Estimated income elasticity and price elasticity of olive in Iran

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Abstract: The objective of this study is to consider the income elasticity and price elasticity of olive products on consumption in Iran using Autoregressive distributed lag (ARDL) approach in order to estimate the relationship between variables. The required data are in the Agri- jahad website, statistical state of Food and Agriculture Organization (FAO) and also in different publishes of central bank for 1991-2007. The result of this study shows that both income and price variables whether in short time or long time have important effects on consume of this production and also compare the effects of this variables in short and long time and shows that use of olive in short time is sensible and meaningful.

Introduction:

Olive tree is one of the ever green trees which grows well around the Mediterranean Sea and shows a good adaptation in area which has suitable climate. The olive economical products obtain in tropical and semitropical area where doesn't have serious winter freezing risk. (Meschi etal. 2002).

Olive plant is resistant against drought and eight gram salt in per liter of water in irrigation and also it can tolerate about ten gram salt in soil extract and two gram salt in per kilogram soil. Olive can grow well in moderate and humid climate. It can tolerate -7-10 c temperate and it would frostbite or loss below -10 c (lozret 1, 1998). The annual precipitation rate should also be 400 to 500 mm and its desirability rate should be between 700 to 1200 mm, (lajvardi, 1980).

Olive is one of the major manufactured and exported products of agriculture department of Iran, so a significant proportion of production, crop lands and a part of export are pertain exclusively to this production (olive) in Iran.

Agriculture is one of the most important segment of economy which provides basic needs of society, thus, it has a particular limitation and preference at economical development in Iran after the Islamic revolution (Amin fard, 2001). In terms of having considerable development potentials, such as millions acters of superficial and for cultivation, possibility of using billions cube meters of superficial and underground sources, enabling to increasing agricultural and horticultural products and in addition to consider the role of this department in strategic purpose, like providing food safty, employment, and export development of non petrolic products, agriculture is the most important segment of government. (Mehrabi Basher Abadi and Taghavi, 2011).

The price of agricultural products was always a determiner factor in agricultural items market. Torkamani and Tarazkar investigate effects of currency rate changes on exported price of pistachio by ARDL method and their major purpose of the study was examine currency rate effects on pistachios export price in Iran. The results shows that changes of currency rate in short and long time is the most important factor which affects on exports price of this product (Torkamani and Trazkar, 2005).

Other researchers, who use ARDL approach in their studies, are Amir Teimoori and Khalilyan. These two scholars research as " profiting and growth of total factors of production in Iran's agricultural department and its overview at forth developmental programs" by using ARDL method and analysis and calculating profiting production factors indices to investigate application efficiency rate of different economical parts. By considering to the assessments, despite of alters in agriculture they deduced that this department had optimum profit and proper implication to use production sources (Amir Tiemoori and Khaliliyan, 2008).

Many researchers use ARDL method in their studies such as: War and Wollmer (1996), Cheung and et al (1997), Rahimi(2001) and etc.

At present study we investigate olive consumption in respect to fields and gardens conditions, climate situation and also by considering consumers income and olive price. The study hypothesis is that rate of income and products price have positive effects on consumption.

Data and Methodology:
In this study we used ARDL method in order to estimate income elasticity and price elasticity of olive on consumption scale. First it is necessary to estimate demand function of olive`s consumers in whole given society, then we analysis this subject by considering the results and investigating.
The specify model for demand function followes:
LnQo = a lnPo + lnRo
Where:
Q_0 is olive consumption;
P_0 is olive real price;
R_0 is income scale of consumers.
Related to the olive demand function structure, we can say that most researchers, who study about olive price variables, intend the income and price of substitute products as major variables in order to investigate price and income elasticity and crossing and non economical variables like numbers of consumers and climate indices. And some other researchers refuse to mention substitute variables for olive because of its properties (such as medicinal properties).
It shows that olive consumption is a function consumer income and olive price. In order to investigate short time and longtime relationship between dependant variables and other explanatory patterns variables, we can use collective method such as Engle Grenger and error correction method (ECM).
However because of limits of using Engle Grenger[1] method and ECM[2] model and also to refusing faults of these models, such as existence of biases in small samples or unable to test statically hypothesis, they suggest more proper methods to analysis short time relationship between variables. So in this case we can indicate to ARDL solution (H.M.Pesaran & B.Pesaran 1997). By using of this solution, it is not necessary for gathering degree of variables- which is essential in Engel Grenger method- to be equal (Yousefi, 1997). In addattion, this method estimates are useful for refusing some problems like its correlation and inborn, so for this reason we use ARDL method in this study.
The total form of generated ARDL model can be show as:

$$\propto (l,p) y_t = \propto_0 + \sum_{i=1}^{k} \beta_i (l, qt) x_{it} + ut, \quad i = 1,2,\ldots,k$$

Where α_0 is width of origin, y_t is dependent variable and L is late factor which are define as:

$$l^i y_{t} = y_{t-j}$$

So:

$$\propto (l,p) - 1 - \propto_1 l^1 - \cdots - \propto_p l^p$$
$$\beta_i (l, q_i) = \beta_{i0} + \beta_{i1} l + \beta_{i2} l^2 + \cdots + (\beta_{iqi} l_i^q)$$

For estimating longtime relationships can use two steps method as follow:
In first step the long term relationship should be test. For this, if evaluated coefficient sum to dependent variables lag was smaller than one, dynamic pattern would move toward longtime balance. So it is necessary to test this hypothesis by convergence test (Noferesti, 2008) like below:

$$H_0 : \sum_{i=1}^{m} \beta_i - 1 < 0$$
$$H_1 : \sum_{i=1}^{m} \beta_i - 1 \geq 0$$

Statistical quantity t which is necessary for this test can be compute like this:

$$t = \frac{\sum_{i=1}^{m} \beta_{i-1}}{\sum_{i=1}^{m} s\beta_i}$$

By statistical comparing calculative t and critical quantity which offer from Benerji and Dolador Master at given confidence level, we can find existence or unexistence of equilibrium longtime erlations between our patterns variables. If this stable longtime relationship between variables proved, in second step we would analysis and estimate the value of coefficients in longtime. In longtime these equations will be confirmed for present variables in this model:

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[1] - Engle Grenger
[2] - Error Correction Model

$$E_t = E_{t-1} = \ldots = E_t \qquad\qquad = \ldots = EP_{t-m}, \quad Ep_t = EP_{t-1}$$
$$X_t = X_{t-1} = \ldots = X_{t-k,} \qquad\qquad PR_t = PR_{t-1} = \ldots = PR_{t-f}$$

The interconnection between a set of economical variables, can provide a range of errors correction/ reform models use. The number of optimum lags intervals for each variable can be determine by Akaik, Hanan queen, Schearts- Beizian criterions (standards).

To consider this model in this study, we use two effective lags at 5% significant level. Data and information which are needed to do this study, are extracted from agricultural Jahad website, statistical state of food and agriculture organization (FAO) and also from different publications of centeral bank in 1370-1386 period, and also we use software packages like Microfit 4.1 and excel to estimate and compute results. Next section shows the olive demand function and its analysis.

Description:

Results of dynamic model (ARDL)

Variable name		coefficient		Standard error
C	Width of origin	B_0	-5.5627	2.5942
LpR(-1)	Olive use logarithm with 1 delay	B_1	-0.25796	0.24085
LpD	Olive price logarithm	B_2	0.57387	0.27958
LR	Income logarithm	B_3	6.3574	2.5055
LR(-1)	Income logarithm with 1 delay	B_4	-5.7906	2.4916
DW=2.02		F=14.2871(.000)		R^2=0.85108

Source: results of this study

The determinate coefficient of regression is 0.85 which estimate by (ARDL) model with lag in each variable. The declaratory variable of the model can show regression change with 85% in average. The error mean of dependant variable is 10.06 and cubes sum of disorganization statement is 0.8 that lag on proper confidence level at this estimating. Results of model correlation show that this regression with 2.02 coefficient consider are placed in high boundary has negative correlation. Thus we can remove this inter-correlation by giving 2 effective lateness to LM test. Fisher statistical test also show that above regression has a very high significance level. The evidence of his claim is statistical value (14.28) with significant level 1 percent.

Results of the long time analysis ARDL model

Variable names		coefficient		Standard error
C	Width of origin	-5.5627	B_0	2.5942
LP_D	Olive price logarithm	0.31591	B_1	-0.32644
LR	Income logarithm	0.56673	B_2	0.26534

Source: result of this study

According to results of this table income variables of olive which has direct effect on consumption. This effectiveness from statistical point of view is not significance, so by applying 1 lag; it will reach to 5% significance level. Because of this you can see effectiveness of this variable at longtime model, according to results of the statistical test investigated computing t and critical quantity which are offer from Benerji and Dolador Master at given confidence level. The results of longtime indicate that income variable with 0.56 coefficient has the most important effects on

olive consumption that corrects at 5% significant level. Therefore you can be optimistic about applying increasing income policy to Regulate Olive consumption. Next variable which investigate is olive price. Results of estimating ARDL model illustrates that this variable has not significant effects on olive consumption rate in our country. The proof of this claim was having no significance of this variable with 0.31 values (from statistical point of view).

Results of error correction estimating

Variable name		coefficient	Standard error
Dc	First degree differences of width of origin	-5.5627	2.5942
Dx_2	First degree differences of olive price logarithm	-0.25796	-0.24085
Dx_3	First degree differences of income logarithm	6.3574	2.5055
Ecm(-1)	Error correction component	-1.000	None
Dw =2.0214		F=5.5552(.014)	R^2=0.62498

Source: result of this study

After being sure about effects of parameters of long time olive consumption function and in order to be assure about probable changes (variations) of variables in short time, we use error correction model as a pattern. To reach this purpose, the different between income and price variables should be considered. Results indicate (That), as income variable has a positive effect on consumption at long time, it also shows positive effect in short time. Then at short time obtains 6.35 which show variables capable in consumption variations declaratory at short time at significance level 5% now we can be optimistic about temporary and short time policy respect to income variations. About price variable also shows that despite of positive effects of price variable in longtime is (0.25), for short time model this value is negative from which statistical point of view, it is not significance and its effect is not increase the olive production. In short time model estimating, the criteria which determine validity rate to reach initial balances, is ECM coefficient or error correction model. According to results of above table, the determinate coefficient at short time regression is 0.62 which shows

declaratory variables cannot explain variations in olive consumption absolutely. The Fisher test results also show that short time model is defining at 5.55 and significance level 5 percent.

Conclusions:
All we can say that the results show that the income variable has a greater impact on the consumption of olive oil and what is meaningful in the long term and short term. But in the case of variable price must be said that the opposite is true. If the government adopted a policy that will allocate a subsidy to consumers Raise income and consumption can be increased olives. As well as policy advocacy and training classes can produce better management and improved quality of production and increase supply and other non-economic variables, marketing and advertising agents can also help to increase the consumption of olive oil.

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