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تحليل اقتصادي لأثر السياسة الزراعية على القمح المصرى.

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المستخلص

يتأثر الإنتاج الزراعي ، مثل أي نشاط اقتصادي آخر ، بالأسعار والسياسات الاقتصادية التي تنتهجها الحكومة وتعتبر تلعب سياسة الأسعار الزراعية دورًا مهمًا في توجيه المزارعين نحو إنتاج محصول معين ، وخاصة محصول القمح الذي يعد أهم محصول حبوب في العالم بوجه عام ، و في مصر بوجه خاص.

بالاضافة الى انها تعتبر من أهم السياسات والأدوات الاقتصادية الوطنية التي يمكن للدولة من خلالها تحقيق هدف تحسين مستوى الدخل الزراعي وبالتالي المعايير الاقتصادية والاجتماعية للعاملين في القطاع الزراعي بشكل خاص وقدرتها على توجيه المزارعين نحو إنتاج محصول معين بشكل عام .

هدفت الدراسة إلى قياس أثر اختلالات الأسعار بين الأسعار المحلية والعالمية لمحصول القمح باستخدام مصفوفة تحليل السياسات (PAM) للتعرف على اتجاهات السياسات الزراعية المطبقة في القطاع الزراعي سواء كانت سياسة حمائية أو سياسة فرض ضرائب مباشرة أو ضرائب غير مباشرة على منتجي القمح، وحساب معاملات الحماية الاسمى للمدخلات والمخرجات بالاضافة الى كفاءة استخدام الموارد الاقتصادية.

وكشفت نتائج البحث ان متوسط القيمة المالية لأجور العمال في إنتاج محاصيل القمح بأسعار السوق تفوق القيمة الاقتصادية بأسعار الحدود والتقييم المالي لمتوسط تكاليف مستلزمات إنتاج القمح كانت أقل من نظيرتها المحسوبة بالتقييم الاقتصادي، حيث بلغت القيمة المالية لمستلزمات إنتاج محاصيل القمح 1080 جنيه للفدان كمتوسط للفترة، و هى تقل عن التكلفة الاقتصادية لتلك المستلزمات بحوالى 8,1% حيث بلغت التكلفة الاقتصادية حوالي 1175جنيه للفدان. وبلغت تكلفة الموارد المحلية غير المتبادلة تجاريا تقدر بحوالي 2918جنيه للفدان كمتوسط للفترة وهى تزيد عن التكلفة الاقتصادية والتي بلغت حوالي 2688جنيه للفدان.

وبلغت قيمة معامل الحماية الاسمي للمخرجات القمح 0.86 في المتوسط ، قيمة معامل الحماية الاسمية للمدخلات الإنتاج 0.92 في المتوسط ، كانت قيمة معامل الحماية الفعال 0.85. في حين كانت قيمة الميزة النسبية 0.53.

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An Economic Analysis of the Agricultural Policy Impact on Egyptian Wheat.

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ABSTRACT

Agricultural price policies play an important role in guiding farmers towards producing a specific crop, especially the wheat crop, which is the most important grain crop in the world, particularly in Egypt.
The study's problem is that the wheat producers in Egypt bear the burden of paying implicit taxes due to price distortions resulting from imbalances between domestic and international markets.
The study aimed to examine the effects of government intervention policies at various stages of the flow of goods using a policy analysis matrix (PAM) by calculating price protection indicators for the producer and consumer, as well as the comparative advantage of producing a wheat crop.
The study results showed that the nominal protection coefficient for the output during the study period (2000–2018) was 0.86 on average, which is less than one, implying that there was an absence of a fair production policy during the study period. It also indicated that the value of the nominal protection coefficient for inputs was 0.92 on average, which is less than unity, implying a very low subsidy on inputs used in wheat production during the study period. The domestic resource cost ratio amounted to about 0.53, implying that Egypt enjoyed a comparative advantage in wheat production during the study period. So, it is preferable to produce wheat domestically rather than be dependent on imports.

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Introduction

Wheat crop is considered as one of the main grain crops in Egypt and the most important strategic crop, accounting for almost 10 percent of the total value of agricultural production and about 20 percent of all agricultural imports.
Agricultural production, like any other economic activity, is influenced by prices and economic policies pursued by the government. Simultaneously, as a result of the implementation of economic reform policies, farmers now have the freedom to cultivate their land with whatever crops they want and to make production and marketing decisions based on market supply and demand and price movement without state intervention.

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In addition to subjecting agricultural crops to free trade conditions, given the international economic blocs that affect both production and export and import of various crops, as well as the farmers' desire to grow specific crops, they are also affected by the government's intervention through its agricultural policies by imposing taxes, subsidizing production requirements, or declaring guarantee prices that approach the international prices of those crops.

Problem statement

The research investigates the problems arising from the impact of agricultural price policies on agricultural production, which result in producers bearing the burden of paying indirect or implicit taxes due to price distortions and market failure resulting from imbalances between domestic and international prices.

Such a situation obstructs efforts exerted to achieve optimum economic efficiency in domestic resource use as well as the welfare of producers and consumers. As a result, producers started choosing to cultivate another crop that is not subject to taxes and, at the same time, is profitable.

Research objectives

The study aimed at measuring the impact of price distortions between domestic and global (international) prices for wheat crop during the period 2000-2018, using policy analysis matric (PAM).

Data source and Methodology

To achieve the research objectives, the impact of agricultural price policy will be assessed for wheat crop in Egypt using policy analysis matrix (PAM), set of indicators that can be measured from PAM, which can help to identify trends of the implemented agricultural policies and measure the efficiency of economic resources' use.

The study relied on published and unpublished secondary collected data to achieve its goals from various sources, including: the Ministry of Agriculture and Land Reclamation, the Central Agency for Public Mobilization and Statistics (CAPMAS), Ministry of Planning and Economic Development, Food and Agriculture Organization of the United Nations, the World Bank, in addition to other websites specialized in publishing data statistics. In addition, some related references and research relevant to the study subject.

Theoretical framework

The policy analysis matrix is one of the most important modern techniques used in policy analysis, where it helps to examine the impacts of government's intervention policies through different phases of the flow of goods, which in turn helps measure and assess such policies' efficiency in achieving the hoped objectives and examine their impacts on both producers, consumers as well the macro-level economic conditions. By filling in the elements of the PAM for an agricultural system, an analyst can measure both the extent of transfers occasioned by the set of policies acting on the system and the inherent economic efficiency of the system.

Table 1. General structure of the Policy Analysis Matrix (PAM).

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	Revenue	Costs		Profit
		Tradable inputs	Domestic factors	
Private (Financial) prices	A	B	C	D
Social (Economic) prices	E	F	G	H
Divergences (Policy impact)	I	J	K	L

Source: Eric A. Monke and Scott R. Pearson (1989).

Where,

A= Total revenue in financial prices.

B= Tradable input in financial prices.

C= non-tradable input (Domestic factors) in private prices.

D= Private profits equal A- (B +C).

E= Total revenue in Economic cost.

F= Tradable input in Economic prices.

G= non-tradable input (Domestic factor) in Social social prices.

H= social profits equal E – (F + G).

I= output transfer equal (A – E).

J= input transfers equal (B – F).

K= equal (C – G).

L= Net transfers equal (D – H); also equal I – (J+K).

Pam usually contains revenues and two cost columns, which occur in the form of tradable inputs (production inputs) and the other for domestic factors. Both revenues and costs are evaluated financially (at market prices) and economically (at border prices) to assess the impact of the implemented policy by measuring the following measures.

1. Nominal Protection on Tradable Outputs (NPC_o)

It compares the financial (domestic) prices of outputs to the economic prices of outputs. It represents the kinds of protection (subsides) or taxes that prevent domestic and border prices from being equated. It reflects the level of incentives or non-incentives offered to domestic farmers. It can be calculated as follows:

$$NPC = \frac{A}{E} \qquad (1)$$

- $NPC > 1$ Indicates that the domestic prices are higher than the border prices, implying that producers are receiving an implicit subsidy.

- $NPC < 1$ Indicates that the domestic prices are lower than the border prices, implying that producers incur implicit taxes.

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- $NPC = 1$ Means that there is no intervention in price policy, as well as no protection.

2. Nominal Protection Coefficient on Tradable Inputs ($\mathbf{NPC_I}$)

The nominal protection coefficient on tradable inputs is the ratio between the financial (domestic) and the economic prices of outputs.

$$NPC_I = \frac{B}{F} \qquad (2)$$

- $NPC_I > 1$ This means that the government imposes taxes on inputs.
- $NPC_I = 1$ This means lack of distortions in input.
- $NPC_I < 1$ This means that the government subsidizes production inputs.

3. Effective Protection Coefficient ($\mathbf{EPC}$)

Effective protection coefficient is an extension of the nominal protection coefficient concept. However, it measures price distortions at the level of output and input markets, where it measures the net impact of economic policy on domestic output and input markets. It is the ratio of a product's value added in the financial (domestic) market price to the value added in the economic price.

$$EPC = \frac{A - B}{E - F} \qquad (3)$$

- $EPC > 1$ Indicates effective protection or incentives for producers.
- $EPC < 1$ Indicates negative protection in the form of taxes imposed on producers.
- $EPC = 1$ Indicates the absence of distortions.

4. Domestic Resource Costs (DRC)

It is the ratio of benefits to costs. It is a measure of a commodity system's comparative advantage or efficiency. A commodity system is said to have a comparative advantage when DRC is less than or equal to the equilibrium exchange rate. This can be calculated as follows.

$$DRC = \frac{G}{E - F} \qquad (4)$$

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- $DRC > 1$ Indicates that more than one unit of domestic resources is used to acquire one unit of hard currency, indicating that a country has no comparative advantage in the global market.

- $DRC < 1$ Indicates that using less than one unit of domestic resources yield one unit of hard currency, indicating that the country enjoys a comparative advantage.
- $DRC = 1$ Indicates that there there is a balance (breakeven point) no loses or gains from producing this commodity.

Result and discussion

Input cost analysis using domestic and border prices: Average production cost per feddan assessed in both economic and financial prices using domestic and border prices during the period (2000-2018). Findings reveal the following:

First: Domestic resource cost

1. Labor wages

Table (2) indicates that labor wages hired for wheat crop production at market prices are higher than wages computed at border price. The average value of labor wages at financial prices reached L.E. 837, while at economic prices is reached L.E. 561.

2. Machinery cost

As shown in table (2), the cost of machinery rented for wheat production at market prices is less than that computed at border prices. The average rent of machinery (non-tradable and tradable) in financial prices reached L.E 261 and 319, respectively, while that computed in economic prices reached L.E 287 and 351, respectively.

3. Cost of production inputs:

Table (2) shows that the cost of production input in market prices is less than that computed in border prices. The average cost of production inputs in financial prices, including seeds, fertilizers, insecticides, and general expenses reached L.E. 1080, while that computed in economic prices reached L.E. 1175.

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Table (2): Production cost items assessed in financial and economic prices of wheat crop over the period 2000-2018.

Cost items	Financial price	Economic price
Labor wage	837	561
Draft animal	4	4
Machinery (45%)	261	287
General expenses (50%)	108	108
Rent	1628	1628
Manure	79	79
Total of Domestic (non-tradable) input	**2918**	**2668**
Seeds	203	213
Fertilizers	369	406
Insecticides	80	96
Machinery (55%)	319	351
General expenses (50%)	108	108
Total production cost (Tradable input)	**1080**	**1175**

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

*Economic value has been computed using conversion factors estimated by experts from the World Bank in 2000, as follows: 0.67 for human labor, 1.1 for machinery, 1.05 for seeds, 1.1 for fertilizers and 1.2 for insecticide. Other items remained unchanged. As for draft animal, general expenses, rent and manure.

Second: Financial and economic analysis for wheat net return

The data in table (3) shows the total revenue of the wheat crop assessed in financial terms compared to the economic price calculated at global (border) prices during the period (2000–2018). The results showed that the financial returns were less than the economic return as it amounted to L.E 5889.68.

Table (3): Net return of wheat crop assessed in financial and economic prices in Egypt over the period 2000-2018.

	Financial Analysis	Economic Analysis
Average Price (per feddan)	2167.00	2666.67
Average productivity (ton/feddan)	2.72	2.72
Total Revenue (L.E)	5889.68	7247.74
Net return (L.E)	1891.72	3404.94

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

Third: Impact of Agricultural Price Policy on Wheat Crop.

It is apparent from table (4), which illustrates the results of the policy analysis matrix applied to the wheat crop developed in Egypt during the period (2000–2018), that the average revenue reached L.E. 5244 in financial prices and reached L.E. 6317 in economic prices, resulting in a policy impact of L.E. 1073, indicating that wheat producers incurred implicit taxes estimated at L.E. 1073 on average during the study period.

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Results also reveal that the cost of tradable inputs during the study period (2000–2018), estimated at LE 1080 in financial prices, corresponding to LE 1175 in economic prices, resulting in a positive policy impact of LE 95 in favor of domestic wheat producer, implying that the government subsidizes the cost of tradable inputs as an attempt to encourage wheat producers to increase the areas directed for wheat production.

Furthermore, wheat farmers paid implicit taxes on non-tradable input labor (as a domestic resource) that averaged L.E 250 over the study period. In terms of net revenue (profit), which represents producers' implicit taxes or subsidies earned, table (4) shows that it amounted to L.E 1246 in financial prices and L.E 2474 in economic prices, which confirms that the domestic price of wheat producers is lower than its counterpart at international price, implying that wheat producers incurred implicit taxes amounting to L.E 1228 on average during the study period.

Table (4): Policy analysis matrix for wheat grown in Egypt over the period 2000-2018.

	Total Revenue	Tradable input	Non- tradable input	Profit
Financial Price	5244	1080	2918	1246
Economic Price	6317	1175	2668	2474
Policy impact (Divergences)	-1073	-95	250	-1228

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

Fourth: protection coefficients and comparative advantage for wheat crop

Data in table (5) show the result of nominal protection coefficient for input and output, the effective protection coefficient and the domestic resource cost for wheat crop during the study period (2000-2018).

a. Nominal protection coefficient (NPC_o)

Results in table (5) show that the nominal protection coefficient on tradable output amounted to about 0.86 on average, which is less than one, indicating the absence of a fair production policy during the study period.

In other words, domestic wheat prices are lower than international prices, resulting in wheat producers incurring implicit taxes amounting to 14% on average due to receiving only 86% of the real price they should get for their product. Such a result indicates that the adopted policy was not in favor of domestic wheat producers.

b. Nominal Protection Coefficient on Tradable Inputs (NPC_I)

It is evident from table (5) that the nominal protection coefficient on tradable output amounted to 0.92, which is less than unity, implying a very low subsidy on inputs used in wheat production

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during the study period. In other words, wheat farmers received as little as an 8% subsidy on production inputs. This also implies that the subsidy to wheat farmers is declined, which is consistent with the implemented agricultural policy of gradually removing the subsidies on production inputs until they meet price levels proportionate to their economic cost.

C. Effective Protection Coefficient (EPC)

Results in table (5) show that the effective protection coefficient amounted to 0.85 on average, which is less than one, implying negative protection in the form of taxes imposed on producers.

In other words, there is no balance between the value of the implicit taxes incurred by wheat farmers and the value of subsidy provided by the government for the production input, as the implicit tax rates exceeded the rates of production inputs subsidy, indicating that wheat producers are suffering from negative protection for their production, which explains the reasons for relative stability of the areas allocated for wheat crop production.

D. Domestic Resource Costs (DRC)

As shown in table (5), the domestic resource cost ratio amounted to about 0.53, implying that Egypt enjoyed a comparative advantage in wheat production during the study period 2000-2018. This means that it is preferable to produce wheat domestically rather than be dependent in imports.

Table 5. Price protection coefficients and domestic resource cost ratio for wheat crop for the average period (2000-2018).

Item	Value	Subsidy or tax (%)
Nominal protection coefficient of output(NPC_o)	0.86	14
Nominal protection coefficient of input(NPC_I)	0.92	8
Effective protection coefficient (EPC)	0.85	15
Domestic Resource costs (DRC)	0.53	47

Source: Calculated from table (4).

Recommendation

Based on the previous finding, the study recommends the following:

1. In order to achieve effective implementation of the planned price policy, it is critical to connect the price policy to non-price policies and procedures.
2. Setting a procurement price three months before the planting season, close to international wheat prices, so that the announced price is fair to farmers, covering production costs and providing a fair profit margin, while still being a fair price for customers.
3. Revising government policies and focusing more on increasing wheat planted area in major producing governorates based on production efficiency indicators and taking into account wheat's profitability relative to competing crops.

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4. increasing the wheat crop's comparative advantage by increasing productivity per feddan, using high productivity and improved seeds, and transferring modern agricultural technology to reduce reliance on wheat imports.

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