Analytical Study of the Movements of Time and Price of Some Vegetable Crops in the Egyptian Market

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Abstract: Due to the characteristic of the soft nature of vegetables which result in quick damage by the factors of various climatic conditions which make transportation and circulation is difficult These factors led to high rates of waste of the marketing crops especially in the peak periods of production, and increasing supply on demand report lower prices Thereby reducing the revenues and lower incomes of producers make them not reluctant to produce some of these crops. The problem of the imbalance between the quantity offered and demand of potatoes, tomatoes and onions may be due to the inability of these crops to satisfy the prosecution and consumption, leading to a gap in food. The research aims to analyze the movements of time in the vegetable market in Egypt, where they are among the goods of perishable and they are more responsive to price changes and production and demand effects. The model includes the periodical time price changes each year, seasonal index and rural movements. The results of the equations of general time trend pointed out to statistically significant increase in the quantity produced and consumed vegetables during the period (1990-2008) by about 2.97%, 1.67% in Egypt. Such increase indicates the potentiality to increase Egyptian exports of vegetables, which represent about 7.55%. The results also shows the significant increase in the quantities produced, consumed of tomatoes and the rate of increase in production is greater than the rate of increase in consumption, where the rate of increase in production reached 4.32%, while the increase in consumption of about 2.43% which confirms the opportunity to increase Egyptian exports of these crops. As for the onions, the rate of increase in production was 4.05%, while consumption totaled about 2.09%. The results showed stable seasonal movements of wholesale prices for potatoes and tomatoes, while it was not true for the onion as the wholesale prices are subject to many factors during the season. The study indicated the periodic cycle changes of the wholesale ranges between 2-7 years of potatoes, tomatoes, onions, which indicates that they are productive and economic cycles. In other words the production cycles are not the main responsible for the cyclical changes in prices, but that economic cycles and production policies also controls price cycles completely.

Introduction

The agricultural production is characterized with the seasonality either in sowing or harvesting, and there are increase the crop quantities in the markets immediately after the harvest season. However there ais a shortage of these amounts as we move away from harvesting date. Given the close correlation between the supply of agricultural commodities and their prices throughout the year, it usually results in an imbalance in the economic balance between supply and demand of crops. Consequently a wide range of price fluctuations and the quantity in the markets of those crops are evident. Most of the agricultural products are characterized with weak demand price elasticities for their importance as a goods without alternatives for the Such weakness is due to the elasticity of supply by the relatively high fixed amount of capital which linked to the agriculture, natural and environmental factors. Moreover the difficulty of access market information on prices and quantities of these crops to the agricultural producers.

Egypt has a relative advantage in the production of vegetables because it possess climatic conditions suitable for production of most varieties of vegetables and so grow a wide variety of seasonal crops such as potatoes, tomatoes, onions .The high level of soil fertility enable the farmers to achieve high productivity of these crops which help in keeping the production profits more than the high cost of production. Given the characteristic lush greens of nature makes it vulnerable to weathering and exposure to different damage and damage as well as intolerance of transportation and circulation, has led to high rates of wastage, especially in marketing its peak periods of production. The increase in supply than demand leads to lower prices, thereby reducing the yield of the low incomes of producers, making them reluctant to produce some of these crops.

Research problem: The research problem in an imbalance between the quantity offered and demand of potatoes, tomatoes and onions, may be due to the inability of production of these crops to balance with

the consumption of the as they are planted in three planting dates differ in their productivity, and also in the average prices On the other hand, as well as the lack of good planning for Egyptian exports in general and in particular exports of vegetables from a third party lead to the increase or a shortage in supply in some periods and therefore low or high prices. The lack of refrigerators with large storage capacities for vegetables, and the proper distribution according to areas of production and consumption contributed to the damage portion of this vegetable, consequently higher prices of the product to compensate such loss.

The research aims to analyze the movements of time in the vegetable market in Egypt, where they are among the goods of perishable and they are more responsive to price changes and production and demand effects. The model includes the periodical time price changes each year, seasonal index and cyclic movements.

Research method and data sources:

The study relied on the analysis of model time price movements described by the following formula:
$P_i = T_i S_i C_i$
Where:
 P_i = wholesale price of vegetables.
T_i = time trend in the movements of wholesale price for vegetables.
 S_i= component item of the seasonal movements of the wholesale price of vegetables.
C_i = component item of periodic movements in the wholesale price of vegetables i.

The analysis was applied as follows :
1. Method was used for least squares regression function of the average monthly price for the year as a function of the product and the wholesale and retail element of time during the period (1990-2008). The significance of this component was tested using the T test for the rate of change and assess the coefficient of determination for the period (1990-2008).
2. When estimating the seasonality by use of the monthly prices for vegetables during the period under study (2000-2008). The monthly seasonal index was estimated using the general periodical prices attitude as a numerical sequence considering the first month (January 2000=zero, 2008=107). The outcome of these transactions was estimated as average ratios for each month, average values have been adjusted relative to each month to modify the seasonal index for the deviations of the total months over 1200.
3. The cyclical changes were estimated after the exclusion of seasonal movements and general time trend. One of the non parametric statistical tests (Run / Test) has been used to examine the seasonal and

cyclical movements. In this test the arithmetic mean is calculated in the case of the index be relative value = 100, then calculates the deviations of the values of this index, and the deviations of values is divided into two groups, one of them is called the positive group (a) and the other is called negative group (b). Then calculate the number of cycles in accordance with the views of groups A, B and using a table of cycles which give numbers.
4. If the number of cycles was found between these two figures, this indicates that the non-significant test cycles it means that it is random and irregular. The presence of the number of cycles outside the range of numbers Almstkrgen, ie smaller than or equal to the minimum or greater than or equal to the higher value, this means that the significance of these cycles the seasonal or periodic movements are subjected to a regular pattern of movement.

The study used published data from the Central Agency for Public Mobilization and Statistics and the Ministry of Agriculture and Land Reclamation. And the daily data and monthly and annual recorded for these three vegetables in the market of transit information center in El-Obour market, Cairo.

Results

Data presented in table 1 show the quantities produced, consumed and exported of vegetables. The fluctuation of the quantity of vegetables Egyptian hit at the beginning of the study period in 1990 reached 11.39 million tons and continued unstable until it reached the end of the period in 2008 to 19.9 million tons. The and average production in the study period (1990-2008) was about 14.89 million tons of vegetables, but the quantity of consumed of vegetables recorded increase with about 8.85 million tons in 1990 to about 11.3 million tons in 2008.The average of vegetable exports in the studied period was about 10.6 million tones. It is clear that the quantity of exported vegetables indicated fluctuations in the quantity of vegetables at the beginning of the study period by 258 thousand tons and continued unstable until it reached the end of the period 2008 and reported 1265 thousand tons with an average of the study period (1990 to 2008) amounted by 614.2 thousand tons of vegetables.

The data of general time trend resulted from the equation (1) table (2) show that there is significant increase in the annual rate of the Egyptian produced vegetables estimated by 0.443 thousand tons, representing about 2.97% of the average of Egyptian vegetables produced in the period (1990-2008) , amounting 14.89 million tons. While application of the equation (2) mentioned in the same table show that there is significant increase in the annual rate of the Egyptian consumed

vegetables estimated by 0.177 thousand tons, representing about 1.67% of the average of the consumed vegetables in the same period amounting 10.6 million tones. Equation (3), table (2) indicate that there is significant increase in the annual rate of

the Egyptian produced vegetables estimated 46.37 thousand tones, representing about 7.55% of the total average amount of the Egyptian exported vegetables period (1990-2008) and of about 614.2 thousand tons.

Table (1) the quantity produced and consumed and exporters of vegetables during the period (1990-2008)

Years	Produced quantity of vegetables million ton	Consumed quantity of vegetables million ton	Exported quantity of vegetables (thousand ton
1990	11.35	8.85	258
1991	11.2	8.63	345
1992	11.8	9.33	366
1993	12	9.19	406
1994	12.5	9.81	355
1995	14.8	10.2	616
1996	14.8	10.4	588
1997	14.7	10.4	410
1998	16.8	10.3	456
1999	13.7	10.7	423
2000	13.9	11.2	404
2001	13.5	11	462
2002	9.3	11.58	637
2003	15.3	11.85	710
2004	18.4	12.52	838
2005	21.9	12.4	929.3
2006	19.1	11.1	1046
2007	18.1	10.9	1155
2008	19.9	11.3	1265
Average	16.01	11.13	614.2

Source:

1 - Ministry of Agriculture and Land Reclamation, the Central Department of Agricultural Economics, Agricultural Statistics Bulletin, various issues.

2 - Central Agency for Public Mobilization and Statistics, a publication of consumption, various issues

Table (2) equations, overall time trend for the amount of producer, consumer and exporter of vegetables during the period (1990-2008)

No.	Item	Equation	Mean	T value	Determination factor	Significance
1	Produced quantity of vegetables million ton	$\hat{Y}h = 10.46 + 0.443\ xh$	14.89	4.54	0.55	* *
2	Consumed quantity of vegetables million ton	$\hat{Y}h = 8.83 + 0.176xh$	10.6	7.2	0.75	* *
3	Exported quantity of (vegetables (thousand ton	$\hat{Y}h = 150.4 + 46.3\ xh$	614.2	7.4	0.76	* *

Source:

1 - Ministry of Agriculture and Land Reclamation, the Central Department of Agricultural Economics, Agricultural Statistics Bulletin, various issues.

2 - Central Agency for Public Mobilization and Statistics, a publication of consumption, various issues.

II: Data presented in table 3 show the development of quantities produced, consumed and exported of potatoes, tomatoes and onions. The fluctuation of the quantity of Egyptian potatoes produced was evident at the beginning of the study period in

1990 and reached 1.638 million tons then continued unstable until it reached the end of the period in 2008 to 3.567million tons. The average of produced potatoes in the study period (1990-2008) was about 2.39 million tons of potatoes, but the

quantity of consumed of potatoes recorded increase with about 1.205 million tons in 1990 to about 1.234 million tons in 2008. The average of produced tomatoes in the study period (1990-2008) was about 3.79 million tons of tomatoes, and recorded the maximum increase with about 9.204 million tons in 2008 but the quantity of consumed of tomatoes 4.235 million tone and at the beginning of the study period and reached in the end about

6.204 million tone

The average of produced onion in the study period (1990-2008) was about 865.5 thousand tons, and recorded the maximum increase with about 1.949 million tons in 2008 with an average for the study period with 1.305 million tone but the quantity of consumed of onion 0.657 million tone and at the beginning of the study period and reached in 2008 about 0.989 million tone.

Table (3) the quantity produced and consumed in tons of some vegetable crops during the period (1995-2008).

Years	Produced potatoes	Consumed Potatoes	Produced Tomatoes	Consumed tomatoes	Produced Onions	Consumed Onions
1990	1638	1204.7	4234	4325.4	865.5	657
1991	1786	1469.1	3796	3783.8	829.2	632
1992	1619	1217.7	4693	4664.8	979.6	741
1993	995	680.7	4762	4733.4	801.7	512
1994	1325	711.8	5011	4686.3	1150.4	816
1995	2599	1653.2	5035	4825.6	1046	931
1996	2626	1620.1	5995	4483.7	1310	1206
1997	1803	1240.7	5873	4328.7	1194	1091
1998	1984	1181.1	6099	4249.4	1305	1155
1999	1809	1044.9	6273	4370.8	1487	1382
2000	1765	1110.8	6785.6	5083.8	1270	938
2001	1903	1208.7	6328.7	4731.3	1234.9	944
2002	1985	1225.3	6777.9	5068.6	1487.9	992
2003	2040	1280.4	7140.2	5094.2	1240.9	779
2004	2097.5	1221.7	7423	4993.1	1612.5	944
2005	2130.7	1224.1	7662.2	5045.2	1925.2	1381
2006	2312.7	1290	8576	6846	1346.9	772
2007	2760.5	1551	8639	6709	1755.8	1133
2008	3567	1233.9	9204	6203.8	1948.9	988.9
Averge	2241.6	1291.8	6986.5	5145.2	1440.4	1045.5

Source:

1 - Ministry of Agriculture and Land Reclamation, the Central Department of Agricultural Economics, Agricultural Statistics Bulletin, various issues.

2 - Central Agency for Public Mobilization and Statistics, a publication of consumption, various issues.

The data of general time trend resulted from the equation (1) table (2) show that there is significant increase in the annual rate of the Egyptian produced potatoes estimated by 64.06 thousand tons, representing about 3.14of the average of Egyptian potatoes produced in the period (1990-2008), amounting 2.039 million tons.

It is clear from equation (2) in the same table that there is a rate of annual increase was insignificant in the quantity consumed of Egyptian potatoes. Application of equation (3) in the same table indicate that the annual average increase was statistically significantly in the total amount produced from tomatoes which estimated at 267.5 thousand tons, representing about 4.22% of the

average total quantity of tomatoes produced (6.33 million tons) . It can be also seen from equation (4) table 4. t significant increases in the quantity consumed of tomatoes per year and estimated at about 111.3 thousand tons, representing about 2.24% of the average quantity consumed of tomatoes during the period, amounting to some 4.959 million tons. While the estimation of the annual increase in the produced quantity of onions was about 52.88 thousand tons, representing about 4.05% of the average produced quantity of onions during the period (1990-2008), amounting to about 1.305 million tons. As for the total amount of the consumed onions the data of equation (6) indicate a statistically significant increase which estimated

annually by 19.83 thousand tons, representing about 2.09% of the average of the quantity consumed of onions during the period (1990-2008)and

amounting about 0.947 million tons.

Table (4) equations, overall time trend for the amount of producer and consumer of potatoes, tomatoes and onions during the period (1990-2008)

No.	Item	Equation	Mean	T value	Determination factor	Significance
1	Produced quantity of potatoes	$\hat{Y}h=1398.7+64.05\ xh$	2039	3.38	0.4	* *
2	Consumed quantity of potatoes	$\hat{Y}h= 1152.4+7.78\ xh$	1230	0.73	0.03	-
3	Produced quantity of tomatoes	$\hat{Y}h=3656.8+267.5\ xh$	6332	20.6	0.96	* *
4	Consumed quantity of tomatoes	$\hat{Y}h=3846.2+111.3xh$	4959	5.05	0.6	* *
5	Produced quantity of onion	$\hat{Y}h =775.9+52.88.\ xh$	1305	7.64	0.77	* *
6	Consumed quantity of onion	$\hat{Y}h= 748.7+19.83\ xh$	947	2.16	0.22	*

Source: Where's exports of these crops
1 - Ministry of Agriculture and Land Reclamation, the Central Department of Agricultural Economics, Agricultural Statistics Bulletin, various issues.
2 - Central Agency for Public Mobilization and Statistics, a publication of consumption, various issues

Seasonal changes to wholesale prices for some varieties of Egyptian vegetables: This part of the study estimate seasonal index of the wholesale prices of potatoes, tomatoes, onions and as vegetable crops it may be affected by the price variations according to the level of demand during the period (2000-2008).
1-Seasonal changes in wholesale prices of the Potato: The potato represents a significant proportion of vegetable production, about 16.8% of the total domestic production of vegetables in Egypt. .Table (5) indicate the seasonal wholesale prices index, which clears that minimum prices ranging from 63% in January, and the maximum was estimated at 156.9% during October. The rate of seasonal ratio decline than the average during December - June, and it was higher than the average during October, November, August and September. It is clear from the cycles Test table that there is a significant index of wholesale prices of potato (p.>0.05) which refers to subjecting of these changes to a particular pattern.
2- Seasonal changes in wholesale prices for tomatoes: The tomato represent a significant proportion of vegetable production, about 45% of the total domestic production of vegetables in Egypt. Table (5) indicate the seasonal wholesale prices index, which clears that minimum prices ranging from 85.5% in January, and the maximum was estimated at 195 .9% during September. The rate of seasonal ratio decline than the average during January – May , and it was higher than the average during April, June, July , August , September ,October, November, and September It is clear from the cycles Test table that there is a significant index of

wholesale prices of tomato (p.>0.05) which refers to subjecting of these changes to a particular pattern.
3-Seasonal variations in the wholesale price of Onion: The onion represent a small proportion of vegetable production, about 6% of the total domestic production of vegetables in Egypt Table (5) indicate the seasonal wholesale prices index, which clears that minimum prices ranging from 77% in May and the maximum was estimated at 123.8% during November. The rate of seasonal ratio decline than the average during May- September, and it was higher than the average during January, February, March, October, November, and December. It is clear from the cycles Test table that there is insignificant index of wholesale prices of onion (p.>0.05) which indicate that these changes do not subject to a particular pattern.
Cyclical changes in wholesale prices for potatoes and tomatoes and onions:
This part of the study focus on the periodic changes of the retail prices for the crops of potatoes, tomatoes and onions. In order to determine the cyclical changes during the period (1990-2008) the impact of general time trend and irregular seasonal changes were excluded (Table 7). The statistically significant effects were evident for potatoes and tomatoes but it was not true for onions. Since the duration cycle ranged between 2-7 years which indicates that it is not production cycles only, but is the economic cycles of recession and boom, It is also indicate that production cycles are not the main responsible for cyclical changes in prices, but the economic cycles, economic policies and structural

changes occurred in the Egyptian economy may
completely control cycles prices.

Table (5) seasonal indices of the average wholesale prices of some vegetable crops (2000-2008).

Month	Potato	Tomato	Onion
October	156.9	210	110.4
November	127.6	170.8	123.8
December	94.9	127	109.3
January	63.9	85.5	103.9
February	68	91.1	103.8
March	7195	117.5	
April	76.9	102.9	112.1
May	77	74.4	99.8
June	82.8	110.8	80.6
July	114	152.6	87.5
August	123.4	165.2	85.3
September	143.6	195.9	88.8

Source compiled and calculated from the data: the Cairo Governorate, the executive body of the transit market,
 Information Center, unpublished data, (2000-2008).

**Table (6) the results of the application of test sessions for seasonal changes to wholesale prices of some
  vegetable crops In the Egyptian market during the period (2000-2008).**

Crop	A	B	No. of Cycle	Tabulated interception point of a and b	Significance at 0.05 level
Potatoes	5	7	3	11، 3	*
Tomatoes	8	4	5	10، 3	NS
Onions	7	5	2	11، 3	*

Where a = number of values that exceed the average, b = number of values that are less than average.
Source: Compiled and calculated from data in table (5)

Table (7) indices of the periodic average wholesale prices of some vegetable crops (1990-2008).

Year	Potato	Tomato	Onion
1990	112.1	74.7	521.2
1991	125.8	97.5	223
1992	105.7	68.9	120.8
1993	101	91.8	52
1994	141.1	153.3	98.2
1995	108.9	128.6	75.4
1996	87.3	84.4	40.4
1997	116.8	108.2	62.9
1998	83.2	121.1	64.8
1999	72.9	104	58.9
2000	68.3	73	54.27
2001	65.6	88.9	60
2002	74.9	88.9	53.6
2003	106.7	114.1	74.5
2004	109.4	97.9	73.8
2005	77.9	98.4	51
2006	106.7	99.1	68.2
2007	125	99.2	78
2008	10.8	93.9	67.8

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Wholesale Price, consecutive
numbers.

Table (8) results of applying the test sessions of the periodic changes to wholesale prices of some vegetable crops in The Egyptian market during the period (1990-2008).

Crop	A	B	No. of Cycles	Tabulated interception point of a and b	Significance at 0.05 level
Potato	12	7	7	14،5	*
Tomato	6	13	7	11، 3	*
Onion	3	16	2	11 ،3	NS

Where a = number of values which increase from the average. B = the number of values which is less than average.
Source: Compiled and calculated from data table (7)

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