

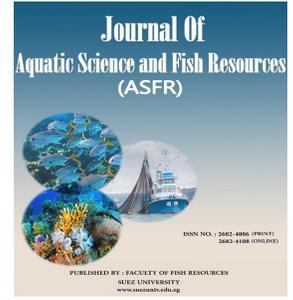


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Impact of Liberalizing The Exchange Rate on Egyptian Agricultural Income

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ABSTRACT

The importance of the agricultural sector is due to its contribution to the gross domestic product, especially in light of the local and international changes; the most important change was the liberalization of the exchange rate. The research aims to study the impact of the exchange rate decision on the net income of the Egyptian agricultural sector from the old and new lands. And by conducting an independent T-test between the two averages of the two periods, where the test value amounted to about -8.639. This indicates that there is a significant difference at the level of 1% between the two averages of the two periods, as it is shown that the average of real net agricultural income increased in the second period as a result of liberalizing the exchange rate compared to the first period at an increased rate representing About 150.6%, it reflects the positive impact of the exchange rate liberalization on the real net agricultural income from the old lands. While the value of the T-test independent between the averages of the two periods was -1.279, which indicates that there is a non-significant difference between the averages of the two periods, this reflects the lack of effect of the exchange rate liberalization on the real net agricultural income in the new lands. Conducting an independent T-test between the averages of the two periods, where the test value reached 3.905, which indicates that there is a significant difference at the level of 1% between the averages of the two periods, as it is shown that the average net income of real animal production decreased in the second period as a result of the liberalization of the exchange rate compared to the first period at a rate of decrease representing About 24.3%, which reflects the negative impact of the exchange rate liberalization on the net income of real animal production in the old lands. Recommend search: - Working to improve the total Egyptian national agricultural net income by paying attention to plant, animal, and fish activities. - Attempting to take actions and procedures that contribute to raising the subsidization provided to the agricultural sector to face local and international changes to correspond with the status of the agricultural sector. Decreasing the net agricultural income, especially plant production in the old lands, this may be due to the encroachment on agricultural lands, and therefore, the encroachment on agricultural lands must be dealt with firmly. Working hard to exploit the new lands to increase both animal and fish production.

Introduction

The agricultural sector represents one of the main sectors affecting the Egyptian economic structure, despite the decline in its role in economic growth in recent years due to what

it suffers from the marginalization, the decline in its allocations, its investment, The agricultural sector is considered one of the main sectors in the national economic structure (Farnham, 2005; Hamada, 2018; Abdel-Hadi and Qadous, 2022).

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as it was shown from agricultural production data issued by the **Central Agency for Public Mobilization and Statistics (2005-2022)**, that the value of plant production was estimated at about 321.8 billion pounds in 2019/2020, in comparison to 286.1 billion pounds in 2018/2019, in an increase of its rate is about 12.4%, representing 54% of the total value of agricultural production. The value of animal production amounted to 210.5 billion pounds in 2019/2020, in comparison to 187.1 billion pounds in 2018/2019, an increase attained about 12.5%, which represents about 35.4% of the total value of the agricultural Production (**Ministry of Agriculture and Land Reclamation, 2005-2022**).

The data indicated that the value of fish production amounted to about EGP 62.9 billion in 2019/2020, in comparison to EGP 61.1 billion in 2018/2019; in an increase amounted about 2.9%, representing 10.6% of the total value of agricultural production (**Ministry of Agriculture and Land Reclamation, 2005-2022**).

Research Problem

The problem of the research is the decrease in the net agricultural income for some of its components from the old lands at one time and the new lands at other times. This is not consistent with the importance of the agricultural sector and its contribution to the gross domestic product, especially in light of the local and international changes, the most important factor was the liberalization of the exchange rate (**Al-Za'balawi and Shoaib, 2021**).

Search objective

The research mainly aims at studying the impact of the exchange rate liberalization decision on the net income from the Egyptian agricultural sector in the old and new lands, by achieving the following sub-objectives:

1- Studying the impact of the exchange rate liberalization decision on the total Egyptian net agricultural income from the old and new lands (**Ahmed et al., 2019**).

2 -Studying the impact of the exchange rate liberalization decision on the total net plant income from the old and new lands (**Mahmoud, 2023**).

3 -Studying the impact of the exchange rate liberalization decision on the total net income of

animal production from the old and new lands (**Shata et al., 2023**).

4- Studying the impact of the exchange rate liberalization decision on the total net income from fish production in the old and new lands. (**Ahmed and Musharraf, 2020**).

Research Method and Data Sources:

To achieve the objective of the research, many qualitative methods were relied upon, such as the arithmetic mean and quantitative methods, the most important of which are: Dummy Variables model to study the impact of the exchange rate liberalization decision on agricultural income, T-test independent.

The research also based on published and unpublished secondary data from many sources and entities concerned with data circulation, such as the Egyptian Ministry of Planning and Economic Development website, Economic Affairs Sector, Agricultural Income Estimates publication, the World Bank, and some previous research studies closely related to the research were used (<https://data.albankaldawli.org> 2005-2022).

Results and Discussion:

1- Impact of the exchange rate liberalization on the real net agricultural income:

A- Impact of the exchange rate liberalization on the real net agricultural income from the old lands:

Data of Table (1) show that the real net agricultural income from the old lands during the first study period (2005-2016) ranged between a minimum limit amounted about 66.325 billion pounds in 2005, and a maximum limit amounted about 195.776 million pounds in 2016, with an average is estimated in about 102.949 million pounds, While the real net agricultural income from the old lands during the second study period (2017-2020) ranged between a minimum limit amounted about 251.931 million pounds in 2018, and a maximum limit amounted about 264.587 million pounds in 2019, with an average estimated in about 257.996 billion pounds. And by conducting an independent T-test between the averages of the two periods, where the test value reached -8.639, this indicates that there is a significant difference at the

level of 1% between the averages of the two periods, as it shows that the average of real net agricultural income increased in the second period as a result of the liberalization of the exchange rate compared to the first period at an increase rate represents About 150.6%, which reflects the positive impact of the exchange rate liberalization on the real net agricultural income in the old lands.

By studying the equation of the time trend of the impact of the liberalization of the exchange rate on the real net agricultural income from the old lands in Table (2), it shows that the liberalization of the exchange rate led to an increase in the average of real net agricultural income in the old lands by a statistically significant increase in about 90.3 billion pounds annually, and the coefficient of determination shows that it is 96% Among the changes in the real net agricultural income in the old lands are due to the changes in the liberalization of the exchange rate and the impact of changes are reflected by the time.

B- Impact of the exchange rate liberalization on the real net agricultural income from the new lands:

Data of Table (1) show that the real net agricultural income in the new lands during the first study period (2005-2016) ranged between a minimum limit amounted about 26.6 billion pounds in 2005, and a maximum limit amounted about 109.291 million pounds in 2015, with an average of about 64.372 million pounds. While the real net agricultural income in the new lands during the second study period (2017-2020) ranged between a minimum limit amounted estimated in about EGP 72.880 million in 2018, The maximum limit amounted about 102.194 million pounds in 2019, with an average is estimated in about 82.738 billion pounds.

By conducting an independent T-test between the averages of the two periods, where the test value was -1.279, this indicates that there is a non-significant difference due to non- variance between the averages of the two periods, which This reflects the lack of impact of the exchange

rate liberalization on the real net agricultural income in the new lands.

By studying the equation of the time trend of the impact of the liberalization of the exchange rate on the real net agricultural income from the new lands in Table (2), it shows that the liberalization of the exchange rate led to an increase in the average real net agricultural income from the new lands by a statistically significant increase is estimated in about 30.95 billion pounds annually, and the coefficient of determination shows that it is 69% Among the changes in the real net agricultural income in the new lands are due to the changes in the liberalization of the exchange rate and the impact of changes are reflected by the time.

Table 1. Development of real net agricultural income from the old and new lands at the level of the Arab Republic of Egypt during the period (2005-2020).

Years	New Lands	Old Lands	Total Land
2005	26.600	66.325	92.925
2006	26.386	75.965	102.351
2007	38.950	77.330	116.280
2008	46.659	90.125	136.784
2009	60.873	77.224	138.097
2010	66.978	83.722	150.700
2011	74.472	105.212	179.684
2012	83.026	107.839	190.865
2013	88.874	114.936	203.810
2014	97.125	126.553	223.677
2015	109.291	114.386	223.677
2016	53.235	195.776	249.011
Average of the first period	64.372	102.949	167.322
2017	74.035	252.759	326.794
2018	72.880	251.931	324.811
2019	81.844	264.587	346.431
2020	102.194	262.706	364.900
Average of the second period	82.738	257.996	340.734
T-test independent	-1.279	-8.639**	-6.430**
Average of the two periods	68.694	139.431	208.125

Source: Collected and calculated from the Ministry of Agriculture and Land Reclamation, Economic Affairs

Sector, Agricultural Income Estimates publications, separated issues and the World Bank.

C- Impact of the exchange rate liberalization on the total real net agricultural income:

Data of Table (1) shows that the total real net agricultural income during the first period (2005-2016) ranged between a minimum limit amount- ed about 92.925 billion pounds in 2005, and a maximum limit in about 249.011 million pounds in 2016, with an average is about 167.322 billion pounds. While the total real net agricultural in- come during the second period (2017-2020) ranged between a minimum limit amounted about 324.811 billion pound in 2018 and a max- imum limit amounted about 364.900 billion pounds in 2019, with an average is estimated in about 340.734 billion pounds.

By conducting an independent T-test between the averages of the two periods, where the test value was -6.430, this indicates that there is a significant difference at the level of 1% between

the averages of the two periods, it shows that the average of real net agricultural income in- creased in the second period as a result of the liberalization of the exchange rate compared to the first period, with an increase rate is estimat- ed in about 103.6%, this reflects the positive im- pact of liberalization of the exchange rate on the total real agricultural net income.

By studying the equation of the time trend of the impact of the exchange rate liberalization on the total real net agricultural income in Table (2), it shows that the liberalization of the exchange rate results in an increase in the average of the total real net agricultural income by a statistically significant increase estimated in about 59.4 bil- lion pounds annually, and the coefficient of de- termination shows that 99% of the changes in total real net agricultural income is due to changes in the liberalization of the exchange rate and the impact of changes are reflected by the time.

Table 2. Time trend equations for the development of real net agricultural income from the old and new lands at the level of the Arab Republic of Egypt in billion pounds during the period (2005-2020).

	Dependent variable	The estimated model	R ²	R ⁻²	F
1	Net agricultural income from the old lands	$\hat{Y}_i = 50.4 + 8.09 X_i + 90.3 D_i$ (4.8)** (5.7)** (6.0)**	0.96	0.95	138.2
2	Net agricultural income from the new lands	$\hat{Y}_i = 24.3 + 6.16 X_i - 30.95 D_i$ (2.6)** (4.9)** (-2.3)*	0.69	0.64	14.2
3	Total net agricultural Income	$\hat{Y}_i = 74.7 + 14.3 X_i + 59.4 D_i$ (20.1)** (28.4)** (11.1)**	0.99	0.99	1614.3

Where: \hat{Y}_i = the estimated value of the dependent variable.

X_i : time variable where $i = (1, 2, 3, \dots, 16)$.

The value in brackets indicates the calculated (T) value, (R²) the coefficient of determination, and (F) the significance of the model as a whole.

(*) indicates significance of the regression coefficient at the significance level 0.05.

(**) indicates the significance of the regression coefficient at the significance level 0.01.

Source: Calculated from the data of Table (1) in the search.

2- Impact of the exchange rate liberalization on the real net income of animal production:

The data of Table (3) shows that the real net income of animal production from the old lands during the first study period (2005-2016) ranged between a minimum limit amounted about 61.485 billion pounds in 2016 and a maximum limit amounted about 90.828 billion pounds in 2008, with an average of about 77.987 billion pounds, while the real net income of animal production from the old lands during the second study period (2017-2020) ranged between a minimum limit amounted about 55.889 billion pounds in 2019, and a maximum limit amounted about 63.164 billion pounds in 2017, with an average of about 59.036 billion pounds. By conducting an independent T-test between the averages of the two periods, where the test value was 3.905, this indicates that there is a significant difference at the level of 1% between the averages of the two periods, it shows that the average of net income for the real animal production decreased in the second period as a result of the exchange rate liberalization compared to the first period, with a decrease rate is estimated in about 24.3%, this reflects the negative impact of the exchange rate liberalization on the net income of real animal production from the old lands.

By studying the equation of the time trend of the impact of the exchange rate liberalization on the net income of real animal production from the old lands in Table (4), it shows that the liberalization of the exchange rate results in a decrease in the average net income of real animal production from the old lands by a statistically insignificant decrease is estimated in about 4.08 billion pounds annually, and the coefficient of determination shows That 76% of the changes occurring in the real net income of animal production from the old lands are due to changes in the liberalization of the exchange rate and the impact of changes are reflected by the time.

B- Impact of the exchange rate liberalization on the real net income of animal production in the new lands:

The data of Table (3) shows that the real net income of animal production from the new lands during the first study period (2005-2016) ranged between a minimum limit amounted about 20.594 billion pounds in 2005 and a maximum limit amounted about 34.058 billion pounds in 2011, with an average of about 28.066 billion pounds, while the real net income of animal production in the new lands during the second study period (2017-2020) ranged between a minimum limit amounted about 27.017 billion pounds in 2018 and a maximum limit amounted about 30.715 billion pounds in 2017, with an average of about 28.655 billion pounds. By conducting an independent T-test between the averages of the two periods, where the test value was -0.242, this indicates that there is a non-significant difference between the averages of the two periods; this reflects the lack of impact of the exchange rate the liberalization on the real net income of animal production from the new lands.

By studying the equation of the time trend for the impact of the exchange rate liberalization on the net income of real animal production from the new lands in Table (4), it shows that the liberalization of the exchange rate led to a decrease in the average net income of real animal production in the new lands by a statistically significant amount of about 6.64 billion pounds annually, and the coefficient of determination shows that 49% of the changes in the real net income of animal production in the new lands are due to changes in the liberalization of the exchange rate and the impact of variables are reflected by the time.

Table 3. The development of the real net income of animal production from the old and new lands at the level of the Arab Republic of Egypt during the period (2005-2020).

Years	New land	Old land	Total lands
2005	20.594	83.111	103.704
2006	21.214	85.205	106.418
2007	22.871	89.144	112.015
2008	24.441	90.828	115.269
2009	30.575	71.757	102.332
2010	28.634	70.700	99.335
2011	34.058	82.752	116.810
2012	34.004	83.289	117.293
2013	30.901	79.159	110.059
2014	30.669	72.310	102.979
2015	30.227	66.099	96.326
2016	28.608	61.485	90.093
Average of the first period	28.066	77.987	106.053
2017	30.715	63.164	93.879
2018	27.017	57.116	84.133
2019	27.864	55.889	83.753
2020	29.026	59.976	89.002
Average of the second period	28.655	59.036	87.692
T-test independent	-0.242	3.905**	4.034**
General average	28.205	73.528	101.733

Source: Collected and calculated from the Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Income Estimates publication, separate issues, and the World Bank.

C- Impact of the exchange rate liberalization on the total real net income of animal production:

The data of Table (3) shows that the total real net income of animal production during the first study period (2005-2016) ranged between a minimum limit amounted about 90.093 billion pounds in 2016 and a maximum limit amounted about 117.293 billion pounds in 2012, with an average of about 106.053 billion pounds, while the total real net income of animal production during the second study period (2017-2020) ranged between a minimum limit amounted about 83.753 billion pounds in 2019, and a maximum limit amounted about 93.879 billion pounds in 2017, with an average is estimated in about 87.692 billion pounds. And by conducting an independent T-test between the averages of the two periods, where the test value 4.034, this indicates that there is a significant difference at the level of 1% between the averages of the two periods, as it shows that average of the real net income for animal production decreased in the second period as a result of the exchange rate liberalization compared to the first period at a decrease rate is estimated in about 20.9%, this reflects the negative impact of the exchange rate liberalization on the total real net income of animal production.

By studying the time trend of the impact of the exchange rate liberalization on the total real net income of animal production in Table (4), it shows that the liberalization of the exchange rate results in a decrease in the average of the total real net income of animal production by a statistically insignificant decrease is estimated in about 0.95 billion pounds annually, and the coefficient of determination shows that 61 % of changes in the total real net income of animal production are due to changes in the liberalization of the exchange rate and the impact of variables are reflected by the time.

Table 4. Equations of the time trend for the real net income development of animal production from the old and new lands at the level of the Arab Republic of Egypt during the period (2005-2020).

S	Dependent variable	The estimated model	R ²	R ⁻²	F
1	Net plant income from old lands (billion pounds)	$\hat{Y}_i = 90.1 - 1.86 X_i - 4.08 D$ (24.4)** (-3.7)** (-0.77)	0.76	0.73	21.6
2	Net plant income from new lands (billion pounds)	$\hat{Y}_i = 22.19 + 0.90 X_i - 6.64 D_i$ (11.7)** (3.5)** (-2.4)*	0.49	0.41	6.2
3	Total net plant income (billion pounds)	$\hat{Y}_i = 112.3 - 10.73 X_i - 0.95 D_i$ (24.6)** (-1.5) (1.6)	0.61	0.55	10.1

Where: \hat{Y}_i = the estimated value of the dependent variable.

X_i : time variable where $i = (1, 2, 3, \dots, 16)$.

The value in brackets indicates the calculated (T) value, (R²) the coefficient of determination, and (F) the significance of the model as a whole.

(*) indicates significance of the regression coefficient at the significance level 0.05.

(**) indicates the significance of the regression coefficient at the significance level 0.01.

Source: Calculated from the data of Table (3) in the search.

3- Impact of the exchange rate liberalization on the real net income of animal production:

A- The impact of the exchange rate liberalization on the real net income of animal production from the old lands:

The data of Table (5) shows that the real net income of animal production from the old lands during the first study period (2005-2016) ranged between a minimum limit amounted about 30.012 billion pounds in 2012, and a maximum limit amounted about 44.681 billion pounds in 2005, with an average is estimated in about 37.364 billion pound, while the real net income of animal production from the old lands during the second study period (2017-2020) ranged between a minimum limit amounted about 15.273 billion pound in 2020 and a maximum limit amounted about 28.974 billion pounds in 2017, with an average of about 20.673 billion pounds. And by conducting an independent T-test between the averages of the two periods, where the test value amounted 5.192, this indicates that there is a significant difference at the level of 1% between the averages of the two periods, as it shows that the average net income of

real animal production decreased in the second period as a result of the exchange rate liberalization compared to the first period at a rate of decrease estimated in about 44.67%, it reflects the negative impact of the exchange rate liberalization on the real net income of animal production in the old lands.

By studying the equation of the time trend for the impact of the exchange rate liberalization on the real net income of animal production for the old lands in Table (6), it shows that the liberalization of the exchange rate results in a decrease in the average of the real net income of animal production in the old lands by a statistically insignificant decrease is estimated in about 5.91 billion pounds annually, and the coefficient of determination shows that 87% of the changes occurring in the real net income of animal production from the old lands are due to changes in the liberalization of the exchange rate and the impact of changes are reflected by the time.

B- Impact of the exchange rate liberalization on the real net income of animal production in the new lands:

The data of Table (5) shows that the real net income of animal production from the new lands during the first study period (2005-2016) ranged between a minimum limit amounted about 0.184 billion pounds in 2005, and a maximum limit amounted about 1.371 billion pounds in 2014, with an average is estimated amounted about 0.741 billion pounds, while the real net income of animal production in the new lands during the second study period (2017-2020) ranged between a minimum limit is estimated in about 0.143 billion pound in 2018 and a maximum limit is estimated in about 4.369 billion pounds in 2020, with an average of about 1.361 billion pounds. By conducting an independent T-test between the two averages of the two periods, where the test value was -1.099, this indicates that there is a non-significant difference due to non- variance between the averages of the two periods, this reflects the lack of impact of the exchange rate liberalization on the real net income of animal production in the new lands.

By studying the equation of the time trend for the impact of the exchange rate liberalization on the real net income of animal production in the new lands in Table (6), it shows that the liberalization of the exchange rate results in an increase in the average of the real net income for animal production from the new lands by a statistically insignificant increase is estimated in about 0.86 billion pounds annually, and the coefficient of determination shows 13% of the changes in the real net income of animal production from the new lands are due to changes in the liberalization of the exchange rate and the changes are reflected by the time.

Table 5. The development of real net income of animal production in the old and new lands at the level of the Arab Republic of Egypt during the period (2005-2020).

Years	New land	Old land	Total land
2005	0.184	44.681	44.865
2006	0.877	43.654	44.531
2007	0.900	43.582	44.482
2008	0.495	41.946	42.441
2009	0.468	38.998	39.466
2010	0.590	37.638	38.228
2011	0.844	31.525	32.369
2012	0.964	30.012	30.975
2013	0.657	33.399	34.057
2014	1.371	38.898	40.269
2015	0.823	31.991	32.814
2016	0.714	32.046	32.760
Average of the first period	0.741	37.364	38.105
2017	0.824	28.974	29.799
2018	0.143	21.759	21.902
2019	0.108	16.685	16.792
2020	4.369	15.273	19.642
Average of the second period	1.361	20.673	22.034
T-test independent	-1.099	5.192**	5.187**
General average	0.887	33.437	34.323

Source: Collected and calculated from the Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Income Estimates publication, separate issues, and the World Bank.

C- Impact of the exchange rate liberalization on the total real net income of animal production:

The data of Table (5) shows that the total real net income of animal production during the first study period (2005-2016) ranged between a minimum limit amounted about 30.975 billion pounds in 2012, and a maximum limit amounted about 44.865 billion pounds in 2005, with an average of about 38.105 billion pounds. While the total real net income of animal production during the second study period (2017-2020) ranged between a minimum limit amounted about 16.792 billion pounds in 2019, and a maximum limit amounted about 29.799 billion pounds in 2017, with an average of about 22.034 billion pounds. And by conducting an independent T-test between the two averages of the two periods, where the test value amounted 5.187, this indicates that there is a significant difference at the level of 1% between the averages of the two periods, as it shows that the average of real net

income for animal production decreased in the second period as a result of the exchange rate liberalization compared to the first period at a rate of decrease is estimated in about 42.18%, which reflects the negative impact of the exchange rate liberalization on the total real net income of animal production.

And by studying the equation of the time trend of the impact of the exchange rate liberalization on the total real net income of animal production in Table (6), it shows that the liberalization of the exchange rate results in a decrease in the average of the total real net income of animal production by a statistically significant decrease is estimated in about 5.88 billion pounds annually, and the coefficient of determination shows that it is 86% among the changes that occurred in the total real net income of animal production are due to changes in the liberalization of the exchange rate and the variables are reflected by the time.

Table 6. Time trend equations for the development of real net income of animal production from the old and new lands at the level of the Arab Republic of Egypt during the period (2005-2020).

S	Dependent variable	The estimated model	R ²	R ⁻²	F
1	Net animal income from old lands (billion pounds)	$\hat{Y}_i = 46.1 - 1.35 X_i - 5.91 D_i$ (21.3)** (-4.6)** (- 1.9)*	0.87	0.84	43.4
2	Net animal income from new lands (billion pounds)	$\hat{Y}_i = 0.6 + 0.08 X_i + 0.86 D_i$ (0.4)* (0.91)* (0.04)*	0.13	0.001	1.01
3	Total net animal income (billion pounds)	$\hat{Y}_i = 46.4 - 1.27 X_i - 5.88 D_i$ (21.6)** (-4.4)** (1.9)*	0.86	0.84	40.4

Where: \hat{Y}_i = the estimated value of the dependent variable.

X_i : time variable where $i = (1, 2, 3, \dots, 16)$.

The value in brackets indicates the calculated (T) value, (R²) the coefficient of determination, and (F) the significance of the model as a whole.

(*) indicates significance of the regression coefficient at the significance level 0.05.

(**) indicates the significance of the regression coefficient at the significance level 0.01.

Source: Calculated from the data of Table (5) in the search.

4- Impact of the exchange rate liberalization on the real net income of fish production:

The data of Table (7) shows that the real net income of fish production in the old lands during the first study period (2005-2016) ranged between a minimum limit amounted about 6.691 billion pounds in 2005, and a maximum limit amounted about 28.878 billion pounds in 2016, with an average in about 14.354 billion pounds, while the real net income of fish production in the old lands during the second study period (2017-2020) ranged between a minimum amounted about 34.602 billion pounds in 2020, and a maximum limit amounted about 55.161 billion pounds in 2019, with an average amount- ed in about 43.250 billion pounds. And by con- ducting an independent T-test between the two averages of the two periods, where the test value amounted -7.220, this indicates that there is a significant difference at the level of 1% be- tween the two averages of the two periods, as it shows that average of the real net income of fish production increased in the second period as a result of the exchange rate liberalization com- pared to the first period at a rate of increase rep- resents about 201.3%, it reflects the positive im- pact of the exchange rate liberalization on the real net income of fish production in the old lands.

By studying the equation of the time trend for the impact of the exchange rate liberalization on the real net income of fish production in the old lands in Table (8), it shows that the liberalization of the exchange rate results in an increase in average of the real net income of fish production from the old lands by a statistically significant increase is estimated in about 16.08 billion pounds annually, and the coefficient of determi- nation shows that 91% of the changes in the real net income of fish production in the old lands are due to changes in the liberalization of the ex- change rate and the variables are reflected by the time.

B- Impact of the exchange rate liberalization on the net income of real fish production in the new lands:

The data of Table (7) show that the real net in- come of fish production in the new lands during the first study period (2005-2016) ranged be- tween a minimum limit amounted about 0.398 billion pounds in 2008, and a maximum limit amounted about 1.106 billion pounds in 2015, with an average is estimated in about 0.624 bil- lion pounds, while the real net income of fish production in the new lands during the second study period (2017-2020) ranged between a minimum limit amounted about 0.965 billion pounds in 2020, and a maximum limit amounted about 1.149 billion pounds in 2017, with an av- erage amounted about 1.079 billion pounds. By conducting an independent T-test between the two averages of the two periods, where the test value reached -3.431, this indicates that there is a significant difference between the two averag- es of the two periods, as it shows that average the real net income of fish production in new lands increased in the second period as a result of the exchange rate liberalization over the first period, with an increase rate is estimated in about 72.9%, this reflects the positive impact of the exchange rate liberalization on the real net income of fish production in the new lands.

And by studying the equation of the time trend for the impact of the exchange rate liberalization on the real net income of fish production from the new lands in Table (8), it shows that the ex- change rate liberalization results in an increase in the average of the real net income for fish production from the new lands by a statistically insignificant increase amounted about 0.0002 billion pounds annually, and the coefficient of determination shows That 81% of the changes in the net income of real fish production in the new lands are due to changes in the liberaliza- tion of the exchange rate and variables are re- flected by the time

Table 7. The evolution of net real fish production income in the old and new lands at the level of the Arab Republic of Egypt during the period (2005-2020).

Years	New land	Old land	Total land
2005	0.425	6.691	7.115
2006	0.436	8.066	8.502
2007	0.490	9.425	9.914
2008	0.398	9.429	9.827
2009	0.280	10.375	10.655
2010	0.443	12.694	13.136
2011	0.620	14.716	15.335
2012	0.812	15.256	16.068
2013	0.679	17.140	17.819
2014	0.886	19.481	20.367
2015	1.106	20.100	21.206
2016	0.912	28.878	29.790
Average of the first period	0.624	14.354	14.978
2017	1.149	39.832	40.981
2018	1.076	43.405	44.481
2019	1.124	55.161	56.285
2020	0.965	34.602	35.567
Average of the second period	1.079	43.250	44.329
T-test independent	-3.431**	-7.220**	-7.161**
General average	0.731	21.153	21.884

Source: Collected and calculated from the Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Income Estimates publication, separate issues, and the World Bank.

C- The impact of the exchange rate liberalization on the total real net income of fish production:

Data of Table (7) shows that the total real net income of fish production during the first study period (2005-2016) ranged between a minimum limit amounted about 7.115 billion pounds in 2005, and a maximum limit amounted about 29.790 billion pounds in 2016, with an average is estimated in about 14.978 billion pounds. While the total real net income of fish production during the second study period (2017-2020) ranged between a minimum limit amounted about 35.567 billion pounds in 2020, and a maximum limit amounted about 56.285 billion pounds in 2019, with an average is estimated in about 44.329 billion pounds. And by conducting an independent T-test between the two averages of the two periods, where the test value amounted -7.161, this indicates that there is a significant difference at the level of 1% between the averages of the two periods, as it shows that average of the real net income of fish production increased in the second period as a result of the liberalization of the exchange rate compared to the first period at a rate of increase represents about 195.96%, it reflects the positive impact of the exchange rate liberalization on the total real net income of fish production.

And by studying the equation of the time trend for the impact of the exchange rate liberalization on the total real net income of fish production in Table (8), it shows that the liberalization of the exchange rate results in an increase in the average of the total real net income of fish production by a statistically significant increase is estimated in e about 16.08 billion pounds annually, and the coefficient of determination shows that it is 91% Among the changes occurring in the total real net income of fish production are due to changes in the liberalization of the exchange rate and changes are reflected by the time.

Table 8. Equations of the time trend of the evolution of net real fish production income in the old and new lands at the level of the Arab Republic of Egypt during the period (2005-2020).

s	Dependent variable	The estimated model	R ²	R ⁻²	F
1	The real net fish income from old lands (billion pounds)	$\hat{Y}_i = 3.9 + 1.6 X_i + 16.08 D_i$ (1.4) ⁻ (4.1) ^{**} (3.9) ^{**}	0.91	0.89	63.96
2	The real net finish income from new lands (billion pounds)	$\hat{Y}_i = 0.25 + 0.06 X_i - 0.0002 D_i$ (2.96) ^{**} (4.9) ^{**} (0.002) ⁻	0.81	0.78	27.6
3	Total net fish income (billion pounds)	$\hat{Y}_i = 4.2 + 1.66 X_i + 16.08 D_i$ (1.4) ^{**} (4.2) ^{**} (3.8) ^{**}	0.91	0.90	65.1

Where: \hat{Y}_i = the estimated value of the dependent variable.

X_i : time variable where $i = (1, 2, 3, \dots, 16)$.

The value in brackets indicates the calculated (T) value, (R2) the coefficient of determination, and (F) the significance of the model as a whole.

(*) indicates significance of the regression coefficient at the significance level 0.05.

(**) indicates the significance of the regression coefficient at the significance level 0.01.

Source: Calculated from the data of Table (7) in the search.

RECOMMENDATIONS

- 1- Working to improve the total Egyptian national agricultural net income by paying attention to plant, animal and fish activities.
- 2- Attempting to take actions and procedures that contribute to raising the subsidization provided to the agricultural sector to face local and international changes to correspond with the status of the agricultural sector.
- 3- Decreasing the net agricultural income, especially plant production in the old lands, this may be due to the encroachment on agricultural lands, and therefore the encroachment on agricultural lands must be dealt with firmly.
- 4- Working hard to exploit the new lands to increase both animal and fish production.

REFERENCES

Abdel-Hadi, W. A. A, and Qadous, I. F. A. (2022). The most suitable crop structure and its contribution to reducing the food gap and achieving food security in Egypt using the method of programming goals. Alexandria Journal for Scientific Exchange, 43(2), 653-673. doi: 10.21608/asejaiqsae.2022.231820

Ahmed, H. H.; Diab, Y. A. H.; EL-Sogheir, G. A. and Mohamed, A. I. (2019). Economic vision of the components of agricultural income in Egypt. Assiut Journal of Agricultural Sciences, 50(3), 259-270.

Ahmed, M. A. and Musharraf, H. A. (2020). The Impact of the Liberalization of the Exchange Rate on Egyptian Agricultural Foreign Trade. Zagazig Journal of Agricultural Research, 47(1), 323-336. doi: 10.21608/zjar.2020.70263

Al-Za’balawi, M. E. and Shoaib, N. M. S. (2021). The Impact of Government Spending on Growth in the Agricultural Sector. The Egyptian Journal of Agricultural Economics, 31(1), 209-222.

Farnham, P. G. (2005). Economics for managers. Pearson Prentice Hall. Upper saddle River. NJ, PP. 70-100.

Hamada, H. A. (2018). Study of Economic Variables Affecting the Components of Egyptian Agricultural Income. Master Thesis, Department of Agricultural Economics, Faculty of Agriculture, Assiut University, Assiut, Egypt.

[https://data.albankaldawli.org \(2005-2022\).](https://data.albankaldawli.org (2005-2022).)

Mahmoud, M. (2023). The Effect of Changes in The Exchange Rate on The Most Important Import Crops in Egypt. Journal of the Advances in Agricultural Researches, 28(1), 177-192. doi: 10.21608/jalexu.2023.195279.1120

Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, (2005-2022). Central Administration of Agricultural Economy, publication of Agricultural Economics, separate issues.

Shata, M. A. M.; Nassar, W. A. A.; Saleh, M. A. A. and El-Sayed, N. M. S. (2023). The impact of the exchange rate liberalization on investment in the Egyptian agricultural sector. Journal of Agricultural Economics and Social Sciences, 14(3), 135-138. doi: 10.21608/jaess.2023.199519.1170

The Central Agency for Public Mobilization and Statistics (2005-2022), Foreign Trade publication, separated issues.