

The International Financial Reporting Standards (IFRS) accounting system as applied to forestry

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Abstract			
<p>Forestry has been monitored in agricultural profitability book-keeping as a separate business area since 1912 by the Economic Research of the MTT Agrifood Research Finland. At present, the monitoring is based on the accounting data collected annually from approximately 1050 book-keeping farms. The monitoring is grounded on the profitability book-keeping application, MARTTI, and an Internet based reporting system, EconomyDoctor. Since 1995, the Finnish data for the Farm Accountancy Data Network (FADN) of the member states of the European Union (EU) has also been supplied by MTT Economic Research, which is the authorized Finnish Agency in the FADN network.</p> <p>The book-keeping data collected from farms is used to calculate the closing of accounts, i.e. the profit and loss statement and balance sheet, as well as key economic ratios for each production line. Forestry incomes and expenditures are collected, as well as labour and property data. The key element of developments forest accounting is the availability of the forest inventory contained in the forest management plan (FMP) of a forest holding. Moreover, owners report all updates, such as fellings and silvicultural activities, after the forest inventory. Using the updated forest inventory, the MELA FMP software of the Finnish Forest Research Institute (Metla) provides the values of the growing stock and bare land and returns these to the MARTTI accounting system. These information systems have been integrated via the Internet using the XML protocol and service procedures, firewalls, etc. information and communication technologies (ICT). The established forestry book-keeping procedure provides reliable information for the purpose of financial statements.</p> <p>The financial statements have been drawn up using the International Financial Reporting Standards (IFRS) and especially its International Accounting Standards (IAS) 41 - Agriculture for the growing stock and IAS 16 - Property, Plant and Equipment for the bare land. The key IAS notion of 'fair value' as the evaluation basis can, in the case of forestry be interpreted loosely as net present value (NPV). The fair value of the growing stock fluctuates annually according to the impact of the net increase and fellings. Both physical and price changes affect the net profit according to IAS 41. The key aspect of the development is the evaluation of the IAS 'fair value' of the growing stock, classified as mature and immature biological assets, and their annual changes. The changes due to stumpage price and physical change in the growing stock are also to be disclosed separately. Moreover, the fair value of bare land is also estimated annually for each stand.</p> <p>The purpose of this study is to apply all relevant IAS/IFRS statutes and relevant theoretical contributions to determine whether the international accounting standards (IASs) are applicable in profitability book-keeping for forest holdings in order to support rural entrepreneurship. The structure of the financial statement reports accords to the IAS standards. The applicability of the IAS standards have been tested with the data and technical framework of the profitability book-keeping system of the MTT Economic Research.</p>			
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1 Introduction

1.1 Agricultural book-keeping farms and forestry

There were roughly 68,700 farms with agricultural arable land exceeding one hectare in 2006 in Finland, possessing on average 47 hectares of forest. In all, there are some 443,000 non-industrial private forest holdings with an average of 23.6 hectares of forest land according to the Finnish Forest Research Institute (FFRI 2007). The agricultural profitability book-keeping maintained by the Economic Research of the MTT Agrifood Research Finland (https://portal.mtt.fi/portal/page/portal/www_en/Research/Economics) monitors the economic development of the various activities of farms, agriculture, horticulture, reindeer husbandry, forestry and the diversification of business, based on the accounting data collected annually from the approximately 1050 book-keeping farms. The monitoring is based on the profitability book-keeping application, MARTTI (2008). Since 1995, the Farm Accountancy Data Network (FADN 2008) of the member states of the European union (EU) (see Argilés and Slof 2001; Elad 2004) has also been taken care by MTT Economic Research.

A book-keeping farm can be disaggregated into different production lines (business areas), forestry being one. The data collected is used to calculate closing the accounts, as well as the profit and loss statement and balance sheet for each production line. It has been difficult to calculate reliable accrual-based financial statements for forestry, the reason being methodological deficiencies in estimating the values of the growing stock and the bare forest-land. The value of the growing stock fluctuates annually according to the impact of the net increase and fellings. Moreover, even changes in stumpage prices affect the value of the growing stock. In fact, the stumpage price development has been surprisingly favourable in recent years, which has also stimulated the development of forestry accounting (Figure 1).

Forestry is an essential part of a Finnish farm and the economy of the entrepreneur. Forestry incomes significantly affect the profitability and liquidity of farms and have also been used for financing investment in agriculture and other businesses, except for private finance. Forestry has

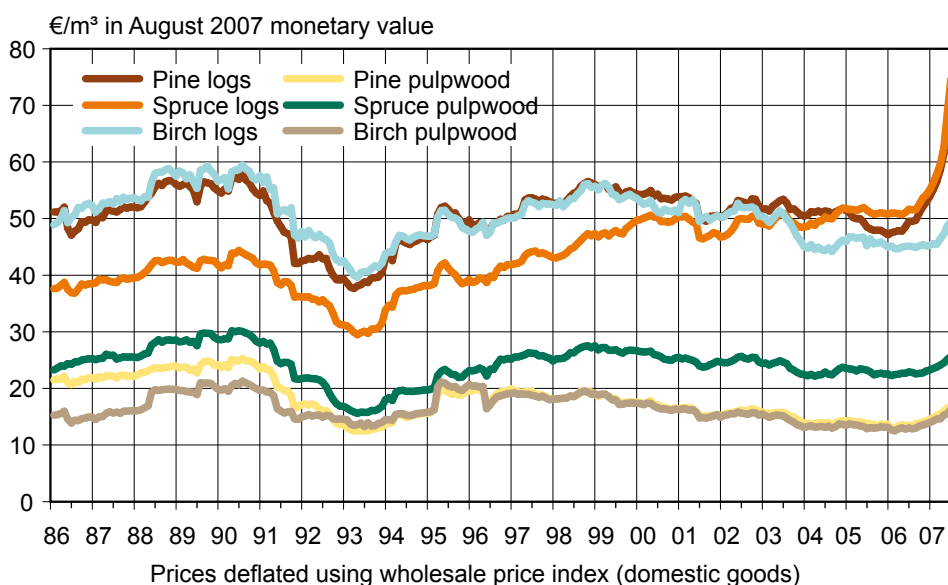


Figure 1. Monthly roundwood stumpage prices (FFRI 2007).

been monitored in profitability book-keeping as a separate business area from the very beginning of operations in 1912. Forestry income and expenditure have been collected as well as the use of labour and property data. The net result was initially calculated by cash-based methods. Accrual-based profit and loss as well as balance sheet calculations were used, however, when the whole profitability book-keeping system was renewed in the 1990s (the MARTTI system, www.mtt.fi/taloustohtori).

FFRI has a long tradition in national forest inventories (NFI 2008) and in developing forest management planning systems such as MELA (Siitonen et al. 1996, Redsvén et al. 2004, 2007). The forest management plans (FMPs) of the book-keeping farms enable the evaluation of the growing stock and bare land in the closing of the books. The system constructed in recent years in cooperation with MTT Agrifood Research Finland and the FFRI is based on growing stock data updated by the NetMELA service (Nuutinen and Kettunen 2005) (www.metla.fi/metinfo/mela/). This data is combined with the forestry book-keeping data of the MARTTI profitability book-keeping system. The system produces the present values of bare land and growing stock for the balance sheet. When the values of other properties are also present values, the balance sheet describes the present value of the forest property in all its parts. Accordingly, the change in the forest property can be taken into account in the profit and loss statement, so that the net profit is based on annual change in the growing stock and wood sales.

The International Accounting Standards (IAS) 41 Agriculture of the EU relies on fair value accounting (FVA), which is enabled here by the relatively new forest inventory data of the forest management plan (FMP) for each forest holding. Moreover, the owners have reported all updates, such as fellings and silvicultural activities, after the forest inventory. The constructions rely on the MARTTI profitability book-keeping system (MARTTI 2008) of the MTT Economic Research and on the MELA forest management planning system (Redsvén et al. 2004) of the Finnish Forest Research Institute (FFRI). These information systems have been integrated via the Internet using the XML protocol and service procedures established for book-keeping farms (Figure 2).

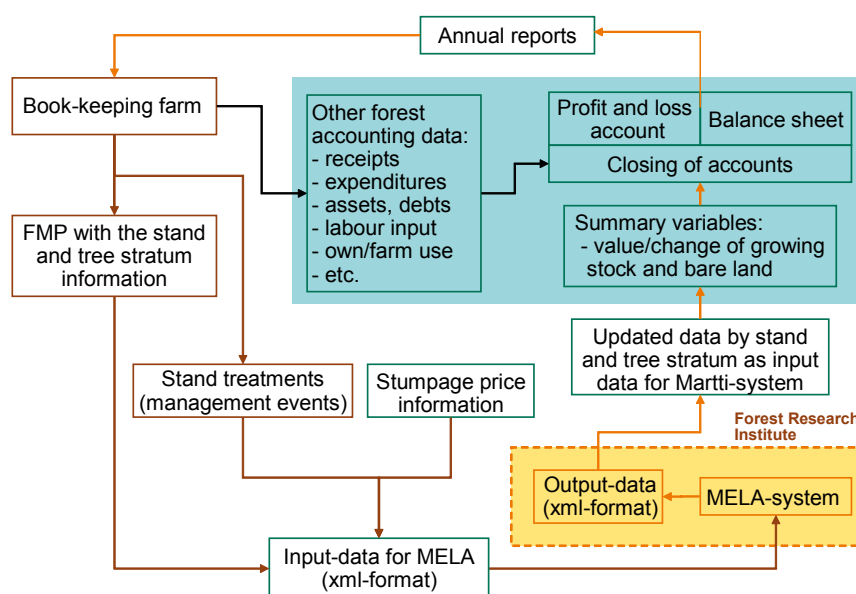


Figure 2. The use of forest management plan (FMP) data in forestry accounting. (Source: Agrifood Research Finland.)

The accounting system developed enables calculation of economic figures and ratios concerning farm forestry. Profitability book-keeping data and results serve entrepreneurs and political decision-making and are employed in research, agricultural administration, economic consulting, advising, financing, interest supervision and agricultural education. 'Empirical studies confirm the significant incremental value of information provided by accounting and that accounting-based information is an important tool for assessing farm viability' according to Argilés (2001), which is also the case with Finnish farms combatting ongoing profitability problems (MTT Economic Research 2008).

1.2 IFRS/IAS

The so-called measurement perspective, rooted in the neoclassical theory of value and income (Hitz 2007, p. 332), represents the traditional view of the information objective of financial reporting, especially financial accounting. Neoclassic economic theory requires that the accounting information provided by financial statements enable decision-making or allow the optimal allocation of resources. Because economic income requires an unambiguous definition of value, it is well defined *only* in a neoclassical setting (Hitz 2007, p. 348). Moreover, Ashbaugh and Pincus (2000) have documented a decrease in the absolute value of analyst forecast errors, on average, after firms adopt IAS.

In order to serve the book-keeping farms better, the International Financial Reporting Standards (IFRS) International Accounting Standard (IAS) 41 Agriculture and IAS 16 Property, Plant and Equipment as well as IAS 2 Inventories have been used to construct solutions for forestry accounting. Yanou (2001) argues that agricultural land should be accounted for under IAS 16 Property, Plant and Equipment or IAS 40 Investment Property, intangible assets under IAS 38 Intangible Assets, and products after harvest under IAS 2 Inventories. However, IAS 40 Investment Property is not applied because it states that owner-occupied property belongs to the area of IAS 16. Moreover, intangible assets such as milk quotas, which are accounted for under IAS 38 Intangible Assets, but do not exist in non-industrial private forestry. Finally, IAS 20 Accounting for Government Grants and Disclosure of Government Assistance is not applied either, because accounting of government grants can be based on IAS 41 (para 34–35).

In all, there is a strong demand for international accounting standards, and the International Accounting Standard Board (IASB) is attempting to meet this need by following the ultimate objective of 'tell it the way it is', according to Whittington (2005). Accounting quality after IFRS hinges on three factors: (i) the quality of the standards; (ii) the country's legal and political system; and (iii) financial reporting incentives (Soderstrom and Sun 2007). The aim of enforcing all listed companies to prepare consolidated financial statements based on IFRS, beginning on 1 January 2005, was to increase its comparability and transparency (Brown and Tarca 2005). Empirical evidence shows that voluntary reported IAS earnings, in addition to the compulsory local Finnish accounting standards (LAS), were of significant relevance to foreign investors (Kinnunen et al. 2000), although, some items of IAS reconciliations are value relevant to all investors (Niskanen et al. 2000).¹ Standard-setters derive requirements for disclosures from a context-specific consideration of judgement and decisions that users of financial reports might make (Schipper 2007). IAS thus provides "better" information and support in acquiring loans and equity capital, according to Liebfried (2002). However, evidence from 1993–2002, according to Daske (2006), failed to document the lower expected cost of equity capital for firms applying IAS/IFRS.

¹The adoption of IFRS in Finland has been summarised by Deloitte (2008)

Argilés and Slof (2001) compared the FADN of the EU and IAS 41, concluding that the contribution of IAS 41 is mainly conceptual and requires additional tools for implementation in practice, like some form of accounting plan. The accounting plan has been developed here, as well as product development and solutions implemented for the whole forestry sector.

1.3 Accounting theories and research traditions

Burrell and Morgan (1979, p. 1) postulate that ‘all theories of organisation are based upon a philosophy of science and a theory of society’. They analyse both the two major dimensions – science and society – and summarise the relation between them in four paradigms: radical humanist, radical structuralist, interpretative, and functionalist. This initiative has inspired modification of these paradigms and resulted in a commonly used classification of accounting research identifying four basic methodological approaches: conceptual, decision-oriented, nomothetic and action-oriented (Kasanen et al. 1993, Penttinen 2007):

The notion of the *conceptual approach* is to describe, create and improve existing concepts and conceptual systems, or to construct completely new concepts. This approach prefers to describe the reality than to understand it. The results typically state and recommend, and are validated by reasoning and argument. Developing accounting recommendations and solutions here applies conceptual reasoning. The *decision-oriented approach* aims at constructing models for decision-making and problem-solving, and is favoured in operational research and management science. *The nomothetic approach* is based on the positivistic and natural-scientific tradition, and often uses extensive empirical data and statistical analysis. *The action-oriented approach* aims to create better, often subjective understanding of the reality which is, in practice, always tied to the observer in the spirit of hermeneutic philosophy. Kasanen et al. (1993) have added *the constructive approach*, which combines theoretical background knowledge with relevant practical problems and produces practical functioning accounting solutions, to these four. Financial accounting developments here are based primarily on the conceptual and constructive approaches in developing accounting solutions for forestry.

Accountancy can be divided according to the Statement of Accounting Theory... (1977) into three approaches: (i) The *classic theory* attempts to create implicit accounting frameworks or to rationalise existing practices. (ii) *Decision-making and its benefits* emphasises investigating decision-making models and decision-makers. (iii) *Information economics* considers what information is needed in economic decision-making. Moreover, according to the *inductive approach* of the classic theory, which focuses the business transactions and emphasises the profit and loss statement, profit is based on *realised* and *objective* values.. The Finnish accounting tradition and its basis, the expenditure-revenue theory, represent the inductive approach.² The *normative-deductive* approach of the classic theory sees profit as the change in value of the enterprise and emphasises the balance sheet. The fair value accounting (FVA) and International Accounting Standards (IAS) 41, Agriculture, introduced in IAS (2002), represents the normative-deductive approach, emphasising the property valuation and the balance sheet. IAS 41 is contradictory to the realization principle, but changes in fair value are not revenue because they are not a gross inflow of economic benefits (Nobes 2006). Moreover, Butler (2001) discusses the implementation of IAS 41 and asks whether adopting IAS 41 would have the disadvantage of increasing taxable profits and reducing taxable losses.

² The development of Finnish accounting has been rigorously described by Kettunen (1993) and Nasi and Nasi (1998) and Pirinen (2005). The expenditure-revenue theory has been explained by Pirinen (2005).

Forestry accounting has a long tradition in Central Europe. The International Union of Forest Research Organizations IUFRO (1966), Wentzer (1972), the Deutscher Forstwirtschaftsrat (1980) and Eurostat (1987) have developed Chart of accounts for use in practice. Forestry accounting has been researched, and changes in the valuation of forest analysed by Openshaw (1980) and Davy (1987), among others. Forestry accounting in some European countries has been reviewed by Rochot (1984) and Jöbstl and Hogg (1997). Accounting for non-industrial private forestry has been developed from the German tradition and coping with continuous change by Hyder et al. (1994, 1997, 1999). Sekot (1998, 2000, 2001) and Sekot and Hellmayr (2000) have also developed profitability book-keeping network and data collection for small-scale forestry by Austrian contributions to forestry accounting has been compiled by Jöbstl (2005). Accounting for the forestry practice extension has been developed for jointly-owned forests (Penttinen 1992), accounting and ratio analysis (Kinnunen et al. 1993), for ratio analysis (Penttinen and Hakkarainen 1998) and cost accounting (Penttinen et al. 1995, 2001). Furuiro (1997) and Vincent (1999) have reviewed forest accounting at the national level, as Sekot (2007) has recently done within the EU Local national level forest accounts are maintained by Statistics Finland (2008), the contribution of which also covers environmental accounting (Kolttola and Muukkonen 1997).

For the time being, the balance sheet has not traditionally been included in the closing of the books in forestry. However, the changes in property values have been recognised in the form of timber balance, which shows the difference between the planned and the actual cut (Hakkarainen et al. 1995). In fact, even the closing of the books of jointly-owned forests, which typically manage thousands of hectares, contains no balance sheet, although their accounting guidelines mention IFRS as a possible method in the future (Silvadata 2005, p. 17).

Accounting differences between EC countries before IAS/IFRS were considerable, which required standardisation and harmonization initiatives by the European Union and (Theunisse 1994, Eriksson 1996). The Fourth, Seventh and Eighth directives are the most important as far as accounting is concerned,³ the Fourth one stating minimum requirements and imposing a *true and fair view* (TFV) of the assets, liabilities and financial position (Teränne 1993, Theunisse 1994, Eriksson 1996). According to van Hulle (1993), these directives have considerably improved the quality of financial reporting in the EC. The reporting needs of large corporations have established an international presence in Finland, and has led to a call for the development of financial statement regulations (Räty 1992). The new financial accounting legislation of 1992 represented a turning-point in the history of Finnish financial accounting, but the goal of reform was to keep the old expenditure-revenue theory as a basic guiding principle, to incorporate the EC Directives into the legislation, and to increase the information content of the financial reports (Kettunen 1993). The effect of IASs has been considerable but secondary because of the implementation of the EU Directives in Finnish accounting legislation in the 1990s (Pirinen 2005). Finnish accounting practices have their roots in the German tradition (Kettunen 1993) and, surprisingly, Finland belongs still to continental accounting zone with Germany and France and not to the British-American one (Barlev et al. 2007)

The old *historical cost accounting* (HCA) is being replaced by the new *fair value accounting* (FVA) paradigm. The US Financial Accounting Standards Board (FASB) defined fair value in 1976. The European International Accounting Standards Committee (IASC) has worked along the same FASB lines with regard to FVA. The IASC recommended FVA in agriculture when it issued the International Accounting Standard 41: Agriculture in 2000 (IASC 2000). The IASC,

³The development of these directives has been described by van Hulle (1992) as a main coordinator of accounting harmonisation in the EC.

which was established in 1973, was restructured as the International Accounting Standards Board (IASB) in 2001. IASB has since been in charge of IAS 41 (IASB 2003). Although IASB is a private body, the Commission of the EU decided to oblige listed European companies from 2005 onwards to establish their consolidated financial statements according to IFRS/IAS, which represent a preliminary peak in the internationalisation process of financial accounting in Europe (Haller 2002). The impact of IFRS can be recognised, for example, in the transition of the 100 biggest companies in the UK to IFRS. Their equity has since been assessed, showing that the value of property, plant and equipment has increased more than 10% (Aisbitt 2006).

IAS 41 for the evaluation of biological property came into force on January 1, 2003 (IAS 2002).⁴ Seeing the effects of biological transformation such as growth is necessary to enable the financial statement users to assess the enterprise's performance and position (Yanou 2001). Moreover, an international accounting standard such as IAS/IFRS and US GAAP provides a better information basis and enhances credibility, which increases loan availability (Liebfried 2002). The IAS 41 requires that *publicly quoted enterprises* evaluate their biological property on initial recognition and at each balance sheet date at its 'fair value' less the estimated point-of-sale costs (IAS 41.12). Fair values can be interpreted as market prices, from which the cost of the sales momentum will be deducted (Argilés and Slof 2001). If the market-determined values and prices are not available, an enterprise uses the present value of expected net cash flows from the asset discounted at a current market-determined pre-tax rate in determining fair value (IAS 41.20). Even in forest economics, net present value is the decision criteria as already suggested by Samuelson (1976). In forestry, a stand ready for final felling can be evaluated by the felling value minus sales costs. The market prices of plantings, young, or middle-aged stands do not, however, conform to the present state of the biological property. The present value of the expected net cash flow from the asset can then be used as their fair value (IFRIC 2003). Finally, cost may sometimes approximate fair value, particularly when the impact of the biological transformation on price is not expected to be material (for example, for initial growth in a 30-year pine plantation production cycle) (IAS 41.24).

1.4 Previous work related to forestry accounting in the IAS/IFRS framework

Argilés and Slof (2001) and Elad (2004) lay a solid theoretical background analysis and comparisons for the implementation of the Farm Accountancy Data Network (FADN) and IAS 41. Argilés and Slof (2001) believe that IAS 41 resolves difficulties in asset valuation, as it defines clear and simple valuations for agricultural assets. They argue, moreover, that 'procedures for changes in the carrying amount for these assets are also easy to implement'. Their key contribution is to analyse the compatibility of FADN and IAS 41, and to serve implementation of IAS 41 using FADN. In all, 'FADN procedures could be used to prepare financial statements compatible with IAS 41'. On the other hand, 'IAS 41 does not seem to take into account the practical experience of FADN or the potential needs of policy makers'.

⁴ Agriculture-related definitions of IAS 41 specify the following meanings: a *biological asset* is a living animal or plant. *Biological transformation* comprises the process of growth, degeneration, production, and procreation that cause qualitative or quantitative changes in biological assets. *Agricultural produce* is the harvested product of the enterprise's biological assets. *Harvest* is the detachment of produce from a biological asset or the cessation of a biological asset's life processes. *Agricultural activity* is the management by an enterprise of the biological transformation of biological assets for sale, as agricultural produce, or as additional biological assets. (IAS 41.5)

In all, an ‘avalanche of accounting will most likely also affect other companies than those which listed as well as other statements than the consolidated ones, with the potential consequence that it will lead to harmonisation in other areas of law, such as accounting-related tax and company law’ (Haller 2002). Some developing countries have actually based their forest tax system on FVA according to the recommendation of the World Bank, which has resulted in a substantial increase in government revenue as well as forest exploitation (Elad 2007, p. 771). ‘Markets need full, transparent information, untainted by concessions to vested interests, and the IASB is attempting to meet this need’ (Whittington 2005).

Survey studies in relation to: (i) valuation of forestry assets, (ii) recognition and measurement of value changes, (iii) balance-sheet classification of forestry assets; and (iv) disclosure of non-financial environmental information by Herbohn et al. (1998) exposed forest accounting practices: historic cost and net present value (NPV) were applied by roughly the same numbers of entities, but only one NPV applier in four disclosed the discount rate. Moreover, only one enterprise in eight recognised value changes in forestry assets in financial statements. A subsequent survey indicated that the use of current market values for forestry assets was weakly supported (10 of 18 were opposed or undecided) and the allocation of value change between price and volume was not accepted (12 out of 18 were opposed or undecided) and only a few accepted the requirement to disclose non-financial, environmental information (Herbohn and Herbohn 1998). Further surveys indicated that only three of 11 preferred asset valuation using net present value, and only three of 16 recognition of valued change as income, but most entities classified forest under traditional long-term asset categories such as property, plant and equipment (Herbohn and Herbohn 1999). In Australia, landholders may however consider small-scale forestry a worthwhile land use (Herbohn and Harrison 2004).

Australian experiences of AASB 1037 similar to IAS 41 suggest that the standard was more appropriate to biological assets with long production cycles such as forests rather than shorter-cycle assets (Herbohn and Herbohn 2006). Moreover, eight out of ten forest-holders recently signalled either qualified or total support for the standards. The coefficient of variation of the timber gain or loss reported over the four-year window, however, was 91.4% (Herbohn 2006). The unrealized gains and losses from changes in the fair value of forest assets imply that dividends may well be paid in advance of any cash flow obtainable from the harvest (Australian Accounting Research Foundation 1997, p. 65). Moreover, the subjectivity in estimates of fair value provides scope for manipulation (Herbohn 2006). Fair values can be unreliable because of intrinsic error in the measurement or the input to the measure. Fair value measurements may be derived from models that contain simplified assumptions that introduce measurement error and require inputs (such as income of cash flow forecasts) that are themselves subject to measurement error. In addition, intentional bias in inputs or judgements and even lack of expertise may occur (Shipper 2005). The fair valuation of different assets and liabilities in a balance sheet should, according to Schuetze (2001), be based on how they can be converted into cash.

1.5 The objective of the study

The purpose of this study is to apply all relevant IAS/IFRS statutes and relevant theoretical contributions to constructing and developing accounting application of the profitability book-keeping of the MTT Economic Research for forest holdings. The focus of this study is to find out whether the international accounting standards (IASs) are applicable to forestry and to test the structure of the closing of the books reports and profitability ratios. IAS 41 (Agriculture) is

based on the application of fair value in the valuation of the growing stock. Where the market-determined price may not be available, an enterprise uses the net present value of future cash flows from the asset discounted at a current market-determined pre-tax rate (IAS41.20).

The kernel of the development is the evaluation of IAS 'fair value' of the growing stock, classified as mature and immature biological assets, and the annual changes in their values for accounting purposes. The changes due to stumpage price and physical change in the growing stock will also be disclosed separately. Moreover, fair value of bare land is estimated annually for each stand as well. The closing of books according to IAS/IFRS has been calculated here for 28 farms and the years 2004 and 2005.

There are various ex-ante and ex-post methods for forest valuations. Ex-ante methods are based in general on a forest management plan (FMP) and its field measurements, called the forest inventory data, used for calculating the expected values of the forest property. Updates after the inventory are recognized and included. This study and development work aim at solution systems as well as data and service networks, which produce the results for the book-keeping farms. The development of the service required improvements in both the profitability book-keeping system MARTTI (2008) and the parameter set definition of the forest management planning system MELA (Redsven et al. 2004) and their connection through the Internet using the XML protocol, implementing firewalls, etc. Information and Communication Technology (ICT) solutions (Latukka et al. 2005).

2 Material and methods

2.1 Empirical evidence

All book-keeping transactions were recorded with the MARTTI (2008) profitability bookkeeping service of MTT Economic Research. Every transaction contains information marking the production line. Book-keeping farms supply information consisting of cash-based revenues and expenditures obtained from taxation book-keeping as well as data on crops and animals, production amounts, changes in property and working hours. Since financial statements are accrual-based, all data relating to the profit and loss account should correspond to the production of the accounting year. Both cash revenues and cash expenditures are therefore corrected in order to calculate accrual-based revenues and expenditures in profitability book-keeping. Accounts, receivables, and advances received are taken into account in correcting turnover, and accounts, payables, and advance payments are used in matching expenditures to the accounting year. Production for one's own use is included in revenues and farm use and inputs received as payments in kind are included in farm expenditures. Moreover, changes in product stocks and inventories are also taken into account in order to obtain accrual-based revenues and expenditures. The accrual-based profit and loss statement and balance sheet can be calculated after these corrections (Figure 3).

In addition to the book-keeping transactions, the empirical evidence of the study was the forest management plans (FMPs) of each of the 28 book-keeping farms, and the update information on felling and other transactions after the FMP. The value of growing stock and that of bare land have been calculated for the balance sheet, and their changes for the profit and loss statement. The volumes of harvested wood were also sought by timber assortment and tree species for each stand. The basal area of the remaining growing stock after a thinning was sought where possible.

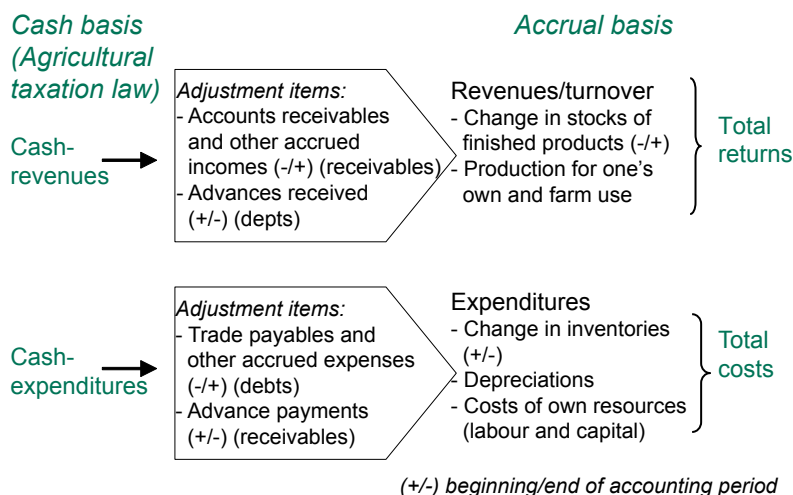


Figure 3. Transformation from cash based transactions to an accrual based one in the MARTTI profitability book-keeping of MTT Economic Research.

2.2 Evaluation methods

The growing stock information on the FMPs and its updates were used and the growing stock was simulated until the end of a fiscal year using the MELA system (Redsven et al. 2004). Two different methods were used to evaluate the felling information (These methods have been studied and depicted by Penttinen et al. 2004 and Meriläinen 2004):

1. *MELA RSU* = the calculation was based on the original FMP updated by the field measurements concerning harvested amounts and *estimated basal areas* of stands after harvest.
2. *MELA SMU* = MELA has an implied activity control that *automatically simulates* the harvesting and other silvicultural activities given for the years determined, and these simulated activities, removals and stand figures (such as basal area), are used as such in the calculations.

Comparison between actual measurements (RSU) and implied activity control (SMU) shows that the latter gives a slightly smaller change in growing stock values. Moreover, calculations without cuttings and using the sum-value method (Vehkamäki 1998, Airaksinen 2008) depict the accuracy of and differences in the methods. The method A maximises the NPV and B maximises the net income of the first 10 year planning period only (Figure 4).

The MARTTI accounting system contains input information planning tables (the abbreviations refer to MELA (Redsven et al. 2007)) standing for:

- Forest management plan
- Forest stands
- Tree stratum (growing stock information on a stand by tree species)
- Actions by forest stand (SMU_EVENTS).

The output information of the MARTTI system contains result tables standing for:

- Calculation results by forest stand (MPU)
- Calculation results by tree stratum (growing stock by tree species) (SMT)
- Bare land value by forest stand (the log file of the run)
- Sum table at the forest holding level (net present value, land value)

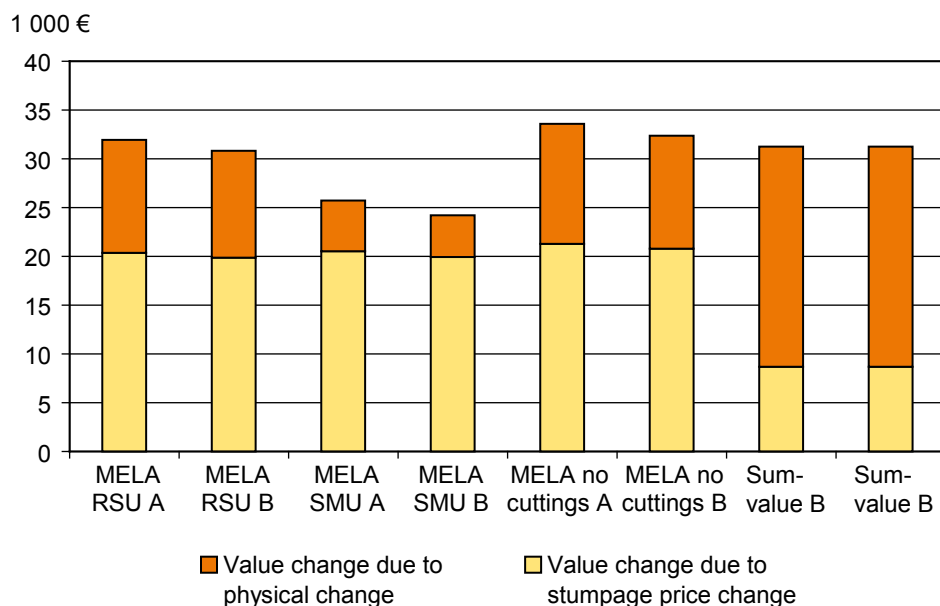


Figure 4. The value change in the growing stock divided into volume and stumpage price changes (Penttinen et al. 2004).

The developed accounting service is based on the cooperation between MTT Economic Research and the Finnish Forest Research Institute as well as cooperation of the MARTTI book-keeping system and the MELA FMP system through the Internet (the development of this service and system descriptions have been described by Latukka et al. 2005).

The MARTTI system table also contains the classifications of forest holdings and forest variables such as location, land use forms, tree species, stumpage prices and actions. The site information for each stand is based on the forest inventory of the forest management plan (FMP), and is available for evaluation of the forest holding. The owners have updated all the factors affecting the amount of the growing stock, such as plantings and fellings, up to the end of the fiscal year. Finally, the valuation of the growing stock for each fiscal year requires updating the stand data with help of growth models of MELA according to the situation at the end of the fiscal year.

The calculations used MELA, a Finnish forest management planning software package, (Siitonen et al. 1996, Redsvén et al. 2004). The MELA system consists of a stand simulator and a linear optimisation package. The stand simulator is based on individual tree models (see Hynynen et al. 2002, Nuutinen et al. 2005, 2006, Redsvén et al. 2004, 2007). The simulator part automatically creates a finite number of feasible alternative management schedules for each stand. The linear optimisation (programming) package in is the JLP (Lappi 1992).

The growing stock can be perceived both as means of production and product in the accounting framework (see Keltikangas 1969). The disaggregation of the value of the growing stock in the assets of the balance sheet requires a special calculation, which distinguishes the proportion of the immediately merchantable growing stock from the remaining growing stock. This split can be performed by the allowable cut calculation of MELA, which maximises the immediate cutting opportunity (the so-called cutting potential). The remaining proportion 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, the allowable cut by roundwood assortment belongs to 'Work in progress' of Stocks in the Current assets. The remaining portion of the value of the growing stock belongs to the 'biological

asset' in Non-current assets as an item called 'Forest growing stock'. The bare land belongs to Land and water areas in Tangible assets of Non-current assets.

The allowable cut calculation yields the volume of the merchantable growing stock as well as the allowable cut output by roundwood assortment. The allowable cut calculation is based on a two-year calculation period, and the hypothetical felling is placed in the middle of the period. When the NPVs of the first planning period are maximised, the net incomes of the future periods are also taken into consideration. The allowable cut can also be calculated by maximising the net income of the first period and ignoring the impact of the net income of the future periods.

The annual calculated profit of a forest enterprise according to IAS/IFRS consists of three parts: (i) The transaction-based realised net profit – the difference between felling and other incomes and expenditures – required to produce them, (ii) timber balance change, i.e., the change in the growing stock caused by volume growth and value growth from pulpwood to log, and (iii) the change in the growing stock value caused by changes in stumpage prices (cf. Hyder et al. 1999). One can therefore speak about a dualistic value change in property that consists of a dynamic portion based on the physical change, and an economic cycle portion based on stumpage prices (cf. Niskanen et al. 2002).

The annual change in the value of the growing stock will be included even in the profit and loss statement (IAS 41.26). The annual turnover of forestry can fluctuate dramatically between fiscal years because of timber sales. However, the change in the value of the growing stock attributable to stumpage price fluctuations may be the dominant part of the net profit, especially, if timber sales income has been small or no wood has been sold during the year in question. This price volatility alone can cause significant changes also in the value of the growing stock between fiscal years. All these annual changes affect the profitability of forestry from net profit to different ROI (return on investment) and other ratio analysis figures.

2.3 Calculation solutions

The MARTTI book-keeping system assembles the input information and results in an XML file of the forest holding (see Latukka et al. 2005). The XML file will be sent via the Internet to the MELA calculation using the NettiMELA Internet service. Technically there are three runs for each forest holding and year (for abbreviations, see Redsvén et al. 2004):

- (i) The updating (returns SMT variables)
- (ii) The simulation and optimisation (returns MPU variables) and
- (iii) The bare land value calculation (the log of the simulation run).

Actually, the applied three runs could be replaced by two runs in which (i) and (ii) are merged and the results are printed in one run.

The output will be produced for the 2, 8 and 10 year calculation periods, where the results of the three first periods will be fetched and stored in the MARTTI result tables. The returned result information for closing of the books by forest stand totals will be produced by forest holding in a sum table of variables such as area, allowable cut, NPV of the growing stock for interest rates 1–5% (MELA MSD variables 801–805) and bare land values for 1–5% interest rates (the log of the simulation). The allowable cut is separated from the rest of the growing stock (MELA MSD variable 500 in gross income euro/year). The accounts and MELA variables are:

<i>Balance sheet:</i>	<i>MELA variable:</i>
Bare land value	Bare land value period 0
The change in the value of the bare land (Revaluation surplus (IAS 16.39))	
Growing stock	The NPV of the growing stock in period 0 – the allowable cut in period 1
The allowable cut	The allowable cut in period 1
<i>Profit and loss account:</i>	
The change in value of the growing stock	
The price correction of the growing stock	

The opening accounts of the balance sheet will be found in the sum table for the previous year and the normal balance sheet continuity will be maintained between years. Changes in the forest property during the fiscal year will be posted to profit and loss accounts with a separate growing stock receipt, and changes in bare value to the balance sheet. The closing of the books routine of the MARTTI book-keeping system collects opening accounts, book-keeping transactions including growing stock receipts as well as the value of the growing stock and its calculated changes supplied by the MELA system. These calculations also split the impact of stumpage price changes and that of change in the growing stock. Both changes are shown in the profit and loss statement. The stumpage prices are those of the end of the year by forest centre and roundwood assortment. The bare land value is also calculated, based on the same stumpage prices.

The change in the value of growing stock is posted to the profit and loss account, and the impact of this change caused by the price change is posted separately. Finally, the change caused by the growing stock without price impacts is posted, supplying the change in the allowable cut and the rest of the growing stock separately. The change in bare value, posted in the revaluation surplus of the balance sheet, has no effect on the profit and loss.

2.4 Accounting solutions

The discount rate

If market-determined prices or values are not be available for a biological asset in its present condition, ‘an enterprise uses the present value of expected cash flows from the asset discounted at a current market-determined pre-tax rate in determining fair value (IAS 41.20).⁵ This rate definition remains quite general, however. Especially in forestry, with as much as an 80–100 year production period, the interest rate dominates the whole fair value estimation. In theory, the discount rate used in present value calculations r_{pv} can be defined as: $r_{pv} = r_f + \sigma$, where r_f is the risk-free rate as represented by the return on a government security of a maturity similar to the item to be valued and σ stands for the risk premium (Eckel et al. 2003). The risk-free rate responds to market-wide events but not to firm-specific or item-specific risks. The use of the risk-free rate to discount ‘risky’ cash flows is theoretically incorrect (Bodenhorn 1984). The risk premium may reflect default as well as variability-in-return risks (Hirschleifer 1970). Risk may be responsive to (ii) market conditions (real and inflationary), (ii) maturity, (iii) firm-specific risk, and (iv) item-specific risk (Eckel et al. 2003). In all, (a) the discounted present value is a good

⁵This pre-tax rate has been impugned. Kvaal (2007) advocates an amendment of the standard IAS 36 Impairment of Assets such that value in use is measured by company-specific *after-tax* cash flows, and such that deferred taxes are included in the impairment review. The policy implication of this is that the standard’s requirement ought to be changed to a post-tax valuation.

surrogate for the market value. However, (b) an equivalent evaluation can be based on whether the discount rate used is equal to the rate that would have been used in the market (Eckel et al. 2003). The main problem in evaluating these rates on the basis of *economic substance* is their lagged response to economic factors, and their ‘portfolio’ effect (Gamble and Cramer 1992). The interest rate is calibrated here by comparing the discounted property values, the surrogates, with actual market prices both at the stand and forest holding levels.

Recall that the cash flows are discounted at a 6.25 percent interest rate and the calculation is done by the succeeding 70–100 years in the Swedish forest industry companies Holmen, SCA, Svea Skog and PWC Öhrlings (Burnside, 2005, Hellsten and Thorsson 2006). An Australian forestry firm uses an 8% rate (Herbohn et al. 1998). Comparisons between market values of forest holdings and the NPV estimates suggest that four per cent (4%) would be the appropriate interest rate for fair value estimations (Hyytiäinen et al. 2007).

Fair value⁶

The prime legal requirement for financial reporting in the EU is that financial statements must give a ‘true and fair view’ (TFV) of the company’s state of affairs and financial results. The TFV legal requirement has been established through the Fourth Company Law Directive (Directive 78/660/EEC), and later extended to consolidated accounts through the Seventh Company Law Directive (Directive 83/349/EEC) (Alexander and Jermakowicz 2006, p. 139). Particularly with reference to formal (formats of the balance sheet and the profit and loss account) and disclosure aspects, national accounting systems have become similar in the EU, because of the directives (Thorell and Whittington 1994, p. 219). The particularities of the Member States of the EC were not sufficiently reflected in international accounting standards, which was the main reason why these standards were not applied at all by companies in the Community (van Hulle 1992, p. 169). The requirement to include fair value of the assets in the profit and loss (IAS41.26) is compatible with the Fourth Company Law Directive, because Arts. 42 e and f (Art 12 Modernisation Directive) grant Member States the option to ‘permit or require in respect of all companies or any classes of company the valuation of specified categories of assets other than financial instruments at amount determined by reference to fair value’ and the inclusion of a change in the fair value in the profit and loss account (Wüstemann and Kierzek 2006, p. 99).

The TFV was not actually mentioned in the first version of the Fourth Directive in 1971, but the second one in 1974 and the final one in 1978 do include the TFV (Alexander 1993). The main reason for introducing a fair value model is a desire to best reflect biological transformation in the financial statement of enterprises undertaking agricultural activity. However, the “accounting for value change” approach of IAS 41 will of itself do nothing to remove incompatibility between forest values calculated and reported by business entities (Barnes 2004). Moreover, both American and Canadian accountancy organisations advocated historical cost as an appropriate measurement basis, except in rare circumstances where realizable value may be considered as an alternative (Herbohn and Herbohn 2006). Historical cost is the most common measurement method for agricultural assets within the EU (Argilés and Slob 2001). In addition, the requirements of IAS 41 are neither theoretically nor practically compatible with the accounting models of Francophone countries (Elad 2004). The key question in fair value accounting is, however, the perception that it will not provide comparable estimates between forest holdings, because a fair value which suits the business best can be estimated (Bingsby 2004). However, the income statement, in line with

⁶A biological asset should be measured on initial recognition and at the end of each balance sheet date at its fair value less estimated point-of-sale cost (IAS 41.12).

the by nature approach, seeks a company's added value in a given period and the profit derived from it (Elad 2004).

According to the framework of the IASC (International Accounting Standards Committee) there are four main methods used to value an asset: historical cost, current replacement cost, realisable value, and future value (iasb.org) (Epstein and Mirza 2003). New Zealand forest valuation standards outline a number of possible valuation methods depending on the circumstances of the valuation (NZIF 1999):

1. historical cost (sum of cost incurred to date)
2. current replacement cost (cost compounded historical costs)
3. immediate liquidation (stock value or current realisation value)
4. net present value (NPV) or discounted cash flow using a discount rate.

The Financial Accounting Standard Board (FASB) (2006) has recently issued the fair value definition as the "price that would be received to sell an asset or paid to transfer the liability as the measurement date (an exit price)". Accountants have traditionally measured assets using historical cost (Herbohn and Herbohn 1998). According to IAS 41, the asset must be valued to the fair value, which means that only the realisable value can be applied. 'The main reason for introducing a fair value model is a desire to best reflect biological transformation in the financial statements of enterprises undertaking agricultural activity. The differences between the historical cost and fair value model would be particularly great in the case of the growing trees' (Yanou 2001). Fair value was more appropriate to biological assets with long production cycles such as forests rather than shorter-cycle assets (Herbohn and Herbohn 2006, p. 181). However, fair value might also give a misleading picture of the financial position, especially before the outbreak of the foot-and-mouth crisis (Butler 2001). The key question in defining the fair value according to Bingsby (2004) is the perception that it will not result in comparable estimates between forest-owners because of the opportunity to define the fair value so that it suits their business. The adoption of fair values as a basis for taxation of tropical timber, even recommended by the World Bank, has resulted in a substantial increase in government revenue, although fair values do not fully reflect the value of this resource (Elad 2007). Application of IAS 41 by the UK Accounting Standard Board (ASB) would increase taxable profits and reduce losses (Butler 2001); however, fair values provide a much better indication of future economic benefits than cost-based systems (Paterson 2001). Moreover, the IAS 41 brings many improvements, such as more transparency and in particular comparability (Liebfried 2002). Finally, the mandatory adoption of IFRS and the international convergence with the US GAAP will encourage to develop reliable fair value measures (Schipper 2005). Surprisingly, none of Swedish forest products companies, Holmen, SCA, Svea Skog and PWC Öhrlings would have chosen to apply fair value accounting and IAS 41 if it was not mandatory (Burnside 2005). In fact, the Swedish forest industry has determined that IAS 41 is not applicable to Swedish forestry (Flamm et al. 2006).

Fair value when it cannot be measured reliably

Measure all biological assets at fair value less expected point-of-sale costs at each balance sheet date unless fair value cannot be measured reliably (IAS 41.12). If reliable market-based prices are not available, use the present value of expected net cash flows from the asset discounted at a current market-determined pre-tax rate (IAS 41.20), which prefers the net present value (NPV) as the fair value, as already suggested by Samuelson (1976). In limited circumstances, such as where little biological transformation has taken place or the impact of biological transformation on price is not expected to be material (IAS41.24, Herbohn and Herbohn 2006, p. 179), cost is an indicator

of fair value. In the case of forestry, the regeneration costs can proxy the asset value as long as there are no forest inventory measurements of the stand to enable the NPV estimation.

Unfortunately, there is general concern that paragraph 21 of IAS 41 is internally inconsistent. The first part clarifies the principle that the objective of the measurement is fair value. By contrast, the second part, read literally, seems to require the exclusion of a major portion of the fair value calculation, the potential future growth of the biological assets. However, the IFRIC noted that fair value would generally be a risk adjusted cash flow. These cash flows *may or may not* reflect the expected growth over the harvest period (IFRIC 2003).

The impact of market fluctuations on profit still remains a problem, however. Market value driven pricing of forests and the fixed assets more generally may cause considerable fluctuation in profit, volatility which is not based on real business transactions as recognised by the accounting principles (Riahi-Belkaoui 2004, p. 480). Moreover, it forces market values based on evaluation of property, which may mean “lazy” capital in the balance sheet. One example of the effect of these pressures is Stora Enso, which sold its forests to its own daughter company Tornator (Tornator 2003, 2008).

An Australian survey demonstrates that only 27% of forestry enterprises suggested NPV for asset valuation (Herbohn and Herbohn 1999). Fair value incorporates subjective items in evaluation. However, Swedish forest industry companies like Holmen SCA, Svea Skog, and PWC Öhring have a tacit agreement that they all use a discounted net cash flow model (Malmhäll and Nyman 2005, Hellsten and Thorsson 2006). The Swedish forest industry saw subjectivity in fair value evaluation models, although previous values might have been too low in some cases (Andersson et al. 2005). The forecasting horizon of the Swedish forest industry is 70–100 years (Burnside 2005). In New Zealand, the estimation practice assumes that prices do not increase and use an 8–12 rolling quarter year average in the stumpage price forecasts (Gorman 2002).

Revenue and expense recognition

Value changes in forestry assets was recognised as a capital adjustment or not recognised at all, but only a few people recognised the changes as an income adjustment in Australian forestry firms. Most entities either ignored value changes or treated them as capital adjustments. (Herbohn et al. 1998). However, investigating Australian forestry firms demonstrated that 44% ignore value changes until timber is cut and sold, 25% treat value changes as capital adjustments, 19% treat all value changes as income, and only 6% treat value change as capital adjustment, reversed at the time of harvesting (Herbohn and Herbohn 1999). IAS 41 has also inspired scathing criticisms: ‘Overall, the IACS’s project on agriculture appears to have portrayed the dubious triumph of theory over pragmatism’ (Elad 2004, p. 638). Moreover, the requirements of IAS 41 are not theoretically or practically compatible with the accounting models such as ‘Plan Comptable Général Agricole’ in Francophone countries (Elad 2004). IAS has however been applied even in developing countries (Chand 2005).

The IASC Draft of IAS 41 recognised the change in value due to physical change as income or expense, but the change due to price changes as a non-owner capital adjustment (Herbohn and Herbohn 1998). This recommendation is made in the context of maintaining productivity capacity (Herbohn et al. 1998). Moreover, this notion is in line with the traditional timber balance approach (Speidel 1984). The change in fair value of biological assets during a period is reported in net profit or loss (IAS 41.26). Consequently, the coefficient of variation of net profit for a four-year period was 91% in an Australian empirical analysis (Herbohn 2006, p. 73).

Balance sheet disclosure of the growing stock

Forest assets in the balance sheet are clearly identified and classified as non-current assets, which is consistent with current Australian accounting practice within the forestry sector according to Herbohn and Herbohn (1999). Biological assets (self-generating and regenerating assets) are shown separately without classification as current and non-current assets (Herbohn et al. 1998). Minimum items on the face of the balance sheet (IAS 1.68): (a) property, plant and equipment; ..., (f) biological assets; (g) inventories; ... and thus biological assets will also be recorded separately. The disclosure required may take the form of a narrative or quantified description (IAS 41.42). An enterprise is encouraged to distinguish between consumable and bearer biological assets or between mature and immature biological assets (IAS 41.43, 41.45). All forestry assets here are disclosed quantitatively distinguished between mature, allowable cut, and immature, the non-merchantable growing stock, and biological assets.

An entity must normally present a classified balance sheet, separating current and non-current assets and liabilities. [IAS 1.51]. The allowable cut can be felled immediately and is thus included in the current assets, but the non-allowable cut in the non-current assets. Non-merchantable growing stock belongs to Biological assets and, moreover, may be designated as Non-merchantable biological assets: the allowable cut belongs to Work in progress in Current assets and may be designated as Allowable cut. Note that allowable cut is both product and production machinery at the same time (Keltikangas 1969). Finished products in Current assets stands for felled trees. Bare land belongs to Land and waters (Figure 5).

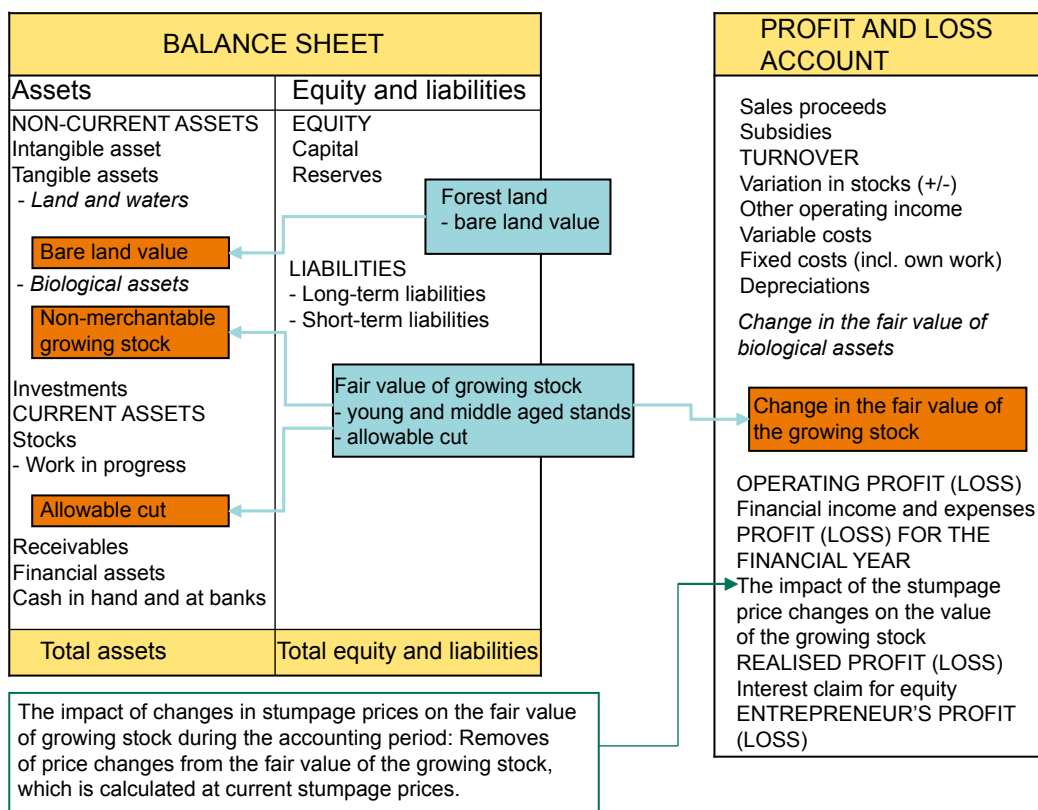


Figure 5. Bare land and the growing stock in the balance sheet and the profit and loss account. (Source: Agrifood Research Finland.)

Income statement disclosure of the growing stock

The changes in biological assets is reported as a whole in Change in the value of the growing stock just before operating profit (as in Tornator 2008) and the (calculated) operating profit is obtained. Moreover, under the above change, its change of subsets in allowable cut and in non-merchantable growing stock are disclosed separately. The allowable cut is the bank of the owner and thus the high point in reporting. After financial income and expense the official part of the closing of the books ends in Profit for the financial year. The rest is additional information for the owner. First, the impact in the value of the growing stock caused by stumpage price changes will be reduced from the fiscal profit in order to obtain sustainable (long-term) net profit, which is called Realised profit (see Hyder et al. 1999). Finally, the interest requirement of the forest-owner's capital is reduced from the realised profit to obtain the Entrepreneur's sustainable long-term net profit, which is an economic value added (EVA) type of result. In forestry, especially small-scale forestry, the fellings typically fluctuate greatly so that a size of a sale is typically clearly bigger than the annual net increase in the growing stock, but sales do happen even every second year. Information is thus needed to reveal various aspects of both the business and future business opportunities. Supplying only the profit for the financial year would even be dangerous where there are conflicts arising from inheritance or other reasons.

Recall that Paterson (2001) suggested that only the impact of physical changes would be reported in the profit and loss. Australian recommendations require that the impact of physical changes be reported in the profit and loss, but that of price changes as changes of capital in reservations (Herbohn et al. 1998). Even the IASC draft of IAS 41 recognised the change in value due to price change as a non-owner capital adjustment (Herbohn and Herbohn 1998). Separate disclosure of physical and price changes is useful in appraising current period performance and future prospects, particularly when there is a production cycle of more than a year (cf. IAS41.51).

Bare land

Bare land can be valued according to historic cost (HC) or fair value (FV). Revaluations have been found to indicate improved future performance. (Barlev et al. 2007). Forest land can be described as 'owner-occupied property' in local circumstances and thus it does not belong to IAS 40 Investment Property but to IAS 16 Property, Plant and Equipment (IAS 40.9). Bare land belongs to the general class of Land and waters in Tangible assets. IAS 16 recognises that assets are measured *initially at cost* (IAS 16.15). The initial value cannot be obtained from such measures as the purchase price or the property valuation given in an inheritance process or from the taxation value. However, all these values stand for the whole property, not merely for bare land. Nearly all forest holdings in profitability book-keeping have been inherited and have only their(?) taxation value. An approach to obtaining the initial values is to use the price tables for bare land sites of different fertility classes provided by the Forestry Development Centre Tapio (Tapio 2007).

IAS 16 requires land to be measured either at its cost less any accumulated impairment losses, or at a revalued amount. The two accounting models are the cost model (IAS 16.30) and the revaluation model (IAS 16.31). According to Cairns (2006, p. 17) the cost model is the usual measurement basis allowed by IFRS and adopted in practice, and fair value is an option. However, fair value measures for property, plant, and equipment are superior to historical cost based on the characteristics of predictive value, feedback value, timeliness, neutrality, representational faithfulness, compatibility, and consistency, while verifiability appears to be the sole qualitative characteristic favouring historical cost (Herrmann et al. 2006). The revaluation increase of bare

land adds “revaluation surplus” directly to the balance sheet and the decrease reduces the surplus (IAS16.39). Where the revaluation surplus has been used, the increases and decreases affect profit and loss (IAS 16.40). Revaluations are made with sufficient regularity (IAS 16.31), and annually in every closing of the books here. Stora Enso report difficulty in the annual revaluation (Borse et al. 2005). Recall that the comparisons between market values and NPV estimations suggest a four per cent (4%) interest rate (Hyytiäinen al. 2007). The bare values have been estimated stand-wise using the Faustmann formulae and a long-term forecasting horizon.

The capital impairment question

When the fair value is less than the cost for impaired, long-lived, non-monetary assets, disclosure is required. The measurement alternatives include fair value, replacement cost, undiscounted future cash flows and discounted future cash flows using a choice of several possible interest rates (Schuetze 1987). Entities reporting under IFRSs are required to determine a value in use in accordance with IAS 36: Impairment of assets. IAS 36 allows three alternative starting-points in determining a suitable discount rate: (i) weighted average cost of capital (WACC), (ii) incremental borrowing rate or (ii) another market borrowing rate. However, WACC is the *only* suitable starting-point (Husmann and Schmidt 2008).

Government grants

An unconditional government grant related to a biological asset measured at its fair value less estimated point-of-sale costs is recognised as income when it becomes receivable (IAS 41.34). The grants and subsidies are reported immediately after total output, such as turnover as the separate item Subsidies on production and costs (Argilés and Slof 2001). Conditional grants do not exist, because subsidies will not be paid before conditions are met. However, the forest-owner may receive plants as a grant in a subsidised regeneration project, but financial support for his work afterwards. Government grants by member states of the EU have already been allowed and regulated by the EEC (1991).

Intangible assets

Intangible assets such as production quotas, which are accounted for under IAS 38, Intangible Assets, do not exist in non-industrial private forestry.

Harvested biological assets

IAS 2 Inventories is applied for harvested produce according to Yanou (2001). Agricultural produce harvested from an entity’s biological assets should in fact be measured at fair value less estimated point-of-sale costs at the point of harvest (Cairns 2006, p. 17, Rätty and Virkkunen 2004, p. 221). This measurement is the cost at that date when applying IAS 2 or some other applicable standard (IAS 41.13).

Forest regeneration duty and reforestation costs

An enterprise does not include any cash flows for financing the assets, taxation, or re-establishing biological assets after harvesting (for example, the cost of replanting trees in a plantation forest after harvest) (IAS 41.22). However, IFRIC (2003) discussed whether regeneration costs are investments or decommissioning costs without making any decision. In 2004, IFRIC concluded

that where the restoration obligation would create an additional asset for the entity, it should be capitalised as part of the asset. Where the restoration provision does not result in an additional asset for the entity, the cost should be expensed. The Swedish forest industry, for example, found a consensus and IASB allowed it to establish its own praxis (Flamm et al. 2006). IFRIC finally decided in 2006 that it would not issue guidance on how to account for an obligation to replant a biological asset after harvest (IFRIC 2008).

The Swedish forest industry sees the recognition of forest regeneration costs in book-keeping confusing, recording them as expenses instead of IAS 41 definitions (Malmhäll and Nyman 2005, Hellsten and Thorsson 2006). Not even other silvicultural costs are recognised as investments and are recognised immediately as expenses without activating for future years (Karlsson and Ohlsson 2003). In Finland, the reforestation duty after final felling is based on the forestry law. Moreover, the reforestation 'does not result in an additional asset' for the forest owner in his/her lifetime. The forest regeneration duty and long production cycle encourage the cost being expensed, especially because forest regeneration cannot by any means compete as an investment. However, when the sales income of a final felling is realised, a reforestation reservation can be made to cover the expected costs in subsequent years (Penttinen 1992).

Forest regeneration costs will be deducted as annual expenses in the original cash-based book-keeping of the owner. However, these expenses will be activated in the constructed accrual-based accounting and depreciated net expenditures will be depreciated by the annual depreciation percentage of 10%. One's own and paid work will be posted to some type of cost such as delivery felling, silviculture, forest regeneration work and other forestry work. In all, forest regeneration consists of material, purchased services and work costs, which will be posted as an investment using the forest-owner's account in tangible assets called Activated forestry costs and the Forestry depreciation .

All other property, such as building, machines, forest roads and ditches as well as current assets and capital will be accounted in the agricultural profitability book-keeping system MARTTI (2008).

Wages and the work of the owner family

Hours of both paid work and that of the owner family will be posted in the work book-keeping applying delivery felling, silviculture, forest regeneration and other forestry work. The cost of one's own work will be calculated according to reported work hours and wage requirement such as 11.70 euros / hour in 2004 and 12.30 euros / hour in 2005. This wage compensation requirement is posted as expenses. Forest regeneration costs, however, will be activated and deducted as depreciation.

Fair value accounting (FVA), the EU Directives, the US GAAP and Plan Comptable Général Agricole

After the 1992 and 1997 reforms of the Finnish accounting legislation, the 4th and 7th Company Law Directives of the European Union were adopted in the accounting statutes (for a comparison between Finnish and EU norms, see Teränne 1993). The inductive approach of the classic theory in the form of expenditure-revenue theory was previously applied and profit based on realised and objective transactions (Kettunen 1993, Pirinen 2005). To avoid potential conflicts between EU accounting rules and IAS/IFRS, the EU Commission has incorporated a regulation in the

Amendment directive which offers more flexibility in the presentation of Articles 23–26 income statements of the Fourth directive, giving the Member States the possibility that companies applying IAS/IFRS present an income statement which will not be in conflict with the Fourth EC Directive (Haller and Schößgangl 2005).

However, Elad (2004) has shown that IAS 41 is not only incompatible with the EU Fourth Directive, but also poses major implementation problems in various national settings. According to Haller and Schößgangl (2005), the IAS/IFRS do not provide a sound conceptual basis for the presentation of income and expenses and are not consistent with the layout requirement of the Fourth EC Directive. However, they focus on the Amendment Directive of the EU Commission, which offers the possibility of companies applying IAS/IFRS not being in conflict with the Fourth EC Directive.

The International Accounting Standards Board (IASB) of the EU and the Financial Accounting Standards Board (FASB) of the US have agreed to work together to develop high quality, fully compatible financial reporting standards. The goal of these convergence efforts is to make US Generally Accepted Accounting Principles (US GAAP) and International Financial Reporting Standards (IFRS) as nearly as possible the same across jurisdictions while also improving the overall quality of those standards (Schipper 2005, 2007). The requirements of IAS 41 are neither theoretically nor practically compatible with the French Plan Comptable Général Agricole (Elad 2004). In spite of this, IAS 41 has been applied even in developing countries (Chand 2005).

Since 2002, the US FASB and the IASB have been undertaking a joint project on the revision and convergence of US GAAP and IFRS revenue recognition, researching the competing accounting paradigms of the revenue expense view and the asset and liability view. A major advantage of the asset and liability transaction approach can be seen in the strict reference to real (market) transactions, in contrast to the hypothetical transactions which are frequently needed in the case of fair value application. (Wüstemann and Kierzek 2005). The IFRS means already a big jump from transaction-based thinking to the US accounting tradition, which will, no doubt, develop in the future.

Disclosure

Survey evidence indicated that forest assets in the balance sheet as non-current assets are consistent with accounting practices within the forestry sector (Herbohn et al. 1998). An enterprise should provide a description of each group of biological assets. The disclosure may take the form of a narrative or quantified description (IAS 41.41–42). Biological assets may be classified either as mature or immature biological assets (IAS 41.45), which in forestry means allowable and non-allowable cut. Separate disclosure of physical and price changes is useful in appraising current period performance and future prospects, particularly when there is a production cycle of more than a year (IAS 41.51), which separate disclosure is implemented here. Paterson (2001) proposed that only physical change impacts the profit and loss statement, and price change was put into reserves, which is in line with the first proposal of IASC (Herbohn and Herbohn 1998). The corresponding Australian standard recognises the impact of the physical change in the profit and loss statement, but places the impact of the price change in reserves (Herbohn et al. 1998). Moreover, biological assets pledged as security for liabilities (IAS 41.49) will be disclosed in the form of separate closing of the books for rural enterprise forests.

However, the developed IFRS/IAS reporting discloses the price and physical change impacts of the growing stock, changes in allowable cut and non-merchantable growing stock, various sustainable and realised profits, among other things. The reporting shows margin and profit levels, which can be calculated so that local accounting standards (LAS) in reporting would hardly provide any relevant additional information.

Taxation

The basis of IFRS is the separation between book-keeping profit calculation and the taxable income (Räty and Vilkkunen 2004, p. 367). Listed companies such as UPM Kymmene and Stora Enso have to close the books according to IFRS, i.e., their own forest according to IAS 41 and IAS16. However, they can report for taxation according to the Finnish law in Finland, etc. In the USA, the main purpose of accounting is not to calculate taxable income but to give useful information to investors (Nobes and Schwencke 2006). Similarly, IFRS serves investors and there is no direct connection between tax and closing of the books according to IFRS. However, some developing countries have based their forest tax system on FVA according to the recommendation of the World Bank, resulting in forest exploitation (Elad 2007, p. 771). From a systematic point of view, taxation of unrealised gains is unacceptable. Although the effects of using IFRS as a tax base on discounted tax burden are small, empirical studies do not support its use. (Eberhartinger and Klostermann 2007). In fact, the elimination of the link between tax rules and accounting numbers seems to be a necessary *pre*-condition for application of IFRS in individual company accounts (Delville et al. 2005, p. 159).

3 Results

The book-keeping transactions are processed and the book-keeping is performed by the MARTTI accounting system of the MTT Economic Research. The MARTTI forestry accounting and profitability book-keeping service was developed from relatively new forest management plans (FMPs) and their updates, which are used in the MELA FMP software of the FFRI. The fair values of the growing stock and the bare land are based on the updated stand information of the FMP (Table 1).

The true and fair view (TFV) legal requirement of the EU has been established through the Fourth Company Law Directive (Directive 78/660/EEC), which allows the profit and loss account to be

Table 1. The updated forest holding stand information.

Stand number	Area, ha	Gr. stock NPV	Allow. cut	Bear land	Pine log /m ³	Pine pulp. /m ³	Spruce log /m ³	Spruce pulp. /m ³	Broadl. log /m ³	Broadl. pulp. /m ³
104	1.6	15.287	0	175	20.6	29.2	141.2	172.3	0	0
105	0.3	2.829	0	302	3.8	5.5	26.1	32.1	0	0
...
285	2.7	9.661	2.917	519	11.8	410.4	1.0	16.5	0.3	0
186	2.6	9.327	2.928	2.513	0.9	296.9	0.2	14.2	0	0
To-gether	120.6	487.046	109.360	35.685	1.400.8	7.835.1	1.887.7	3.233.7	98.0	17.0

based on the *nature of expenses* or on *function of expenses*. These alternatives have also been implemented in the Accounting Ordinance (1997, 2005) in Finland. Since the functions such as sales and marketing expenses are less relevant in non-industrial private forestry, the *nature of expenses* option has been applied. The constructed accounting development here implemented International Financial Reporting Standards (IFRS) and the International Accounting Standard (IAS) 41 Agriculture and IAS 16 Property, plant and equipment, in particular.

The comparison of soil expectation and market values suggest a 4% interest rate for discounting (Hyytiäinen et al. 2007). Since the most suitable basis for determining a discount rate is the weighted average cost of capital (WACC) according to Husman and Schmidt (2008), 4% was considered a WACC of the owner. The fair values will be calculated using simulations and optimisations within the framework of a 150-year planning horizon in MELA (Redsven et al. 2004). The harvesting and silvicultural decisions of the simulation/optimisation are made according to the local forestry laws and recommendations. The fair value option of IAS 16 for bare land was chosen instead of historical cost as suggested by Hermann et al. (2006). The discount rate used here was also 4%. No capital impairment for bare land could be found to be realistic. Government grants were recognised as income when they became receivable according to IAS 41.34. No intangible assets or rights could be found. Harvested biological assets were measured at fair value less estimated point-of-sale cost at the point of harvest. IAS 2 Inventories was applied to harvested produce (Yanou 2001).

Costs approximate fair value in the case of forest regeneration according to IAS 41. 24–25. Surprisingly, an entity does not include cash flows for re-establishing biological assets (for example, the cost of replanting trees in a plantation forest after harvest) according to IAS 41.22. However, IFRIC concluded in 2004 that where the restoration obligation creates an additional asset for the entity, it should be capitalised as part of the asset. Where the restoration provision does not result in an additional asset for the entity, the cost should be expensed.

Wages and the work of owner family have been based on careful hourly work book-keeping (MARTTI 2008). Both paid work and that of the owner family contribution have been posted applying delivery felling, silviculture, forest regeneration and other forestry work as types of work. The assumed wage compensation of owner family has been 11.70 euros/hour in 2004 and 12.30 in 2005. Both wages and wage compensation have been posted as expenses, but the regeneration costs have been activated.

IAS 41 has encouraged distinguishing between mature and immature assets (IAS 41.43, 41.45). The mature assets, the allowable cut, are located in Work in progress of Current assets. The young and middle-aged stands have been located after Land and waters and before Buildings in Tangible Non-current assets as Non-merchantable growing stock. The bare land forms Land and waters in Tangible assets, although Tornator (2008), for instance, is using Property, plant and equipment. The change in the bare land fair value is posted to the Revaluation surplus in Capital and reserves under Equity and liabilities according to IAS 16.39.

The changes due to stumpage price and physical change in the growing stock will be disclosed separately as encouraged by IAS 41.51. Additionally, the Change in the value of the growing stock is located as late as possible after Depreciations and before Operating profit, as Tornator does (2008). This arrangement enables disclosure of the Operating margin of the entity, which recognises the transaction-based results only without any fair values. The beginning of the profit and loss statement thus follows the expenditure-revenue theory of the Finnish accounting tradition (see Kettunen 1993 and Pirinen 2005).

The updated stand information requires three MELA runs for: (i) the fair values of the growing stock by forest stand, (ii) the allowable cut values by stand and (iii) the bare land values also by stand. The results, together with the book-keeping transactions, provide the balance sheet and the profit and the loss of the fiscal year as averages of 28 farms and by hectare (Table 2).

The proposed income statement is as informative as possible, supplying the operating margin in the spirit of the old expenditure-revenue theory. The profit of the year is in line with IAS 41, but realised profit after subtracting the price change impact discloses additional information. All EconomyDoctor results contain an economy value added (EVA) type of result after subtracting the interest claim of capital.

Operating margin is clearly less than expected in 2005, perhaps because of timber not being sold actively. The change in allowable cut in 2005 is really negative, also caused by the negative stumpage pricetrend. The profits could be seen as relatively modest.

Table 2. The adjusted income statements of 28 forest holdings (panel data) in the 2004 and 2005 fiscal years.

Year	2004		2005		
Number of farms	28		28		28
Average forest area. ha/farm	83.82		84.44		Per cent
	Eur/farm	Eur/ha	Eur/farm	Eur/ha	
Net Sales (Turnover)	10,534	126	14,961	177	100
Subsidies	435	5	314	4	2
Forest-owner's use	393	5	528	6	4
Variation in stocks of finished goods	4	0	145	2	1
Materials and supplies	-624	-7	-6,886	-82	-46
Outsourced services	-1,136	-14	-436	-5	-3
Personnel expenses	-56	-1	0	0	0
Wage claim of entrepreneur's work	-1,569	-19	-2,132	-25	
Other operating expenses	-722	-9	-769	-9	-5
Operating margin	7,258	87	5,725	68	38
Depreciation	-332	-4	-425	-5	-2
Change in the fair value of growing stock	15,082	180	5,272	62	35
<i>Non-merchantable growing stock</i>	14,789	176	7,367	87	49
<i>Allowable cut</i>	293	3	-2,095	-25	-14
Operating profit (loss)	22,008	263	10,573	125	71
Financial income	165	2	181	2	1
Financial expenses	-87	-1	-385	-5	-3
Profit (loss) for the financial year	22,086	263	10,369	123	69
The impact of the stumpage price change on the value of the growing stock	-8,752	-104	4,545	54	30
Realised profit (loss)	13,334	159	14,913	177	100
Interest claim of equity (5%)	-16,962	-202	-17,212	-204	-115
Entrepreneur's profit (loss)	-3,628	-43	-2,298	-27	-15

Table 3. The balance sheet of 28 forest holdings (panel data) in the 2004 and 2005 fiscal years.

Year	2004		2005		
Number of farms	28		28		28
Average forest area, ha/farm	83.82		84.44		Per cent
Assets	Eur/farm	Eur/ha	Eur/farm	Eur/ha	
Non-current assets					
Tangible assets					
Land and waters	12,410	148	10,710	127	3
Buildings	142	2	133	2	0
Machinery and equipment	892	11	1,373	16	0
Non-merchantable growing stock	225,761	2,693	233,128	2,761	65
Other tangible assets	1,122	13	1,010	12	0
Investments					
Bonds and shares	4,959	59	5,344	63	2
Current assets					
Stocks					
Materials and supplies	1	0	6	0	0
Allowable cut (work in progress)	108,062	1,289	105,967	1,255	30
Finished products	1,071	13	1,139	13	0
Other inventories	0	0	0	0	0
Other current assets					
Receivables and financial assets	43	1	183	2	0
Total assets	354,462	4,229	358,992	4,251	100
Equity and liabilities					
Equity					
Forest-owner's capital	316,518	3,776	324,168	3,839	90
Revaluation surplus	8,672	103	6,972	83	2
Voluntary reserves	964	11	626	7	0
Profit (loss) for financial year	22,086	263	10,369	123	3
Liabilities					
Long-term liabilities	4,509	54	13,823	164	4
Short-term liabilities	1,713	20	3,034	36	1
Total equity and liabilities	354,462	4,229	358,992	4,251	100

The value of bare land is surprisingly low. The allowable cut is the key figure, and turns out to represent a real buffer for agriculture, although the profitability was less than expected. The return on investment (ROI) figures show the impact of the price change component (Figure 6).

The results have been supplied to the farms, which deliver updates for 2006 and 2007. A key notion is to deliver as much information as possible. By placing the change in the value of the growing stock after the operating margin, the owner receives both results by way of the traditional transaction based accounting and the new fair value based one. Moreover, the growing stock has been split between mature (allowable cut) and immature (young and middle-aged stands) biological assets as encouraged by IAS 41.43. Even the impact of price change and physical change has been disclosed, as suggested in IAS41.51.

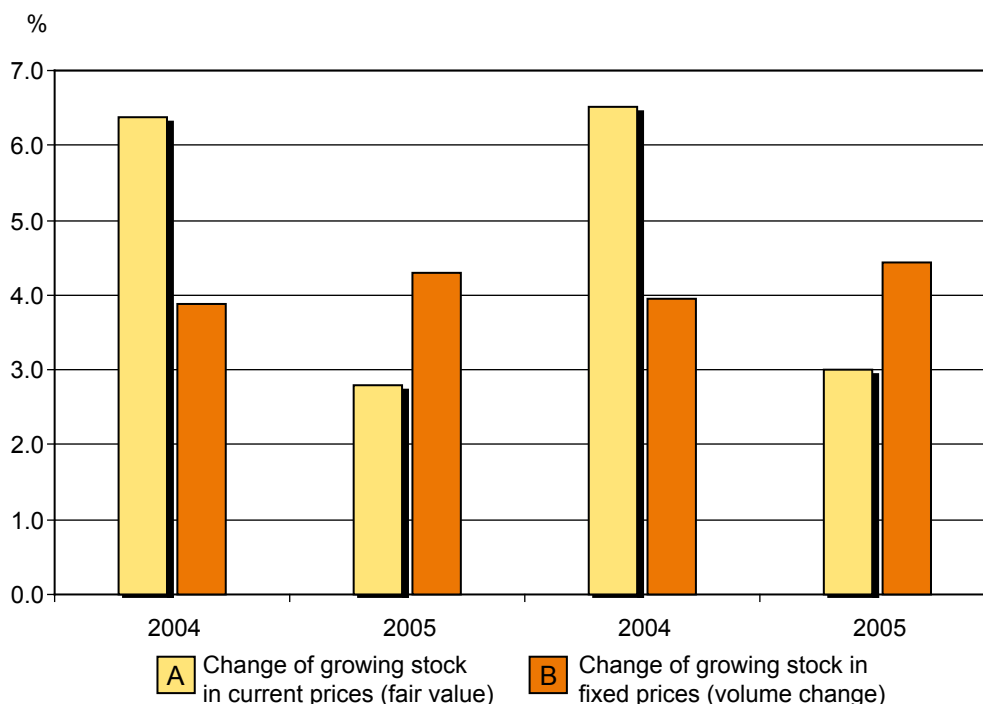


Figure 6. The return on assets (ROA) and the return on equity (ROE) for 2004 and 2005 recognising (A) and ignoring (B) the price change.

4 Conclusions

Argilés and Slof (2001) as well as Elad (2004) provide a theoretical background and the comparison between the farm accountancy data network (FADN) and International Accounting Standards (IAS) 41 Agriculture of International Financial Accounting Standards (IFRS) guidance, also implementing IAS 41 for non-industrial private forestry (NIPF). They concluded that the contribution of IAS 41 is mainly conceptual and requires additional tools for implementation in practice, like some form of accounting plan. The accounting plan has been developed here, as well as product development and solutions implemented for the whole forestry sector.

One may note that the traditional historical cost accounting (HCA) is still the most common measurement method for agricultural assets within the European Union (EU) (Argilés and Slof 2001). Moreover, empirical surveys show that most entities ignored value changes or treated them as capital adjustments (Herbohn and Herbohn 1999). Additionally, Elad (2007) remarks critically that 'overall, the IASC's project – IAS 41 – on agriculture appears to have portrayed a dubious triumph of theory over pragmatism'. In spite of this criticism, Argilés and Slof (2001) see FADN as a relevant development context for IFRS reporting.

Empirical studies suggest that foreign investors are more interested in the performance-related information based on the tax- and institutions-independent IAS earnings than in the idiosyncratic local accounting standards (LAS) earnings on which the dividend distribution is based, but a significant difference in responses of domestic investors to the two earnings could not be found (Kinnunen et al. 2000). Somehow surprisingly, an empirical test supports the view that particular items are value relevant to all investors irrespective of the domicile (Niskanen et al. 2000), which suggests supplying both IAS and LAS results. Standard-setters derive requirements for disclosures

from a context-specific consideration of judgement and decisions that users of financial reports might make (Schipper 2007). Ashbaugh and Pincus (2000) have in fact documented a decrease in the absolute value of analyst forest errors once firms adopt IAS

Implementing IAS 41 Agriculture and IAS 16 Property, Plant and Equipment of the EU IFRS on book-keeping farms requires relatively new forest management plans (FMPs) and updates. Both the FMP and its updates are taken into consideration. The growth will be simulated until the end of the fiscal year by the MELA planning system (Redsven et al. 2004). The evaluation of fair values requires three separate runs: (i) the value of the growing stock as a whole; (ii) the value of the allowable cut; and (iii) the value of the bare land. The predetermined MELA-tasks apply simulations and optimisations with a time span of 150 years. The 4% interest rate is used in discounting as suggested by analyses of the prices and growing stocks of purchased forest holdings (Hyytiäinen et al. 2007). These three runs (i)–(iii) produced by the MELA planning system will return results through the Internet to the MARTTI book-keeping system, which contains all book-keeping transactions. The covering service will be delivered to the farms by MTT Economic Research. The IAS/IFRS forest holdings accounting provides comparable, relevant and up-to-date information. In modern economic theory, information can in fact be treated as a factor of production at a very general level. The information content perspective of accounting thus means a shift from the measurement perspective and stresses the use of accounting numbers in decisions under *uncertainty* (Liang 2001). The subjectivity of FVA estimates and scope for manipulation as claimed by Herbohn (2006), for instance, is not a real problem here, because the updated FMPs contain accurate information, the FMP software MELA uses the validated growth models and best practice forestry decisions, and the interest rate is supported by the markets. Future timber prices, however, are a real source of uncertainty.

A key notion was to supply as much information as possible. By placing the change in the value of the growing stock after the operating margin, the owner receives both results according to the traditional transaction based accounting (LAS) and the new fair value based one (IAS). Moreover, the growing stock has been split between mature (allowable cut) and immature (young and middle aged stands) biological assets as recommended by IAS 41.43. Even the impact of price change and physical change has been disclosed as suggested in IAS 41.51. Profitability ratios have been implemented in the service palette in addition to closing of the books.

Numerous articles claim that implementation of IAS 41 means ambiguity and even errors in estimating the fair value, especially in using ‘the present value of expected net cash flows from the asset discounted at a current market-determined pre-tax rate in determining fair value’ (IAS 41.20). It turned out that growth models predict future volumes by roundwood assortment with great precision. Moreover, market prices of forest holdings suggest a 4% discount rate without greater uncertainty. Although future stumpage prices are uncertain, the closing of the books can be seen as a really good estimate of the finances of the forest holding. The solutions developed and results belong to a larger service called EconomyDoctor (2008). For the time being, farms can already use EconomyDoctor as an extranet service and read all the results on their own and the average results of the reference groups. This existing service could also be used for forestry book-keeping results as well. In the case of forestry accounting, the availability of a forest management plan (FMP) and of the MELA FMP software as well as the MARTTI accounting system together with the application of IFRS means a *quantum leap improvement* in the information service compared with the present level.

All the results are based on the benefits of earlier research and the development of a profitability book-keeping service, growth models, and forest management planning systems, which typically have a century of tradition. The information and communication technology (ICT) capabilities of both institutes have enabled the development work. In practice, the key problem and challenge is the availability and processing of forest management plans (FMPs) and their updates. When offering the service to a greater number of users, machine readable FMPs are perhaps needed as a prerequisite.

The International Financial Reporting Standards (IFRS) finds its theoretical foundation in the neoclassical theory of value and income (Hitz 2007, p. 332), according to which the accounting information provided by financial statements must enable decision-making or allow the *optimal allocation* of resources. This notion leads to 'fair value', which first appeared in IAS 16 [1982] where it was used to measure the cost of property, plant and equipment acquired in exchange for another asset (Cairns 2006, p. 11). The fair value accounting (FVA) of IFRS might bring about a change in management philosophy and in the strategy of management of the firm. Risk management will be an integral part of business management and will involve consistent investigation of local as well as global market trends and the use of new hedging methods (Barlev and Haddad 2003). However, according to Elad (2007) FVA reinforces commodity fetishism by forging a link between accounting and market values, because it ignores the social and environmental relations of production that underlie the market exchanges. At present, no sound theory is offered for generalising the fair value paradigm to non-financial items such as property, plant and equipment, or even intangibles (Hitz 2007, p. 354). The International Accounting Standards Board (IASB) has already discussed several proposals for a change and improvement in the format of the incomes statement and statement of changes in equity. The current effort of IASB has been strongly supported by a conceptual and empirical study (Haller and Schloßgangl 2005).

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