

# Landowner Total Income From Oak Woodland Working Landscapes in Spain and California<sup>1</sup>

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## Abstract

Conventional accounting of agricultural income focuses on the commercial operating income from oak woodland ranches, omitting the value of amenities to the landowner and real capital gains, which includes land revaluation (appreciation). These accounting exercises also mix income earned through self-employed (landowner and household) labor with ranch operating income, making it difficult to estimate separately how capital investment and landowner labor time are remunerated. In this paper we estimate the total landowner income and profitability rates from six oak woodland case studies in Spain and California. We use data from commercial operations, private amenity values from two contingent valuation surveys and average land revaluation rates. Self-employed labor returns are estimated for each economic activity. We find that when private amenity values and capital gains are considered, profitability rates range from 9.7 to 12.6 percent in California, and 6.3 to 8.7 percent in Spanish case studies, rates that are competitive with alternative investments. Self-employed labor is present in two California and in two Spanish case studies, providing positive returns in the former, though below the average wage rate from an alternative employment, and no returns in the latter. Our results provide a more complete economic valuation of these oak woodlands and a better understanding of landowner decisions and motivations for current and future land investment.

*Key words:* income accounting, private amenities, rangeland economics

## Introduction

It is well-recognized that private amenities (environmental and lifestyle values enjoyed by landowners) have a significant influence on the price of rangelands and that land appreciation also influences these prices and the owner's long-term financial status (Campos and others 2009, Torell and others 2005). It is also acknowledged that the landowner and household (self-employed) labor is often present in ranching operations (Huntsinger and others 2010) and a return is desired from this labor. When these factors are not considered in economic analysis, it is hard to understand land prices and why landowners so often persist in ranching, instead of making other investments with their financial resources.

Such is the case for oak woodlands in Spain and California. Apart from commercial operating income, the conventional profit associated with commodity production, these working landscapes have three additional income streams for the

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landowner. These are often not factored into applications of the System of National Accounts (SNA), the internationally agreed upon standard set of recommendations for how to compile measures of economic activity, and are identified as: (i) private amenity income, because the SNA is generally limited to market commodities; (ii) income from self-employed (landowner and household) labor, which in the SNA is mixed with operating income; and (iii) capital gains from land revaluation (appreciation) and other assets, which is acknowledged as part of total income (BEA 2009, Eisner 1989) but not measured in current applications of the SNA. This leads to an incomplete valuation of landowner returns, and therefore of full economic activity, in oak woodlands. Accounting systems that include these three income sources can help correct this failing, and better understand the decisions of ranchers about their lands.

In this paper we measure the total landowner income and profitability rates from six oak woodland case studies in Spain (named *dehesas*) and California. We apply at the farm scale the Agroforestry Accounting System (AAS), which is designed specifically to overcome the limitations of the SNA for total income measurement when applied to agroforestry systems (Campos 2000). We integrate the value of market commodities, costs and capital investment, private amenities consumed by the landowner, and capital gains. To that end, we use landowner records from the case studies, private amenity values from two contingent valuation surveys, and average land revaluation rates from official statistical sources. Income from self-employed labor is estimated for each economic activity.

## Methods

Total income from an economic activity is defined as: “that which can be consumed while keeping real wealth intact, saving (= investment) is the difference between this measure of income and actual (final) consumption. Both income and saving will then include real capital gains. To preserve the saving-investment identity, investment would also have to include these capital gains. Failure to include them causes a disparity between income statements and balance sheets that reflect market values” (Eisner 1989: 17). According to this definition, total income is the aggregated value of final consumption and investment, and the two components of total income from an oak woodland ranch are the net value added and capital gains. The AAS departs from this definition and extends the concept of production to include in income measurement the amenities consumed by the landowner.

Net value added and capital gains are obtained from the two accounts used by the AAS: the production account and the capital balance account, respectively. The production account measures output and cost flows from current production, including gross capital formation (gross investment) as output and work in progress (ongoing work on products not yet finished) used as cost. The net value added is estimated as net operating margin (the net surplus from the operation before taxes and subsidies on production) plus labor. The net operating margin is the balance between outputs and costs (similar to a typical enterprise budget). Labor includes employee and self-employee compensation. The capital account incorporates entries, withdrawals and revaluation (changes in the value) of fixed capital and stored work in progress. Capital gains are measured from capital revaluation less capital destruction plus normal depreciation during the accounting period. The production and capital accounts provides the information needed to estimate the immobilized capital (IMC), which is the average annual capital investment in a woodland operation, including in land, infrastructure, equipment and animals.

The total income from the oak woodland to the landowner is the sum of capital income plus landowner self-employee compensation. Capital income is the sum of net operating margin and capital gain, and represents the return to capital investment obtained annually both as an actual monetary and expected return. Self-employee compensation represents the income returns to the labor devoted by the landowner and household in the operation.

Outputs and durable goods sales are valued at producer prices and costs and durable goods bought are valued at purchase prices. Both prices exclude operating subsidies and taxes. We do not consider subsidies and taxes, and nor does the SNA, because they are economic transfers between sectors. In addition, taxes and subsidies regimes are different between countries and would partly distort our results. While in Spain dehesa owners mostly receive subsidies from the European Union, in California ranchers are more likely to benefit from tax breaks.

Profitability rates are measured on the basis of capital income related with IMC over the accounting period in order to be consistently comparable to alternative investments. The estimation of profitability refers to the ratios of net operating margin, capital gain and capital income to IMC, which offers the operating, capital gain and total profitability rates, respectively. Operating and capital gain profitability are expressed in nominal terms. Total profitability is presented both at nominal and real terms, the latter being a nominal rate deflated by consumer price index.

## **Data**

Data taken from the case studies refer to commercial operating activities in the woodland and capital (asset) values except land. These data were collected from account books, in-depth interviews and field data in 2010 for the Spanish case studies and in 2007 for the California case studies. Private amenity output, land price and land price revaluation were obtained from other sources as explained below. We also detail the criteria to estimate the part of mixed operating income corresponding to self-employed labor compensation.

### ***Private amenity values***

The missing measurement of privately consumed (non-market) amenities in income accounting is a relevant gap because these are “a significant part of the real income of many individuals” (Krutilla 1967: 779). To obtain a monetary value for the non-market production of private amenities in Spanish and California oak woodlands, we used a contingent valuation study applied in the two oak woodland areas.

For the Spanish case studies, the landowner willingness to pay (WTP) for private amenities is estimated from a 2010 contingent valuation study of 765 privately-owned oak woodlands and forests in Andalucía (Oviedo and others, n.d.). The authors use a logit regression to estimate a WTP function from the analysis of a single-bounded question. For the California case studies, the landowner WTP for private amenities is estimated from a 2004 contingent valuation study of 115 privately-owned oak woodlands in California (Campos and others 2009). The authors use a weighted least square regression to obtain a WTP function from the analysis of an open-ended question.

Substituting the values of the corresponding explanatory variables from our case studies into these functions, we obtain the WTP for each case study. This WTP corresponds to the output amenity value we integrated into the AAS. The estimated values were transformed to United States dollars in the Spanish cases and updated to

2010 United States dollars in the California cases.

### ***Land prices and land revaluation***

The same surveys that included the contingent valuation questions also included a question about what landowners thought the current sale price of their woodland was. They were also asked to allocate (in percent) how this land price was explained by the commercial and amenity benefits from the woodland. Based on this, we constructed two functions in each study area, one for the land price and one for the percentage of land price explained by private amenities. Using the values of the corresponding explanatory variables we obtained the land price and the percentage of the land price explained by private amenities for each case study.

The capital account also requires an estimation of how much land price changes during the year (land revaluation), as part of the capital gain figure. However, land revaluation is a highly variable figure and using the one from a single year would not represent a long-term trend. Instead, we employ an average value for a longer period by using statistical data for rangeland price variation in the studied areas of the case studies. For the dehesa, we calculated the average nominal cumulative land revaluation rate for dry natural grassland in Spain for the period 1994-2010 from MARM (2011), resulting in a 6.7 percent rate. For the California ranches we calculated the average nominal cumulative land revaluation rate for rangelands in California for the period 1999-2010 from CASFMRA (2012), resulting in a 7.9 percent rate.

We also distinguish the share of land revaluation from commercial and private amenity activities. As in both areas we observe decreasing real commercial operating income (Ovando and others, n.d.; Torell and others 2001) and increasing values of amenities to landowners (Huntsinger and others 2010; Oviedo and others, n.d), we assume that all land revaluation is explained by an expected increase in future private amenity values and is entirely attributed to the capital gains of this activity. This is open to re-assessment if trends change.

### ***Self-employed labor***

Many landowners and their households work the land themselves, obtaining income that is a mix of returns from self-employed labor and capital investment. This mixed income is an integration of net operating margin, including both returns to manufactured net operating margin and resource rent and self-employee compensation, and is obtained from the production account. We propose here an *ad hoc* criterion of separating the components of this mixed income (net operating income and self-employed labor).

For each woodland activity, we estimate the value of this mixed income and the hours of self-employed labor devoted to it. The resource rent is known from the local market (we estimate it from our case studies). When there is no self-employed labor, the remaining income (once resource rent is subtracted) corresponds to the manufactured net operating margin. When there is self-employed labor devoted to an activity, three situations could arise: (i) if the mixed operating income is negative, we attribute all of it to the manufactured net operating margin (self-employed labor is unpaid); (ii) if the mixed operating income is positive and on a per hour basis is lower or equal than 80 percent of the employee hourly wage in the area, all is attributed to self-employed labor; (iii) if the mixed operating income is positive and on a per hour basis higher than 80 percent of the employee hourly wage, self-

employed labor corresponds to the 80 percent and the remaining is manufactured net operating margin.

## **Case study description**

The dehesa is an ancient land use system in the oak woodlands of Spain, largely in the southwest of the country. Cork, acorns, pigs, sheep, goats, cattle (including fighting bulls), mushrooms and other products are marketed from woodlands with well-spaced oaks and a grass understory grass in a dry-summer, frost-free Mediterranean climate.

We analyze three dehesa case studies: Dehesas A, B and C. Dehesa A is a flat property of 179 ha, located in Córdoba province. Holm oak (*Quercus Ilex*) occupies almost the entire property. Firewood is harvested for landowner use and silvopastoral practices are carried out to improve pasture productivity. Cattle are crossbred meat breeds, and purebred Iberian pigs graze on acorns and grass. Wild boar and small game are hunted. Dehesa B is a moderately sloped sierra property of 1336 ha, located in Sevilla province. Holm and cork oaks (*Q. suber*) cover 87 percent of the land. Cork and firewood harvesting is carried out, and silvopastoral management aims to improve grass and acorn yields. Purebred retinta cattle are the only livestock breed raised. The property includes an enclosed commercial hunting reserve (coto). Dehesa C is a property of 1260 ha on a moderate to highly sloped sierra located in Córdoba province. Pure stands of holm oak cover 43 percent of the property. There is no timber or firewood harvest. Iberian pigs and merino sheep are reared, and segureña sheep graze on the property. This dehesa has a partially enclosed commercial hunting reserve (coto).

On the California side we also have three case studies: Ranches A, B and C. Ranch A is located in Shasta County and covers 2671 ha. Oak woodland and annual grassland are 34 and 55 percent of the property, respectively. English crossbreeds graze dryland range and irrigated pasture. Firewood is sold by the ranch owner as stumpage and a fee is collected annually from hunters who are allowed access. Ranch B is located in Tehama County and covers 1358 ha. Oak woodlands occupy 65 percent of the property. Hunting is the main commercial activity and firewood is harvested. The landowner maintains a small herd of English crossbred cattle that are used to help meet vegetation management goals. The rancher also leases winter pasture to a local livestock producer and cultivates crops for cattle and big game. Ranch C is located in Mendocino County and covers 2656 ha. Oak woodlands cover 38 percent of the property. It is family-operated ranch and the main activity is livestock production.

**Table 1—Income, capital and profitability indicators in three dehesa case studies (\$ per hectare of useful agrarian land except for profitability rates which are in percent)**

Class	Dehesa A			Dehesa B			Dehesa C		
	COM	PA	TOT	COM	PA	TOT	COM	PA	TOT
1. Labor (L)	179.4	-	179.4	212.5	-	212.5	64.6	-	64.6
1.1 Employee compensation	179.4	-	179.4	212.5	-	212.5	64.6	-	64.6
1.2 Self-employed compensation <sup>a</sup>	0.0	-	0.0	-	-	-	0.0	-	0.0
2. Net operating margin (NOM)	-117.8	642.1	524.3	-207.9	465.9	257.9	-13.0	62.2	49.2
3. Net value added (NVA=NOM + L)	61.5	642.1	703.6	4.5	465.9	470.4	51.6	62.2	113.8
4. Capital gain (CG)	-91.1	377.1	286.0	72.2	704.4	776.7	-4.6	468.3	463.7
5. Capital income (CI=NOM + CG)	-208.9	1,019.2	810.2	-135.7	1,170.3	1,034.6	-17.6	530.5	512.8
6. Total income (TI=CI + L)	-29.5	1,019.2	989.6	76.8	1,170.3	1,247.1	47.0	530.5	577.5
7. Land price <sup>b</sup>	5,020.2	3,787.2	8,807.4	4,569.8	5,364.5	9,934.4	2,968.5	3,935.0	6,903.5
8. Immobilized capital (INC)	9,113.3	3,787.2	12,900.5	6,602.0	5,364.5	11,966.5	3,790.5	3,935.0	7,725.5
9. Operating profitability (NOM/CIN) (%)	-0.9	5.0	4.1	-1.7	3.9	2.2	-0.2	0.8	0.6
10. Capital gain profitability (CG/CIN) (%)	-0.7	2.9	2.2	0.6	5.9	6.5	-0.1	6.1	6.0
11. Total profitability (CI/CIN) (%)	-1.6	7.9	6.3	-1.1	9.8	8.7	-0.3	6.9	6.6

COM: Commercial activities; PA: Private amenity activity; TOT: Total.

<sup>a</sup> As value is quantity (hours of work) times price (wage rate), we prefer to maintain the self-employed item when its value is zero to denote real unpaid labor in the commercial activity. A dash implies that there is no self-employed labor time devoted to ranch operations in the case study.<sup>b</sup> Land price at the beginning of the year.

## **Results**

In tables 1 and 2 we present a set of income, capital and profitability indicators from our case studies. As the AAS classifies economic activities according to types of production, we differentiate between commercial and private amenity activities. All results are in 2010 United States dollars per hectare and represent nominal values (they are not adjusted by inflation).

In the three dehesa cases, private amenity activities contribute more than commercial activities to all income indicators except for income resulting from labor, which is completely derived from paid employment (table 1). Commercial activities have negative values in the net operating margin in all cases. Capital gains from private amenities are high as all land revaluation is attributed to this activity. Capital gains from commercial activities come from manufactured investments and are negative for Dehesas A and C, and positive for B. Capital income from commercial activities is negative for the three dehesas. The main contribution to total capital income comes from the net operating margin in Dehesa A (65 percent) and from capital gains in Dehesa B and C (75 and 90 percent respectively).

According to the functions elaborated from the Oviedo and others (n.d.) data, 43, 54 and 57 percent of total land price is explained by private amenities in Dehesas A, B and C, respectively (table 1). The contribution of manufactured capital to immobilized capital in the accounting period represents 32 percent for Dehesa A, 17 percent for Dehesa B and 11 percent for Dehesa C.

The profitability indicators also show differences between commercial and private amenity activities, with negative or low values for the former and positive values for the latter (table 1). Total profitability ranges from 6.3 to 8.7 percent (table 1). If capital gains were not considered the total profitability would be reduced around 5 percent (ranging from 0.6 to 4.1 percent); and if private amenities were ignored the total profitability would be reduced by 4 percent (becoming negative in all cases). The real total profitability, which considers the inflation rate in the period 1994 to 2010, is 3.2, 5.6 and 3.5 percent for Dehesas A, B and C, respectively. These rates do not include net subsidies on livestock production, which have been important in dehesa management in the past decades, and increase landowner profitability.

For the ranch cases, private amenity activities contribute more than commercial activities to all income indicators except for labor in all cases and for net value added in Ranch A. For Ranches B and C, landowner self-employment contributes 19 and 79 percent to labor income, respectively (table 2). Commercial activities offer positive values for the net operating margin in the three cases, although it is very low or even close to zero in ranch B and C. Capital gains are contributed mainly by private amenity activities, being low or negative for commercial activities (table 2). Capital income from commercial activities offers positive values for the three cases, although is particularly low for Ranches B and C. The main contribution to total capital income comes from capital gains in the three ranches.

**Table 2—Income, capital and profitability indicators in three ranch case studies (\$ per hectare of useful agrarian land except for profitability rates which are in percent)**

Class	Ranch A			Ranch B			Ranch C		
	COM	PA	TOT	COM	PA	TOT	COM	PA	TOT
1. Labor (L)	35.3	-	35.3	19.6	-	19.6	6.6	-	6.6
1.1 Employee compensation	35.3	-	35.3	15.8	-	15.8	1.4	-	1.4
1.2 Self-employed compensation <sup>a</sup>	-	-	-	3.8	-	3.8	5.2	-	5.2
2. Net operating margin (NOM)	104.1	114.9	219.0	5.0	205.9	210.9	32.9	83.2	116.1
3. Net value added (NVA=NOM + L)	139.4	114.9	254.3	24.6	205.9	230.5	39.5	83.2	122.7
4. Capital gain (CG)	4.1	279.5	283.5	31.4	281.0	312.3	-10.7	246.8	236.1
5. Capital income (CI=NOM + CG)	108.2	394.4	502.5	36.4	486.8	523.2	22.3	330.0	352.3
6. Total income (TI=CI + L)	143.5	394.4	537.8	56.0	486.8	542.8	28.8	330.0	358.9
7. Land price <sup>b</sup>	1,293.2	2,201.9	3,495.1	1,305.3	2,222.6	3,527.9	1,212.3	1,896.2	3,108.6
8. Immobilized capital (INC)	1,774.9	2,201.9	3,976.8	2,224.8	2,222.6	4,447.4	1,740.9	1,896.2	3,637.1
9. Operating profitability (NOM/CIN) (%)	2.6	2.9	5.5	0.1	4.6	4.7	0.9	2.3	3.2
10. Capital gain profitability (CG/CIN) (%)	0.1	7.0	7.1	0.7	6.3	7.0	-0.3	6.8	6.5
11. Total profitability (CI/CIN) (%)	2.7	9.9	12.6	0.8	10.9	11.8	0.6	9.1	9.7

COM: Commercial activities; PA: Private amenity activity; TOT: Total.

<sup>a</sup> As value is quantity (hours of work) times price (wage rate), we prefer to maintain the self-employed item when its value is zero to denote real unpaid labor in the commercial activity. A dash implies that there is no self-employed labor time devoted to ranch operations in the case study.

<sup>b</sup> Land price at the beginning of the year.

According to the functions elaborated from the Campos and others (2009) data, 63, 63 and 61 percent of the total land price is explained by private amenities in Ranches A, B and C, respectively (table 2). The contribution of manufactured capital to immobilized capital in the accounting period represents 12 percent for Ranch A, 21 percent for Ranch B and 15 percent for Ranch C.

The three profitability rates show higher values for private amenity activities (table 2). Total profitability ranges from 9.7 to 12.6 percent (table 2). If capital gains were not considered the total profitability would be reduced by around 6 percent, ranging from 3.2 to 5.5 percent; and if private amenities were ignored the total profitability would be reduced by around 3 percent, to 2.6 percent in Ranch A and near zero percent in the other two cases. If we consider the inflation rate in the period 1999 to 2010, we find that the real total profitability is 9.9, 9.1 and 7.0 percent for Ranches A, B and C, respectively. United States subsidies in the form of tax relief and crop production subsidies are not included in the capital income indicators and profitability rates, which would be slightly increased if taken into account.

## **Concluding remarks**

We have quantified the income and profitability from oak woodlands to landowners in Spanish dehesa and California ranches in a standardized framework that includes market and (non-market) private amenity values, capital gains, and returns from household labor. Our analysis shows that private amenities add about 3 percent to total profitability while integrating capital gain based on historical land revaluation trends adds about an additional 6 percent in an average year. In real terms, dehesa and ranch total profitability is in the 3 to 5 percent and 7 to 9 percent ranges, respectively. Both capital gains and private amenities are important for explaining landowner income and land prices in our case studies, and create profitability rates that can compete with alternative investments of similar risks and time horizon.

We also find that in some case studies there is unpaid or low-paid self-employed labor, showing that landowners substitute hired labor with their own labor and that they work for a low remuneration to maintain their operating activities. This willingness to keep their operations with unpaid or self-employed labor returns can be attributed to their desire to enjoy land and work-related amenities. In other words, self-employed labor returns could be embedded in the amenity income value. In addition, we recognize that our private amenity income estimate could be overvalued if the private amenity activities were using as inputs intermediate services from other ranch activities.

Important economic values associated with the activities of these working woodlands are missed, or not accounted for, in the income measurement by national accounts and related economic analysis. The amenity component of ranching enterprises is becoming more important with as yet not fully understood outcomes for these ecosystems (Huntsinger and others 2010). If we want to progress in ecosystem accounting and in the integration of the market and non-market values into economic and policy decisions, the proposed method in this paper can be a departing point for larger scale application to these working woodlands. This could support conservation programs based on a better understanding of landowner decisions and potential responses to natural resource conservation policy.

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