IAS FAIR VALUE AND FOREST EVALUATION ON FARM FORESTRY

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ABSTRACT

Forest evaluation causes the greatest problems in farm accounting because it requires exact up to date information concerning the growing and bare forestland. Moreover, the changes in forest property value caused by the fluctuation of stumpage prices affects both the balance sheet and even the profit and loss statement, and therewith all forest profitability measures from annual net profit to different ROI measures. The evaluation of marketable stands can be based on market prices. On the other hand, the evaluation of unrealisable property, such as seedling stands, as well as young and middle aged stands, is vague.

International Accounting Standards (IAS 41) came into force at the beginning of 2003 in the European Union (EU). According to this standard the biological property of public enterprises in stock exchange has to be evaluated by a 'fair value', which can be defined based on the market prices at the time of felling and marketing expenses. However, evaluation by a 'fair value' must not be made, if the value cannot be measured reliable. The property values can also be based on yield value, such as net present value (NPV), which is calculated by discounting the incomes and costs. The interest rate used is defined in the IAS by the market interest rate. Although the IAS does not bind enterprises outside stock exchange, there are reasons even for other enterprises even in farms to adopt its practices.

The forest management test material used in the research was collected from five farm accounting estates. Farm profitability accounting is part of EU's Farm Accounting Data Network (FADN) Only in Finland more than 1000 farm and involved in the FADN bookkeeping annually. Forestry data provided by the bookkeeping farms are based on forest management plans (FMPs). Using new FMPs the balance sheet can be calculated accurately enough, but over time the data will become obsolete. The value of the forest and its changes requires updating the growing stock data. In addition to a FMP, knowledge is required about fellings and silvicultural activities. A local FMP software (Mela) is used for updating the forestry data. The program even simulates the growth of trees according to growth models.

The value of the marketable stand is based on an allowable cut calculation that estimates the total amount of felling opportunities when only forest law limitations have been included The value of seedling stands, as well as young and middle aged stands, is based on expectation values. The value of the whole growing stock has been divided in the balance sheet into inventories and fixed assets using the FMP software. The fluctuation of property values are caused by fellings, as well as the change in growing stock volume, but especially by the change in stumpage prices. The change in forest value also affects the profit and loss statement. The IAS therefore causes unrealistic fluctuations in net profit. This profit and loss statement volatility suggests that it would be recommendable to perform sensitivity analyses and to compare the evaluations obtained from different paradigms. Property values, their components and sensitivity results were made available to the farms in the investigation.

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INTRODUCTION

Savings Account Forest

Of the non-industrial private forest land in Finland, 33% is owned by farm entrepreneurs, 32% by pensioners, 25% by employees, 6% by other entrepreneurs, and 4% by others (Sevola 2002). In 2001, there were roughly 72,500 farms with agricultural land exceeding one hectare, and they possessed altogether 4,490,000 ha of forest. The average area of forestland per farm was 48 ha, an increase of some 6 ha per farm from 1990. At the same time, the area of arable land had increased from 17.4 ha to 29 ha per farm.

A farm's forests can be a very important source of financing agricultural investments. Income from timber sales can be used for financing agricultural production in addition to other forms of financing. Forests can be perceived as a kind of bank where the liquidity and solvency of agriculture is concerned.

Agricultural Bookkeeping Farm Network and FADN

The agricultural profitability bookkeeping maintained by MTT Economic Research follows the economic development of agricultural and horticultural, as well as multibusiness enterprises, based on the accounting data collected from the enterprises. There are about 1000 bookkeeping farms providing the data annually. Profitability bookkeeping material is employed in research, agricultural administration, economic consulting, interest supervision, and agricultural education. Since 1995, profitability bookkeeping has been part of the farm accountant data network (FADN) of the member states of European union (EU).

A farm can be disaggregated into different production lines (business areas): agriculture, horticulture, forestry, other entrepreneurial activities, and the private household. For each production line, closing the accounts, as well as ratios depicting profitability, liquidity, and solvency, will be calculated using the collected data. Both traditional ratios of the agriculture and commonly used ratios of enterprises are utilized. Information supplied by the bookkeeping farms are monetary incomes and expenditures obtained from taxation bookkeeping, as well as cultivation data, production amounts, changes in property and working hours. The bookkeeping material sales income figures are based on real accounting transactions. The stumpage prices used in the evaluation of the growing stock are not based on real sales prices, however, they are average prices obtained from local forest centers.

It has not been possible to calculate the accrual based closing of accounts of forestry in farm bookkeeping. The reason for this has been methodological deficiencies in estimating the values of the growing stock and the bare forestland. The value of the growing stock fluctuates annually according to impact of the net increase and fellings. Moreover, changes in stumpage prices affect the value

of the growing stock. The change in the value of the growing stock has an effect on the profit and loss statement and, consequently, on the profitability of forestry.

Forest Value Approaches

The annual net profit of a forest enterprise consists of three different parts: (i) the realized net income—the difference between felling incomes and expenditures required to produce them, (ii) timber balance change, i.e. the volume change, and (iii) the value change caused by changes in stumpage prices. One can therefore talk about a dualistic value change that consists of a dynamic portion, i.e. the value change based on the volumes, and an economic cycle portion, i.e. the value change based on stumpage prices (Niskanen ym. 2002).

The evaluation of forest property of the bookkeeping farms can be based on the utilization of existing forest management plans (FMPs). The value of the growing stock and the annual timber balance can be estimated using the field measurements of the FMSs. The site information of each forest stand is also available from the FMPs for the evaluation of the forestland. The evaluation of the growing stock for each fiscal year requires an update of the growing stock stand data of the FMPs according to the situation at the end of the fiscal year. All the factors affecting the amount of the growing stock, such as net increment and fellings, can be updated until the end of the fiscal year. Using the FMP software (MELA) developed by the Finnish Forest Research Institute (FFRI) the growth can simulated years ahead. The simulation is based on the growth models, which present the state-of-the-art of the forest mensuration science. The evaluation of forest land can be performed with help of the FMP SW (MELA) using the bare land evaluation, which is based on the Faustmann formula or using the forestland values based on the auxiliary tables of the sum-value method (Vehkamäki 1998).

International Accounting Standards (IAS)

The international bookkeeping standard called International Accounting Standard (IAS) 41, for the evaluation of biological property, came into force on January 1, 2003. According to IAS 41, publicly quoted enterprises have to evaluate their biological property based on the 'fair value' according to market prices, from which the costs of the sales momentum will be deducted (Argilés & Slof 2001). The evaluation of the property is by the 'fair value' if the value cannot be measured reliably. In forestry, a stand ready for final felling can use the felling value minus sales costs. The market prices of plantings, young or middle-aged stands do not conform the present state of the biological property. As their fair value, the 'present value of the expected net cash flow from the asset' can be used (IFRIC 2003). The market interest rate before the impact of taxation is used as the discounting interest rate. The IAS brings many improvements such as more transparency and, especially, comparability (Liebfried 2002). The impact of market fluctuations on profit still remains a problem, however.

MATERIAL AND METHODS

Evaluation Methods

The growing stock can be perceived both as means of production and product in the accounting framework. The disaggregation of the value of the growing stock in the assets of the balance sheet requires a special calculation, which reveals the share of the immediately merchantable growing stock from the remaining growing stock. This split can be performed by the help of the allowable cut calculation of the FMP SW (MELA). The remaining share of the growing stock consists of the plantings, young and middle-aged stands, which contain no merchantable wood. In the balance sheet, the growing stock, which can immediately be cut according to the forestry law, and the allowable cut belongs to the current assets, i.e. inventories under the title 'work in progress'. The remaining portion of the value of the growing stock belongs to the fixed assets, i.e. tangible assets as an item 'the growing stock'.

The NPV, using the interest rate 1–5% based on the net income of the growing stock, can be defined by MELA-SW both by stands and the forest holding level. The allowable cut calculation yields the volume of the growing stock as well as the outturn by roundwood assortment divided into logs and pulpwood. The allowable cut calculation is based on a ten-year calculation period, and the outturn is placed in the middle of the period. When calculating the allowable cut, the sustainability principle is applied. When the allowable cut of the first planning period is maximized, the net incomes of the future periods are also taken into consideration. The allowable cut can be calculated using the MELA-SW by maximizing the net income of the first period and ignoring the impact of the net income of the future periods.

The annual change in the value of the growing stock will included into the profit and loss statement as an item such as change in inventories belonging to total income. The annual turnover of forestry can fluctuate dramatically between different fiscal years because of the timing of timber sales. The change in value of the growing stock can, however, be the dominant single part of the total income if timber sales income has been small or no wood has been sold during the year in question. The fluctuation of stumpage prices can cause significant changes in the value of the growing stock between fiscal years. All these annual changes also affect the profitability of forestry.

Material and Calculations

The forest management plans (FMPs) of bookkeeping farms for the years 2001 and 2002 formed the research material. In addition to the FMPS inquiries were sent to farms, by which means information was acquired concerning fellings and other silvicultural activities after the FMP. The harvested wood volumes were also sought as log and pulpwood by tree species and by forest stand. Moreover, the basal area of the remaining growing stock after the felling was sought, if possible. The profitability material of the farms for 2001 and 2002 was used in the investigation in addition to the updated FMPs and felling information, etc.

The growing stock information of the Farms' FMPs was updated until the end of 2001 and 2002 using the MELA-SW. When simulating the felling information, two different methods were used. Fellings can be simulated either (i) based on the new updating field measurements or (ii) by using the activity control of the MELA-SW, which is based on simulation of predefined silvicultural activities. The value of the growing stock was also calculated manually using the sum value method and the updated forest stand information. The total value of the growing stock was then reduced by 30% according to the principle of the sum value method.

RESULTS

The Forest Value and the Allowable Cut

The growing stock was disaggregated in the balance sheet into current assets and fixed assets using the allowable cut calculation of the MELA-SW. The immediately merchantable growing stock belongs to inventories of the current assets. The value of the remaining growing stock is obtained by subtracting the allowable cut from the NPV of the net incomes. The allowable cut can be defined using two alternative methods: (i) the allowable cut calculation is based on the maximization of net income of the first 10-year period without any consideration of the income from the following periods. (ii) the allowable cut calculation is based on the

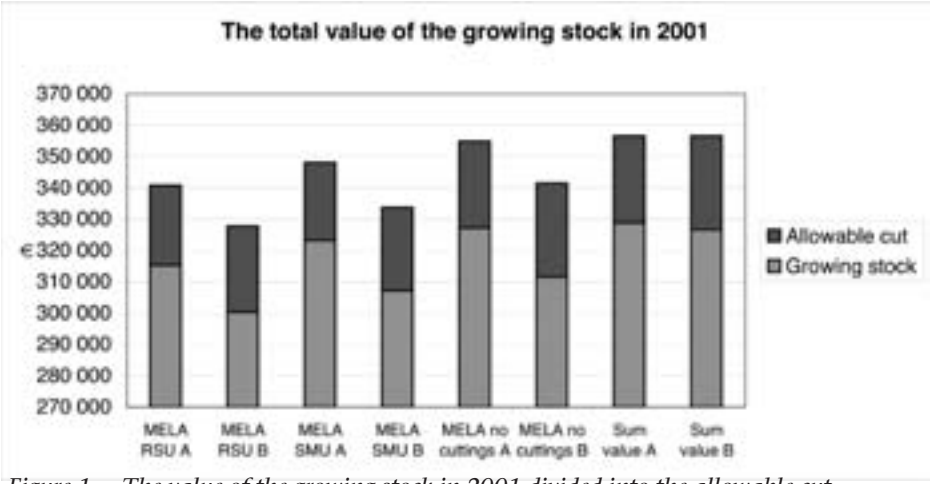

Figure 1.—The value of the growing stock in 2001 divided into the allowable cut and the remaining growing stock, by different methods in 2001.

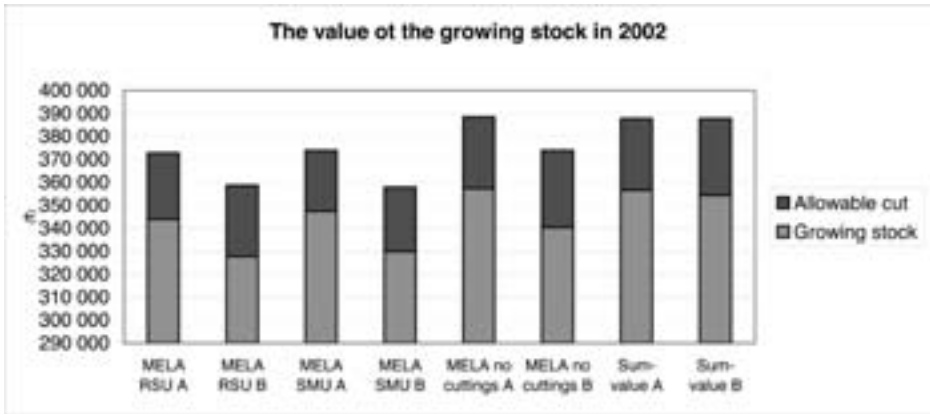

Figure 2.—The value of the growing stock in 2002 divided into the allowable cut and the remaining growing stock in 2002.

Table 1.—The allowable cut and the remaining growing stock, by different methods in 2001

	Allowable cut / €	Allowable cut / %	The value of the remaining growing stock / €	The total value of the growing stock / €
Average	27 500	8.0	317 500	345 000
Methods A on average	26 500	7.6	323 700	350 100
Methods B on average	28 500	8.4	311 400	339 900
No cuttings A	27 800	7.8	327 200	355 000
No cuttings B	30 000	8.8	311 500	341 500
SMU A	24 900	7.1	323 300	348 100
SMU B	26 500	7.9	307 200	333 700
RSU A	25 500	7.5	315 300	340 800
RSU B	27 500	8.4	300 300	327 800
Sum value A	27 500	7.8	328 900	356 600
Sum value B	30 000	8.4	326 600	356 600

In 2002, the total value of the growing stock increased; on average, by 30 600 € using methods A and 29 700 € using methods B.

maximization of the NPV of the net income using 5% interest rate, and also takes into consideration the net income of the next periods.

The calculation methods have been nominated as follows:

no cuttings = the MELA calculation of the value of the growing stock is performed and based only on the FMP.

MELA RSU = the MELA calculation is based on the FMP and the ACTUAL updated information consisting of harvested amounts and estimated basal areas.

MELA SMU = the MELA has an IMPLIED activity control, that has decided and performed harvesting and other silvicultural activities, and these harvested amounts of wood and estimated basal areas, as well as other activities, have also been used in calculations.

Sum-value = the value of the growing stock has been defined using the sum-value method, in which no cuttings have been taken into consideration.

The calculation methods have been grouped according to different allowable cut calculations so that method 'A' maximizes the PV of the net incomes and 'B' maximizes the net income of the first 10-year planning period.

Different methods depict the impact of background assumptions and the input data set.(Table 1)

In 2002, the total value of the growing stock increased; on average, by 30 600 € using methods A and 29 700 € using methods B. With both methods A and B, the allowable cut increased compared to the previous year on average, 10.5% or 2 900 €.

The Value Change of the Growing Stock

The value change of the growing stock in 2001-2002 can be divided into the change in stumpage prices and the change in volumes of the growing stock. The change in the volumes means the difference between the net increment and fellings. The impact of the changes in stumpage prices has been defined by calculating the values of the growing stocks in 2001 and 2002 using the stumpage prices of 2001. The remaining portion of the value change has been caused by the change in net increment and fellings.

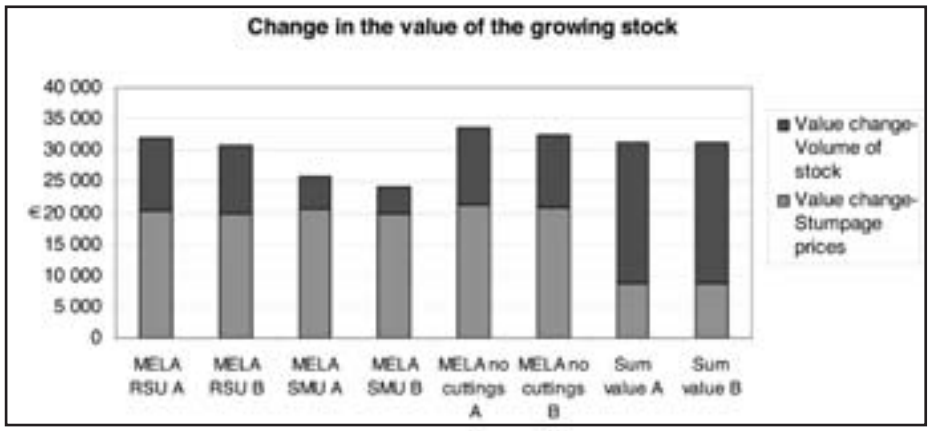

Figure 3.—The value change of the growing stock divided into stumpage price change and volume change impacts

Table 2.—The allowable cut and the remaining growing stock, by different methods in 2002.

	Allowable cut / €	Allowable cut / %	The value of the remaining growing stock / €	The total value of the growing stock / €
Average	30 400	8.1	344 800	375 200
Methods A on average	29 400	7.7	351 400	380 800
Methods B on average	31 400	8.5	338 200	369 600
No cuttings A	31 200	8.0	357 300	388 500
No cuttings B	33 400	8.9	340 500	373 900
SMU A	26 300	7.0	347 500	373 900
SMU B	28 000	7.8	329 900	357 900
RSU A	28 700	7.7	344 000	372 800
RSU B	30 800	8.6	327 900	358 700
Sum value A	31 200	8.0	356 700	387 900
Sum value B	33 400	8.6	354 500	387 900

With both methods A and B, the allowable cut increased compared to the previous year on average, 10.5% or 2 900 €.

Table 3.—The value change in the growing stock divided into stumpage price and volume change components, by different methods

	The impact of the stumpage price change		The impact of the volume change	
	The value change / €	Share of the total change	The value change / €	Share of the total change
Average	17 500	59.2	12 600	40.8
Methods A on average	17 700	58.7	12 900	41.3
Methods B on average	17 300	59.7	12 300	40.3
No cuttings A	21 300	63.4	12 300	36.6
No cuttings B	20 800	64.2	11 600	35.8
SMU A	20 500	79.8	5 200	20.2
SMU B	19 900	82.4	4 300	17.6
RSU A	20 400	63.8	11 600	36.2
RSU B	19 900	64.5	11 000	35.5
Sum value A	8 700	27.8	22 600	72.2
Sum value B	8 700	27.8	22 600	72.2

Timber sales incomes amounted to 17 500€ in 2002. The methods MELA RSU A and B, and MELA SMU A and B recognized the fellings and reduced the value of the growing stock. When these methods are compared with methods MELA no cuttings A and B, it appears that the impact of the fellings on the value change of the growing stock is smaller than the sales income.

SUMMARY

The amendment of the accounting of biological assets, IAS 41, inspired the development of agricultural accounting in order to implement an accrual based accounting system to include forestry assets. The IAS 41 employs the 'fair value' concept. The most recent interpretation of fair value focuses the 'present value of the expected net cash flow from the asset'. This requirement means that the forest stand data of the forest management plans (FMPs) and a FMP software is needed to evaluate these present values of the future activities.

An inquiry among the c. 1000 bookkeeping farms revealed some 150 farmers who were interested in providing their FMPs for research purposes. In this study, five forest holdings have been used in the analysis. The rigorous input data requirements of the FMP software was very demanding. The estimation of the basal areas of stands after fellings was a particular challenge.

The value change of the growing stock and felling incomes form the major part in the net income of the profit and loss statement. The value of the growing stock at the end of 2002 was nearly the same after the fellings performed by the RSU- and SMU-methods. Recall that the basal areas after fellings were based on the actual measurements in the RSU-method and on software decided fellings and calculations in the SMU-method . The change in the value of growing stock was, however, much smaller with the RSU-method than with the SMU-method. The SMU-method simulated the final fellings better than thinnings. When using the sum-value method, the change in stumpage prices was significantly smaller than when using the forest management planning (FMP) software (MELA). The expectation values of the sum-value method are based on coefficients for each stand and a 30% reduction in the total calculated value that reduces the impact of the changes in stumpage price.

The RSU-method based on the measurements resulted in smaller, and probably more realistic, changes in the value of the growing stocks. The evaluations were performed using 4% interest rate. The critical point of the evaluation, the 'expected net cash flows' of seedling-, young- or middle-aged stands was performed using different methods, which also imposed allowable cut and forest value estimates. The maximization of first periods net income, alternative B, represents a

radical solution compared with the maximization of the present values, alternative A, in the allowable cutting calculations. The A solutions, especially, with RSU- and SMU-methods were not close to each other, the first of which could be considered the best estimate.

LITERATURE CITED

Agrilés, J. M. & Slof, E. J. 2001. New opportunities for farm accounting. The European Accounting Review 19(2): 361-383.

IFRIC. 2003. IAS 41 Agriculture: Recognition and measurement of biological assets. International Financial Reporting Interpretation Committee (IFRIC) of International Accounting Standard Board (IASB), Meeting September 30-October 1, 2003 (http://www.isdn.org.uk/)

Liebkind, P. 2002. Accounting according to IAS: more transparency and better comparability. Stahl und Eisen 122(3): 87-91 [in German with English summary]

Niskanen, A., Hakkarainen, J., Leppänen, J., Veijalainen, S., Pynnönen, E., Hyttinen, P., Kallio, T. 2002. Laskentatoimen perusteet metsätaloudessa [Basics of accounting in forestry]. Silva Carelia. University of Joensuu. Faculty of Forestry 179 p.[in Finnish]

Sevola, Y. 2002. Forest resources. In: Peltola, A. (ed.). Finnish Statistical Yearbook of Forestry. Finnish Forest Research Insitute, Helsinki, Finland, s. 33–76.

Vehkamäki, S. 1998. Sum-value method as an institution of the forest estate business. In: Jöbstl, H, Merlo, M. & Vinzi, L. Proceedings of the international symposium on Insititutional Aspects on Managerial Economics and Accounting in Forestry. Stabilimento Tipolitografico Agnesotti, 01100 Viterbo, Italy, p. 181-201.

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