



المجلة المصرية للاقتصاد الزراعي

ISSN: 2311-8547 (Online), 1110-6832 (print)

<https://meae.journals.ekb.eg/>

تقدير نموذج التوازن الجزئي لمحصول القمح في مصر

أ.د. سعد زكي نصار أ.د. على عاصم زكي فؤاد ياسمين عبد الناصر عبد الله
قسم الاقتصاد الزراعي- كلية الزراعة - جامعة القاهرة

بيانات البحث

استلام 2022 / 1 / 20
قبول 2022 / 2 / 15

الكلمات المفتاحية

محصول القمح،
نموذج التوازن الجزئي،
معامل الحماية
الأسمي، السياسة
السعريّة.

المستخلص

استهدف البحث تقدير نموذج التوازن الجزئي لمحصول القمح خلال الفترة (٢٠١٨-٢٠٢٠) للتمكن من معرفة مقدار الدعم أو الضرائب المفروضة على منتجي القمح ومستهلكيه في مصر، بالإضافة إلى تحديد وقياس تأثير سياسات التدخل الحكومي على الإنتاج والاستهلاك والحكومة والإيرادات والأثر النهائي على رفاهية المجتمع وقد تم الاعتماد على البيانات الثانوية المنشورة والغير منشورة من المؤسسات والهيئات ذات الصلة وشبكة المعلومات الدولية (الانترنت) بالإضافة إلى الاستعانة بالبحوث والدراسات المتعلقة بمجال البحث.

تبين من حساب معامل الحماية الأسمى خلال فترة الدراسة أن قيمه المعامل أقل من الواحد مما يعني فرض ضرائب ضمنية على منتجي القمح في مصر، واتضح من نتائج نموذج التوازن الجزئي إن متوسط صافي الخسارة الاقتصادية على مستوى المنتج كانت 105 مليون جنيه وبلغت حوالي 0.06 مليون جنية عام 2008 كحد أدنى، في حين بلغت 852.8 كحد أقصى عام 2017.

بلغ صافي الخسارة الاقتصادية على مستوى المستهلك حوالي (1389) مليون جنية عام 2017 كحد أدنى في حين بلغ حوالي -0.05 مليون جنية عام 2008 كحد أقصى، بمتوسط بلغ (150) مليون جنية وبلغ متوسط الخسارة المجتمعية حوالي 45 مليون جنية و536 مليون جنية كحد أقصى في عام 2017 وحد أدنى -0.012 في عام 2008، وبالنسبة لمؤشرات الرفاهية بلغ متوسط التغير في فائض المنتج - 3368 مليون جنية في حين بلغ متوسط التغير في فائض المستهلك 12278 مليون جنية.

وبالنسبة لمؤشرات ميزانية الدولة بلغ متوسط الفقد في الإيراد الحكومي والتغير في حصيلة النقد الأجنبي 8864، 1883 مليون جنيه على الترتيب خلال فترة الدراسة. لذلك توصى الدراسة بضرورة دعم منتجي السلع الاستراتيجية كالقمح لتقليل صافي الخسارة على مستوى المنتج والأعباء التي يتحملها المنتج وبالتالي توفير النقد الأجنبي لصالح الدولة والربط بين السياسات السعريّة بالسياسات الغير السعريّة من أجل التنفيذ الناجح لسياسة الأسعار المصممة بالإضافة إلى تحديد سعر توريد القمح قريب من الأسعار العالمية وقبل ثلاثة أشهر من موسم زراعة القمح، بحيث يكون السعر المعلن عادلاً للمنتجين، ويغطي تكاليف إنتاجهم، ويقدم هامش ربح معقول، وفي نفس الوقت يكون عادلاً أيضاً بالنسبة للمستهلكين.

الباحث المسئول: ياسمين عبدالناصر

البريد الإلكتروني: Jasmineabdelnasser@gmail.com

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Available Online at EKb Press
Egyptian Journal of Agricultural Economics ISSN: 2311-8547 (Online),
1110-6832 (print)
<https://meae.journals.ekb.eg/>

Assessment of the Partial Equilibrium Model of the Wheat Crop in Egypt.

Prof. Saad Zaki Nassar

Prof. Ali Assem Zaki Fouad

Yasmine Abd El-Nasser Abd Allah.

*Department of agricultural economics, Faculty of agriculture, Cairo University.

ARTICLE INFO

Article History

Received: 20-1- 2022
Accepted: 15-2- 2022

Keywords

Wheat crop, Partial equilibrium model, nominal protection coefficient, price policy.

ABSTRACT

Wheat is considered the main grain crop in Egypt, since it produces the Baladi bread, which is the main source of carbohydrates for the Egyptian population. Egypt is considered the largest importer of wheat in the world. Despite the annual increase in wheat production, this production is not sufficient to meet the demand, so the state tries to fill this gap through imports, which puts a burden on the country's budget.

The study aimed to determine the characteristics of the agricultural price policy for wheat crop, identify imbalances in prices, and assess the value of subsidies received by or taxes imposed on wheat producers and consumers in Egypt using partial equilibrium model.

The result revealed that the average nominal coefficient for wheat reached during the study period was 0.86, which means that wheat producers receiving only 86% of the real price, implying that the government has been imposing taxes on wheat producers to subsidize domestic consumers. The net economic loss in production and consumption was about 105 million pounds and the net economic loss in consumption was (150) million pounds on average during the period (2000-2018), the average loss in the government's revenue reached (8864) million pounds during the study period. As for the country's revenue from foreign exchange amounted to 1883 million pounds on average during the study period.

Corresponding Author: Yasmine Abd El-Nasser Abd Allah

Email: Jasmineabdelnasser@gmail.com

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Introduction

Agricultural policy is considered one of the most important tools through which the country can achieve its goal of raising national agricultural income and, as a result, improve the economic and social conditions of agricultural workers in particular and the whole population in general. Perhaps, one of the most important agricultural policies that help develop the agricultural sector is the agricultural price policies, which play an effective role in motivating the forces of production and the forces affecting food consumption and rationalizing demand on the other hand, in addition to guiding farmers towards the production of a particular crop.

Wheat crop is considered the main strategic cereal crop in Egypt, as it produces the Baladi bread, Therefore, the study employed the partial equilibrium model in order to determine the characteristics of the agricultural price policy for that crop, identify imbalances in prices, and assess the value of subsidies received by or taxes imposed on wheat producers and consumers in Egypt.

Research problem

Since 2006, Egypt has been one of the top three wheat-importing countries, despite the annual increase in wheat cultivation area. The production is not sufficient to meet the demand for wheat and flour, so the country and the private sector import wheat from abroad to fill the supply gap. This resulted in a rapid increase in world wheat prices per ton, allowing some countries to exert significant political pressure, as well as the accumulation of external debts, leading to an increase in the balance of payment deficit.

Research objectives

The aim of this research is to assess the price policy for wheat crop, assessing the impact of the state's intervention on the producer and consumer surplus, governmental revenues, change in foreign exchange and estimating the value of subsidy wheat producers and consumers receive or taxes imposed on producers.

Data source and methodology

The study relied on published and unpublished secondary data from various sources, including: the Ministry of Agriculture and Land Reclamation, the Central Agency for Public Mobilization and Statistics (CAPMAS), Food and Agriculture Organization of the United Nations and the World Bank.

The research employed Partial Equilibrium Model to explain the imbalances in volume of subsidies to or taxes imposed on wheat producers and consumers in Egypt, in addition to identifying the impact of governmental intervention policies on production, consumption, government's revenue and the final impact on society's welfare based on computed net economic losses for producers and consumers and change in producer and consumer surplus.

Theoretical framework for the research**1. Partial Equilibrium Model (Import Commodity)** (Taskok, I. 1984)

This model includes the following equation:

First: Efficiency Indicators:

Net economic loss in Production

$$NEL_P = 0.5e_s \left(\frac{NPC - 1}{NPC} \right)^2 v \quad (1)$$

Net economic loss in Consumption

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

Net Effect

$$= -(NEL_P + NEL_C)$$

Second: Welfare Indicators:

Change in producer surplus

$$WG_P = \left(\frac{NPC - 1}{NPC} \right) v - NEL_P \quad (3)$$

Change in Consumer surplus

$$WG_C = -\left(\frac{NPC-1}{NPC}\right)w + NEL_C \quad (4)$$

Third: Government's Revenue indicators:

Change in government revenue

$$\Delta GR = \left(\frac{NPC-1}{NPC}\right)(w-v) \quad (5)$$

Change in Foreign exchange earnings

$$\Delta FE = -\left(\frac{NPC-1}{NPC^2}\right)(e_s v - n_d w) \quad (6)$$

Where,

e_s = Price elasticity of supply*n_d* = Price elasticity of demand.*W* = value of consumption at domestic farm gate price .*V* = value of production at domestic farm gate price**Results and discussion****First: Current situation of wheat crop**

Table (1) data indicates that the average wheat production during the study period reached 7949 thousand tones. It ranged between a minimum of 6255 thousand ton in 2001 and a maximum of 9608 thousand tones in 2015. Meanwhile, the average consumption reached 13442 thousand tons, ranged between a minimum of 9826 thousand tons in 2000 and a maximum of 19129 9826 thousand tons in 2017.

The farm gate price of wheat has increased from 695 L.E/ ton in 2000 to 3760 L.E / ton in 2018, with an average of 1920 L.E/ton during the period (2000-2018). as for, the consumer price has reached its minimum in 2001 at about 1017 L.E/ton, while it reached the maximum in 2018 to be about 8033 L.E/ton.

The average value of production during that period has amounted to about 16169 million pounds. Also, the table indicates that the minimum value of production in 2001 was about 4382 million pounds. Meanwhile, the maximum value of production in the year 2017 reached about 31663 million pounds. The average consumption value of the wheat crop in Egypt during the period (2000-2018) amounted to about 48704 million pounds.

The table also indicates that the value of consumption reached its minimum in 2000 at about 10056 million pounds and reached the maximum consumption in 2017 to be about 150922 million pounds.

Table (2) show that the elasticity of supply was estimated at about 0.19; this value is consistent with the price elasticities of supply calculated from previous studies.

As for the price elasticity of demand, the demand function was estimated by using both the consumer price and the average per capita weight in kilograms. Results in table (2) reveal that the price elasticity of demand was estimated at about -0.06, which is consistent with the economic logic.

Table 1. Evolution of economic indicators for the wheat crop during the period (2000-2018).

Years	production (1000 tons)	Consumption (1000 tons)	Farm gate price (L.E/ton)	Consumer price (L.E/ton)	Production value 1000 pounds	Consumption Value 1000 pounds
2000	6564	9826	695	1023	4560	10056
2001	6255	9931	701	1017	4382	10104
2002	6625	11750	718	1057	4757	12416
2003	6845	10365	760	1273	5202	13198
2004	7178	11099	1000	1735	7178	19257
2005	8141	12575	1120	1765	9118	22192
2006	8274	13499	1127	1585	9322	21397
2007	7379	13029	1153	2886	8510	37598
2008	7977	13743	2553	3487	20368	47918
2009	8523	10828	1613	2963	13750	32084
2010	7169	15522	1813	3320	13000	51535
2011	8371	15056	2347	3487	19643	52496
2012	8795	12447	2520	3415	22165	42510
2013	9460	13126	2580	4296	24407	56388
2014	9280	14219	2740	4367	25427	62099
2015	9608	15390	2753	4094	26453	63001
2016	9343	15380	2773	4665	25910	71745
2017	8421	19129	3760	7890	31663	150922
2018	8349	18482	3760	8033	31391	148457
Average	8029	13442	1920	3282	16169	10056

Source: 1) calculated using data from the Ministry of Agriculture and land Reclamation, Economic Affairs Sector, agricultural economy bulletin, different journals.

2) The Central Administration for Public Mobilization and Statistics, Foreign Trade Database, Foreign Trade Bulletins; Different journals.

Table 2. Price Elasticity of demand and supply of wheat crop grown in Egypt during the period (2000-2018).

No	Variable	Equation	F	R ²
1	Price elasticity of supply	$\ln Y = 7.60 + \ln 0.19 X_1$ (33.26)* (6.02)*	36.23	0.68
2	Price elasticity of demand	$\ln Y = 5.54 - \ln 0.06 X_2$ (15.99)* (-1.45) ^{N.S}	2.11	0.11

Source: Calculated from data in table (1).

It is clear from table (3) that the calculated average nominal rate of protection is -0.14, indicating that taxes imposed on wheat producers reached 14% during the study period. The table indicates that the nominal rate of protection reached its minimum value in 2008 to be about 0.01, indicating that taxes imposed on wheat producers reached 0.057%, while it reached its maximum value in

2017 to be about 0.35, indicating that taxes imposed on wheat producers reached 35%. Also, it can be noticed that the nominal rate of protection for the year 2013 has returned to a positive value equal to zero, implying that the government neither offered subsidies or internal protection, nor taxes on wheat producers during that year.

Table 3. Evolution of nominal protection coefficient for wheat crop during the period (2000-2018).

Years	Farm gate price (L.E /ton)	Equivalent Price (L.E/ton)	NPC	Nominal rate of protection
2000	695.0	851.4	0.82	-0.18
2001	700.7	923.3	0.76	-0.24
2002	718.0	781.9	0.92	-0.08
2003	760.0	864.9	0.88	-0.12
2004	1000.0	1200.2	0.83	-0.17
2005	1120.0	1308.4	0.86	-0.14
2006	1126.7	1137.0	0.99	-0.01
2007	1153.3	1323.9	0.87	-0.13
2008	2553.3	2567.9	0.99	-0.01
2009	1613.3	1882.7	0.86	-0.14
2010	1813.3	2103.8	0.86	-0.14
2011	2346.7	2625.1	0.89	-0.11
2012	2520.0	2813.6	0.90	-0.10
2013	2580.0	2568.2	1.00	0.00
2014	2740.0	3025.9	0.91	-0.09
2015	2753.3	3067.9	0.90	-0.10
2016	2773.3	3627.3	0.76	-0.24
2017	3760.0	5786.4	0.65	-0.35
2018	3760.0	5450.9	0.69	-0.31
Average	1920.4	2311.08	0.86	-0.14

Nominal Protection Coefficient (NPC) = Farm gate Price ÷ Border Price

Nominal Rate of protection (%) = Nominal protection Coefficient - 1

Source: 1) Ministry of Agriculture and land Reclamation, Economic Affairs Sector, agricultural economy bulletin, different journals.

2) FAO Stat.

Efficiency indicators

It is based on computed net economic losses for producers, net economic losses for consumers, and the net economic losses for society (net impact).

Net Economic loss in production

Results in table (4) reveal that the net economic loss in wheat production recorded an average of 105 million pounds during the period (2000-2018). It can be noticed that the years during which the imposed taxes are higher, net economic loss in production is also higher, and vice versa. Net economic loss and implicit taxes imposed on producers recorded a maximum value of 852.8 million

pounds and 35% in 2017 respectively. Meanwhile, the net economic loss and implicit taxes imposed on producers recorded a minimum value of 0.06 million pounds and 0.57% in 2008. The high value of net economic loss for producers during the study period may be attributed to farm gate prices that recorded values less than the equivalent prices. On the other hand, the low value of the net economic loss for producers during the study period can be attributed to the high farm gate prices of wheat that recorded values close to the equivalent prices.

Net Economic loss in Consumption

Results in table (4) show that the net economic loss in wheat consumption recorded an average of (-150 million pounds) during the study period. It can be noticed that the net economic loss in consumption recorded a minimum value of (-1389.22 million pounds) in 2017 during which implicit taxes imposed on producers recorded its maximum value. Net economic loss in consumption recorded a maximum value of (-0.05 million pounds) in 2008, during which implicit taxes imposed on producers recorded its minimum value. The low value of economic loss in consumption observed during the study period might be attributed to the high farm gate prices that approached equivalent prices, which led to positive impacts on the efficiency of allocation and rationalization of consumption expenditure.

Net Economic loss for the society

Regarding the variation in economic loss for the society, which is the outcome of economic loss for both producers and consumers, the results presented in table (4) indicate that net economic loss for society recorded an average of 45 million pounds during the study period. It can be observed that the net economic loss for the society declines as implicit taxes imposed on producers decline, and vice versa. Results indicate that net economic loss for society during the study period reached a minimum value of (-0.012 million pounds) in 2008, during which implicit tax also reached its minimum. The net economic loss for the society reached a maximum value of 536 million pounds in 2017, during which implicit tax also reached its maximum.

Welfare Indicators

Two indicators are used to measure welfare over the study period; these are change in producer surplus and change in consumer surplus.

Change in producer surplus

Results in table (4) indicate that the average loss in producer surplus reached 3368 million pounds during the study period. It can also be noticed that the burden beared by producers declines as implicit taxes decline, and vice versa, where the lowest burden producers' bear was that recorded in

2008, at about (116 million pounds), while the highest burden producers' bear was that recorded in 2017, at (17917 million pounds).

Change in Consumer surplus

Results in table (4) indicate that the average consumer surplus reached about 12278 million pounds, fluctuating between a minimum of 197 million pounds in 2006 and a maximum of 82728 million pounds in 2017. The loss in consumer surplus in 2013 can be attributed to consumers' purchase of small quantities at high prices. Consequently, an increase in consumer spending has been reflected in a reduction in consumer's welfare, as shown in table (1) of appendices.

Governmental Revenue Indicators

Two indicators are used to measure welfare over the study period; these are the change in the government's revenue and the change in the country's foreign currency proceeds.

Change in Government Revenue

Results in table (4) indicate that the average loss in the government's revenue reached (8864 million pounds) during the study period. It can also be noticed that the minimum loss in the government's revenue was realized in 2017 (64274 million pounds), the year during which the implicit tax imposed on wheat producers reached its maximum. The maximum loss in the government's revenue was that realized in 2006 (156.8 million pounds), the year during which the implicit tax imposed on wheat producers reached its minimum

Change in country's foreign exchange

Results in table (4) indicate that the average foreign currency proceeds were about 1883 million pounds during the study period. It also indicates that the change in foreign exchange reached its minimum in 2008 at about 39 million pounds, the year during which the implicit tax imposed on wheat producers reached its minimum. While it reached its maximum in 2017 at about 12804 million pounds, the year during which the implicit tax imposed on wheat producers reached its maximum

Table (4). Results of applying partial equilibrium model on wheat crop grown in Egypt over the period 2000-2018.

Years	(Values in million pounds)						
	NEL_p	NEL_c	$NET\ effect$	WG_p	WG_c	ΔGR	ΔFE
2000	21.4	-16.1	-5.28	-1047.8	2279.7	-1237.2	409.0
2001	41.0	-32.3	-8.70	-1433.3	3242.4	-1817.8	608.3
2002	3.5	-3.1	-0.38	-426.6	1107.5	-681.3	161.7
2003	9.2	-8.0	-1.22	-727.4	1830.1	-1103.9	283.0
2004	26.7	-24.5	-2.22	-1463.8	3879.9	-2418.4	613.2
2005	23.9	-19.9	-4.03	-1557.9	3753.4	-2199.5	608.8
2006	0.07	-0.06	-0.02	-85.8	196.9	-111.1	28.6
2007	17.3	-26.1	8.80	-1276.0	5587.1	-4302.3	672.6
2008	0.06	-0.05	-0.012	-116.0	272.7	-156.8	39.0
2009	35.5	-28.3	-7.20	-2331.1	5384.6	-3060.7	893.0
2010	30.9	-41.9	10.97	-2113.3	8297.1	-6172.8	1055.1
2011	25.6	-23.4	-2.22	-2356.5	6252.8	-3898.4	925.3
2012	27.9	-18.3	-9.61	-2610.5	4971.5	-2370.6	885.3
2013	0.05	-0.04	-0.010	112.0	-258.8	146.8	-37.0
2014	25.7	-21.4	-4.25	-2679.0	6501.6	-3826.8	997.0
2015	32.0	-26.1	-5.96	-3054.4	7224.1	-4175.7	1132.9
2016	227.8	-215.6	-12.23	-8206.4	22308.2	-14114.1	3766.8
2017	852.8	-1389.2	536.39	-17917.5	82727.7	-64273.8	12804.3
2018	588.7	-951.5	362.79	-14705.8	67715.3	-52646.7	9930.2
Average	105	-150	45	-3368	12278	-8864	1883

Source: Calculated from data in table (1) and (2).

Recommendations

-Provision of subsidies for wheat producers in order to reduce the burden they face as well as the net economic loss at the level of producers on one hand and save the country's hard currency, on the other hand.

-Link price policy to non-price policies and procedures in order to realize successful implementation of the designed price policy.

-Setting a procurement price, close to the international prices of wheat, three months before the wheat planting season, such that the declared price is fair to producers, covers their production costs and offers a reasonable profit margin, and at the same time is a fair price for consumers.

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