the seed sector and the prospects of agricultural mechanization will also need to be evaluated in light of the possibility of setting up institutional arrangements in which both the private and public sector may contribute to increase productivity.

Finally, the role of cooperatives is a complex issue within the general area of institutional development. The general question of the survival of cooperatives in a competitive environment will need to be addressed by research on their current performance and the understanding of their comparative advantage in the supply of services such as distribution of seeds, agricultural equipment rental and repair services, and as a facilitator in financing the distribution of fertilizers.

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