

Finnish Forest Sector Economic Outlook

2002–2003



December 2002

Finnish Forest Sector Economic Outlook 2002–2003

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Summary

The 2002 figure for GDP growth in the world economy weighted according to the distribution of Finnish forest industry exports will be about 1.5 per cent, little changed since 2001. The sluggish growth in export markets has slowed growth in the Finnish forest industry this year to such an extent that the only sector to show robust growth has been pulp production, where new capacity has been brought on stream and exports are doing well. Slack demand and abundant supply in the export markets have affected prices, and indeed the nominal export prices of both paper and pulp will be down this year compared with 2001; by contrast, the nominal export price of Finnish sawnwood will be higher than in 2001. The growth in pulp production has increased roundwood consumption and thus commercial fellings of pulpwood. The domestic sawlog harvest is also up this year, although the higher demand for sawlogs is mainly being met by increased imports.

Growth in the world economy will pick up slightly in 2003. This will boost production and exports in the Finnish forest industry, although, with the exception of plywood, pulp and paperboard, the figures will remain below the record levels of 2000. As the demand for paper picks up, export prices will gradually rise. However, the average nominal price of paper exports for the year as a whole will change little, due to the low starting point. Increases in the export price of sawnwood will be restrained by slow growth in the European construction sector. Increased production in the Finnish forest industry will raise roundwood demand, and stumpage prices will reach the level of 2000. The rise in pulpwood demand will be met largely from higher imports of pulpwood and chips. The sawlog harvest will increase as more domestic roundwood is offered for

sale, and sawlog imports will correspondingly fall.

The greatest forecasting uncertainty concerns the level of GDP growth in the United States and its effect on the world economy. The prospects for recovery in the Japanese economy also remain uncertain. Other significant risks to growth in the euro area include the faltering German economy and slow growth in the euro area's other main economies, France and Italy. If growth in export markets falls short of expectations, this will also mean that growth in the Finnish forest sector will be lower than anticipated.

Economic Operating Environment

The continuing impact of the sharp downturn in the world economy that started in the United States in the last quarter of 2000 will ensure that world GDP growth is still low in 2002. Although the bottom of the cycle has already been passed, economic recovery in export markets has been very slow. In the euro area export markets important to the Finnish forest industry – not least Germany – both the economy in general and the construction sector in particular have been weak. Growth in the construction sector is of prime importance to Finnish wood product exports.

In 2003 GDP growth in the euro area is expected to gather pace as the world economy picks up. In Finland growth will be export-led in response to the more vigorous demand in export markets. Considerable uncertainties will nevertheless overshadow the improved export prospects, in the forest industry as elsewhere. If growth in the United States starts to fade, due to a drop in consumer confidence for

example, the recovery of the entire world economy would be in jeopardy. Moreover, there is still considerable uncertainty over the future of the Japanese economy, and the possibility of a prolonged period of high oil prices following any intervention in Iraq. An additional concern in the euro area is that growth in the largest economies – Germany, France and Italy – may lag behind the other euro countries. A poorly performing German economy is a particular threat to growth in the Finnish forest industry, both directly through the effect on Finnish exports and indirectly through the effect on the European economy.

Exports, Production and Prices in the Finnish Forest Industry

European demand for wood products in 2002 will be only a little higher than last year, due to the sluggish growth in the construction sector. Production and exports of Finnish sawn softwood will be up by about one per cent, and the proportion of exports destined for non-European markets will be higher than last year. The nominal unit price of sawnwood exports in 2002 will be up by about two per cent, having been rising steadily throughout the year.

Growth in Europe's construction sector and in the related demand for wood products will continue to pick up slowly in 2003. Construction growth in Finland will boost sawnwood consumption, and together with export growth this will raise sawnwood production by two per cent. Prices are also expected to improve, though the increase will only be marginal because of the abundant supply. The export price of Finnish sawnwood is forecast to rise by about two per cent.

In paper product markets, those grades reliant on advertising and publishing have suffered particularly badly from the slow growth in the economy in 2002. Production and exports of Finnish paper and paperboard will be up by about two per cent overall on the 2001 figure, although the average nominal export price will be down by about seven per cent. Spurred on by exports in particular, pulp production

will be approximately 9 per cent above the 2001 level, whereas the average export price will drop to about 14 per cent below last year's average.

Growth in the demand for paper is expected to start picking up in 2003, raising Finnish paper exports by about five per cent. With the rise in demand, paper prices are expected to begin creeping upwards. However, the average export price will remain little changed from this year, due to the low starting point. 2003 will also see a rise in production and exports of paperboard and an increase in the paperboard export price. Pulp exports are forecast to remain more or less unchanged, whereas the increase in domestic consumption will raise pulp production by about two per cent. Market prices for pulp are expected to rise gradually as demand grows.

Costs and Profitability in the Finnish Forest Industry

Production costs in the Finnish forest industry in 2002 will be higher than last year because of the increased labour costs and higher stumpage prices; the costs of other inputs will either be almost unchanged or will be lower. The rise in labour costs will nevertheless be lower than in 2001, and the increase in stumpage prices will be relatively small. The forest industry's capacity utilisation rate will be only slightly higher than last year, due to the slow growth in demand for end products. In the paper and paperboard industry, for example, the capacity utilisation rate will rise this year by one percentage point, to 89 per cent. Higher costs and the drop in export prices in the paper industry mean that the forest industry's profitability and results for 2002 will be down on last year's figures. The profitability of magazine papers and sawnwood will be lower than for other product groups.

Stumpage prices and labour costs will continue to rise in 2003. The recovery in demand and possible higher oil prices will also add to the pressure to raise the prices of pigments and chemicals used in the pulp and paper industry. Despite the rise in costs,

the Finnish forest industry's profitability is expected to improve as production increases and export prices rise. In the paper and paperboard industry the capacity utilisation rate will remain comparatively low, rising to 92 per cent.

Roundwood Markets

Production in the Finnish forest industry has been picking up in 2002, raising the demand for roundwood. Commercial fellings will be up by two per cent, to 54.2 million cubic metres, and imports of roundwood will be up slightly, reaching approximately 15.5 million cubic metres. Sawlogs will account for a higher proportion of imports than previously. The growing roundwood consumption in pulp production will increase commercial fellings of pulpwood this year, and imports will be down on 2001. The higher demand for sawlogs, on the other hand, will be mainly covered by imports. Stumpage prices will be an average of 1–3 per cent above last year's level, due to the increased demand for roundwood.

In 2003 the forest industry's growing roundwood needs will increase both commercial fellings and roundwood imports by two per cent. Commercial fellings will rise to 55.1 million cubic metres, and imports to 15.8 million cubic metres. More domestic sawlogs will be offered for sale in 2003, raising the sawlog harvest by three per cent and consequently reducing the proportion of sawlogs in roundwood imports. Imports of pulpwood and chips will be up next year because little increase is anticipated in the supply of domestic pulpwood. The growing demand for roundwood will push up average stumpage prices by 2–4 per cent, depending on the roundwood category.

Investment and Profitability in Non-Industrial Private Forestry

Total investment in timber production in Finnish non-industrial private forests in 2002 will rise to

over EUR 190 million. Private forest owners have been investing more of their own resources, which this year will account for over 70 per cent of the total investment in non-industrial private forestry. The improvement in state funding criteria has been the principal reason for this. Together with the expansion of the funding basis, this prompted an increase in the take up of state funds in 2001 to such an extent that the subsidies for tending of young stands were insufficient to meet the demand. It is likely that demand for the subsidies will again exceed the funds available, despite the increase in funding. Due to the higher level of investment in timber production and last year's reduction in stumpage earnings, the investment rate (total investment as a percentage of gross stumpage earnings) in non-industrial private forestry has risen to over 12 per cent this year. In 2003 the total investment in roundwood production in non-industrial private forests will increase by almost two per cent, and the proportion invested by the private forest owners themselves will remain more or less at this year's level.

The increase in commercial fellings and the moderate rise in stumpage prices will raise the 2002 gross stumpage earnings in non-industrial private forestry to over EUR 1.5 billion, bringing earnings per hectare to EUR 113. Following the substantial amount of final cutting and the campaign to improve young stands at the beginning of the decade, the total costs of forest regeneration are still high this year. Nevertheless, the rise in total costs may be as little as 1–2 per cent, leaving net earnings at EUR 97 per hectare, up on last year's figure. In 2003 stumpage earnings in non-industrial private forestry will rise to about EUR 1.6 billion, due to the increase in fellings and stumpage prices. Provided that costs do not increase by more than they did this year, net earnings per hectare will rise to EUR 104. Although gross stumpage earnings for 2002 and 2003 will be considerably less than in the peak years, in real terms they will be about 20 per cent higher than the average for the 1990s.

Labour Force

Production in the Finnish forest industry has increased relatively slowly in 2002, and the same is forecast for 2003. As a result, employment in 2002 is unchanged from last year, at 70 000 jobs, and no change is anticipated in 2003. Exceptions to this are the joinery and wood pulp industries: jobs have been lost this year in the joinery industry but gained in the wood pulp industry (due to higher production). The major export-oriented forest industry companies did not reduce their labour force in 2001 in response to the decline in demand, probably because the downturn was expected to be short-lived and there was concern about having a sufficient supply of labour in the longer term. The unemployment rate in the sector as a whole has fallen to about four per cent, which is considered in practical terms to be full employment.

In forestry, the reduction in sawlog harvesting work meant a drop in employment. Employment has continued to fall in 2002, declining to 26 000 people. The improved economy in 2003 is expected to lead to a slight increase in roundwood harvesting, bringing a halt to the loss of jobs. Employment in forestry next year will thus remain at the 2002 level. This stabilisation affects wage-earners in particular, whose work input has declined considerably in recent years while the input of entrepreneurs has risen. The unemployment rate in forestry has fallen to a level representing the average for all sectors in the Finnish economy: about nine per cent.

Basis of Forecasts and Risk Scenario

The forecasts set out for the forest sector in this *Economic Outlook* are based on a wide range of information: publicly available statistics and forecasts about the world economy; market information and other data on the forest sector from various sources; and research conducted by the Finnish Forest Research Institute (METLA). The view of GDP growth in the world economy and export markets is formulated

on the basis of forecasts made by a number of different organisations, among them the International Monetary Fund (IMF), the Research Institute of the Finnish Economy (ETLA), Merrill Lynch and Dresdner Bank. The forecasts given in this publication are for the years 2002 and 2003 and are based mainly on information available in late September and early October 2002.

The forest sector forecasts presented here are point forecasts. They represent the views of researchers about the most likely course of events, given the export market growth forecasts and other background assumptions about the markets. The greatest uncertainty in the forecasts is whether or not the growth will be lower than expected. Of particular concern is the growth in the US economy, which is forecast to pick up in 2003. Any delay in this would retard GDP growth in the world economy and cut the demand for forest industry products. A sharp rise in oil prices as a result of the Iraq situation would threaten growth further if the rise were to be prolonged. In Europe an additional concern is the uncertainty over growth prospects for the German economy, which has implications for growth in the Finnish forest industry: Finnish exports are directly affected by the state of the German economy, and indirectly affected via Germany's influence on the entire European economy. If economic growth in Europe fails to match the forecasts, the demand for forest industry products will be lower than anticipated and price competition will intensify. Competition on Europe's export markets would also become tougher if the US dollar weakens significantly against the euro. This would hamper exports from Europe and would increase the supply from outside Europe. If the growth in export markets is below the forecasts given here, this will affect the export prices, production and profitability of the Finnish forest industry. With falling demand for wood, the adverse impact would spread from the forest industry to roundwood markets, forestry employment and the profitability of non-industrial private forestry. Growth in the Finnish forest sector would then fall short of the forecasts presented here.



1 World and Finnish Economic Outlook

1.1 World Economy

The growth prospects for the Finnish forest industry in 2002 have been rather weak. The continuing impact of the sharp downturn in the world economy that started in the United States in the last quarter of 2000 will ensure that the 2002 world GDP growth is still low. Although the bottom of the cycle has already been passed, economic recovery has been very slow. This year's real GDP growth in the world economy weighted according to the distribution of Finnish forest industry exports will be about 1.5 per cent, little changed since 2001. Among the Finnish forest industry's key export markets, economic growth has been particularly slow in Germany.

Growth in the world economy will pick up slightly in 2003. Real GDP growth weighted according to the distribution of Finnish forest industry exports is expected to rise to about 2.5 per cent. The brighter outlook will be overshadowed, however, by considerable uncertainties. If growth in the US economy starts to fade, due to a slowdown in private consumption for example, the recovery of the entire world economy would be in jeopardy. A further uncertainty in the euro area is that growth in the largest economies – Germany, France and Italy – may be slow to pick up, lagging behind the other euro countries.

Slow Recovery in Euro Area Economies

Contrary to the general trend in the world economy, economic growth in the euro area in 2002 has been clearly below last year's level. Euro area GDP growth will be less than one per cent, although the latter part of the year has shown an improvement over the early months. Growth in private consumption and exports in the euro area has been sluggish, and investment is likely to be down for the year as a whole. The low level of growth has also been reflected in higher unemployment in the euro area.

Slow growth has nevertheless reduced the euro area's inflationary pressures, reinforced by the stable raw material prices and the euro's strengthening against the dollar, by about 10 per cent. The inflationary outlook for 2003 is also moderate, thus diminishing the need for any immediate tightening of monetary policies as economic growth gathers pace. If growth proves to be weaker than anticipated, a cut in central rates is possible.

The euro rate against the US dollar is expected to remain at its September level (0.98), while the average rate in 2003 is likely to strengthen by about four per cent. Economic prospects for the immediate future are supported by low interest rates, accelerating growth in the US economy and the still quite robust purchasing power of euro area consumers.

Following a poor second quarter in 2002, the US economy has picked up again, and growth is forecast to continue at a reasonable level in 2003. Although the impact of higher US growth will not be felt in the euro area until some time afterwards, total euro area

exports are expected to grow to about four per cent in 2003, supported by an increase in trading between the euro countries. As a result of this export growth, together with new investments and a doubling of growth in private consumption, the euro area's 2003 GDP growth will pick up to around two per cent.

Unexpectedly slow growth this year has increased the budget deficit of many euro area countries. The 2002 public sector deficit for the entire euro area expressed as a proportion of GDP will be approximately 1.8 per cent. Many euro countries have failed to meet their stability programme targets, which are intended to stabilise public sector finances. The credibility of the EU's Stability and Growth Pact, established to support monetary policies, is also in the balance. It is estimated that Portugal, for instance, will exceed the three-per-cent limit set for the budget deficit, and Germany's deficit is also very close to this limit. If the European Commission has to resort to sanctions for violating the Stability and Growth Pact, this will slow the level of economic growth.

The projected improvement in the euro area economies is most at risk from possible developments in the United States. The uncertainties surrounding the US economy are exceptionally great, as they were in 2001. The high indebtedness of households, the fall in share prices, the question marks over corporate accounting, and the possible sharp rise in oil prices linked to the Iraq situation all conspire to make US households and businesses more cautious. Any unwelcome news could easily reduce both household consumption and corporate investment.

Mixed Trends in Finnish Forest Industry's Traditional Export Markets

The Finnish forest industry's most important export markets in Europe are Germany and the United Kingdom. In 2001 Germany accounted for 19 per cent, and the UK for 15 per cent, of Finnish forest industry exports by value. Germany is currently experiencing its second successive year of excep-

tionally low growth: its annual growth for 2002 will be around 0.5 per cent, which is considerably below the level elsewhere in the euro area or the UK. This is very significant for the growth prospects in the rest of the euro area, as Germany accounts for about 30 per cent of the euro area's GDP. In 2003, however, the German economy is expected to grow by almost two per cent, as the world economy picks up and private consumption rises.

The German economy's meagre growth rate is largely attributable to the standstill in private consumption growth and the contraction in investment; exports, on the other hand, will actually be up by almost four per cent this year. Consumer confidence in the German economy has fallen dramatically over the past year as a consequence of rising unemployment and falling share prices, and the consumption prospects for 2003 are dampened by the postponement of the planned tax relief due to the costs of repairing the summer's flood damage. The repair work is to be spread over a number of years, and so the positive effect on GDP in 2002 will remain small.

Germany's room for manoeuvre is limited because monetary policy decisions are in the hands of the European Central Bank (ECB), and the country's budget deficit is approaching the critical three-per-cent limit defined in the Stability and Growth Pact, thus restricting public sector spending. German economic growth is therefore heavily dependent on an improvement in the world economy. A poorly performing German economy is a risk to growth in the Finnish forest industry, both directly through the effect on Finnish exports and indirectly through the effect on the European economy in general.

The United Kingdom's 2002 GDP growth will remain at last year's level, at just under two per cent. This is distinctly higher than GDP growth in the euro area. The state of the euro area economy is very important to UK industry, as almost half of the nation's exports are to markets in the euro area. Growth in the UK's export markets has been slow, and so the main factor boosting the UK economy has been private consumption, up almost three per cent this year. Consumption has been stimulated

by the lower inflation figures, relatively low interest rates, and consumer confidence in the economy and personal finances. The low unemployment rate has helped maintain consumer confidence in personal finances despite the slow growth in the world economy.

GDP growth in the UK in 2003 is expected to rise to approximately 2.5 per cent. Private consumption is forecast to grow by almost three per cent, although rising inflation will reduce consumer purchasing power. Improved growth in the euro area will lead to higher industrial output and investment in the UK.

Although the pound sterling rate against the euro has remained relatively stable in recent years, the pound has nevertheless strengthened by around 25 per cent since the mid-1990s, boosting the euro area's industrial competitiveness on the UK market. The pound sterling rate has fallen slightly in 2002 as a result of the general strengthening of the euro. Forecasts and derivatives market data indicate that the average GBP/EUR rate in 2002 and 2003 will be 0.63.

Economic Growth Comparatively High in Finland's Competitor Countries

Sweden's 2002 GDP growth will reach just short of two per cent and will accelerate to around 2.5 per cent in 2003. Supported by pay increases and low unemployment, private consumption has driven growth in 2002 and will continue to do so next year. 2003 will also see a rise in investment, due to the buoyant level of domestic demand and the revival in the world economy. Export growth is projected to rise further, but the sectoral differences will be significant: exports of communications products will grow considerably, whereas in other sectors exports will be in some difficulty as a result of the strengthening krona. On the other hand, a stronger krona will dampen the inflationary pressures from pay increases, which will allow a more gradual tightening of monetary policies.

Sweden's EMU referendum in 2003 will be of critical importance for both interest rates and exchange rates: if the prospect of joining grows before the referendum, interest rates will approach those of the euro area and the krona will appreciate in value. The forecasting basis for the krona's exchange rate against the euro is an average rate of 9.2 this year and 8.9 in 2003.

Russia's GDP growth for 2002 will be around four per cent, and the same is forecast for 2003. This level of growth has been maintained by the expansion in private consumption fuelled by higher incomes, and by rising exports and export company investments financed mainly through export revenues. Export revenues have grown as a result of rising oil prices, compensating for the slower growth in export demand caused by adverse developments in the world economy. Inflation has remained high, however, due to the growing domestic demand and the weakened ruble. Although the ruble has fallen only slightly against the US dollar this year, it has fallen almost 15 per cent against the euro. So far, exporting companies have benefited from the falling value of the ruble, but if it falls much further they will be hit by high debt servicing costs.

GDP growth in the Baltic countries is slowing somewhat, following the trend in the world economy, but it still continues to be considerably above that of the euro area. Supported by strong growth in private consumption and investment, the Baltic countries' GDP is expected to grow by about five per cent this year and around 5.5 per cent in 2003.

Canada's GDP is forecast to grow by over three per cent both this year and in 2003. The Canadian export industry has benefited from the 30-per-cent drop in the value of the Canadian dollar against the US dollar in the past ten years. Although this has now come to an end, Canadian companies will remain more competitive than their US counterparts on world markets for some years to come. Stable employment growth, low interest rates and falling inflation have encouraged private consumption in Canada this year. In 2003, however, the revival in the world economy will increase inflation and

Forecasts of economic growth (real GDP, annual percentage change)

| | Share of Finnish forest industry's export value 2001, % | Actual GDP growth % 2001 | IMF* growth % | | ML** growth % | |
|---|---|--------------------------|---------------|------|---------------|------|
| | | | 2002 | 2003 | 2002 | 2003 |
| Weighted by share of Finnish forest industry exports | 100 | 1.6 | 1.5 | 2.7 | 1.3 | 2.5 |
| EU | 67 | 1.6 | 1.1 | 2.3 | 0.9 | 2.2 |
| Euro countries | 47 | 1.4 | 0.9 | 2.3 | 0.6 | 1.8 |
| Germany | 19 | 0.7 | 0.5 | 2.0 | 0.2 | 1.5 |
| United Kingdom | 15 | 1.9 | 1.7 | 2.4 | 1.7 | 3.0 |
| Eastern Europe | 7 | 3.5 | 3.9 | 4.5 | 3.0 | 3.3 |
| Russia | 3 | 5.0 | 4.4 | 4.9 | 4.0 | 3.5 |
| Unites States | 6 | 0.3 | 2.2 | 2.6 | 2.6 | 3.3 |
| Asia, excl. Japan | 5 | 3.9 | 5.9 | 6.1 | 5.4 | 5.6 |
| Japan | 4 | -0.6 | -0.5 | 1.1 | -0.8 | 1.6 |
| Latin America | 2 | 0.2 | -0.6 | 3.0 | -1.1 | 3.0 |
| Other | 9 | | | | | |

* Forecast by the International Monetary Fund (IMF) published September 25, 2002

** Forecast by the Merrill Lynch (ML) published September 27, 2002

interest rates. The Canadian dollar is expected to appreciate slightly against the euro in 2003, which will improve the relative competitiveness of Finnish forest industry companies on the world market in relation to their Canadian competitors.

United States Driving the World Economy

The US economy has recovered quickly from last year's downturn, which was worsened temporarily by the September terrorist attacks. Signs of a turnaround were already evident in the last quarter of 2001, and growth accelerated further at the start of 2002. The recovery has been aided by the continued high level of private consumption and the very expansionary fiscal and monetary policies adopted to maintain growth after the terrorist attacks. The economy slowed significantly in the second quarter of 2002, however, and the increase in general

uncertainty cast a shadow over the prospects for the remainder of the year. GDP growth for 2002 is nevertheless expected to be about 2.5 per cent.

A key question mark in forecasting US economic growth is the level of private consumption, as this accounts for about two thirds of GDP. Factors restraining private consumption growth are the high indebtedness of households and the shrinkage in household assets resulting from the fall in share prices. For the time being, however, low interest rates and rising property values have maintained the high rate of private consumption.

The unexpectedly slow recovery in the world economy has led the US Federal Reserve to prolong its policy of low interest rates, aimed at offering strong support to consumption and growth. With inflation down to about 1.5 per cent in 2002, real interest rates are close to zero. Low real interest rates have not, however, stimulated investment to the extent hoped for, because companies detect

uncertainty in demand both at home and abroad. The readiness to invest has also been dampened by the abundance of spare capacity in many sectors, allowing production to be adjusted to meet any increase in demand in the short term.

Although the recovery in the US economy has been quite slow and erratic, the probability of a new downturn is very small. In 2003 the economy is expected to be in better shape than this year. If private consumption continues to increase at its present rate, new investment will push GDP growth to around three per cent.

As the United States is driving the world economy, the uncertainties surrounding the above growth assessment are particularly significant. Considerable uncertainty exists over whether the growth in the world economy will fall short of the anticipated level. In the US, there is further uncertainty over the impact of household indebtedness. Were companies to reduce their labour force, consumer confidence in personal finances would plummet, and in such an uncertain environment households would try to reduce their debts, thus leading to a drop in private consumption. Slower GDP growth could then persist for a longer period.

A further uncertainty in the growth equation is the price of oil, in particular following any US military action against Iraq. An extended conflict would drive up oil prices and heighten the general climate of uncertainty, probably plunging the world economy into a new recession.

Asian Growth More Dependent on Exports

The sustained period of sluggish growth in the Japanese economy has reduced the country's scope for using monetary and fiscal policies to revive its economy. Although interest rates are negligible, the poor outlook is discouraging companies from investing. No major boost in public sector demand is possible either, because the public sector deficit has already reached 130 per cent of GDP. Although

private consumption has picked up intermittently, raising demand in the domestic economy, the prospects for a more sustained period of substantial growth in private consumption remain low as long as consumer prices continue to fall.

A revival in the Japanese economy is thus heavily dependent on export growth. The slight weakening of the yen led to higher exports in the early months of 2002. However, the slowdown in the United States during the summer hit Japan's US exports as well as its exports to other Asian countries heavily dependent on exporting to the US. If the world economy recovers as forecast, Japan's GDP growth in 2003 should rise to over one per cent.

GDP growth in Asia (excluding Japan) is forecast to be approximately 5.5 per cent for 2002 as a whole. Exports to the United States have begun to increase again after the severe contraction in 2001, and trade between Asian countries – led especially by China but also Japan – has been growing too. As the world economy picks up, Asian GDP will accelerate to about six per cent in 2003.

1.2 Finnish Economy

The ongoing recovery in the world economy in 2002 has led to growth in Finnish exports. With private consumption also up, Finnish GDP growth for 2002 is expected to be about 1.5 per cent. The higher level of growth forecast for the world economy in 2003 will boost growth in the Finnish economy quite significantly. The prospects for export-led growth will nevertheless be affected by uncertainty over the general economic situation and the level of pay increases agreed in the autumn round of pay negotiations.

Towards Export-Led Growth

Finnish exports began to increase in the second quarter of 2002 in response to the revival in the

| | Actual | ETLA** | | Nordea*** | |
|-----------------------------------|--------|--------|------|-----------|------|
| | 2001 | 2002 | 2003 | 2002 | 2003 |
| *GDP, % | 0.7 | 1.9 | 3.7 | 1.5 | 3.5 |
| *Exports, % | -2.2 | 3.1 | 6.6 | 3.4 | 7.1 |
| *Private consumption, % | 1.1 | 2.4 | 3.4 | 2.8 | 3.5 |
| *Investment, % | 4.0 | -2.3 | 4.6 | -2.0 | 3.4 |
| – private | 4.6 | -2.6 | | | |
| – public | 0.8 | 0.0 | | | |
| *Construction, % | -3.0 | -2.4 | 3.8 | | |
| Change in consumer price index, % | 2.6 | 1.7 | 1.7 | 1.7 | 1.8 |
| Unemployment rate, % | 9.1 | 9.2 | 9.0 | 9.2 | 9.0 |
| Euribor, 3-month, % | 4.3 | 3.4 | 3.7 | | |

* Change in volume

** Forecast by Research Institute of the Finnish Economy (ETLA) published September 5, 2002

*** Forecast by Nordea published September 2, 2002

world economy. Although the growth expectations of the spring have not been met, a sound foundation for export-led growth now exists as a result of the moderate GDP growth in export markets in the latter part of the year and Finland's very competitive position.

GDP growth has been driven not only by exports but also by private consumption. Low inflation, low interest rates and modest tax reductions have all contributed to a growth in net household income in real terms. However, uncertainty about the world economy and discouraging signs in the labour market have reduced consumer confidence in the economy in recent months. Confidence in personal finances is nevertheless good, and so private consumption is projected to be up by a total of about 2.5 per cent for 2002 as a whole.

Despite the improvement in the economy, the level of investment has not grown this year. Industrial investment projects have instead been postponed until 2003 in view of the current excess capacity and the uncertainty over the economy. The August 2002 business survey by the Confederation of Finnish Industry and Employers (TT) showed

that 37 per cent of industrial companies had excess capacity in relation to demand.

The increase in exports is expected to raise Finland's GDP growth to 3.5 per cent in 2003. Growth in Finnish exports will in fact be higher than the GDP growth in export markets. In other words, the demand for Finnish products in export markets will, on average, be growing faster than the demand for other products. Export-led growth in the Finnish economy in 2003 will also be reflected in the domestic market: private consumption will continue to rise, and investment is expected to grow as a result not only of higher exports but also improved domestic demand and a better economic outlook.

The unemployment rate for 2002 will be slightly higher than last year's figure because companies have been adjusting their labour needs in line with the earlier decline in demand; employment has fallen in the metal and engineering industry in particular. The decrease in construction sector jobs, however, has been turned around: according to the Research Institute of the Finnish Economy (ETLA), employment in the construction sector will increase by a combined total of 10 000 jobs in 2002–2003. ETLA

also estimates that some 20 000 new jobs will be created in the same period in the main areas of the private service sector. However, the autumn pay negotiations may have a significant impact on employment, especially in sectors oriented towards the domestic market.

Inflation has fallen significantly in 2002. Inflationary pressures have been kept in check by the slack demand for end products, the strengthening of the euro and the moderate price increases of raw materials (excluding oil). Inflation is projected to remain at this year's level in 2003.



2 The Finnish Forest Industry

2.1 Exports and Production in the Sawmilling and Plywood Industries

The 2002 figure for total wood product demand in Europe will be only slightly higher than last year, as the construction sector in Western Europe is still weak. Production and exports of Finnish sawn softwood in 2002 will be up by only about one per cent, and the unit price of sawnwood exports will be around two per cent above last year's level. An increasing proportion of these exports is to markets outside Europe. Production and exports of plywood will be up by about five per cent. However, the average unit price of plywood exports will be down, due to increased exports of the lower priced softwood plywood.

Euroconstruct forecasts only a small increase in the construction sector growth rate in Europe in 2003, as it expects the resurgence in construction to be delayed until 2004. Slow growth in the demand for wood products next year will limit the growth in Finnish sawn softwood exports to two per cent. In the plywood industry the substantial capacity increases of recent years will allow plywood exports to grow by five per cent, to meet the rising demand. Growth in both exports and domestic consumption will raise sawnwood and plywood production. The unit price of sawnwood exports is forecast to rise in 2003 by only two per cent, and the average price of plywood to remain unchanged, due to the abundant supply of wood products. If economic growth in the United

States turns out to be below the level expected, this would threaten the demand-supply balance in the European wood products market as well as Finnish exports and export prices.

Construction Recovery Delayed in Europe

Economic growth in Western Europe in the first six months of 2002 did not pick up to the extent widely predicted by the forecasting institutions in autumn 2001. Forecasts by Euroconstruct now indicate that the recovery in European construction projected for 2003 will be delayed until 2004. The meagre growth in the construction sector was evident in the export figures for January–June 2002, which were down on the same period last year. This was especially the case for spruce sawnwood exports, which were down by seven per cent, whereas exports of pine sawnwood remained at approximately last year's level.

A geographical distinction has emerged in the European construction industry's growth figures: rapid growth in new building has been typical of the transition economies of Eastern Europe, whereas in Western Europe growth has been concentrated in renovation of existing buildings. According to Euroconstruct's June 2002 forecast, the number of new housing starts in Western Europe will be down this year by around two per cent, to 1.6 million units. Building renovations, on the other hand, will be up, and already account for 43 per cent of Europe's construction output by value and half of its

| | Sawnwood | % of production | Plywood | % of production |
|------------------|----------|-----------------|---------|-----------------|
| Production | 12 670 | 100 | 1 140 | 100 |
| *Domestic use | 4 535 | 36 | 131 | 11 |
| Exports: | 8 135 | 64 | 1 009 | 89 |
| EU | 5 185 | 41 | 843 | 74 |
| Africa | 1 307 | 10 | 1 | 0 |
| Japan | 805 | 6 | 4 | 0 |
| Asia excl. Japan | 549 | 4 | 34 | 3 |
| North America | 85 | 1 | 44 | 4 |
| Russia | 4 | 0 | 1 | 0 |
| Other | 200 | 2 | 82 | 8 |

The plywood figures comprise birch plywood, softwood plywood and laminated veneer lumber (LVL).

* Estimated use = production – exports

Sources: Statistics 2001 (Finnish Forest Industries Federation) and Finnish Forest Research Institute

housing construction by value. Indeed, the increase in construction output in Western Europe this year – although only 0.6 per cent – is attributable to the growth in building renovation.

The Food and Agricultural Organisation of the United Nations (FAO) forecasts that sawn softwood consumption in Europe in 2002 will reach 90.8 million cubic metres. The small increase in construction output will boost sawnwood consumption to a level 1.6 per cent above last year's figure. The construction sector will be affected by uncertainty over the economic situation, however, and so construction output and sawnwood consumption could fall short of the FAO forecast.

Continued Growth in Finnish Sawnwood Exports to Markets Outside Europe

Finnish sawn softwood exports in January–June 2002 were one per cent below the level achieved last year. Nevertheless, exports for the full year are projected to be up by one per cent due to a small

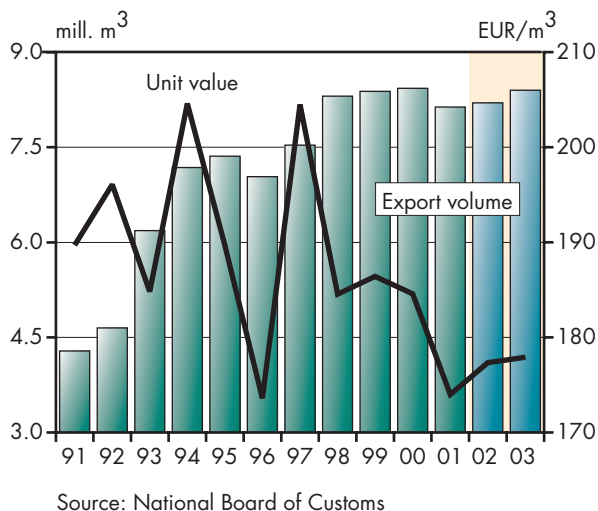
improvement in demand in the second half of the year.

The importance of non-European markets in Finnish exports of sawnwood has continued to grow. Exports to markets outside Europe in January–June 2002 were up by four per cent, while exports to European markets fell by four per cent on the same period last year.

Finnish sawnwood exports to the United Kingdom, Southern Europe and Africa in the first six months of 2002 were up on the same period last year, whereas exports to Germany, the Netherlands and Japan, consisting mainly of spruce sawnwood, were down. Planed wood accounted for about 11 per cent of Finnish sawnwood exports, and the biggest proportionate increase was in exports to the UK and Japan.

Exchange Rates Affect Demand-Supply Balance in European Market

The continued high level of sawnwood exports to non-European markets from Europe's major produc-



Volume and unit value of sawnwood exports, 1991–2003 at 2001 prices (wholesale price index)

ers – Finland and Sweden – has been good for the demand-supply balance in Europe. Swedish exports to European markets also increased in the first half of 2002, especially pine sawnwood and primary processed sawnwood products. This was helped by the exchange rate, as the krona is still weak against the euro compared with the average rate for 2000.

In January–September 2002 the euro appreciated by an average of 11 per cent against the US dollar, and nine per cent against the Canadian dollar, thus weakening European competitiveness in relation to North America. Europe’s competitiveness remains relatively good, however, because the euro is still fairly weak compared with its rate in the late 1990s. Housing construction in the United States has continued to grow in 2002, which has maintained the level of sawnwood consumption in the US. European producers’ exports to the United States have correspondingly increased, despite the strengthening of the euro.

Russia’s sawn softwood exports grew by 16 per cent in the first half of 2002 compared with the same period last year. The weakening of the ruble against the euro has also prompted an increase in exports to

countries within the European Economic and Monetary Union (EMU). The biggest percentage growth in Russian exports, however, has been to markets outside the euro area, especially the United Kingdom and China. The growth in exports is not expected to continue at the same pace to the end of the year.

Japanese imports of sawn softwood fell in the first half of 2002. Both Europe and North America experienced a fall in their share of Japanese imports, due to the weakening of the yen against the euro and the dollar. Japan’s construction activity has been moderate in view of the country’s very fragile economy. The number of housing starts decreased only slightly in January–August 2002 compared with the same period last year, and no major decrease is expected in the remaining part of the year.

Sawnwood Price Increases Modest Due to Supply Outstripping Demand

The downturn in the world economy in 2001 was followed by a drop in sawnwood consumption both in Europe and North America. In Europe the decline in construction activity led to a situation of sawnwood oversupply. European production was cut, but by less than the drop in consumption, and the consequent oversupply led to a fall in the average market prices of sawnwood.

The export price of Finnish pine sawnwood in January–June 2002 was one per cent lower, and of spruce sawnwood two per cent lower, than in the same period last year. Nevertheless, taking all Finnish sawnwood exports as a whole, the unit price for January–June was unchanged from the previous year because the exports included a greater proportion of the higher priced pine and planed softwood. The price of spruce sawnwood will be affected by the economic uncertainty and construction recession in its key German market. The price of pine sawnwood, however, can be expected to remain fairly stable, as demand depends to a large extent on the joinery and furniture industries.

In recent months the unit price of Finnish sawn-

wood exports has been creeping upwards, and the average unit price for 2002 as a whole is expected to be about two per cent higher than last year.

Growing Domestic Consumption of Sawnwood

2001 saw a drop in domestic sawnwood consumption to an estimated total of about 4.9 million cubic metres following the decline in housing construction in Finland as elsewhere, due to the poor economic situation. In 2002, however, the growth prospects for domestic consumption of sawnwood and plywood – both dependent on the construction industry – look relatively satisfactory. If the actual growth in housing construction and renovation matches the forecast level, domestic consumption of sawnwood in 2002 will be up by around two per cent.

In the first half of 2002 the total volume of housing construction for which building permits were granted was four per cent lower than in the same period last year. This decline has since levelled off, and the Confederation of Finnish Construction Industries (RT) is forecasting a small increase in housing construction for 2002 as a whole. This is due to the growth in non-subsidised housing construction, stimulated by low interest rates and continued household confidence in personal finances. By contrast, state-subsidised housing construction will be down this year. Order books in the prefabricated housing industry are relatively good, which should mean a modest rise in the construction of single-family houses.

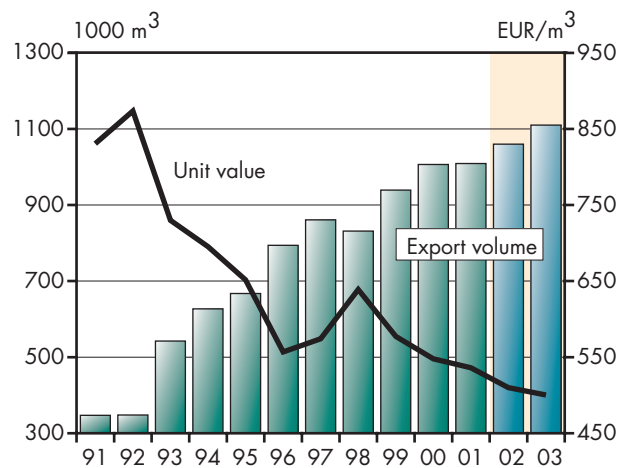
Sawnwood production in January–June 2002 was down by one per cent on the same period last year. According to the August business survey of the Confederation of Finnish Industry and Employers (TT), raw material availability has restricted production in the wood products industry, although availability has improved since the summer due to an increase in sawlog imports and sales of domestic roundwood. Production for 2002 as a whole is expected to be up by one per cent, to 12.8 million cubic metres, due

to the slight increase in both exports and domestic consumption.

Increase in Finnish Plywood Exports

Lower growth and the downturn in construction in Western Europe in 2001 had an immediate impact on the year's plywood consumption, which fell by around two per cent. The FAO forecasts that European plywood consumption in 2002 will remain at approximately last year's level, at about six million cubic metres. Only a little over half of European plywood consumption is met by domestic producers, which leaves Europe dependent on imports of plywood. Finland is the market leader in the European plywood market, with over one third of all European plywood production.

The biggest plywood consumers in Europe are the United Kingdom and Germany, the latter being Finland's largest export market. In 2001 the recession in the German construction sector led to a drop of nine per cent in plywood consumption. By contrast, consumption increased in Eastern European markets and Russia, as a result of their above-aver-



Source: National Board of Customs

Volume and unit value of plywood exports, 1991–2003 at 2001 prices (wholesale price index)

age economic growth. Softwood plywood accounted for just over half of European plywood consumption, although this was down by about six per cent on the previous year's figure. Growth in the consumption of hardwood plywood, which is less reliant on the construction industry than softwood plywood, did not reach the level attained in 2000.

Although European markets still account for almost 95 per cent of Finnish plywood exports, the level of exports to markets outside Europe in the first half of 2002 was up by one quarter in comparison with last year. While European consumption was falling in the first half of the year, Russia expanded its exports especially to markets of the former Soviet Union and to its single most important export market, the United States. US plywood production is in decline, while oriented strand board (OSB) accounts for a growing proportion of the production and consumption of wood-based panels. The supply of sawlogs suitable as raw material for softwood plywood has diminished on the North American market due to the protection of old-growth forests on the west coast.

Total Finnish plywood exports in 2002 are forecast to be up by about five per cent. Production capacity would allow a much greater level of exports, but this would be a risk to the stability of plywood prices in the present market situation.

The price of softwood plywood, like sawnwood, has been affected by the slow growth in the market this year. The price of birch plywood reflects the expansion of supply in Russia and the tougher competition on the European market. The 2002 average unit price of exported plywood will be down by five per cent on account of the weak state of the market in Europe (the main export destination) and the higher export proportion of the lower priced softwood plywood.

Economic Outlook for 2003 Better Than 2002

Euroconstruct forecasts that construction in Western Europe will increase by 1.4 per cent in 2003.

However, construction growth in Germany, which is critical to exports of Finnish spruce sawnwood, will be delayed until 2004. In 2003 German construction investment is forecast to remain at this year's level, though residential (the term used in Euroconstruct) construction may even decline (by 0.3 per cent), leaving (residential) construction activity more than 10 per cent below its 1999 level. By contrast, residential construction in the United Kingdom is forecast to grow by 2.4 per cent next year. In the first half of 2002, UK housing starts were as much as 13 per cent above last year's figure. Residential construction in France and the Netherlands is expected to increase by one per cent in 2003. As construction growth begins to pick up slowly in Europe the demand for wood products will grow slightly more quickly than this year. Repair of last year's flood damage will also add to the demand for sawnwood and plywood in Central Europe.

Although demand growth will improve the demand-supply balance in Europe to some extent, supply will be plentiful, not least because of the considerable increase in Swedish sawnwood production. The euro is not expected to appreciate much against the dollar, and so supply from outside Europe will not grow to any great extent. If the euro does strengthen significantly, however, it would increase Canadian supply to European markets. Supplies to the European market from both Russia and the Baltic countries have increased in 2002. The higher levels of economic growth in Russia and Eastern Europe compared with Western Europe are also encouraging domestic construction activity and will thus increase domestic consumption of sawnwood and plywood.

In the longer term, competition from the Baltic countries will intensify as they begin exporting kiln-dried sawnwood and higher value-added sawnwood products. Sawnwood supply from Russia and Eastern Europe will increase in the next few years due to the foreign investment project decisions that will increase production capacity by more than four million cubic metres. The Russian Government's plans to increase wood processing in Russia will also increase the supply of sawnwood to the European

Forecasts of production and exports in the sawmilling and plywood industries (1000 m³); percentage changes from previous year are shown below the respective volumes

| | Production | | | Exports | | |
|----------|--------------|-------------|-------------|-------------|------------|------------|
| | 2001 | 2002 | 2003 | 2001 | 2002 | 2003 |
| Sawnwood | 12 670 -5 | 12 800 1 | 13 100 2 | 8 135 -4 | 8 200 1 | 8 400 2 |
| Plywood | 1 140 -3 | 1 200 5 | 1 260 5 | 1 009 0 | 1 060 5 | 1 110 5 |

market, provided that Russian consumption does not grow at the same rate.

Forecasts for Japan's housing construction sector, important to the demand-supply balance of European sawnwood markets, indicate a further shrinkage of 1.5 per cent in 2003 (Research Institute of Construction and Economy). Together with the likely strengthening of the euro, this will retard any export growth to Japan. The high quality of European sawnwood nevertheless remains a competitive advantage on the Japanese market in relation to North American unseasoned sawnwood.

Exports of Finnish sawnwood in 2003 are set to grow by approximately two per cent if Euro-construct's forecast of slightly higher construction growth holds true and the euro does not strengthen significantly against the currencies of Finland's main competitor countries. The relatively low increase in demand and the abundant supply will, however, ensure that the unit price of exports rises by an average of no more than two per cent. One factor in the higher unit price will be the slightly larger share of exports accounted for by the higher priced pine and planed sawnwood.

The greatest uncertainty in making forecasts about world markets for forest industry products is the general economic situation. Forecasts of sawnwood exports for 2003 largely depend on the state of the US market, and so the demand-supply balance in the European market remains uncertain. The number

Forecasts of export prices for sawnwood and plywood (as percentage changes from previous year*)

| | 2001 | 2002 | 2003 |
|----------|------|------|------|
| Sawnwood | -5 | 2 | 2 |
| Plywood | -2 | -5 | 0 |

* Export prices are nominal unit values.

of housing starts in the United States is forecast to fall slightly in 2003, and according to assessments made at the September meeting of the Timber Committee of the United Nations Economic Commission for Europe (UN/ECE), sawnwood consumption will also fall, by about two per cent. Uncertainty is further heightened by the imposition of an import duty of 27.2 per cent on Canadian sawnwood imported to the US, introduced in May 2002. In a previous, similar situation the Canadians cut their production in an attempt to raise the price of sawnwood in the United States. The UN/ECE Timber Committee believes that Canadian sawnwood production will be cut slightly both this year and in 2003. Despite this, the pressure to export more to Europe will probably increase a little because Canadian exports to the US and Japan are expected to fall.

Increase in Plywood Exports and Modest Improvement in Prices in 2003

The demand for plywood differs from that for sawnwood because plywood is used not only in construction but also in, for example, the packaging and transport equipment industries. Finnish plywood capacity totals about 1.8 million cubic metres. Softwood plywood capacity has increased most of all, and exports of softwood plywood now account for more than 50 per cent of Finnish plywood exports, as against 16 per cent in the early 1990s. With no shortage of production capacity and with demand growing, plywood exports in 2003 are forecast to rise by five per cent.

The expansion of plywood production in Russia, Eastern Europe and Canada has increased competition on export markets in recent years. Finland's main competitors in the birch plywood market are Russia and the Baltic countries. The substantial increase in Europe's OSB and MDF board production capacity is also increasing the competition for softwood plywood and sawnwood. As the export proportion of the lower priced softwood plywood is rising, the unit price of all Finnish plywood exports in 2003 is not expected to exceed this year's average.

Production Up Slightly in Wood Products Industry

Consumption of Finnish sawnwood is increasingly focused on the building renovation sector, which will grow by 3–4 per cent both this year and in 2003, according to forecasts by the Research Institute of the Finnish Economy. The Confederation of Finnish Construction Industries (RT) forecasts that housing construction will also pick up next year, by about 2.7 per cent. Based on the increase in both construction and renovation activities, the consumption of sawnwood is projected to grow by around two per cent in 2003.

The increase in domestic construction activity

and the slight improvement in demand on export markets are expected to boost sawnwood production by about two per cent in 2003, to approximately 13.1 million cubic metres. The forecast figure is still below the production record set in 2000.

The considerable expansion of Finnish plywood capacity, particularly softwood plywood, since the mid-1990s, allows for a major increase in production, should this be desirable on the basis of demand and prices. With this in mind, plywood production is forecast to increase in 2003 by about five per cent.

2.2 Exports and Production in the Pulp and Paper Industry

The market for paper products has remained weak in 2002. In particular, those grades reliant on advertising and publishing have suffered from the slow growth in the economy, and their prices have fallen. Production and exports of Finnish paper and paperboard this year will nevertheless be about two per cent higher than the 2001 figures. The average export price of paper and paperboard products will be down by around seven per cent. Pulp production will be up by about nine per cent, due to the growth in paper production and especially exports. Nevertheless, the average export price of pulp in 2002 will remain about 14 per cent below last year's level.

The demand for paper is expected to increase gradually in 2003, lifting Finnish paper exports by about 4–5 per cent. With barely any new capacity scheduled to come on stream, the capacity utilisation rate will rise. Export prices of paper are expected to start picking up, but due to the low starting point, the average export price will remain close to this year's level. 2003 will also see a rise in production and exports of paperboard and an increase in the paperboard export price. Pulp exports are forecast to remain more or less unchanged, whereas the increase in domestic paper production will raise pulp production by about two per cent. Market prices

for pulp are expected to rise gradually as demand grows. The export price of Finnish pulp next year is forecast to increase by about five per cent.

Demand for Paper Remains Slack

Finnish paper exports decreased in 2001 as a result of the decline in the demand for paper on export markets. The slack demand has continued in 2002, as economic growth has remained relatively low on the main export markets. Finnish paper exports did begin to recover in the second quarter of 2002, however, up about four per cent on the same period last year, despite the decrease in prices. Demand has remained sluggish though, especially for paper grades dependent on the volume of advertising: newsprint, magazine papers and coated fine papers. In the first half of 2002, the consumption of printing and writing papers in Finland's main market, Western Europe, fell by one per cent on the same period last year, according to estimates by Resource Information Systems Inc.

The trends in the paper industry elsewhere in Europe in the first six months of 2002 were simi-

lar to those experienced by the Finnish industry. According to the Confederation of European Paper Industries (CEPI), paper and paperboard production in its member countries was about one per cent below the 2001 level in the first quarter of the year. This was predominantly due to the drop in production volumes of newsprint and coated magazine papers, the latter troubled by overcapacity. Production of almost all other paper and paperboard grades was up, and fine papers grew by as much as four per cent. As in Finland, production volumes of paper and paperboard in the second quarter of 2002 exceeded last year's figures: in Sweden by 4 per cent, France by 3 per cent, Germany by 5 per cent and Italy by 8 per cent. The recovery in paper production has increased the consumption of hardwood pulp in particular, and has reinforced its price.

The late summer floods in Central Europe brought production to a standstill at many paper mills in Southern Germany, the Czech Republic and Austria. The effect of the floods on the paper market in general was only minor, however, as the mills affected were mostly quite small and it was still the holiday season, thus reducing the need to find substitute supplies. The biggest impact was probably the

The Finnish pulp and paper industry, 2001 (1000 tonnes)

| | Pulp | % of production | Paper | % of production | Paperboard | % of production |
|---------------|-------|-----------------|-------|-----------------|------------|-----------------|
| Production | 6 548 | 100 | 9 902 | 100 | 2 601 | 100 |
| Domestic use* | 4 942 | 75 | 1 008 | 10 | 392 | 15 |
| Exports: | 1 606 | 25 | 8 894 | 90 | 2 209 | 85 |
| EU | 1 284 | 20 | 6 376 | 64 | 1 329 | 51 |
| Asia | 88 | 1 | 537 | 5 | 334 | 13 |
| Africa | 6 | 0 | 82 | 1 | 72 | 3 |
| United States | 78 | 1 | 587 | 6 | 106 | 4 |
| Russia | 17 | 0 | 139 | 1 | 74 | 3 |
| Other | 133 | 2 | 1 173 | 12 | 294 | 11 |

* Estimated use = production – exports

Sources: Statistics 2001 (Finnish Forest Industries Federation) and Finnish Forest Research Institute

month-long closure of a major Austrian liner mill with a daily production of 1 300 tonnes.

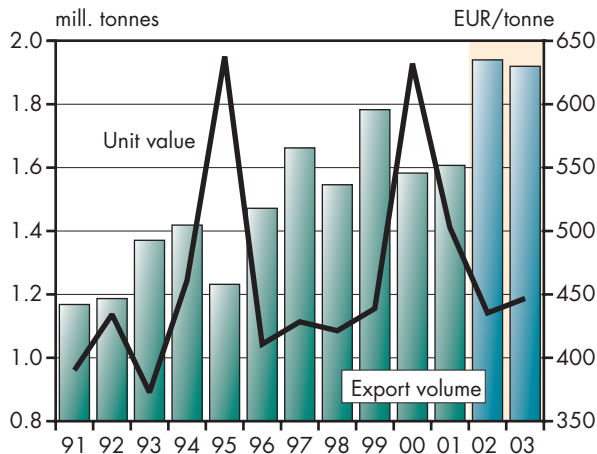
Towards a New Record for Pulp Exports

The price of pulp has fluctuated during 2002. According to the PIX index of FOEX Indices Ltd, the price of bleached softwood pulp was just below USD 460 per tonne in mid-November, about two per cent less than in January. The demand for hardwood pulp has been stronger than for softwood pulp, especially with the increase in fine paper and tissue production in Western Europe. The price of hardwood pulp has consequently risen; by mid-November it was almost 14 per cent above its January level, and it has surpassed the price of softwood pulp since early June.

Despite the higher demand for pulp, producers have again had to resort to shutdowns in order to prevent oversupply and accumulation of stocks. In January–October 2002, the market pulp capacity utilisation rate of the NORSCAN countries (Canada, Sweden, Finland and the USA), which together supply 60 per cent of the world's market pulp, averaged 91 per cent.

Pulp stocks in European ports have been reduced during the year, and in October they were one fifth below their level a year earlier. NORSCAN stocks of pulp at the end of October amounted to 1.66 million tonnes, a little over the 1.5 million tonnes considered in recent years as the dividing line between scarce and abundant supplies.

Uncertainty about the world economy will continue to make pulp prices sensitive to changes in demand and stocks. Pulpex futures (the world's only standard, listed pulp derivatives) indicate a continued decline in the price of bleached softwood pulp to the end of the year. Although trading in Pulpex futures has been very slow, especially in recent times, their rate has been a fairly accurate predictor of trend reversals in the pulp list price around four to eight weeks in advance.



Source: National Board of Customs

Volume and unit value of pulp exports, 1991–2003 at 2001 prices (wholesale price index)

Pulp production capacity will remain more or less unchanged in Europe both this year and in 2003. However, in Brazil a major new production line was brought on stream in May. The facility belongs to the Aracruz company, which supplies pulp to Europe and elsewhere. The new line will eventually be capable of producing as much as 700 000 tonnes of bleached eucalyptus pulp per year. The new line has not yet resulted in oversupply, as this year has even seen a shortage of eucalyptus pulp.

Finnish pulp production was up by seven per cent in the first half of 2002. The growth in domestic consumption has been only moderate, whereas pulp exports have been at record levels. Measured in tonnes, Finnish exports of pulp in the first half of the year were 43 per cent above last year's level. Exports increased to nearly all the traditional export markets. As a result of last year's major increase in pulp production capacity, and due to the industry's abundant stocks of harvested roundwood, Finnish producers were in a position to meet the growing demand for pulp.

Pulp production for the whole of 2002 is expected to be about nine per cent above last year's total, and pulp exports are expected to be up by about one fifth.

However, the average export price will be approximately 14 per cent below last year's level.

Downward Slide in Paper Prices Continues in 2002

With barely any growth in the demand for paper industry products in 2002, paper producers have been competing for market share by selling paper and paperboard at prices lower than last year. In the first half of 2002 the export price of Finnish paper was about six per cent below the average for the whole of 2001, and the price of many paper grades has fallen. The unit price of newsprint exports fell to a level 12 per cent below last year's average in the early months of 2002, when the lower prices in recent contracts began to show up in export consignments. The prices of coated magazine papers and fine papers have continued the downward slide that began in 2001. Besides the overcapacity affecting these grades, the low price of pulp has also pushed prices down.

In the first six months of 2002 the average export price of paperboard was more than three per cent below the average for the whole of 2001. However, the price has been improving in later months. In the autumn, many European producers reported increases in sulphate cartonboard prices. Containerboard prices have also been rising in Western Europe following a dramatic jump in the price of recovered paper since the start of the year.

Taking into account the movements in prices that have already occurred, average export prices for 2002 as a whole will remain significantly below last year's level; the price of paper by about eight per cent, and paperboard by three per cent.

Newsprint Spreads Gloom Over the 2002 Production Figures

Newsprint production in Finland in the first half of 2002 was 27 per cent (187 000 tonnes) below the

total for the same period last year. Two old newsprint machines, with a combined capacity of slightly under 200 000 tonnes per year, were withdrawn from service this year, and production of other units has also been reduced. Newsprint production is continuing its geographical shift towards the recycled-fibre raw material sources of Central Europe. For example, Myllykoski opened a new newsprint mill in Germany in the summer, and Stora Enso will be starting up a new newsprint/SC paper machine in Belgium in June 2003.

Fine paper production fell considerably in 2001 but recovered in the second quarter of 2002 to a level seven per cent higher than in the same period a year earlier. Exports of coated fine paper were up in the first half of 2002 by about one quarter compared with the previous year, although exports of uncoated grades were down. This reflects the changes in fine paper capacity that occurred last year: two uncoated fine paper machines, with a combined capacity close to 0.5 million tonnes per year, were converted to produce coated grades.

The growth in demand for fine paper is partly because paper wholesalers have been replenishing their stocks, which were quite low at the start of the year. With the export price of coated fine paper falling by almost nine per cent in January–June 2002, it would appear that a strategic shift on the part of producers, from defending prices to defending market shares, was also behind the increased supply.

Although the demand for paper on the export markets is expected to remain comparatively slack at the end of the year too, autumn will see a seasonal increase in the sales of many products. In all, Finnish paper production for 2002 as a whole is expected to be about two per cent higher than last year.

Production of paperboard was up in the first six months of 2002 by three per cent on last year's figure, and the market outlook for the rest of the year has remained good. The full year's production is forecast to end four per cent higher than last year.

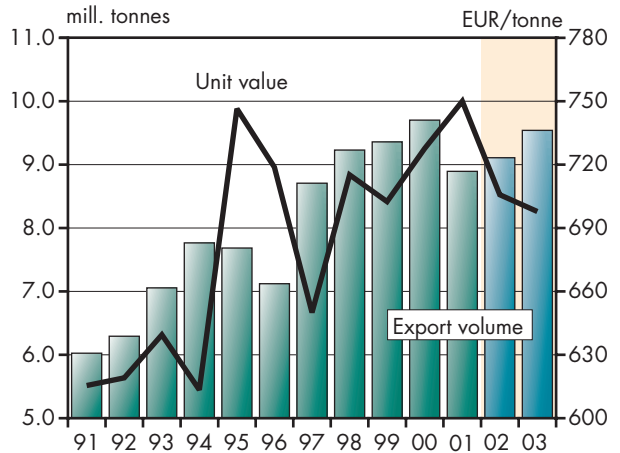
Demand for Paper Will Recover in 2003 at the Earliest

Expectations of a demand-led recovery in the paper market have been reviewed and now focus on some time later in 2003. As economic growth picks up, the demand for paper and paperboard is expected to start rising gradually. About three quarters of Finnish paper production is consumed in the European Union, where economic growth is estimated to rise by around two per cent in 2003. Growth is also expected to pick up in Asia, an important paperboard market accounting for about 15 per cent of exports.

No major increase is expected in the demand for paper used in advertising and printing, especially if the 2003 forecasts made by institutions specialising in the advertising sector hold true. In its September 2002 forecast, the London-based media communications agency Zenith Optimedia Group predicted that the year-on-year growth in advertising value in 2003 in the main advertising media (including newspapers and magazines) of the five biggest Western European countries will not exceed two per cent. This would not even be sufficient to return advertising expenditure to the 2001 level. The August 2002 forecast of WPP, one of the world's largest communications groups, was along the same lines in predicting that a resurgence in the media markets will probably not occur until 2004.

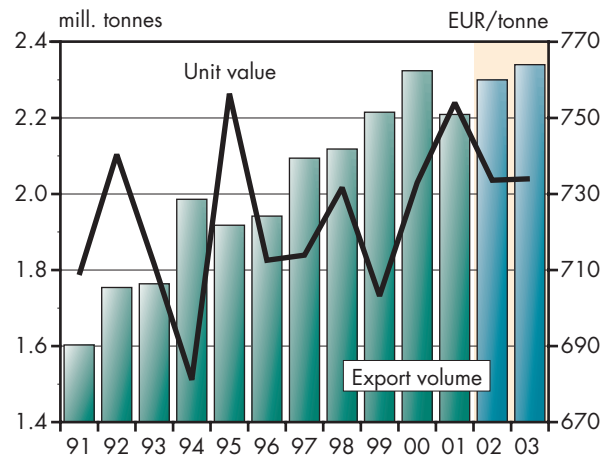
European production capacity for printing and writing papers will not increase appreciably in 2003, and so an increase in supply to meet the gradually growing demand will require more efficient use of existing capacity. Newsprint production is the only area in which a small increase in capacity is scheduled.

In the paperboard industry, 2003 will see a considerable increase in waste-based containerboard capacity on the world market, raising the prospect of oversupply. Through product substitution, the impact of this may also be felt in the demand for virgin-fibre containerboard produced in Finland. However, these products account for only about 14 per cent of Finnish paperboard exports by value.



Source: National Board of Customs

Volume and unit value of paper exports, 1991–2003 at 2001 prices (wholesale price index)



Source: National Board of Customs

Volume and unit value of paperboard exports, 1991–2003 at 2001 prices (wholesale price index)

The position of Finnish producers is helped by the fact that the demand for paper has begun to pick up in the United States too, which in 2003 may result in fewer Canadian exports to Europe – Finland's principal export market – despite any strengthening of the euro against the dollar. The Swedish krona

Forecasts of production and exports in the pulp and paper industry (1000 tonnes); percentage changes from previous year are shown below the respective volumes

| | Production | | | Exports | | |
|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 2001 | 2002 | 2003 | 2001 | 2002 | 2003 |
| Pulp | 6 548 -8 | 7 150 9 | 7 320 2 | 1 601 2 | 1 940 21 | 1 920 -1 |
| Paper | 9 902 -8 | 10 100 2 | 10 540 4 | 8 894 -8 | 9 110 2 | 9 540 5 |
| Paperboard | 2 601 -5 | 2 700 4 | 2 750 2 | 2 209 -4 | 2 300 4 | 2 340 2 |

is also expected to appreciate next year. The Finnish paper industry's competitiveness should remain good in 2003, and production and exports of paper are projected to rise by about four per cent, and paperboard by around two per cent.

As demand grows, a modest rise in paper product prices is anticipated in 2003, alongside the rising price of pulp. There will be barely any rise in Finland's average export prices, however, as the low initial price level will return towards the level seen in early 2002. The average export price of paper is thus expected to remain almost unchanged in 2003. A modest increase is expected in pulp-based paperboard prices.

Growth in Pulp Production to Continue in 2003

Consumption of pulp is on the increase, which bodes well for a gradual improvement in prices, especially as stocks are at fairly low levels. However, if producers do not adjust their output to match demand, pulp stocks could increase quite rapidly again, pushing down prices. Imposing year-round production ceilings through shutdowns is not possible, however, for technical reasons: many Canadian producers have

Forecasts of export prices for the pulp and paper industry (as percentage changes from previous year*)

| | 2001 | 2002 | 2003 |
|------------|------|------|------|
| Pulp | -20 | -14 | 5 |
| Paper | 3 | -8 | 1 |
| Paperboard | 3 | -3 | 2 |

* Export prices are nominal unit values.

to keep their pulp mills in operation in the winter in order to avoid them freezing up. Seasonal considerations of this kind led to an increase in stocks again last winter.

Eucalyptus pulp capacity will increase in Brazil in 2003. Birch and softwood pulp capacity, on the other hand, will remain almost unchanged, which will improve the situation of the NORSCAN countries.

The export price of Finnish bleached sulphate pulp is projected to rise in 2003 by about five per cent. This is based on the assumption that pulp producers can successfully curb their overproduction, allowing more scope for raising prices as the demand for pulp continues to improve. Pulp exports will probably remain just below their present high

level, whereas pulp production, spurred on by domestic demand, is expected to increase by some two per cent.

2.3 Costs and Profitability in the Forest Industry

Production costs in the Finnish forest industry in 2002 will be higher than in 2001 because of the increased labour costs and higher stumpage prices; the costs of other inputs will either be almost unchanged or will be lower than last year. The forest industry's capacity utilisation rate will be only slightly higher than in 2001, due to the slow growth in demand for end products. Higher costs and the drop in export prices in the paper industry mean that the forest industry's profitability and results for 2002 will be down on last year's figures. The profitability of sawnwood is below that for other product groups.

Stumpage prices and labour costs will continue to rise in 2003. Provided that the increase in total costs remains low, the profitability of the Finnish forest industry's domestic operations is expected to improve as production grows and export prices rise slightly. However, no significant improvement in profitability is anticipated in the sawmilling industry until a distinct rise in prices is seen on export markets. Increased production in the forest industry will raise the capacity utilisation rate to some extent in 2003; in the paper and paperboard industry the rate is expected to rise to 92 per cent.

Moderate Rise in Mill Prices and Labour Costs in 2002

Stumpage prices will be up in 2002 by an average of about 1.5 per cent. In the sawmilling industry the unit cost of roundwood will be up by over two per cent, whereas in the pulp and paper industry it will be almost at last year's level. Stumpage prices

account for approximately two thirds of the mill price.

The nominal unit costs of roundwood harvesting for 2002 will be about 1.5 per cent above the 2001 figure, while long-distance transportation costs will rise by only around 0.5 per cent. Direct and indirect labour costs account for one third, capital costs one quarter and fuel costs 15 per cent, of harvesting and transportation costs. Costs have increased especially as a result of pay rises; by contrast, fuel costs have decreased. Taking all the cost changes into account, the nominal mill price will be up by about 1.5 per cent, and the real price (inflation-adjusted using the wholesale price index) by approximately 2.2 per cent.

The price of recovered paper has remained stable in Finland because recycled fibre is relatively unimportant in Finnish paper and paperboard production, and because the principal supplier of recovered paper, Paperinkeräys Oy, is wholly owned by the major forest companies. By contrast, the price of recovered paper in Central Europe rose sharply in the second quarter of 2002. Only one tenth of the recovered paper used by Finnish mills is imported, however.

Labour costs in the forest industry have risen in 2002 at a more moderate rate than in 2001 due to the lower increment agreed for the second year of the two-year collective agreement. The pay of paper industry employees in the second quarter of the year was about 3.5 per cent higher than the same period in 2001, of which around 2.3 percentage points were accounted for by the agreement increments. In the mechanical forest industry, pay increased correspondingly by about 2.5 per cent, most of which was attributable to the agreement increments. The increase in pay for 2002 as a whole is expected to be of the same order. Labour productivity, however, declined in both 2001 and 2002.

Oil Prices High Towards Year-End

Oil prices rose in the early part of 2002 to a level significantly above last year's closing low. After a

dip in May, prices began to rise steadily, climbing steeply once more from early August, prompted in particular by the possibility of an attack on Iraq. The pressure to maintain high oil prices was perpetuated by OPEC's decision at its September meeting not to raise the production ceiling. At its highest, the price of Brent crude approached USD 30 per barrel. Brent futures on the International Petroleum Exchange indicate that oil prices will still be high at the end of 2002. The increase in oil prices across the year as a whole, however, is expected to be fairly small: the Research Institute of the Finnish Economy forecasts that the average oil price in 2002 will be USD 25 per barrel, which is almost three per cent higher than last year's average.

Among the fossil fuels, natural gas is used the most by the Finnish forest industry in its own power and heat production. The price of natural gas in the first six months of 2002 was clearly below the previous year's level, and despite the rise of the last few months, the price of natural gas for the full year will probably be down on the 2001 figure. No major changes are anticipated in the prices of peat or bioenergy.

The market price of electricity in the first part of 2002 was significantly below the level of a year earlier. This was the result of lower consumption due to the unusually warm weather and because of the plentiful water reserves in Norway and Sweden. However, water reserves have since dwindled, due to the very dry summer. Futures quoted on Nord Pool, the Nordic power exchange, indicate a rise in electricity prices in the latter part of 2002 to a level slightly above that of last year. Short-term fluctuations in the price of market electricity do not greatly affect the paper industry's energy bill, however, as much of the industry's power is self-generated or based on long-term agreements. Furthermore, hedging can be made against the price risk associated with market electricity.

The cost of sea freight has risen considerably from the low level at the start of 2002, as world trade has picked up and prices of oil products have risen. The Baltic Dry Index (BDI), measuring dry

cargo spot prices on the busiest shipping routes, has risen by 50 per cent since January 2002, and will remain high to the end of the year. For the full year, however, the price of sea freight may even be down in comparison with last year's average.

Chemical and Pigment Prices Almost Unchanged

Pigments such as kaolin, precipitated and ground calcium carbonate, and talc are used as paper fillers and coating materials. As fillers, pigments increase the paper's opacity, while as coating materials they guarantee a high print quality. The use of pigments is also advantageous due to their low price in relation to fibre raw material.

Imports account for over 65 per cent of pigment consumption by value. All the kaolin and half the ground calcium carbonate are imported. The precipitated calcium carbonate is usually produced at the paper mill using carbon dioxide obtained from a pulp mill and burnt lime, some of which is imported and some produced domestically. As precipitated calcium carbonate is usually produced at the paper mill, its price is based on long-term supply agreements. The pigment industry is very concentrated, and imported pigment is bought from just a few globally operating companies. Finnish pigment production is also partly in foreign ownership.

Pigment prices in 2002 have remained at approximately last year's level, on account of the tough competition. Pigment prices also depend on oil prices, because energy is used in mining, refining and transportation. Changes in pigment prices affect the costs of coated fine paper in particular, as pigment can account for up to half of the product weight. Pigments account for about three per cent of costs in the pulp and paper industry.

Chemicals and latexes account for about seven per cent of the pulp and paper industry's costs. The prices of forest industry chemicals are dependent on oil prices, as oil may constitute their raw material (e.g. in latexes used as a coating material) or their

production may be energy intensive (most other forest industry chemicals). The prices of basic chemicals, on the other hand, continued to fall at the start of 2002, despite the increase in oil prices. Besides their production costs, chemical prices are also affected by the demand situation. The low level of paper production and low paper prices have reduced the upward pressures on chemical prices. The prices of forest industry chemicals will probably start to rise towards the end of the year, as paper production increases slightly and oil prices climb further. Chemical prices in 2002 as a whole are likely to remain below last year's level, while latex prices will remain unchanged.

Moderate Increase in Costs in 2003

Nominal stumpage prices are set to rise in 2003 by almost four per cent. The rise in the mill price is expected to be somewhat less than this.

The increase in total labour costs will depend on the next collective pay settlement, which will take effect in February 2003. The forecasting institutions estimate that labour costs will rise by about 3–3.5 per cent. After adjustments, this would put the increase in forest industry pay a little above the 2002 figure.

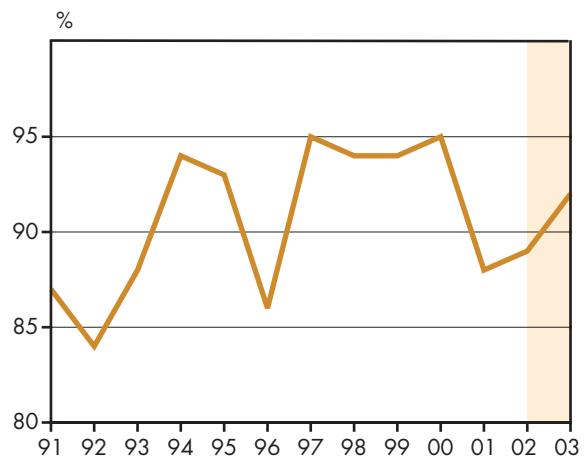
Any assessment of raw material costs in the pulp and paper industry is hampered by the uncertainty over oil prices. Brent futures indicate that oil prices will start falling steadily from the start of 2003, and that the average price for the year will not exceed USD 25 per barrel. The Research Institute of the Finnish Economy also forecasts an oil price of around USD 25 per barrel, which is about the same as this year. If the steeper price trend that began in August 2002 is short-lived, the oil price will not greatly affect chemical and pigment prices. These prices will nevertheless be subject to upward pressure as demand picks up.

The 2003 spot market price of electricity will depend very much on water reserves in the Nordic countries and the level of consumption in the coming

winter. Futures prices on Nord Pool indicate a distinct rise in the price of electricity in the early part of 2003 compared with early 2002, due to the scant water resources. Futures prices also indicate that the market price of electricity in 2003 as a whole will be significantly more expensive than this year. An increase of around five per cent in the electricity tax and in the tax on fuels used in heat production will also increase energy costs.

Forest Industry's Capacity Utilisation Rate Rising

The delayed recovery in demand in 2002 will keep the forest industry's capacity utilisation rate at about the 2001 level in its Finnish-based operations. In the paper and paperboard industry the capacity utilisation rate this year will be 89 per cent. Paper machines have had to be shut down in 2002 on account of the slack demand. The demand for newsprint and magazine paper, for example, has fallen as a result of the reduction in advertising and publishing. By contrast, the demand for consumer-



Sources: Finnish Forest Industries Federation and Finnish Forest Research Institute

Paper and paperboard industry capacity utilisation rates, 1991–2003

driven office papers and packaging board has been growing. The 2002 capacity utilisation rate in the pulp industry will be slightly above the previous year's level, although still clearly less than 90 per cent, due to the substantial amount of new capacity built in 2001.

The capacity utilisation rate for paper and paperboard is expected to improve somewhat in 2003, when paper exports start to increase and capacity remains unchanged. The utilisation rate is projected to be 92 per cent.

In 2001 the capacity utilisation rate in the sawmilling industry was 94 per cent, according to figures from the Finnish Forest Industries Federation. The 2002 figure will be marginally higher as a result of the slight increase in production, and the rate will improve further in 2003 as production continues to climb. No precise forecasts are given because total production capacity in the sawmilling industry is difficult to determine accurately, and there is no consensus on the figure.

Production capacity in the plywood industry increased again in 2001, when the capacity utilisation rate stood at an average of 88 per cent. By early 2002, capacity had increased to approximately 1.8 million cubic metres, lowering the full year's capacity utilisation rate to less than 70 per cent, despite the five-per-cent production increase to 1.2 million cubic metres. In 2003, the capacity utilisation rate will increase slightly to 72 per cent, due to the absence of new capacity and a production increase of five per cent.

Higher Production Will Improve Paper Industry Profitability in 2003

In 2001 the combined profits of Stora Enso, UPM-Kymmene and Metsäliitto Group were approximately EUR 2.7 billion (before extraordinary items and taxes). This represented a slight drop in profitability since the high of the previous year. The downturn in the world economy reduced demand for the industry's products and so production levels

fell. Prices in the paper industry remained high, however.

Profitability is shown by product group in the accompanying diagram, which represents the entire production of Finnish forest industry companies. The estimates of production profitability for 2002 and 2003 given in the text deal only with Finnish-based production.

The profitability of newsprint production declined significantly in the first six months of 2002, due to lower prices. Nevertheless, this level of profitability was still higher than that for other product groups. Magazine paper profitability also dropped considerably compared with last year. Operating profit was reduced by lower sales prices. Although prices of writing and printing papers have been declining throughout the year, the price level has nevertheless been satisfactory when compared against long-term average prices. The sector has therefore still remained profitable despite the weak demand.

Pulp and paper industry profitability is expected to improve somewhat in 2003 as growing production levels raise the capacity utilisation rate. Profitability improvements will find little support from export prices, however, as nominal export prices for paper are projected to remain almost unchanged in 2003.

Only Slight Improvement in Sawmilling Profitability in 2002 and 2003

Profitability in the sawmilling industry will be only a little higher in 2002 than in 2001, due to the low overall increase in export prices. According to the market review *Wood Focus*, the sawmilling industry turned in a significant loss in the first quarter of 2002, although the figure was slightly up on the result for the last quarter of 2001. Profitability did improve in the second quarter, however, as a result of the marked rise in exports. After financial expenses, sawmilling was nevertheless still making a considerable loss. The rise in export prices ensures that profitability in the latter half of 2002 will be slightly better than in the first half.

Cost Structure of the Finnish Forest Industry

Johanna Pohjola

The overall cost structure of the forest industry's units located in Finland is shown in the accompanying diagram for the year 2000. The pulp and paper industry comprises the production of pulp, paper and paperboard, and paper and paperboard products. The wood products industry comprises sawing, planing and impregnation of timber, production of plywood and other wood-based panels, and manufacture of joinery products, wooden packaging and other wood products.

Total costs in the pulp and paper industry increased by almost nine per cent in 2000, to approximately EUR 12.2 billion, and in the wood products industry by almost 10 per cent to about EUR 4.8 billion. About half of the increase in costs was attributable to the increase in production. In both sectors the growth in wood raw material, energy, transportation and labour costs and in depreciation was slower than the growth in total costs. By contrast, the costs of other supplies, for example, and the pulp and paper industry's chemical and pigment costs increased more rapidly than total costs. Examining the costs against the previous year's figures reveals little change in the percentages, although in the pulp and paper industry the growth in the costs of some items differed markedly from the growth in total costs.

Stumpage costs in the pulp and paper industry were almost unchanged, as both the consumption and price

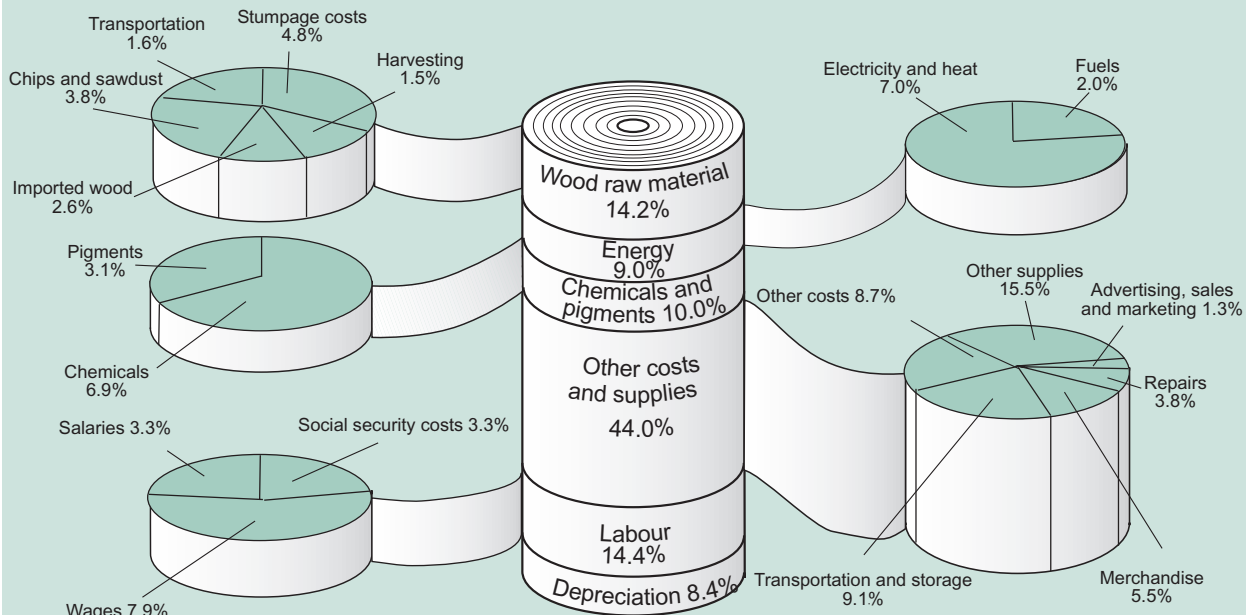
of domestic roundwood were almost at the previous year's level. The total costs of the industry's roundwood imports rose by 15 per cent due to the marked rise in both the price and quantity of imports. In the wood products industry, stumpage costs increased as a result of the higher price of spruce sawlogs, in particular, and the total costs of roundwood imports were also up on the previous year, due principally to the higher volume of imports.

Felling costs per cubic metre were down by six per cent, which reduced the pulp and paper industry's roundwood harvesting costs compared with the previous year, despite the increase in standing sales of roundwood and local transportation costs. Roundwood harvesting costs in the wood products industry were slightly up on the previous year's figures.

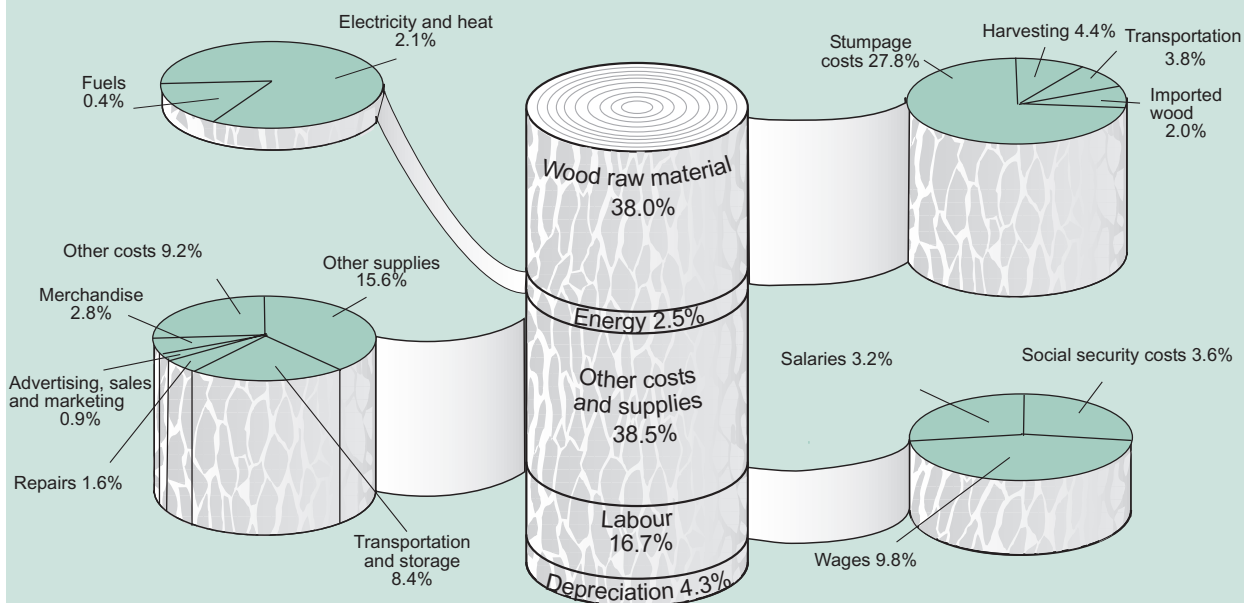
The rise in fuel prices led to a clear increase in both transportation and fuel costs, while the increase in the cost of electricity and heat was relatively small.

Any analysis of the cost structure must take into account that the two sectors produce both basic products and processed products, and that the cost distribution differs for each of these. In the sawmilling industry, for example, which is part of the wood products sector, slightly over half of all costs are from the wood raw material (stumpage costs, harvesting, transportation and imported roundwood), and only some 10 per cent is incurred in the form of labour costs.

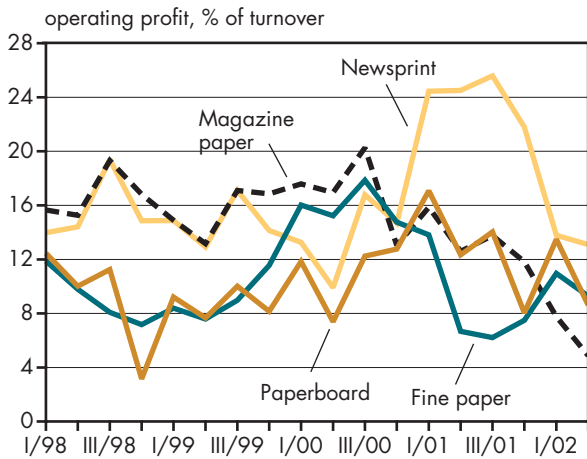
Pulp and Paper Industry 2000



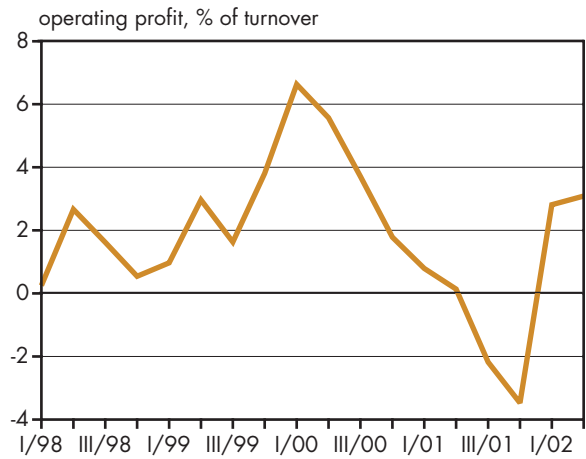
Wood Products Industry 2000



Sources: Statistics Finland and Finnish Forest Research Institute



Magazine paper excludes M-Real and fine paper excludes UPM-Kymmene, as separate data was not available.



Sawnwood excludes UPM-Kymmene, as separate data was not available.

Forest industry operating profit by product group from 1st quarter 1998 to 2nd quarter 2002
Sources: UPM-Kymmene, Stora Enso, M-real and Finnforest annual and interim reports

The capacity utilisation rate in the sawmilling industry will improve in 2003, as production is expected to grow by about two per cent. Sawnwood prices will be up by about two per cent, but production costs are also expected to rise. The price of softwood sawlogs is expected to increase by about three per cent. In fact, no significant improvement is anticipated in the sawmilling industry's performance until prices improve considerably on the export markets.

In the plywood industry profitability has been affected this year by a reduction in export prices and in capacity utilisation rates. Production costs have also increased, for example as a consequence of the rise in stumpage prices. Profitability will be down for softwood plywood in particular, as the export price in the first six months of 2002 fell by eight per cent on last year's figure. Softwood sawlog prices will also have risen by an estimated 2–3 per cent this year, depending on the tree species. In 2003 the average export price of plywood will remain at this year's level while at the same time sawlog prices will rise, thus adversely affecting profitability in the plywood industry. The capacity utilisation rate, on the other hand, will improve slightly.

Sawmilling Industry Turns to Russia and the Baltic Countries

Corporate restructuring is continuing at a steady pace in the forest industry. The most significant corporate acquisition was the purchase of the German company Haindl by UPM-Kymmene in November 2001. This increased UPM-Kymmene's market share considerably in newsprint and magazine papers and reinforced the company's position as a leading global manufacturer of printing papers. Annual synergy benefits in production, logistics and purchasing are estimated at EUR 70 million by 2004. UPM-Kymmene also improved its position on the self-adhesive labelstock market by acquiring the MACtac pressure-sensitive materials business for its own Raflatrac subsidiary from the US-based Bemis Company Inc. The deal made UPM-Kymmene the second largest producer in this field on the US market.

Investment by the Finnish sawmilling industry is currently being targeted mainly at Russia and the Baltic countries. Besides the proximity of raw materials and markets, this also assists Finnish companies in their roundwood procurement, even

for plants located in Finland. Lower prices are a further benefit. Among the Finnish companies, Stora Enso is especially active, investing in five new sawmills in Russia, Latvia and Lithuania by 2006. The increase in production capacity will be almost one million cubic metres, of which 200 000 cubic metres will come on stream in 2003. UPM-Kymmene will also start up a new sawmill next year, with a capacity of 200 000 cubic metres. Besides investing, Finnish companies are also reinforcing their positions through corporate acquisition. Stora Enso has signed a letter of intent to buy shares in Estonia's largest sawmill company, AS Sylvester, and this share purchase is expected to be completed by the end of 2002.

Ownership restructuring has also taken place in the Finnish sawmilling industry, where Metsäliitto Osuuskunta acquired a one-third holding in Vapo

Oy from the state in spring 2002. Vapo includes Finland's fourth largest sawmilling company, Vapo Timber Oy, which has a combined sawmill production capacity of almost 800 000 cubic metres per year. Metsäliitto also has the right of pre-emption on any state shares sold at a later date.

Stora Enso corporatised its forests in 2002 and is selling off part of its shareholding to release capital for core business activities. A total of 600 000 hectares of Finnish forest land and related business operations were sold in early July to Tornator, a newly established company owned by Stora Enso. The intention is to sell most of Tornator's shares to institutional investors before the end of 2002.



3 Forestry in Finland

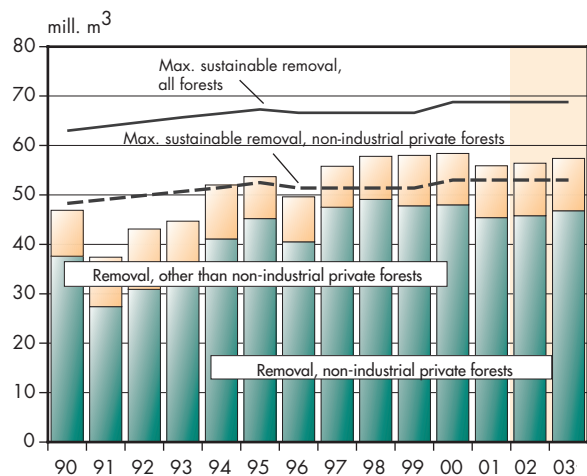
3.1 Utilisation of Wood Resources

Finland's abundant forest resources are sufficient to meet the Finnish forest industry's demand for roundwood, with the exception of birch; some 40 per cent more birch is consumed than the estimated maximum sustainable removal will allow, the shortfall being made up by imports. In 1999–2001, the forest industry's roundwood consumption and commercial fellings were at record highs. The forest industry was consuming an average of 69 million cubic metres of roundwood a year, of which 56 million cubic metres was of Finnish origin. The industry's roundwood procurement and consumption this year will be slightly higher than in 2001, and will continue to rise a little in 2003.

Finland has 23 million hectares of forest, and the total volume of growing stock is approximately 2000 million cubic metres. Pine accounts for 47 per cent of this, spruce for 34 per cent, birch for 15 per cent and other broad-leaved species for 4 per cent. The annual increment in the growing stock is about 78 million cubic metres. Some 2.8 million hectares of forest, mainly in Northern Finland, is wholly or partially excluded from commercial roundwood production. Forestry can thus be practised across an area of more than 20 million hectares, containing a growing stock of almost 1900 million cubic metres with an annual increment of approximately 76 million cubic metres.

The maximum sustainable removal is approximately 69 million cubic metres of useful wood per year, and the maximum justifiable in silvicultural terms (maximum potential removal) is as much as 94 million cubic metres. The removal of industrial wood in recent years has been about 57 million cubic metres, or 83 per cent of the calculated maximum sustainable removal. The proportion of the maximum sustainable removal harvested in non-industrial private forests is almost 90 per cent. Some 95 per cent of Finnish forests are covered by certification. Forest certification places certain additional demands on forest management and use, and on authentication of roundwood origin.

Sixty-five per cent of Finland's commercial forests are in the possession of non-industrial private



Removals of industrial wood and maximum sustainable removal

Timber consumption by the forest industry and maximum sustainable removals in Finland

| Tree species | Consumption 1999-2001 | |
|--------------|--------------------------|----------------------------------|
| | mill. m ³ /yr | % of maximum sustainable removal |
| Pine | 25.1 | 79 |
| Spruce | 28.7 | 114 |
| Birch | 13.5 | 141 |
| Total | 67.3 | 101 |

Consumption includes imported timber: pine 2.3 mill. m³, spruce 2.2 mill. m³ and birch 6.9 mill. m³

owners, 20 per cent is owned by the state, nine per cent by companies and six per cent by other groups of owners. The state's forest ownership is concentrated in Northern Finland, which is reflected in the low average increment in the growing stock compared with forests in other ownership. Forests in non-industrial private ownership account for 74 per cent of the increment in the growing stock; state-owned forests account for 11 per cent, company-owned forests for 10 per cent and the rest for five per cent. From the roundwood procurement viewpoint, the non-industrial private forests are of crucial importance, as 75–85 per cent of the domestic roundwood used by the forest industry is from such forests. Roundwood supplied from non-industrial private forests accounts for 65–75 per cent of all the industry's roundwood.

The table shows the Finnish forest industry's consumption of roundwood, and compares these figures with the maximum sustainable removal estimated for Finnish forests. The calculation of maximum sustainable removal is based on information about the amount, composition and annual increment of the growing stock and assumes that the standard of silviculture will remain unchanged. The calculation indicates the level to which fellings could rise

without prejudicing the size of future removals. It is an optimisation calculation prepared by the Finnish Forest Research Institute and includes the effect of roundwood price differentials on the composition of the maximum sustainable removal.

The maximum sustainable removal has risen because the volume of growing stock has continually increased, and silviculture has been quite intensive. The additional funding granted with the National Forest Programme will help secure a high level of silvicultural investment. The increase in maximum sustainable removal has slowed, but at the present rate of wood resource use this is set to rise again in the future.

Felling in excess of the maximum sustainable removal on a temporary basis only will not jeopardise future harvests. Flexibility of this kind, which is justifiable in silvicultural terms (maximum potential removal), is extremely widespread in Finnish forests, especially in spruce stands. In spruce-dominant forests in Southern Finland, the average volume of growing stock is 173 cubic metres per hectare, compared with only 107 cubic metres per hectare in pine-dominant forests. Spruce harvests have been very high in recent years and spruce reserves have no longer been increasing.

The proportion of the maximum sustainable removal harvested in Southern Finland is over 80 per cent, and is at its highest in Southern Ostrobothnia and Northern Savo, at over 90 per cent. Up-to-date information on Northern Finland is not available.

From a wood resources viewpoint, pine (especially sawlogs) has the best potential for quickly meeting an increase in the demand for roundwood. Birch consumption is currently 40 per cent greater than the level of maximum sustainable removal in Finnish forests, and so about half of the birch for industrial use is imported as birch pulpwood. The comparison given in the table also shows that spruce resources are being used to the full. Imports of spruce are thus increasing. According to the maximum sustainable removal calculations, spruce harvests can be sustainably increased in as little as about ten years from now. Non-industrial use of

roundwood – principally domestic firewood – is also of importance to forest management, but its main significance is in terms of energy use.

The aim of the National Forest Programme (1999) is to increase the use of industrial wood and fuelwood (particularly felling residues). The use of industrial wood has not yet increased, but the use of felling residues and small-sized trees for energy purposes has almost doubled since 1999. In energy production the use of wood material unfit for industrial products is very high: wood-based energy accounts for 20 per cent of all energy consumed in Finland and 60 per cent of the Finnish forest industry's energy consumption.

3.2 Roundwood Markets

A rise in production in the Finnish forest industry is increasing the demand for roundwood. Commercial fellings in 2002 will be up by two per cent, to 54.2 million cubic metres, and imports of roundwood will be up slightly, reaching 15.5 million cubic metres. The demand for sawlogs has increased as a result of the slight improvement in the outlook for sawnwood production and the growth in plywood production. The total harvest of Finnish sawlogs in 2002 will be about one per cent more than in 2001, despite the considerable increase in sawlog imports. Pulp production will also be up in 2002, raising the domestic demand for pulpwood; fellings will be up three per cent on last year. Pulpwood imports will be marginally down. Average stumpage prices will be 1–3 per cent above the figure for 2001, due to the increased demand for roundwood.

In 2003, the Finnish forest industry's growing roundwood needs will increase commercial fellings by two per cent, to 55.1 million cubic metres, and roundwood imports to 15.8 million cubic metres. With an increase in the production of sawnwood, planed wood and plywood and a steady rise in stumpage prices, the harvesting of Finnish sawlogs will be up by three per cent in 2003. Sawlog imports

will correspondingly fall. Paper and pulp production will continue to grow, adding to the demand for pulpwood. The supply of domestic pulpwood is forecast to increase only marginally, which will lead to higher imports of pulpwood and chips. Higher demand will push up average stumpage prices by 2–4 per cent, depending on the category of roundwood.

The supply of roundwood from non-industrial private forests began to increase in summer 2002 after the forest industry had returned roundwood prices to the level they were at before the price cuts of summer 2001. The increase in supply was also triggered by the decision of Metsäliitto and UPM-Kymmene to reduce the minimum diameter requirement for softwood pulpwood to six centimetres. The increase in roundwood sales at the end of the summer was considerable in comparison with last year: in early September, weekly procurement started to exceed one million cubic metres, and by the end of September, standing sales were already 25 per cent, and delivery sales 15 per cent, above their levels for the same period in 2001.

The roundwood supply situation in autumn 2001 was quite different. Falling stumpage prices had led many private forest owners to postpone their roundwood sales. Despite the forest industry's demand for roundwood remaining fairly high, roundwood sales declined considerably until the severe storms in early November 2001, when more than seven million cubic metres of roundwood was felled or damaged. Although a considerable proportion of this roundwood came onto the market during the winter, the industry's stocks of wood stands had dwindled to such an extent that sawlog imports had to be increased substantially. With the increase in imports, sawmills' stocks of harvested sawlogs began to grow, reaching record highs by summer 2002. Storms also played a role during the summer, though the impact of the severe storm in Savo on roundwood sales was relatively minor and localised.

| | 2001 mill. m ³ | 2002 mill. m ³ | Change % | 2003 mill. m ³ | Change % |
|--|------------------------------|------------------------------|-------------|------------------------------|-------------|
| Commercial fellings, total | 53.3 | 54.2 | 2 | 55.1 | 2 |
| Non-industrial private forests | 45.1 | 45.8 | 2 | 46.8 | 2 |
| Company-owned forests | 3.5 | 3.6 | 2 | 3.6 | 0 |
| Finnish Forest and Park Service forests | 4.6 | 4.7 | 2 | 4.7 | -1 |
| Sawlogs | 25.4 | 25.5 | 1 | 26.4 | 3 |
| Pulpwood | 27.8 | 28.7 | 3 | 28.7 | 0 |
| Roundwood imports | 15.4 | 15.5 | 0 | 15.8 | 2 |
| Commercial fellings and roundwood imports, total | 68.7 | 69.7 | 1 | 70.9 | 2 |

Forest Industry's Roundwood Consumption Increases

The Finnish forest industry's roundwood consumption in 2002 will be more than three million cubic metres above last year's figure due to the growth in production. This in turn has increased sawlog harvesting and imports, although by a combined total of only one million cubic metres, because last year's harvesting and imports had already swelled stocks by two million cubic metres. Stocks were once more being reduced in 2002.

The total volume of commercial roundwood harvested in 2002 will be 54.2 million cubic metres, which is two per cent up on last year. Increased supplies of domestic roundwood mean that imports in 2002 will be up by only a small amount, to approximately 15.5 million cubic metres. Production of sawnwood, planed wood and plywood will be up slightly, adding to the demand for sawlogs. Sawlog harvesting will only be one per cent higher, however, because sawlog imports have already grown to one third of all roundwood and waste wood imports; the growth in imports has occurred quickly, as it was only in 2001 that the proportion had climbed

to one quarter. Commercial fellings of pulpwood in 2002 will be up by three per cent as a result of the growth in pulp production. Pulpwood imports will be slightly down because stocks of harvested pulpwood are relatively high.

Fellings in non-industrial private forests in 2002 will be two per cent up due to higher stumpage prices. Commercial fellings will also be two per cent higher in forests owned or corporatised by the forest industry companies and forests of the Finnish Forest and Park Service. Fellings in corporatised forests are determined not only by the harvestable roundwood available, but also in the short term by the orders from the parent company and owner-imposed performance targets. Fellings by the Finnish Forest and Park Service are influenced in the short term by the performance target set in the Government budget.

Real Stumpage Prices Remain Stable on Roundwood Markets

Growth in the demand for roundwood will mean that stumpage prices for 2002 on both the sawlog and pulpwood markets will be 1-3 per cent above last

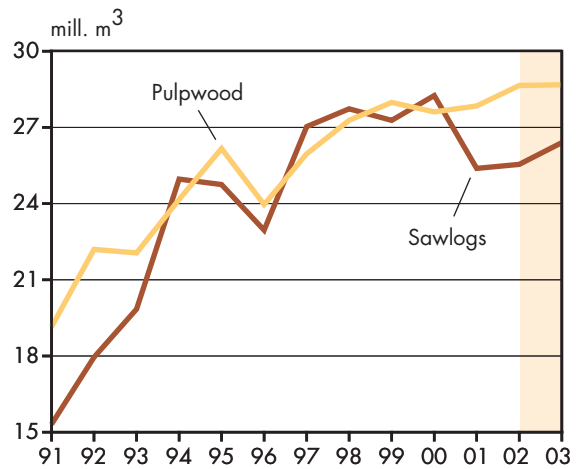
year's figures. Non-industrial private forest owners are consequently selling more wood than in 2001, when the prices were lower. Roundwood sales will have climbed to about 38 million cubic metres by the end of 2002, up by 30 per cent on 2001.

Summer stocks of harvested sawlogs in 2002 were 38 per cent above the 1998–2002 average, which also indicates that standing sawlog stocks are at a low level. The volume of roundwood sales in the latter part of the year will increase the forest industry's standing stocks of both sawlogs and pulpwood.

The 2002 stumpage price of pine sawlogs will be two per cent above last year's figure, due to the strengthening demand for sawnwood. The stumpage price of spruce sawlogs will be up by three per cent, as export demand has risen for primary processed products, planed wood and plywood. The increase in the price of birch sawlogs in 2002 will be smaller than for pine and spruce, at only one per cent, because considerably more birch is imported for industrial use.

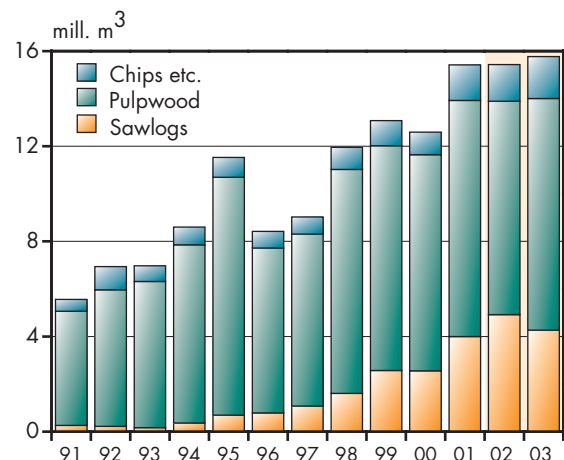
The 2002 stumpage price of pine pulpwood will be up by three per cent on last year, as a result of the increase in pulp production. Demand has also increased for birch pulpwood as a pulp raw material, but its stumpage price will only be one per cent higher on account of the stocks of harvested birch pulpwood and the high proportion of imports. The stumpage price of spruce pulpwood will be up by two per cent due to the scarce domestic supply and relatively low level of imports.

The reduction in the small-end diameter requirement for softwood pulpwood, to six centimetres, will increase the 2002 figures for the number of exploitable thinnings stands and the thinnings removal. The demand for pulpwood in standing sales of thinnings has improved as thinning technology has been further developed. Pine and birch pulpwood are especially important in delivery fellings of thinnings. In 2001 some 33 per cent of all pine pulpwood, and 29 per cent of birch pulpwood, was harvested through delivery fellings; the equivalent figure for sawlogs was an average of only 14 per cent.



Source: Finnish Forest Research Institute

Commercial fellings of sawlogs and pulpwood, 1991–2003



Source: Finnish Forest Research Institute

Volume of imported wood by type of roundwood, 1991–2003

Sawlog Fellings Up in 2003

In 2003 both commercial fellings and roundwood imports will increase by two per cent, as the forest industry's production and roundwood consumption increase. Production of sawnwood, planed wood

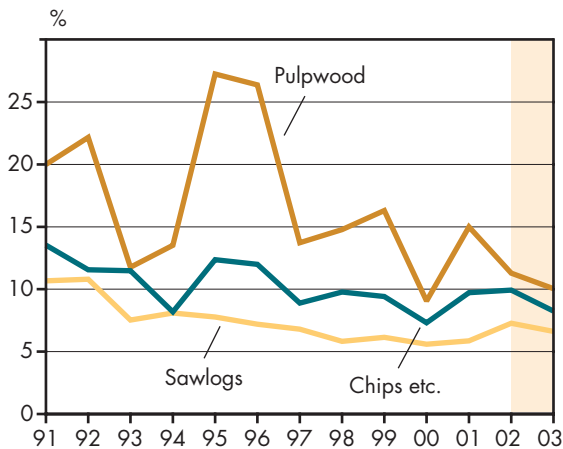
and plywood will grow, leading to an increase in sawlog fellings of three per cent, to a total of 26.4 million cubic metres. The supply of domestic sawlogs in 2003 will increase as stumpage prices rise, and sawlog imports will correspondingly decline. Pulpwood fellings will remain at approximately 28.7 million cubic metres despite the growth in paper and pulp production, because more of the fibre raw material will be supplied as sawmill chips, and imports of both pulpwood and chips will increase. The industry's stocks of harvested roundwood will decrease.

In non-industrial private forests commercial fellings will be up by two per cent in 2003, due especially to the higher demand for sawlogs; fellings of sawlogs from private forests are forecast to increase by as much as four per cent. By contrast, commercial fellings of sawlogs from forests owned or corporatised by the forest industry companies and by the Finnish Forest and Park Service will decrease by a small amount. In corporatised forests and those of the Finnish Forest and Park Service the higher price of roundwood will mean that performance targets for 2003 could also be met with slightly fewer fellings than this year.

Higher Export Prices Will Boost Roundwood Sales in 2003

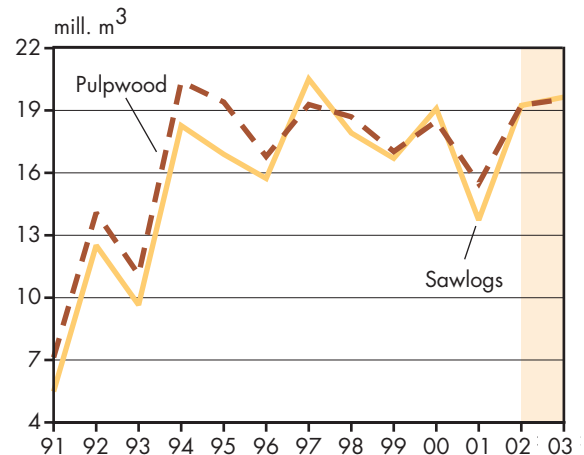
In 2003 average stumpage prices will rise by 2–4 per cent as roundwood demand picks up and export prices increase. Being a little above the inflation rate, this will help the supply situation, ensuring that the volume of roundwood sales remains at approximately this year's level. Stumpage prices for sawlogs will be supported by the rise in wood product prices as construction activity gradually picks up on export markets. The price of pine and birch pulpwood will also rise as a result of the projected growth of five per cent in the export price of pulp.

The average sawlog and pulpwood stumpage prices for both pine and spruce will increase by around three per cent. In the case of spruce, the rise in sawlog and pulpwood stumpage prices will be restrained by imports. Imports will also be a restraining factor on the price of birch sawlogs, which is expected to rise by two per cent. The price of birch pulpwood, on the other hand, will increase by four per cent despite the rise in imports, due to the growing demand for it in pulp manufacture. The industry's stocks of wood stands will increase from this year's level.



Source: Finnish Forest Research Institute

Forest industry stocks of harvested wood at year-end, 1991–2003 (percentage of annual wood consumption)



Source: Finnish Forest Research Institute

Purchased quantities of sawlogs and pulpwood from non-industrial private forests, 1991–2003

| | 2001 | 2002 | Change | 2003 | Change |
|-----------------|--------------------|--------------------|--------|--------------------|--------|
| Roundwood | EUR/m ³ | EUR/m ³ | % | EUR/m ³ | % |
| Pine sawlogs | 46.2 | 47.1 | 2 | 48.3 | 3 |
| Spruce sawlogs | 43.1 | 44.3 | 3 | 45.7 | 3 |
| Birch sawlogs | 45.9 | 46.3 | 1 | 47.4 | 2 |
| Pine pulpwood | 14.0 | 14.4 | 3 | 14.8 | 3 |
| Spruce pulpwood | 22.0 | 22.6 | 2 | 23.3 | 3 |
| Birch pulpwood | 13.9 | 14.0 | 1 | 14.5 | 4 |

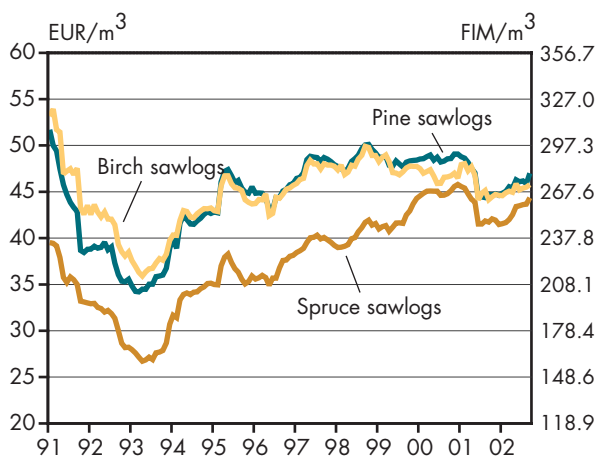
Commercial Fellings and Roundwood Imports Undergoing Changes

The transition period in forest taxation is soon to end. Those forest owners affected by the site productivity tax will be aiming to sell considerable quantities of sawlogs in the period 2002–2004. The only tax-affected felling stands to remain unharvested in 2005 will be those on which it is possible to pay the tax up to the start of 2006.

Although no significant change is expected in the overall supply of roundwood in the next few years, commercial fellings of domestic sawlogs are now some two million cubic metres below the level of 1997–2000. This may be because the forest industry is preparing for the end of the forest taxation transition period and any consequent changes in roundwood supply. Relatively high domestic stumpage prices will lead the industry to increase its imports wherever possible to satisfy its rising demand for sawlogs. This will reduce the upward pressure on domestic stumpage prices. In addition, the industry is likely to increase its dwindling stocks of wood stands in the period to 2005 by purchasing more standing wood than needed and delaying fellings on some of the purchased stands as well.

The costs of stocking and transporting wood in Finland are critical in any comparison of the costs

of procuring imported versus domestic roundwood. Managing the logistics of felling and transporting wood has so far proved more troublesome for imports than for domestic procurement. As an example, in the first part of 2002 the growth in sawlog imports increased stocks of harvested sawlogs considerably; assuming an interest rate of 13 per cent (as used in Metsäteho’s economic analysis of reduced summer fellings), it can be seen



Source: Finnish Forest Research Institute

Sawlog stumpage prices by month, January 1991–September 2002 at 2001 prices (cost of living index)

Stumpage Price Index and Forest Product Export Price Index

Pekka Ollonqvist

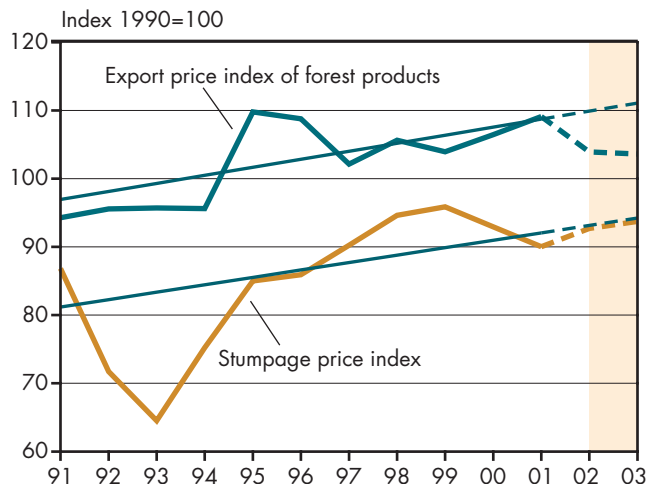
The index measuring the real change in forest product export prices will be down in 2002 by almost five per cent on last year's level, due to the drop in forest product export prices (except for sawnwood). By contrast, the stumpage price index for roundwood will be up by almost three per cent on last year. Both indices are based on prices adjusted for inflation using the wholesale price index.

With nominal export prices rising, the forest product export price index in 2003 is expected to remain almost at this year's level, about four per cent higher than in 1990. The stumpage price index is forecast to rise by more than one per cent in 2003, which will be about six per cent below its 1990 level.

Both indices have experienced an overall rising trend throughout the period 1990–2001. However, the drop in the stumpage price index last year and in 2000

has lowered its average growth rate to almost the same level as the growth rate of the forest product export price index. The stumpage price index was about two per cent below its 1990–2001 trend last year, whereas the forest product export price index was more or less in line with its trend. This year and in 2003, however, the forest product export price index will be below its 1990–2001 average.

After falling for two successive years, the stumpage price index began to rise in summer 2001. The expected rise in the index in 2002 will be almost three per cent, in part as a result of the decline in wholesale prices. In real terms, the index will return to its level of the first half of 2001 and thus to the 1990s trend; this rise will continue in 2003, though at a slower rate because of the rise in the wholesale price index.



Sources: Research Institute of the Finnish Economy, Finnish Forest Research Institute and Statistics Finland

Real stumpage price index, forest product export price index and linear trends in these indices, 1991–2003 (inflation-adjusted by the wholesale price index)

that every permanent increase of one cubic metre in sawlog stocks is equivalent to an annual interest charge of about EUR 6. This is not dissimilar to the average long-distance transportation cost per cubic metre for domestic roundwood. Based on the costs of keeping stocks, any price gap between imported roundwood and domestic commercial roundwood would be narrower than assumed, because stocks of locally procured domestic roundwood can be kept for some time as stocks of standing wood, and, even when felled and paid for, can be held in smaller quantities than imported roundwood procured from distant forests.

Importing sawlogs from Russia also carries a risk that the Russians may impose rules restricting sawlog exports in order to support the country's domestic wood processing industry. The Finnish forest industry is already making preparations for future changes in roundwood procurement by investing in the sawmilling and plywood industries of the Baltic countries and Russia. The industry is also seeking to increase imports of pulpwood and chips from the Baltic Sea region to its Finnish-based pulp and paper mills.

3.3 Investment and Profitability in Non-Industrial Private Forestry

Total investment in timber production in Finnish non-industrial private forests in 2002 will rise to over EUR 190 million and a little further still in 2003. Non-industrial private forest owners have recently been investing more of their own resources in real terms; in 2002 and 2003 their input will account for over 70 per cent of the total investment in non-industrial private forestry. The improvement in state funding criteria and expansion of the funding basis in 2001 led to an increase in the take up of state funds to such an extent that the subsidies for tending of young stands were insufficient to meet the demand. Moreover, the demand for subsidies avail-

able under the legislation on funding for sustainable forestry will probably again exceed the funds available, both this year and in 2003, despite the increase in funding since 2001. The higher level of investment in timber production and the reduction in stumpage earnings have together raised the investment rate (total investment as a percentage of gross stumpage earnings) in non-industrial private forestry to over 12 per cent this year.

A minor increase in fellings and modest rise in stumpage prices will raise gross stumpage earnings for 2002 by two per cent. A further increase of six per cent is anticipated in 2003, which will lift earnings to EUR 120 per hectare. Following the substantial amount of final cutting at the beginning of the decade, the total costs of forest regeneration are still high, and the effect of the campaign to improve young stands is still evident in the costs. Nevertheless, the rise in total costs may be as little as 1–2 per cent, or less than EUR 0.5 per hectare. Net earnings per hectare for 2002 will rise to EUR 97 and will be EUR 104 in 2003.

Total Investment to Exceed EUR 195 Million in 2003

In 2001 a total of approximately EUR 57 million in state funding was taken up for timber production in non-industrial private forests; this was almost 20 per cent above the previous year's figure. In 2002 about EUR 59 million in state loans and grants will be taken up, just short of the target set in the National Forest Programme. Total investment in non-industrial private forestry in 2002 will already exceed EUR 190 million. The projection for 2003 is slightly over EUR 195 million.

The amount of their own resources invested in timber production by private forest owners has been growing continuously in real terms for almost 10 years, with the exception of 1996. In 2001 the forest owners invested over EUR 130 million in silvicultural and forest-improvement work. This year and in 2003 the figure will be slightly higher still,

accounting for over 70 per cent of the total investment. The corresponding figure in the early 1990s was only 50–60 per cent.

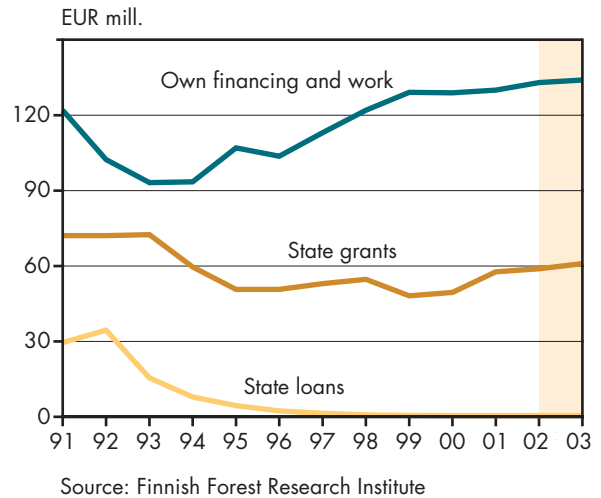
Almost 60 per cent of the private forest owners' own input is spent on statutory forest regeneration obligations, which are mainly soil preparation and planting of regeneration sites. Most of the resources for non-statutory purposes are used for construction, maintenance and basic improvement of forest roads. Almost two thirds of the EUR 26 million spent on roads by the forest owners is spent on maintenance (this is an estimate and not based on actual work performed). The additional expenditure by private forest owners last year on tending of young stands brought their own input in this area almost up to the level of their input in forest road investment.

Increase in Sustainable Forestry Funding in 2003

About EUR 61 million of state funding has been reserved in the Government's budget proposal for 2003 for the purposes of securing sustainable timber production. This incorporates an additional allocation of EUR 2 million to cover the increased costs of silvicultural and forest-improvement work and the further artificial regeneration needed as a result of the autumn 2001 storm damage. An index-linked increase was also made to allow the National Forest Programme targets to be met.

The priority in state funding continues to be with tending of young stands, fuelwood harvesting, and ditch cleaning and supplementary ditching. As much as EUR 25 million of the EUR 44 million funding is targeted at tending of young stands and harvesting fuelwood. The biggest increase was reserved for forest regeneration and other silvicultural work as a result of the storm damage; the allocation for this work was increased from a little over EUR 9 million to EUR 11 million.

Funding for sustainable forestry also includes the allocation reserved for environmental grants and for projects concerned with managing the forest



Financing of silvicultural and forest improvement works in non-industrial private forestry, 1991–2003 at 2001 prices (cost of living index)

environment, among other things. This allocation remains at EUR 4.2 million in the 2003 budget proposal. Besides individual management projects, a considerable amount of funding is used in national projects for surveying habitats of special importance referred to in the Forest Act; this work is mainly the concern of the regional forestry centres. Field afforestation under the EU-approved action plan for forestry measures in agriculture will no longer receive state funding in 2003. However, the field afforestation commitments made before 2000 are still very much evident in the Government's budget in the form of afforestation management allowances and compensation for loss of earnings, totalling more than EUR 6 million.

State Funding Attracts Forest Owners Again

In 2000 almost one quarter of the state funds available for timber production in non-industrial private forestry went unclaimed. The situation changed completely in 2001, however, as a result of an

improvement in the funding criteria and an expansion of the funding basis. By the end of the year, the available state funds were no longer sufficient for all the projects undertaken. This has adversely affected funding in 2002 because some of the sustainable forestry funding has had to be spent on a number of last year's projects.

The nature of the authorisation procedure in regard to long-term projects (such as ditch cleaning and supplementary ditching, and forest road improvements) has created a problem for the funding of sustainable forestry work. If a long-term project is granted funding, its estimated total funding need is authorised as a single sum from the first year's available funds, even though the project's expenditure is to be spread over several years. The funding situation was eased in the 2002 supplementary budget by increasing the funding authorisations that can be granted.

The improvement in funding criteria and expansion of the funding base in 2001 appear to have been successful in encouraging the take up of state funds for timber production. This has correspondingly increased the input of private forest owners' own funds and labour, mainly in non-statutory silvicultural and forest-improvement work. Greater use of state funds is probably also due to the additional resources given to organisations that promote and monitor forestry for the purpose of supporting regional forest planning and providing advice and training for private forest owners in accordance with the National Forest Programme. Despite the increase in state funding, a shortfall rather than a surplus of funding seems more likely in 2003.

Investment Rate Increasing in Non-Industrial Private Forestry

Gross stumpage earnings from non-industrial private forestry in 2001 were more than 10 per cent lower in real terms than in 2000, due to the decrease in fellings and stumpage prices. Private forest owners' earnings from roundwood sales totalled EUR 1.48

Balance sheet calculations for non-industrial private forestry, at 2001 prices (cost of living index)

| | 2001 | 2002 | 2003 |
|---|-------|-------|-------|
| Gross stumpage earnings, EUR/ha | | | |
| Whole country | 110.5 | 113.0 | 120.0 |
| Southern Finland | 143.5 | 147.0 | 156.0 |
| Northern Finland | 42.7 | 45.0 | 48.0 |
| – Gross costs, EUR/ha | | | |
| Whole country | 20.7 | 21.0 | 21.3 |
| Southern Finland | 24.2 | 24.5 | 24.9 |
| Northern Finland | 13.6 | 13.7 | 13.9 |
| + Subsidies, EUR/ha | | | |
| Whole country | 4.3 | 4.4 | 4.6 |
| Southern Finland | 4.1 | 4.2 | 4.4 |
| Northern Finland | 4.8 | 4.9 | 5.1 |
| = Net earnings, EUR/ha (before taxes and external capital costs) | | | |
| Whole country | 94.1 | 97.0 | 104.0 |
| Southern Finland | 123.4 | 126.0 | 135.0 |
| Northern Finland | 33.9 | 36.0 | 39.0 |

Northern Finland = Oulu and Lapland provinces

Sources: Statistics Finland and Finnish Forest Research Institute

billion. The average stumpage price for 2002 is expected to be a little above last year's level. Following the brisk roundwood sales in the autumn, felling volumes will also be slightly above the 2001 level. Overall, this means that gross stumpage earnings in non-industrial private forestry in 2002 will reach just over EUR 1.5 billion. In 2003 roundwood sales are expected to pick up further, lifting total earnings to about EUR 1.6 billion.

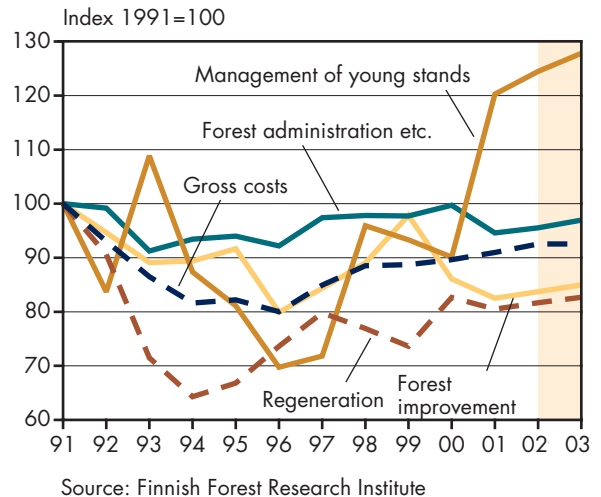
In 2001 total investment in non-industrial private forestry accounted for almost 13 per cent of gross stumpage earnings. This high investment rate was due in part to the sharp decline in stumpage earnings after 2000 and in part to the continued real increase in amount invested in timber production. The investment rate in 2002 is likely to be just below 13 per cent, and in 2003 a little over 12 per cent.

Gross Stumpage Earnings Below Their Earlier Peak

Gross stumpage earnings fell to EUR 110 per hectare in 2001, down by more than 10 per cent on the previous year, mainly due to the decrease in sawlog stumpage prices. Roundwood sales were good at the start of 2001, but the summer's reduction in stumpage prices cut the sales level later on. In 2002 the small rise in stumpage prices and brisk roundwood sales give reason to expect that gross stumpage earnings will be 1–2 per cent above last year's level. The increase in thinnings and especially the harvesting of storm-damaged trees in certain areas has added to this year's harvesting costs and limited the rise in average stumpage prices. The rise in gross stumpage earnings is forecast to climb to six per cent in 2003, bringing earnings to EUR 120 per hectare. Although the figures for 2002 and 2003 will be considerably less than in the peak years, gross stumpage earnings will be about 20 per cent higher in real terms than the average for 1991–2000.

Only Small Rise in Gross Costs

In 2001 the gross costs of timber production and administration in non-industrial private forestry amounted to EUR 24.2 per hectare in Southern Finland and EUR 13.6 per hectare in Northern Finland. Subsidies covered 21 per cent of costs, a rise of two percentage points on the previous year; the equivalent figure for Southern Finland was 17 per cent and for Northern Finland, 35 per cent. The average percentages for the 1990s were 16 and 42 per cent, respectively. Gross costs in 2002 are expected to be up slightly, to approximately EUR 21 per hectare, and to remain at the same level in 2003. The figures for Southern and Northern Finland this year are about EUR 25 per hectare and almost EUR 14 per hectare, respectively. These estimates are primarily based on the moderate increase in state subsidies and the corresponding increase in investment by private forest owners.



Gross costs in non-industrial private forestry, 1991–2003 at 2001 prices (cost of living index)

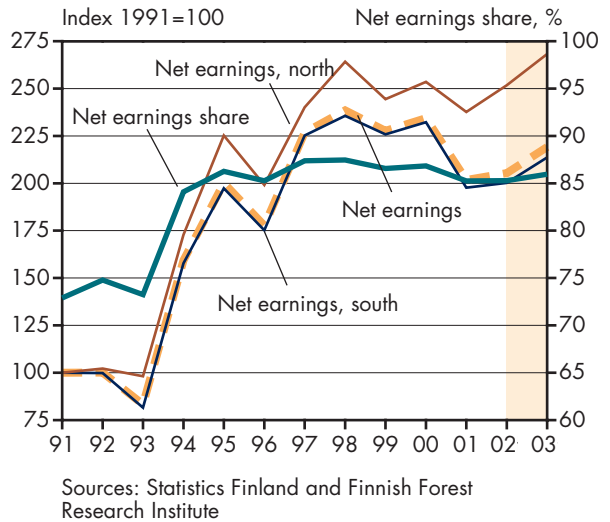
The gross costs of non-industrial private forestry can be divided into four cost pools. The largest of these are forest regeneration and administration, each accounting for over 30 per cent of costs. Tending of young stands and forest improvement accounted for 19 per cent and 18 per cent of costs, respectively, in 2001. Although real gross costs have risen since 1996, they will still be more than five per cent below the 1991 level both this year and in 2003. The increased investment in tending of young stands is clearly evident in that this is the only cost item consuming more resources than in 1991.

Marked Rise in Net Earnings Expected in 2003

Net earnings from timber production in non-industrial private forestry amounted to EUR 110.5 per hectare in 2001. This was a drop of over EUR 15, or 12 per cent, on the peak of the previous year. This appears to be a short-term dip, as the figure is expected to be up by around EUR 2 in 2002, and by a further EUR 6 in 2003. These figures are significantly lower than the peak years of 1998–2000. They

are nevertheless 20–25 per cent above the average for the 1990s, and higher than the early 1990s recession years by a factor of 2–2.5. Net earnings per hectare in Southern Finland will rise this year by EUR 3 and next year by EUR 9, reaching an estimated EUR 135 per hectare. In Northern Finland the corresponding figures are a rise of EUR 2–3 per hectare both this year and next year, lifting net earnings to record levels in 2003: EUR 39 per hectare. The calculations for Northern Finland assume buoyant demand for pine and rising prices; in Northern Finland pine accounts for two thirds of roundwood sales revenue and pine pulpwood for one quarter (in Southern Finland it is less than 10 per cent).

With earnings rising more rapidly than expenditure, the figure for net earnings share will rise slightly, but nevertheless remain in the region of 85 per cent. The net earnings share indicates the proportion of gross stumpage earnings that remains after timber production costs for the purposes of paying forest taxation, investment and everyday living costs. Forest taxation will be around EUR 200 million in total, which means that the amount of earnings left for everyday living costs and investment this year will be about EUR 1.1–1.2 billion; the same figure is anticipated in 2003.



Net earnings in non-industrial private forestry and as a proportion of gross stumpage earnings, 1991–2003 at 2001 prices (cost of living index)



Featured Topics

The European Union's Eastward Enlargement and the Forest Industry

Raija-Riitta Enroth and Ritva Toivonen

Ten Central and Eastern European countries have applied for membership of the European Union: Latvia, Lithuania, Estonia, Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Bulgaria and Romania. The European Commission has proposed that, with the exception of Bulgaria and Romania, the candidate countries could be approved for membership in 2004. Bulgarian and Romanian membership could be approved in 2007.

The candidate countries have a combined total of 34 million hectares of forest. The most forested of them are Poland, Romania, Bulgaria, Latvia and the Czech Republic. Enlargement will bring approximately 30 million hectares of additional commercial forest into the EU, raising the current 95 million hectares by 31.5 per cent. The percentage increase in roundwood reserves will be even greater than this, as the candidate countries' forests generally have a high density of trees and removal is considerably less than the annual increment. In contrast to existing EU members, many of the candidate countries are net exporters of roundwood. Their stumpage prices have risen throughout the 1990s and are today only an estimated 20 per cent lower than those in Finland.

Major Wood Product and Furniture Industries

The candidate countries differ from each other not only in regard to their forests but also their forest industries.

The forest-based sector as a whole is very important to these countries: at the end of the 1990s the value of production totalled approximately EUR 22 billion, and the forest industry together with the printing, publishing and furniture industries employed about one million people. The forest-based sector is particularly important in Latvia and Estonia, whose forest industries account for around one quarter of all industrial production by value. Labour costs in the candidate countries are relatively low; in Poland, for example, forest industry workers' earnings are roughly one fifth of the level in Finland. Moreover, the forest industry in these countries has specialised in fields that are labour intensive and have low capital costs: the wood products and furniture industries. The number of companies in these industries is estimated at 16 000. The number of pulp and paper mills is just under 200.

Exports to the EU Have Grown

The transition from a planned to a market economy in the early 1990s was a painful process for all the candidate countries. This is also evident from the forest industry production figures: between 1985 and 1993 sawmilling output fell by 40 per cent, and production of wood-based panels, pulp and paper by about 30 per cent. Domestic consumption dropped even further. However, both production and exports, especially to the EU, have grown since the early 1990s, in some

cases substantially. Today, about half of the candidate countries' sawmill production goes for export. There are considerable differences between the countries, however. The Baltic countries and Poland, for example, have increased their exports tremendously. It is also significant that a high proportion of export value, especially exports to the EU, consists of highly processed wood products of the furniture industry rather than basic sawnwood and wood-based panels. By contrast, production of pulp and paper is relatively minor; indeed, the candidate countries are net importers of paper.

Forest Industry Attracts Investors

The main problems facing the forest industry in the candidate countries are centred on the need to raise the level of technology and expertise and on the fragmented nature of the industry. Production technology and environmental protection have to be improved in the elderly production plants. Competitiveness is hampered by the small size of the companies, although they do have a competitive advantage in their low costs, which will probably remain so for some time to come, even after accession to the EU. This has undoubtedly been a factor in the growing level of direct foreign investment in Eastern European countries. Finnish companies have been involved in setting up wood products manufacturing facilities in a number of the candidate countries, and this is likely to continue in the future too.

EU membership will mean that all investment projects will be required to conform with the relevant EU legislation. This is likely to increase the level of foreign investment, which will bring changes to the structure of the forest industry and help raise productivity. In the longer term, production capacity may also be transferred from existing EU members to the new member countries.

Consumption of Forest Industry Products Still Low

Consumption of forest industry products per capita in the candidate countries is low. Average annual con-

sumption of sawnwood is in the region of 0.1 cubic metres per capita, which is less than half the present EU average, and average annual consumption of paper is about 50–60 kg per capita, only one third of the present EU average.

If EU membership brings higher economic growth, the consumption of wood products, paper and paperboard is likely to increase many times over in the longer term. A doubling of sawnwood consumption in the new member countries would mean about another 10–11 million cubic metres of sawnwood. Paper consumption could even rise to triple its current level, increasing by an estimated 10–15 million tonnes; this is equivalent to the annual production of 25–35 modern paper machines.

Is Enlargement Good or Bad for Finland?

In the long term, the EU's eastward enlargement will probably increase Finland's export potential for forest industry products, expertise and technology, and bring profitable investment opportunities. In the short term, however, the presence of new member countries will bring tougher competition, especially in wood product markets, because EU membership will improve the operating potential of the new members' wood products industries. This has already started to happen.

The candidate countries have already integrated well into the EU market, with growing exports of wood products and significant levels of direct foreign investment. Rising living standards will not necessarily translate into higher domestic consumption of wood products, however, as consumption patterns are very deep-rooted and change only slowly. It is even possible that rising living standards will lead instead to higher market shares for competing materials, such as plastic, steel and concrete. In any event, a major increase in consumption could take years if not decades. To succeed in a tougher competitive environment, the wood products industry in Finland will need to be efficient and to produce even higher quality products. The industry would no doubt also benefit from launching various campaigns to promote the use of wood, for instance.

For paper industry products, the link between growing living standards and product demand is much

clearer. In the long term, the outlook for the paper industry is therefore considerably more certain than for the wood products industry. Although electronic media could slow growth in the demand for some paper grades, the demand for others such as packaging paper and paperboard will grow. The domestic paper industry in the candidate countries is only small, and so the EU's eastward enlargement will at least provide the Finnish paper industry with opportunities to increase its exports.

Sources

- Opinion of the Economic and Social Committee on the eastward enlargement of the European Union and the forestry sector. 2002. European Economic and Social Committee. CES 523/2002. Brussels, April 24–25, 2002.
- Toivonen, R. and Mäki, P. 1999. The European Union's eastward enlargement and the forest industry. Pellervo Economic Research Institute (PTT) working papers No. 20. (in Finnish).
- Viitamo, E. and Bilas, O. 2002. Competitiveness of the forest sector in the EU candidate countries – cluster analysis. Interim report IR-02-012. IIASA. www.iiasa.ac.at

Restructuring Forest Ownership in the Forest Industry

Jussi Leppänen and Pekka Ollonqvist

The listed Finnish forest industry companies own about two million hectares of forest in Finland, representing a growing stock of 170 million cubic metres and an annual increment of 7.9 million cubic metres. In 1990–2001 these companies harvested an annual average of 3.5 million cubic metres of roundwood from their forests; in 2001 this amounted to about five per cent of the industry's total roundwood procurement.

Traditionally, the major forest industry companies have owned forest land themselves in order to safeguard their roundwood procurement. The procurement situation, however, is not likely to change significantly even if the companies corporatise their forests and sell off part of their shareholding. The industry's continuity of supply will be safeguarded by long-term supply agreements and by retaining minority shareholdings in corporatised forests.

Restructuring of forest ownership has been prompted by the changes taking place in the wider world. These changes include the application of International Accounting Standards (IAS) for asset measurement, which will become mandatory for listed companies in Finland in 2005, and the pressure for good returns on capital invested. For forest industry companies today, 100 per cent ownership of their forest assets is no longer considered essential if a smaller percentage holding can improve the consolidated balance sheet and release investment capital for expansion.

IAS Will Focus Attention on the Hidden Value of Forest Assets

In forest industry company accounts, forests have been recorded as fixed assets whose book value, based on historical acquisition cost, is altered only in excep-

tional cases. Balance sheets show a relatively satisfactory return on forest assets because most forests were acquired decades before, and their book value has been low in comparison with the value determined by the market. Companies have publicly reported the market values of their forests to be EUR 800–1000 per hectare, which is considerably lower than the median price paid in forest land sales throughout the country, which was EUR 1340 per hectare in 2001.

Although application of the International Accounting Standards will not become mandatory for listed companies until 2005, IAS accounting practices can be applied in advance of this. The IAS 41 (Agriculture) standard will be effective from January 1, 2003, and represents an important change for the forestry sector. The IAS 41 standard concerns agriculture and the biological transformation of biological assets. According to this standard, the biological assets of listed companies must be measured at their 'fair value' according to a market-determined price, less the point-of-sale costs at the point of harvest. Accordingly, the measure of fair value in forestry could be the harvest value, less point-of-sale costs.

Measurement of biological assets must not, however, be made at fair value if the value cannot be reliably measured. In addition, if the available market prices do not correspond to the current condition of the biological assets, the measurement of fair value must be based on discounted present value of expected net cash flow from the assets. The current market-determined pre-tax rate at the time of calculation should be used as the discount rate. A significant proportion of forestry assets, for example seedling and thinning stands, will not be realisable at the time of valuation.

The possible effects of applying the new accounting model are examined here with the aid of examples.

The data used is from the *Finnish Statistical Yearbook of Forestry* and is also based on calculated estimates of growing stock composition and development. It should, however, be emphasized that the IAS 41 guidelines for calculating the fair value of forest assets are yet to be finalised.

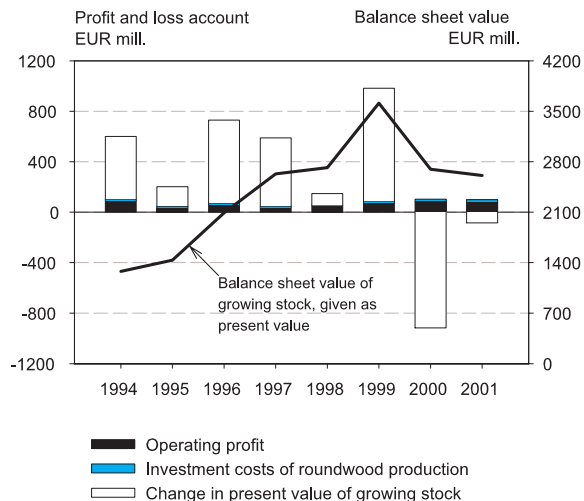
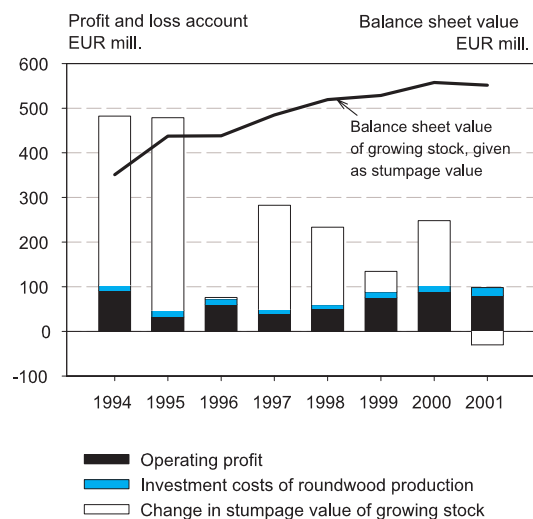
Fair value balance sheet calculations for the years 1994–2001 have been made for the forest industry companies' Finnish forest assets of two million hectares. A simplified representation of the realised profit and loss account is shown as a stumpage earnings calculation, where estimated gross stumpage earnings represent turnover, which is divided into investment costs of roundwood production and operating profit. Expected future turnover is also estimated in the form of expected gross stumpage earnings.

A calculation of fair value based on the harvest value of the growing stock is made by multiplying the volume of standing stock by the corresponding stumpage price for the roundwood grade (thus known as the stumpage value), and then deducting from this the roundwood sales revenue tax of 25–29 per cent. The fluctuation in the calculated balance sheet values

of the growing stock is very considerable on account of the movements in stumpage prices.

The other measurement of fair value, using net present value, is based on the expected net cash flow (= expected gross stumpage earnings – present investment costs of roundwood production – roundwood sales tax). The discount rate used in the calculation is the industry's nominal total interest rate on new credit for each year (in the example period, 3.7–7.4 per cent). Again the fluctuation in the calculated balance sheet values of the growing stock is very considerable, on account of the variation in interest rates. Interpretation of the calculation is hampered, however, by the fact that the discount rate includes inflation.

Determining forestry balance sheet values using harvest value or net present value under the IAS 41 standard thus produces an extremely wide variation in asset values. Due to the large volume of forest assets, the changes in value can be many dozen times greater than the realised annual turnover, depending on the method of calculation. The new accounting model will at least highlight the fact that forests are not a risk-free or even low-risk investment, as is often asserted.



Examples of IAS 41 profit and loss account and balance sheet calculations for the forest companies' Finnish forests. On the left is the calculation of fair value less sales revenue taxes, based on harvest value (stumpage value). On the right is the calculation of fair value based on net present value, calculated using market-determined interest rates.

In financial statements based on fair values, the change in the value of biological assets will be entered as a profit (or loss) for the financial year and transferred to the balance sheet as an increase (or decrease) in the company's equity. As seen from the examples in the diagrams, the changes in the value of forest assets can be as large as the entire company's profits if it is a major forest owner.

Corporatised Forest Assets and Consolidated Financial Statements

Corporatising forest assets is of benefit both to forest industry companies, who are interested in securing a steady flow of roundwood, and investors, who are looking for a steady return on capital. The benefits for forest industry companies occur not only in the form of capital released in the sale, but also in the streamlining of their accounting. The group relationship of a parent company to another group company is based on control (either by voting or by management), as laid down in the Finnish Accounting Act. If the party legally obliged to keep the accounts has a holding of less than 50 per cent in a corporatised forest asset (e.g. if more than 50 per cent is held by outside investors), the corporatised forest asset is no longer a group subsidiary company but an associated company or participating interest undertaking.

The Finnish Accounting Act definition of an associated company is based on the group having a permanent connection with it and maintaining a holding that promotes the group's operations, as well as exercising considerable authority. A participating interest undertaking is an associated company if the party legally obliged to keep the accounts holds at least 20 per cent

and no more than 50 per cent of the votes conferred by the undertaking's shares.

The IAS model of fair value balance sheet entries will not be mandatory for companies that are not listed on the stock market. Even where the IAS 41 standard is applied in an associated company's (corporatised) forest assets, the balance sheet value of these assets in the group's financial statements will be determined on the basis of the market value of the associated company's shares. Only that part of the associated company's profit or loss and change in equity that is equivalent to the group's holding will appear in the consolidated financial statements. If consolidation of the associated company's financial statement information is not necessary to provide a true and fair view of the group's performance and financial position, this information may be left unconsolidated.

Sources

- European Commission. 2001. Examination of the conformity between IAS 1 to IAS 41 and the European Accounting Directives. 6926: 39 p.
http://europa.eu.int/comm/internal_market/en/company/account/ias/6926en.pdf
- International Accounting Standards Board
<http://www.iasc.org.uk/>
- Finnish Accounting Standards Board. 2000. General instruction on drafting consolidated financial statements. February 21, 2000. 45 p. + annex 18 p. (in Finnish)
<http://www.vn.fi/ktm/kirjanpitolautakunta/kila.html>
- Finnish Statistical Yearbook of Forestry 2001. Finnish Forest Research Institute. 374 p.
- Niskanen, A., Hakkarainen, J., Leppänen, J., Veijalainen, S., Pynnönen, E., Hyttinen, P. and Kallio, T. 2002. Principles of accounting in forestry. *Silva Carelica* 38. 180 p. (in Finnish).

New Tools for Improving the Profitability of Roundwood Production

Kari Hyytiäinen and Olli Tahvonen

The profitability of roundwood production is a key issue for forest owners and for silviculture. Studies have shown that harvesting and silvicultural activities producing the highest financial return can be different from the forestry guidelines issued by Forestry Development Centre Tapio and the provisions of the Forest Act. It seems that Finnish silvicultural traditions and the Tapio guidelines may be based on a belief that the maximum possible roundwood yield will automatically mean a good financial return. Recent research, however, suggests that this belief may not be soundly based. Loss of earnings, for example, can be quite considerable if forest owners omit to take account of interest rates or adopt practices aimed only at achieving maximum roundwood yield.

The profitability of roundwood production can be analysed using mathematical models that combine economic optimisation with descriptions of forest growth, prices of different roundwood categories, silvicultural practices and roundwood harvesting technology. The output of the model is a sequence of silvicultural actions designed to produce the best financial return both for the forest owner and the national economy.

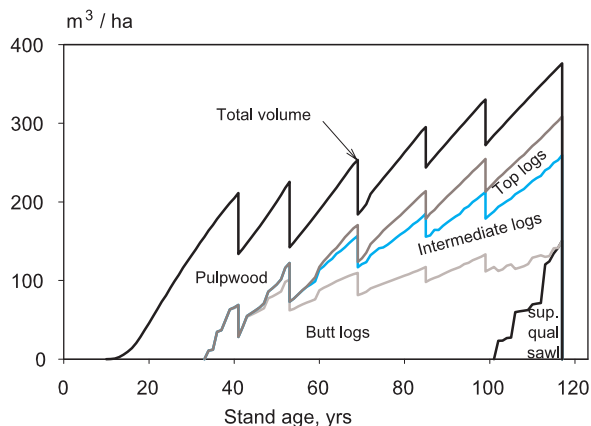
Descriptions of forest growth in economic analyses have so far relied on statistical models based on information from inventories and monitoring, such as the MELA growth models. Statistical models are reliable as long as they are used for examining cases that correspond with the silvicultural practices of the sample plot data on which the model is based. If the case being examined features aspects that differ from the conventional practices, then the model's reliability may come into question; such uncommon practices may include thinning from above. A problem with economic analyses has been that the practices required

to achieve maximum profit in roundwood production often fall outside or barely within the limits of reliability of the statistical models, thus adding further uncertainty to the results.

Growth models based on forest ecophysiology and life processes of individual trees offer an alternative to the statistical models. The development of such models began some 30 years ago, and in Finland one of the main participants in this research has been the University of Helsinki's Department of Forest Ecology. Growth models are not subject to the same type of reliability limitations as the statistical models. Forest ecophysiology models are based on the best existing theory of tree growth and the factors affecting it. The models are expected to provide competent forecasts of tree growth even in situations for which no empirical sample-plot data yet exists. It must be stated, however, that these models do also include many uncertainty factors. Nevertheless, there is growing interest in forest ecophysiology growth models in international research. No optimisation studies on the profitability of roundwood production using these models have yet been published, however, mainly due to the computational demands and complexities involved.

Integration of a forest ecophysiology growth model with an economic optimisation model is the subject of a joint study by forest ecologists at the University of Helsinki and economists at the Finnish Forest Research Institute, funded by the Academy of Finland. After two years' work, it is clear that the growth model developed by the University is well suited for use with an economic optimisation model. The growth model divides the assimilation growth into needles, branches, roots and the different parts of the stem on the basis of the state and competition circumstances of the trees being

(a) Growth of stand volume as a function of age and by roundwood category



(b) Removal by roundwood category and net stumpage earnings (EUR/ha)

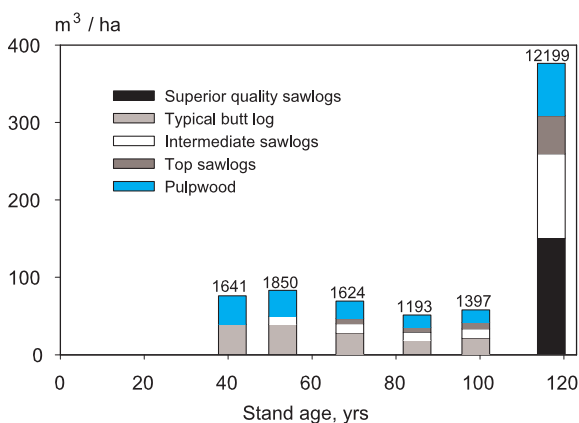


Figure 1. Optimum solution for a *Vaccinium*-type pine stand at an interest rate of one per cent

studied. This enables a more detailed description of stem taper and various quality factors such as branchiness.

The results of combining the growth model with the optimisation model are illustrated in Figure 1. This illustrates the case of an optimum harvesting programme for a *Vaccinium*-type cultivated pine stand using a low interest rate of one per cent. The starting point is a five-year-old even-aged seedling stand, with an initial density of 2000 seedlings per hectare. Figure 1a shows the growth in the volume of usable wood in the stand as a function of stand age, while Figure 1b shows the removal by roundwood category and the net (post-tax) stumpage earnings from thinnings and final cutting.

In the course of forest rotation the stand is thinned five times in all, and each thinning is light. Generally the biggest trees are removed in the thinnings (provided that they have attained the necessary sawlog dimensions), because there is a substantial price differential between pine sawlogs and pine pulpwood. Besides butt logs and pulpwood, the later thinnings also remove lower value sawlogs.

The stand is final cut when the remaining trees have attained the dimensions and quality required of

the most valuable roundwood category: superior quality butt logs. Since thinnings have removed the largest trees, the final cutting stand will comprise chiefly those trees that were smallest in the initial stand. For these trees, their slow diameter growth and competition with the dominant trees at a young age will have produced good quality characteristics: thin branches at the butt, rapid growth of the crown base and early shedding of dry branches. Repeated and light thinnings from above will also lead to improved diameter growth of the smallest trees in an even-aged stand at a later age.

If higher interest rates are applied in the model, optimal thinnings will no longer be as light and the stand will be final cut at an earlier age. For example, at an interest rate of three per cent the optimum forest rotation period is 70–75 years. Preliminary calculations indicate that if an interest rate of three per cent or higher is applied, the production of superior quality butt logs will no longer be profitable, given the current price differentials between roundwood categories.

The general understanding is that thinning from above is especially suitable as a thinning method for norway spruce stands. Scots pine is less tolerant of shade than norway spruce, and so conventional thinning in pine stands removes the smallest trees from

the stand. However, the preliminary results presented above, together with the majority of earlier economic analyses based on statistical growth models, and a number of yield studies, indicate that thinning from above may also produce the best financial return in even-aged Scots pine stands, provided the thinnings are timely and carefully conducted.

Sources

- Hyytiäinen, K. and Tahvonen, O. 2001. The effects of legal limits and recommendations on timber production: the case of Finland. *Forest Science* 47: 443–454.
- Mäkelä, A. 1997. A carbon balance model of growth and self-pruning in trees based on structural relationships. *Forest Science* 43: 7–24.
- Mäkelä, A. 2002. Derivation of stem taper from the pipe theory in a carbon balance framework. *Tree Physiology* 22: 891–905.

The System of Forecasting Business Cycles in the Forest Sector

A research project of the Finnish Forest Research Institute (METLA)

Project tasks

- To produce the *Finnish Forest Sector Economic Outlook*
- To develop models for forecasting exports of Finnish forest industry products
- To develop forecasting models for roundwood markets
- To produce market reviews on the forest sector
- To develop and maintain the MESU database

Staff

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Raija Lahtinen, project secretary

Further information: <http://www.metla.fi/julkaisut/suhdannekatsaus/index-en.htm>

Finnish Forest Sector Economic Outlook

The Finnish Forest Sector Economic Outlook is an annual publication on the business cycles of the Finnish forest industry and forestry sector. It gives an overview of the development of the entire forest sector and includes forecasts for the export volumes and prices of Finnish forest industry products, roundwood consumption and prices, employment in the sector, and investment in private forestry. In addition, the Economic Outlook contains several short articles on topical matters in the forest sector.

The Economic Outlook has been published in Finnish since 1991, and in English since 1998. The English version is published in PDF format on the Internet. It is produced at the Vantaa Research Centre of the Finnish Forest Research Institute (METLA). The Institute, established in 1918, is an independent research organisation under the Ministry of Agriculture and Forestry. It produces research-based information on the forest environment, multiple use of forests, forestry practices and the forest industry. It is Europe's largest forest research institute and has a permanent staff of 750, including almost 200 researchers.



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