Study of effective factors on tomato supply in Khorasan Razavi with ARDL method

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ABSTRACT

The main objective of this study is evaluating of effective variables on tomato supply in long term and short term in Khorasan Razavi. For this, we use Nerlove method whit respect of ARDL in 1984-2007. Results indicated that main variables that affect on tomato supply are production of tomato with one year gap and cultivation area of competitor product sugar beet that have negative and positive effect on its supply respectively.
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INTRODUCTION

In recent years, one of the products that has had a large of fluctuation in its prices is tomato. This is due to its high perishable, very low product storing and on the other hand its seasonal offering, in a way that in one year this product has faced an significant increase in offering and instead a severe drop in prices and even in some cases, the price of selling product does not cover the harvesting costs. This conditions have caused decreasing the crop cultivation area in the next year that will result irrregulation in the market, and according to many experts and specialist's believes, fluctuations of the crop price and its impact on farmer's decision is the main reason for the lack of market regulation. Hence evaluating the fluctuations of the tomato product prices is very essential.

Khorasan province is one of the top positions in the country in agriculture. Such a way that has area of 1081130 hectares of horticulture and crops and has high rank of position with more than 11739546 livestock with more than 7564491 tons of various horticultural crops production and livestock in national agricultural production. The production of tomato in Khorasan Razavi province is about 617,129 tons, which provides about 9.27% of the total province production and the most prodcution of the cities respectively is: Mashhad, Chenaran, Torbat Jam (Information Center of Khorasan Razavi Agriculture Organization, 1386).

The main objective of this study is to evaluate short-term and long-term relationships during various factors affecting on supply of tomatoes and price affecting in Khorasan Razavi Province. The required data for studying by the existing Statistical Yearbook, site of the center of the Khorasan Razavi Agriculture Organization and center Statistics organization for the years 1370 - 1390 is taken. In studies of the factors affecting supply of Nerlav usually is used partial adjustment model (1956).according to this, studying of Valhar Park (1996),jafar (1997),Dindesa and Shamham(1997) , Til (2003 and 2003), Livar (2003) , Torkamani (1376) , Najafi (1380), Yazdani and Mazhari(1382) and torkamani and Rafiee(1384) is noted .

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MATERIALS AND METHODS

Research Method:

To estimate the tomato supply function the Nerlav supply model (1956) is used. According to this function, if optimum and potential supplying of a production in this year is Y_t^* , and assumed as a function of producers' expected price, following equation will be imagined:

$$Y_t^* = \beta_0 + \beta_1 P_t^e + \mu_t \qquad (1)$$

In agriculture, normally, expected price of farmers is the price that they had in the last year so $P_t^e = P_{t-1}$ where P_{t-1} is the crop price in last year. By placing the price of the previous year in equation (1), the following relationship obtain:

$$Y_t^* = \beta_0 + \beta_1 P_{t-1} + \mu_t \qquad (2)$$

Due to the potential supply is not directly observable, Nerlav uses the partial adjustment hypothesis that is as following:

$$Y_t - Y_{t-1} = \lambda \left(Y_t^* - Y_{t-1} \right) \qquad (3)$$

$$0 \le \lambda \le 1$$

Or

$$Y_t = \lambda\, Y_t^* - \lambda Y_{t-1} + Y_{t-1} \qquad (4)$$

And

$$Y_t = \lambda Y_t^* + (1 - \lambda) Y_{t-1} \qquad (5)$$

where λ is the adjustment coefficient or Nerlove coefficient and its reverse $\left(\dfrac{1}{\lambda} \right)$ is speed of adjustment. Speed of adjustment indicates that how fast farmers respond to the expectations of the future. Adjustment coefficient varies between zero and one. In this relation, if λ is too high and equals to one, the operator raction is very rapid and as is closer to zero, the reaction speed will decrease. Therefore, this coefficient is usually differing between these two limits, and hence this model is called the partial adjustment pattern (Torkamani and Rafiee, 1384). About offering, Y_t represents a real supply of this year, Y_{t-1} real supply of last year and Y_t^* presents potential supply product on t the time. In this model it is assumed that the difference between real changes in offering in this year with the last year, $(Y_t - Y_{t-1})$ is Multiple of the difference between the desired and potential supply level of this year and real supply with delayed time $(Y_t^* - Y_{t-1})$. Replacing equation (2) in equation (5) the following minor modifications is taken:

$$Y_t = \lambda(\beta_0 + \beta_1 P_{t-1} + \mu) + (1 - \lambda) Y_{t-1} \qquad (6)$$

$$Y_t = \lambda\beta_0 + \lambda\beta_1 P_{t-1} + (1 - \lambda) Y_{t-1} + \lambda\mu_t \qquad (7)$$

Now if:

There is $\alpha_0 = \lambda\beta_0$ ، $\alpha_1 = \lambda\beta_1$ ، $\alpha_2 = (1 - \lambda)$ and $v_t = \lambda\mu_t$, the final pattern will be as followed:

$$Y_t = \alpha_0 + \alpha_1 P_{t-1} + \alpha_2 Y_{t-1} + v_t \qquad (8)$$

In this study, from relation (8) and with entering other variables such as function and acreage of competitor products, has been analyzed to determine the factors affecting on supply of tomatoes. Numerous studies usually done by rival supply price for its association with the supply of the product which in this study we used competing

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product acreage and actually is noted that being rival or not of the product, in making farmer decision is showing. requie data for the study , has been obtained from the statistical year books and Agriculture Organization of Khorasan Razavi province and Information Center and the Statistical Center of Iran .

RESULTS AND DISCUSSION

In this study and prior estimate Nerlove function, the variable reliability by testing Dickey fuller (ADF) tested and was studied. The results showed that the cost is unstable and static degree of tomato is I (1) and proceeds variable of tomatoes and sugar beet acreage are static. The result of estimating of short-term and long-term relationships that has been gotten by using the tomato supply function ARDL is shown in Tables 1 and 2.

Table 1: result of estimating tomatoes supply model ARDL (2,1,0,2) (Short term)

Variable name	Coefficient	Standard error
Y intercept	316453.1	414599.3
Tomato production rate with one interval	0.6845	0.2746**
Tomato production rate with two interval	- 0.573	0.334
The real price of tomato with one interval	7914.4	8312.2
The real price of tomato with two interval	-11090.5	8162.6
Tomato function	6.749	9.96
Sugar beet acreage	-2.304	3.269
Sugar beet acreage with one interval	3.544	3.34
Sugar beet acreage with two interval	-5.932	2.846**
Process	9852.9	14657.3

R^2=0 . 89   Adj-R^2=0.79   DW=1.8   F=9.43 (99%)
**: means in trusted rate of 95%

Table 2: result of estimating tomatoes supply model ARDL (2, 1, 0, 2) (long term)

Variable name	Coefficient	Standard error
Y intercept	356185.3	462375.9
Real tomato price	-3574.9	11737.8
Tomato function	-7.5965	12.327
Sugar beet acreage	-5.2812	5.564
Process	11090	14075.7

In table (1), the factors affecting on supply of short-term relationships are shown. The optimal number of standstill in Table (1) shows (ARDL (2, 1, 0, a 2)) is obtained by statistic kaeek. The results of table indicate that the producing variable with a standstill has positive effect and meaningful to the supply of tomatoes and despite at two standstills having negative effect on producing but it's not meaningful. Also real price variable of tomatoes at a standstill (tomatoes price in last year) has positive affect .and this variable at two standstills have negative effect on supplying tomatoes although these two variable were meaningless. In other words, farmers have paid special attention to the price of tomatoes last year. Other studying variables, that have positive effect and meaningless on supply of tomato is tomato function. This is due to a slow growth of performance of this product. Also changing in acreage of rival products (sugar beet crop considered in this study) has negative and meaningless effect on the supply of product. During past different years this influence has shown with sinusoidal process that acreage with a standstill period (acreage of the previous year) has negative and meaningful effect on tomato. The process variables have positive and meaningless effect on the supply of tomatoes. Results in Table (2) which related to long-term relationships on tomato supply. Showing, it will not effecting on none of the variable on the supply of tomatoes. Although sign of the coefficients on all variables will be expected (with a time standstill by regarding to impacting prices).

CONCLUSIONS

The results showed that the last year production and acreage of competitor product, as two main and meaningful variables play important role in the supply of tomato and on the contrary of researcher's expectation, price variable has no significant effect on this product. This is due to of the main role of competing products, the sugar beet crop in the tomato supply. In other words, farmers in their decision based on increased acreage and increasing the supply of tomato products, have particular attention to the sugar beet and cultivation of this product is very important for them. Hence it is recommended that the policies that are in the market for this product, particular attention to the regulation of product markets and alternative products are paid. According to the slow growth and the entry of

technology, it is recommended that problems in the usage of new technologies in this field should be in the main program of the policies.

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