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THE VALUATION OF OLIVE (*OLEA EUROPAEA* L.) ORCHARDS: A CASE STUDY FOR TURKEY

S. ENGINDEKIZ, M. YERCAN and H. ADANACIOGLU

Ege University, Faculty of Agriculture, Department of Agricultural Economics Bornova, Izmir, Turkey

Abstract

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Valuation of orchards is important in condemnation, taxation, loan, insurance, inheritance, and purchase-sale cases. The approach to be used for orchards may vary according to the purpose of appraisal, age of the establishment, obtainable data, and according to the current regulations. In this study and tree values of olive orchards in a selected region from Turkey were determined by income capitalization approach. For this aim, four villages have been selected and data have been collected from 55 farmers selected randomly. While determining the value of the olive orchards with trees, past values approach was used. The capitalization rate for income capitalization approach was determined as 5.32%.

Key words: capitalization rate, orchards, income capitalization approach, olive, valuation

Introduction

The olive which is the symbol of peace has been the most important plant in Mediterranean and Aegean Regions since ancient times (Sesli and Bkmakoglu, 2006). According to 2007 FAO statistics, olive production in the world was realized in 7.7 million ha area and production quantity was 17.4 million tones. The most important share in olive production of the world belongs to Spain (33%), then comes respectively Italy (20%), Greece (15%), and Turkey (9%) (FAO, 2007). In Turkey, 65-70% of olives are produced for oil and the rest are reserved for table olives. Further 85% of table olive production in Turkey is black (Tunalioglu and Karahocagil, 2005).

Olives grow best in warm temperatures, and can-

not tolerate extreme climatic conditions. The Mediterranean region, owing to its mild climate, contains 98% of the olive harvest and 95% of the olive oil production in the world. The annual production of olives depends on climatic conditions and the alternate bearing nature of the olive tree, which yields one-year high/one-year low amounts (periodicity). Nevertheless, Turkey enjoys the advantages of being one of the major producers of olives in the Mediterranean basin. Turkey stands in second place in table olives production (first in black olives) and fourth in olive oil production in the world (Goksu, 2008).

According to 2007 data of Turkish Statistical Institute, there are 144.3 million olive trees in Turkey (TURKSTAT, 2007). 65% of olive trees in Turkey are in the Aegean region. Manisa which is located in

the Aegean region is an important place in olive production of Turkey. Manisa is situated in the western part of Turkey between 38° 04' N and 27° and 27° 08' E. According to 2007 data of Turkish Statistical Institute, there are 4.4 million olive trees in Manisa and its olive production is 34 249 tones (TUKSTAT, 2007).

In recent years, many studies have been made on economics of olive and olive oil production in Turkey (Olgun and Akgungor, 1998; Artukoglu, 2002; Tunalioglu and Gokce, 2002; Dizdaroglu et al., 2003; Tunalioglu and Karahocagil, 2005; Ozden, 2006; Karsli, 2006; Erdogan, 2008; Artukoglu and Olgun, 2008). However, there has not been much research examining valuation of olive and other orchards in Turkey (Angin, 1989; Ozudogru, 1998; Engindeniz, 2001; Engindeniz, 2003; Keskin, 2003; Engindeniz, 2007). Therefore, there is still need for study, especially in local level.

The purpose of valuation should be known to carry out valuation accurately, to explain the results, and to interpret them correctly. The approach to be used for valuation of real estates varies according to the purpose and different approaches give different results (Murray et al., 1983). Valuation of orchards is mainly carried out for condemnation, taxation, loan, insurance, inheritance, and purchase-sale purposes (Casler and White, 1982; Anonymous, 1983; Buchwald, 1986; Verger et al., 1989; Kennedy et al., 1995; Henning et al. 1996; Corraera, 1997; Kennedy et al., 1997).

In this study, income capitalization approach that can be applied in determining the land and tree values of orchards was examined theoretically, and then application of this approach was performed for olive orchards in Manisa, Turkey.

Material and Methods

Data have been collected from 55 **non-irrigated** olive orchard owners (farmers) by randomly sampling method in four villages (Caglayan, Karayakup, Malkoca, and Tepekoy) selected from Gordes district of Manisa province by survey method. Accord-

ing to 2007 data of Turkish Statistical Institute, there are 93,000 olive trees in Gordes district and its annual olive production is 180 tones (TURKSTAT, 2007). All the data surveyed from the farmers were the data of 2008. Size of olive orchards varied between 0.3-3.6 hectares and average olive orchard size was 1.7 hectares.

Various data of this study were collected by survey method. To serve the purpose, two different survey forms were used. The first one was done with owners of olive orchards and the second one with people dealing with purchase-and-sales of land in every location.

In this study, to determine the land and tree values of olive orchards, income capitalization approach was used. According to the income capitalization approach, in order to find the value of a real estate, all incomes of that real-estate in future are estimated and added to the value on valuation time. The standpoint in this approach is the income of the appraised goods. Therefore, to apply this approach the appraised goods should have a continuous income (Boykin and Ring, 1993; Ventolo and Williams, 2001; Anonymous, 2001). Basically, it is possible to appraise land and tree values of orchards both over average annual net income and over periodic net income.

In calculation of average annual net income of orchards; total establishment and maintenance (production) costs are subtracted from total production value (gross production value) to be obtained. Compound interest factor $(1 + f)^n$ is used in calculating the added establishment and production costs at the end of rotation period.

In determination of land value over average annual net income, the following equation is used (Murray et al., 1983);

$$D_0 = \frac{R}{f}, \quad (1)$$

where: D_0 – is land value of orchard; R – is obtained average annual net income from orchard; f – is capitalization rate.

For appraisal of tree value according to age; gross income value is used and all paid costs at the end of

economic life should be updated to the valuation time. At this stage, a discount factor $\left[\frac{1}{(1+f)^n} \right]$ is used.

As a second step, total cost is subtracted from gross income. In determining the value of land with trees according to their age, values determined according to age are also added to the land value. Because, orchards are perennial, in valuation of orchards by income capitalization approach, it is better to take periodic net income capitalization as the basis (Casler and White, 1982; Murray et al., 1983; Corraera, 1997).

The following equation is used in determination of land value using total periodic net income (Mulayim, 2001):

$$D_0 = \frac{\sum_0^n (R)}{q^n - 1} \quad (2)$$

where: D_0 – is land value of orchard; $\sum_0^n (R)$ – is

total net income obtained from orchard at the end of economic life; n – is economic life of orchard; q – is compound interest factor $(1+f)^n$.

In determining value of land with trees in orchards over periodic net income, two approaches are generally used (Rehber, 2008):

- a) Past values approach
- b) Future values approach

In calculating the value of land covered with trees by using past values approach, the value of the land is updated to “ t ” year and then the updated total income is subtracted from this value. This equation can be written as follows:

$$D_t = (D_0 \cdot q^t) - \sum_0^t (R) \quad (3)$$

In future values approach; the value of a land covered with trees at “ t ” age is calculated by adding the updated land value $(n-t)$ and net income updated to “ t ”. This equation can be written as follows:

$$D_t = \left(D_0 \cdot \frac{1}{q^{n-t}} \right) + \sum_n^t (R) \quad (4)$$

In determination of tree values according to age, land value is subtracted from the calculated value of

land with trees according to age and divided by number of trees per hectare. In principle, same or similar results are obtained by past and future approaches. However, it is recommended to use past values approach if the orchard to be appraised is close to establishment years and future values approach if it is close to end of economic life.

Results

According to 2007 data of Turkish Statistical Institute, yield of olive per tree in Gordes, Manisa and Turkey were 8, 14, and 10 kg, respectively (TURKSTAT, 2007). The average yield of olive in normal production period was found 2 959.60 kg per hectare and 10.57 kg per tree in this study. Productive years of olive had been accepted to be 100 years.

Olive is marketed by sales co-operatives, wholesalers, commissioners, olive oil companies, and retailers in Turkey. In the selected area, most olives of producers were marketed to olive oil companies The producer price of olives varied between \$ 0.73/kg and \$ 1.17/kg according to results of this study. Average price was calculated to be \$ 1.05/kg (Table 1).

The establishment costs are spreading to six years in olive orchards. The establishment costs cover all the expenses that is relating with the period of the trees having productive capacity. These are generally related with the costs of labor and machines (maintenance, energy, etc). On the other hand, production cost consists of both operating (variable) and fix cost. Labor is used for harvesting, transporting and classification in this production branch.

In this study, average gross production value of olive orchards for productive years was found to be \$ 3 107.58 per hectare and \$ 11.10 per tree. Gross production value is expressed by the total yield multiple the average price of olive. Net income is calculated by deduction from the total gross production value all such costs within the production period. This value is the income of fix assets. Net income of olive orchards was found to be \$ 1 960.18/hectare and \$ 7.00/tree (Table 1).

Generally, land values of olive orchards can be

Table 1
Average net income of olive orchards

Periods	Olive production			Number of tree in ha	Average price of oil, \$/kg	Gross production value, \$/ha	Total costs, \$/ha	Net income, \$/ha
	Age of trees	kg/tree	kg/ha					
Establishment period	1	-	-	280	-	-	1.247.06	-1.247.06
	2	-	-	280	-	-	469.93	-469.93
	3	-	-	280	-	-	571.07	-571.07
	4	-	-	280	-	-	571.07	-571.07
	5	-	-	280	-	-	571.07	-571.07
	6	-	-	280	-	-	571.07	-571.07
Increasing period	7	2.21	618.80	280	1.05	649.74	1.147.40	-497.66
	8	4.07	1.139.60	280	1.05	1.196.58	1.147.40	49.18
	9	6.92	1.937.60	280	1.05	2.034.48	1.147.40	887.08
Normal production period	(10-96)	10.57	2.959.60	280	1.05	3.107.58	1.147.40	1.960.18
Decreasing period	97	8.39	2.349.20	280	1.05	2.466.66	1.147.40	1.319.26
	98	7.86	2.200.80	280	1.05	2.310.84	1.147.40	1.163.44
	99	7.45	2.086.00	280	1.05	2.190.30	1.147.40	1.042.90
	100	6.96	1.948.80	280	1.05	2.046.24	1.147.40	898.84

appraised according to sales comparison and income capitalization approaches. In Turkey, farmers rarely sell their land. Therefore, in using of sales comparison approach, only data of six non-irrigated orchards that have undergone purchase-sales procedures lately

were used. Sales price per hectare of six non-irrigated orchards varied between \$ 14 666.67 and \$ 19 166.67. Average sales price per hectare by sales comparison approach was calculated to be \$ 18 079.10.

Table 2
Total tree values per hectare by income capitalization approach of olive orchards

Age of tree	Land value without tree (D_0), \$/ha	Land value with tree (D_t), \$/ha	Total value of tree ($D_t - D_0$), \$/ha	Value per tree, \$/tree
10	19.684.87	36.453.00	16.768.13	59.89
20	19.684.87	36.309.47	16.624.60	59.37
30	19.684.87	36.077.40	16.392.53	58.54
40	19.684.87	35.681.33	15.996.46	57.13
50	19.684.87	35.016.53	15.331.66	54.76
60	19.684.87	33.898.80	14.213.93	50.76
70	19.684.87	32.023.73	12.338.86	44.07
80	19.684.87	28.874.73	9.189.86	32.82

In application of income capitalization approach, first of all capitalization rate should be determined. In the study, a proportion has been made between total net income obtained from the above mentioned six non-irrigated orchards and total sales price of these orchards and a capitalization rate of 5.32 % have been calculated.

In this study, land value without tree of olive orchards over periodic net income was calculated to be \$ 19 684.87. Further, tree values for between 10 and 80 ages were determined by using income capitalization approach. When periodic net income is used in calculation, past or future values approaches can be preferred. Past values approach was used for determining tree values in this study. Tree values per hectare varied between \$ 9 189.86 and \$ 16 768.13 according to tree ages (Table 2).

In this study, the planting space was found between the interval of 5x5 m and 8x8 m. The most common and preferable planting space in olive orchards was 6x6 m. The number of trees per hectare was determined to be average 280 trees. Thus, if total value of trees in one hectare to be divided to 280 trees, the value of one olive tree can be calculated to be between \$32.82 and \$59.89 according to ages of trees.

Discussion

For valuation of orchards, sales comparison, income capitalization and cost approaches can be used. However, the approach to be used varies, depending on the purpose of the appraisal (condemnation, taxation etc.), the period of establishment, obtainable data, and regulations of the country.

In determination of land values without trees of olive orchards, sales comparison and income approaches can be used, in general. In valuation of trees; sales comparison, income capitalization and cost approaches can be used. If olive orchards are within establishment period cost approach may be better. But, if the establishment period is over sales comparison and income capitalization approaches can be preferred.

As stated above, the approach to be used in valu-

ation of olive orchards differs depending on regulations of the country. For example; for determination of condemnation cost, sales comparison approach is preferred in countries like Holland, Germany, and Italy; income capitalization approach is preferred in England, Scotland, Ireland, and Turkey; and that both approaches are used in USA and Canada. Besides, it should be stated that application of the same approach varies from one country to another.

According to the results of this study, it was found out that land value with trees of olive orchards calculated over net income and a rate of 5.32% was more high than the values calculated by sales comparison approach. Further, age of a tree and the number of tree per hectare effect the value of land with trees significantly.

Conclusion

Basically, making calculations according to more than one approach is important in making comparisons and in interpretation of results. Accuracy of data to be used is as important as the selection of the approach to be used. For example, if sales comparison approach will be used recent sales-and-purchase values should be determined; if income capitalization approach will be used income per year, expenses, and proper capitalization rate should be determined; and if cost approach will be used cost should be carefully determined. Therefore, advantages and disadvantages of every approach should be taken into consideration in determining the approach to be used.

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