Economic study of corn pricing in Egypt

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Abstract: The problem of the study is the farmer's reluctance to cultivate corn crop due to the decline in net return, in addition raising the import prices. The research aimed to encourage farmers to adopt corn cultivation by establishes a fair price. As well as the estimation of the partial equilibrium model to measure the effect of price distortions on the structure of corn market on both the producer and the consumer, in addition to measuring the efficiency, welfare and state revenue. The results showed that the fourth scenario achieves the best indicators for the corn farmers, according to the highest percentage of the value of domestic production to domestic consumption, The increasing in product price exceeds the border price by about 13% during the period considered in the current values, while in real terms an increase of about 40%, 2% during the average of the first and second periods, and decrease by about 40%, 50% during the average of the third period and in 2017, Respectively, in addition, Support for the local producer is estimated at 15% of the current values, whereas according to the real values, the producer receives support by about 69% during the average of the initial period, while there is a mandatory implicit tax estimated at 28% during the third period and about 33% in 2017. By measuring input efficiency, the lowest economic loss in real terms is about LE 8.9, 153, 312 million for the second, third, and 2017 periods, respectively, it achieves the largest gain in the state revenues of corn crop at current values of about 0.682, 1.289, 2.977 billion pounds during the three periods respectively, and about 3.31 billion pounds in 2017, achieving a gain in foreign exchange earnings estimated at 0.579, 1.359, 3.164 billion Pounds during the three periods and about 3.9 billion pounds in 2017. Also the fourth scenario achieves the lowest deficit in government revenues estimated at 0.438, 6.447 billion pounds during the second and third periods respectively, and about 8.7 billion pounds in 2017. The minimum deficit in the foreign exchange proceeds is estimated at 0.567, 11.037 billion pounds during two periods Second and third, and about 16.9 billion pounds in 2017. Therefore, the study recommends that the state can encourage farmers to adopt corn cultivation and reduce price distortions in favor of the farmer, by setting a fair price estimated according to the import price index.

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1- Introduction:

Corn crop considered one of the most important strategic grain crops of high economic and nutritional importance. It occupies the largest share of the summer crops. The area of crop is estimated about 2.22 million feddans, which occupy about 33.54% of the summer agricultural area that reached to 6.6 million feddans in 2016. Corn is important for the animal production sector. It represents more than 75% of the concentrated feed value in 2016, and it used in many food industries such as starch, fructose and corn oil.

Despite the economic and social importance of the corn crop, the quantities produced do not meet the local consumption needs, thus the imported quantity reached about 6.2 million tons in 2017, which led to import large quantities from abroad to fill the deficit in local production. It leads to a burden on the Egyptian trade balance.

On the other hand, Agricultural prices are important to achieve the objectives of the agricultural sector, which have an important role in the allocation of resources. In addition, the price affects on production by directing resources towards crops with relatively high profitability, and it has a significant impact on consumption due to the demand on different crops, In addition its effect on income distribution.

2- Objectives

The main objective of the research was to encourage farmers for cultivate corn crop through:

- Determine suitable price according to several alternative or scenarios.
- Identify the structure of corn market.
- Measure the indicators of efficiency, welfare and state revenues.

3- Methodology:

To achieve the objectives mentioned above. The research divided the study period (2000-2017) in to three periods. The first period represents the time before Food Crisis (2000-2006), the second period represents the time during Food Crisis (2007-2012), and the third period represents the time after food

$$P_{xt} = \frac{TC_{xt} + TC_{xt} - SPV}{MP}$$

$P_x \rightarrow P_x \rightarrow$ $TC_x \rightarrow$ $TC_x \rightarrow$ $SPV \rightarrow$ $SPV \rightarrow$ $MP \rightarrow MP \rightarrow$

$$P_{xt} = \frac{TC_{xt} + 35\%TC_{xt} - SPV}{MP}$$

$$P_{xt} = CI_{xt} \times P_{to}$$

$P_{xt} \rightarrow P_{xt} \rightarrow$ $CI_{xt} \rightarrow$ $CI_{xt} \rightarrow$ unit cost index number, $P_{to} \rightarrow P_{to} \rightarrow$ base price (1999).

The fourth alternative uses the index of the import price of the crop as shown in the following equation:

$$P_{xt} = IPI_{xt} \times P_{to}$$

$P_{xt} \rightarrow P_{xt} \rightarrow$ $IPI_{xt} \rightarrow$ $IPI_{xt} \rightarrow$ $P_{to} \rightarrow P_{to} \rightarrow$

$$P_d = (1+\theta)P_b P_d = (1+\theta)P_b$$

$P_d \rightarrow P_d \rightarrow$

$P_b \rightarrow P_b \rightarrow$

$$(P_d/P_b) = (1+\theta)(P_d/P_b) = (1+\theta)$$

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$$\theta = (P_d/P_b) - 1\theta = (P_d/P_b) - 1$$

$NPCNPC$

$$NPC = (P_d/P_b)NPC = (P_d/P_b)$$

$NPC > 1$ $NPC > 1$

$NPC < 1NPC < 1$

$NPC = 1$ $NPC = 1$

$NPRNPR$

$$NPR = 100(NPC - 1)NPR = 100(NPC - 1)$$

$NPR > 0$ $NPR > 0$

$NPR < 0NPR < 0$

$NPC > 1$ $NPC > 1$ $NPR > 0$ $NPR > 0$

direct interventions, is above the border price, giving them incentives to produce more of the crop than if equilibrium prices prevailed. That a commodity be initially taxed (NPR < 0) or protected (NPR > 0), a

$$T = (NPC - 1)$$

$$T = (NPC - 1)$$

$$t^{`} = t(P_b/P_d)t^{`} = t(P_b/P_d)$$

$$V^{`} = P_d * dom.prodV^{`} = P_d * dom.prod$$

$$W^{`} = P_d * total\ supply$$

$$W^{`} = P_d * total\ supply$$

$$e_s = \hat{b} \ldots from \rightarrow \ dom.prod. = f(P_d) \rightarrow \ln($$

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$$n_d = \ddot{b} \ldots from \longrightarrow total\ supply = f(P_c) \ \rightarrow \ln$$

$$n_d = \ddot{b} \ldots from \longrightarrow total\ supply = f(P_c) \ \rightarrow \ln(tot$$

$$\Delta GR = \left(\frac{NPC-1}{NPC}\right)(W^{`} - V^{`})$$

$$\Delta GR = \left(\frac{NPC-1}{NPC}\right)(W^{`} - V^{`})$$

$$\Delta FE = \left(\frac{NPC-1}{NPC^2}\right)(e_s V^{`} - n_d W^{`})$$

$$\Delta FE = \left(\frac{NPC-1}{NPC^2}\right)(e_s V^{`} - n_d W^{`})$$

(3) "Net Economic loss in Production"

$$NEL_p = 0.5\, e_s \left(\frac{NPC-1}{NPC}\right)^2 V^{`}$$

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ss in Consumption"

$$NEL_C = 0.5\, n_d \left(\frac{NPC-1}{NPC}\right)^2 W^{`}$$

$$NEL_C = 0.5\, n_d \left(\frac{NPC-1}{NPC}\right)^2 W^{`}$$

$$WG_P = \left(\frac{NPC-1}{NPC} * V^{`}\right) - NEL_P$$

$$WG_P = \left(\frac{NPC-1}{NPC} * V^{`}\right) - NEL_P$$

$$WG_C = -\left[\left(\frac{NPC-1}{NPC}\right) W^{`} + NEL_C\right]$$

$$WG_C = -\left[\left(\frac{NPC-1}{NPC}\right) W^{`} + NEL_C\right]$$

$$Net\ Effect = -(NEL_P + NEL_C)$$

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Table (1): The alternatives corn prices in (2000-2017).

year	1st (L.E/Ton)	2nd (L.E/Ton)	3rd (L.E/Ton)	4th (L.E/Ton)
2000	529.97	530.60	604.53	482.25
2001	537.02	543.08	622.20	567.70
2002	533.73	539.03	625.88	701.12
2003	602.93	617.59	717.11	965.40
2004	646.73	663.50	765.20	1150.06
2005	703.86	725.35	831.34	977.42
2006	746.49	770.67	879.24	1026.08
Average (2000-2006)	**614.39**	**627.11714**	**720.78571**	**838.58**
2007	937.61	960.90	1091.23	1464.23
2008	1229.54	1237.77	1393.71	2619.29
2009	1243.69	1243.41	1407.27	3011.85
2010	1477.11	1510.15	1700.79	1868.44
2011	1517.74	1560.75	1753.74	2335.02
2012	1615.17	1653.87	1869.28	2619.06
Average (2007-2012)	**1336.81**	**1361.14**	**1536.00**	**2319.6**
2013	1753.66	1825.41	2055.81	2582.45
2014	1827.28	1902.68	2138.27	2797.99
2015	2066.21	2174.35	2435.72	2482.84
2016	2644.66	2584.12	2860.25	2489.55
2017	3047.24	2843.59	3132.93	2615.01
Average (2013-2017)	**2267.81**	**2266.03**	**2524.596**	**2593.6**

Source: 1- Ministry of agriculture and land reclamation, central administration of agricultural economics, Agricultural economics bulletin, various issues. 2- http://www.fao.org/statistics/ar/

Table (1) shows the comparison between the farm price according to the forth alternatives or scenarios, for corn crop during the average periods (2000-2006), (2007-2012), and (2013-2017). It shows that corn farmers are getting a higher price according to the fourth alternative in the period (2013-2017) by about 2593.6 L.E/Ton. On other hand corn farmers are obtaining a lower price in the first alternative. Therefore, prices should be determined by the state for corn farmers before to the agricultural season start, it must take into account the changes occurring in the cost of production or demand or import prices. In addition to raise the relative profitability of corn crop for its economic and social importance.

Table (2) shows the corn market structure for the benefit of the consumer under implicit taxes on the producer by using the partial equilibrium model estimated in nominal values to measure welfare effects of the corn pricing policies as following:

- The value of domestic production is about 12.8% of the value of domestic consumption in 2017, compared to about 12.2% in 2016.

-The price of the producer exceeds the price of the border by about 31% in 2017 compared to 23% in 2016, while the price of the consumer exceeds the border price by about 23% in 2017. While it reaches about 37% in 2016.

-Lower value of nominal protection coefficient for the correct one during the period of study (2000-2017), indicating the presence of implicit taxes at the producer level.

-Producers of corn obtained about 76% of the value of their output at the world price in 2017 compared to 81% in 2016.

- that there are implicit taxes imposed on the domestic product estimated at about 24% in 2017 compared to about 19% in 2016.

- There is a deficit in the legal revenue of the corn crop, which is about 12.278 billion pounds in 2017, compared to about 6.780 billion pounds in 2016.

- In addition, there is a deficit in foreign exchange earnings estimated at 17.506 billion pounds in 2017, compared to about 8.951 billion pounds in 2016.

- The economic loss of the product is 135.3 million pounds in 2017, compared to 51.5 million pounds in 2016.

- The NELC Index showed that the consumer achieved an economic gain of about 1.957 billion pounds in 2017 compared to about 0.782 billion pounds in 2016 and that the maximum profit achieved by the consumer reached about 6.809 in 2009.

- The amount of loss in the surplus product as a result of the import of corn about 1.938 billion pounds in 2017, compared to about 0.994 billion pounds in 2016.

- While the amount of return to consumers of corn about 16.037 billion pounds in 2017 compared to about 8.504 billion pounds in 2016.

- Net impact on imports as a result of the import of maize to achieve net economic gain of about 1.821 billion pounds in 2017, compared to about 0.731 billion pounds in 2016.

Table (3) shows the structure of the corn market by using real-value partial equilibrium model that is in favor of the consumer under implicit taxes on the product as following:

- The value of domestic production represents about 15.2% of the value of domestic consumption in 2017, compared to about 11.9% in 2016.

- The price of the product is lower than the price of the border by about 127% in 2017 compared to 116% in 2016, while the consumer price of the border price is about 37% in 2017, compared to about 10% in 2016.

- Decrease in the value of the nominal protection coefficient from the correct one during the period from 2005 to 2017, indicating the existence of implicit taxes on the producer level.

- The producers of corn have obtained about 44% of the value of their output at the world price in 2017 compared to about 46% in 2016.

- That there are implicit taxes imposed on the domestic product estimated at 56% in 2017 compared to about 54% in 2016.

- There is a deficit in the government revenues of corn crop, which is about 24.25 billion pounds in 2017, compared to about 21.4 billion pounds in 2016.

- A deficit in the proceeds of foreign exchange estimated at 62.1 billion pounds in 2017, compared to about 49.5 billion pounds in 2016.

- The economic loss of the product is 1316 million pounds in 2017, compared to 803 million pounds in 2016.

- The NELC index showed that the consumer achieved an economic gain of about 16.1 billion pounds in 2017, compared to about 12.5 billion pounds in 2016, and that the maximum profit achieved by the consumer is about 18.4 in 2015.

- The amount of loss in the surplus product because of the import of corn is about 5.654 billion pounds in 2017, compared to about 3.694 billion pounds in 2016.

- while the amount of return to consumers of corn about 44.643 billion pounds in 2017 compared to about 36.822 billion pounds in 2016.

- Net impact on imports because of the import of maize to achieve net economic gain of about 14.743 billion pounds in 2017, compared to about 11.703 billion pounds in 2016.

Table (2): Welfare analysis of the corn market in Egypt by using nominal values in (2000-2017).

variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Parameters:																		
P_b	418	492	608	837	837	847	889	1269	2270	2611	1620	2024	2270	2239	2425	2152	2158	3219
P_d	339	396	496	706	746	661	744	1041	1283	969	1156	1878	2029	1885	1523	1417	1756	2450
P_c	935	937	969	1047	1256	1327	1372	1642	2396	1779	1915	2405	2515	2675	2930	3200	3400	4200
ΔP_b ΔP_b P_d P_d (	0.23	0.24	0.23	0.19	0.12	0.28	0.20	0.22	0.77	1.69	0.40	0.08	0.12	0.19	0.59	0.52	0.23	0.31
ΔP_b ΔP_b P_c P_c	(0.55)	(0.48)	(0.37)	(0.20)	(0.33)	(0.36)	(0.35)	(0.23)	(0.05)	0.47	(0.15)	(0.16)	(0.10)	(0.16)	(0.17)	(0.33)	(0.37)	(0.23)
NPC	0.81	0.80	0.82	0.84	0.89	0.78	0.84	0.82	0.57	0.37	0.71	0.93	0.89	0.84	0.63	0.66	0.81	0.76
T	(0.19)	(0.20)	(0.18)	(0.16)	(0.11)	(0.22)	(0.16)	(0.18)	(0.43)	(0.63)	(0.29)	(0.07)	(0.11)	(0.16)	(0.37)	(0.34)	(0.19)	(0.24)
$t^`$	(0.23)	(0.24)	(0.23)	(0.19)	(0.12)	(0.28)	(0.20)	(0.22)	(0.77)	(1.69)	(0.40)	(0.08)	(0.12)	(0.19)	(0.59)	(0.52)	(0.23)	(0.31)
$V^`$	74	113	224	209	367	405	398	714	1101	1047	1254	1956	2432	3002	2787	2501	4115	5741
$W^`$	4838	4765	5012	4537	6005	7473	5890	8460	8168	5369	11343	19439	19420	22558	24583	27470	33726	44838
/																		
ΔGR ΔGR	(1107)	(1129)	(1080)	(805)	(684)	(1987)	(1071)	(1701)	(5439)	(7317)	(4041)	(1356)	(2024)	(3673)	(12904)	(12945)	(6780)	(12278)
ΔFE	(1236)	(1288)	(1255)	(908)	(747)	(2452)	(1259)	(2097)	(10559)	(23943)	(5968)	(1516)	(2447)	(4773)	(21760)	(20078)	(8951)	(17506)
NEL_P	0.95	1.59	2.72	1.72	1.29	7.65	3.62	8.23	155.73	717.11	48.06	2.81	8.25	25.29	233.38	160.61	51.53	135.27
NEL_C	(116)	(124)	(113)	(69)	(39)	(261)	(99)	(181)	(2140)	(6809)	(805)	(52)	(122)	(352)	(3813)	(3267)	(782)	(1957)
WG_P	(18)	(29)	(53)	(40)	(46)	(122)	(81)	(165)	(1003)	(2490)	(550)	(155)	(298)	(589)	(1883)	(1457)	(994)	(1938)
WG_C	1240	1281	1243	913	768	2363	1248	2039	8426	15898	5349	1560	2436	4588	18367	17509	8504	16037
$Net\ Effect$	114.7	122.6	110.1	67.7	37.8	253.7	95.6	172.4	1984.6	6091.8	757.3	48.9	113.7	326.7	3579.3	3106.4	730.7	1821.3

S om the partial equilibrium model

(3): Welfare analysis of the corn market in Egypt by using real values in (2000-2017).

\	0	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
I																		
P_b		643	803	1051	984	966	989	1330	2208	2707	1620	1823	2060	2040	2241	2199	2295	3309
P_d		912	1112	1445	1018	903	975	925	1283	988	871	1514	1324	1191	953	874	1061	1458
P_c	4	2034	2046	2115	2281	2298	2207	2415	2979	1980	1915	2185	2133	2073	2060	2109	2092	2416
ΔP_b ΔP_b P_d P_d	3	-0.30	-0.28	-0.27	-0.03	0.07	0.01	0.44	0.72	1.74	0.86	0.20	0.56	0.71	1.35	1.52	1.16	1.27
ΔP_b ΔP_b P_c P_c	'5)	(0.68)	(0.61)	(0.50)	(0.57)	(0.58)	(0.55)	(0.45)	(0.26)	0.37	(0.15)	(0.17)	(0.03)	(0.02)	0.09	0.04	0.10	0.37
NPC	)	1.42	1.38	1.37	1.03	0.93	0.99	0.70	0.58	0.37	0.54	0.83	0.64	0.58	0.43	0.40	0.46	0.44
T	)	0.42	0.38	0.37	0.03	(0.07)	(0.01)	(0.30)	(0.42)	(0.63)	(0.46)	(0.17)	(0.36)	(0.42)	(0.57)	(0.60)	(0.54)	(0.56)
$t^`$	3	0.30	0.28	0.27	0.03	(0.07)	(0.01)	(0.44)	(0.72)	(1.74)	(0.86)	(0.20)	(0.56)	(0.71)	(1.35)	(1.52)	(1.16)	(1.27)
$V^`$		260	502	427	501	553	521	635	1101	1067	945	1576	1587	1897	1743	1543	2487	3417
$W^`$	32	10336	10582	9166	10903	12939	9475	12446	10157	5973	11343	17663	16473	17478	17284	18104	20920	22514
/																		
ΔGR ΔGR	6	2975	2801	2383	340	(869)	(128)	(5164)	(6527)	(8530)	(8927)	(3287)	(8268)	(11097)	(21008)	(25090)	(21425)	(24247)
ΔFE	7	1929	1927	1649	313	(880)	(126)	(7112)	(11799)	(27601)	(16738)	(4032)	(13250)	(19968)	(51271)	(63855)	(49517)	(62118)
NEL_P	2	5.42	9.26	7.59	0.13	0.65	0.03	29.01	136.59	771.02	166.39	15.72	117.00	229.97	760.85	846.11	802.82	1315.87
NEL_C	6)	(399)	(362)	(302)	(5)	(28)	(1)	(1053)	(2334)	(7990)	(3700)	(326)	(2249)	(3923)	(13974)	(18387)	(12506)	(16059)
WG_P		71	130	109	16	(39)	(7)	(307)	(930)	(2627)	(978)	(338)	(999)	(1581)	(3117)	(3184)	(3694)	(5654)
WG_C	47)	(2653)	(2579)	(2198)	(352)	936	137	6495	9654	18376	13438	3936	11399	16371	37337	45814	36822	44643
$Net\ Effect$	.9	393.3	352.3	294.0	5.0	27.6	0.8	1023.8	2197.7	7219.3	3533.2	310.6	2131.8	3693.0	13212.9	17540.4	11703.1	14742.7

Source: calculated from the partial equilibrium model

On the other hand, according to the fourth alternative prices, there are some scenarios to select the best indicators by using the nominal and real values, which found that the fourth scenario achieves the best indicators for the benefit of the local product for many reasons:

1. **The relative importance of the value of domestic production to domestic consumption at domestic price (table4):**

A -The fourth scenario achieves the highest percentage of local production value in nominal values representing about 5.6%, 20.4%, 18.25% of the value of domestic consumption during the average periods (2000-2006), (2007-2012), (2013-2017) and about

19.3 in (2017). While in real values it represented 5.12%, 15.9%, 17.4% during the three periods respectively, and 22.9% in 2017.

B-The fourth scenario achieves the maximum increase in the price of the producer from the price of the border estimated at 13% during the period considered in the nominal values, while in real values an increase of about 40%, 2% during the average of the first and second periods and a decrease of about 40%, 50% during the average of the third period And 2017 respectively.

Table (4): The relative importance value of domestic production to domestic consumption at domestic price & rate of change in domestic price to board price of corn in (2000-2017).

		(%) $V^{`} V^{`}$ to $W^{`} W^{`}$				$\Delta P_b \Delta P_b$ to $P_d P_d$ (%)**			
	year	(2000-2006)*	(2007-2012)*	(2013-2017)*	2017	(2000-2006)	(2007-2012)	(2013-2017)	2017
Nominal	basic	4.01	12.07	11.65	12.8	0.21	0.44	0.35	0.31
	scenario 1	4.36	11.88	14.55	15.9	0.15	0.50	0.08	0.06
	scenario 2	4.44	12.09	14.67	14.86	0.12	0.48	0.08	0.13
	scenario 3	5.11	13.65	16.37	16.37	(0.02)	0.31	(0.03)	0.03
	scenario 4	5.59	20.37	18.25	19.34	(0.13)	(0.13)	(0.13)	(0.13)
Real	basic	3.7	9.44	11.1	15.17	(0.17)	0.70	1.18	1.27
	scenario 1	4.03	9.29	13.86	18.85	(0.23)	0.75	0.74	0.83
	scenario 2	4.11	9.46	13.98	17.61	(0.24)	0.72	0.74	0.96
	scenario 3	4.72	10.68	15.59	19.4	(0.34)	0.52	0.56	0.77
	scenario 4	5.17	15.94	17.39	22.92	(0.40)	(0.02)	0.40	0.50

*refer to geometric mean. ** refer to the local price exceeds porder price. Source: calculated from table (1) and the partial equilibrium model.

C) Nominal protection coefficient and tax effect on domestic corn farmers (Table 5), according to nominal values, the fourth scenario achieves the highest percentage of farmer's corn value of their output at the world price, with about 115% during the study period. In addition, The result showed that there is a support for the producer with about 15%, while according to real values, corn producers receive 169%,100%, 72% of the value of their output at the world price during the three periods of the study respectively, and about 67% in 2017, this mean that there is a support to local producer during the average of the first period with about 69%, while there is a implicit tax estimated at 28% and about 33% in the third and fourth period respectively.

Table (5): Nominal Protection Coefficient & Implicit tariff of the corn market in Egypt in (2000-2017).

		"Nominal Protection Coefficient" $NPC\ NPC$**				"Implicit tariff" $T = (NPC - 1)\ T = (NPC - 1)$***			
	year	(2000-2006)*	(2007-2012)*	(2013-2017)*	2017	(2000-2006)	(2007-2012)	(2013-2017)	2017
Nominal	basic	0.83	0.68	0.74	0.76	(0.17)	(0.32)	(0.26)	(0.24)
	scenario 1	0.90	0.67	0.92	0.95	(0.10)	(0.33)	(0.08)	(0.05)
	scenario 2	0.92	0.68	0.93	0.88	(0.08)	(0.32)	(0.07)	(0.12)
	scenario 3	1.05	0.77	1.03	0.97	0.05	(0.23)	0.03	(0.03)
	scenario 4	1.15	1.15	1.15	1.15	0.15	0.15	0.15	0.15
Real	basic	1.21	0.59	0.46	0.44	0.21	(0.41)	(0.54)	(0.56)
	scenario 1	1.32	0.58	0.57	0.55	0.32	(0.42)	(0.43)	(0.45)
	scenario 2	1.34	0.59	0.58	0.51	0.34	(0.41)	(0.42)	(0.49)
	scenario 3	1.55	0.67	0.64	0.56	0.55	(0.33)	(0.36)	(0.44)
	scenario 4	1.69	1.00	0.72	0.67	0.69	(0.00)	(0.28)	(0.33)

*refers to Geometric mean for the period studied
** refers to Values that exceed the correct one means the percentage exceeds 100%.
*** refers to the values between the brackets represent implicit taxes on the farmer, while the values without brackets indicate support for the local farmer. Source: calculated from the partial equilibrium model.

2- Measuring of input and output efficiency:

Table (6) shows the measuring of the input efficiency that the lowest economic loss by using real values with about 8.9, 153, 312 million pounds for the second, third periods and 2017, respectively, while by using the nominal values share the lowest loss values between the third and fourth scenarios. On the other hand by measuring output efficiency, the consumer achieves the highest economic gain according to the nominal values of domestic corn pricing, while in the fourth scenario (real values) it achieves the lowest economic gain during the three studied periods.

3- Measuring the welfare of the producer and the consumer:

Table (6) shows that the fourth scenario achieves the best estimates of the surplus of the product because of the import of corn. According to the nominal values, thus it achieved the maximum gain over the study period, while in real values it achieves the maximum gain during the first and second periods, while it achieved the lowest loss with about 1.587, 2.91 billion pounds in (2013-2017), and 2017 respectively.

Thus, the current price of corn achieves the highest return for consumers during the first, third periods and 2017, by using both nominal and real values.

Table (6): Measuring of efficiency and welfare of corn in Egypt in (2000-2017).

		Measurement of efficiency								Welfare analysis							
		"Net Economic loss in Producer" NEL_P NEL_P (input efficiency)*				"Net Economic loss in Consumer" NEL_C NEL_C (output efficiency) *				"Change in Producer Surplus" WG_P WG_P (producer welfare)**				"Change in Consumer Surplus" WG_C WG_C) consumer welfare) **			
	year	**(2000-2006)**	**(2007-2012)**	**(2013-2017)**	**2017**	**(2000-2006)**	**(2007-2012)**	**(2013-2017)**	**2017**	**(2000-2006)**	**(2007-2012)**	**(2013-2017)**	**2017**	**(2000-2006)**	**(2007-2012)**	**(2013-2017)**	**2017**
Nominal	basic	**2.8**	**156.7**	**121.2**	**135.3**	**(117.4)**	**(1684.8)**	**(2034.1)**	**(1956.5)**	**(55.6)**	**(776.7)**	**(1372.2)**	**(1938.1)**	**1293.7**	**5951.2**	**13000.9**	**16037.0**
	scenario 1	**3.3**	**118.2**	**38.8**	**5.7**	**(131.1)**	**(1391.2)**	**(504.3)**	**(66.5)**	**(49.5)**	**(795.6)**	**(296.9)**	**(418.4)**	**909.8**	**6602.1**	**2867.7**	**2661.0**
	scenario 2	**2.7**	**113.8**	**33.1**	**27.8**	**(105.8)**	**(1292.1)**	**(417.2)**	**(346.5)**	**(42.7)**	**(766.2)**	**(324.6)**	**(908.4)**	**750.0**	**6169.7**	**2806.0**	**6272.0**
	scenario 3	**1.0**	**69.9**	**27.0**	**1.3**	**(54.1)**	**(646.5)**	**(270.9)**	**(15.1)**	**(1.0)**	**(544.6)**	**198.4**	**(203.9)**	**(103.4)**	**3601.8**	**(715.9)**	**1252.0**
	scenario 4	**1.5**	**10.0**	**23.5**	**35.0**	**(42.7)**	**(94.4)**	**(217.9)**	**(255.1)**	**45.5**	**303.0**	**719.7**	**1091.3**	**(685.9)**	**(1507.9)**	**(3502.1)**	**(4183.0)**
Real	basic	**3.9**	**206.0**	**791.1**	**1315.9**	**(231.8)**	**(2942.0)**	**(12970)**	**(16058.6)**	**47.4**	**(1029.6)**	**(3445.7)**	**(5653.6)**	**(1393.6)**	**10549.6**	**36197.6**	**44643.0**
	scenario 1	**8.2**	**172.8**	**381.0**	**693.8**	**(468.2)**	**(2958.0)**	**(5060.9)**	**(6816.5)**	**62.5**	**(1024.9)**	**(2434.1)**	**(4204.3)**	**(1605.4)**	**11591.7**	**19492.5**	**25440.0**
	scenario 2	**8.5**	**165.3**	**390.6**	**865.0**	**(475.6)**	**(2726.4)**	**(4986.4)**	**(9094.9)**	**71.5**	**(998.4)**	**(2461.3)**	**(4653.9)**	**(1785.8)**	**10953.6**	**19304.3**	**30607.0**
	scenario 3	**14.5**	**104.7**	**258.8**	**626.8**	**(665.9)**	**(1470.8)**	**(2939.1)**	**(5981.7)**	**132.7**	**(791.2)**	**(2013.3)**	**(4012.2)**	**(2681.2)**	**7352.1**	**13803.6**	**23428.0**
	scenario 4	**21.0**	**8.9**	**153.1**	**311.7**	**(793.7)**	**(96.2)**	**(1535.3)**	**(2519.1)**	**195.4**	**14.2**	**(1587.3)**	**(2906.3)**	**(3377.7)**	**511.4**	**9416.7**	**13841.0**

* The values between brackets represent gain
** The values between brackets represent loss
Source: calculated from the partial equilibrium model.

4- Measuring of state revenues:

Table (7) shows the largest gain in the state revenues of corn with nominal values of about 0.682, 1.289, 2.977 billion pounds during the three periods respectively, and about 3.31 billion pounds in 2017, in addition, achieve gain in foreign exchange earnings estimated at 0.579, 1.359, 3.164 billion pounds During the three periods and about 3.9 billion pounds in 2017. Moreover, by using real values, it achieved the lowest deficit in state revenues estimated at 0.438, 6.447 billion pounds during the second and third periods respectively, and about 8.7 billion pounds in 2017. The minimum deficit in the foreign exchange is estimated by 0.567, 11.037 billion pounds during the second and third periods, and about 16.9 billion pounds in 2017.

In addition, it shows that the net impact on imports as a result of imports of corn indicates that the current price of corn achieves the highest net economic gain in nominal values during the study period, and by using real values during the period (2013-2017).

Conclusion:

The results of the estimated partial equilibrium model during the period (2000-2017) show that the structure of the corn market imposes implicit taxes on farmers. In addition, there is a deficit in state revenues for corn crop. In addition, there is a deficit in the foreign exchange earnings, and there is an economic loss for the farmer, Therefore, the paper assumed fourth alternatives for pricing corn, and found that the best alternative is the fourth, which depends on the price of import where it characterized by efficiency.

Thus, the state can encourage farmers to adopt corn cultivation and reduce price distortions in favor of the farmer, by setting a fair price estimated according to the import price index.

Table (7): Measurement of state revenue of the corn market in Egypt during (2000-2017).

		“Change in state Revenue” ΔGR				**“Change in foreign Exchange”** ΔFE				**Overall Welfare Effect”** *Net Effect*			
	year	(2000-2006)	(2007-2012)	(2013-2017)	2017	(2000-2006)	(2007-2012)	(2013-2017)	2017	(2000-2006)	(2007-2012)	(2013-2017)	2017
Nominal	basic	(1123.4)	(3646.4)	(9715.8)	(12277.6)	(1306.6)	(7755.0)	(14613.7)	(17506)	114.6	1528.1	1912.9	1821.3
	scenario 1	(732.6)	(4533.6)	(2105.3)	(2182.2)	(980.0)	(7954.0)	(3301.1)	(2638)	127.8	1273.0	465.5	60.7
	scenario 2	(604.1)	(4225.1)	(2097.4)	(5044.9)	(806.2)	(7440.1)	(3153.9)	(6413)	103.2	1178.3	384.0	318.7
	scenario 3	157.5	(2480.6)	761.4	(1034.6)	29.2	(4275.0)	385.3	(1225)	53.1	576.6	243.9	13.8
	scenario 4	681.6	1289.4	2976.9	3311.4	578.9	1358.8	3164.4	3885	41.2	84.5	194.4	220.1
Real	basic	1574.0	(6783.9)	(20573.4)	(24247.1)	991.5	(13421.9)	(49345.8)	(62118)	227.8	2736.1	12178.4	14742.7
	scenario 1	2002.9	(7781.6)	(12378.5)	(15113.1)	916.0	(14309.3)	(24636.4)	(33179)	459.9	2785.2	4679.9	6122.7
	scenario 2	2181.4	(7394.1)	(12247.3)	(17723.2)	1071.3	(13462.3)	(24414.3)	(40768)	467.1	2561.2	4595.7	8229.9
	scenario 3	3199.9	(5195.0)	(9109.9)	(14060.6)	1671.7	(8683.8)	(16848.9)	(30274)	651.4	1366.0	2680.3	5355.0
	scenario 4	3955.1	(438.3)	(6447.3)	(8727.0)	2165.5	(566.7)	(11037.0)	(16921)	772.8	87.2	1382.2	2207.4

The values between brackets represent lose.
Source: calculated from the partial equilibrium model.

Reference:

1. Attala, M., Elzaabalawy, M. Bediwy, E.,2017 "Impact of Rice Export Restrictions Policy on Stakeholders in Egypt", World Rural Observations, Volume 9, Number 3, Pp18-24.
2. Ministry of agriculture and land reclamation, central administration of agricultural economics, Agricultural economics bulletin, various issues.
3. Nassar, S. 1982 "Proposed alternatives to agricultural price policy in Egypt", Contemporary Egypt Magazine, Volume 73, Number 388, Pp. 91-119.
4. Nkosazana N. Mashinini, Ajuruchukwu Obi, Herman van Schalkwyk. 2006, "Deregulation of the Maize Marketing System of Swaziland and Implications for Food Security", Poster paper prepared for presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18.
5. Said, M. 2013, "The effect of the agriculture pricing policies on the crop corn in Egypt", Agriculture Economic. And Social Science Journal. Mansoura University., Volume 4, Number 12, Pp 2393 – 2404.
6. Tsakok, Isabelle. 1990. "Agricultural Price Analysis Policy: A Practitioner’s Guide to Partial Equilibrium Analysis". Cornell University Press. London.
7. http://www.fao.org/statistics/ar/.

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