MASTER'S THESIS, STOCKHOLM SCHOOL OF ECONOMICS

How fair is fair?

The Swedish Forest Industry's Application of the IAS 41- Agriculture

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Abstract

Could a market-valuing-method give a better measurement of fair value of standing timber than the DCF model which is current practice of the Swedish forest industry today? In 2005, IFRS was implemented in Swedish accounting and fair value became the guideline for biological asset valuation. According to IAS 41, a mark-to-model approach as the DCF, is a less preferable way of measuring fair value. In this thesis we will carefully study one large actor in Swedish forestry and explain how they use their DCF-model in practice. We will also develop two new methods: the Immediate Harvesting Method and the Decomposed Real Estate Method, both based on actual market transactions, which we will argue reach higher in the hierarchy of fair value measurement according to IAS 41. These two approaches will be applied on the studied forest company, and pros and cons will be discussed related to fair value measurement. When applying our developed methods, significantly higher values of the biological assets will be reached.

Key words: Fair value, IAS 41, active market, forest industry, biological asset.

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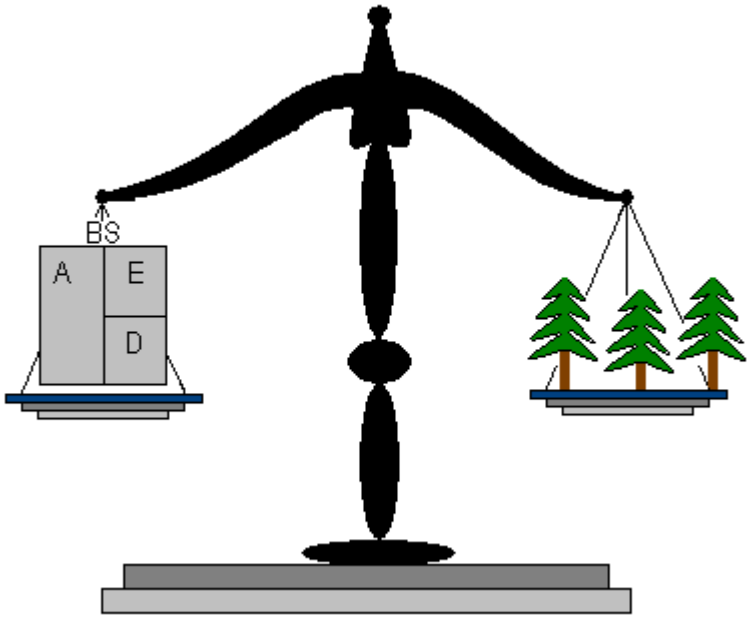
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1. Introduction

The forest has been called "the green gold of Sweden" and is an important source of income for many private land owners and corporations. However, Swedish forestry requires a very long term perspective. Due to the climate on the northern hemisphere, the person who plants a tree rarely gets to harvest it during his own lifetime. How should an asset like this be accounted for? The International Financial Reporting Standards (IFRS), implemented in Sweden in 2005, requires that growing forest is valued at fair value, first and foremost using prices set by the market in real market transactions.

The four largest owners of forest in Sweden are Sveaskog, SCA, Bergvik Skog and Holmen. Each of these companies has forest holdings larger than one million hectares, which is roughly as large as the Swedish province of Skåne. All four of them have made the assessment that no relevant market is available that can be used to value holdings of this size. Instead, when they implemented IAS 41 in 2005, they all decided to determine fair value through the use of a discounted cash flow model. The idea is to discount all net cash flows that will result from forestry for the next 100 years to a present value.

Comparing the book values of growing forest for these companies with the market transaction prices of smaller forest real estates, the gap is striking. According to LRF Konsult, the largest estate agent of agricultural and forest properties in Sweden, the price per cubic meter (price/m3) of forest properties that were exchanged during 2007 is about three times higher! During the period 2004-2007 the market price for forest real estate properties in Sweden, increased with 57% (218-343 SEK per m3).[4] During the same period, the balance sheet values on average increased with 17%, for the forest industry (94-110 SEK per m3).[5]

Admittedly, a forest property consists not only of standing timber, but also of land. Still, given this gap, is it really possible that the current book values are the fair values of the growing forest according to IAS 41? Does the current accounting fail to fulfill its main objective; to communicate relevant information to investors? Or is it actually the case that the "size discount" for a large forest holding is this substantial? These are the kind of issues this

[4] LRF Konsult, http://www.konsult.lrf.se/press/pressmeddelanden/skogsmarkspriserna (2008-12-09)

[5] We have calculated average from the balance sheet of, Sveaskog, SCA, Bergvik Skog and Holmen. References to all annual reports can be found in the reference list under "Internet sources"

paper will address. The question *"How fair is fair value?"* is valid also in a more general sense and was the title of a paper published by Ernst & Young in 2005.[6]

2. Purpose

The Swedish forest industry currently uses a discounted cash flow model to determine the fair value of growing forest according to IAS 41. The purpose of this paper is to examine the valuation method used by the listed forest companies in Sweden and evaluate whether it fulfills the purpose of the standard. We also aim at proposing two alternative methods, based on selling prices, of measuring fair value for the forest holdings of those companies. Our goal is for these alternative methods to come closer to the intention of the standard. We therefore formulate the following question:

Could a market based approach for valuing growing forest according to IAS 41 give a better measure of fair value than the current DCF method used by the listed Swedish forest companies?

In present there are two main markets available for determining the fair value of standing timber; the timber market (sawlogs and pulpwood market) and the real estate property market. We will attempt to come up with a fair value according to IAS 41 through these two markets. To get a further deep in our thesis we have chosen to study one of the large actors – Holmen in more detail. By trying to apply a more market-based valuation of Holmen's stand we hope to be able to draw conclusions for the industry as a whole due to the similarities in their valuation approaches.

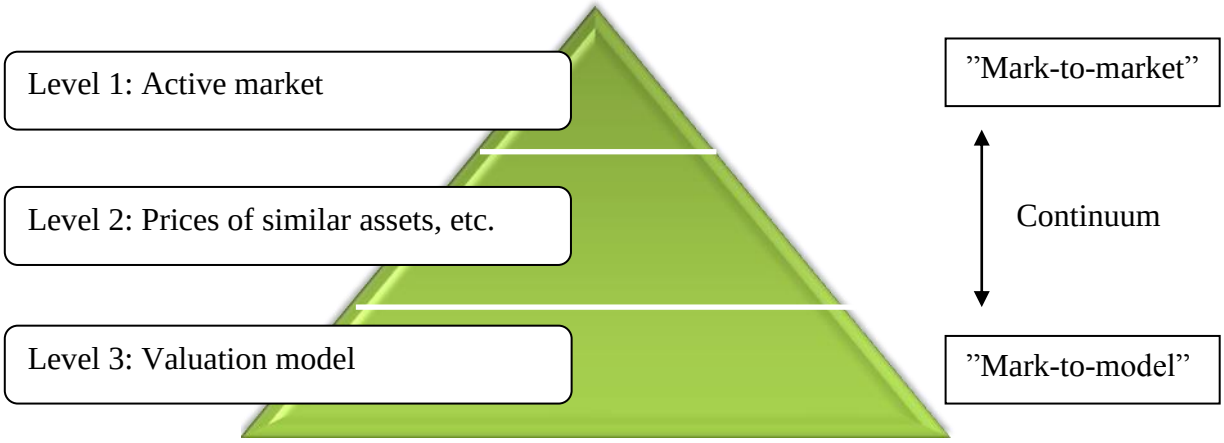
3. Background

In 2005 the European Union adopted the International Financial Reporting Standards from IASB in order to increase the comparability of reporting for companies in different countries within the Union.[7] The standard IAS 41 regulates the accounting treatment, financial statement presentation and disclosures related to agricultural activity, which includes the accounting treatment of biological assets such as forest plantations. For the four large

[6] Lindsell, David (signed by), 2005: "How fair is fair value?"- A paper by Ernst & Young.
[7] Marton, Jan, Falkman, Pär, Lumsden, Marie, Pettersson, Anna Karin, Rimmel, Gunnar, 2008: "IFRS – i teori och praktik". Sweden. Bonniers, p.3

Swedish forest owners; Holmen, Sveaskog, SCA, and Bervik Skog, the standard brought changes from the previous practice. Previously, forest and forest land were recorded at cost. With the new standard that demanded "fair value", they were forced to re-measure their biological assets.

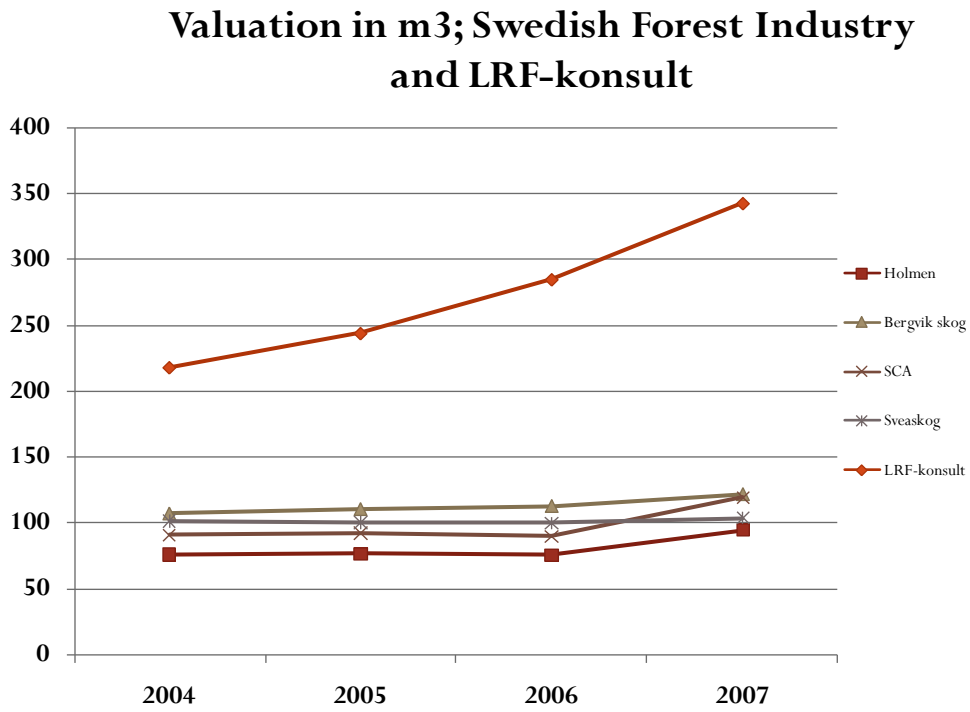
In measuring the fair value of biological assets, the IAS 41 prescribes a hierarchy of methods with increasing levels of subjectivity. Most preferable is the most recent market transaction price of the asset (mark-to-market). Secondly, prices of similar assets or sector benchmarks should be used. Thirdly, if market prices are not available, the standard prescribes the use of a discounted cash flow model (mark-to-model). The hierarchy can be seen below. This hierarchy is used in other standards by the IASB as well as by the Financial Accounting Standards Board (FASB). When IAS 41 was implemented, all of Sweden's four large forest owners came to the conclusion that a discounted cash flow model was the best way of estimating fair value. Hence, they chose the mark-to-model method, which is least preferred in the hierarchy.



Picture 4.1. The hierarchy of fair value measurement.

After three years of implementation we can see large deviations between the forest companies "fair values" and the market prices reported by the real estate agent LRF Konsult, relating to forest properties. Picture 4.2 below shows this gap for the previous four years. As pointed out in the introduction, the average market price of sold forest properties is more than three times higher than the fair value displayed in the books of the forest companies. However, the data from LRF Konsult is not fully comparable to the book values of the forest companies. The Price/m3 from LRF Konsult consists of both standing trees and land, whereas the forest

companies' book values only relates to the biological asset – the standing trees. The transactions LRF Konsult reports are made in the open market with buyers and sellers in arm's length transactions.



Picture 4.2. For the four lower lines, the picture illustrates the valuation in cubic meter (millions of cubic meter divided by the value in the balance sheet) one year before IFRS implementation and until year 2007.The top line is an average of market prices of forest properties, numbers are in average for Sweden, reported by the real estate agent LRF Konsult.[8]

Is this gap reasonable? Or can we go higher up in the hierarchy of fair value measurement and increase the fairness? Even if a part of the gap can be attributed to the value of land, there is still a large difference. After studying the forest sector, we have found that there are in principle only two markets that can be used to determine the value of standing forest:

1. The real estate market for forest land.
2. The raw material-/cubic meter market for sawlogs and pulpwood.

It could be argued that prices of felling rights would also be a possible alternative. When selling felling rights, it is usually agreed that the buyer harvest within something like 18 months or two years. But, since there are large similarities to the raw material-/cubic meter

[8] Annual report from Sveaskog, SCA, Bergvik Skog and Holmen (see further reference list, under "Internet sources") and information from LRF Konsult homepage: http://www.konsult.lrf.se/press/pressmeddelanden/skogsmarkspriserna (2008-12-08)

market for sawlog and pulpwood, that alternative does not add any information. It's more or less the same buyers and sellers acting in both cases, the only difference is the terms of delivery. We will discuss the two different markets and will hopefully come to a conclusion how to deal with fair value in the Swedish forest industry.
The large Swedish forest owners are players in an international market. In northern Europe for example, shipping of logs and wood occurs between countries.

4. Previous research

The implications for entities of adopting the International Accounting Standard 41 (IAS 41) have been well examined. Herbohn & Herbohn (2006) investigates the implications of IAS 41 for European Union entities reporting on material holdings of forest assets. Experiences from corresponding Australian regulation similar to IAS 41 imposed some years earlier are used to identify potential implications for EU reporting entities. In Australia, the recognition of unrealised gains and losses from timber assets from changes in fair value has markedly affected income statements, introducing greater volatility into reported income. The median timber gain expressed as a percentage of net profit ranged from 44.5% to 79.9% in individual years.[9]

Charles Elad (2004) investigates what implications fair value accounting has on the international harmonization of accounting. He writes that the IAS 41 is highly controversial because it "…*represents the most radical and comprehensive departure from historic cost accounting to date, thus provoking some theoretical and practical problems that might affect its widespread adoption."*His conclusion is that the standard is not only incompatible with the accounting models in Francophone countries, but also poses major implementation problems in different national settings. Also, he writes that *"…the use of subjective judgement by practitioners in establishing estimates of fair value, such as the market price for similar assets, or net present values, might result in different treatments that hamper comparability and harmonization."*[10]

[9] Herbohn, K. F. & Herbohn, J, 2006: "International Accounting Standard (IAS) 41: What are the implications for reporting forest assets? Small-scale Forest Economics," Management and Policy 5(2): p. 175–189.
[10] Elad, C. 2004: "Fair Value Accounting in the Agriculture Sector: Some Implications for International Accounting Harmonization." European Accounting Review, Vol.13, Nr 4. p. 621-641.

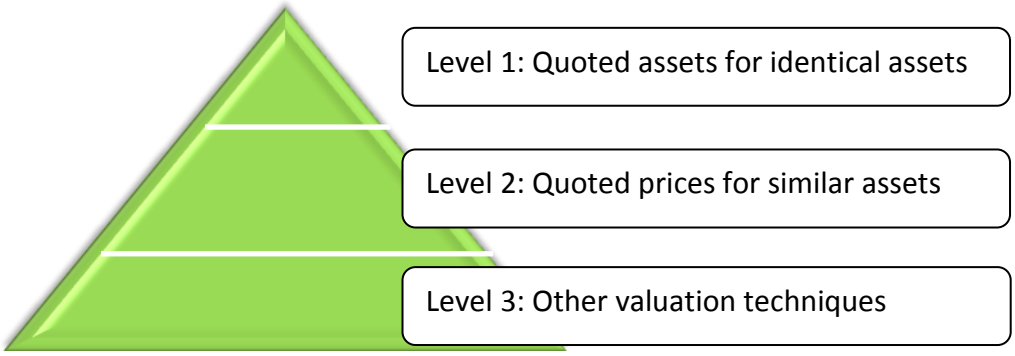
The valuing of some assets is more subjective than that of others. Danbolt & Rees (2008) investigate the effects of this on the value relevance of fair value accounting. They use the British real estate and investment fund industries as experimental settings where historic cost (HC) and fair value accounting (FVA) can be compared. The authors are able to contrast fair value accounting in a near ideal setting (the investment fund industry) with one where it remains important, but where valuation difficulties may permit bias (the real estate industry). FVA for the real estate sample is found to be considerably less value relevant than for the investment companies and exhibit biases consistent with earnings management. The authors conclude that where valuation is ambiguous, which will normally be the case, value relevance will be lower and biased accounting may be revealed. [11]

Studies have also been performed to examine to what degree value relevance is affected by the liquidity of assets carried at fair value. Petroni & Wahlen (1995) analyzes the relation between fair values of equity and fixed maturity debt securities and share prices of property-liability insurers. They find that the value relevance of fair value disclosures of investments depend on the liquidity of the assets held**.** Carroll et al. (2003) finds that for US-closed-end mutual funds *"…the need to estimate fair values for securities traded in thin markets…does not cause the incremental value-relevance of fair value information to be eliminated."*

In the paper by Ernst & Young[12] mentioned in the introduction, the fair value model of the IASB for measuring assets and liabilities is criticized. More precisely, the authors question if it is appropriate for measurements with relatively low reliability to be referred to as ways of determining "fair value". First, on the meaning of fair value, they write: "*Fair value is a wonderfully powerful expression in the English language that conveys the very essence of truth and fairness. /.../ What possible objection can there be to financial statements that report assets and liabilities at their "fair value?"* However, they argue, standard-setters sometimes use the term "fair value" in a way that does not correspond to this. The "fair value hierarchy" developed by the US FASB and embraced by IASB, states that companies should first use quoted prices for identical assets in active markets to determine fair value. If quoted prices are not available, they should use prices of similar assets. Thirdly, if such prices are not

[11] Danbolt, J. and Rees, W, 2008: "An experiment in fair value accounting: UK investment vehicles." *European Accounting Review* 17(2): p. 271-303.
[12] "How fair is fair value?", 2005

available either, the use of some valuation technique is prescribed. This hierarchy is illustrated by the authors in the following way:



The authors continue:

"The practical reality is that a Level 3 subjective assessment will be necessary for many assets and liabilities that will be required to be measured at fair value. /…/ in all these cases "fair value" will be determined by hypothesising what a market price would be if there were a market, very often based on management assumptions about the future and using a valuation model. We consider it inappropriate to refer to such calculated values as "fair value""…the term "fair value" implies active and liquid markets with knowledgeable and willing buyers and sellers and observable arm's length transactions – not values calculated on the basis of hypothetical markets, with hypothetical buyers and sellers."

Hence, the authors think that in many cases, a level 3 assessment like a DCF calculation, is not reliable enough to be labeled "fair value", given the definition of fair value provided by the IASB.

5. Method

We have performed a combination of a descriptive and illustrative case study.[13] Since our ambition is to examine the valuation method used by the Swedish forest industry and evaluate whether it gives a good measure of fair value, we took the role as a visitor (describe how they

[13] Ryan, B., Scapens, R.W. & Theobald, M. 2002 *"Research Method and Methodology in Finance and Accounting"* p. 143.

do) and an actor (improvements) at Holmen. When we performed our case study we have followed the steps in "Method of case study research".[14]

- We first collected *artefacts*, which is tangible items that is available for the market, like annual reports, material from home pages and work that others have performed.
- We then came up with several *interviews* that would support or reject our first thoughts about our research area.
- During the interviews we used a *structured* approach where we asked several persons with different positions within and outside the company the same questions, and contacted expertise within the concern about detailed questions. After the interviews we investigated the information we got and complemented with details from the company and outsiders.
- We have received material, accessible for internal use only containing, traded volumes, costs and information about age, quality, etc about the forest holdings. Further, we have collected publicly available data and statistics of market observations.

6. Description of data

In this section, all relevant data used in the paper is described in subsections.

6.1 Data received from Holmen

Holmen has provided us with the assumptions and reasoning behind their DCF-calculation, including all relevant cash flows and factors that will affect the cash flows. We have also received information including internal transactions and changes in stock as well as prices for sawlogs and pulpwood during 2007. The costs in Holmen are also well described and divided in employee cost, investments, transport, silviculture and costs for harvesting.

6.2 Data received from LRF Konsult and Areal

LRF Konsult and Areal are two forest real estate agents with national coverage in Sweden. From these two agents, we received transaction information of sold forest properties relating to the second half of 2007. For each transaction, the data is broken down into the main components and each component is valued separately; forest, water, farmland, pasture land and impediment (see Appendix C). This is performed by the individual real estate agent. From

[14] Ryan et al. p. 154

this information, the value of growing forest can be derived. We can also see the total amount of wood in cubic meters and which type it is. The information also reveals in which county the deal took place, which gives us the possibility to estimate a more precise value taking into account price differences in Sweden.

6.3 Data received from buyers of timber and pulpwood

We have also performed data collection from different buyers of sawlogs and pulpwood in Sweden. We have received price lists (see Appendix A) from all relevant parts of Sweden corresponding to where Holmen has its forests. The lists contain current market prices of sawlogs and pulpwood during the very end of 2007. Prices in the list are specified for sawlogs or pulpwood and differ depending on diameter and quality. It is common use in the business of dealing with wood that you receive different premiums depending on accessibility, quality and how good customer you have been through the years and other complex variables. These premiums are excluded from the price list we have got.

We have also received data from Skogsvårdsstyrelsen (SVO), which on a quarterly basis do statistics for average prices of sawlogs and pulpwood prices in southern, central and north parts of Sweden. The statistics only reveal which price the seller got, not which quality, length or wideness, hence the data contains the average of all qualities and prices.

7. This is Holmen

Holmen is a forest products industry group producing paper, paperboard and timber. [15] Of the five business areas, Holmen Paper is the largest, representing 54% of net turnover in 2007. The raw material-oriented business areas – Holmen Skog and Holmen Energi – supply wood and electricity respectively to the product-oriented business areas – Holmen Paper, Iggesund Paperboard and Holmen Timber. In 2007, the group had net sales of 19,159 million SEK and employed 4,900 persons. The company has a long history - Holmen first started to produce weapons back in 1609 and will celebrate its 400 year birthday 2009.

With a total stand of 1,265 million hectares of land, out of which 1 million is productive forestland Holmen is one of Sweden's largest forest owners. This can be compared to the province Skåne of Sweden, which has an area of 1.1 million hectares. Predominantly, the

[15] All information provided under this headline is publicly available, originating either from Holmen's annual report for 2007 or from Holmen's website www.holmen.com.

forest holdings are located in northern Sweden. The total volume of standing timber is 117 million forest cubic meters, growing by almost four million forest cubic meters every year. The following table (7.1) summarizes species- and age distribution for Holmens's total forest holdings.

Species	Percentage
Pine	50%
Spruce	34%
Deciduous	12%
Contorta	4%

Age class	Percentage
0-30 years	39%
31-60 years	24%
61-90 years	15%
91- years	22%

Table 7.1. Holmen forest species and age in percentage

Holmen owns its forest assets trough a separate company named Holmen Skog, which also manages the forest holdings and provides the industries of Holmen group with timber. The industries of Holmen uses around 4.5 million cubic meters a year but is only harvesting 2.5 million cubic meters from their own woods;[16] hence Holmen Skog also deals with buying timber for the whole group to fill the gap.

8. The concept of value

This paper is about valuation, so to get started, we must have an idea of what value is and the different approaches to determine value. In a general definition value could be seen as the attractiveness or the utility a good has. The utility is often measured in monetary terms. But value could also be the sentimental value, value in use or the value in exchange.[17] In economic theory the utility of a commodity is its ability to satisfy human wants, and if the commodity has utility so that it is demanded by people, then it has economic value. Accounting is not concerned with economic resources (assets) in general, only those which are under the *control* of a given entity, as a result of *past events* and where *future economic benefits* will be generated.[18]

Value is not intrinsic to the commodity itself, but relates to the consumers' willingness to give up something to obtain it. Economists have decided that the market price of a commodity is

[16] Swedish Annual Report of Holmen, p. 20
[17] http://www.ne.se/artikel/O396061/O396061 (2008-11-28)
[18] Godfrey, Jayne, 2006: "Accounting Theory". Sixth edition publ. Australia: John Wiley & Sons Australia, Ltd. p. 449-451

an indirect measure of the marginal utilities of the average consumer. Demand and supply curves illustrate the value that has been placed on commodities for their demand and supply. The equilibrium or market price represents market consensus on value.[19]

8.1 Valuation bases

Simplified, an enterprise can be valued as the present value of the whole business or by valuing the assets. The main asset valuation bases for the latter approach have been diagrammatically summarized by Alexander & Nobes in the following way:[20]

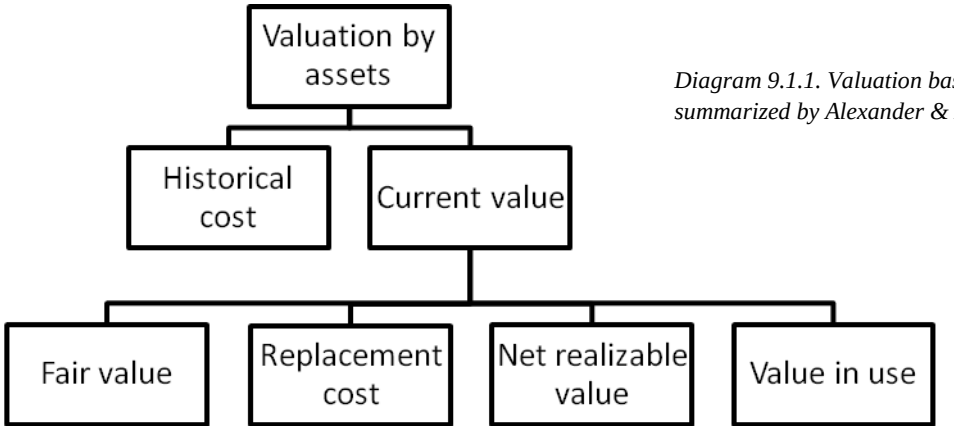


Diagram 9.1.1. Valuation bases as summarized by Alexander & Nobes.

Using historical cost is reliable and cheap, but in some cases it can have little relevance for making economic decisions. In most cases, the current value methods in the diagram 9.1.1 are more relevant, but also less reliable since they involve subjective judgements. The most useful value to users of financial statements would be the "true" economic value of assets and liabilities. Unfortunately, we do not know for sure what the true economic value is. Market prices should be the best approximation of true value since it fulfills the requirement of being objective.[21]

Fair value

IAS 41 defines fair value as *the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction*. Fair value assumes that the business is neither buying nor selling.

[19]Godfrey, p. 490-491
[20] Alexander, David & Nobes, Christopher, 2004: "Financial Accounting- An International Introduction". Second edition publ. England: Pearson Education, Ltd., p. 182
[21]Godfrey, p. 487

Replacement cost

Current value is thought of as the transaction costs of replacement. The values of fixed assets are their depreciated current replacement costs.

Net realizable value

Net realizable value defines current value as the expected sales receipts less any costs to sell. Depreciation is measured as the fall in the net realizable value of the asset.

Value in use (or economic value)

This approach requires forecasts of all future cash flows from the asset and therefore represents a more long-term view. These cash flows must then be discounted to get a present value. Forecasting the future and setting a proper discount rate is difficult and requires subjective judgement. Hence, the value arrived at is quite theoretical and less reliable.

8.2 Valuing a biological asset using selling prices

In connection with environmental reporting, Godfrey states*:"In valuing nature we seek to turn it into a commodity, as a resource available for consumption /.../ Quantification of nature therefore makes it another economic resource that can be traded…"*[22] In valuing the living forest that is growing on a piece of land we must turn it into something that is traded. For mature forests, one possibility of turning it into something that is traded is to simply felling the trees and selling the raw timber and pulpwood on the market. Secondly, since properties consisting of both land and forest are sold frequently, it should be possible to derive the value attributed to the standing timber by deducting the value of land from the value of the combined real estate asset.

9. IAS 41 – Agriculture

A main objective of the IASB is to develop standards that are relevant in the general purpose financial statements of all businesses. In valuing growing forests, the IASB determined that fair values are more relevant to users of financial statements than the historical costs. In the following, we will outline the principles prescribed in IAS 41 that are relevant for the purpose of this paper. In principle, the standard prescribes that biological assets are measured at fair

[22]Godfrey, p. 652-653

value and that changes in fair value of biological assets during a period, are reported in net profit or loss. It's important to remember the long term nature of biological transformation in Swedish forestry. During the lifecycle of a forest plantation, costs are incurred early when planting and for silviculture (thinning, fertilizers, etc.). However, the bulk of the income arrives at final felling which can occur after a period as long as 100 years. In the "basis for conclusion" that is provided by IASB in connection with the standard, the following is stated:

"No income might be reported until first harvest and sale (perhaps 30 years) in a plantation forestry entity using a transaction-based historical cost accounting model. On the other hand, income is measured and reported throughout the period until initial harvest if an accounting model is used that recognises and measures biological growth using current fair values."[23]

The standard is structured into three main areas related to agricultural activity and we will focus on the first two:

(a) biological assets;
(b) agricultural produce at the point of harvest; and
(c) government grants.

The objective of IAS 41 is to prescribe the accounting treatment and disclosures related to agricultural activity. Agricultural activity is defined as *"the management by an entity of the biological transformation of living animals or plants (biological assets) for sale, into agricultural produce or into additional biological assets"*.[24] For example sheep, cattle, trees in a plantation forest and fruit trees are biological assets whereas wool, milk, logs and picked fruit are agricultural produce that are harvested from those biological assets.[25] The standard does not apply to land nor intangible assets related to agricultural activity.[26]

The standard states that a biological asset should be measured at its fair value on initial recognition and at each balance sheet date (§12). In determining fair value, the standard prescribes a hierarchy of approaches. First and foremost, the quoted price in an *active market* for the biological asset or biological produce is the appropriate basis for determining fair value (§17). An active market is a market where all of the following conditions exist:

[23] IAS 41: Basis for conclusions, B15
[24] IFRS as at January 1, 2007, IAS 41 Agriculture, paragraph IN1
[25] IFRS as at January 1, 2007, IAS 41 Agriculture, paragraph 4
[26] IFRS as at January 1, 2007, IAS 41 Agriculture, paragraph 2

(a) the items traded within the market are homogenous;
(b) willing buyers and sellers can normally be found at any time; and
(c) prices are available to the public.

Second, if an active market does not exist, an entity uses one or more of the following, when available, in determining fair value (§18):

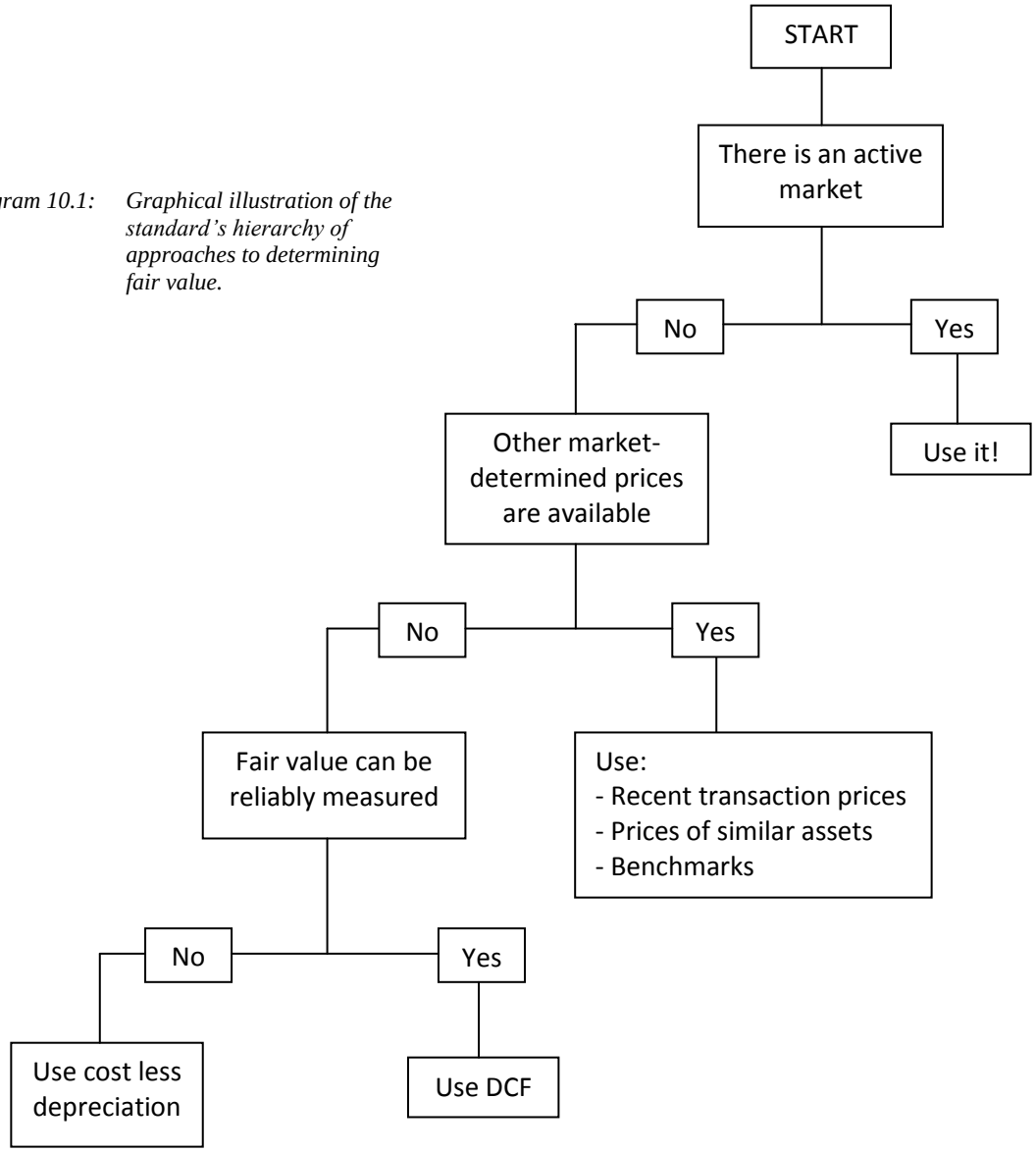
(a) the most recent market transaction price, provided that there has not been a significant change in economic circumstances between the date of that transaction and the balance sheet date;
(b) market prices for similar assets with adjustment to reflect differences; and
(c) sector benchmarks such as the value of an orchard expressed per export tray, bushel, or hectare, and the value of cattle expressed per kilogram of meat.

Thirdly, in some circumstances, market-determined prices or values may not be available for a biological asset in its present condition. In these circumstances, an entity 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 (§20).

If market-determined prices or values are not available and alternative estimates of fair value are determined to be clearly unreliable the biological asset should be measured at its cost less any accumulated depreciation (§30).

In our minds, these paragraphs can be summarized in the following way (see below). Given that fair value can be measured reliably, the entity should first use quoted prices in an active market. If no such market exists, the preparer should use other market-determined prices such as recent transaction prices, prices of similar assets or sector benchmarks. Finally, if there are no market-determined prices available, the entity should determine fair value using a discounted cash flow model (DCF).

Diagram 10.1: *Graphical illustration of the standard's hierarchy of approaches to determining fair value.*



The standard clarifies that market prices of real estate assets can also be used in determining the fair value of a biological asset:

Biological assets are often physically attached to land (for example trees in a plantation forest). There may be no separate market for biological assets that are attached to the land but an active market may exist for the combined asset, that is, for the biological asset, raw land and land improvements, as a package. An entity may use information regarding the combined asset to determine fair value of the biological asset. For example, the fair value of raw land and land improvements may be deducted from the fair value of the combined asset to arrive at the fair value of the biological asset (§25).

9.1 The trade-off between relevance and reliability

The standard is an example of a case where the trade-off between relevance and reliability has to be considered and this balancing should be made by the preparer:

In adopting IAS 41, IASB determined that the fair values of biological assets and agricultural produce are more relevant to users of financial statements than the historical costs of those items. Therefore, IAS 41 requires accounting for those items at fair value. The board recognised, however that sometimes it is simply not possible to get a reliable measure of fair value. Therefore, IAS 41 includes a "reliability exception" to the fundamental fair value measurement principle. This "reliability exception" places the burden of judgement on the preparer and auditor of the financial statements and is an illustration of the trade-off between relevance and reliability.[27]

9.2 Additional biological transformation

Returning to the discussion of biological transformation, it is stated in the standard that the objective of a calculation of the present value of expected net cash flows is to determine the fair value of a biological asset in its present location and condition. This excludes any increases in value from additional biological transformation and future activities of the entity, such as those related to enhancing the future biological transformation, harvesting and selling (§21). However, at the December 2003 International Financial Reporting Interpretations Committee (IFRIC) meeting, there was general agreement among IFRIC members that the prohibition of including potential future growth of the biological assets in the DCF model excluded a major portion of the fair value.[28] Therefore, effective January 2009, §21 will be changed and this prohibition will be removed.[29]

The accountant that were responsible for the audit of Holmen in 2007, states that the IFRS standards are not always consistent. He exemplifies by comparing IAS 41 to IAS 36 - Impairment of Assets. IAS 36 prescribes the procedures that an entity applies to ensure that its assets are carried at no more than their recoverable amount (this standard does not apply to biological assets related to agricultural activities). IAS 36 states:*" An asset is carried at more than its recoverable amount if its carrying amount exceeds the amount to be recovered*

[27] Applying International Financial Reporting Standards, p.73
[28] http://www.iasplus.com/ifric/ias41fairvalue.htm (2008-12-08)
[29] http://www.iasb.org/NR/rdonlyres/2E12B0EC-4AE6-4F8B-9DF1-F1AC99CF6C79/0/IASBUpdateMarch08.pdf (2008-12-08)

through use or sale of the asset." Note that he says through use or sale of the asset. This is different from the prescriptions found in IAS 41, where the value in use comes into play not until the level three DCF model.

10. IAS 41 in practice

We will now look at how the standard described above has been applied by practitioners. Obviously, all of the major forestry companies that prepare their reports in accordance with the IFRS have followed the "guided tour" illustrated in diagram 10.1. and reached a conclusion on how to determine fair value of their forests. Holmen's and other firms' reasoning is summarized as follows:

Holmen	*"Holmen's assessment is that no relevant market prices are available that can be used to value forest holdings as extensive as Holmen's. The valuation is therefore made by calculating the present value of expected cash flows from the growing forests. This calculation of cash flows is made for the coming 100 years, which is regarded as the harvesting cycle of the forests."*[30]
Stora Enso	*"Biological assets, in the form of free standing trees, are accounted for under IAS 41, which requires that the assets be measured at fair value less costs to sell. Fair value is determined using discounted cash flows from continuous operations based on sustainable forest management plans taking into account the growth potential of one cycle."*[31] *"The valuation of newly acquired and recently planted biological assets are carried at cost, which equates to fair value."*[32]
SCA	*"The biological assets are valued and reported at fair value after deduction for estimated selling costs. The fair value of the Group's standing forest is calculated as the present value of anticipated future cash flow from the assets before tax."*[33]

[30] Holmen annual report 2007, p. 50. (see further reference list under "Internet sources" for URL)
[31] Stora Enso annual report 2007, p. 130 (see further reference list under "Internet sources" for URL)
[32] Stora Enso annual report 2007, p. 123 (see further reference list under "Internet sources" for URL)
[33] SCA annual report 2007, p.70 (see further reference list under "Internet sources" for URL)

Sveaskog (translated into English)	*"There is no functioning market for growing forest of the size corresponding to Sveaskog's holdings and therefore, relevant market prices are missing. The fair value has therefore been calculated as the present value of future revenues from felling less costs from replanting and silviculture."*[34]

The state-owned company Sveaskog, Sweden's largest forest owner with 3.3 million hectares of productive forestland makes the same argument as Holmen and uses the DCF approach. The same goes for SCA, the owner of approximately 2.0 million hectares of productive forestland. Stora Enso's biological assets are mainly held in the associated company Bergvik Skog AB in which the DCF is used as well.

Expanding our view, Finnish UPM and M-real takes the same stance in this issue. UPM states that *"the fair value of biological assets other than young seedling stands is based on discounted cash flows from continuous operations."* So, in Sweden and Finland there seems to be no disagreement in that the DCF approach is the proper method to use for large forest holdings.

We have found two companies that have chosen different paths. Smurfit Kappa Group owns about 0.1 million hectares of forest plantations in Colombia and Venezuela and uses *prices of similar transactions,* where available. Where this is not available, Smurfit Kappa uses the DCF method. The South African pulp and paper company Sappi owns almost 0.4 million hectares of productive forestland in South Africa and separates between mature and immature timber. For mature timber, *unadjusted prices of timber* are used and for immature timber, the DCF is used to calculate fair value. Hence, both Smurfit Kappa and Sappi use some kind of "hybrid model" where market prices and the DCF method are mixed to arrive at a fair value.
It should be pointed out that the rotation periods vary from eight to eighteen years in Southern Africa, which is far less than the 100 years in Sweden. Moreover, the forest holdings for Smurfit Kappa and Sappi are small relative to the holdings of the Swedish and Finnish companies. Still, it's interesting to note that there actually are cases in which the fair value of forest plantations is determined using a mix of market prices and the DCF model.

[34] Sveaskog annual report 2007, p.30 (see further reference list under "Internet sources" for URL)

UPM	*"Biological assets (i.e. living trees) are measured at their fair value less estimated point-of-sale costs. The fair value of biological assets other than young seedling stands is based on discounted cash flows from continuous operations. The fair value of young seedling stands is the actual reforestation cost of those stands."*[35]
Smurfit Kappa	*"The fair value of standing timber is calculated using weighted average prices for similar transactions with third parties, where available. Where this is not practical, the Group uses the discounted cash flow method"*[36]
Sappi	*"The fair value of immature timber is the present value of the expected future cashflows /…/ The standing value of mature timber is based on unadjusted current market prices and estimated timber volumes in metric ton less cost of delivery."*[37]

11. Holmen's discounted cash flow model

In line with fundamental valuation theory, assets can be valued by discounting all future cash flows from the asset to a present value. This thinking is closely related to the concept of value in use described previously. The idea of discounting net cash flows from forestry goes back to the work made by the German forester Faustmann (1849). He developed a formula (the Faustmann formula) for calculating the value of raw land, presuming that the land would be used for forestry. The idea is to identify a single hectare of forestland that is representative for the entire holding and then calculate the annual net of costs and revenues from planting and management of the forestland for a perpetual series of rotation periods. The formula has also been used to derive the optimal rotation period for a forest holding, known as the Faustmann-Ohlin theorem.[38]

[35] UPM annual report 2007, p. 79 (see further reference list under "Internet sources" for URL)
[36] Smurfit Kappa Group annual report 2007, p. 82 (see further reference list under "Internet sources" for URL)
[37] Sappi limited annual report 2007, p. 88-89 (see further reference list under "Internet sources" for URL)
[38] Grainger MB (1968) Problems affecting the use of Faustmann's formula as a valuation tool. New Zealand Journal of Forestry 13(2): 168–183. http://nzjf.org/free_issues/NZJF13_2_1968/38AE524B-7AC1-4AA8-865C-50B870B42404.pdf (2008-12-08)

Now, we turn to describe Holmen's DCF model in more detail. A forecast horizon of 100 years is used. The purpose of the DCF model according to IAS 41 should be to determine fair value.

Holmen takes into account biological transformation, claiming that not doing so would substantially underestimate the fair value of growing forest. For immature forests, the value would be zero or even negative since the cost of felling would sometimes exceed the value of the raw material obtained from felling. When it comes to replanting, Holmen's assessment is that a valuation model that does not include costs for replanting would overestimate fair value. Given that replanting is a statutory obligation following from felling the trees according to Swedish law, Holmen considers costs for replanting as being a part of the cost for felling. The cost of replanting includes costs for preparing the ground for planting as well as costs for planting itself and is a cost of considerable size. For Holmen, excluding the cost of replanting (approximately 9,000 SEK/hectare) would generate an increase in the DCF value of growing forests by 10% - 20%. Consistent with this reasoning is that Holmen also includes the positive cash flows from thinning that will arrive in the future from trees that have not yet been planted.

11.1 Forecasting

The major groups of cash flows taken into the DCF model will now be outlined. All have to be forecasted, explicitly or implicitly, for a period of 100 years for each of the three regions (Örnsköldsvik, Iggesund and Norrköping as illustrated in picture 15.2.1).

- Quantity

The expected volumes of felled spruce, pine tree, etc. has to be forecasted and must be separated into sawlogs and pulpwood. Naturally, the percentage of total volume that becomes sawlogs is higher for final felling (when the trees are fully grown) than for thinning.

- Price

For each species, the price for sawlogs and pulpwood must be forecasted. The price for a cubic meter of pine tree timber or spruce timber is normally in the interval of 400-600 SEK, depending on location. For pulpwood, the price per cubic meter is usually in the area of 250-350 SEK.

- Variable costs

This includes all variable costs for felling and transporting trees and sawlogs, both for final felling and thinning. The cost of transportations is divided into two parts – transporting to the nearest road and the transport to the buying industry. Divided per cubic meter, thinning is more expensive than final harvesting.

- Silviculture

In the first and second year after final harvesting, the land is prepared, seeded, fertilized and replanted. These costs, as well as costs for periodically clearing the forests are accounted for here.

- Fixed costs

This includes fixed costs such as administration, on a local as well as central level.

A valuation is made every quarter. However, the forecasts for felling volumes are only updated every 10 years when the inventory of the standing volume is carefully measured. A person interviewed at Holmen says that historically, these measurements tend to have surprised Holmen. It usually turns out the total standing volume is larger than expected.

Also, if forest estates have been sold or acquired during the year, the forecasts of felled volumes are adjusted. In 2007, acquisitions of growing forest had a positive impact on the book value of Holmen's biological assets of 53 MSEK. Virtually no sales were made. The prices at which these estates were acquired were however considerably higher than Holmen's book value. Hence, buying forest estates at market value and then valuing the biological asset in the balance sheet using the DCF method results in an immediate loss in the income statement. When the newly acquired forest is merged into the large forest holdings of Holmen, its fair value is considered by Holmen to become the DCF value.

11.2 The discount rate

When all future cash flows have been forecasted, they should be discounted to a present value. The discount rate is based on a weighted average cost of capital (WACC) for debt and equity capital. Using a risk-free rate of 4.5% based on long term Swedish government bonds and a beta value in the area of 0.3-0.4 for Holmen Skog and Holmen Energy combined, the after-tax cost of equity capital is 6.5%. The cost of debt has been calculated by adding on a

1% risk premium to the risk-free rate. Finally, Holmen's target capital structure in book value terms has been used as basis for the weights. Consequently, Holmen arrives at a WACC of 5.5%. The sensitivity analysis provided in Note 11 in Holmen's annual report for 2007 states that a change in the discount rate of only 0.1 percentage units will have an impact on value of 240 MSEK before tax.

	Risk-free rate + riskpremium	**Adjustment for tax**	**Weight**		
Debt	(4.50 % + 1.0 %)	* (1 – 28 % tax)	* 35 %	=	1.3%
Equity	(4.50 % + 2.0 %)		* 65 %	=	4.2%
WACC					**5.5%**

11.3 Simple DCF

We will now make a simplification of Holmen's DCF model to arrive at a rough value of Holmen's growing forests. [39]

On average, the annual net cash flow from Holmen's forest for 2001-2007 is 460 MSEK. This includes revenue from sold sawlogs and pulpwood as well as costs associated with managing the forests. Using Holmen's WACC for 2007 of 5.5% and assuming a growth rate of cash flows due to inflation of 2%, the discount rate in real terms should be 3.5%. The Gordon's growth formula leads us to the following value of Holmen's growing forests:

$$V = \frac{460\ MSEK}{0.035} - \left(\frac{460\ MSEK}{0.035}\right) \Big/ 1.035^{100}$$

$$= 13\,100\ MSEK - 400\ MSEK = 12\,700\ MSEK$$

The first term in the formula above is the cash flows from 2008 to infinity discounted to a present value and represents the value of the combined asset (land and forest). The second term is the cash flows occurring in 100 years from now and for infinity, discounted to a present value and represents the value of raw land. Hence, by subtracting the second term, we are left with the present value of cash flow occurring from now and 100 years forward. Notice that the second term is merely 3% of the total value. The simple DCF value of 12,700 MSEK is not that far from Holmen's current book value of growing forests of 11,100 MSEK. The

[39] All numbers that will be presented below this headline have been communicated in Holmen's annual report for 2007. (see further reference list under "Internet sources" for URL)

main reason for our value being a bit higher should be that Holmen forecasts a growth in net cash flows that is slower than 2% until year 2035.

If raw land as an asset is being used for forestry, the value of the combined asset (land and growing forest) can be said to be the present value of all future cash flows that will arrive from forestry, from now to infinite time. The forest that is growing on the land has an average lifecycle of 100 years and the present value of those cash flows can be said to be the value of the growing forest. Thus, by this reasoning, the DCF model can be used to separate the value of the biological asset (growing forest) from land. This is exactly what we just did above. The same methodology was used when Holmen estimated the acquisition cost of all of Holmen's raw land to 100 MSEK, which is the present book value of Holmens's raw land.

There are difficulties in correctly separating raw land from the biological asset growing upon it and the DCF model does not fully succeed in this respect. A PhD student at the Swedish University of Agricultural Sciences (SLU) claims that a model to calculate the value of the growing forest in which all future net cash flows from forestry are discounted to a present value, "steals" the site productivity[40] of the land. The growth in volume of the biological asset should be attributed to the ability of the land – its location and characteristics – to generate growth. Not to the growing forest.[41]

12. Climbing up the hierarchy ladder: two new methods to measure fair value

We now have an understanding of the present method of measuring fair value, the DCF model. Next, we turn to the second part of the purpose of this paper; to propose alternative ways of measuring fair value. To advance to a higher level in the hierarchy of fair value measurement in IAS 41, we will now develop two methods based on actual market transactions.

The ideal way to measure fair value according to IAS 41 is to use market transaction prices in an active market. However there is usually more than one market available. Godfrey states: *"In accounting, the market in which an entity buys relates to its input and the market in which*

[40] The site productivity is the increase in cubic meters per hectare and year.
[41] Telephone interview with a PhD student at SLU, 2008-11-22

it sells usually relates to its outputs." "Entry price" and "exit price" are terms used for this distinction. The former is the replacement or current cost and the latter the selling price.[42]

The growing forest assets of the four largest forest owners in Sweden can be seen as commodities where entry and exit prices are more or less the same. In the *Basis for conclusions* provided in connection with IAS 41, arguments in favour of using selling price accounting (SPA) are presented. The main argument is that the long life-cycles of some biological assets create a large time-gap between the occurrence of costs (replanting and silviculture) and income (harvesting). This is the same quote as referred to previously:

"No income might be reported until first harvest and sale (perhaps 30 years) in a plantation forestry entity using a transaction-based historical cost accounting model. On the other hand, income is measured and reported throughout the period until initial harvest if an accounting model is used that recognises and measures biological growth using current fair values"[43]

Hence, SPA introduces unrealized holding gains to the income statement, making it vary from year to year depending on market conditions. Therefore, SPA results in a more volatile income statement. Also, using selling prices implies a short-term approach to business operations, since one is interested in disposition and liquidation values.[44]

In line with the arguments proposed in IAS 41, our two alternative methods for measuring fair value of large forest holdings are both based on selling prices. In our opinion, there are two main markets available; the raw materials market for sawlogs and pulpwood and the forest estate market. We will now develop our two alternative methods and describe the markets they are based on.

12.1 Sawlogs- and pulpwood market

According to IAS 41, an active market is a market where all of the following conditions exist:

(a) the items traded within the market are homogenous;
(b) willing buyers and sellers can normally be found at any time; and
(c) prices are available to the public.

[42] Godfrey, p. 496
[43] IAS 41: Basis for conclusions, B15
[44] Godfrey, p. 192

We will argue that these conditions are all fulfilled for the market for sawlogs and pulpwood. First, there is no doubt that they are homogenous products. Timber taken directly from the forests is a commodity in the first line of the chain of production. Second, sawlogs and pulpwood are traded virtually every hour on an increasingly internationalized market. Third, buyers' of logs and pulpwood usually have pricelists publicly available continuously on their websites or provide them at request. Hence, the three necessary requirements for an active market are met.

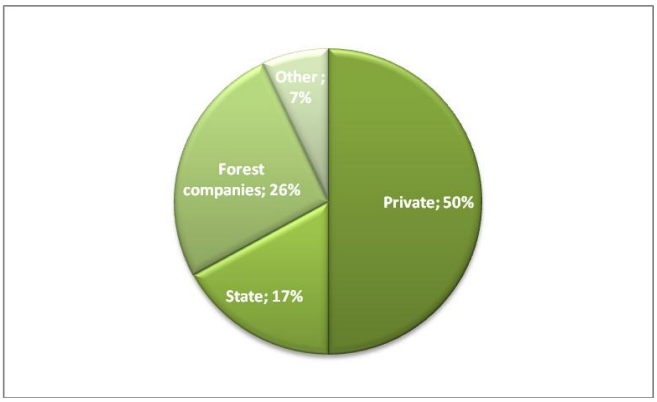
12.2 First method: The Immediate Harvesting Method (IHM)

Our first method assumes that growing forest can be valued using prices of a similar type of asset, namely the prices of the agricultural produce resulting from managing forests. By transforming the growing forest into sawlogs and pulpwood, we get access to an active market, which is an important advantage. As the name of this method suggests, the IHM values the biological assets as if the entire holding would be felled at once and the timber sold on the market for sawlogs and pulpwood. This thinking is in line with the second-best level of measuring fair value of the biological asset (IAS 41.18). Therefore, the IHM should be more preferable than the level three DCF model (mark-to-model level), given that fair value can be measured reliably.

A drawback of the IHM is its hypothetical nature. First, an immediate harvesting of the whole stand is not allowed according to Swedish law. In Sweden there is a minimum age for final harvesting in order to prevent pre-mature harvesting. That minimum age varies from 60 to 80 years for different regions in Sweden. Second, even if an immediate harvesting would be allowed, it would not be performed by large forest companies anyway. The forest industry wants a steady stream of timber to maintain production, not an immediate liquidation of all growing forest. Still, the IHM should have some practical relevance. Recall that 22% of Holmen's holdings is 91 years or older and all that could be harvested in a relatively short period of time if Holmen wanted so. Also, we do not think that the IHM needs to be 100% realistic in order to be valid. A second issue that should be addressed is the fact that the transaction prices of logs and pulpwood are marginal prices for relatively small quantities. Is it reasonable to assume that an immediate harvest of Holmen's forests could be sold at the same price? This will be analyzed more closely in connection with the IHM calculations.

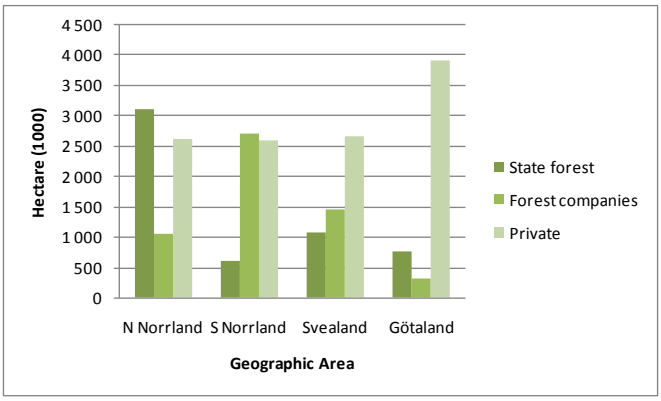
12.3 The real estate market

The forest land in Sweden covers 22.9 million hectares out of which 100,000 hectares are traded on the open forest estate market each year.[45] Hence, the turnover of forest estates is less than 0.5%. An annual turnover of 100,000 hectares is not that much compared to Holmen's holdings of 1 million hectares. Even if the forest estate market is illiquid, there are still transactions taking place and price statistics are publicly available, although it requires some effort to obtain the statistics. In 2007, the number of forest owners amounted to 334,000.[46]



Picture 13.2.1.

Distribution of ownership in Sweden, compiled using data from Skogsvårdsstyrelsen. [47]



Picture 13.2.2.

Ownership by geographic area, compiled using data from Skogsvårdsstyrelsen. [48]

The distribution of ownership in Sweden can be seen in seen in the picture above. Picture 13.2.1 shows that private owners are the largest group of owners, followed by forest companies and the state of Sweden. Picture 13.2.2 provides the same information specified for the main regions of Sweden. In the north of Sweden, the fractions of state-owned land and corporate holdings are relatively large, whereas the ownership in southern Sweden is far more fragmented and the private ownership is dominating.

[45] http://www.sveaskog.se/Press-och-nyheter/Pressmeddelanden/2006/Sveaskog-har-salt-927-skogsfastigheter/ (2008-12-08)
[46] http://www.svo.se/episerver4/templates/SNormalPage.aspx?id=16226 (2008-12-08)
[47] http://www.skogsstyrelsen.se/episerver4/templates/SNormalPage.aspx?id=16226 (2008-12-08)
[48] http://www.skogsstyrelsen.se/episerver4/templates/SFileListing.aspx?id=15322 (2008-12-08)

12.4 Second method: The Decomposed Real Estate Method (DREM)

Our second method is based on the forest estate market and is completely consistent with the prescriptions of IAS 41 (§25) as outlined previously:

"An entity may use information regarding the combined asset to determine fair value of the biological asset. For example, the fair value of raw land and land improvements may be deducted from the fair value of the combined asset to arrive at the fair value of the biological asset."

Just as in the case of the IHM, the DREM uses prices of a similar asset (the package of forest and land) to measure fair value of the biological asset. Hence, the DREM is also a second level method, given that fair value can be reliably measured. Because the properties consist of both raw land and the forest growing upon it, the DREM requires the value of the raw land to be deducted from the property. That way, the price of the growing forest alone can be derived. As we will see, the raw land-component is difficult to price separately, since it contains various "soft" values such as hunting, attachment to the area in which the property is located and sentimental value. The low liquidity of forest estates is of course a drawback of the DREM.

13. Introduction to forestry

In this section we will try to give the reader some fundamental knowledge in forest and forestry, to make it easier for the reader to follow and understand the assumptions that we make and the conclusions we draw.

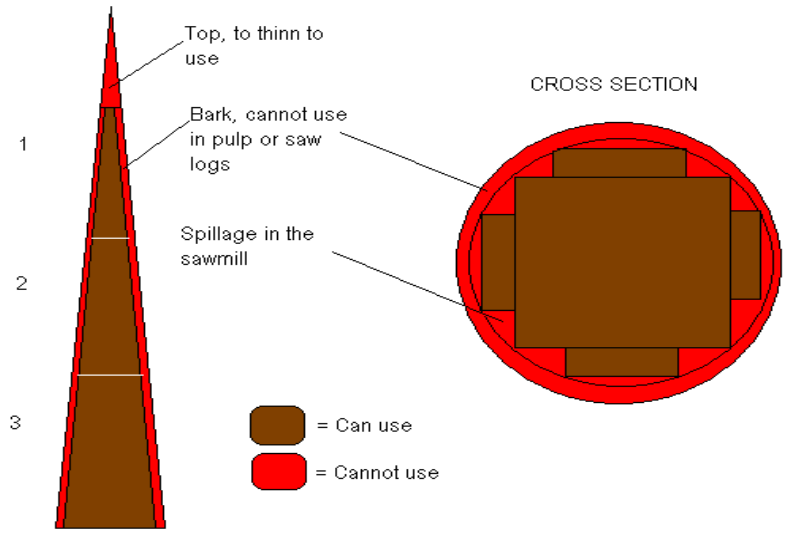
When you plant wood you normally divide the land in several pieces and plant the same kind of tree in that area. This area is called a forest parcel. This means that in every parcel there is only one kind of tree, all with the same age. When you do a plantation, the seedlings are put tightly together of two reasons, first to avoid empty spots since not all seedlings strike root. The second reason is that you want the trees to seek for light, this they do by growing in length. Up to the point of final harvesting, you do three thinning at different stages of maturity; T1, T2 and T3. T1 is the first thinning stage; typically this is done in the age of ten to twenty years depending on geographic location. In T2 you still want the trees to be tight but now you don't want that the trees will compete for nutrition and therefore oppose each other. You therefore harvest some of them to increase space. T3 is the same as T2 but at a later

stage. After all thinning stages the trees are ready for final harvesting, this takes 60-90 years, depending on geographic location. The final harvesting is also divided into two or three stages; F1, F2 and F3. In all stages you can harvest everything but most owners' do not complete the final harvesting at F1 and therefore wait to F2 or F3, this since the wideness increase and also the value of the trees.

The first stage of thinning is more or less just a cost, since there is no market except the Christmas tree market for the output. In T2 you can sell everything, most of the timber only fulfil the requirements for pulpwood. In the south part of Sweden you often can sell some timber as sawlogs.

When you final harvest you earn the most money, you will get paid for everything and most of it is sawlogs which is the most valuable. The longer you wait the thicker the trees becomes and the payment will increase, but if you wait too long the trees can start decompose.

In thinning (T2-T3) sometimes part three in the picture 14.1 below can be sawlogs, this timber is in the border of fulfilling the requirement to become sawlogs. You will therefore receive less money than from timber in final harvesting, but more money than from selling it as pulpwood. When performing final harvesting, often part one in the picture14.1 can become pulpwood due to lack in wideness.



Picture 14.1: To the left you can see a graphic illustration of a standing tree, when harvesting the timber is divided into different parts. The cross section to the right illustrate the parts that can be used.

We will also use different type of terms when referring to volume of the timber, explained below:

fm3: Cubic meters or Forest Cubic meters	Cubic meter standing volume (stem volume over bark from stump to top) Parts, 1-3, the bark and the top in picture 14.1.
fubm3: fub-cubic-meters	Cubic metre solid volume exl. bark. The volume that you will be paid for. Parts, 1-3 without the bark in picture 14.1.

Since Sweden is a narrow country geographic location will affect the quality of earth and climate which also will affect quality of the trees and how fast they grow. In southern parts of Sweden the quality of the earth is better than in the northern parts, also the climate is warmer, this will make the trees grow faster in south than in the northern parts of Sweden. Since the speed of growth is different in parts of Sweden this will off course also affect when T1-T3 and F1-F3 will occur. This also means that in southern parts of Sweden you often does not perform T3 and F3 since the trees grows faster there.

14. The Immediate Harvesting Method (IHM)

Mandated by the prescriptions of IAS 41, we will now turn to our first method for measuring the fair value of growing forest using market determined prices. The IHM method is based on the idea that growing forest can be valued using prices of a similar but not identical type of asset, namely the agricultural produce resulting from felling the trees. As explained above, the IHM is hypothetical for several reasons, but can still produce valid a measure of fair value in our opinion. The IHM will now be applied to value Holmen's forest holding. The structure will be as follows:

- Explain why we use Skogsvårdsstyrelsen's prices instead of the price lists for sawlogs and pulpwood from the large Swedish wholesalers.
- Valuation of the biological assets of Holmen according to current market prices on the raw material market (sawlogs and pulpwood).
- Consider the effect of the supply chock that may occur if Holmen does a theoretical sell of their whole biological asset on the raw material market.

14.1 Skogsvårdsstyrelsen's prices and wholesalers' price lists

Skogsvårdsstyrelsen (SVO) has calculated average transaction prices of sawlogs and pulpwood for each quarter, specified for the northern, mid and southern part of Sweden.[49] This is in line with the Swedish forest industry that also divides the country into three regions.[50] The prices are based on the contract of delivery called delivered-to-road or delivery logs.[51] For spruce and pine-tree, prices of sawlogs and pulpwood are available whereas for birch-tree only prices of pulpwood are to be found.

Buyers of sawlogs and pulpwood, such as Holmen, are using the raw material as input in their production of paper, paperboard, sawn goods, etc. They usually have pricelists published on their websites or will provide the price lists when asked. Hence, these price lists reflect the demand-side prices. Example of pricelists and statistics of SVO can be found in Appendix B

14.1.1 Differences between SVO's prices and the reported market prices

For pulpwood, the prices reported in the buyers' pricelists and the price statistics reported by SVO are largely in line. This depends on the fact that there is little correction needed, since pulpwood is a homogenous product and quality, length, wideness, etc. will not affect the price that much.

For sawlogs, however, the prices reported by buyers on the market can be very different from SVO's statistics. SVO sometimes reports prices that are only a third of the prices you can find in the buyers' pricelists. The reason for this is that quality, length, wideness and where the trees have grown has a large impact on the price of sawlogs. It is easy for a untrained eye to focus on the high figures in the upper right corner of the price list where the most wide, the tallest and the best quality of sawlogs is reported, but it should be stressed that only a few percent of the harvested trees qualify in to that extreme high quality. SVO has reported the average price paid on the market for sawlogs. This will then also include the average of quality in that region.

[49] All statistics can be found trough this URL:
http://www.svo.se/episerver4/templates/SFileListing.aspx?id=16583 (2008-12-08)
[50] Södra in the southern parts of Sweden, Mellanskog in the middle parts of Sweden and Norrskog and Norraskogsägarna in the northern parts of Sweden.
[51] Delivered-to-road is a contract of delivery where the forest owner handles the harvesting and is responsible for transporting the timber to a car road. The payment is done according to price lists, see
http://www.svo.se/episerver4/templates/SNormalPage.aspx?id=16590 (2008-12-08)

14.1.2 Why we choose SVO's prices

As mentioned in section 7.3. Data, it is common practice that the buyers of sawlogs and pulpwood offer premiums in addition to the prices stated in their lists. Because of these premiums, the list prices are normally lower than the actual transaction prices. Since SVO's statistics is based on transaction prices, SVO takes the premiums into account. That is an important reason for us choosing SVO's prices in our calculations. Another reason is due to the fact that SVO deals with these complex problems on a daily basis and their prices will therefore give a more reliable value than our estimates. This will minimize the risk for us to miscalculate average prices of sawlogs. Since the buyer of delivery logs must pay for the transportation to the factory this cost is incorporated in the price. SVO has a larger amount of observations therefore the average cost of transportation will be better captured in SVO's material. Hence, we will use SVO's price statistics for the last quarter 2007 to calculate the fair value of Holmen's holdings. However, if SVO's average prices for each region are to be applied to value Holmen's forests, we have to assume that Holmen's stands are representative for the average Swedish forest stand in terms of quality. We think that Holmen's forests are sufficiently large and well spread in each region to be valued using average qualities and prices.

14.2 Example of valuation through the Immediate Harvesting Method.

Below, we will value a theoretical stand of timber to illustrate the method used on Holmen's forest. This is to give the reader further knowledge in how we derive the value in the IHM, without revealing sensitive data. The same methodology that is used in the example will be used to value Holmen's forests and the resulting value of these calculations will then be shared with the reader. We will now present the example forest stand to be valued:

The stand of the property is of total 10,000 forest cubic meters (fm3), 40% of the stand is below 80 years old and 10% is below 20 years old. 40 % of the trees is spruce, 40 % is pine and 20 % is birch.

The final felling age on this stand is 80 years old. We will in this case not harvest any tree which is younger than 20 years old since it is not economic defensible due to the fact that the payment of that weak timber is less than the cost of harvesting it. The fraction of sawlogs in final harvesting is 70% for all tree species. In the age between 20 to 80 years 15% will be sawlogs, this since some of the trees have lower parts that full fill the requirement for broadness of sawlogs. When you sell sawlogs on the open market pine is valued higher than

spruce, the condition is the opposite on the pulpwood market were the pine is slightly cheaper than the spruce. The birch is only valued on the pulpwood market since the sawlogs market is almost nonexistent. The prices we will use in this example are for sawlogs in fub: 450 SEK for pine, 437 SEK for spruce. In the pulpwood market we will use the prices in fub of: 258 SEK for pine, 266 SEK for spruce and 261 SEK for birch. In this example we will estimate the harvesting cost to 100 SEK/fm3.

Summary of condition used:

- Total 10,000 forest cubic meters
- 1 forest cubic meter = 0.84 fub[52]
- Age: 60% of stand older than 80 years, 40% below 80 years and 10% is below 20 years.
- 40 % spruce, 40 % pine and 20 % birch.
- Fraction sawlogs when final harvesting: 70 %
- Fraction sawlogs when harvesting the trees between 20 and 80 years: 15%
- Sawlog prices in fub: 450 SEK/ m3 for pine, 437 SEK/m3 for spruce
- Pulpwood prices in fub: 258 SEK/m3 for pine, 266 SEK/m3 for spruce and 261 SEK/m3 for birch.
- Harvesting cost: 100 SEK/fm3

First step:

How many forest meters of every species?

Spruce: 10,000*40%= 4,000 fm3

Pine: 10,000*40%= 4,000 fm3

Birch: 10,000*20%= 2,000 fm3

Second step:

How much of every species we have in fub m3?

Spruce: 4,000 fm3 * 0.84 = 3,360 fubm3

Pine: 4,000 fm3 * 0.84 = 3,360 fubm3

Birch: 2,000 fm3 * 0.84 = 1,680 fubm3

[52] http://www.skogsstyrelsen.se/episerver4/templates/SNormalPage.aspx?id=20997 (2008-11-29)

Third step:

How much of pine and spruce is sawlog?

Spruce over **80 years**: 3,360fubm3* 60%= 2,016 fubm3

Pine over **80 years**: 3,360fubm3* 60%= 2,016 fubm3

Fraction of spruce that will be sawlogs: 2,016 fubm3*70%= 1,411.2 fubm3

Fraction of pine that will be sawlogs: 2,016 fubm3*70%= 1,411.2 fubm3

The difference between 2,016 fubm3 and 1,411.2 fubm3 will be pulpwood, hence 2,016-1,411.2=604.8 fubm3 of spruce and pine will be pulpwood.

Spruce between **20 and 80 years**: 3,360 fubm3* 30%= 1,008 fubm3

Pine between **20 and 80 years**: 3,360 fubm3* 30%= 1,008 fubm3

Fraction of spruce between 20 and 80 years that will be sawlogs: 1,008 fubm3*15%= 151.2 fubm3

Fraction of pine between 20 and 80 years that will be sawlogs: 1,008 fubm3*15%= 151.2 fubm3

Fourth step:

How much of the stand is pulpwood?

We know that 40% of the stand is below 80 years old and 10% is below 20 years old, hence 30% of the stand is in the age between 80 and 20 years old.

- Amount of spruce pulpwood in fub in the age between 20 and 80 years subtracted by the sawlogs in step three: 3,360 fubm3*30%-151.2 = 856.8 fubm3
- Amount of pine pulpwood in fub in the age between 20 and 80 years: 3,360 fubm3*30%-151.2 = 856.8 fubm3
- Amount of birch pulpwood in all ages: 1,680 fubm3
- From earlier calculations in step three we have 604.8 fubm3 of spruce and pine.
- Total amount of spruce pulpwood in fub: 856.8 +604.8= 1,461.6 fubm3
- Total amount of pine pulpwood in fub: 856.8 +604.8= 1,461.6fubm3

Fifth and last step:

How much will we get paid for this?

Sawlogs:

- Pine: 450* (1,411.2+151.2)fubm3 = 703,080 SEK
- Spruce: 437* (14,11.2+151,2) fubm3 = 682,768.8 SEK

Pulpwood:

- Pine: 258*1,461,6 fubm3 = 377,092.8 SEK
- Spruce: 266*1,461.6 fubm3 = 388,785.6 SEK
- Birch: 261*1,680 fubm3= 438,480 SEK

Total payment received: 703,080+682,768.8+377,092.8+388,785.6+438,480=2,590,207.2 SEK

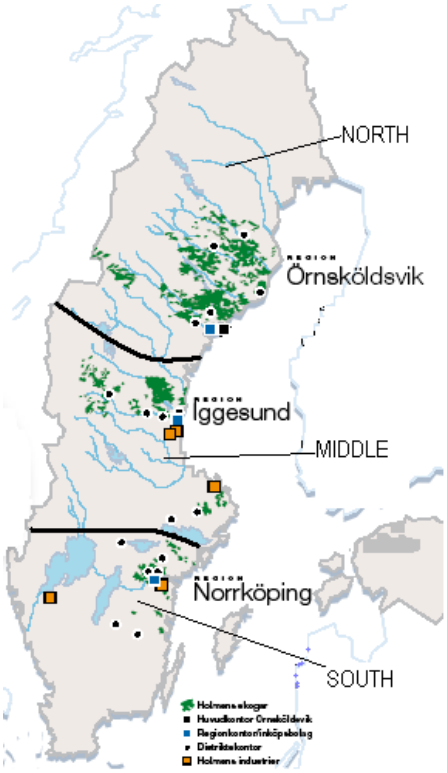
Total cost of harvesting: 100*9,000= 900,000

Hence a stand like this above we would according to immediate harvesting method value to 2,590,207.2-900,000= 1,690,207.2SEK.

14.3 Valuation of Holmen's stand

Now, we will state and motivate the assumptions that we will make in order to do an estimation of Holmen's stand according to the above developed IHM. In order not to reveal any sensitive information, we will discuss our assumption on a general level.

Like the Swedish forestry industry and SVO, Holmen has also divided their stand in to three geographic parts, southern part, named Norrköping, the middle part, named Iggesund and the northern part, named Örnsköldsvik. In the historical numbers we have got from Holmen we can see what average fractions of harvested volume that becomes sawlogs and pulpwood respectively. The fraction of sawlogs is higher for final harvesting compared to thinning. We will use this average information in our calculations since we believe this will give a good view of what Holmen's forests will generate in a felling of trees of different ages.



Picture 15.2.1. Above we can see the geographic location of Holmen's stand, it is divided in to tree parts, north, middle and south.

Since the productivity of forest land differs in geographic regions due to climate and earth-quality differences, we wished to use different final harvesting ages depending on geographic location. But due to the data from Holmen which does not give us that detailed information we will use 80 years for all the regions. We know this is too low at some locations and too high at others but according to a person we interviewed this will give a good approximation. When we do the theoretical harvesting of trees below the age of 80 years, we will use a lower limit of 20 years. Like the limit for final harvesting, this limit could be discussed and should vary over geographic locations.

Holmen also reports three species of tree, spruce, pine and leaves, and a sum up column named deciduous which we will value to birch pulpwood. We will do this due to the fact of the inability to investigate closer what specific species of wood this post holds.

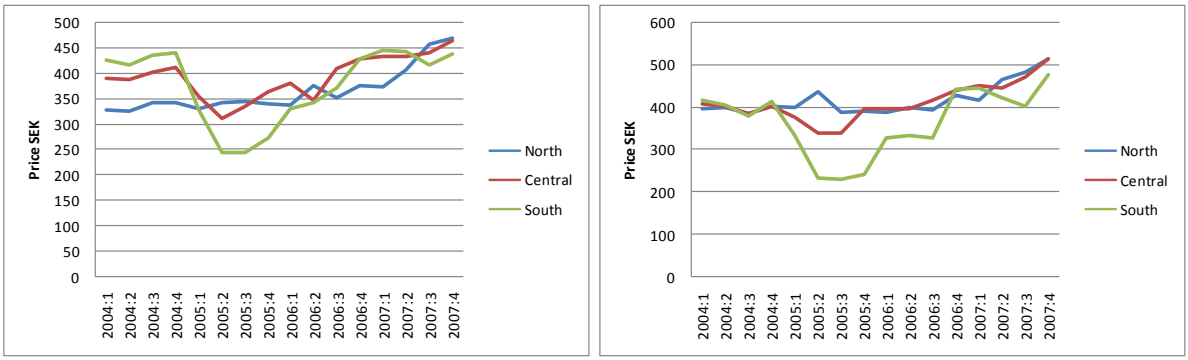
We will use Holmen's estimated cost for final harvesting in our calculations. These cost vary over different geographic locations, (south: 120-140 SEK/m3, central: 80-100 SEK/m3 and north: 100-120 SEK/m3). The reason why we only use the final harvesting cost is because it will more correctly reflect the costs that would occur, since thinning is more labour and time

consuming, costs should be over estimated. In a theoretical harvesting of the whole stand, everything would be harvested at once, and no thinning will be performed.

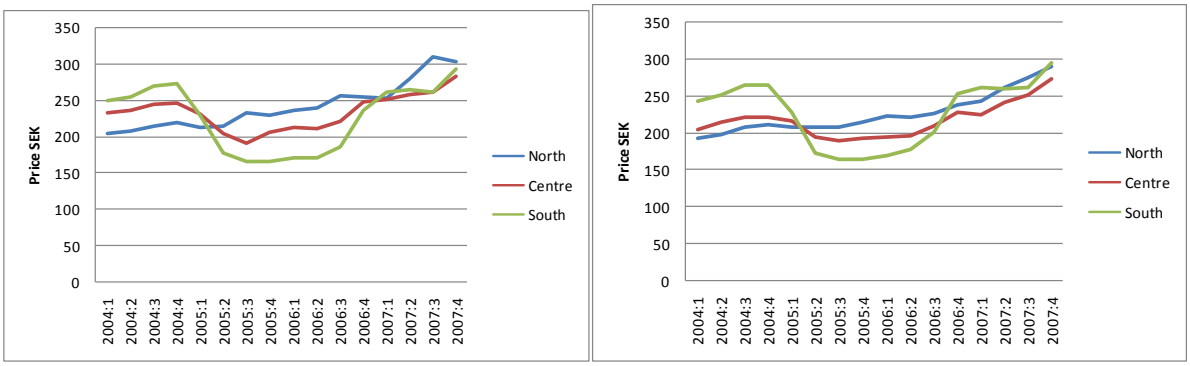
Finally, after having applied the IHM using the assumptions stated above, we arrive at a value of Holmen's growing forest of 20,762 billion SEK.

14.4 Hurricane Gudrun, discussion of supply-shock

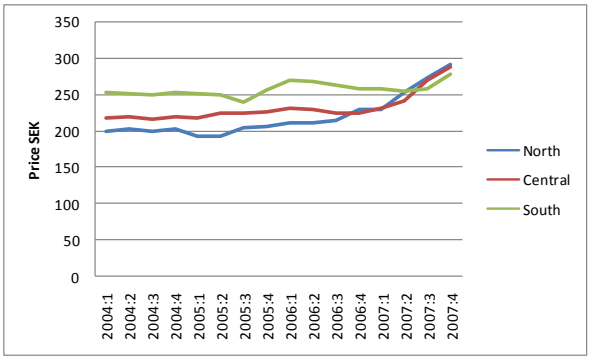
Holmen has considered the possibility of applying a valuing method like the IHM to determine the fair value of the biological assets, but rejected it. One argument is that an immediate harvesting would create a supply shock, leading to lower prices of sawlogs and pulpwood. And an adjustment for this supply shock will not give reliable values. As the diagrams below communicate, a distinct change in price levels of different types of timber occurred after the hurricane Gudrun. This is in line with Holmen's argument and with this in mind, we will below discuss what effects on prices a supply shock like this would have.



Picture 15.3.1. We can easily see the differences in price of sawlogs of spruce (left) and pine (right) in the tables above.



Picture 15.3.2. Above we can see the prices of pulpwood for spruce (left) and pine (right) wood during the period of 2004 to 2007.



Picture 15.3.3. Above we can see the price changes in birch pulpwood during the period of 2004 to 2007.

The hurricane Gudrun felled an estimate of 75 million cubic meters in Swedish Götaland during the beginning of 2005,[53] which can be compared to the total amount of harvested timber during 2007 in Sweden of 96,7[54] million cubic meters. Holmen has holdings of 117 million cubic meters in total, which is much more than was felled during Gudrun. According to SVO, the price of timber decreased to 70-75% of the value before the hurricane.[55] Because of Gudrun, transportation of timber has been rationalized and more effective since the industry was forced to manage all its harvested timber. Still the transportations are costly and the hurricane had most impacts on prices in southern parts of Sweden, and low in the northern parts. A felling in the size of Gudrun will have national price impact but the main price effects will be locally centred. Since Holmen's main stand is in the central (Iggesund, ca 275,000 hectares) and in the northern (Örnsköldsvik, ca 700,000 hectares) parts of Sweden, a felling of its whole stand will have lower effects in southern parts of Sweden, due to the timber market's local limitation in price effects and Holmen's small holdings there. The main impacts of an immediate harvesting, we would see in the central and north parts of Sweden which also would be the parts were we can use the knowledge from the supply chock of Gudrun. Örnsköldsvik is the only part of Holmen's stand in which Holmen holds a comparable amount of the total blew down amount of timber in Götaland (south part).

What we could see after Gudrun was that export of timber, timber products and effectiveness of transportation increased; timber was also transported larger distances than before.[56] This type of effect will of course decrease the fall in price of timber if all of Holmen's holdings

[53] http://www.skogsstyrelsen.se/episerver4/templates/SNormalPage.aspx?id=17523&epslanguage=SV (2008-12-08)
[54] http://www.svo.se/episerver4/templates/SNormalPage.aspx?id=40815 (2008-12-07)
[55] http://www.svo.se/episerver4/templates/SNormalPage.aspx?id=17523&epslanguage=SV (2008-12-07)
[56] Falk, Mikael, 2008: Skogsvärden, autumn 2008, News paper: "Nu får vi väsentligt högre pris". p. 2

were harvested now days. This will do that the estimated price of Holmen's assets that we ended up with may be a bit low due to the fact that infrastructure has developed since Gudrun.

During Gudrun the whole 75 million cubic meters of wood were harvesting over one night, this fast harvesting is not possible for Holmen which will decrease the effect of a supply chock. This theoretical felling will take a while and will give us the ability to spread the harvesting over a period of time, say one year; this will decrease the effect of supply chock.

14.5 Problematisation of immediate harvesting method (IHM)

We will below discuss the drawbacks that we believe exist in the IHM:

According to IAS we believe IHM will give a more fair value since it has its ground in actual market transactions which the current model of Holmen doesn't. We believe that the IHM value will give a closer value of what Holmen would receive if they actually sold their holdings than what their current booked value is reporting.

A drawback with the IHM is that due to lack of time and knowledge we have used SVO's statistics for market transactions which is not desirable since in the best of world we would have worked out our figures by our self and would not have needed to rely on somebody else.

Another con with the IHM is that it will only work in theory since according to Swedish law you are not allowed to fully harvest a stand in the size of Holmen, only less than 50%.

When developing IHM we could have been more careful in deciding limits for final harvesting and dividing the holdings in smaller geographic parts, this to be more exact in our calculations. Since we have divided it in large parts we have under estimated the "true" value since these limits were decided to rather under estimate than over estimate. This is because our main purpose was to show that the current model is generating a too low value rather than showing an exact value of what Holmen's stand would be worth in a total harvesting.

If this theoretical harvesting of the whole of Holmen's stand were done, this would affect prices due to the supply shock that would be created, this since Holmen have such large holdings. We have not estimated what effects a supply shock would have been when performing our valuation; we have only discussed what the effects could have been. It is obvious that a decrease in price would occur and therefore our estimated value is too high.

Even thought there are several drawbacks with the IHM we believe it is a fairer measurement of Holmen's stand than the DCF that they currently are using.

15. The Decomposed Real Estate Method (DREM)

We now turn to our second attempt to measure the fair value of Holmen's growing forest using market determined prices. This time, we start out from the real estate market for forest properties that price growing forest and raw land as a combined unit. Then, to calculate the value of the forests alone, we must deduct the value of raw land. These are the main steps of the DREM method (see below).

1. Collect transaction prices of sold forest estates.
2. Derive the market's pricing of the raw land component of the sold forest estates.
3. Derive the value of the forests by deducting the value of raw land from the transaction prices of the combined asset (the forest estates).

The DREM method will provide an answer to some of the questions we asked in the introduction part. It will help explaining the growing gap between the market prices of sold forest estates and the DCF values of the forest companies displayed in picture 4.2. As stated, it is possible that a part of the gap can simply be attributed to the increase in the value of raw land. However, it would be unreasonable to assume that the gap in its entirety can be explained by the land component. Given that the DCF value actually is the true fair value of Holmen's forest holdings, the remaining gap must follow from the fact that Holmen's total holding is huge in comparison to the marginal prices of smaller forest estates. Hence, given the gap in picture 4.2, the forest companies implicitly claim that there is a discount for large forest holdings. This alleged "size discount" will also be investigated.

15.1 Transactions involving large holdings

The best benchmark for valuing a forest holding is to look at recent transactions that have taken place in the same region and that are equally large as the target holding. From such transactions, multiples like price/m3 or price/hectare could be derived and applied to value the target forest holding. Unfortunately, transactions of similar size as the holdings of the Swedish forest industry are rare. We will now briefly describe the three largest transactions that have taken during the last ten years and then compare their relative values.

The formation of Bergvik Skog AB

In 2004, Bergvik Skog acquired all of Stora Enso's and Korsnäs' former forest holdings in Sweden of 1.9 million hectare for 23.654 billion. Bergvik's owners are, in addition to Stora Enso and Korsnäs, mainly institutional investors such as insurance companies and foundations. In connection with the acquisition, Bergvik Skog signed long-term timber-supply contracts with Stora Enso and Korsnäs regarding the sale of felling rights. Bergvik Skog also entered into agreements on the purchase of silvicultural services from Stora Enso and Korsnäs.[57] Due to the underlying agreement of deliveries to Stora Enso's and Korsnäs' mills and the fact that the transaction was not put on the open market, the transaction can't be treated as a pure market transaction in arms' length.

Korsnäs' sales of forest properties to state-owned Sveaskog AB

In 2002, Korsnäs sold one third of its total forest holdings - 200,000 hectares of productive forestland - to state-owned Sveaskog for two billion.[58] All details concerning the transaction are not publicly available and other assets were exchanged in addition to the forest holding. In the transaction there were underlying agreements on deliveries to Korsnäs' mills.[59] Therefore, the price of the forest holding alone can't be derived. Also, the acquisition was not offered to the open market. Consequently, the transaction can't be treated as an open-market transaction.

Skanska's sales of Boxholm forests to Gustaf Douglas

In 1998, Skanska sold their forest holding in Boxholm comprising 48,000 hectares to Gustaf Douglas. The transaction price was 1.4 billion SEK. There was a bid process where LRF, MoDo (nowadays part of Holmen) and Assidomän (nowadays part of Sveaskog) and Gustaf Douglas were parties in the final round. This transaction took place on the open market and the forest holding was the sole asset exchanged. Hence this can be viewed as a "clean" asset offered to the open market.[60]

Transactions	Year	Price	Hectare	Price/Hectare
Bergvik skogs acquisition	2004	23 654 000 000	1 900 000	12 449
Korsnäs sales to Assidomän	2002	2 000 000 000	200 000	10 000
Skanskas sales of Boxholm skog	1998	1 400 000 000	48 000	29 167

Table 16.1.3. Summary of large transactions during the last 10 years.

[57] http://www.bergvikskog.se/default.aspx?id=3 (200-12-08)
[58] http://www.kinnevik.se/default.asp?ML=2754 (200-12-08)
[59] http://hugin.info/1114/R/997185/151619.pdf (200-12-08)
[60] Hallenius, Johan, 1998: Dagens Industri 1998-06-06, "Douglas i deceniets största skogsaffär"

As we understand from the section above, large transactions during the last ten years are rare. We found that only the sale of Boxholm could be seen as an open-market transaction. Since that deal was closed in 1998, it can only be seen as an historical indication of market value for large forest estates. A valid question to ask is if there are at all any buyers to a holding of one million hectares.

15.2 Who can buy one million hectares?

Our second attempt to value Holmen's growing forests relied on prices of forest properties with a minimum of 200 hectares of forest land. Relative to the holdings of large forest corporations like Holmen, 200 hectares is virtually nothing. As we know, the number of potential buyers falls rapidly as the size of the holding goes up. Who is then able to buy a holding of one million hectares? Indeed, this is a central issue in this paper. Perhaps the answer can be found on the other side of the Atlantic. In the newsletter "Skog & Ekonomi", citing a report made by the forest industry consulting firm Wood Resources International (WRI)[61] it is stated that the rate of acquisitions of forest properties in the USA hit a record in 2006 when 3 million hectares of forest land were exchanged. The buyers were almost always pension funds and wealthy investors that acquire through so called TIMOs (Timberland Investment Management Organizations) and REITs (Real Estate Investment Trusts). The same newsletter also provides a list of the ten largest forest owners in the USA. The list has changed dramatically in recent years. In the 1990s, the forest industrial owners dominated the list. Now (2007), seven out of the ten largest holdings belong to asset managers and investors. To us, this is a strong indication of the existence of potential buyers in Europe as well.

To price large forest properties, we must search for a more liquid market with more transactions. Hence, we must go down in size. With this in mind, we will now turn to transactions of smaller real estate properties which we hope enables us to do a fair estimation of Holmen's stand according to the DREM.

15.3 State owned Sveaskog's sales program.

Since 2001, Sveaskog has been engaged in a sales program of forest estates, with the purpose to make it possible for forest owners in non-urban areas to make a living on their properties. In the south of Sweden, the sales are managed by real estate agents and in the north, the sales are done through declarations of interest to buy a property. In 2007, Sveaskog sold 37,100

[61] Freij, Johan, 2007: Skog & Ekonomi (a newsletter published quarerly by Danske Bank), No 1 February/March 2007, URL:http://www-2.danskebank.se/Lantbruk (2008-12-08)

hectares of forestland in 238 transactions. Looking in the footnotes, the sales generated 571 million.[62] That gives a price per hectare of 15,391 SEK. The average property had 156 hectares. Most of the transactions have taken place in the north of Sweden, where Sveaskog has its main forest holdings (see picture 13.2.2).

Sveaskog's sales are not "clean" transactions in an open marked because not everyone can take part in the bidding process. Still, the figures may give an indication of the value per hectare. An advantage of these transactions from our point of view is that Sveaskog's properties are pure forest properties, free from buildings and other "noise" that must be deducted to arrive at a value of the growing forest. Unfortunately, we were not able to obtain detailed data for these transactions.

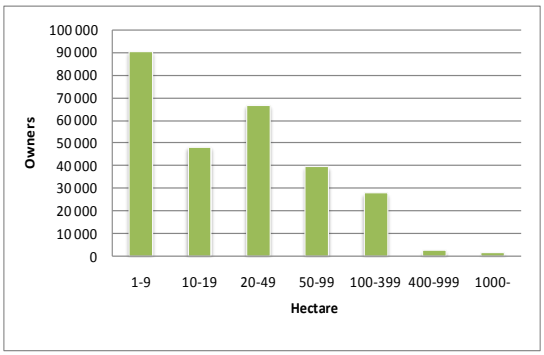
15.4 Choosing property sample: Trade-off between size and liquidity

The forest estate market is relatively illiquid and transactions of large estates are rare. For small properties, the number of potential buyers is much larger. Obviously, we would like to get as many transactions as possible to increase the reliability when valuing Holmen's growing forest. The problem is that we also want the properties to be as large as possible, in order to involve rational investors that mainly care about the return on investment. Without any further justification, we limited our dataset to forest properties with a minimum size of 200 hectares. Properties over 200 hectare has a trading value that makes it more likely that the buyer see the investment with pure economic eyes. This enables us to minimise the non-monetary component, also known as the "soft values", including for example the right/possibility to hunt and fish and the satisfaction that comes with owning land and the recreation that the forest gives. When forest estates are sold, there can also be houses and farming fields included in the sale that could bring valuation problems.

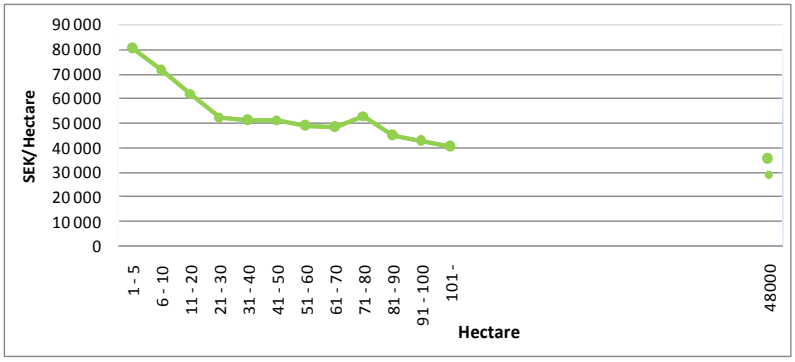
Our dataset contain 36 observations of forest properties sold through LRF Konsult and Areal during the second half of 2007 (see Appendix C). During our interview with Holmen's former auditor we got the advice to set six months as the time limit for valuing Holmen's forests at the end of 2007.[63] The transaction price for each observation has been decomposed into several components by the real estate agent, based on a "professional assessment". For our purposes, the forest component is the most interesting. On an aggregated level, the estimated

[62] 2007 Annual report of Sveaskog, see Reference list under "Internet sources" for URL
[63] Interview with a person responsible for the audit of Holmen, , see further reference list

value of growing forest accounted for 87% of total sales price for these properties. To us, 13% seems like an acceptable level of "noise". The columns that are painted in yellow in the Appendix C are the parameters that we use in our valuation later on. Picture 16.4.1 shows that large forest estates are rare. [64]



Picture 16.4.1.
Distribution in numbers of forest estate owners in Sweden and size in hectare-intervals on the horizontal axis. [65]



Picture 16.4.2.
Price/Hectare from small to larger forest estates, in the county of Götaland.

With decision to only include properties larger than 200 hectares, we exclude the observations smaller than 200 hectares, which we from picture 16.4.1 can see comprise a very large fraction of total forest estates. The critical assumption in the DREM is that the average value per hectare of a group of relatively small forest estates (>200 hectares) is roughly the same as the average value per hectare of a holding of one million hectares. In the statistics from SVO that are illustrated in picture 16.4.2 above, we can see that the Price/Hectare declines when the properties grows larger, at least in the range of 1-100 hectares. The higher Price/Hectare for smaller forest estates can be derived from the soft values and that there is a higher number of potential buyers compared to larger properties. To reach our aim of determining a value of a large forest property using multiples from relative smaller forest estates, we want to see if the Price/Hectare multiple continue to decline or if it levels off.

From the previous section we concluded that the sale of Boxholm was the only open market transaction. We included the sales of Boxholm into picture 16.4.2 in order to see if the trend declined- which it did. When adjusting the sale of Boxholm for inflation (two percent), the trend levels off even more. Resent research in the area has also showed that large forest holdings that previous were traded at a discounted/lower multiple than smaller real estates, are now traded with a premium.[66] The real estate agent LRF Konsult states in their homepage:

[64] http://www.skogsstyrelsen.se/episerver4/templates/SFileListing.aspx?id=15351 (2008-12-08)
[65] http://www.svo.se/episerver4/templates/SFileListing.aspx?id=16227 (2008-12-08)
[66] Interview with a PhD student at SLU, see further reference list

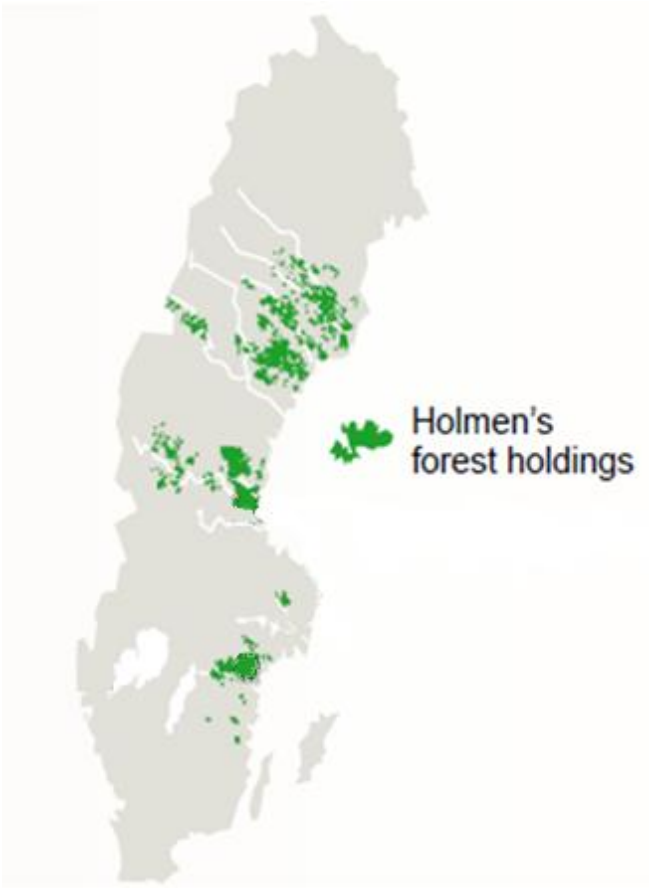
"The increasing prices for forest properties have also affected the sales on larger estates that previously were traded with a size discount. Nowadays the buyer tends to value the size and therefore trade them with a premium."[67]

The price for standing trees, measured in cubic meter and hectare differ within Sweden mainly to the growth possibility for the forest in different geographic areas. In the south of Sweden the forest grows faster than in the north. Another reason is the location of the property, properties closer to an urban area is traded at higher prices than the opposite. Because of the price difference, we have chosen to divide Holmen's forest holdings into two geographic areas- north and south (see further picture 16.5.2).

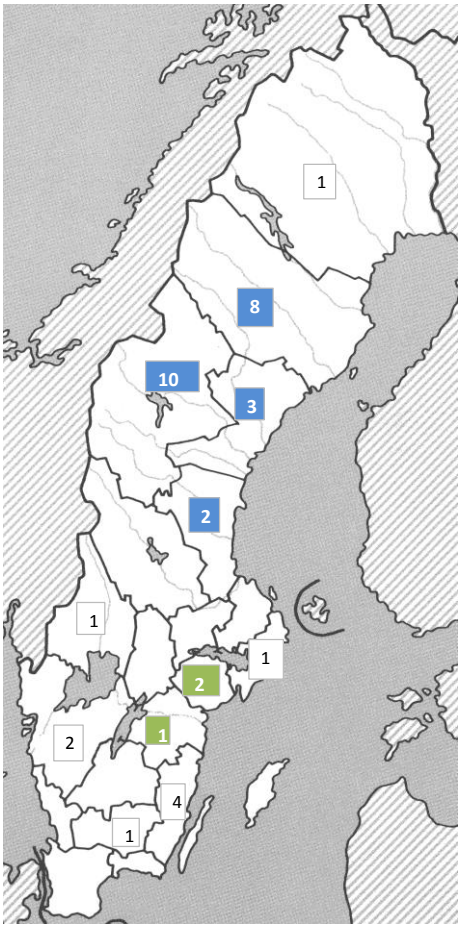
15.5 Forest property data

We have collected our dataset from the two largest forest real estate agents; LRF Konsult and Areal. We have then divided the transactions into different counties (see Appendix C) From that information, we compared the transactions that have been made with the areas where Holmen has their forest holdings.

[67] http://www.lrf.se/data/internal/data/10/41/1187163998272/LRFKonsult_Skogsstatistik.pdf (2008-12-08)



Picture 16.5.1.
The green fields in the map are Holmen forest holdings. [68]



Picture 16.5.2.
The boxes and numbers are the forest estate transactions that took place in second half in year 2007, over 200 hectare, divided into countys'and geographic areas- north and south. North is represented by blue colour and south by green colour. [69]

15.6 Multiple valuation of Holmen's holding through transactions that took place in the second half of 2007.

To get multiples for price per cubic meter (Price/m3) and in price per hectare (Price/Hectare) for the two different regions we have used an average within the county and thereafter calculated an average within the geographic region (north/south). We calculated the transaction average in two steps because we wanted to adjust for the over-weight some county with large numbers of transactions would get otherwise. If we had used a single average within the regions, the county of Jämtland for example that had ten transactions should have got higher- non-accurate weight in the average for the north region. This is due to the numbers of transactions and to the fact that Holmen's forest holding is not mainly located to Jämtland.

[68] See the annual report of Holmen 2007, p. 20
[69] Additions to picture from: http://www2.mora.se/stmikael/kurs/sha/sverigeslan2004.jpg (2008-12-08)

From our dataset we have derived a Price/m3 and a Price/Hectare multiple, by dividing the sales price of forest through cubic meter and hectare, this will give us two different values depending on what multiple we use.

After recalculated Holmen's combined forest holding we derived a value of around 33 billion when we used Price/m3 as ratio multiplied with Holmen's total cubic meters. With the ratio Price/Hectare the value becomes a little lower with around 31 billion. The value in the balance sheet is around 11 billion for Holmen,[70] leading to a difference of around 20 billion. But we can't compare Holmen's combined forest holding with that on the balance sheet, since the latter refers to the biological asset/standing timber only.

DREM multiple valuation	Price/m3 * Holmens m3	Price/Hectare * Holmens hectare
North	29 481 014 057	27 645 440 253
South	3 687 604 674	3 073 067 546
Value	33 168 618 731	30 718 507 799

Table 16.6.1.Calculations of value in region, derived through the Price/m3 and Price/Hectare multiple

We will now move on to the task of valuing raw land that enables us to decide a value of the biological asset only by deducting the land from the combined asset.

15.7 Lantmäteriet's questionnaire

Twice a year, the Lantmäteriet makes a questionnaire to capture the current trends in the market prices of agricultural real estate properties in Sweden. The survey is known as "Lantmäteriet's minienkät" and the respondents participating are brokers, consultants, banks and forestry companies. Based on location, the respondents are placed into one of the five regions presented in picture 16.8.3 on page 49. In the most recent questionnaire, running from October 2007 to March 2008, a group of 34 persons out of 56 asked participated. For our purposes, this questionnaire can be used to determine the value of land. The fifth question asked in the latest survey, only covering properties dominated by forest, was as follows (translated):

If individual properties, consisting in principle of raw land (class K1) and replanted land (class K2/R1) respectively, have occurred within your area of activity, what level of market

[70] See the annual report of Holmen 2007, p. 32.

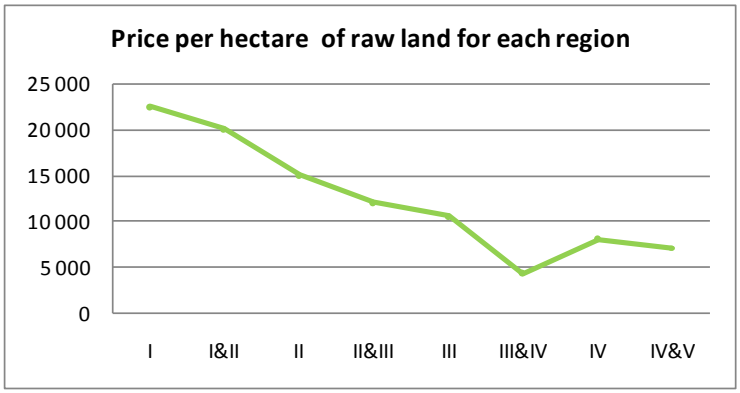
value has been prevailing for properties with raw land and replanted land respectively? State your answer in SEK/hectare.

The results for properties of five hectares or larger are displayed below. It should be emphasized that the results of this questionnaire are rough approximations. The prices calculated below are averages, sometimes based on very broad ranges of responses. For example, in region 1, the five responses concerning raw land cover prices ranging from the interval of 15,000 – 20,000 per hectare to 25,000 – 30,000 per hectare.

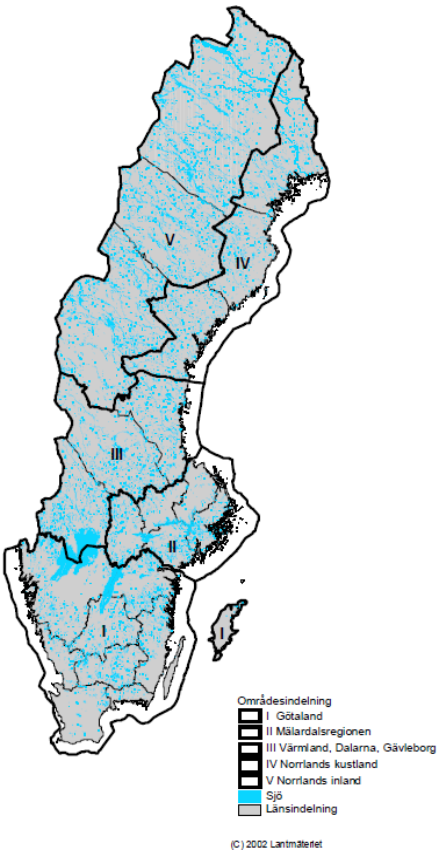
	Average price per hectare for each region								
	I	I&II	II	II&III	III	III&IV	IV	IV&V	V
Raw land	22 500	20 000	15 000	12 000	10 500	4 250	8 000	7 000	no data
No of respondents	5	1	3	1	3	2	5	1	0
Replanted land	32 500	30 000	20 000	18 000	13 750	7 500	16 000	12 000	no data
No of respondents	5	1	4	1	3	2	5	1	0

Table 16.8.1. Average price per hectare for each region.

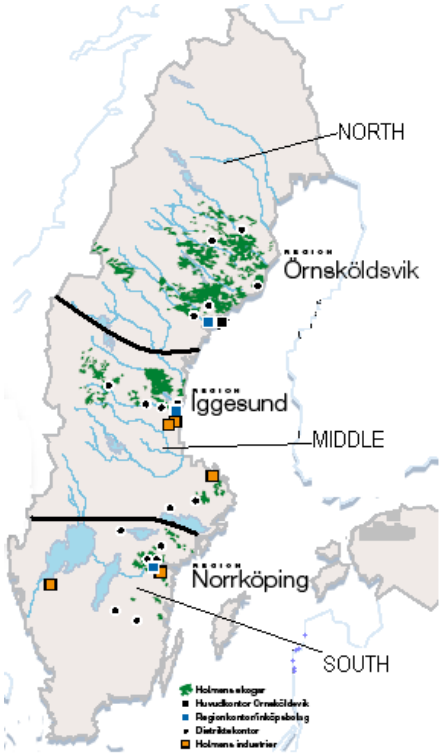
Note that some of the respondents operate in two of the regions, for example in region I & II. Their answers are provided in separate columns. As a whole, do the numbers make sense? By going from left to right in the table 16.8.1, you travel north in Sweden and that normally means lower prices of real estate properties. Fortunately, that is also what the respondents tell us. Despite the rather low number of actors participating in the survey, this relation seems to hold well, as illustrated in the graph below.



Picture 16.8.2.
Illustrate the numbers from table 16.8.1 in a graph.



Picture 16.8.3. Lantmäteriet's questionnaire in regions.



Picture 16.1.4. Holmen's holdings in regions.

The distinction made between raw land and replanted land is important, which is obvious from looking at the prices. The replanted land is valued higher because the costs of preparing the land and replanting have already been paid. As mentioned, Holmen has incorporated the costs of replanting in the DCF model, referring to the fact that replanting is required by law. Hence, to make our valuation of Holmen's growing forests comparable to the DCF based value we should incorporate this cost as well. In the DREM, we derive the value of growing forest as the difference between the value of the combined property and the value of raw land. In addition to that, the cost of replanting should be withdrawn. Withdrawing the value of raw land and the cost of replanting should be equivalent to withdrawing the value of the replanted land only. That is, we should use the prices of replanted land in the table 16.8.1 above.

15.8 Application of the Lantmäteriet's questionnaire to value Holmen's raw land.

In picture 16.8.3 above, we can see the location of the regions that table 16.8.1 communicates in numbers. Holmen's stand is divided into three areas; north, middle and south. From Holmen, we got the exact numbers of the amount of hectares and cubic meters in the different areas. Following the discussion above, we will use the values for replanted land (shaded in grey in the table 16.9.1 below).

Region by Lantmäteriet	I	I&II	II	II&III	III	III&IV	IV	IV&V
Replanted land price (SEK)	32 500	30 000	20 000	18 000	13 750	7 500	16 000	12 000
Holmens region		South			Middle			North

Table 16.9.1. The fields marked in grey, the land price for the tree region areas that Holmen has their forest holdings are displayed, these are later used to derive the value of the land component.

When we calculated the value of Holmen's forest holding, we have taken the productive forest that Holmen has available for modern forest management. From that, we have deducted the productive forest that is protected by law and regulations. The resulting holding is slightly below one million hectares. Hence, we have valued productive forest that is protected by law and regulations to zero.

To derive a value of the raw land on this remaining holding, we have multiplied the number of hectares in each region with the values of replanted land from Lantmäteriet's questionnaire. That way, we arrived at a value of land of 13.171 billion.

Region	Value
Ö-vik	7 671 925 200
Iggesund	3 491 270 750
Norrköping	2 007 879 000
Total value of land	13 171 074 950

Table 16.9.2. Display the value of land in each of Holmens' three region.

15.9 Calculating the value of the forest holdings of Holmen through the DREM

In the previous sections, we have derived a value of Holmen's forest holding and the value of land. To derive a value of the standing trees we just deduct the land price from the total value of the combined forest holdings of Holmen. We derived two values - one using the multiple Price/m3 and one using Price/Hectare see table 16.10.1.

	DREM	
	m3	Hectare
North	29 481 014 057	27 645 440 253
South	3 687 604 674	3 073 067 546
Total value	33 168 618 731	30 718 507 799
Land value	-13 171 074 950	-13 171 074 950
Value standing trees	19 997 543 781	17 547 432 849

Table 16.10.1. The table above state the value for the different regions in combined value (land and timber) from the combined value we deduct the land component, the residual is the value of standing trees.

15.10 Advantage/disadvantage of the DREM

The Decomposed Real Estate Method calculates a value that includes the expectations of the future. When purchasing a forest property you buy the future cash flows that the property will generate in form of future harvesting. The future price is uncertain and the preferred value differs between buyers due to their individual expectations and risk aversion. Buying a forest property can therefore be compared to buying a stock of a firm; you buy the future earnings or cash flows.

The DREM is based on data collected in an illiquid market, compared to the market for timber used in the IHM. This is an obvious drawback. The timber market has a larger number of transactions taking place more frequently and the timber can be distributed easily to other countries.

Finally, despite the advantage and disadvantage the DREM derives a value that is much higher than the present "fair value" that Holmen account their biological asset for. The DREM value is between 64-87% higher, depending on which multiple you choose.

16. Comparing and analyzing the valuation methods

We have presented two alternative attempts to determine the fair value of Holmen's growing forest – the IHM and the DREM. Both are based on selling prices. The differences between the methods are illustrated below.

Method	DREM		IHM
Values in SEK	Hectare	m3	m3
Total value	30 718 507 799	33 168 618 731	
Land value	-13 171 074 950	-13 171 074 950	
Value standing trees	**17 547 432 849**	**19 997 543 781**	**20 761 960 000**
Holmen DCF value	11 073 000 000	11 073 000 000	11 073 000 000
Difference	6 474 432 849	8 924 543 781	9 688 960 000
% difference in value compared to DCF	58%	81%	88%

Table 17.1. Illustrate the difference in value between the DREM, IHM and the current DCF method.

Next, we will compare these methods to each other and the DCF model and evaluate to what extent they correspond to what can be described as "fair value" for Holmen.

The DCF model currently used by Holmen and others assumes that the fair value of growing forest can be calculated as the present value of all net cash flows occurring from managing the forest land during one life cycle (100 years). As previously mentioned, this complies with the notion of value-in-use. By now, it should be clear to the reader that the purpose of the DCF model according to IAS 41 is to calculate the fair value of a biological asset in absence of any reliable market determined prices. Perhaps, what is not completely clear is what is meant by "fair value". Quoting from IAS 41, fair value is *the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction.* To us, this sound very much like a market price and the two alternative methods presented by us, the IHM and DREM, are both based on selling price. However, an employee interviewed at Holmen stated that *"Holmen's ambition has never been for the DCF model to arrive at a market value of the growing forests, but a fair value."* Thus, Holmen considers fair value to be something else, something that is different from market value. This indicates that Holmen's idea of fair value is different from what is described in the standard. Instead, the underlying presumption seems to be for the DCF model to come up with a value of growing forest that eminates from using the forests as an integrated part of the industrial production.

A fundamentalist, faithful to the prescriptions of the standard, would conclude from this that Holmen's and the other forest companies' way of measuring fair value is wrong. However, taking on a broader perspective, one must acknowledge that the accounting standards are only means to an end, not ends in themselves, and that the objective is to provide useful information to users of financial statements. The person responsible for the audit of Holmen until 2007, states that using market values for determining fair value of Holmen's forest holdings would not benefit shareholders or other stakeholders. *"No one would get any wiser from doing so as the purpose of being owner of the forests is not to sell them"*, he claims. This is indeed criticism against the standard setter. Obviously, the intention of the standard setter has been to set standards that, if followed properly, give the user of the financial statements the very best basis for making investment decisions.

As pointed out, the DCF model does not fully succeed in separating the value of the growing forest from the value of land. The reason is that additional biological transformation, that is totally dependent on the productivity of the land and therefore should belong to the land, is attributed to the growing forest. This will of course create problems when comparing the DCF model to the IHM and DREM methods, since none of our two methods incorporates the productivity of land into the value of growing forest. Doing so would result in even higher values in our two methods.

We will now move from discussing the DCF of Holmen to discuss our two developed methods. Below we have compiled a table were we sum the pros and cons with IHM and DREM according to IAS 41.

Immediate Harvesting Method	Decomposed Real Estate Method
+ • Uses homogenous products, traded on active markets. • The sawlog and pulpwood market increasingly internationalized.	+ • Values the biological asset in its current condition, reflecting expectations of the future. • Gives a good indication of value for immature forest.
- • Requires transformation of the growing forest into something else. • The law does not permit immediate harvesting of whole stands. • Immediate harvesting not desirable anyway. => Hypothetical method • The supply chock would lower prices.	- • Low turnover, especially for large forest estates. • "Noise" in the form of soft values. • Land must be valued separately and deducted from the real estate, creating additional sources for errors and uncertainty.

Compared to the DREM the IHM has the advantage that we have a larger amount of transaction in an active market and the product traded is much more homogenous. Transactions in the sawlogs and pulpwood market are happening virtually every hour which is not the case for forest properties. In the DREM a lot of noise is incorporated in to the data, as soft values like the right to hunting. Transactions on the sawlogs and pulpwood market are only driven by pure economic aspects were as non monetary values are important for buyers of forest properties. This enforces the importance of subtracting the value of raw land from the forest estate in the DREM. A drawback with the IHM according to DREM is that before valuing the property you would need to transform it to commodities where as in the DREM you are initially valuing the correct asset. Therefore the DREM gives a better indication of the value of immature forest

It can be argued that the raw material prices that have been proved to be more stable over time should be more preferable compared to the more volatile prices of forest estates. You should however ask yourself, should not accounting reflect reality? If the asset is volatile should not that be reflected in the financial reports? We should stress that no support for using a more stable valuing method can be found in IAS 41.

17. Conclusion

In the introduction, we noticed that there is a large gap between the DCF values of growing forest for the Swedish forest industry and the transaction prices of smaller forest estates. Therefore, we asked the following question:

Could a market based approach for valuing standing forests according to IAS 41 give a better measure of fair value than the current DCF valuation used by the Swedish forest industry?

With access to internal data, we have shown that it is possible to better fulfill the intention of the IAS 41. The standards states several different ways of using market determined prices to measure fair value before turning to the DCF model. This expresses a strong preference for market prices which legitimises our question. Our two alternative methods, developed and applied to Holmen's forest holdings, reach a higher level in the hierarchy of fair value measurement than the current DCF method. With Holmen as a representative for the forest industry, we believe that we can draw general conclusions for the whole industry due to the similarities of their current valuation methods. Attempting to determine the fair value of one million hectares of growing forest we developed two market based methods.

The first, the Immediate Harvesting Method, although hypothetical in nature, gave us a value of about 20,7 billion. The advantage of this approach is that it gives access to a large and liquid market for homogenous commodities, namely the market for sawlogs and pulpwood. This market has even grown in recent years due to increasingly integrated markets internationally.

The second, the Decomposed Real Estate Method is our second attempt to derive a fair value for the biological assets. In this method we start out with the transaction prices of forest properties. Then, the value of the growing forest is obtained by deducting the value of the land. Given that we know the correct values of the combined asset and raw land, this approach is impeccable. It values exactly what IAS 41 requires – the growing forest - without transforming it to something else. In reality however this method suffers from low liquidity and the difficulties of determining the value of raw land. This second attempt gave us a value of Holmen's standing forest in the neighborhood of 18-20 billion.

Hence, compared to the present book value of Holmen's growing forest of about 11 billion, both our market based valuations are considerably higher. As stated by a person interviewed, *"Holmen's ambition has never been for the DCF model to arrive at a market value of the growing forests, but a fair value".* Just as the Faustmann formula, Holmen's DCF measures the value of the growing forest from forestry and is in line with the concept of value in use.

The Decomposed Real Estate Method relies on transactions of forest properties with a minimum size of 200 hectares. Thus, this method hinges on the assumption that the price that can be expected to be paid for one million hectares is proportional to the average prices paid for these smaller properties. We argued that this is not an unrealistic assumption since it is supported by recent reports from LRF Konsult and from the Swedish University of Agricultural Sciences. We have also identified pension funds and asset managers as potential buyers of large forest holdings. In the USA, seven out of the ten largest owners of forest assets belong to this type of owners.

Finally the answer to our question is yes. We do believe that our two market based valuations give a better measure of the fair value of Holmen's standing forest, especially as they give similar values. In fact, all existing transactions available show that the current book values of growing forest for the Swedish forest industry are underestimated. Finally, returning to the gap between the DCF values for the Swedish forest industry and the transaction prices of smaller forest estates, we now claim that a large part of that gap can be explained by the fact that the DCF model underestimates fair value.

18. Discussion

Both our methods, the IHM and the DREM, hinges on several assumptions, some more critical than others. We do believe that the assumptions we have made are reasonable and for the more controversial assumptions, such as using transaction prices of relatively small forest estates to value Holmen's holdings, we have provided our arguments and reasoning. Still, these are subjective assumptions made by us and not unadjusted market prices. Hence, our valuations are not fully objective, even if they are more objective than the DCF model.

As pointed out, we consider it to be a strength of our paper that our two alternative methods arrive at rather similar values of Holmen's growing forest. This indicates that our two methods are reliable. However, we can't be sure that this is the case. Our valuations refer only to one single year – 2007. It's possible that applying the IHM and DREM in 2008 will generate more diverging values. It is also

possible that a hybrid model, combining the IHM and DREM would give a more reliable value. Such a hybrid model could combine the best from both methods by valuing mature forests using the IHM and immature forests using the DREM. However, a hybrid model would probably not be as easy to understand for a user of financial statements.

Throughout the paper, we have been backed-up by the prescriptions of IAS 41. This standard is however not celebrated by all. First, IAS 41 was not developed for valuing growing forests only, but for biological assets in general. The fact that IFRIC decided to change the prescriptions regarding additional biological transformation in the DCF model indicates an adaption to the long long-term nature of Swedish forestry. Charles Elad (2004) investigates what implications fair value accounting has on the international harmonization of accounting. He writes that the IAS 41 is highly controversial because it "…*represents the most radical and comprehensive departure from historic cost accounting to date, thus provoking some theoretical and practical problems that might affect its widespread adoption.".*[71]

A method to measure fair value requires a certain level of stability and consistency over time to create measurements that are comparable from year to year. We realize the difficulties in using some of our two methods as a consistent basis for measuring purposes. For example, Russian custom duties on exported timber or a reduced number of exchanged forest estates would create serious problems. The contribution of this paper is to have developed alternative ways of determining fair value of a large forest holding and shown that the current DCF model underestimates fair value. We now leave the question of choosing the most appropriate method to Holmen and the other forest companies.

[71] Elad, C. 2004: "Fair Value Accounting in the Agriculture Sector: Some Implications for International Accounting Harmonization." European Accounting Review, Vol.13, Nr 4. p. 621-641

19. Suggestions for future research

Since our main purpose with our developed models was to reach higher in IAS 41 hierarchy of fair value rather than give an exact fair value of Holmen's stand, we believe that increasing the level of details and parameters in IHM and DREM will be valuable. In the IHM further researches could be done in order to handle the public pricelists from wholesalers and add more quality variables when measuring IHM-values. In DREM we believe that developing methods for handle noise in smaller forest estates would be very interesting to see, since now we base our conclusions on fairly few observations. We also think that investigate if investors like pension funds in America would be interested in buying properties in Sweden and analyze their method for valuing forest estates and apply it on holdings of Holmen's size.

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E-mail:

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Telephone:

Ljunggren, Johan, Ture Johanssons Trävaru AB, (2008-09-08)

Sundelin, Torbjörn, SLU/PhD Student, (2008-10-29)

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Appendix A

Appendix A Pricelist from Norrskog

MASSAVEDSPRISLISTA D36 8 00

Gällande fr o m 2007-10-15 och tills vidare

MÄTNINGSFÖRESKRIFTER OCH SORTIMENTSKRAV
Skogsstyrelsens mätningsföreskrifter gäller. I övrigt hänvisas till VMF:s mätningsinstruktioner och de VMF-instruktioner som vid leveranstillfället tillämpas på resp. mottagningsplats. Se även omstående sida.

FORSKNINGSBIDRAG
Från virkespriset dras ett forskningsbidrag till Skogforsk på 60 öre/m³fub. Avdraget särredovisas inte på leverantörsbesked.

PREMIER och tillägg kan tillkomma enligt avtal.

Region väst

Sbo	Församling	Barr	FFG	Björk
Hammerdal-	Föllinge	267	288	267
Föllinge	Laxsjö, Hotagen	267	284	267
	Gäxsjö, Hammerdal	270	284	270
Lit-Hissmofors	Kyrkås, Lit, Häggenås	270	284	270
	Aspås, Ås	272	288	272
Offerdal	Alsen	267	299	267
	Offerdal	267	294	267
	Rödön, Näskott	272	294	272
Västra	Åre, Kall, Undersåker	267	304	267
Jämtland	V. Storsjöbygden	267	297	267
Hallen-Oviken	V. Storsjöbygden	267	297	267
	Oviken, Myssjö	267	288	267
	Norderö	267	284	267
Berg	Berg, Hackås, Storsjö	267	280	267
	Åsarna	270	282	270
	Klövsjö	277	289	272
	Rätan	277	289	272
Östersunds	Frösön, Sunne, Näs	272	284	272
Södra	Östersund, Lockne	274	286	274
	Marieby	274	286	274
	Brunflo	274	286	274
Gimån	Sundsjö, Bodsjö	277	289	277
	Revsund	277	289	277
	Bräcke-Nyhem	281	293	281
Stugun-	Stugun	281	293	281
Kälarne	Håsjö	284	296	284
	Hällesjö	286	298	286
Ragunda	Borgvattnet	280	292	280
	Ragunda	285	297	285
	Fors	290	302	290
Borgsjö-	Haverö, Ytterhogdal	284	296	284
Haverö	Borgsjö	286	298	286
Torp-	Torp	290	302	290
Stöde	Stöde	294	306	294

Leveranstidstillägg, endast leveransvirke (Kr/m³fub för volymer avlämnade vid industri eller terminal under angiven månad)

Sortiment	Maj	Juni	Juli	Aug	Sep	Okt
Massaved FFG, leveransvirke	10	20	20	20	10	10

Region öst

Sbo	Församling	Barr	FFG	Björk
Vilhelmina	Vilhelmina	265	-	265
Åsele-	Dorotea-Risbäck	268	-	268
Dorotea	Åsele	280	-	280
Vattudalen	Ström	272	-	272
	Alanäs	272	-	272
	Frostviken	272	294	272
Tåsjö-	Tåsjö	275	-	272
Fjällsjö	Fjällsjö, Bodum	277	289	277
Tre älvar	Junsele	285	297	285
	Ramsele-Edsele	286	298	286
	Ådalsliden	288	300	288
Sollefteå-	Helgum	290	302	290
orten	Resele	290	302	290
	Graninge, Långsele, Ed	294	306	292
	Multrå och Sånga	294	306	294
	Sollefteå	296	306	292
	Överlännäs	296	306	294
Ådalen	Boteå, Stymäs	298	306	296
	Dal, Torsåker, Ytterlännäs	300	308	294
	Gudmundrå	300	308	294
Höga	Vibyggerå	296	308	300
Kusten	Ullånger, Nordingrå,	296	308	298
	Nora-Skog	298	310	297
	Björtrå	298	308	296
Härnösand	Härnö	296	310	292
	Stigsjö, Säbrå, Hemsö,	296	310	292
	Viksjö	296	310	292
	Häggdånger	296	310	292
	Högsjö	298	312	294
Sundsvall	Attmar	295	307	295
	Selånger, Tuna, Gustav A	298	310	296
	Njurunda, Gnarp	297	310	298
Indalen	Holm, Liden	294	306	292
	Sättna, Indal	298	310	294
Medelpads	Ljustorp	298	310	292
östra	Hässjö, Tynderö	298	310	294
	Alnö	298	310	296
	Timrå	300	312	294
	Skön	300	312	296

SORTIMENTSKRAV m m GÄLLANDE den 13 juni 2007

Dimensioner

Fallande längder: 30 - 55 dm

Obs! Standardlängd under 40 dm är ej leveransgill.

Min diam 5 cm i topp under bark

Max diam 600 mm (lokalt kan förekomma 700 mm)

Barrmassaved

Svensk tall och gran samt lagringsskadad barrved. Där övrigt barr är leveransgillt betalas det med barrmassapriset minus församlings-avdrag.

Vinteravverkad ved (1/11 - 30/4) skall levereras senast 15/6.
Sommaravverkad ved (1/5 - 31/10) skall levereras inom 6 veckor efter fällning. Sommaravverkad ved som bedöms äldre än 6 veckor men utan lagringsskada redovisas som **ej färsk barrmassaved** och betalas med det lokala priset i församlingen minus 30 kr/m³fub.

Lagringsskadad barrmassaved samt på rot torkad ved betalas med det lokala priset i församlingen minus 77 kr/m³fub. Löv samt stockar med mer skogsröta än **67%** av någon ändytas area vrakas. Stockar med mindre skogsröta behandlas med volymavdrag för rötan. **Högst 15 % vrak** får ingå i sortimentet, varav andelen löv ej få vara mer än 5 %.

Grannmassaved, rensorterad

Frisk och Färsk Gran (FFG).

Parti mindre än en bilrave levereras som barrmassaved.

Vinteravverkad ved (1/10 - 31/3) skall vara levererad senast 30/4.
Sommaravverkad ved (1/4 - 30/9) skall levereras inom 3 veckor efter fällning.

Tall, löv, lagringsrötad barrved, på rot torkad ved och stockar med mer skogsröta än **25 %** av någon ändytas area vrakas.
Mätenhet får innehålla **högst 10 % vrak och avdrag, dock högst 3 %** volymavdrag för skogsröta.

Lövmassaved

Asp betalas med 80 % av grundpriset på björk, där övrigt löv är leveransgillt betalas det med 50 % av grundpriset på björk. För såväl asp som övrigt löv gäller samma församlingsavdrag som för björk.

Vinteravverkad ved (1/9 - 31/5) skall levereras senast 15/7.
Sommaravverkad ved (1/6 - 31/8) skall levereras inom 6 veckor efter fällning.

För SCA's mottagningsplatser gäller:
Vinteravverkad ved (1/11 - 30/4) skall levereras senast 15/6.
Sommaravverkad ved (1/5 - 31/10) skall levereras inom 6 veckor efter fällning.

Sommaravverkad ved som bedöms äldre än 6 veckor men utan lagringsskada redovisas som **ej färsk lövmassaved** och betalas med 183 kr/m³fub minus församlingsavdrag.

Barrvirke, lagringsrötad stock samt stockar med mer skogsröta än **67%** av någon ändytas area vrakas. Stockar med mindre skogsröta behandlas med volymavdrag för rötan. **Högst 15 % vrak** får ingå i sortimentet, varav andelen barrvirke ej får vara mer än 5 %.

För ytterligare upplysningar hänvisas till gällande VMF-bestämmelser.

Appendix B

Appendix B, Example of statistics from SVO

År Year	Tertal/kvarta Third/quarter	Landsdel Region			Hela landet The whole country	Landsdel Region			Hela landet The whole country
		Norra North	Mellan Central	Södra South		Norra North	Mellan Central	Södra South	
		kr per m³f ub SEK per m³				1 000 m³f ub till och med 1999 1000 m³ under 1999			
2003	1:a kv.	391	391	400	394	66 457	194 310	153 996	434 763
2003	2:a kv	396	395	383	392	92 945	200 890	117 906	411 743
2003	3:e kv	382	377	385	381	27 112	62 598	42 003	131 713
2003	4:e kv.	403	406	412	407	64 094	324 911	79 009	468 014
2004	1:a kv.	396	409	417	409	81 810	239 428	141 715	462 953
2004	2:a kv	398	401	406	402	80 902	243 834	150 157	474 892
2004	3:e kv	385	384	379	383	22 579	104 686	158 719	285 984
2004	4:e kv.	402	402	415	406	46 471	96 246	62 869	205 587
2005	1:a kv.	398	378	333	362	70 529	172 366	182 571	425 466
2005	2:a kv	437	340	235	292	77 409	228 439	393 596	699 444
2005	3:e kv	389	341	231	265	12 854	54 165	165 572	232 591
2005	4:e kv.	391	396	242	325	47 995	88 476	115 092	251 563
2006	1:a kv.	388	398	328	373	49 075	151 598	102 784	303 458
2006	2:a kv.	400	396	333	372	60 585	167 855	144 470	372 910
2006	3:e kv.	393	417	329	376	21 079	52 489	52 887	126 455
2006	4:e kv.	427	440	443	439	38 339	117 596	90 436	246 373
2007	1:a kv.	417	451	445	445	51 449	203 216	143 502	398 167
2007	2:a kv.	465	445	422	438	71 212	273 114	246 886	591 212
2007	3:e kv.	483	471	402	442	35 441	72 232	87 821	195 494
2007	4:e kv.	515	514	477	499	40 884	96 079	93 830	230 793
2008	1:a kv.	521	505	515	511	54 176	160 956	103 405	318 536
2008	2:a kv.	525	498	491	499	65 338	165 186	221 105	451 629
2008	3:e kv.	527	456	452	472	23 509	46 649	25 617	95 775

m³f ub = cubic metre solid volume exclusive bark

Källa: SDC, Skogsstyrelsen
Source: SDC and Swedish Forest Agency

Sveriges officiella statistik

Appendix C

Nr	County	Date of sale	Total hectar	Forest in hectare	Impediment	Farm land	Pasture land	Other	Water	Forest in m³
1	Gävleborg	02/11/07	392	303	73	1	0	9	6	45 000
2	Gävleborg	15/10/07	416	382	28	0	0	6	0	57 050
3	Jämtland	25/09/07	238	208	25	0	0	5	0	6 452
4	Jämtland	04/12/07	247	223	22	0	0	2	0	24 600
5	Jämtland	23/10/07	383	236	145	0	0	2	0	10 000
6	Jämtland	19/12/07	286	236	47	0	0	3	0	13 239
7	Jämtland	08/10/07	371	302	51	16	0	2	0	21 193
8	Jämtland	05/11/07	603	363	234	0	2	3	0	19 643
9	Jämtland	07/11/07	763	508	246	5	0	4	0	36 476
10	Jämtland	11/07/07	606	533	39	3	1	30	0	47 612
11	Jämtland	02/07/07	841	620	211	0	4	5	0	34 790
12	Jämtland	16/12/07	252	200	-	0	-	52	-	12 996
13	Kalmar	28/11/07	245	203	25	0	4	4	8	34 542
14	Kalmar	16/11/07	231	210	17	0	0	4	0	25 300
15	Kalmar	21/11/07	334	306	17	6	0	5	0	62 100
16	Kalmar	04/07/07	373	330	14	6	7	16	0	43 689
17	Kronoberg	11/12/07	294	219	61	3	0	11	0	30 231
18	Norrbotten	22/10/07	273	207	57	5	0	3	0	10 996
19	Stockholm	26/10/07	374	307	-	40	-	27	-	33 021
20	Sörmland	20/11/07	246	218	-	17	-	12	-	33 663
21	Sörmland	08/11/07	230	226	-	0	-	4	-	30 000
22	Värmland	24/09/07	210	205	3	0	0	2	0	30 904
23	Västerbotten	28/09/07	284	216	55	8	0	5	0	22 346
24	Västerbotten	10/10/07	316	234	77	5	0	0	0	21 720
25	Västerbotten	26/12/07	385	250	135	0	0	0	0	11 174
26	Västerbotten	29/10/07	358	255	89	5	0	9	0	26 144
27	Västerbotten	27/09/07	366	313	37	0	3	5	8	15 900
28	Västerbotten	26/12/07	472	319	153	0	0	0	0	11 200
29	Västerbotten	10/12/07	710	510	159	0	0	3	38	34 785
30	Västerbotten	20/12/07	945	590	346	6	0	3	0	26 740
31	Västernorrland	06/07/07	261	251	3	0	0	8	0	22 056
32	Västernorrland	16/11/07	345	268	53	18	0	5	1	27 588
33	Västernorrland	21/12/07	485	440	21	0	0	24	0	44 700
34	Västra Götaland	01/07/07	329	223	97	0	4	5	0	21 304
35	Västra Götaland	04/12/07	244	231	8	0	0	5	0	56 500
36	Östergötland	18/12/07	656	360	89	95	37	16	60	34 400
	Average		399	306	82	7	2	8	4	28 890

Nr	County	Total sales price	Price for forest	Price forest imped.	Price farm land	Price Pasture land	Price buildings	Price lot	Price residence	Price other
1	Gävleborg	17 500 000	17 500 000		0	0	0	0	0	0
2	Gävleborg	22 100 000	22 080 000	20 000	0	0	0	0	0	0
3	Jämtland	3 255 000	3 237 000	18 000	0	0	0	0	0	0
4	Jämtland	7 300 000	7 300 000	0	0	0	0	0	0	0
5	Jämtland	3 262 000	3 149 000	113 000	0	0	0	0	0	0
6	Jämtland	3 600 000	3 600 000	0	0	0	0	0	0	0
7	Jämtland	6 600 000	6 000 000	25 000	125 000	0	30 000	50 000	370 000	0
8	Jämtland	6 100 000	6 100 000	0	0	0	0	0	0	0
9	Jämtland	12 000 000	11 900 000	75 000	0	0	0	25 000	0	0
10	Jämtland	11 664 000	11 594 000	59 976	6 000	4 024	0	0	0	0
11	Jämtland	10 580 000	10 410 000	162 000	0	5 000	3 000	0	0	0
12	Jämtland	4 450 000	4 450 000							0
13	Kalmar	15 800 000	14 600 000	190 000	0	70 000	190 000	120 000	630 000	0
14	Kalmar	11 200 000	11 100 000	100 000	0	0	0	0	0	0
15	Kalmar	28 200 000	27 414 000	136 000	150 000	0	50 000	50 000	400 000	0
16	Kalmar	18 800 000	17 467 000	72 000	111 000	48 000	407 000	100 000	595 000	0
17	Kronoberg	12 750 000	11 750 000	250 000	100 000	0	50 000	75 000	400 000	125 000
18	Norrbotten	2 200 200	1 995 200	25 000	30 000	0	50 000	50 000	50 000	0
19	Stockholm	33 000 000	14 000 000		2 000 000				7 000 000	10 000 000
20	Sörmland	25 000 000	20 400 000		700 000				3 000 000	900 000
21	Sörmland	12 500 000	12 450 000							50 000
22	Värmland	13 400 000	13 400 000	0	0	0	0	0	0	0
23	Västerbotten	6 250 000	5 719 000	100 000	96 000	0	40 000	0	70 000	225 000
24	Västerbotten	4 900 000	4 820 000	80 000	0	0	0	0	0	0
25	Västerbotten	2 300 000	2 180 000	120 000	0	0	0	0	0	0
26	Västerbotten	8 850 000	8 795 000	45 000	10 000	0	0	0	0	0
27	Västerbotten	3 850 000	3 785 000	53 000	0	12 000	0	0	0	0
28	Västerbotten	2 400 000	2 270 000	130 000	0	0	0	0	0	0
29	Västerbotten	9 800 000	9 720 000	80 000	0	0	0	0	0	0
30	Västerbotten	5 400 000	5 155 000	245 000	0	0	0	0	0	0
31	Västernorrland	6 300 000	6 300 000	0	0	0	0	0	0	0
32	Västernorrland	8 124 000	7 434 000	20 000	50 000	0	200 000	20 000	400 000	0
33	Västernorrland	15 100 000	15 100 000	0	0	0	0	0	0	0
34	Västra Götaland	8 500 000	7 662 000	678 000	0	160 000	0	0	0	0
35	Västra Götaland	36 000 000	35 700 000	100 000	0	0	0	100 000	100 000	0
36	Östergötland	29 200 000	6 267 000	835 000	6 250 000	512 000	2 825 000	2 890 000	6 621 000	3 000 000
	Average	11 895 422	10 355 644	120 386	283 176	25 345	120 156	108 750	577 529	397 222