Effect of Price Policies on the Most Important Egyptian Cereal Crops

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Abstract: Wheat and rice are considered to be the most important cereal crops in Egypt. The world prices for cereal extremely increased in the last few years. The main research problem and the objective was to determine the effect of price policies on wheat and rice, with respect to protection domestic prices in order to guarantee continuity of production that achieve the comparative advantage. Data were collected from different sources during the period (2005-2009). To display the effect of prices policies on wheat and rice, the Policy Analysis Matrix (PAM) was estimated. The results indicated that, there was a protection in wheat prices in 2005 and 2006 with respect to producer, while there was a policy of imposing taxes on wheat producers during (2007-2009). On the other hand, the results indicated that, there was a protection in rice prices in 2005 and 2007 with respect to producer, while there was a policy of imposing taxes on rice producers during in 2006, 2008, 2009. Both of wheat and rice are characterized with comparative advantage in their domestic production. The results of (PEM) for wheat showed that, the net economic loss as a result of importing wheat reached maximum in 2009, by 93.04 million bounds, while reached minimum in 2006 by 4.89 million pounds. Also, the results of (PEM) for rice showed that, the net economic loss as a result of exporting rice reached maximum in 2009, by 1.395 billion bounds, while it reached minimum in 2006 by 0.12 million pounds. It can be said that, the irrational behavior in resources due to input subsidies, led to non optimal allocation in the consumption expenditure. It could be recommended from this study, the need to increase the value added of wheat and rice, to achieve the comparative advantage from through high yield, and effective agricultural stabilization funds to insure stability of domestic farm gate prices, and minimize the fluctuations in prices of wheat and rice.
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Introduction

Wheat and rice are the most important grain food crops in Egypt, due to their importance Wheat is considered the first crop of importing and while rice for export. World prices for strategic grains has increased sharply in the last years because of the factors of climate change, the global crisis and using grains in the production of bio-fuels. These factors prompted the World Trade Organization to mitigate of the negative effects of these factors on the global economy as a whole. Food is no longer being only a commodity to be traded due to the law of supply and demand, but is at the forefront of issues of interest to the country either through local production or by resorting to imports from external sources to overcome the food gap.

The importance of the issue of food with a steady increase in population which needs the increase in the production of food with the same rate to avoid the increase in the food gap, which is filled by imports of food commodities and consequently a deficit in trade balance. There is no doubt that food imports, particularly of strategic commodities is risky and even affect national security. The change of agricultural policies of producing countries for food may put restrictions on certain exported food commodities or as aids for developing countries. It becomes this food-exporting countries may be used as a tool of pressure on the importing countries, which limits their political decision, where food has become a political commodity of a strategic nature.

Egypt is one of the countries that does not meet food production needs of the growing population, where the population is increasing at rates higher than the rates of increase in agricultural production. This situation led to the presence of increasing severity of food gap year after year. There is no doubt that the local and international variables represent a real challenge for the Egyptian agricultural policy and Egyptian products in international markets against the economic lobbies, as a tool for the deepening of the Egyptian agriculture competitive ability to reduce tariffs and non-tariff and price fluctuations which result in the inefficient allocation of resources.

Research problem:

The current research problem concerns in the nature of changes in agricultural policies of wheat and rice crops, in terms of the availability of protection prices which enable to continue in production and keeping the relative advantage at east at the minimum level of presence in the global market under the application of World Trade Agreement. The problem also lies in the low level of subsidizing of the agricultural sector as a result of government intervention is represented in unbalanced support to the non-agricultural sectors at the expense of the agricultural sector through the imposition of taxes directly or indirectly. Also, to investigate the impact on the economic welfare of the society for wheat and rice crops.

Aim of the research:

The aim of this research is to identify the impact of different economic variables relevant to the agricultural policies adopted in the production of wheat and rice in Egypt in terms of conditions of protection price and the elements of comparative advantage for them. Also, to stand on the reality of some of the variables of the net economic loss in production, net economic loss in consumption, the change in producer surplus, the change in consumer surplus, change in government revenue, and the change in foreign exchange.

Research method and data sources:

The research method depended on estimation of the matrix of agricultural policy analysis and estimating Partial Equilibrium Model (PEM) for wheat and rice. The data resources included the statistical data published and unpublished decisions by the authorities and official institutions such as the government sector data Economic Affairs, Ministry of Agriculture and Land Reclamation, the Central Agency for Public Mobilization and Statistics, and bulletins of the National Bank during the period (2005-2009).

Analytical framework for research:

(I) Policy Analysis Matrix (PAM): The (PAM), in order to account transactions and the rates of nominal protection and the cost of local resources, to define the trends of price policy for agricultural crops, and the possibility of comparing prices of farm world prices represented in the limit prices. Thus determination of the policy directions carried out by the government in each crop either the policy of protection or the policy of imposing direct taxes or indirect taxes, Also, using the cost factor in determining comparative advantage. The estimated Standards were determined as follows:

Nominal Protection Coefficient (NPC):

$$NPC = P^d \div P^b$$

Nominal Protection Rate (NPR):

NPR = NPC - 1

Domestic Resource Cost (DRC):

$$DRC = C^* \div VA^b$$

Where:

P^d = Farm price of the crop (pounds / ton).

P^b = Price limit of the crop (pounds / ton).

VA^b = Value added at price limit (pounds / acre).

$= C^*$ =Local resources at shadow prices (pounds / acre).

If the protection coefficients greater than one, this shows the existence of support for the product, and if less than one, this shows the existence of taxes on the product, while if it is equal to the One, it demonstrates a policy of neutrality. It also shows the coefficient of domestic resource cost advantage relative to the commodity, and there is a relative advantage in commodity production if the coefficient is less than one, and the lack of relative advantage if it is larger than one.

(II) Partial Equilibrium Model (PEM): The (PEM) indicate the imbalances price and volume of support or taxes imposed on the product and the consumer. Also, the aim of using PEM to identify the impact of policies of the governmental intervention in production and consumption and the revenue of the government. Also, application of (PEM) is to stand on the reality of some of the variables of the net economic loss in production, net economic loss in consumption, the change in producer surplus, the change in consumer surplus, change in government revenue, and the change in foreign exchange.

The following is an explanation for the structure of Partial Equilibrium Model (PEM:

- Net economic loss in production: NELP = (Qw - Qd) (Pb - Pd) / 2
- Net economic loss in consumption: NELC = (Cw - Cd) (Pd - Pb) / 2
- The change in producer surplus: PS = Qd (Pd - Pb) - NELP
- Change in consumer surplus: CS = Cd (Pb - Pd) - NELC
- The change in government revenue: GR =-NELP - NELC - PS - CS
- Change in foreign exchange: FE =-Pb (Qw - Qd + Cd - Cw)
- Net effect: NET = PS + CS + GR

Where:

Qw = the volume of production at price limit price.

Qd = the volume of production at farm price.

Pb = price of the price limit.
Pd = Price farm.
Cw = the volume of consumption at the price of the price limit.
Cd = the volume of consumption at the farm price.

4. Results and Discussion

To identify the impact of agricultural price policies on wheat and rice in Egypt, the factors of protection and relative advantage, as well as estimation of the partial equilibrium model are as follows:

1 - Wheat:

Data presented in Table (1) show that that the minimum area of wheat reached about 2.72 million acres in 2007, which contributed about 17.9% in the crop area. While, a peak in 2009 was about 3.15 million acres, which contributed about 20.3% of the cropping area.

Wheat productivity reached the lowest level during the period (2006 to 2009) approximately 2.70 tons per Feddan, while the maximum productivity during the period (2005-2008) was approximately 2.73 tons per Feddan .Regarding Egypt's wheat imports it was estimated in 2009 at the lowest level by 3.97 million tons, and the maximum imports in the year 2007 was about (5.9 million tonnes).

Table (2) indicates the results of the estimation of the coefficient and the rate of nominal protection, coefficient and domestic resource cost, and the partial equilibrium model of the wheat crop during the period (2005-2009), where the following results could be revealed:

The rate of nominal protection of wheat in 2005 reached 1.13, while it was lower in 2009 (0.73), and this shows that the protection of producers of wheat began to decrease, due to the reduction of low domestic prices of wheat compared to the price of the price limit. So, the farmer's cost of the direct and indirect taxes was estimated by 27% in 2009, while when he was supported it was estimated by 13% in 2005, according to the rate of nominal protection. Also it was found that the coefficient of the cost of local resources for wheat reached the peak in 2006 with about 0.76, while it was lower at 2008 with about 0.40 and this shows the existence of comparative advantage in wheat production locally.

Table (1): Crop area , productivity of wheat and rice and the total imports and exports during the period (2005-2009).

Year	Cropping area	Wheat			Rice		
		Area	Productivity	imports	Cropping area	Productivity	Exports
	Million Feddan	Million Feddan	ton	Thousand Ton	Million Feddan	ton	Thousand Ton
2005	14.91	2.99	2.73	5632.52	1.46	4.2	1113
2006	14.92	3.06	2.7	5804.65	1.59	4.11	983
2007	15.18	2.72	2.72	5900.33	1.67	4	1224
2008	15.24	2.92	2.73	4077.54	1.77	4.09	364
2009	15.5	3.15	2.7	3974.18	1.37	4.03	654

Source:- Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, "Bulletin of Agricultural Statistics", various issues.
- Central Bank of Egypt, "Statistical Bulletin", various issues.

Table (2) policy analysis matrix for wheat in Egypt during the period (2005-2009)

Item	2005	2006	2007	2008	2009
Farm price (pounds / ton)	1120	1126.7	1153.3	2553.3	1613.3
Price limit (pounds / ton)	992.4	1007.7	1553.6	2884	2220.3
Costs of production in pounds per Feddan	1981	2143	2444	3145	3459
Added value in pounds per Feddan at the border price	2803	2817	4334	7932	5960
Nominal protection coefficient	1.13	1.12	0.74	0.89	0.73
Nominal rate of protection	0.13	0.12	-0.26	-0.11	-0.27
Domestic resource cost coefficient	0.71	0.76	0.56	0.4	0.58

Source: Analysis of the results of matrix analysis of price policy

Table (3) partial equilibrium model of wheat per million pounds in Egypt during the period (2005-2009)

Item	2005	2006	2007	2008	2009
Net economic loss of production	0.6	0.53	5.25	1.74	9.86
Net loss for the economic figures of consumption	4.57	4.35	45.25	14.71	83.18
Change in producer surplus	1055.4	1008.3	-3029.6	-2687.3	-5250.3
Change in consumer surplus	-1609.8	-1653.2	5170.2	4528.7	8760.3
Change in government revenue	549.2	640.1	-2191.1	-1857.8	-3603.1
Change in foreign exchange	-80.47	-82.76	392.02	286.92	680.65
Net effect on imports of wheat	-5.17	-4.89	-50.5	-16.45	-93.04

Source: Results of analysis of partial equilibrium model.

The analysis of PEM of wheat crop as presented in Table (3) shows that, the net economic loss in production of wheat in the year 2009 was about 9.86 million pounds, while it was in 2006 about 0.53 million pounds. Such increase in net economic loss in production may be attributed to the policy of imposing taxes on producers of wheat, which was followed by gradual canceling the support policy of the consumers which led to the irrational behavior of production resources consequently, the production resources was not distributed efficiently to the activities directed to low-producers .

The net economic loss in the consumption of wheat in 2009, was about 83.18 million pounds, while the lowest loss was and reached about 4.35 million pounds in 2006 Such increase in net economic loss in production may be attributed to the policy of imposing taxes on producers of wheat, which was followed by gradual canceling the support policy of the consumers.

Wheat producers were affected and the maximum loss reported estimated by 5.25 billion pounds in 2009, while wheat producers achieved the maximum yield value with about 1.06 billion pounds in 2005. The loss in could be attributed to increase the cost of surplus production than the revenues due to the reduction in farm price than the price limit, and consequently the local product reported loss from the sale of small quantities at low prices, while the gains of the domestic product from the sale of large quantities at high prices, higher farm price than the price limit, which in turn is reflected on the well-being of low or high producers of wheat.

On the other hand, the data show that the consumers of wheat reported the maximum loss which estimated by 1.65 billion pounds in 2006, while consumers reported the maximum yield of wheat which estimated by 8.76 billion pounds in 2009. The increase in losses could be attributed to the decline in consumer support policy and therefore the loss to the consumer as a result of buying small quantities with high prices was evident. Therefore, increasing consumer spending on wheat reflected the decrease in welfare of consumers of wheat.

The change in government revenue reached the maximum losses in 2009 with about 3.6 billion pounds, while the government reported the maximum return in 2006 and which estimated by 640 million pounds.

The foreign currency paid for the importation of wheat from abroad reported losses in 2006 and estimated with about 82.76 million pounds. The increase in the foreign currency paid to the increasing demand for domestic supply of wheat rather than the offered due to the increased consumption of wheat, which led to increased reliance on Importing.

Finally, the net economic loss as a result of importing of wheat in 2009 was about 93.04 million pounds; it reached the minimum in 2006 with about 4.89 million pounds. Such increase in the net economic loss to could be attributed to the inefficient distribution of resources, productivity and consumer spending.

2- Rice

Data presented in Table (1) shows that, the minimum area of wheat in 2009 reached about 1.37 million Feddans, which contributed about 8.83% of the cropping area, while the maximum area in 2008 was about 1.77 million Feddans, which contributed about 11.61% of the cropping area.

The productivity of rice has reached the minimum in 2007 with about 4.0 tons per Feddan, while in 2005 it reached the highest productivity with about 4.02 tons per Feddan. With regard to Egypt's exports of rice it was the lowest in 2008 and amounted about 364 000 tons, while the maximum in 2007 was about 1.22 million tones.

Table (4) indicates the results of the estimation of the coefficient and the rate of nominal protection, coefficient and domestic resource cost, and the PEM of the rice during the period (2005-2009), where the following results could be revealed:

Total nominal protection coefficient for the rice crop reached the maximum by the year 2007 with about 1.29, while in 2009 it was the lowest with about 0.58, and these figures indicate that the protection of rice producers have started to decline,

which may be due to low domestic price of rice compared to his counterpart at the price of the price limit. Therefore, bearing farms taxes directly and indirectly was estimated by 42% in 2009, while the farmer enjoyed the tacit support which estimated by 29% in 2007, according to an index rate of nominal protection. Also, it was found that the coefficient of the cost of local resources for the rice reached the peak in 2007 with about 0.84, while in 2009 it was the lowest with about 0.41 and this shows the existence of comparative advantage in rice production locally.

Table (5) indicates the analysis of PEM for the rice crop.

The net economic loss in production yield of rice in 2009 was estimated by 42.79 million pounds, while the lowest was recorded in 2006 with about 0.01 million pounds, Such increase in net economic loss in production may be attributed to the policy of imposing taxes on producers of rice, which was followed by gradual declining in the support policy of the consumers which led to the irrational behavior of production resources consequently, the production resources was not distributed efficiently to the activities directed to low-producers. The decrease in net loss product economic figures as a result of higher domestic prices for rice crop, as well as rising production costs led to a rationalization of the use of productive resources and thus increase the efficiency in using these resources.

The net economic loss in consumption for rice in 2009 was estimated by 1.352 billion pounds, while the lowest was in 2006 with about 0.12 million pounds. Such increase in the net economic loss in consumption could be attributed to following a policy of protection to support the consumer, and thus changing the consumption expenditure attitude from high benefit of goods to another with lower benefit because of low prices, and thus a case of bad distribution of consumer spending was evident.

Rice producers reported the maximum loss which estimated by 6.06 billion pounds in 2009, while they reported the maximum yield with about 2.247 billion pounds in 2007. This loss in could be attributed to increase the cost of surplus production than the revenues due to the reduction in farm price than the price limit, and consequently the local product reported loss from the sale of small quantities at low prices, while the gains of the domestic product from the sale of large quantities at high prices, higher farm price than the price limit, which in turn is reflected on the well-being of low or high producers of rice.

On the other hand, the data showed that rice consumers have reported the maximum loss which estimated by 1.213 billion pounds in 2007, while the consumers of rice has achieved the maximum yield by 3.828 billion pounds in 2009. The increase in losses could be attributed to the decline in consumer support policy and therefore, the loss to the consumer occurred as a result of buying small quantities at high prices, consequently increasing consumer spending on rice, which reflected a decrease in welfare of them.

Table (4) policy analysis matrix for rice in Egypt during the period (2005-2009)

Item	2005	2006	2007	2008	2009
Farm price (pounds / ton)	1069.3	1077	1451	1465	1495
Price limit (pounds / ton)	1003	1087.1	1123.3	1697.5	2585.5
Costs of production in pounds per Feddan	2455	2658	3065	3933	3788
Added value in pounds per Feddan at the border	3335	3669	3628	5675	9177
Nominal protection coefficient	1.07	0.99	1.29	0.86	0.58
Nominal protection rate	0.07	-0.01	0.29	-0.14	-0.42
Local resource cost coefficient	0.74	0.72	0.84	0.69	0.41

Source: Analysis of the results of matrix analysis of price policy.

Table (5) partial equilibrium model of rice million pounds in Egypt during the period (2005-2009)

Item	2005	2006	2007	2008	2009
Net economic loss production, figures	0.25	0.01	4.96	2.61	42.79
Net loss for the economic figures of consumption	4.32	0.12	90.77	59.42	1352
Change in producer surplus	405.93	-68.16	2247.1	-1687.2	-6060.2
Change in consumer surplus	-198.84	34.99	-1213.9	987.1	3828
Change in government revenue	-211.65	33.05	-1128.9	638.11	837.39
Change in foreign currency	138	-26.7	656.2	-905.8	-6613.8
Net impact on exports of rice	-4.56	-0.12	-95.73	-62.03	-1394.8

Source: Results of analysis of partial equilibrium model.

The change in government revenue, has reached the maximum losses in 2007 with about 1.129 billion pounds, while the governmental maximum return in 2009 was estimated at 838.4 million pounds.
The foreign currency from the foreign export losses of rice in 2009 reached a maximum at about 6.614 billion pounds, due to the reduction in rice exports.
Finally, the net economic loss as a result of export reduction of rice in 2009 was about 1.395 billion pounds, while the lowest was reported in 2006 by 0.12 million pounds.

It can be said in general in light of the results matrix of policy analysis for the wheat, the presence of protection in 2005 and 2006 for the benefit of the producer at the expense of the consumer, while following the policy of imposing taxes on producers during the period (2007-2009). Also, a comparative advantage was evident, according to the standard cost of the local resources in the production of wheat during the study period. The results of matrix of policy analysis for the policy of protection in 2005 and 2007 showed benefit of the producers at the expense of the consumer, while following the policy of imposing taxes on producers during the period (2007-2009). Also, a comparative advantage was evident, according to the standard cost of the local resources in the production of wheat during the study period.

The analysis of partial equilibrium model of wheat crop has shown that the net economic loss as a result of importation of wheat reached the peak in 2009 at and estimated by 93.04 million pounds, while the lowest was about 4.89 million pounds. Such increase in the net economic loss to could be attributed to the inefficient distribution of resources, productivity and consumer spending.. As for the results of partial equilibrium model for rice it could be seen that, the net economic loss as a result of export of rice in 2009 was about 1.395 billion pounds, while the lowest was in 2006 and estimated by 0.12 million pounds.

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