

The valuation of olive orchards: A case study for Turkey

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Abstract

Valuation of orchards is an important issue 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, land and tree values of olive orchards in a selected region from Turkey were determined by the periodic income capitalization approach. For this aim, four villages were selected and data was 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 the income capitalization approach was determined as 5.32%. The value of bare land of olive orchards over periodic net income was calculated to be \$ 19,684.87/ha. Tree values per hectare varied between \$ 9,189.86 and \$ 16,768.13 according to tree ages.

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 Tokmakoglu, 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 tonnes. The most important share in olive production of the world belongs to Spain (33%) followed by 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 olive (Tunalioglu and Karahocagil, 2005).

Olives grow best in warm temperatures, and cannot 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 producer 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 (Göksu, 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 tonnes (TUKSTAT, 2007).

In recent years, many studies have been made on economics of olive and olive oil production in Turkey (Olgun ve Akgungor, 1998; Artukoglu, 2002; Tunalioglu and Gokce, 2002; Dizdaroglu

et al., 2003; Tunalioglu and Karahocagil, 2005; Ozden, 2006; Karsli, 2006; Erdoğan, 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, the periodic income capitalization approach that can be applied in determining the land and tree values of orchards was theoretically examined, and then application of this approach was performed for olive orchards in Manisa, Turkey.

Material and methods

Data was 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. According to 2007 data of Turkish Statistical Institute, there are 93,000 olive trees in Gordes district and its annual olive production is 180 tonnes (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 filled with owners of olive orchards and the second one with people dealing with purchase-and-sales of land in every location.

To determine the land and tree values of olive orchards, the periodic income capitalization approach was used. According to the periodic income capitalization approach, in order to find the value of a real estate, all incomes of that real-estate in future were 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 were subtracted from total production value (gross production value) to be obtained. Compound interest factor $(1+f)^n$ was 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 was used (Murray *et al.*, 1983);

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

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

For appraisal of tree value according to age; gross income value was used and all paid costs at the end of economic life should be updated to the valuation time. At this stage, a discount factor

$$\left[\frac{1}{(1+f)^n} \right]$$

was used. As a second step, total cost was subtracted from gross income. In determining the value of land with trees according to their age, values determined according to age were also added to the land value. Because, orchards are perennial, in valuation of orchards by the income capitalization approach, it is better to take the periodic net income capitalization as the basis (Casler and White, 1982; Murray *et al.*, 1983; Corraera, 1997). This is not the only reason; other important factors are that tree ages and thus yield (income from trees) differ. Therefore, periodic net income should be calculated instead of annual net income for valuation of orchards.

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

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

where: D_0 – is value of bare land of orchard; $\sum_0^n (R)$ – is total periodic 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, generally two approaches *viz.*, Past value or Future value approach are used (Rehber, 2008).

In calculating the value of land covered with trees by using past values approach, the value of bare land was 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 bare 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 principle, same or similar results are obtained by past and future approaches. Therefore, past values approach was only used in this study. 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.

In determination of tree values according to age, value of bare land was subtracted from the calculated value of land with trees according to age and divided by number of trees per hectare.

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 cost cover all the expenses that is relating with the period of the trees having productive capacity and were included for six years in olive orchards. These are generally related with the costs of labour 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 year and \$ 11.10 per tree in normal production period. Gross production value is expressed by the total yield multiplied with the average price of olive. Net income was calculated by deduction from the total gross production value all such costs within the production period. This value was the income of fix assets. Net income of olive orchards in normal production period was found to be \$ 1,960.18/year and \$ 7.00/tree (Table 1).

Generally, land values of olive orchards can be 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

Table 1. Average net income of olive orchards by age of trees

Periods	Olive production			Number of tree in a 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
	97	8.39	2,349.20	280	1.05	2,466.66	1,147.40	1,319.26
Decreasing period	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

Table 2. Land and tree values of olive orchards by the periodic income capitalization approach

Age of tree	Value of bare land (D_0) (\$/ha)	Value of land with tree (D_t) (\$/ha)	Total value of trees ($D_t - D_0$) (\$/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

\$14,666.67 and 19,166.67. Average sales price per hectare of six non-irrigated orchards was calculated to be \$18,079.10.

In application of periodic income capitalization approach, first of all capitalization rate should be determined. In the study for determining appropriate capitalization rate, total net income obtained from the above mentioned six non-irrigated orchards divided by total sales price of these orchards (Mulayim, 2001), and a capitalization rate of 5.32 % has been calculated.

In this study, value of bare land 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 the periodic 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 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 is divided by 280 trees, the value of one olive tree can be calculated which ranged between \$32.82 and 59.89 according to ages of trees.

Discussion

For valuation of orchards, the sales comparison, the periodic income capitalization and the 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. Cost approach can be used only for valuation of olive trees (1-6 ages). However, value of olive trees (1-100 ages) can be also determined by the periodic income capitalization approach. But, the periodic income capitalization approach for valuation of trees is preferred more than the cost approach in valuation practices of orchards (Casler and White, 1982; Corraera, 1997)

In determination of value of bare land of olive orchards, the sales comparison and the periodic income approaches can be used, in general. In valuation of trees; the sales comparison, the periodic income capitalization and the cost approaches can be used. Especially, if olive orchards are within the establishment period the cost approach for calculating value of trees can be preferred. But, if the establishment period is over the sales comparison and the periodic income capitalization approaches are better.

As stated above, the approach to be used in valuation of olive orchards differs depending on the regulations of the country. For example in valuation for condemnation; cost and sales comparison approaches are 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 (Corraera, 1997; Gulden, 2000; Mulayim, 2001).

According to the results of this study, it was found out that value of bare land of olive orchards calculated over net income and a rate of 5.32% was higher than the sales comparison approach. This result can be evaluated as a contradiction. But, the value of land with tree per hectare of olive orchards by the sales comparison approach can be less than the value of bare land per hectare of olive orchards by the periodic income capitalization approach in valuation practices. There are many reasons for value loosenesses in Turkish land market. For example; avoiding the high property tax, economical crisis, agricultural and land policies, industrialization, economic affects of drought, immigration from villages to urban etc. The same results were determined also in some previous studies done in Turkey (Engindeniz, 2001; Engindeniz, 2003).

Basically, making calculations according to more than one

approach is important in making comparisons and interpretation of results. But, different approaches may arrive to different results. Further, different approaches can be used according to aims of valuation and country's law. Accuracy of data to be used is as important as the selection of the approach to be used. For example, if the sales comparison approach is used, recent sales-and-purchase values should be determined; if the income capitalization approach is used, periodic net income and proper capitalization rate should be determined; and if the cost approach is used, the 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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