

## Impact of Rice Export Restrictions Policy on Stakeholders in Egypt

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**Abstract:** The paper aims at verification if the policy attained its objectives or not and answer a question about could the policy achieve adverse effect? Examine impact of rice export restriction policy on producer, consumer and society welfare. For evaluating these objectives, the paper employed Dummy Variable, the Difference between Two Means methods, and Nominal Protection Rate (NPR). Welfare distributions were estimated using the classical welfare analysis by implementation of Partial Equilibrium Model (PEM). The paper resulted in, the rice export restrictions policy did not attained its objective in introducing rice to consumers in a reasonable price, but attained adverse effect, caused in doubled rice price in the market, which indicates a status of the state failure. If the loss of producer surplus is less than the gain in consumer surplus, then the government has been successful in raising national welfare. But what happened in this stance adverse. Producer surplus increased, and consumer achieved more of loss. This indicates implementation of this policy without any marketing controls led to appearance of hidden marketing loops, represented in rice monopoly traders and rice smugglers through borders. So when implementing new policy government must takes in its account the external factors, which could be affect policy implementation negatively. Like, to what extend society have awareness of public policy and its role in policy success. And the degree of corruption also could be the reason of occurring policy adverse.

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**Keywords:** rice, export restrictions, policy effect, welfare, PEM.

### 1. Introduction:

Rice is the principal source of calorie intake for about half the world's population, especially the poor; it makes up one in five calories consumed worldwide (Ogheneruemu, 2013). Rice considered as one of the main export and cash crops in Egypt. From the beginning of 2008, the Egyptian government represented in the ministry of trade and industry adopted a new export restriction policy for rice crop. These restrictions ranged between imposing taxes on exporting rice and outright ban. The justification of doing these restrictions was providing local consumption requirements in reasonable prices, on the other hand reducing rice area planted which exceeds local market needs, and for rationalize water consumption. These new policy implemented in form of a series of ministerial decisions were characterized by fluctuation and instability. Sometimes an export tax is imposed and sometimes it is totally banned and then the export door is allowed to be opened again, that happened in 2015 for instance (Attala, 2016).

Since then, the rice market in Egypt witnessed the emergence of many crises in the rice commodity, and the sharp rise in prices despite the banning and imposition of export taxes. So this paper aims at examine impact of rice export restriction policy on producer, consumer and society welfare, verification if the policy attained its objectives or not and answer a

question about could the policy achieve adverse effect or not.

### 2. Methodology:

For evaluating the objectives mentioned above. The research divided the study period (2000-2015) into two periods. The first period represents the time before imposing rice export restriction policy, and the second period represents the time after imposing rice export restriction policy. The paper used Dummy Variable, and the Difference between Two Means methods, for measuring the extent of change in economic variables like (planted area, production and prices of rice crop), which resulted from the interference of government in price and trade policy. Some economic indicators have been applied to analyze rice price policy, including Nominal Protection Rate (NPR), and Nominal Protection Coefficient (NPC). The formula for NPR as follows (Rafeek, 2000):

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

$$\text{Where, } NPC = \frac{p_b}{p_d}$$

Pd = Domestic Price

Pb = Border Price

Welfare distributions were estimated using the classical welfare analysis, which is used to measure the cost of trade policy interventions and impact of trade restrictions, by application of the "Partial

Equilibrium Model", the model consists of the following set of indicators (Tsakok, 1990):

### 1- Net economic loss in production

What does the economy gain/lose in terms of efficient production if output expands or contracts as a result of a price change on a given commodity, and if interaction with related markets are not considered?

$$NEL_p = 0.5es \left( \frac{1 - NPC}{NPC} \right)^2 V'$$

### 2- Net economic loss in consumption

What does the economy gain/lose in terms of efficient consumption if output expands or contracts as a result of a price change on a given commodity, and if interaction with related markets are not considered?

$$NEL_c = 0.5ed \left( \frac{1 - NPC}{NPC} \right)^2 W'$$

### 3- Change in producer surplus

The producer surplus is a measure of the society welfare, where the producer is in a better position as a result of increased revenue from costs due to the higher local price of the commodity. The concept of producer surplus relates to the study of the supply where there are many prices of the commodity, In the case of a balance in the commodity market, the producer is willing to sell at prices below the equilibrium price, and therefore there is surplus to the producer as a result of the sale of large quantities at high prices.

$$WGP = - \left[ \left( \frac{1 - NPC}{NPC} \cdot V' \right) \right] + NEL_p$$

### 4- Change in consumer surplus

Changing in consumer surplus is a scale of consumer welfare. Imposition of tariff duties on imports/exports makes domestic commodity price increase / decrease, which works to increase/decrease of income spent on this item. The concept of consumer surplus related to demand study. Where there are many prices for the commodity make consumers willing to pay for various quantities. In the event of a balance in the commodity market the consumer is ready to buy the commodity at a higher price than the equilibrium price. Consumer surplus achieved from the difference between what needs to be paid by the consumer and what is actually paid at the equilibrium price, so the consumer achieves loss as a result of consumption small quantities at high prices.

$$WGC = \left( \frac{1 - NPC}{NPC} \cdot W' \right) - NEL_c$$

### 5- Change in government revenue

Does the price change increase or decrease government revenue if the cross effects with other taxes or subsidies in the system are ignored?

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

### 6- Change in foreign exchange

Does the price change increase or decrease availability of foreign exchange to the economy if cross-effects with other sources of inflow outflow for foreign exchange are ignored?

$$\Delta FE = - \left( \frac{1 - NPC}{NPC^2} \right) (es V' - ed W')$$

### 7- Net effect

Is the net effect of imposing a tariff on imports/exports, which is the total net economic loss of producer, and net economic loss of consumer? The effects of taxation on exports can be measured on efficiency, welfare and government revenue.

$$Net\ Effect = -(NEL_p + NEL_c)$$

Where:

$V'$  = value of production at domestic prices.

$W'$  = value of consumption at domestic prices.

$es$  = elasticity of domestic supply.  $ed$  = elasticity of domestic demand.

**Data source:** The research relied on secondary data available from various sources in Egyptian government agencies and institutions. Including data from the Ministry of Agriculture and land Reclamation, Central Agency for Mobilization and Statistics, Ministry of Supply, Ministry of Foreign Trade and Industry, theses, scientific books, periodicals, published papers, and published and unpublished studies.

## 3. Results

### Impact of implication rice export restriction policy on production indicators: the planted area, productivity, and total production:

Planted area of rice decreased from 1555 thousands feddan (Feddan = 4200 m<sup>2</sup>) as average of the first period (before imposing rice export restriction policy in 2000-2008), to 1334.7 thousands feddan as average of the second period (after imposing rice export restriction policy in 2009-2015), this restriction policy affected planted area of rice by decreasing trend reached about 36.36 thousands feddan annually. While before imposing rice export restriction policy planted area increased by 32.07 thousands feddan annually, which means rice planted area decreased by about 14.17% as a result of imposing export restriction policy. Total production of rice decreased also in the second period by 15.38%, where the productivity remained close to 4.0 ton /feddan, with insignificant change rate through the period (2000-2015).

### The impact of rice export restriction policy on the farm gate price, wholesale and retail prices:

The farm gate price increased from about 933 pounds/ton as the average of the first period, to about 1912 pounds/ton as the average of the second period,

increasing rate reached about 105% between the two periods. The wholesale price increased from about 1661 pounds/ton as the average of the first period, to about 2323 pounds/ton as the average of the second period, increasing rate reached about 40% between the two periods. At the same time, the retail price reached about 1789 pounds/ton as the average of the first

period, increased to 4136 pounds/ton as the average of the second period, increasing rate of the retail price reached about 131% between the two periods. This indicates retail price increased in an excessive manner and unjustified, as the consumer price increasing rate volatile more than three times of wholesale price increasing rate.

**Table 1: production indicators of rice crop in (2000 – 2015)**

years	Planted area (thousands feddan)	Productivity (tons/feddan)	Total production (thousands tons)
2000	1568.9	3.83	6001
2001	1340.3	3.90	5227
2002	1547.4	3.95	6104
2003	1507.6	4.10	6174
2004	1536.6	4.13	6351
2005	1459.0	4.20	6124
2006	1592.8	4.23	6744
2007	1672.7	4.11	6868
2008	1769.8	4.09	7240
<b>Average</b>	<b>1555.0</b>	<b>4.1</b>	<b>6315</b>
2009	1369.2	4.03	5518
2010	1093.3	3.96	4327
2011	1409.2	4.02	5665
2012	1472.1	4.01	5897
2013	1419.4	4.03	5717
2014	1363.8	4.00	5461
2015	1215.8	3.96	4818
<b>Average</b>	<b>1334.7</b>	<b>4.00</b>	<b>5343.2</b>

Source: ministry of agriculture and land reclamation, central administration of agricultural economics, Agricultural economics Bulletin, Various issues.

**Table 2: the farm gate price, wholesale and retail prices and consumers pound distribution of rice crop in (2000 – 2015)**

years	Farm gate price (pounds/ton)	Wholesale price (pounds/ton)	Retail price (pounds/ton)	Producers share (%)	Wholesale traders share (%)	Retail traders share (%)
2000	583	1277	1380	42.2	50.3	7.5
2001	592	1378	1410	42.0	55.7	2.3
2002	672	1469	1505	44.7	53.0	2.4
2003	992	1538	1745	56.8	31.3	11.9
2004	1024	1861	2160	47.4	38.8	13.8
2005	1069	1751	1935	55.2	35.2	9.5
2006	1077	1876	1930	55.8	41.4	2.8
2007	1451	2140	2250	64.5	30.6	4.9
<b>Average</b>	<b>933</b>	<b>1661</b>	<b>1789</b>	<b>51</b>	<b>42</b>	<b>7</b>
2008	1465	2990	3105	47.2	49.1	3.7
2009	1495	1595	3225	46.4	3.1	50.5
2010	1837	2083	3060	60.0	8.0	31.9
2011	2008	2180	4380	45.8	3.9	50.2
2012	2067	2450	4090	50.5	9.4	40.1
2013	2110	2350	4895	43.1	4.9	52.0
2014	2130	2437	4985	42.7	6.2	51.1
2015	2180	2500	5345	40.8	6.0	53.2
<b>Average</b>	<b>1912</b>	<b>2323</b>	<b>4136</b>	<b>47</b>	<b>11</b>	<b>42</b>

Source:

- Ministry of agriculture and land reclamation, central administration of agricultural economics, Agricultural economics Bulletin, Various issues.
- Central Agency for Public Mobilization and Statistics, Quarterly Bulletin of Wholesale Prices, Various issues.
- Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Food Price Intermediate (consumer), various issues.

Especially, when analyze shares of market brokers of consumer pound; found that the share of producer, wholesale trader, retail trader is 51%, 42%, 7% respectively as an average of the first period. But, at the second period, also found the share of the wholesale trader decreased sharply from 42% in the first period to 11% in the second period. The share of the retail trader increased sharply also from 7% to 42%, without any reasonable reason or any structural changes, except imposing export restrictions policy on rice. This indicates implementation of this policy without any marketing controls led to appearance of hidden marketing loops, represented in rice monopoly traders and rice smugglers through borders.

Hidden marketing loops appeared clearly, when look at the situation of the consumer's rice prices and its change percentage throughout January to December

in 2015 and 2016, and to what extends the consumer price volatile. Especially, when we know that, the government issued decision in august 2015, for panning export of all varieties of rice. Then opened the rice export gate with imposing export tariffs in October 2015, and in April 2016 closed the rice export gate, except break of rice, meanwhile in august 2016 the minister of trade decided halt all varieties of rice and break of rice (Attala, 2016).

In spite of all panning rice export decision made by the government in the second period, the rice retail prices increased in an unprecedented manner. Which resulted in the rice export restrictions policy did not attained its objective in introducing rice to consumers in a reasonable price but attained adverse effect caused in doubled rice price in the market, which indicates a status of the state failure.

**Table 3: Consumer's price per kilogram and its change rate through year months of rice, in (2015, 2016).**

Month	2015	2016	Change rate
January	5.26	5.76	9.5
February	5.26	6.26	19.0
March	5.51	6.52	18.3
April	5.51	6.80	23.4
May	5.51	6.80	23.4
July	5.51	6.80	23.4
June	5.51	7.30	32.5
August	5.51	6.80	23.4
September	5.51	5.80	5.3
October	5.51	5.30	-3.8
November	5.51	5.8	5.3
December	5.51	6.05	9.8

**Source:** Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Food Price Intermediate (consumer), various issues.

#### **The Nominal Protection Coefficient of rice:**

Price distortion could be defined as the difference between international price, which represented in the equivalent farm price and the local farm price. Price distortion could be expressed by nominal protection coefficient (NPC), which represents a measurement for all kinds of protections and taxes, which barriers equality between the farm price and the equivalent price, and also reflect the level of Incentives or taxes, which receive or afford by local farmers. Table (4) shows, the average of (NPC) for rice in the first period (2000-2007) was 0.64, which indicates the existence of unfair production policy for rice crop. That also means rice farmers get 64% only of their production in international price, which mean the farmers bears implicit taxes (Nominal Protection Rate for outputs) estimated at 36% of the value of rice produced. In the second period (2008-2015) NPC was decreased to 0.55, which increased implicit taxes burdens on rice farmers to 45%.

Partial Equilibrium Model introduces important results about the impact of government interference in price policy of rice crop, Distributional Impact, and Welfare Effects. Table (5) shows that: rice producers made gains reached about 29.56 billion pounds as average of the first period. In spite of adaptation restriction policy and the decreasing NPC to 0.55 in the second period, producer's gains increased to 157.08 billion pounds as average of this period. At the same time, loss achieved at the level of consumer approximated 213.1 billion pounds as average of the first period. In the second period consumer's loss increased to 1680.1 billion pounds. While, rice restriction policy aimed at decrease rice price in favor of consumers, which declare the failure in policy implementation.

Producer's surplus increased from 3255.8 billion pounds as average of the first period to 9174.4 billion pounds as average of the second period. The change in consumers surplus shows consumers loss increased

from 4784 billion pounds as average of the first period to 19154.9 billion pounds as average of the second period. Meanwhile, government returns increased from about 1711.5 billion pounds to about 11503.5 billion pounds as average of the second period. And that due to the existence of implicit taxes on producers

and consumers in the first period, and export taxes in the second period. Foreign exchange achieved loss in the first period approximated at 1283 billion pounds, this loss increased to 6871.2 billion pounds as average of the second period.

**Table 4: the farm gate price, Farm gate equivalent price, NPC and NPR of rice crop in (2000 – 2015)**

Years	Farm gate price (pounds/ton)	Farm gate equivalent price (pounds/ton)	NPC	NPR
2000	583	1029	0.57	-0.43
2001	592	826	0.72	-0.28
2002	672	1027	0.65	-0.35
2003	992	1579	0.63	-0.37
2004	1024	1760	0.58	-0.42
2005	1069	1673	0.64	-0.36
2006	1077	1822	0.59	-0.41
2007	1451	1916	0.76	-0.24
Average	933	1454	0.64	-0.35
2008	1465	2799	0.52	-0.48
2009	1495	4200	0.36	-0.64
2010	1837	3733	0.49	-0.51
2011	2008	2469	0.81	-0.19
2012	2067	4271	0.48	-0.52
2013	2110	4215	0.5	-0.5
2014	2130	2676	0.8	-0.2
2015	2180	4469	0.48	-0.52
Average	1912	3604	0.55	-0.44

**Source:**

- (1) Ministry of agriculture and land reclamation, central administration of agricultural economics, Agricultural economics Bulletin, Various issues.
- (2) Ministry of Finance, Customs Department, Information Center.

Otherwise, nation gained 183.53 billion pounds as average of the first period, this gain decreased to approximated 1523.01 billion pounds as average of the second period. If the loss of producer surplus is less than the gain in consumer surplus, then the government has been successful in raising national welfare (Suranovic, 2007). But what happened in this stance adverse. Producer surplus increased, and consumer achieved more of loss. So when implementing new policy government must takes in its account the external factors, which could be affect policy implementation negatively. Like, to what extend society have awareness of public policy and its role in policy success. And the degree of corruption also could be the reason of occurring policy adverse. Policy is not only decisions taken by governments, but must combined with all social circumstances. Governments must but supplementary social policy. Which deal with these external factors to prevent policy out of adverse effect.

**Conclusion**

Rice is one of crops EGYPT achieve self sufficiency, and one of cash crops to farmers. EGYPT exports the amount which exceeds of local consumption of rice. However, planting rice crop consumes a lot of water, and exporting rice increases local prices. So that, at the beginning of 2008 Egyptian government starts to impose restrictions on rice export. This policy reduced the area planted and total production, while productivity remained without significant change. Otherwise, adapting new technology and less water consume varieties were solutions which government did not subsidy its implementation. After imposing restrictions on rice export, the policy did not attain its objective in introducing rice to consumers in a reasonable price, but attained adverse effect. And rice price doubled in the market, which indicates a status of the state failure. This indicates implementation of this policy without any marketing controls led to appearance of hidden marketing loops, represented in rice monopoly traders and rice smugglers through porous borders. If the loss



of producer surplus is less than the gain in consumer surplus, then the government has been successful in raising national welfare. But what happened in this stance adverse. Producer surplus increased, and consumer achieved more of loss. So when implementing new policy governments must take in account the external factors, which could be affect policy implementation negatively. Like, to what extend society have awareness of public policy and its

role in policy success. And the degree of corruption also could be the reason of occurring policy adverse. Policy is not only decisions taken by governments, but must combined with all social circumstances. Governments must but supplementary social policy, which deals with these external factors to prevent policy out of adverse effect cycle.

**Table 5: the results of Partial Equilibrium Model of rice crop in (2000 – 2015).**

Years	Producer Gains	Consumer Losses	Producer Surplus Change	Consumer Surplus Change	Government Returns Change	Foreign Exchange Change	Welfare Gains
2000	30.8	-286.6	2647.8	-5061.9	2670	-1464	255.9
2001	7.2	-68	1214.8	-2390.4	1236.3	-531.2	60.7
2002	17.2	-132.9	2152.2	-3457.4	1421	-868	115.7
2003	32.1	-224	3589.6	-5186.4	1788.7	-1378.3	191.8
2004	50.4	-396	4625.4	-7473	3193.2	-2134.9	345.6
2005	31.4	-210.9	3670.4	-5115.9	1624.9	-1341.3	179.5
2006	52.1	-303.6	4971	-5968.3	1248.8	-1740.2	251.5
2007	15.3	-82.9	3174.9	-3616.4	509.1	-810	67.6
<b>Average</b>	<b>29.563</b>	<b>-213.1</b>	<b>3255.8</b>	<b>-4784</b>	<b>1711.5</b>	<b>-1283</b>	<b>183.53</b>
2008	131.9	-1197.7	9525.8	-17594	9134.4	-5579.9	1065.8
2009	405.2	-4806.3	14523.6	-33135	23012.2	-16183	4401
2010	127	-1083.7	8076.9	-13917	6796.8	-4767.6	956.7
2011	9	-71.1	2599.6	-4355.6	1818.1	-858.1	62.1
2012	207.8	-1786.4	12785.9	-22152	10944.3	-7729.5	1578.6
2013	180.1	-1843.6	11854.4	-24556	14365.2	-8104.4	1663.5
2014	11.5	-129	2971.9	-7054.4	4200	-1376.1	117.5
2015	184.2	-2523.1	11056.9	-30475	21757.1	-10372	2338.9
<b>Average</b>	<b>157.08</b>	<b>-1680.1</b>	<b>9174.4</b>	<b>-19154.9</b>	<b>11503.5</b>	<b>-6871.2</b>	<b>1523.01</b>

The Values in millions pounds.

#### Supplementary Data:

**Table (1) impact of export restriction policy on area and production of rice In (2000-2015)**

Variable	Model	R <sup>2</sup>	F	Average
Area (thousands feddan)	$Y_t = 1392.8 + 32.07X_t - 36.36dX_t$ (2.24)* (-3.62)**	0.59	*9.39*	1458.6
Production (thousands tons)	$Y_t = 5377.49 + 186.97X_t - 189.37dX_t$ (3.36)** (-4.86)**	0.69	**14.55	5889.7

Where: (\*) significant at 0.05

(\*\*) significant at 0.01

**Source:** summarized and calculated from table (1) data.

**Table (2) the results of analysis the difference between the two averages for area and production of rice during the periods (2000-2008) and (2009-2015).**

Variable	(2000-2008) Average	(2009-2015) Average	Change rate (%)	T value
Area (thousands feddan)	1555.0	1334.7	-14.17	-3.4**
Production (thousands tons)	6315	5343.2	-15.38	-3.37**

Where: (\*\*) significant at 0.01

**Source:** summarized and calculated from table (1) data.

**Table (3) the results of analysis the difference between the two averages for wholesale and retail price of rice during the periods (2000-2008) and (2009-2015).**

Variable	(2000-2007) Average	(2008-2015) Average	Change rate (%)	T value
<b>Farm gate price</b> (pounds / ton)	<b>933</b>	<b>1912</b>	<b>105</b>	<b>9.69**</b>
<b>Wholesale price</b> (pounds / ton)	<b>1661</b>	<b>2323</b>	<b>40</b>	<b>3.78**</b>
<b>Retail price</b> (pounds / ton)	<b>1789</b>	<b>4136</b>	<b>131</b>	<b>6.81**</b>

Where: (\*\*) significant at 0.01

**Source:** summarized and calculated from table (2) data.

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