Zagazig J. Agric. Res., Vol. 43 No. (2) 2016

http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

WHEAT AND RICE SUPPLY RESPONSE IN EGYPT: A VECTOR OF ERROR CORRECTION MODEL

Mohamed A. Alboghdady*

Agric. Econ. Dept., Fac. Agric., Suez Canal Univ., Egypt

ABSTRACT

This study aimed at estimating the supply response of harvested areas of wheat and rice in Egypt using secondary data obtained from FAO statistics database during the period of 1972-2012. The presence of unit root and indication of non-stationary time series was tested using augmented dickey test (ADF). The results obtained from Johansen method test of co-integration supported evidence on the long-run equilibrium relationships among variables. Vector error correction model (VECM) was used to estimate long run and short run relationships between harvested areas of wheat and rice and their estimators. The estimators were own price, competing crops prices, and climatic variables like mean of seasonal temperature and precipitation. The results indicated that wheat harvested area is affected significantly and positively by wheat price in the preceding year and negatively by the prices of the competing crops like clover and barley. Rice harvested area is affected significantly and negatively by maize price. The short-run and long-run supply elasticities of wheat and rice are positive and consistent with economic logic. All estimated elasticities were significant and inelastic implying that notably price changes are needed to achieve the desired harvested areas of wheat and rice in Egypt.

Key words: Supply response, elasticity, augmented dickey test, vector error correction model.

INTRODUCTION

Egypt is not only described as net importer country of food, it also remains the world's largest wheat importer. The main winter crops in Egypt are wheat, berseem (Egyptian clover) and broad beans. Among the summer crops, maize, rice and cotton are dominant. According to FAO statistics, Egypt consumed about 38.3 million tons of cereal crops in 2102. The domestic production was about 20.6 million tons while the rest (17.7) were imported from all over the world. Wheat, in particular, plays a significant role in the nourishment of the Egyptian people, and its population's total need is far greater than the potential for domestic consumption. Egypt imported about 11 million tons of wheat in year 2014 which represent about 46% of the total supply.

Rice is the second important crop after wheat in human food. Rice cultivation takes place in Egyptian Nile delta especially in the northern part (Arafat *et al.,* 2010). Egypt is the most important rice producer and exporter in the middle east region by 4530 and 250 thousand tons of milled rice, respectively in 2014. Moreover, The Egyptian rice yield is one of the highest in the world by 9.5 ton/hectare.

The Egyptian economy has practiced crucial structural changes during the last four decades. Such changes began with adoption of the "Open-door "economic system in 1975, up-to the program of economic reform and liberalization released in 1987 (Abdou, 2003). Egypt partially liberalized wheat production and marketing, reducing taxes on wheat production and allowing more private traders to participate in domestic wheat markets (Kherallah, 2000). In addition, high government procurement prices,

***Corresponding author: Tel. :** +201204662251
E-mail address: mboghd@agr.suez.edu.eg

at USD 400/ton since the 2013/14 season, are also encouraging additional plantings of wheat. These steps have led to greater wheat and flour production. Fig. 1 shows notable increases of wheat and rice prices since 1987.

Supply function is different from supply response as supply response is dynamic while supply function is static. The supply function describes a price quantity relation, where all other factors are the same. The response relation shows the change in quantity with changes in prices besides supply shifters and therefore, approximates to the long run, dynamic concept of supply theory (Ayalew, 2015). There are many studies examined the supply response of wheat and rice in Egypt, for intense: El-Kawy (1986), Attia (1997), Elsebaei and Boghdady (2011) and Elsebaei (2015). However, time series properties, like stationarity and co-integration, had not been taken into account that may lead to spurious regression suspicion. Therefore, the present study estimates the supply response of wheat and rice in Egypt using Vector Error Correction Model (VECM) to cope with such problems.

Data Sources and Variables

The economic data required for the study has been obtained from Food and Agriculture Organization's (FAO) for the period of 1970-2012. The data set consists of two variables groups. The first is the data for the variables needed to estimate wheat supply response which are: area harvested of wheat (hectare), and prices (LE/ton) for wheat, clover, barley, onion, and broad beans. The second group of data is needed to estimate supply response of rice in Egypt. Rice response model consists of area harvested (hectare) and prices (LE/ton) of rice, sorghum, and maize. In addition, the climatic data of temperature (C°) and precipitation (mm/ season) were obtained from FAOClim-NET : Agroclimatic database management system.

Analytical Framework

Supply response model

Two types of methodologies are found to be adopted for analyzing the supply response in agriculture. The first and most widely adopted is Nerlovian direct reduced model. The second is the indirect structural approach that based on profit maximization framework in which detailed input and output prices and quantities are required (Paltasingh and Goyari, 2013). The Egyptian agricultural market structure is not function in a competitive circumstance of profit maximization outline. Therefore, the Nerlovian reduced form approach will be adopted. Nerlove (1958) partial adjustment model is a dynamic econometric approach used in measuring agricultural supply response for a commodity. The model is stating that output is a function of price incentives, output adjustment, and some other exogenous variables. Gujarati (1995) argued that a model is described as dynamic if the time path of dependent variable is explained by its lag values. A survey conducted by (Askari and Cummings, 1977a, b) involved over one hundred of empirical studies in Nerlovian tradition, it stated that the simplest form of Nerlovian model consists of three equations:

$$A_t^* = \alpha_0 + \alpha_1 P_t^* + \alpha_2 z_t + u_t \text{.......}(1)$$

$$P_t^* = P_{t-1}^* + \beta(P_{t-1} - P_{t-1}^*); 0 \le \beta \le 1 \text{.....}(2)$$

$$A_t = A_{t-1} + \gamma(A_t^* - A_{t-1}); 0 \le \gamma \le 1 \text{.....}(3)$$

Where A_t and A^*_t are actual and desired area under cultivation or yield at time t, P_2 and P^*_t are actual and expected price at time t, β is the expectation coefficient, and γ is the adjustment coefficient. Since A^*_t and P^*_t are unobservable variables, exclusion of them from the above equations will produce the reduced form. Following Braulke (1982) and Leaver (2004), the reduced form equation will be:

$A_t = b_0+b_1P_{t-1}+b_2A_{t-1}+b_3A_{t-2}+b_4Z_t+b_5Z_{t-1}+v_t$ …(4)

where:

$b_0=\alpha_0\beta\gamma$, $b_1 = \alpha_1 \beta\gamma$, $b_2 = (1-\beta) + (1-\gamma)$, $b_3 = -(1-\beta)(1-\gamma)$, $b_4 = \gamma\alpha$, $b_5 = \gamma\alpha_2(1-\beta)$, and $v_t=\gamma(u_t - (1-\beta)u_{t-1})$. Such reduced form equation is called the distributed lag model with lag dependent variable as independent variable. The short-run price elasticity can be calculated by:

$$\alpha_1 = \frac{b_1}{1-b_2-b_3}$$

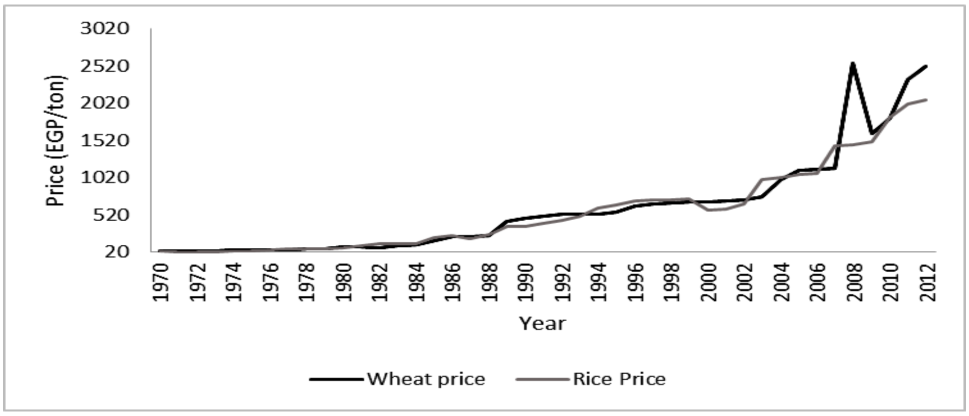

Fig. 1. Wheat and rice price in Egypt, 1970-2012

Where $\overline{P}$ and $\overline{A}$ could represent some historical mean of prices and acreage under cultivation, respectively.

$$\varepsilon_s = b_1 \frac{\overline{P}}{\overline{A}} \quad \text{.... (5)}$$

The long-run price elasticity is calculated by:

$$\varepsilon_1 = \frac{b_1}{1 - b_2 - b_3} \cdot \frac{\overline{P}}{\overline{A}} \text{.....(6)}$$

However, Nerlovian model has been criticized by many studies such as (McKay *et al.*, 1998) because of its ad hoc assumptions and possibility of rising to spurious regressions coming from non-stationary time series. Consequently, the studies adopted the traditional Nerlovian model with non-stationary time series have mostly found low values, even zero for long-run elasticities (Olubode-Awosola *et al.* 2006). For these reasons, Co-integration methodology and Error Correction Mechanism (ECM) are designated rather than Ordinary Least Squares (OLS) estimation.

Test for unit root

Most of economic and financial time series exhibit trending behavior or non-stationary which can strongly influence its behavior and properties persistence of shocks will be infinite. Therefore, Augmented Dickey test (ADF), according to (Said and Dickey, 1984), is used to examine the presence of unit root and indication of non-stationary. The test formula is as follows:

$$\Delta Y_t = \alpha + \rho Y_{t-1} + \sum\nolimits_{t=1}^{j} \gamma \Delta Y_{t-1} + \mu_t \text{...(7)}$$

Where Y is the series to be tested; ρ is the test coefficient; j is the chosen lag length; μ_t is the empirical white noise. The null hypothesis H_0 is there is unit root *i.e.* the series is not stationary. Consequently, if the null hypothesis of non-stationary can't be rejected, the variables are differenced until become integrated I(k) before conducting co-integration test. The economic time series of variable often become integrated after the first difference I (1).

Test for co-integration

The intention of co-integration test is examine whether the set of non-stationary time series are co-integrated or not. The relationship between co-integration and error correction models first introduced by Granger (1981) and extended by Engle and Granger (1987) for a single co-integration. On the other hand, Johansen test (Johansen, 1991) permits more than one co-integrating relationship. So the present study uses Johansen co-integration test. Johansen's methodology takes its starting point in the vector autoregression (VAR) of order given by :

$$X_t = II_1X_{t-1}+II_2X_{t-2}+\ldots+II_kX_{t-k}+\varepsilon_t(t=1,\ldots,T)\text{.. (8)}$$

Where X_t is a vector of m endogenous variables; II_1 is an (n x n) parameter matrix that measures the long run effect of the respective lag level. ε_t is disturbance term. We can write equation (8) in its first difference as:

$$\Delta X_t = T_1\Delta X_{t-1}+T_2\Delta X_{t-2}+\ldots+Tk_{-1}\Delta X_{t-k+1}-IIX_{t-k}+\varepsilon_t\text{..(9)}$$

Where T_t is (n x n) coefficient matrix for II.

$T_i = (I - II - \ldots II_i); i = 1,2,\ldots k - 1$ ..(10)

$II = -(1 - II_1 - .. II_k)$ .. (11)

RESULTS AND DISCUSSION

Table 1 shows the results of the ADF unit root test for all variables involved in wheat and rice supply response models. The results show that all variables involved in the model of wheat supply response have unit root except for temperature and precipitation. The null hypothesis of non-stationary was rejected for harvested area, production, wheat price, clover price, barley price, onion price, and broad bean price at level. At first difference, ADF test statistics were more than the MacKinnon critical values of all the series at 1% levels of significance. On the other hand, all time series of variables embedded in supply response of rice have unit root at level except for temperature which is stationary at the level. At the first difference, all variables: harvested area, production, rice price, maize price, sorghum price, and precipitation are stationary at significance level of 1%.

Since the time series are non-stationary, it becomes necessary to test co-integration. The Johansen method provides two likelihood ratio tests, that are with trace or with eigenvalue. Trace value statistic tests the number of co-integrating equations given by the co-integration rank r. A co-integration equation is the long-run equation of co-integrated series. The results obtained from such test support evidence on the long-run equilibrium relationships among variables. Table 2 presents the results of Johansen's test for wheat and rice supply response model. The null hypothesis for each row is that there is less than r co-integrating equations. When r = 0, and the trace statistics is greater than the critical value, we reject the null hypothesis that there is less than zero co-integrating equations. The null hypothesis was rejected for r = 1 implying that there is at least two co-integrating equations are identified in the wheat model. On the other hand, at least three co-integrating equations are identified in rice model with a 5 percent significance level.

After long-run relationship between harvested area of wheat and the explanatory variables are established, VECM is developed. The results of vector error correction model estimates are presented in Table 3. The coefficient of error correction is negative and significant at level of 1% suggesting that about 53% of deviation from long-run equilibrium is occurred within one period time. It is also called speed up adjustment toward long-run equilibrium. Thus, the speed by which the explanatory variables adjust from short-run disequilibrium to changes in wheat supply to reach long-run equilibrium is 53% within one year.

The coefficient of the changes of harvested area of wheat in the previous year is negative and significant at level 1% indicating that the higher the changes in harvested area in the previous year the smaller is the changes of harvested area in the current year. Coefficient of wheat price is positive, as expected, and significant at level 1%. Such result is consistent with microeconomic theory explaining the direct relationship between price and supply. The estimated parameters of the prices of the competing crops; clover, and barley are negative and significant at level 1% reflecting the effect magnitude of the competing crops on the cultivated area of wheat in Egypt. By the contrary, the price of onion is positive and significant at level 1%.

According to Hallam and Zanoli (1993), a high R^2 in the long-run regression equation is necessary to minimize the effect of small sample bias on the parameter estimates of the error correction model. The model fits better as R^2 is 0.93 and also Chi^2 is significant at level 1%.

The results of vector error correction model estimates of rice supply response are presented in Table 4. The coefficient of error correction is negative and significant at level of 5% implying that about 18% of deviation from long-run equilibrium is occurred within one period time. On other words, the speed up adjustment by which the explanatory variables adjust from short-run disequilibrium to changes in rice supply to reach long-run equilibrium is 18% within one year.

Table 1. Results of augmented dickey fuller unit root test

Wheat Model			Rice Model		
Variables	**Level**	**1st difference**	**Variables**	**Level**	**1st difference**
Harvested area	-2.426	-5.676**	Harvested area	-1.733	-6.565**
Production	-2.535	-5470**	Production	-2.654	-5.861**
Wheat price	-2.154	-5.520**	Rice price	-2.27	-4.211**
Clover price	-1.624	-3.815*	Maize Price	-2.350	-5.074**
Barley price	-2.670	-3.915*	Sorghum price	-1.391	-6.600**
Onion price	-0.608	-3.581*	Temperature	-3.240*	-4.417**
Broad bean price	-1.982	-3.922*	Precipitation	-2.629	-6.007**
Temperature	-5.716**				
Precipitation	-5.010**				

** Significantly different from 0 at 1%, *significantly different from 0 at 5%

Mackinnon's critical value at 1% = -2.5658

Table 2. Johansen's test for multiple co-integrating

Hypothesis	Eigen value	Trace statistic	Critical value 5%	Decision
Wheat Model				
H_0: r=0; H_l: r>0	.	167.62*	156.00	Rejected
H_0: r=1; H_l: r>1	0.86	129.77*	124.24	Rejected
H_0: r=2; H_l: r>2	0.75	39.39	94.15	Accepted
Rice Model				
H_0: r=0; H_l: r>0	.	180.72*	94.15	Rejected
H_0: r=1; H_l: r>1	0.79	122.14*	68.52	Rejected
H_0: r=2; H_l: r>2	0.73	72.16*	47.21	Rejected
H_0: r=3; H_l: r>3	0.70	26.99	29.68	Accepted

Notes: r indicates the number of co-integrating relationships. *significantly different from 0 at 5%

Table 3. VECM results for harvested area of wheat

	Δ Area harvested	Δ Wheat price	Δ Clover price	Δ Broad bean price	Δ Barley price	Δ Onion price
Co-integration eq. 1	-0.53 (-7.31**)	0.00 (-0.09)	-6.0E-05 (-0.79)	2.8E-04 (0.66)	3.09E-04 (6.64**)	3.34E-04 (2.73**)
Area harvested						
LD.	-0.49 (-2.48**)	0.00 (0.5)	1.53E-04 (0.73)	1.8E-05 (0.02)	-1.6E-04 (-1.27)	-3.51E-04 (-1.05)
L2D.	0.55 (3.43**)	0.00 (0.39)	3.08E-05 (0.18)	1.06E-04 (0.11)	-1.02E-05 (-0.1)	-3.60E-04 (-1.32)
Wheat price						
LD.	1583.67 (7.69**)	0.12 (0.23)	4.16E-01 (1.99*)	-0.22 (-0.18)	-0.26 (-1.97*)	-0.34 (-0.97)
L2D.	1061.26 (4.42)	-0.19 (-0.32)	4.17E-02 (0.17)	-0.45 (-0.31)	-0.39 (-2.55**)	-0.02 (-0.52)
Clover price						
LD.	-826.41 (-2.92**)	-0.29 (-0.42)	4.36E-01 (1.47)	1.20 (0.7)	-0.51 (-2.78**)	-1.07 (-2.24*)
L2D.	974.12 (3.17**)	0.54 (0.72)	4.54E-01 (1.41)	-1.97 (-1.06)	-0.33 (-1.67)	-0.61 (-1.16)
Broad bean price						
LD.	-46.98 (-0.68)	0.10 (0.6)	1.24E-02 (0.17)	0.16 (0.38)	-0.04 (-0.92)	-0.07 (-0.62)
L2D.	8.53 (0.12)	0.06 (0.3)	-9.2E-02 (-1.19)	-0.36 (-0.8)	-0.08 (-1.66)	0.02 (0.18)
Barley price						
LD.	-2649.34 (-6.54**)	-0.37 (-0.37)	-2.8E-01 (-0.67)	0.53 (0.22)	1.36 (5.24**)	1.39 (2.04*)
L2D.	-2782.17 (-6.79**)	-0.67 (-0.66)	-7.9E-02 (-0.19)	1.37 (0.55)	1.37 (5.22**)	2.70 (3.9)
Onion price						
LD.	2168.44 (7.3**)	0.02 (0.02)	1.84E-01 (0.59)	-1.12 (-0.62)	-0.91 (-4.79**)	-1.68 (-3.35**)
L2D.	948.62 (4.37**)	0.06 (0.11)	1.37E-01 (0.6)	-0.54 (-0.41)	-0.25 (-1.77)	-0.78 (-2.14*)
Constant	0.06	47.37	2.66	84.78	16.40815	7.91
R^2	0.93	0.55	0.86	0.45	0.96	0.81
Chi^2	151.21**	13.11	67.29**	8.97	295.25**	45.08**
Log likelihood	-767.64					
AIC	68.53					

Note: LD refers to first order of lag of differences and L2D refers to second order of lag. Values in parentheses are Z vlaues. ** Significantly different from 0 at 1%, *significantly different from 0 at 5%.

Table 4. VECM results for harvested area of rice

	Δ Area harvested	Δ Rice price	Δ Maize price	Δ Sorghum price
Co-integration eq. 1	-0.18 (-1.95*)	-1.47E-04 (-0.85	-6.62E-04 (-5.35**)	-6.14E-04 (-4.32**)
Area harvested				
LD.	-0.83 (-5.04**)	-4.10E-04 (-1.43)	6.38E-04 (3.12**)	6.34E-04 (2.69**)
L2D.	-0.50 (-3.53**)	-3.16E-04 (-1.29)	4.08E-04 (2.33*)	4.18E-04 (2.08*)
Rice price				
LD.	37.43 (0.25)	-0.25 (-0.98)	-0.48 (-2.66**)	-0.37 (-1.76)
L2D.	-227.47 (-1.95*)	0.09 (0.42)	-0.07 (-0.48)	-0.02 (-0.14)
Maize price				
LD.	-554.87 (-2.15*)	-0.26 (-0.31)	1.05 (1.76)	1.54 (2.24*)
L2D.	-268.79 (-0.54)	-0.19 (-0.22)	-0.22 (-0.36)	-0.01 (-0.01)
Sorghum price				
LD.	670.80 (1.65)	-0.26 (-0.37)	-1.36 (-2.7**)	-1.99 (-3.44**)
L2D.	202.59 (0.46)	-0.69 (-0.91)	-0.73 (-1.35)	-1.11 (-1.78)
Temperature				
LD.	12420.47 (4.26**)	10.16 (2.01)	18.13 (5.03**)	17.14 (4.14**)
L2D.	9091.40 (4.05**)	4.81 (1.24)	8.82 (3.18**)	4.79 (1.5)
Precipitation				
LD.	-2317.77 (-0.51)	9.49 (1.2)	1.67 (0.3)	-0.48 (-0.07)
L2D.	-3092.25 (-0.68)	3.81 (0.49)	4.06 (0.73)	1.78 (0.28)
Constant	0.02	19.92	-0.02	-0.065
R^2	0.85	0.74	0.94	0.94
Chi^2	142.64**	73.86**	397.53**	376.18**
Log likelihood	-1159.4			
AIC	64.02			

Notes: LD refers to first order of lag of differences and L2D refers to second order of lag. Values in parentheses are Z vlaues. ** Significantly different from 0 at 1%, *significantly different from 0 at 5%.

The results also show that the parameter estimate of the lag difference of the rice harvested area negatively affect the change of the harvested area at the current year. The coefficient of the second order of lag of rice price changes is positive and significant at level 5%. Maize, as competing crop, price has negative and statistically significant effect on the area harvested of rice. Sorghum price does not statistically affect the cultivated area of rice. The coefficient of weather variable which is temperature has positive and significant effect at level 1%. The model fits better as R^2 is 0.85 and also Chi^2 is significant at level 1%.

The short-run and long-run supply elasticities of wheat and rice in Egypt are presented in Table 5. The results showed that both short-run and long-run supply elasticities of wheat and rice are positive and consistent with economic logic. All elasticities are inelastic (less than one). A 10% increase in the price of wheat in the preceding year will lead to about 6.9% and 7.3% increase in cultivated area of wheat in the short-run and long run term, respectively. Furthermore, the area harvested of rice will response by about 3.5% in short term and 5.2% in long term to a 10% increase in rice price in the preceding year. Elasticities were tested in terms of if they different from zero or not. The results confirmed that all elasticities are significant and more than zero suggesting that elasticities values are reliable and stable.

Conclusion and Policy Implications

The empirical analysis of wheat and rice supply response at the present study has introduced reasonable results in terms of both economic theory and statistical fitting. Inelastic own-price elasticity of wheat supply (0.69 in short run and 0.73 in long run) emphasizes the sizeable price support is needed to attain more added cultivated areas of wheat in Egypt. Although rice is one of the important export crops in Egypt, the results indicated that the own-price elasticity of supply is inelastic. Such result may come from the Egyptian policy of water conservation. Consequently, rice cultivation has been restricted to clay soils to control water loses. In addition, rice exports have been irregularly prohibited during the last decade. As a result, the rice cultivation has accompanied by high risk of price fluctuations.

Table 5. Short-run and long-run price supply elasticities of wheat and rice

	Short-run Elasticity	**Long-run Elasticity**
Wheat	0.689**	0.733**
	(0.068)	(0.075)
Rice	0.348**	0.520**
	(0.031)	(0.077)

values in parentheses are standard error of the mean. ** Significantly different from 0 at 1%, *significantly different from 0 at 5%.

REFERENCES

Abdou, A.I. (2003). Responses of Egyptian Food crops producers to new economic policies: cases of wheat and rice. In 14th Congress, Perth, Western Australia, August 10-15, Int. Farm Manag. Ass.

Arafat, S., A. Afify, M. Aboelghar and A. Belal (2010). Rice crop monitoring in Egyptian Nile Delta using EgyptSAT-1 data. In Joint USA–Egypt workshop for space technology and geo-information for sustainable development, NARSS, Cairo".

Askari, H. and J.T. Cummings (1977a). Agricultural Supply Response. A Survey of the Econometric Evidence, New York, Praeger Publishers.

Askari, H. and J.T. Cummings (1977b). Estimating agricultural supply response with the Nerlove model: a survey. Int. Econ. Rev., 257-292.

Attia, M.S. (1997). Analytical study on supply response of agricultural crops in the Egyptian new land. Egyptian J. Agric. Econ., 7.

Ayalew, B. (2015). Supply response of maize in Ethiopia: cointegeration and vector error correction approach. Trends in Agric. Econ., 8: 13-20.

Braulke, M. (1982). A note on the Nerlove model of agricultural supply response. Int. Econ. Rev., 23 (1): 241-244.

El-Kawy, A.E.-K. A. A. (1986). Production response function of some field crops in Egypt. J. Studies and Res. Helwan Univ.

Elsebaei, M.N.M. (2015). An econometric study of supply response of the most important cereal crops, Egypt Alex. J. Agric. Res., 60.

Elsebaei, M.N.M. and S.M. Boghdady (2011). Economic study on supply response of the most important strategic crops in Egypt. Egyptian Ass. Econ. and Stat. and Leg., 503.

Engle, R.F. and C.W. Granger (1987). Co-integration and error correction: representation, estimation, and testing. Econometrica: J. Econ. Soc., 251-276.

Granger, C.W. (1981). Some properties of time series data and their use in econometric model specification. J. Econ., 16: 121-130.

Gujarati, D.N. (1995). Basic Econometrics, McGraw-Hill. Inc., New York.

Hallam, D. and R. Zanoli (1993). Error correction models and agricultural supply response. European Rev. Agric. Econ., 20: 151-166.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometrica: J. Econ. Soc., 59 (6): 1551-1580.

Kherallah, M. (2000). Wheat policy reform in Egypt: Adjustment of local markets and options for future reforms, Int. Food Policy Res Inst.

Leaver, R. (2004). Measuring the supply response function of tobacco in Zimbabwe, Agrekon, 43 (1): 113-131.

McKay, A.D., O. Morrissey and C. Vaillant (1998). Aggregate export and food crop supply response in Tanzania. Res. Cent. in Econ. Develop. and Int. Trade, Nottingham Univ.

Nerlove, M. (1958). Distributed Lags and Demand Analysis for Agricultural and Other Commodities. Agric. handbook, Agric. Mark. Serv., Washington, USA., 141.

Olubode-Awosola, O., O.A. Oyewumi and A. Jooste (2006). Vector error correction modelling of Nigerian agricultural supply response. Agrekon, 45 : 421-436.

Paltasingh, K.R. and P. Goyari (2013). Supply response in rainfed agriculture of odisha, Eastern India: A Vector Error Correction Approach. Agric. Econ. Rev., 14 : 89.

Said, S.E. and D.A. Dickey (1984). Testing for unit roots in autoregressive-moving average models of unknown order. Biometrika, 71 : 599-607.

دالة استجابة العرض لمحصولي القمح والأرز في مصر: نموذج متجه تصحيح الخطأ

محمد التابعي علي البغدادي

جامعة قناة السويس – كلية الزراعة – قسم الاقتصاد الزراعي – مصر

تهدف الدراسة إلى تقدير دالة استجابة العرض لمحصولي القمح والأرز في جمهورية مصر العربية ومن ثم تقدير مرونة العرض لهما، لقد تعددت الدراسات التي تناولت دراسة استجابة العرض لمحاصيل الحبوب في مصر باستخدام سلاسل زمنية لمتغيرات نموذج الإستجابة إلا أنها لم تختبر سكون السلاسل الزمنية على الرغم أن معظم السلاسل الزمنية للمتغيرات الاقتصادية ذات متجه وبالتالي معظمها غير مستقرة، لذلك فإنه في هذه الدراسة تم تقدير دالة استجابة العرض بعد اختبار سكون السلاسل الزمنية ومعالجتها للتغلب على مشكلة الإنحدار الزائف واختبار التكامل المشترك، وبناء على ذلك فقد تم استخدام نموذج متجه تصحيح الخطأ (Vector of Error Correction Model) والذي يساعد في الحصول على معلومات عن سلوك النموذج في الأجل الطويل، وقد تكون النموذج من المساحة المزروعة من المحصول والعوامل المؤثرة والمحددة له مثل سعر المحصول في السنة السابقة وأسعار المحاصيل المنافسة له على المورد الأرضي بالإضافة إلى أثر بعض المتغيرات المتعلقة بالمناخ مثل درجة الحرارة ومعدلات سقوط الأمطار وذلك خلال الفترة (١٩٧٢-٢٠١٢)، وقد أُوضحت نتائج الدراسة أن مساحة محصول القمح تتأثر معنوياً وايجابياً بسعر المحصول في العام السابق وسلباً بأسعار بعض المحاصيل المنافسة كالبرسيم والشعير على الترتيب في حين لم يثبت اثر سعر الفول البلدي والبصل. اما بالنسبة لمساحة محصول الأرز، فقد أشارت النتائج إلى أنها تتأثر سلباً وبمقدار ذو دلاله إحصائية بسعر محصول الذرة، في حين لم يثبت اثر سعر محصول الذرة الرفيعة، وبتقدير مرونات العرض السعرية، أشارت النتائج أن مرونة العرض لمحصول القمح بلغت نحو ٠.٦٩ في المدى القصير ونحو ٠.٧٣ في المدى الطويل والتي ثبتت معنويتهما عند مستوى ١%، انخفاض قيمة المرونة يوضح أنه إذا ما أرادت الدولة زيادة الرقعة المزروعة بمحصول القمح فإن ثمة محفزات سعرية كبيرة تكون مطلوبة لتحقيق المساحة المستهدفة، وعلى الرغم من أن الأرز يٌعد واحداً من المحاصيل التصديرية الهامة في مصر، إلا أن مرونة العرض السعرية كانت منخفضة حيث بلغت ٠.٣٥ في المدى القصير و ٠.٥٢ في المدى الطويل. ويمكن تفسير ذلك من خلال السياسة التي تنتهجها الدولة في الحفاظ على مورد المياه، والتي حظرت فيها زراعة الأرز في الأراضي الرملية بالإضافة إلى السياسات غير المستقرة لصادرات الأرز والتي انعكست في الحظر المتكرر وغير المنتظم لتصدير الأرز خلال العقد الماضي، الأمر الذي من شأنه أن يرفع نسبة المخاطر المصاحبة لزراعة الأرز في مصر والناتجة من التقلبات السعرية.

المحكمون :

١- أ.د. منـــى أحمد ســـــليم	أستاذ الاقتصاد الزراعي – كلية الزراعة – جامعة قناة السويس.
٢- أ.د. محمد أمين مصيلحي	أستاذ الاقتصاد الزراعي المتفرغ – كلية الزراعة – جامعة الزقازيق.