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**THE FOREST SECTOR DEVELOPMENT
IN AUSTRIA, FINLAND AND SWEDEN
DURING THE 1970S TO THE 1990S**

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Foreword

Efficiency of roundwood markets is vital for the forest industry and forest owners. Thus, efficient and fluently functioning roundwood markets are important for the whole economy in Finland, where the forest industry and forestry still contribute about 8% to the GNP. Well functioning roundwood markets guarantee sufficient availability of roundwood for the forest industry, and provide income for forest owners.

Roundwood trade has so far concentrated on national markets within Europe. In spite of this, Austria, Finland and Sweden are among the world's largest wood importers. Due to the limited volumes of international roundwood trade, researchers have shown little interest in international comparisons of wood markets. Along with the political and economic integration of Europe, particularly the introduction of the euro, European roundwood markets are also expected to develop towards further integration. Analysing the development of the forest sector over time in several European countries helps to identify possible links, similarities and differences between national wood markets. This information is helpful when trying to forecast future development on the European roundwood markets.

The objective of the present paper is to provide comparative information on the development of forest sectors in the most forested EU Member States: Austria, Finland and Sweden. These three countries contain almost half of the forest land available for wood production in the EU(15), and account for a significant share of production and trade in forest products in the EU area. This description is also aimed at helping in the interpretation of studies that statistically analyse forest sector development. PTT Working Paper No 30 includes an example of this type of analysis, reporting a pilot study on roundwood markets in Austria, Finland and Sweden based on statistical comparisons of price development from 1980 to 1997.

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Helsinki, May 2002

Vesa Vihriälä

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ABSTRACT: This study compares forest sector development in Austria, Finland and Sweden from the 1970s to the mid-1990s, including forest resources, roundwood production, imports of roundwood and the forest industry. The comparison shows that the forest sector is characterised by quite strong growth in each of the three countries. Finland and Sweden in particular share a very similar development. The use of roundwood and production by the forest industry have both grown, but not at equal rates. It is assumed that on-going integration in the EU will increase future roundwood market integration within Europe. Therefore, issues such as restrictions or increases in the roundwood supply in certain regions will probably have impacts on the forest sector throughout Europe, or at least in large parts of Europe.

Key words: wood markets, forest industry, EU, Austria, Finland, Sweden

Anna-Kaisa RÄMÖ – Ritva TOIVONEN –Anne TOPPINEN – Päivi MÄKI. 2002. Metsäsektorin kehitys Itävallassa, Suomessa ja Ruotsissa 1970-luvulta 1990-luvulle. Pellervon taloudellisen tutkimuslaitoksen Raportteja No. 182. 66 s. ISBN 952-5299-55-4, ISSN 1456-3215.

TIIVISTELMÄ: Tämä raportti vertailee Itävallan, Suomen ja Ruotsin metsäsektorien kehitystä aikavälillä 1970-1995. Kuvaus kattaa metsävarat, raakapuun ja metsäteollisuuden tuotannon ja viennin sekä raakapuun tuonnin, jotka kaikki ovat kasvaneet kussakin maassa tuntuvasti tarkastellulla 25-vuotiskaudella. Erityisen samanlaista kehitys on ollut Suomessa ja Ruotsissa. Raakapuun käyttö on kehittynyt metsäteollisuuden tuotannon kanssa saman suuntaisesti, mutta kasvuvauhti on ollut varsin erilainen. Jatkossa integraation eteneminen ja EU:n laajeneminen vaikuttanevat metsäsektorin kehitykseen ja vauhdittavat raakapuumarkkinoiden integraatiota Euroopassa. Puumarkkinoiden integraation syveneminen levittää myös puun tarjonnan ja kysynnän muutosten vaikutuksia jatkossa yhä nopeammin ja laajemmille alueille. Siten mm. ympäristönsuojelun tuomien mahdollisten lisärajoitusten tai toisaalta lisämetsitysten vaikutukset joissakin valtioissa koettaneen koko Euroopassa aiempaa laajemmin.

Avainsanat: puumarkkinat, metsäteollisuus, EU, Itävalta, Suomi, Ruotsi

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1. INTRODUCTION

Austria, Finland and Sweden joined the European Union (EU) in 1995. These three countries are major exporters of forest industry products to the other regions of the Union. This is possible due to the relatively small population but rich forest resources in each country.

The EU-membership of Austria, Finland and Sweden in 1995 almost doubled the forest resources of the union and made it closer to self-sufficiency or even net exporter of some of the forest products. The EU-membership of the three countries also initiated discussion about the impacts of the membership on the forest sector development. However, discussion about the future requires understanding the history. Therefore this study provides an overview of the development of the forest sector in the three countries before the EU-membership.

The specific aims of this study are:

1. To describe the development of forest resources, roundwood markets and forest industry in Austria, Finland and Sweden during the 1970s to the 1990s.
2. To compare the forest sector development in the three countries.

The qualitative analysis is based on the secondary statistical and other material concerning forest resources, round wood production and forest industry in Austria, Finland and Sweden. The data is collected and published by national forest organisations, FAO and Eurostat.

This study contains three chapters (2,3,4) in addition to this one, each of which can also be used separately. Chapter 2 describes the development of the wood market in Austria, Finland and Sweden during 1970-1995. The development is evaluated by factors like forest area, growing wood stock, forest ownership, wood supply, production and wood consumption of wood products and pulp and paper industries in each country. Chapter 3 provides a comparison of the forest sector development in the three countries. Chapter 4 summarises previous chapters and discusses the future development.

2. ROUNDWOOD MARKETS AND FOREST INDUSTRY

2.1 Development of the Forest Sector in Finland

2.1.1 Forest area and growing stock from the 1960s to the 1990s

Forest area

Figure 1 shows the area of forest land in Finland. In the late 1990s the area amounted to about 20 million ha which accounts for 66 % of the total land area. The area of the forest and scrub land was at the same time about 23 mill. ha accounting for about 68 % of the total land area. Since the 1960s the area of forest land has grown by about 3 million hectares (Finnish Statistical Yearbook of Forestry 1998, 1992, 1980). The rapid growth of the forest area in the late 60s and the early 70s resulted to a great extent from strong afforestation measures of arable land used for limiting agricultural production (Hytönen 1997).

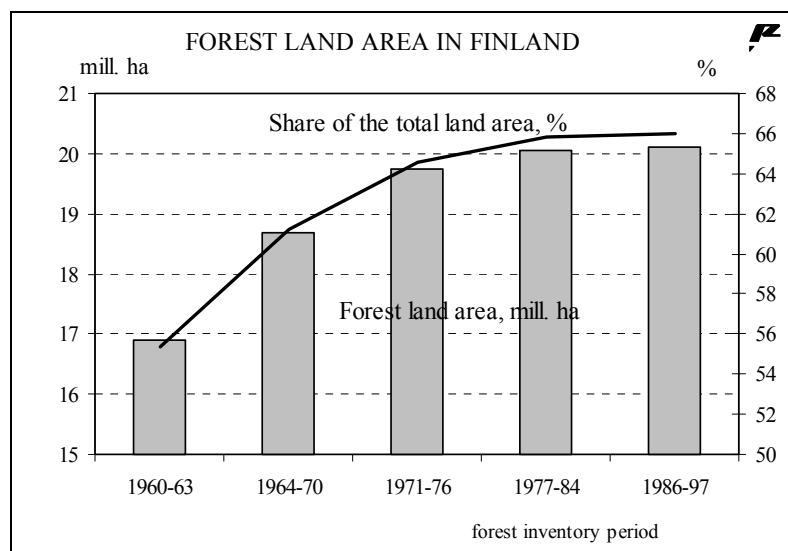


Figure 1. Development of forest area in Finland according to the national forest inventories. (Sources: Finnish Statistical Yearbook of Forestry 1998, 1992, 1980).

Growing stock and annual volume increment

The volume of growing stock has increased by about 450 million m³ from the 1960s to the 1990s (Figure 2). The volume of the late 1990s amounted to about 1 900 million m³ (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1977-78, 1975). The intensive forest management of the 1960s started the strong growth of the stock. Concern for the shortage of wood produced many forestry programs. The most famous of them were so-called MERA programs which were implemented during 1964 to 1969. The growth of the stock has continued until the late 1990s even though the forest management methods have changed with the environmental requirements (Leikola 1997).

Annual volume increment was in the late 1990s nearly 80 million m³. There has also been a growing trend from the 1960s to the 1990s (Finnish Statistical Yearbook of Forestry 1997, 1992, 1977-78, 1975). This can be regarded to a great extent as a consequence of the increasing volume of the growing stock and the more efficient forest management.

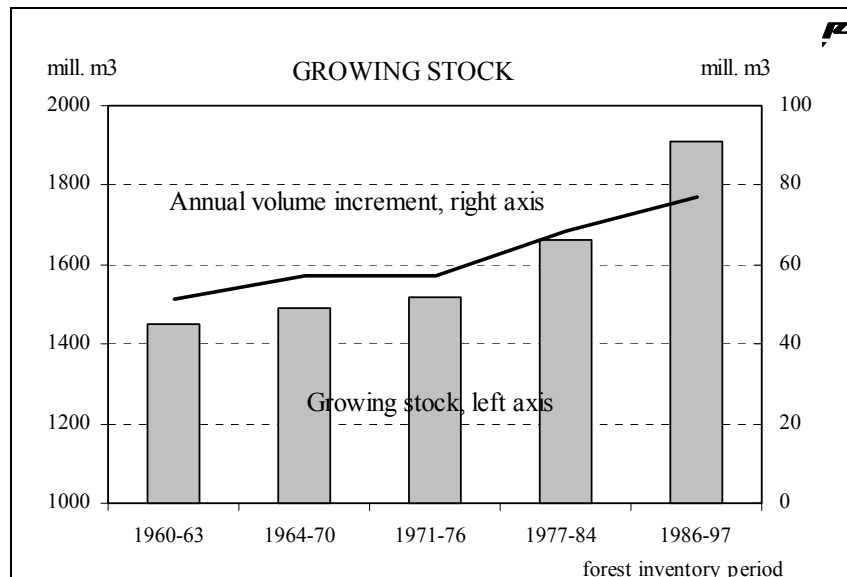


Figure 2. Growing stock and annual volume increment according to the national forest inventories. (Sources: Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1977-78, 1975).

2.1.2. Forest ownership and wood supply

Forest ownership

About 85 % of the Finnish forests are owned by two groups i.e. private persons and the state. The non-industrial private forest (NIPF) owners make traditionally the biggest group owning about 58 % of the Finnish forest and scrub land (23 million ha) and about 62 % of the forest land (20 million ha) in the late 1990s. However, as figure 3 shows there is a very slight decrease in their share since the 1960s (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1977-78, 1975). The state owns a little less than a quarter of the Finnish forests. State's share has remained quite unchanged since the 1960s.

Forest companies own about 9 % of the forest area. They have increased their share nearly by 1,5 percentage points since the 1960s. Others e.g. municipalities, parishes and other collective bodies make only a marginal owner group with a share of less than 5 % (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1977-78, 1975).

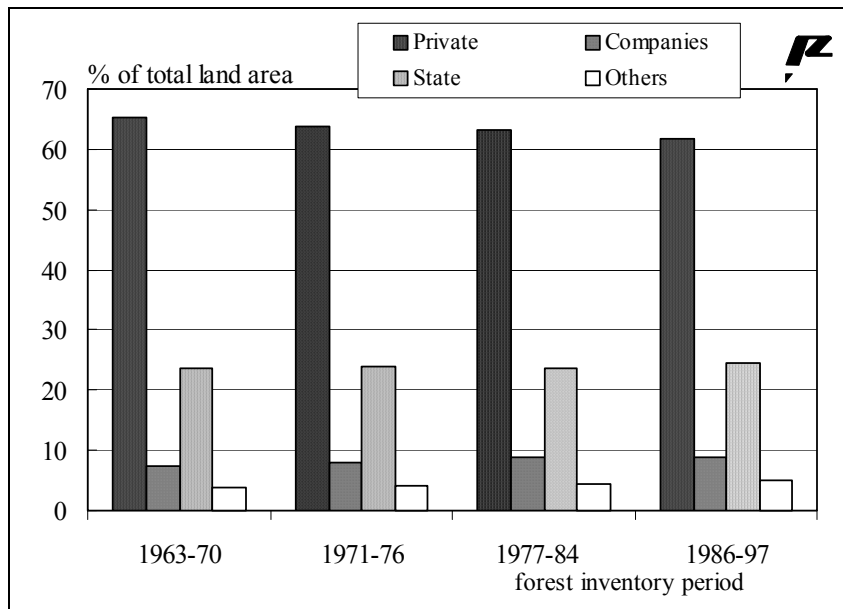


Figure 3. Forest ownership in Finland according to the national forest inventories. (Sources: Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1977-78, 1975).

Commercial fellings and roundwood sales

Commercial roundwood fellings were in the late 1990s nearly 20 million m³ bigger than in 1960 (Figure 4). In 1975 the international depression after the first energy crisis caused remarkable reduction in exports, which can also be seen in the felled volume. In the late 1990s the volume crossed the level of 50 million m³. Most of the felled wood originates from privately owned forests. The share of the NIPF-owners accounted nearly for 90 % of the total volume in the late 1990s. The share has been over 80 % since the 1970s. State produces about 10 % of the annually felled commercial wood though there can be considerable variation between individual years (3-5 million m³). Companies' share accounted for 3-4 % in the late 1990s but there is also variation between individual years depending very much on the supply of private forest owners. However, since the 1970s companies' share has not exceeded 10 % (Finnish Statistical Yearbook of Forestry 1998, 1992, 1977-78, 1975).

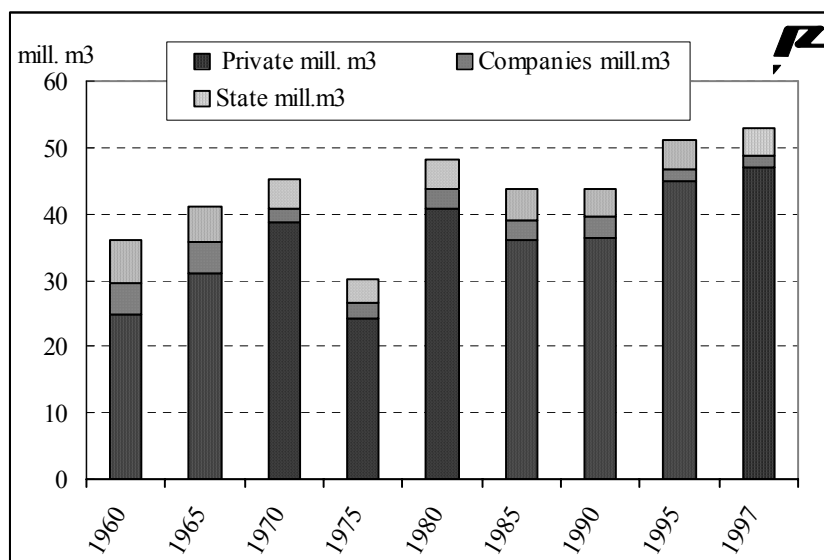


Figure 4. Roundwood fellings by owner groups in Finland. (Sources: Finnish Statistical Yearbook of Forestry 1998, 1992, 1977-78, 1975).

Types of roundwood sales from private forests

Stumpage sales dominate the private roundwood sales in Finland (Figure 5). The proportion of stumpage sales has been growing during the 1980s and the 1990s. In the late 1990s, stumpage sales accounted nearly for 80 % of the total volume of roundwood sales from private forests in Finland (Finnish Statistical Yearbook of Forestry, 1998, 1992).

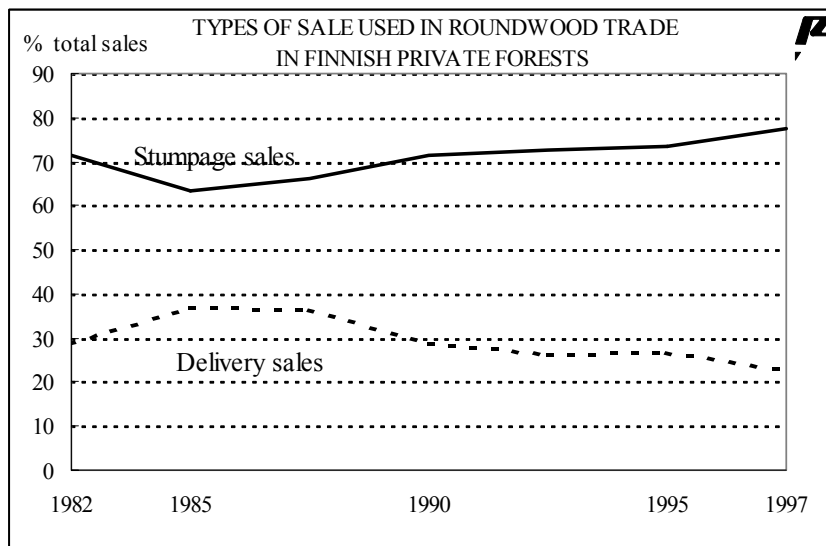


Figure 5. Shares of different types of roundwood sales from private forests in Finland. (Sources: Finnish Statistical Yearbook of Forestry, 1998, 1992).

2.1.3 Forest industry

Production and exports of the forest industries in 1960-1990

Wood products industry

Annual production of sawn wood has varied approximately between 7,5 and 10 million m³ during 1960 to 1997 (Figure 6); the latest figures show a volume of 10,6 million m³ (Finnish Statistical Yearbook of Forestry 1998, 1995). The year 1980 was a peak year exceeding first time the production

volume of 10 million m³. As shown in the figure 6, after that the production started to decrease and the falling trend continued through the whole 1980s. This was due to poor profitability in the sawmill industry. The difficult situation ended with closures of many so called 'independent' sawmills which were not integrated with pulp and paper industry (e.g. Pöyhönen 1994). Instead, the integrated sawmills were able to continue their operation. Therefore, the structure of the sawmill industry changed quite a lot during the 1980s. In the early 1990s, the international recession reduced the demand and production of sawn wood strongly, and the closures or sales of smaller sawmill companies to the larger ones continued. The trend towards fewer but larger companies has continued during the whole 1990s and the early 2000s.

The major part of the sawn wood production has been exported from Finland traditionally. In 1997 more than 70 % of the production went outside the country (Figure 6). However, in the early 1990s during the economic depression, only slightly more than a half of the production was exported (Finnish Statistical Yearbook of Forestry 1998, 1997). Due to devaluations of the Finnish mark and lower production costs the exports of sawn wood started to recover before the mid-1990s (Metsäsektorin ajankohtaiskatsaus 1994). The export demand was particularly boosted by the integration of the East and West Germany and related construction boom, and the collapse of the Soviet Union, which reduced the supply. Overall, the sawn wood production and exports reached again the increasing trend before the mid 1990s, which continued toward the year 2000.

Great-Britain has traditionally been the biggest export market of the Finnish sawn wood. In the early 1970s about 40 % of the exported volume went to Great-Britain. Since that time the UK's share has reduced to about 15 %, i.e. about one million cubic meters, while Germany has gained importance as another major export destination of the sawn goods with almost equal share with Great-Britain. Other important export countries for Finnish sawn goods are the Netherlands and France. Together these four countries accounted for about a half of the Finnish sawn wood exports, in the 1970s the share was even about two thirds. During the 1990s, Japan has grown as one of the most important destinations for Finnish sawn wood exports. This means that the export markets of sawn goods have expanded in geographical sense (Finnish Statistical Yearbook of Forestry 1998, 1997,

1992, 1975, 1971). This expansion has been regarded as positive for the industry.

The figures of plywood production in the year 2000 showed a volume of more than one million m³. In 1960 the volume was less than a half of the production in the late 1990s but since then the production has grown remarkably (Finnish Statistical Yearbook of Forestry 1998, 1995, 2001; Figure 6). Plywood is an export item, too. In the period from 1960 to 1990 about 85 % of the production was exported and in the 1990s more than 95 % has been delivered outside the country, in 1994 even 99 % (Finnish Statistical Yearbook of Forestry 1998, 1997).

The major buyers of Finnish plywood and veneer are Great-Britain, Germany and Sweden. Together they accounted for about a half of the exports in the late 1990s. Still in the early 1970s Great-Britain alone had a 50 % share of the exports but it has reduced to about 10 % while Germany's share has increased from about 10 % of the 1970s to 20-30 % of the 1990s (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1975, 1971).

Production of particle board started in Finland in the late 1950s and, as figure 6 shows, at the early stage the growth was very strong (Finnish Statistical Yearbook of Forestry 1997, 1995). In the 1980s the figures started to fall which was caused by the decreased domestic demand and the recession of the building industry as well as falling exports (Saarro 1997). The production of the mid 1990s amounted to about 0,48 million m³ (Finnish Statistical Yearbook of Forestry 1998, 1995). Particle board can be regarded as a home market product because more than a half of the production is used in the domestic market. During the economic depression in 1990 only 35 % of the production was exported (Finnish Statistical Yearbook of Forestry 1998, 1997). Great-Britain is by far the biggest importer of Finnish particle board. In the 1990s it accounted for about a half of the exports but in the 1970s and the 1980s the share has been between 50 % and 70 %. Another bigger importer is Sweden and together with Great-Britain they have accounted for 60-80 % of the exports during 1971 to 1997 (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1975, 1971).

The annual production of fibreboard totalled in the late 1990s about 90 000 tons and approximately two thirds of the volume was exported (Finnish Statistical Yearbook of Forestry 1998, 1997, 1995). The production was at biggest in the early 1970s with volumes of nearly 250 000 tons (Figure 6). The share of the exports was at that time, as it was still in the

late 1990s, 60 % to 70 % of the production. Towards the 1980s the domestic demand dropped and competition got keener reducing the production (Saarro 1997). The biggest importer of Finnish fibreboard is Great-Britain. It's imports from Finland account traditionally for 30-50 % of the total export volume. Another substantial export country is the Netherlands. These two countries together have imported 50-60 % of the total volume exported from Finland (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1975, 1971).

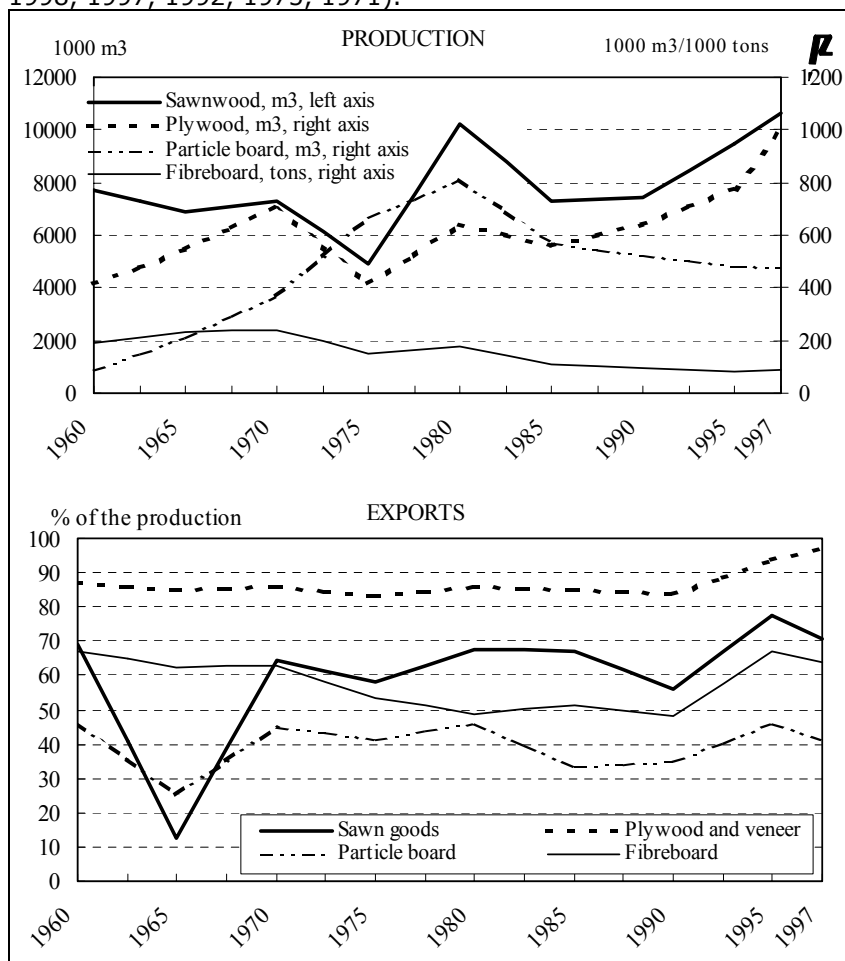


Figure 6. Production and exports of the Finnish wood products industry. (Sources: Finnish Statistical Yearbook of Forestry 1998, 1997, 1995, 1992, 1975, 1971).

Pulp and paper industry

Production of pulp and both paper and paperboard have had a strongly growing trend between 1960 and 1997 (Figure 7). The production of pulp has grown approximately threefold during that period. In the late 1990s about 40 % of the total pulp volume was mechanical pulp and most of all pulp was used by domestic mills,. Less than 2 % of the mechanical pulp and about a fourth of the chemical pulp were exported in the late 1990s, but still in 1960 the figures were different; more than 15 % of the mechanical pulp and nearly 60 % of the chemical pulp were sold abroad.

The biggest buyers of the Finnish pulp have been Germany and Great-Britain. In 1997 nearly 60 % of the exported total pulp volume was sold to these countries. Still in the 1970s they accounted for about a third of the pulp exports but the share has gradually increased. Germany and Great-Britain have also changed the order compared to the 1970s; In 1971 Great-Britain was the biggest buyer with a share of about 25 % against Germany's share of less than 10 %. In 1997 Germany imported over 40 % of the exported Finnish pulp while Great-Britain's share remained below 15% (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1975, 1971). However, more than a half of the pulp exported in the late 1990s was so-called integrated pulp, i.e., pulp that is delivered to foreign subsidiaries of the Finnish pulp and paper companies. Thus the change in the pulp export destinations reflects most of all the change and expansion in the paper production capacity locating outside Finland but owned by the Finnish companies.

In the late 1990s the paper production was about sevenfold compared to the volumes of 1960. Also the structure of the production has undergone changes; the share of the mechanical printing and writing papers has grown and the degree of processing has increased. Traditionally, most of the paper production has been exported: in 1960 about 80 % and in 1997 already 90 %. The volumes of paperboard have grown from about 0,5 million tons to 2,6 million tons which means a fivefold increase. Paperboard exports have accounted approximately for 80 % of the production since 1960 (Finnish Statistical Yearbook of Forestry 1998, 1997, 1995). The main importers of Finnish paper and paperboard products are Great-Britain and Germany. In the late 1990s they accounted together for about one third of the export volume with equal shares. In the 1970s and the 1980s their summed up

share was between 35 % and 40 % but it has dropped a little in the 1990s. Until the 1990s Great-Britain's share of the Finnish paper and paperboard exports was about 10 % bigger than Germany's share (Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1975, 1971).

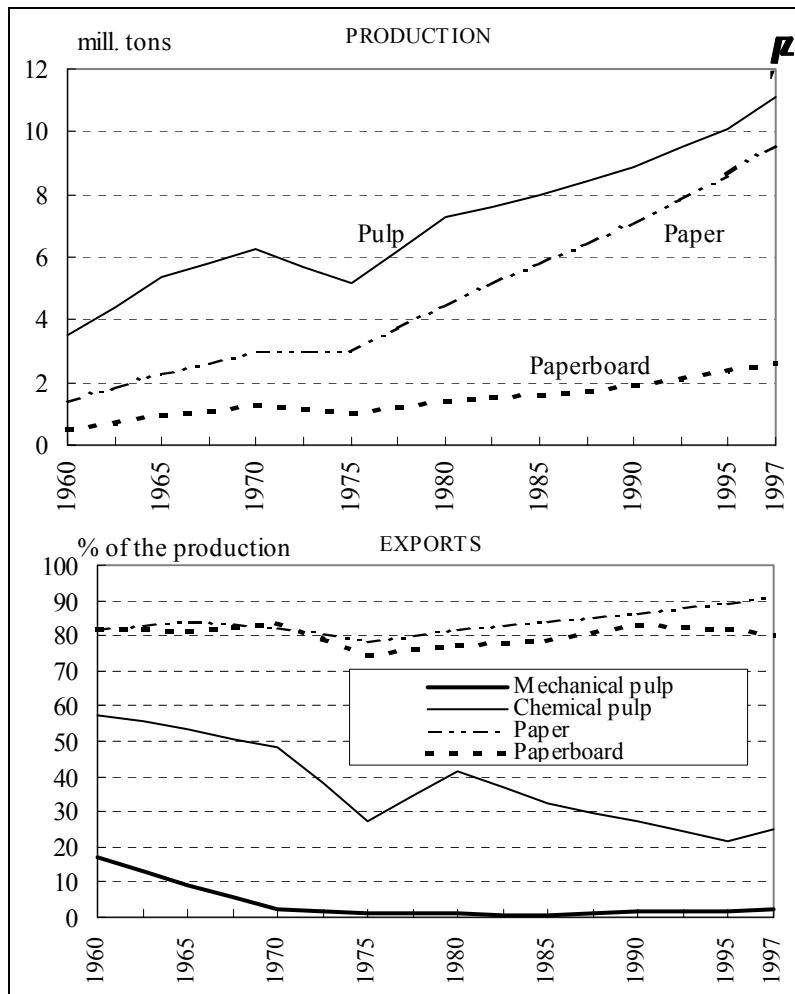


Figure 7. Production and exports of the Finnish pulp and paper industry (Sources: Finnish Statistical Yearbook of Forestry 1998, 1997, 1992, 1975, 1971).

Demand for roundwood

Annual roundwood consumption of the Finnish forest industry amounted to about 65 million m³ in the late 1990s (Figure 8). Pulp industry used about 55 % of it, and mechanical wood products industry about 45 %. In 1960 the pulp and paper industry used roundwood about 14 million m³. This was less than the use of mechanical wood products industry, which used 17,5 million m³. Since then the consumption of the pulp and paper industry has generally been bigger than that of the mechanical wood products industry (Finnish Statistical Yearbook of Forestry 1997).

The consumption figures include also the imported roundwood, the volume of which has strongly been growing in the 1990s (Figure 9). the Roundwood imports doubled from the mid 1970s to the late 1990s. In 1997 the imported volume totalled 8,4 million m³. About 80 % of the imported volume originated from Russia. Estonia supplied nearly 10 % and Latvia about 2,5 % of the roundwood imported to Finland (Finnish Statistical Yearbook of Forestry 1998, 1997).

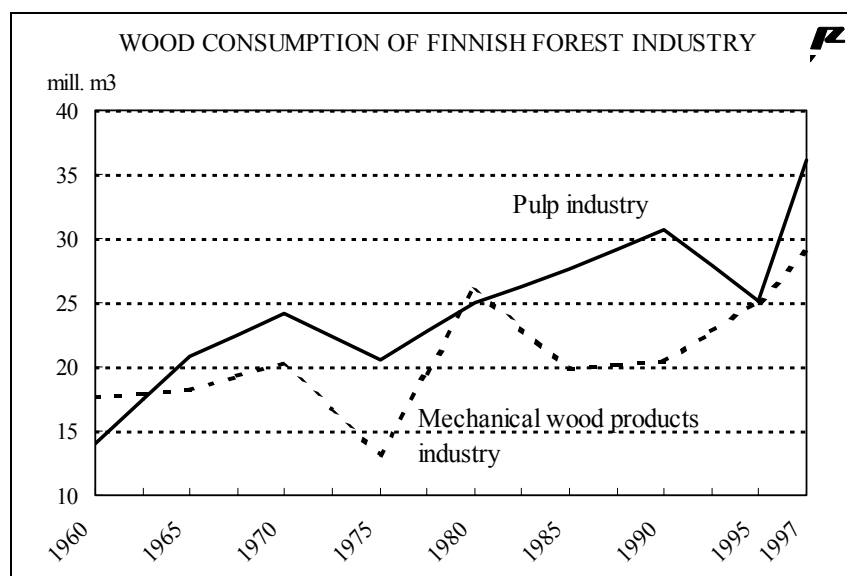


Figure 8. Wood consumption by the Finnish forest industry. (Sources: Finnish Statistical Yearbook of Forestry 1997).

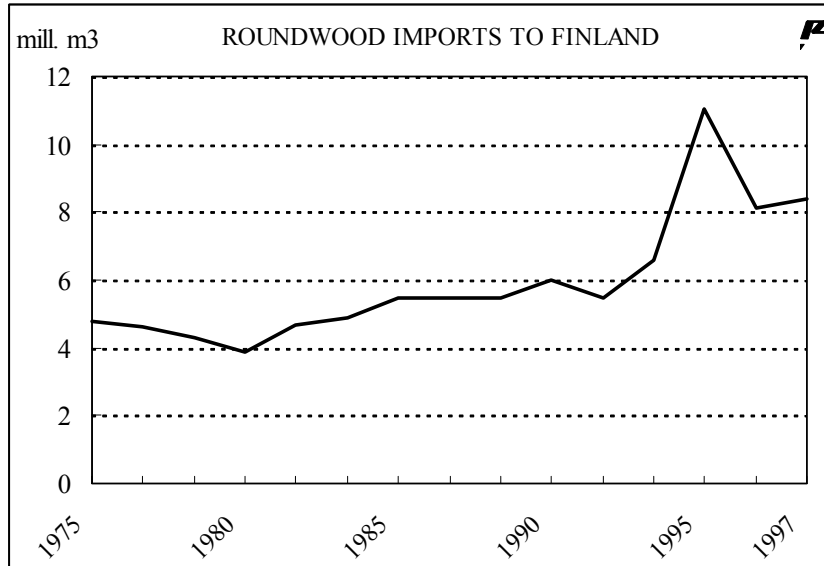


Figure 9. Roundwood imports to Finland. Spaces between dividers are equal to 1,7 years. (Sources: Finnish Statistical Yearbook of Forestry 1998, 1997).

2.1.4 Roundwood trade

In the 1980s, voluntary agreements on recommended price levels for wood assortments were negotiated between the unions representing Finnish wood trade partners. The agreements covered the whole country. Overall, the purpose of the wood trade negotiations has been to find a mutual understanding regarding the market situation and price expectations (Airaksinen 1997). In 1991 the agreement system was abandoned for three years in the exceptional economic recession where the unions could not reach common understanding.

Thereafter the practices varied: In 1994 a new kind of negotiation on common price trends was carried out. This was aimed to help in discussions between sellers and buyers on the terms in individual deals. In the years 1995 and 1996 similar but regional level negotiation practices were applied. In 1997 and 1998 negotiations were carried out between specific companies and groups representing sellers. However, the negotiations did not lead to any results in spring 1999. In the following summer the Finnish competition

authorities denied also this type of trade negotiations. Thus, after 1998 any kinds of collective negotiations have not taken place on the roundwood markets in Finland.

In practice, the roundwood sales have always been an agreement between individual buyer company and the seller who is usually an individual person. The collectively negotiated prices were used as supportive background information and these were not binding individual buyers or sellers. The sales agreement between individual buyer and seller generally concerns standing timber on a specific lot (stumpage sale), but sometimes the deal is that the owner cuts the trees and delivers them in cut-to-length for on a forest road side (delivery sale). Forest owners' local associations may help the owners in measuring the timber. The forest owner may also ask the association to take care of the whole sales procedure for his/her account.

2.2. Development of the Forest Sector in Sweden

2.2.1. *Forest area and growing stock during the 1970s to the 1990s*

Forest area

Figure 10 shows that the forest land area of Sweden was about 22 million hectares in the mid 1990s. It means a 55 % share of the total land area (the area of forest and scrub land totals about 29 mill ha equalling about 70 % of the total land area). Until the late 1980s the exploitable forest area was over 23 million hectares. After that it has reduced, due to establishment of many large nature reserves which are not included in the forest land of the statistics of the Swedish National Board of Forestry (Finnish Statistical Yearbook of Forestry, 1971, 1982, 1987, 1992, Skogsstatistisk årsbok 1998, 1993). All the forest land area still exists, though, only it is not shown in forest land statistics but in nature reserves.

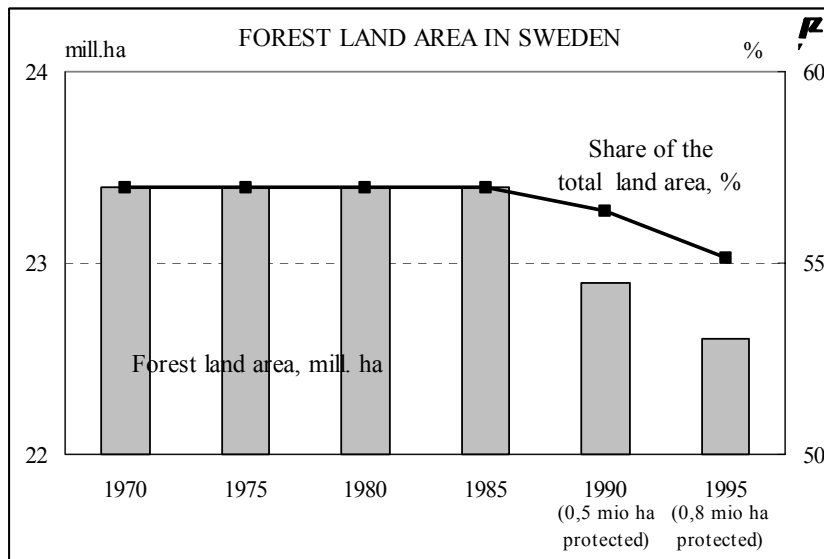


Figure 10. Forest land area and its share of the total land area in Sweden. (Sources: Finnish Statistical Yearbook of Forestry 1971, 1982, 1987, 1992; Skogsstatistisk årsbok 1998, 1993).

Growing stock and annual volume increment

Growing stock on forest land amounts to about 2 900 million m³ according to the Swedish National Forest Surveys (Figure 11). From the early 1970s to the mid 1990s the stock has increased by about 480 million m³. The trend was increasing also in the 1990s although the area of exploitable forest land has been strongly reduced due to change as nature reserve. Annual volume increment had also an increasing trend during the period from the early 1970s to the mid 1990s. The annual average growth of the late 1990s was about 25-30 million m³ bigger than in the early 1970s (Skogsstatistisk årsbok 1998, 1996, 1993, 1990, 1985, 1980, 1975, 1970).

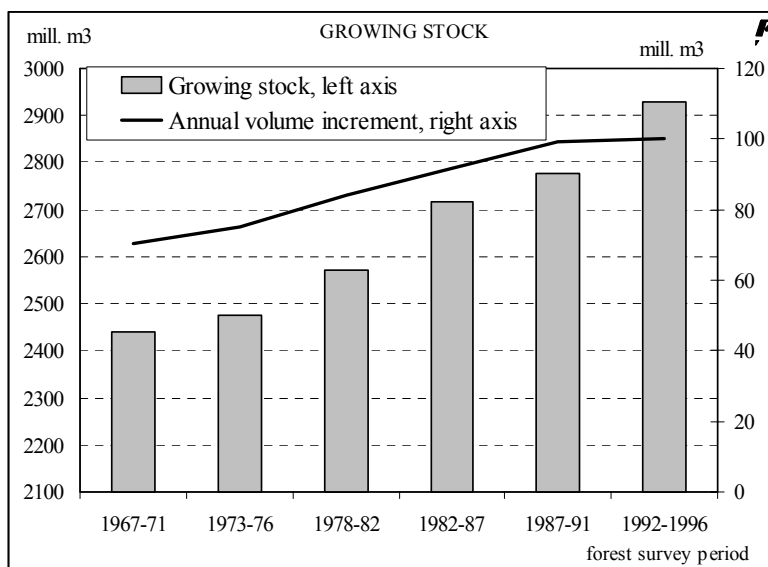


Figure 11. Growing stock and annual volume increment according to the National Forest Surveys in Sweden. (Sources: Skogsstatistisk årsbok 1998, 1996, 1993, 1990, 1985, 1980, 1975, 1970).

2.2.2 Forest ownership and wood supply

Forest ownership

The non-industrial private forest owners make up the biggest forest owner group in Sweden. They own about 51 % of the forest land (Figure 12). The share has not changed essentially during the mid 1960s to the mid 1990s. Companies make up another big owner group with a share of nearly 40 %. State and other groups together own 10 % of the forest land area in Sweden. Earlier, the share of the state was nearly 20 % but on April 1, 1994 the main part of the state forests were transferred to the forest industry company AssiDomän which is half-owned by the state. This procedure reduced state's share of the forests, and increased companies' share from 25 % to nearly 40 % (Skogsstatistisk årsbok 1998, 1996, 1990, 1985, 1980, 1975, 1970). In the late 1990s and the early 2000s, there has been some discussion in Sweden about transferring some of the forests back to the state's ownership.

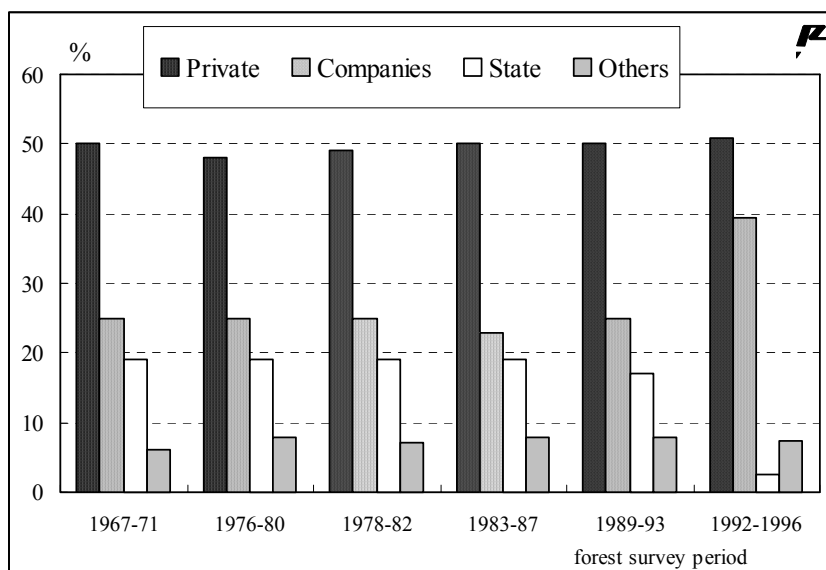


Figure 12. Forest ownership in Sweden according to the National Forest Surveys. (Sources: Skogsstatistisk årsbok 1998, 1996, 1990, 1985, 1980, 1975, 1970).

Commercial fellings and roundwood sales

The volume of annual gross fellings in Sweden totalled about 70 million m³ in the late 1990s (Figure 13). The volume has increased strongly since the 1980s from the annual fellings of about 50 million m³ (Finnish Statistical Yearbook of Forestry 1998, 1992, 1987, 1981, 1971).

In the late 1990s about 60 % of the felled volume originated from privately owned forests (NIPF-owners) in Sweden. More than one third originated from companies' forests, and the rest was supplied by other groups. After the transfer of state forests to the forest industry company AssiDomän, the state has practically not supplied any wood at all. In the 1970s and the 1980s state accounted for about 10-15% of the total fellings while companies' share was less than 25 % (Skogsstatistisk årsbok 1998, 1996, 1990, 1985, 1980, 1975, 1970).

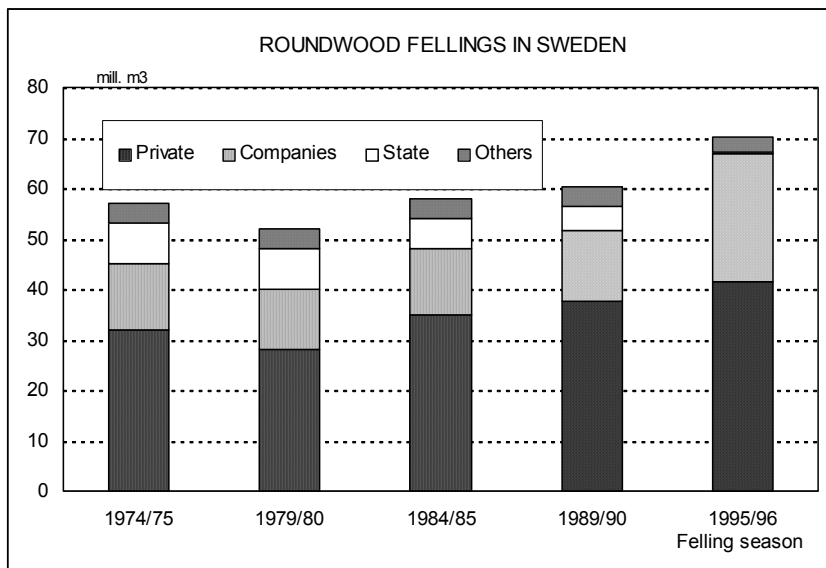


Figure 13. Annual total gross fellings by forest owner categories in Sweden. (Sources: Skogsstatistisk årsbok 1998, 1996, 1990, 1985, 1980, 1975, 1970).

Types of roundwood sales from private forests

Delivery sales are dominating the trade of coniferous sawlogs in Sweden. In this study stumpage sales are defined to include sales of standing timber and delivery stumpage purchases (rotposter and leveransrotköp), and delivery sales include delivery timber and purchases where the price depends on actual felling costs (leveransvirke and avverkningsuppdrag).

Regarding sawlogs, the share of delivery sales has increased by 10 percentage points in 1979-1995 i.e. from 55 % to 65 % in total purchase volume of coniferous sawlogs (by sawmills with annual production of more than 5 000 m³, Figure 14). Consequently, stumpage sales accounted for about 18 % of all coniferous sawlog purchases in the mid 1990s. The remaining volumes are procured from the companies' own forests. (Skogsstatistisk årsbok 1998, 1993, 1986)

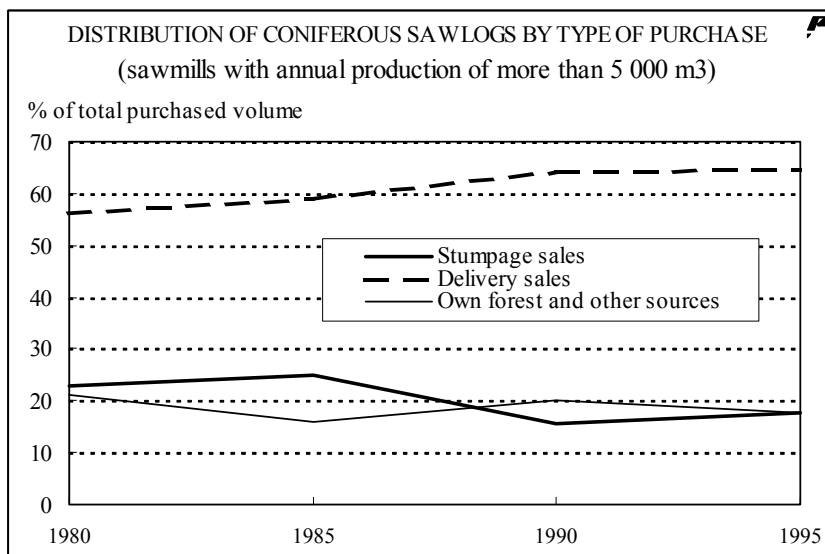


Figure 14. Shares of purchase/procurement types in Swedish coniferous sawlog trade (Sources: Skogsstatistisk årsbok 1998, 1993, 1986)

2.2.3 Forest industry

Production and exports of the forest industries in 1970 to 1995

Wood products industry

The production of Swedish sawn goods in 1995 amounted nearly to 15 million m³. In 1970 the volume was about 12 million m³. The production reduced during the oil crisis in the mid 1970s, but after that the trend has been upwards (Figure 15).

From 50% to 70% of the production has been exported during the 25-year period. The biggest foreign buyer of Swedish sawn goods has been, and still was in the late 1990s, Great Britain. Its share of the exported sawn goods has been about 20-25 %. The exported volume to Great Britain amounted to about 2,5 million m³ in the mid 1990s. Germany has been the second most important export destination of Swedish sawn goods with a share of about 15 % of the exported volume. Germany has kept this share for about 20 years, from the mid 1970s to the late 1990s. The Netherlands and Denmark are also important buyers. Their shares have varied between 10 % and 15 % during the same period. Together these four countries have covered about 60 % of the Swedish sawn goods exports. (Skogsstatistisk årsbok 1998, 1992, 1987, 1981, 1971.)

The volume of plywood and veneer production totalled about 100 000 m³ in the late 1990s. It has varied between 60 000 m³ and 100 000 m³ from the 1970s to the mid 90s (Figure 15). Sweden has also imported plywood about volumes equal to domestic production. Nevertheless, the figures of the late 1990s show that about 80 % of the own production has been exported. (Skogsstatistisk årsbok 1998, 1992, 1987, 1981, 1971.)

Particle board production amounted to about 600 000 m³ in the late 1990s. The annually produced volumes were close to 1 million m³ between 1975 and 1985, and in the peak year even about 1,2 million m³ (Figure 15). About a quarter of the production has been exported, the main destinations being Denmark, Norway, Great Britain and Germany. (Skogsstatistisk årsbok 1998, 1992, 1987, 1981, 1971.)

The production of fibreboard has gradually come down from about 700 000 tons in 1970 to about 130 000 tons in 1995 (Figure 15). More than a half of the production was exported in the late 1990s but earlier three

quarters were used in the domestic market. (Skogsstatistisk årsbok 1998, 1992, 1987, 1981, 1971.)

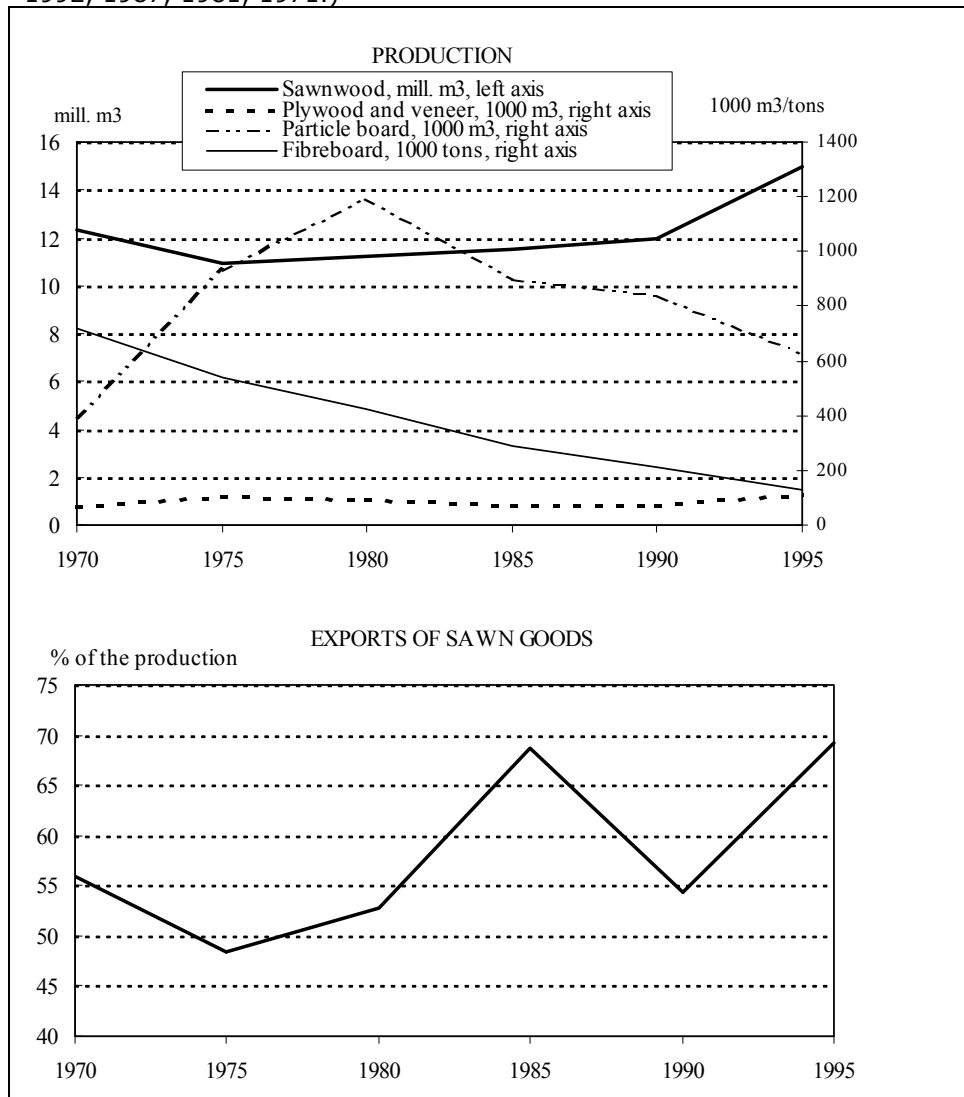


Figure 15. Production of the Swedish wood products industry. (Sources: Skogsstatistisk årsbok 1998, 1992, 1987, 1981, 1971.) Pulp and paper industry

In the late 1990s Sweden produced pulp about 10,5 million tons in total. The share of mechanical pulp was about 28 % of the produced total volume. The volume has increased since the 1970s by 2 million tons (Figure 16). Approximately one quarter of the production was exported in the late 1990s

while the share was about 48 % in the early 1970s. The majority of the exported volume has been delivered to Germany. In the late 1990s Germany's share was about one third of the exported pulp volume, while in the 1970s and 1980s the share varied between 20 % and 25 %. Other big importers of Swedish pulp are Great Britain, France, the Netherlands and Italy. Together with Germany these countries cover nearly 70 % of Swedish pulp exports. (Finnish Statistical Yearbook of Forestry 1997, 1992, 1987, 1981, 1971, Skogsstatistisk årsbok 1998, 1993.)

Paper and paperboard production has more than doubled in Sweden during the 1970s to the 1990s, i.e. from 4,5 million tons to nearly 10 million tons (Figure 16). In the 1970s exports accounted for about 65 % of the produced volume. The share increased gradually to about 85 % of the late 1990s. The two biggest foreign buyers of Swedish paper and paperboard have been Great Britain and Germany with almost equal shares varying around 20 %. Other important destinations of the Swedish paper and paperboard exports have been France, the Netherlands and Denmark. Together these five countries account for 50-60 % of the total exported volume. (Finnish Statistical Yearbook of Forestry 1997, 1992, 1987, 1981, 1971)

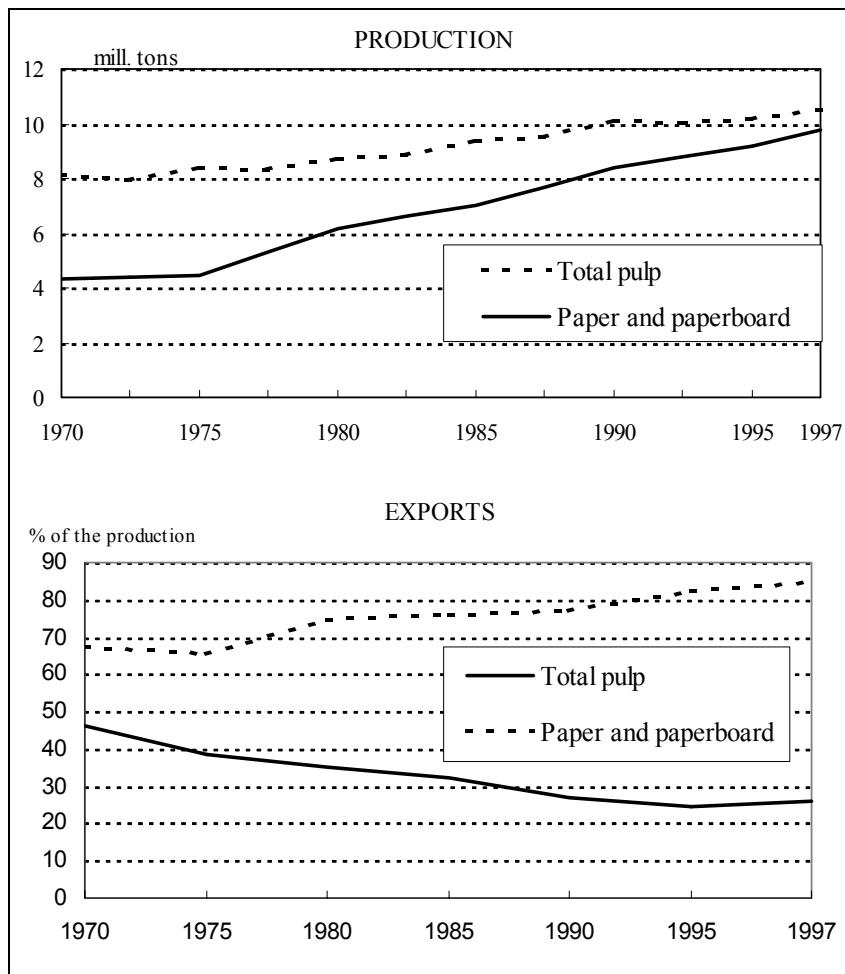


Figure 16. Production and exports of the Swedish pulp and paper industry. (Sources: Finnish Statistical Yearbook of Forestry 1997, 1992, 1987, 1981, 1971; Skogsstatistisk årsbok 1998, 1993.)

Demand for wood

In the late 1990s the annual roundwood consumption of the Swedish forest industry was more than 70 million m³. Since the mid 1970s to the mid 1980s the consumption was quite stable. During the 1990s the production of sawnwood increased strongly in Sweden. This increased also the use of roundwood markedly (see Figure 17): The use of roundwood increased by 10 million m³ during the early 1990s, and a majority of this increase was brought about by mechanical wood industry. Pulp industry used roundwood

a little more than the mechanical wood products industry in Sweden in the early 1990s. (Skogsstatistisk årsbok 1998, 1996, 1990, 1985, 1980,1975.)

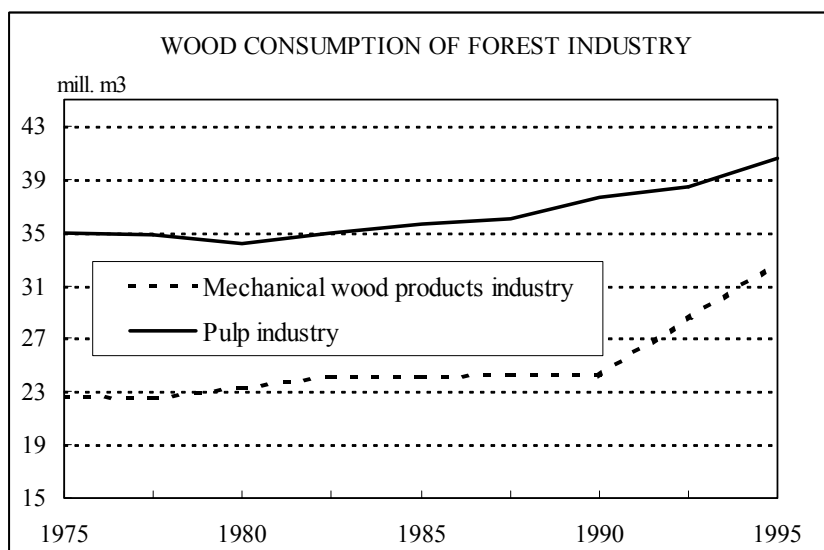


Figure 17. Wood consumption of the Swedish forest industry. (Sources: Skogsstatistisk årsbok 1998, 1996, 1990, 1985, 1980,1975.)

Swedish forest industry has also imported roundwood, and the trend in imports has been growing, especially in the 1990s (Figure 18). From 1975 to the late 1990s the import volume had more than doubled from 3,5 million m³ to nearly 8 million m³. In the late 1990s, the major part of the imported roundwood came from the Baltic countries and Russia. Latvia accounted for a third of the amount, Russia and Estonia about one fifth each. In 1990, imports from Germany accounted for nearly one third but towards the end of the decade Germany's share dropped to 7 %. (Skogsstatistisk årsbok 1998, 1993, 1977)

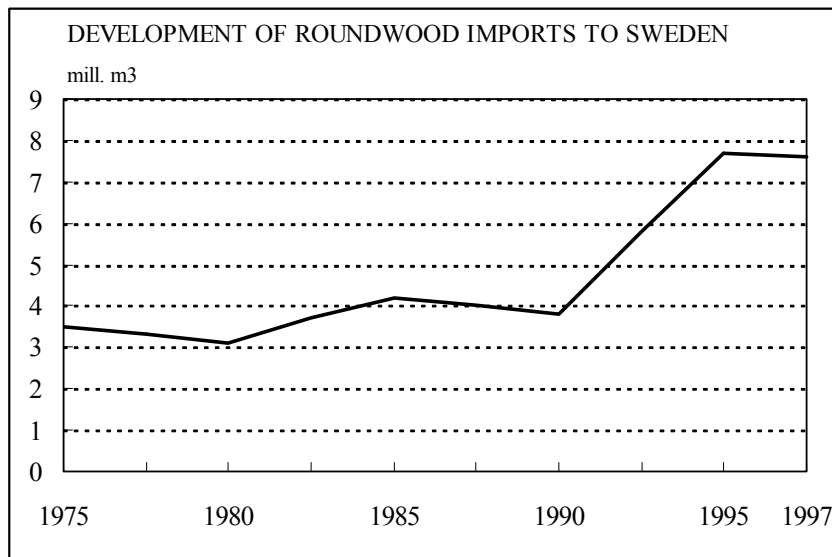


Figure 18. Roundwood imports to Sweden. (Sources: *Skogsstatistisk årsbok 1998, 1993, 1977*)

2.2.4 Wood trade

In Sweden, there are several practices in roundwood sales. The most common system has been to sell wood priced as “alongside forest road”, i.e. the price covers stumpage, harvest and forest transportation (delivery sale). Earlier, prices were negotiated for the delivered wood by the (regional) interest organisations of the forest owners and forest industry. This procedure produced price lists for wood assortments. It was, however, possible to adjust the prices upwards at the end of the year with some kind of additional sums depending on various factors. This partly centralised and collective agreement system was abandoned due to revised competition laws in 1996. Instead, the regional forest owner association started to make price agreements with each buyer. The association gives the price suggestions (price lists) to the buyer but occasionally industry can also suggest prices (industry price list) (Toivonen 1996b). The situation has remained unchanged also in the beginning of the 21st century.

Stumpage price is formed so that the logging costs and transportation in the forest to the road side are deducted from the list price. The price to the industry is higher than the list price due to various costs of buying

organisation and the possible premiums. Part of the costs can also be moved to the seller which then increases the stumpage price. Usually, the list price is applied more strictly during a recession than during a boom.

2.3. Development of the Forest Sector in Austria

2.3.1. Forest area and growing stock during the 1970s to the 1990s

Forest area

The forest land area of Austria expanded in the period of 1970 to 1995 from 3,7 million hectares to 3,9 million hectares. This area accounts for 44 % and 46 % of the total land area, respectively (Finnish Statistical Yearbook of Forestry 1971, 1981, 1987, 1992, 1997; Eurostat 1992-1996; Figure 19). The growth is partly artificial, caused by changes in survey methods, but partly real as a result of afforestation measurements (Schwarzbauer 1994).

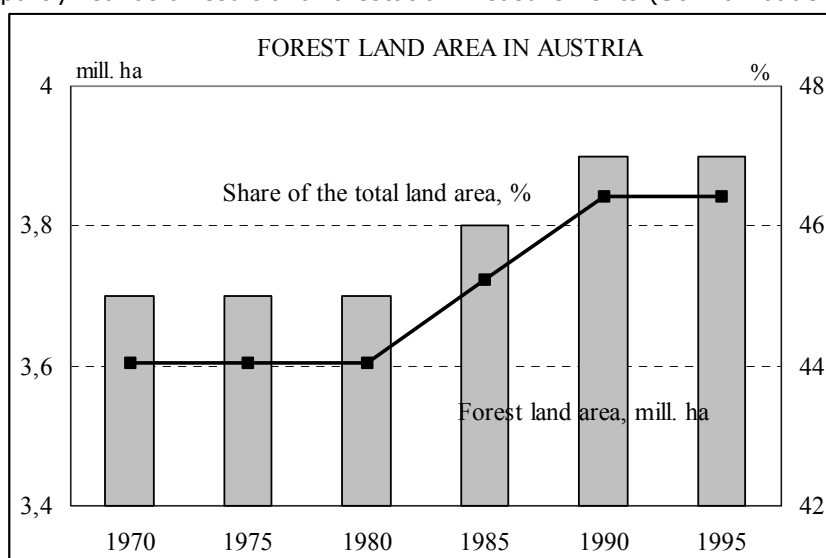


Figure 19. Forest land area and its share of the total land area in Austria. (Sources: Finnish Statistical Yearbook of Forestry 1971, 1981, 1987, 1992, 1997; Eurostat 1992-1996).

Growing stock and volume increment

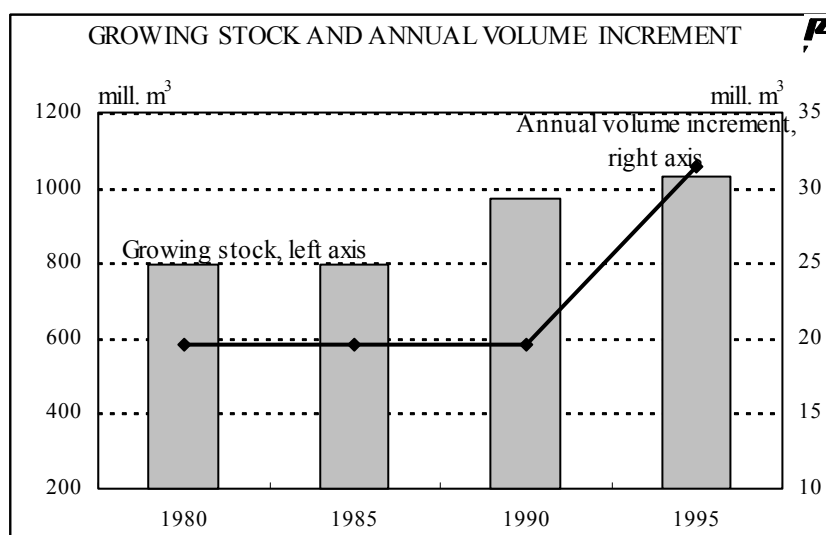


Figure 20. Growing stock and annual volume increment of Austrian forests. (Sources: FAO 1985; Österreichischer Waldbericht 1995, Eurostat 1992-1996)

In Austria, the volume of growing stock has increased by 20 %, from 800 million m³ to 1 000 million m³ during the period of 1980 to 1995 (Figure 20). During the same period the annual volume increment grew clearly, by 60 % from the volume of 19,6 million m³ to 31,4 million m³. The quite sudden increase shown in Figure 20 may be caused partly by changes in the measurement and inventory systems. On the other hand, it may also show the impacts of changed forest management systems (such as increase in intermediate fellings).

2.3.2 Forest ownership and wood supply

Forest ownership

The biggest forest owning group in Austria consists of the non-industrial private owners with a share of about 80 % in the years 1970 to 1995 (Figure 21). State has owned about 15 % of the Austrian forests during the same

period. Forest industry companies practically do not own any forest land at all. (Jahresbericht ueber die Forstwirtschaft 1970, 1975, 1981, 1985; FAO 1985; Österreichischer Waldbericht 1995; Eurostat 1992-1996)

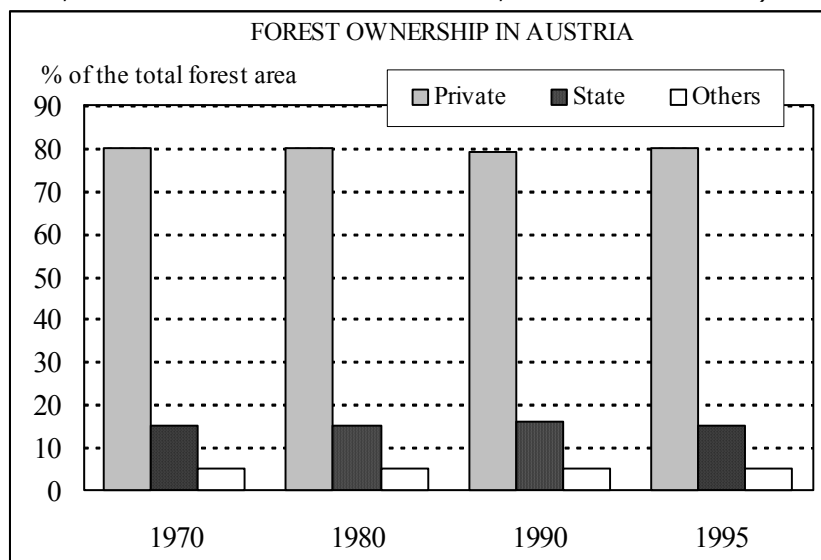


Figure 21. Forest ownership in Austria. (Sources: Jahresbericht ueber die Forstwirtschaft 1970, 1975, 1981, 1985; FAO 1985; Österreichischer Waldbericht 1995; Eurostat 1992-1996.)

Commercial fellings and roundwood sales

As can be seen in the Figure 22, the annual fellings in Austria have grown from 11 million m³ of 1970 to about 15 million m³ of the 1990s, with the peak of nearly 16 million m³ in 1990 (Jahresbericht ueber die Forstwirtschaft 1986, 1977; Statistisches Jahrbuch 1998 Austria; Eurostat 1998). The growth is mainly due to a remarkable increase of intermediate fellings (Schwarzbauer 1994).

The private forest owners have covered about 80-85 % of the commercial fellings in Austria between 1970 and 1997. The state has delivered annually 2 million m³ on average which has accounted for 12-18 % of the commercial roundwood in Austria during that time. (Statistisches Jahrbuch 1998, Austria).

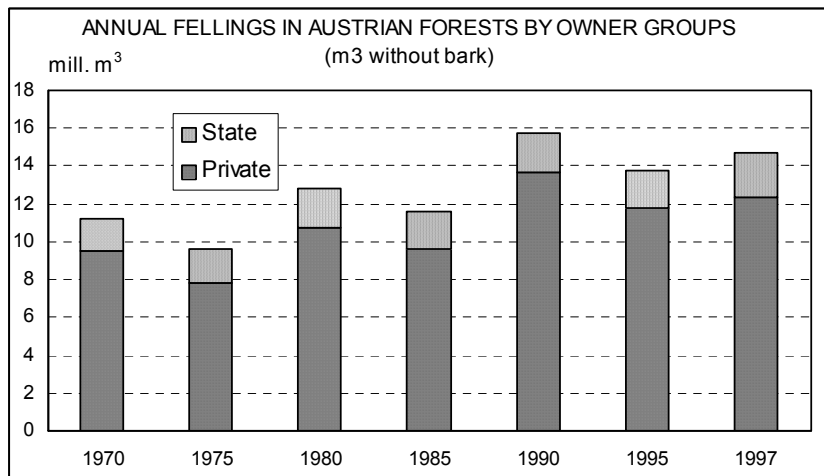


Figure 22. Roundwood fellings by owner groups in Austria. (Sources: *Jahresbericht über die Forstwirtschaft 1986, 1977, Statistisches Jahrbuch 1998 Austria, Eurostat 1998*).

Types of roundwood sales from private forests

Delivery sales have dominated the private roundwood trade in Austria. The share of stumpage sales is estimated to cover about 10% of the total felled volume. However, stumpage sales occur somewhat more commonly in state's forests than in private forests (Petäjistö et al. 1997). Private forest owners associations organize collective sales from their members' forests. In Austria, private forest owners are members of the forest owners' associations by law.

2.3.3 Forest industry

Production and exports of forest industries during 1970-1995

Wood products industry

As shown in the figure 23, sawnwood was produced slightly over 5 million m³ in 1970 in Austria. Towards the end of the 70s the production grew up to 6,5 million m³. The growing trend continued also in the 80s and the 90s reaching the volume of 7,8 million m³ in 1995. Export volume of sawnwood totalled about 3,4 million m³ in 1970 growing strongly till the 80s. In the 1980s the export figures fell but towards the 1990s the trend turned to show growth again. Exports of sawnwood accounted for more than 60 % of the production in the 70s and the 80s but less than 60 % in the early 90s, which implies that the domestic demand had grown substantially (Finnish Statistical Yearbook of Forestry 1971, 1981, 1987, 1992, 1997; Jahresbericht uber die Forstwirtschaft 1971, 1976, 1979, 1986). Italy is by far the most important export market for the Austrian sawn wood with a share of 70 % of the total exported volume in the late 1990s (Faostat).

During the 1970s, the production of plywood and veneer amounted to 20 000-25 000 m³ (Figure 23). Between the years 1970 to 1985 the production remained practically unchanged but at the turn of the 1980s and the 1990s the production volume increased strongly to about 140 000 m³. The export volume of plywood and veneer grew strongly between 1970 and 1995 from the volume of 5 000 m³ to 170 000 m³. The exports accounted for about 20 % of the production in 1970 but in 1995 nearly the whole production was exported. (Finnish Statistical Yearbook of Forestry 1971, 1981, 1987, 1990-91, 1992, 1997, FAO yearbook 1994: Jahresbericht uber die Forstwirtschaft 1971, 1976, 1979, 1986.)

The volume of particleboard production and exports have been growing in 1970-1995 (Figure 23). The strongest growth period was the 1970s, however. The production of 1970 amounted to about 0,5 million m³ but in 1995 to 1,6 million m³. More than a half of the production has been exported since the late 1970s. (Finnish Statistical Yearbook of Forestry, 1971, 1981, 1987, 1990-91, 1992, 1997; Jahresbericht uber die Forstwirtschaft 1971, 1976, 1979, 1986). Italy and Germany covered almost three-fourths of the exported volume of particleboard in the late 1990s (Faostat).

In the 1970s the production of fibreboard totalled about 100 000 tons (Figure 23). In the mid 1970s and the mid 1980s the production dropped to about 70 000 tons but increased again to the figures of the early 1970s. In 1995 the production amounted to nearly 120 000 tons. The volumes of fibreboard exports have varied considerably between 1970 and 1995. At the highest the volumes have been in the early 1990s with about 66 000 tons and at the lowest in the mid 1970s with 30 000 tons. The exports of fibreboard have accounted for 50-65 % of the production except in the mid 90s, when one third of the production was exported. (Finnish Statistical Yearbook of Forestry, 1971, 1981, 1987, 1990-91, 1992, 1997; Jahresbericht über die Forstwirtschaft 1971, 1976, 1979, 1986).

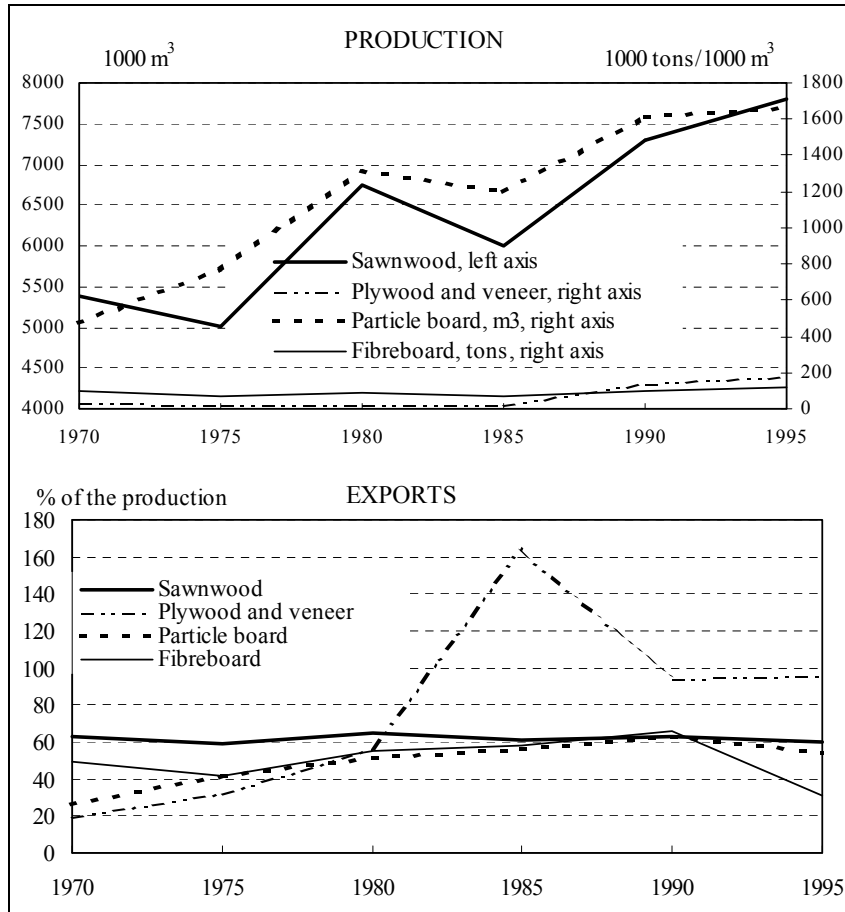


Figure 23. Production and exports of the Austrian wood products industry. (Sources: Finnish Statistical Yearbook of Forestry, 1971, 1981, 1987, 1992, 1997; FAO yearbook 1994)

Pulp and paper industry

In 1970 the Austrian pulp production was nearly one million tons (Figure 24). The production grew till 1995 when it reached the volume of 1,6 million tons. Mechanical pulp accounted for about 23 % of the total pulp production in the late 1990s. The major part of the Austrian pulp production has been used by the domestic industry. Consequently, the exported volumes have been small, 15-20 % of the production. However, as to the annually exported volumes they were nearly twice as big in 1995 as in 1970 (230 000

tons and 130 000 tons respectively) (Finnish Statistical Yearbook of Forestry, 1971, 1981, 1982, 1987, 1990-91, 1992, 1997, 1998; Jahresbericht über die Forstwirtschaft 1971, 1976, 1979, 1981). Italy is the biggest foreign buyer of Austrian pulp (Faostat).

In the beginning of the 1970s the annual production volume of paper and paperboard volumes were more than one million tons. Since then the production has grown strongly, up to 3,6 million tons in 1995. In the 1990s about 40 % of the pulp used by the Austrian paper and paperboard industry has been recovered pulp.

In 1970 Austria exported paper and paperboard about 0,5 million tons which accounted for 45 % of the production. Since that time both the exported volume and its share of the production have grown considerably. In 1995 the exported volume totalled 2,6 million tons and accounted for 72 % of the production (Finnish Statistical Yearbook of Forestry, 1971, 1981, 1987, 1992, 1997, 1998; Jahresbericht über die Forstwirtschaft 1971, 1976, 1979, 1981). Germany and Italy have been destinations for a half of the paper products exported from Austria (Faostat).

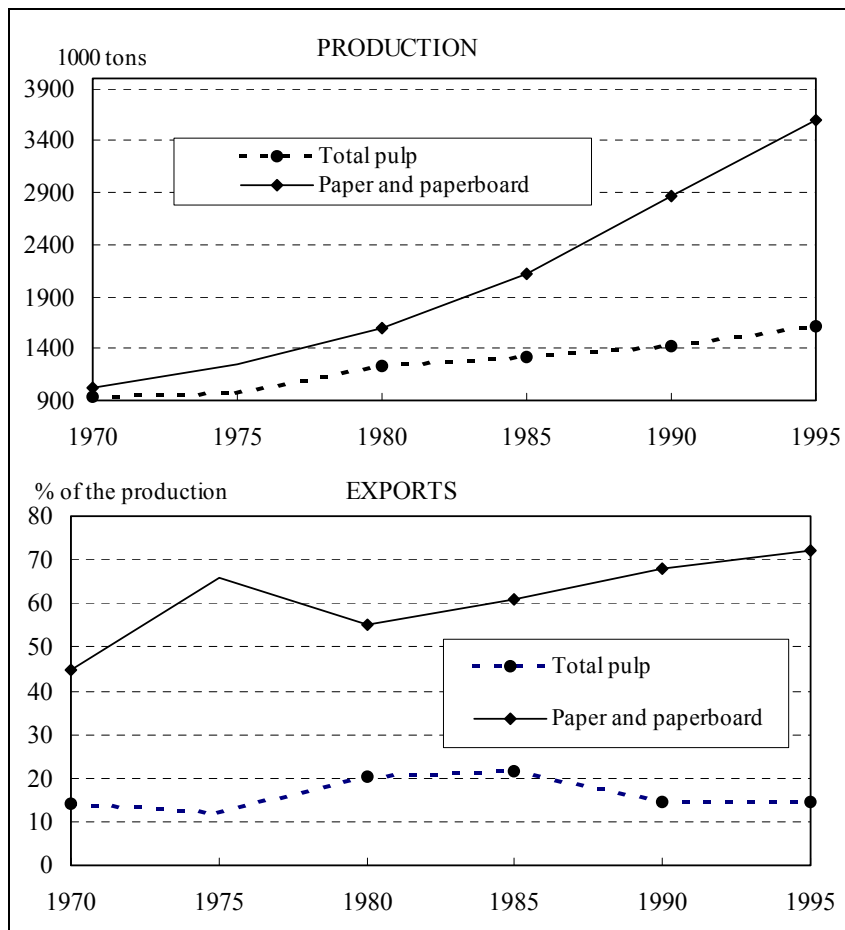


Figure 24. Production and exports of the Austrian pulp and paper industry. (Sources: Finnish Statistical Yearbook of Forestry, 1971, 1981, 1982, 1987, 1990-91, 1992, 1997, 1998; Jahresbericht über die Forstwirtschaft; Jahresbericht über die Forstwirtschaft 1971, 1976, 1979, 1981).

Demand for wood

Wood consumption of the Austrian forest industry exceeded 18 million m³ in the mid 1990s. Sawmill industry used two-thirds and pulp industry one-third of the consumed roundwood. In sawmills the use and demand for roundwood increased rapidly in the 1990s. Wood consumption of paper and pulp industry increased to a lesser degree, which can be partly explained by the increased use of recovered pulp in the paper industry (Figure 25). Totally,

the wood consumption grew by one fifth in 1985-1995 (FAO 1985; Jahresbericht über die Forstwirtschaft 1976, 1986; Österreichischer Waldbericht 1995; Eurostat Forest statistics 1998).

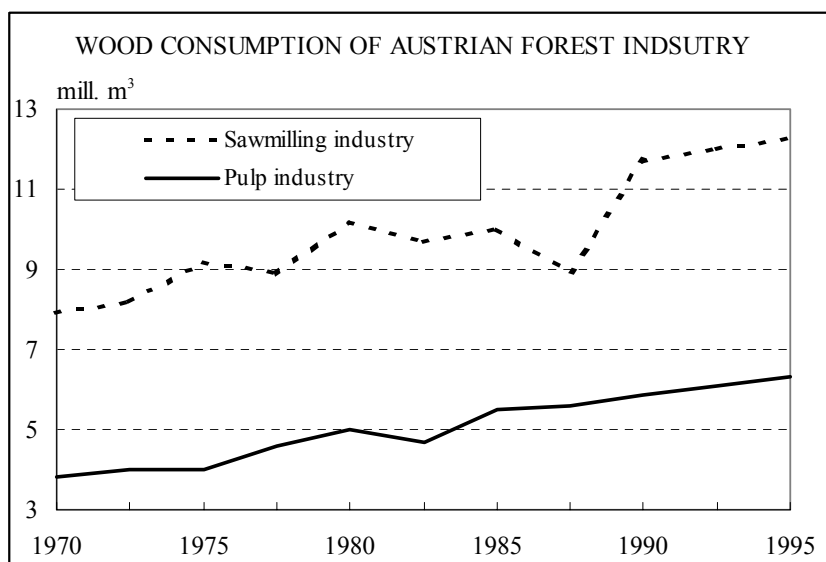


Figure 25. Wood consumption of the Austrian forest industry. (Sources: FAO 1985; Österreichischer Waldbericht 1995; Eurostat Forest statistics 1998).

In 1995, Austria imported about 6 million m³ roundwood. The imports had a growing trend since the mid 1970s continuing in the 1980s and in the early 1990s (Figure 26). However, especially in the 1990s the imported volumes may have varied greatly between individual years. The neighbouring countries, Czech Republic, Slovakia and Germany supplied two-thirds of the roundwood imported to Austria in the late 1990s (FAO 1985; Österreichischer Waldbericht 1995; Eurostat Forest statistics 1998). Russia or the Baltic states have not been important roundwood suppliers to Austria unlike they are for Finland (particularly Russia) and Sweden (particularly the Baltic states).

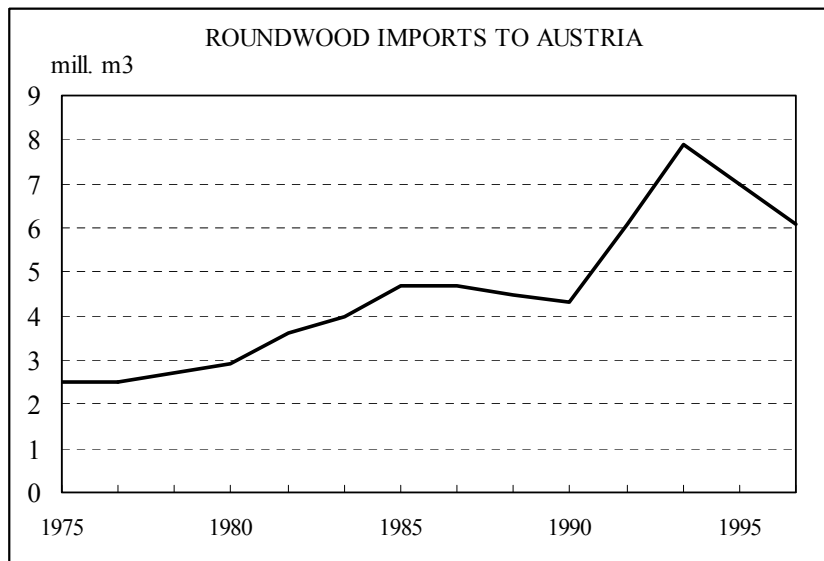


Figure 26. Roundwood imports to Austria. (Sources: Jahresbericht über die Forstwirtschaft 1976, 1979, 1981; FAO 1985; Österreichischer Waldbericht 1995; Eurostat Forest statistics 1998).

2.3.4 Wood trade

Before 1995, pulpwood and hardwood timber prices were centrally negotiated between the forest owners and forest industry's interest groups in Austria. This collective negotiation system was abandoned in 1995 when Austria joined the European Union (Toivonen 1996a).

3. COMPARISON OF THE FOREST SECTOR DEVELOPMENT IN THE THREE COUNTRIES

3.1. Development of Production and Exports

Paper and paperboard industry

The development trends in the paper and paperboard production are quite similar in the three countries analysed. These show strong growth in the Finnish, Swedish, and Austrian paper industries during 1970-1995 (see Figure 27). In 1970-1980 Swedish production was a little higher than in Finland but since the mid 1980s Finland has produced larger volumes than Sweden. The gap has also grown bigger between these two countries. In 1970 the production amounted to 4,3 million tons in Finland, the Swedish production being about 4,4 million tons. In 1995 the figures were 10,9 and 9,2 million tons, respectively. Accordingly, the Finnish industry had a growth of 153 % and the Swedish industry 109 % from 1970 to 1995.

The volume of the Austrian paper and paperboard production has been clearly smaller than in Finland and Sweden. Nevertheless, the growth rate of the production has been even stronger in Austria (250 %). While Austria's production was less than one fourth of the Finnish and Swedish productions in the 1970s, in 1990 it was about one third of them: Volumes of the Austrian paper and paperboard production has grown from one million tons to 3,6 million tons from 1970 to 1995.

Exports of the paper and paperboard industries in Finland and Sweden have been growing in 1970-1995 both in volume and as to share of the production. Finnish export volumes are, however, bigger and since 1980 the growth has also been stronger than in Sweden. The Finnish exports have developed from 3,5 million tons to 9,6 million tons in 1970-1995 i.e. by 174 %. The Swedish exports have grown from 2,9 million tons to 7,5 million tons, i.e., by 159 % in the same period.

Austrian exports are considerably smaller in volume than in Finland and Sweden but the volumes have grown strongly. In Austria, the exports account for a slightly smaller proportion of the production than in Finland and Sweden. However, the growth of the exports was the strongest in

Austria in 1970-1990. The export volumes grew in Austria from 0,5 million tons to 2,6 million tons in 1970-1995 i.e. by 420 %.

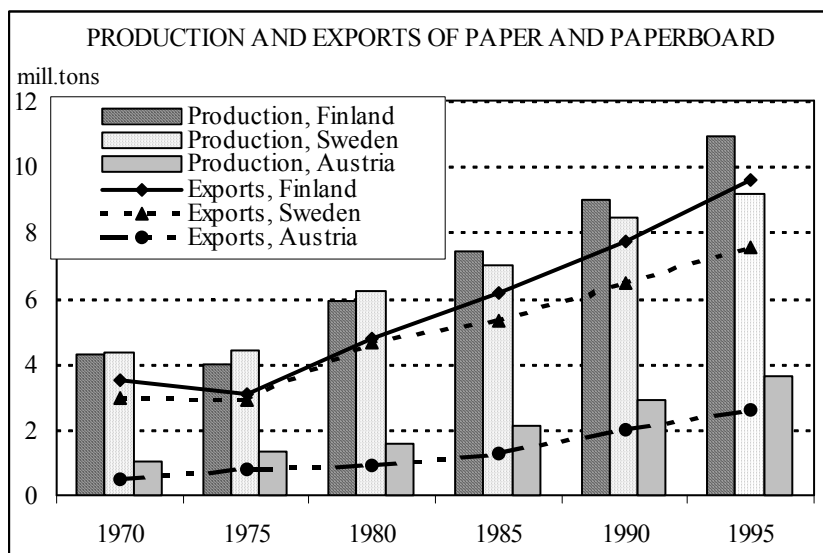


Figure 27. Production and exports of the Finnish, Swedish and Austrian paper and paperboard industries. (Sources: Finnish Statistical Yearbook of Forestry, 1998, 1997, 1995, 1992, 1987, 1981, 1971; Skogsstatistisk årsbok 1998, 1993; Jahresbericht über die Forstwirtschaft 1976, 1981)

Sawmill industry

As the figure 28 shows, Sweden is distinctly the biggest producer among the three countries as to the volumes of sawn wood. Swedish production has grown from 12 million m³ to 15 million m³ (25 %) in 1970-1995. Finland's production grew from 7,5 million m³ to 9,5 million m³ (27 %) during the same period (13,3 million m³ in 2000). However, for instance in 1980 the production volumes in Sweden and Finland were almost equal (10 mill. m³). Austria's production has been about 2 million m³ lower than in Finland. In 1970-1995 Austrian production increased from 5,5 million m³ to 8 million m³, which means a growth of about 45 %. Yet, there have been years when Austrian production equalled the Finnish production. The Finnish production has the largest variations between individual years.

In 1970 exports accounted for 64 % of the sawn wood production in Finland and for 56 % in Sweden. In 1995 the figures were 77 % and 70 % respectively. Sweden is the biggest exporter of sawn wood when it comes to volumes. Finland is the biggest as to export's share of the production. The figures in 1995 show for Sweden an export volume of more than 10 million m³ but there have been considerable variations from time to time. Finnish export figures of sawn wood are closer to the Swedish figures than the production figures: In 1980 the Finnish exports have been even bigger than the Swedish ones. Sweden has increased its exports in 1970-1995 from 7 million m³ to more than 10 million m³ and Finland from 5 million m³ to 7,5 million m³. These volumes grew further during the latter part of the 1990s.

The Austrian sawmill industry exports also considerable amounts of sawn wood. The growth in volume was about 30 % in 1970-1995, i.e., from 3,5 million m³ to 4,5 million m³. Export's share of the production has varied around 60-65 % during the whole period in Austria. Thus, the relationship between domestic consumption and export has been stable in Austria unlike in Finland and Sweden.

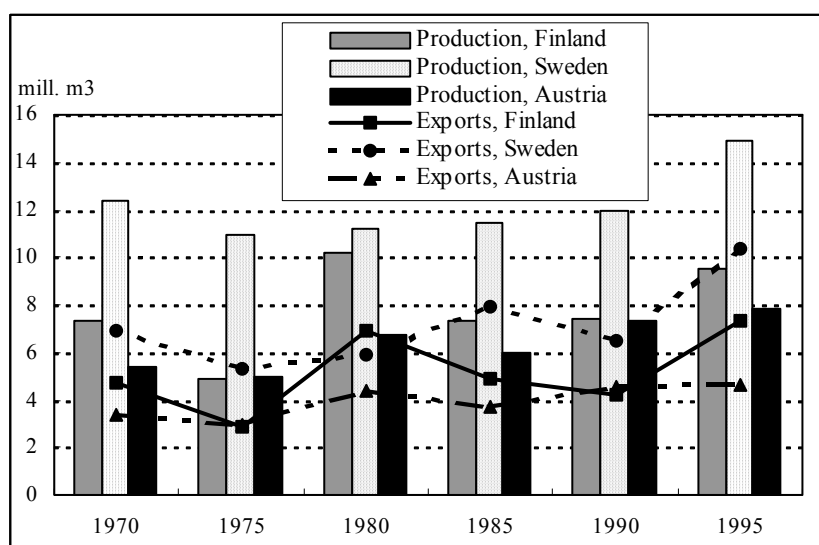


Figure 28. Production and exports of the Finnish, Swedish and Austrian sawmill industry. (Sources: Finnish Statistical Yearbook of Forestry 1998, 1997, 1995, 1992, 1987, 1981, 1971; Skogsstatistisk årsbok 1998, 1993; Jahresbericht über die Forstwirtschaft 1975, 1979, 1981, 1986)

3.2 Development of roundwood consumption and imports

Sawmill industry

In Finland the mechanical wood industry consumed roundwood about 25 million m³ annually in the mid 1990s (Figure 29). This exceeds by more than 10 million m³ the consumption of the mid 1970s when it was about 13 million m³. Compared to the mid 1970s the consumption of the mid 1990s had doubled. However, practically speaking the growth rate was smaller i.e. about 30 % since the mid-70s were times of major recession and exceptionally low production volumes in the forest industry. The wood consumption prior to the recession was 17-20 million m³ annually. After the recession the consumption kept to the prior recession level until the mid 1990s when it grew to 25 million m³.

In Sweden, the annual roundwood consumption of the mechanical wood products industry remained quite stable from the mid 1970s to the mid 1980s, i.e. at 22-24 million m³ annually. In the mid 1990s the consumption, however, increased drastically, almost by 10 million m³, and exceeded the level of 30 million m³. This means nearly a 50 % increase on the consumption of the 1970s.

The Austrian wood products industry increased its roundwood consumption by 50 % in the 1970s to the mid 1990s. In the early 1970s the consumption amounted to about 8 million m³ but in the mid 1990s the figures showed a consumption of more than 12 million m³.

Pulp and paper industry

Roundwood consumption of the Finnish pulp and paper industry was rather stable from the mid 1970s to the late 1980s i.e. about 20-22 million m³ annually. In the early 1990s the consumption exceeded 30 million m³ (Figure 29). Accordingly, in Finland the consumption has increased by about 50 % in 1975-1995.

As the figure 29 shows, roundwood consumption of pulp and paper industry has been quite stable also in Sweden in 1975 to 1990. The volumes have varied between 35 and 37 million m³. Yet, the trend has been slightly rising (14% growth) and in 1995 the wood consumption exceeded 40 million

m³. In Austria, wood consumption of the pulp and paper industry was about 4 million m³ in the early 1970s. After that the consumption has grown somewhat. During the mid 1980s to the mid 1990s the volumes have varied between 5,5 and 6 million m³.

Overall development in industry structure and wood consumption

Overall, Figure 29 shows some interesting differences in the development of the forest industries and their wood usage in the three countries: Production, production capacity and use of sawlogs have some long-run fluctuations in Finland much more clearly than in Sweden or in Austria. Both downward and upward fluctuations are clear during the period of 1975-1995. Instead, sawlog consumption has remained stable and then strongly increased in Sweden during the 1990s. This reflects the large capacity investments in the mechanical wood products industry in Sweden during the 1990s.

Instead, investments in Swedish pulp and paper industry have developed in a much more stable manner, as well as the use of pulpwood. In Finland, a similar development can be detected in pulp and paper industry as what happened in Sweden's sawmill industry: A quite strong and sudden increase in investments in production capacity since 1985 on. This is reflected in similar development in the pulpwood usage.

It seems that the development in both sawlog and pulpwood usage has been the most stable in Austria. The wood usage does not reflect, however, the strong growth in pulp and paper industry properly, due to the large use of recovered fibre in the Austrian pulp and paper industry.

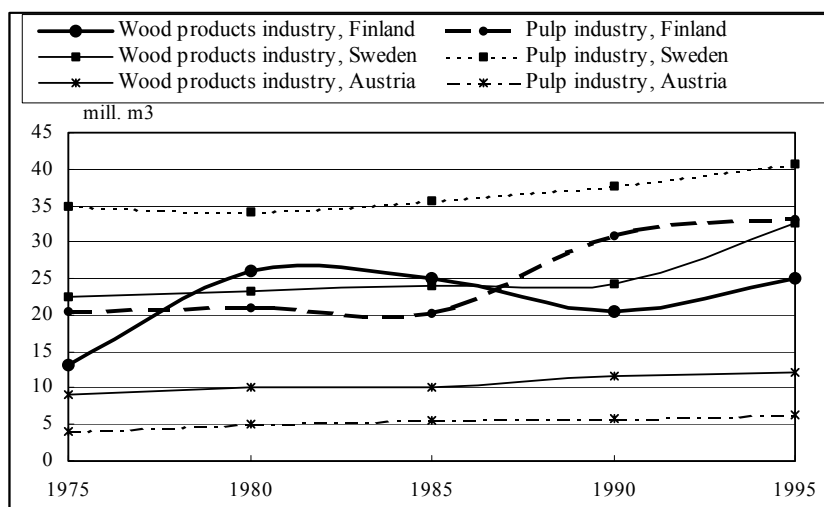


Figure 29. Roundwood consumption in the Finnish, Swedish and Austrian forest industries. (Sources: Finnish Statistical Yearbook of Forestry, 1998; Skogsstatistisk årsbok 1998, 1996, 1990, 1985, 1980, 1975; FAO.ECE/TIM/27; Jahresbericht über die Forstwirtschaft 1976, 1986; Österreichischer Waldbericht 1995; Eurostat Forest Statistics 1998)

Roundwood imports

The total industrial roundwood consumption grew from 33,5 million m³ to 58 million m³ in Finland in the mid 1970s to the mid 1990s. This means an increase of 73 %. Roundwood imports also show a strong growth during the same period, i.e. from 4,8 million m³ to 11 million m³ (122 % growth). Roundwood imports have had a growing trend since 1975 but a particularly strong growth has taken place during the 1990s.

In Sweden, roundwood imports have grown as well, even though the variation between individual years may have been larger than in Finland. In 1970-1995 roundwood imports grew from 3,5 million m³ to 7,7 million m³, i.e., by 120 %. The total roundwood consumption has increased only by 22 % during the same period (from 50 mill. m³ to 61 mill. m³).

Austria has increased its roundwood imports very strongly, the most of the three countries compared. During the period from the mid 1970s to the mid 1990s the imports grew from 2,5 million m³ to 7 million m³ (180%). From the mid 1980s to the mid 1990s the volume has increased more

mildly, i.e. by 50 %. The total consumption of industrial roundwood has increased from 15,5 million m³ to 18,5 million m³ during that time (1985-1995). This means that both the total consumption and the imports of roundwood have had about the same growth rate in Austria during 1985-1995.

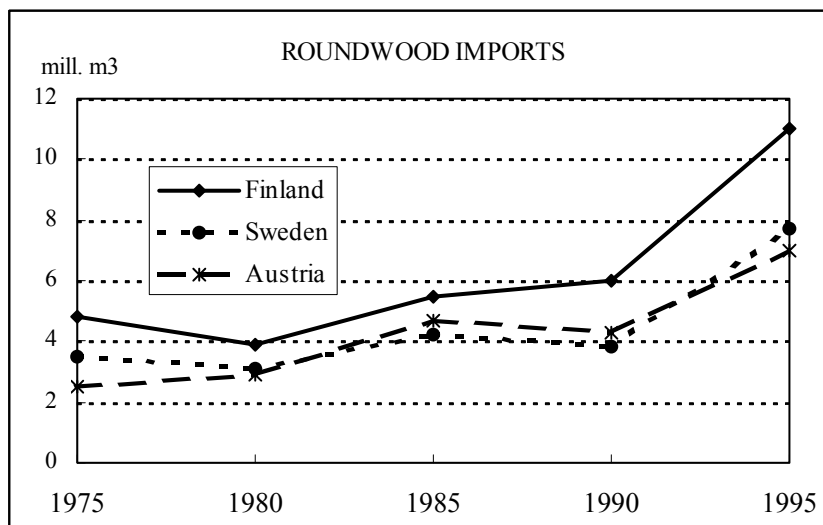


Figure 30. Imports of roundwood in Finland, Sweden and Austria. (Sources: Finnish Statistical Yearbook of Forestry, 1998, 1995, 1992, 1990-91, 1987, 1982; Skogsstatistisk årsbok 1998, 1997, 1993, 1987, 1984, 1977; Jahresbericht über die Forstwirtschaft 1976, 1981)

3.3 Development of roundwood production

Forest resources

The economically exploitable forest area of Finland, Sweden and Austria is altogether around 46 million hectares which is 48 % of the forest area in the EU(15). Sweden has the largest forest land area of these three countries, around 22 million hectares. In Sweden the economically exploitable forest area has decreased in statistical terms since 1985. Actual forest land has not been diminished, however, but it has been transferred to nature reserves.

In Finland, the forest area has grown slightly since 1970, and in the mid 1990s the forest area covered 20 million hectares. The forest area grew most strongly during the 1960s thanks to intensive afforestation programs. After the mid 1990s the forest area has been quite stable. Finnish forests cover more of the country's land surface than Swedish ones. In Finland the forest cover accounts for 66 % of the total land area, while in Sweden the coverage is only 55 %.

In Austria, forest land (3,9 million ha) covers 46 % of the total land area. Since 1970 the Austrian forest area has increased by 0,2 million hectares. This is at least partly due to afforestation measures. In all countries, changes in definitions of forest land and in inventory methods also may have caused some changes in the statistics describing forests and forested area during the past tens of years.

Also the growing stock in the forest land is by far the biggest in Sweden. In the late 1990s it amounts to about 2 900 million m³. From the early 1970s to the mid 1990s the growing stock has increased by 20 % in Sweden, although the area of exploitable forest land has decreased. At the same time the annual volume increment has grown from the level of 80 million m³ to 100 million m³. In Finland the growing stock was about 1 900 million m³ in the late 1990s the annual growth being nearly 80 million m³. Since 1970 the growing stock has increased by 27 % and annual growth by 20 million m³. In Austria the growing stock has increased by one quarter during the period 1980-1995 amounting to 1 000 million m³. Annual volume increment grew by 60 % from the level of 1980.

3.3.2 Wood supply

In all three countries non-industrial private forest (NIPF) owners are the biggest owner group. They own 80 % of the forest land in Austria, 62 % in Finland and 51 % in Sweden. State is an important forest owner in Finland (24 %) and in Austria (15 %). In Sweden the state used to own nearly 20 % of forests but in 1994 the main part of the state forests was transferred to a forest industry company (AssiDomän). Thus in the late 1990s, companies owned almost 40 % of forests in Sweden. In Finland the share of forest industry companies is 9 % and in Austria they do not practically own forest at all. After 1995, some forest land has been delivered back to the state ownership in Sweden.

Commercial fellings amounted to about 70 million m³ in Sweden in the mid 1990s, 51 million m³ in Finland and 14 million m³ in Austria. In the early 1970s but also in the 1990s roundwood consumption and fellings dropped due to the international economic recessions. Relatively speaking, this drop was the largest in Finland both in the 1970s and in the 1990s. Fellings dropped in Finland and Sweden again in 1996 due to another recession. In Sweden a storm felled big volumes of wood during the felling season 1969/70. Anyhow, from the late 1970s on, fellings have grown in all three countries (figure 31).

Private forest owners have delivered 80-85 % of the industrial roundwood in Austria. In Finland the share of private forests has varied between 80 % and 90 % and in Sweden between 50 % and 60 %. Regarding the forest ownership, it seems that particularly in Finland the private forests supply relatively large amounts of wood. The most significant change has happened both in forest ownership and roundwood supply in Sweden. In Sweden the share of forest companies as forest owners and in roundwood fellings has grown to 35%-40% in the mid 1990s, but the role of the state has decreased.

In Finland the major part of roundwood is sold by stumpage sales and their share has been increasing since 1980 (already 75 % in the late 1990s). In Sweden and Austria roundwood is mainly sold as delivered to roadside.

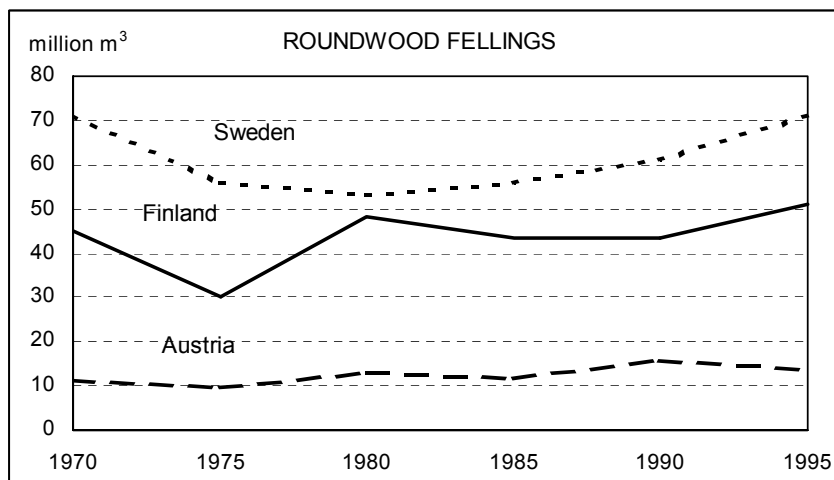


Figure 31. Commercial fellings in Finland (m^3 with bark), Sweden (m^3 with bark) and Austria (m^3 without bark). Statistics of marked years are included only. The curve indicates development of each five-year-period. (Sources: Finnish Statistical Yearbook of Forestry 1998; Skogsstatistisk årsbok 1993, 1999; Jahresbericht über die Forstwirtschaft 1970, 1975, 1981, 1985; Österreichischer Waldbericht 1995)

4. SUMMARY AND DISCUSSION

4.1 Summary

This study describes the development of Finnish, Swedish, and Austrian roundwood markets in 1970-1995. The development of the roundwood resources (supply markets) is illustrated by forest resources, forest ownership, fellings, and common practices in roundwood trade (Table 1).

Table 1. Summary table of the roundwood markets on the supply side during 1970-1995.

	FINLAND	SWEDEN	AUSTRIA
<i>Forest area, % of land area (1995)</i>	20 mill. ha , 66% <ul style="list-style-type: none"> ▪ Increased by 3 mill. ha since 1960, strong afforestation measures 	22 mill. ha , 55% * <ul style="list-style-type: none"> ▪ Decreased, due to nature reserves (1980) that are not included in forest land 	4 mill. ha , 47% <ul style="list-style-type: none"> ▪ Increased by 0,2 mill. ha since 1970, afforestation and changed survey methods
<i>Growing stock, annual growth (1995)</i>	1900 mill.m³, 80 mill.m³ <ul style="list-style-type: none"> ▪ Stock increased by 400 mill. m³ since 1970 (+27%) ▪ Annual growth increased by 20 mill. m³ (+35%) 	2900 mill.m³, 100 mill.m³ <ul style="list-style-type: none"> ▪ Stock increased by 480 mill. m³ since 1970 (+20%) ▪ Annual growth increased by 25-30 mill. m³ (+35%) 	1000 mill.m³, 31 mill.m³ <ul style="list-style-type: none"> ▪ Stock increased by 200 mill. m³ since 1980 (+25%) ▪ Annual growth increased by 11 mill. m³ (+60%)
<i>Forest ownership (1995)</i>	<ul style="list-style-type: none"> ▪ NIPF 62% (-) ▪ State 24% (±) ▪ Companies 9% (+) ▪ Other 5% 	<ul style="list-style-type: none"> ▪ NIPF 51% (±) ▪ Companies 40% (+) ▪ State & other 10% (-) 	<ul style="list-style-type: none"> ▪ NIPF 80% (+) ▪ State 15% (±) ▪ Others 5% (-)
<i>Commercial fellings (1995)</i>	51 mill. m³ <ul style="list-style-type: none"> ▪ Increased by 6 mill. m³ since 1970 (+13%) ▪ Private 90% of fellings (+) 	70 mill. m³ <ul style="list-style-type: none"> ▪ Increased by 13 mill.m³ since 1975 (+23%) ▪ Private 60% of fellings 	14 mill. m³ <ul style="list-style-type: none"> ▪ Increased by 3 mill.m³ since 1970 (23%) ▪ Private 80-85% of fellings
<i>Trade practice</i>	Stumpage sales 75% Price neg. end 1999	Delivery sales 65% Price neg. end 1996	Delivery sales 90% Price neg. ended 1995

+ = growth - = decrease (±) = stable

* In Sweden the exploitable forest land + nature reserves account for 23 mill ha.

- Sweden has the largest forest area of the three countries. Swedish forest area available for wood supply has decreased due to establishment of nature reserves. In statistics these are not included in the forest area. In Finland and Austria, the forest area has increased during 1970-1995, mainly due to afforestation measures. These three countries are the most forested countries in the EU(15).
- Sweden has by far the biggest growing wood stock of these three countries. In every country the volume of growing stock has increased by about one quarter during 1970-1995. Annual growth of wood stock has increased most strongly in Austria. However, one should also keep in mind that survey methods have been developed and changed during the time in every country. This makes it somewhat complicated to estimate what the real changes of forest land, growing stock or annual increase are.
- In all three countries NIPF- owners own the majority of forests and also supply the biggest volume of roundwood to market. The ownership of forest companies has grown especially in Sweden, where they own 40 % of the forest land. Forest industry companies are thus important round wood suppliers themselves. State is an important forest owner and wood supplier in Finland (24 %) and Austria (15 %). In these two countries, particularly in Finland, state is also an important player on the roundwood market.
- The trend in the volume of commercial fellings has been upwards in all three countries, but naturally with quite large variations between individual years. Sweden supplies the highest volumes of roundwood in the area of EU, and Finland is the second biggest wood supplying country. Delivery sales are the dominating sales type in Sweden and Austria, whereas in Finland stumpage sales dominate the market. When comparing fellings with annual increment of growing stock, Austria is using the annual increment less intensively than Finland or Sweden. However, all the three countries as well as the whole EU are felling clearly less than the total annual increment and thus the growing stock is increasing.
- In all three countries various types of collective price negotiation practices have been used on roundwood markets. Due to the new competition laws, effective since the membership in EU in 1995, the traditional collective negotiation systems ended in each country.

4.2 Forest industry and roundwood demand

Demand for roundwood is tied up with the production volumes of different wood based products. The demand for these products can be derived from the general economic activity in the society. Hence, round wood is a typical commodity with a derived demand. Therefore not only roundwood markets but also the development of mechanical and chemical forest industry need to be analysed if one is interested about roundwood market development.

Export of forest industry products and import of roundwood has increased in all the three countries analysed in this paper during the past decades. Table 2 presents the production levels in 1995 and summarizes the development during 1970-1995.

- All three countries can be regarded as significant exporters of wood products in the European and even in the world scale. Finland and Sweden are major exporters of paper and paperboard both in Europe and in the World. The main part of both sawn wood and paper production is exported, and the export share of the production has increased since 1970 in each country. Overall, the forest based industry in each country has grown in volume and become very clearly export oriented.
- The production of sawn wood has increased in all three countries. Sweden is the biggest producer of sawn wood among these countries, but in Austria the growth has been most vigorous. Finland exports the largest share of production. As a producer and exporter of sawn wood Austria is clearly closer to Sweden and Finland than as a producer and exporter of paper and paperboard.
- Finland has increased its plywood production strongly and is by far the biggest producer among the three countries. Plywood is almost totally an export product. Particleboard production has decreased both in Finland and Sweden since 1980 whereas in Austria the production has increased.

Table 2. Summary table of the forest industry and the round wood markets demand side, 1970-1995.

	FINLAND	SWEDEN	AUSTRIA
<i>Mechanical forest products (1995)</i>	Sawn wood 9.5 mill.m³ <ul style="list-style-type: none"> ▪ Production increased by 27% since 1970 ▪ In 1970 64% of prod. exported, 1995 77% exp. ▪ Export volume increased by 50% since 1970 	Sawn wood 15 mill. m³ <ul style="list-style-type: none"> ▪ Production increased by 25% since 1970 ▪ In 1970 56% of prod. exported, 1995 70% exp. ▪ Export volume increased by 43% since 1970 	Sawn wood 8 mill m³ <ul style="list-style-type: none"> ▪ Production increased by 45% since 1970 ▪ 60-65% of prod. exported 1970-1995 ▪ Export volume increased by 30% since 1970
	Plywood 0.8 mill. m³ <ul style="list-style-type: none"> ▪ Volume doubled since 1960 ▪ 95% of prod. exported 	Plywood 0.1 mill m³ <ul style="list-style-type: none"> ▪ Stable volume 1970-1990 ▪ 80% of prod. exp. 	Plywood 0.2 mill. m³ <ul style="list-style-type: none"> ▪ Strong volume growth in 1980s ▪ 96% of prod. exp.
	Particled. 0.5 mill.m³ <ul style="list-style-type: none"> ▪ Prod. decreased from the peak of 1980 (0.8 mill.m³) ▪ 40% of prod. exp. 	Particled. 0.6 mill.m³ <ul style="list-style-type: none"> ▪ Prod. decreased from the peak of 1980 (1.2 mill. m³) ▪ 25% of prod. exp. 	Particled. 1.6 mill.m³ <ul style="list-style-type: none"> ▪ Production 3-fold compared to 1970 ▪ 55% of prod. exported
<i>Pulp (1995)</i> <i>Chemical + mechanical</i>	Pulp 10 mill. t (total) <ul style="list-style-type: none"> ▪ Production increased by 67% since 1970 ▪ In 1970 50% of prod. exported, now 20% 	Pulp 10.5 mill. t (total) <ul style="list-style-type: none"> ▪ Production increased by 25% since 1970 ▪ In 1970 46% of prod. exported, now 25% 	Pulp 1.6 mill. t (total) <ul style="list-style-type: none"> ▪ Production increased by 60% since 1970 ▪ In 1970 14% of prod. exported, now 14,5%
<i>Paper and paperboard (1995)</i>	Paper & p.b. 10.9 mill. t <ul style="list-style-type: none"> ▪ Production increased by 153% since 1970 ▪ In 1960 80% of prod. exported, now 90% ▪ Export volume increased by 174% since 1970 	Paper & p.b. 9.2 mill. t <ul style="list-style-type: none"> ▪ Production increased by 109% since 1970 ▪ In 1970 65% of prod. exported, now 85% ▪ Export volume increased by 159% since 1970 	Paper & p.b. 3.6 mill. t <ul style="list-style-type: none"> ▪ Production increased by 250% since 1970 ▪ In 1970 45% of prod. exported, now 72% ▪ Export volume increased by 420% since 1970

<i>Demand for wood (1995)</i>	Sawmills 25 mill. m³ ▪ increased by 30% in 70-95 Pulp mills 33 mill. m³ increased by 32% in 70-95 Imports 11 mill. m³ increased by 122% in 75-95 Consumption growth 31% in 70-95	Sawmills 32 mill. m³ ▪ increased by 50% in 75-95 Pulp mills 40 mill. m³ increased by 14% in 75-95 Imports 8 mill. m³ increased by 120% 75-95 Consumption growth 20% in 75-95	Sawmills 12 mill. m³ ▪ increased by 50% in 70-95 Pulp mills 6 mill. m³ increased by 60% 70-95 Imports 7 mill. m³ increased by 180% 75-95 Consumption growth 54% in 70-95
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In 1970 Sweden produced 8 million tons of pulp while Finland's production was 6 million tons. Since that the production growth has been stronger in Finland than in Sweden, and in the mid 1990s Finland has overtook Sweden. Also Austrian production of pulp has grown significantly since 1970.

In Finland and Sweden about 50 % of the pulp production was exported in 1970. In the mid 1990s the export share was decreased to 20-25 %. In Austria the export share of the pulp production has been quite stable at 14 % to 15 %.

The growth of paper and paperboard production volumes has been strong in all three countries. The strongest the growth was in Austria but also the growth of the Finnish production has been rapid. Sweden has the smallest growth figures, although the Swedish production has doubled since 1970. In Austria the volume is, however, still much lower than in Finland and Sweden.

In the mid 1990s, Finland is both the biggest producer and exporter of paper and paperboard. In the mid 1990s about 90 % of the production has been exported from Finland. The share has, however, not increased very strongly after 1970 since it was over 80% already then. The Swedish paper exports are somewhat below the Finnish figures both in volume and in share of the production. Yet, Sweden has increased the exports proportion more than Finland i.e. from 65 % to 85 %. Although Austria is clearly behind Finland and Sweden in production and export volumes of paper and paperboard, its production and exports have grown the most strongly. Similar is the case with the share that Austrian paper and paperboard exports account for the production.

Imports of roundwood have increased in all three countries. Finland imported the biggest volumes in the mid 1990s. However, since 1975 Austria has increased its roundwood imports most strongly. Austria's import volumes have been bigger than Sweden's, some years equal to Finnish volumes. After 1995, imports of round wood has continued to increase in all the three countries. Sweden and Austria have imported roundwood mainly from the EU candidate countries, whereas Finland imports almost solely from Russia.

The Swedish and Finnish forest industries use logs and pulpwood almost equal amounts but in Austria logs are consumed about a double amount over the pulpwood consumption. This reflects the difference in the structure of forest industry: In Sweden and Finland forest industry is dominated by the pulp and paper industry in economic terms and also in terms of total wood fibre consumption while it is the opposite in Austria.

Quite interestingly, the demand for logs has been increased more than the demand for pulpwood in all the three countries. Even though the development of the Swedish and Finnish forest industry has been the opposite. In Finland and Sweden, the increase in sawn wood production was about 25% in 1970 to 1995, while the use of domestic log timber increased by more than 90% in Finland and by 50% in Sweden. This can partly be explained by the development of other wood products industries, such as plywood production. In Austria, the use of domestic logs grew somewhat less than the production of sawn wood. This can be explained by the strong growth in imports of roundwood.

Pulp production has increased by about 60% in Austria and Finland, and by 25% in Sweden. The increase in use of domestic pulpwood and imports have nearly the same growth figures at least in Finland and Sweden where the imports of roundwood consist mainly of pulpwood. However, paper production has increased much more strongly than pulp production in each country. This must reflect the decrease in pulp exports but also increased efficiency in fibre use and increase in the use of other substances in paper making. Austrian paper industry in particular uses a lot of recovered fibre.

Overall, it seems that particularly in Finland and Sweden the development has not led towards more efficient use of raw material in sawmilling industry. On the other hand, in pulp and paper production the use of wood seems to have become much more efficient during the past decades. This observation does not take into account the changes in measurement of tim-

ber. Furthermore, at least in Finland the strongly grown plywood production capacity explains the strong increase in the use of sawlogs.

4.3 Discussion

The forest sector experienced quite strong growth from 1970-1995 in Austria, Finland and Sweden: paper production and exports more than doubled in each of these three countries. However, wood industry production and the use of roundwood have also increased, although not as much.

Overall, this study refutes the argument that the forest sector is experiencing its "sunset". Growth within the forest sector has continued since the 1970s, and it accelerated rather than slowed during the 1990s. Furthermore, the quality of products and environmental technology have developed strongly.

This study also shows that growth in the forest sector has been possible in the three countries examined despite their different systems and traditions in roundwood trade, and despite structural differences in forest ownership and the forest industry. On the other hand, the countries share important similarities such as private forest ownership, and the role of forest sector in the national economy is strong in all three.

Interestingly, it seems that forest sector growth in Finland has been led by investments in the pulp and paper industry. However, the sawmill sector has also undergone recessions in terms of production and even production capacity. In Sweden during the 1990s the sawmill industry was the sector with the strongest capacity growth after a long and quite stable period. The sawmill industry has traditionally dominated the forest industry in Austria, but in the 1990s investments in both sawmill and paper capacity increased strongly.

Global issues have also contributed to the development of the forest sector in these countries. For instance, in the 1990s export volumes to Asia, especially to Japan, increased mainly due to felling/logging restrictions in the USA placed for environmental reasons. This reduced both production and exports of sawn goods. The high value of the US\$ has also benefited European exports to Asia.

Austria, Finland and Sweden joined the European Union in 1995. This changed the forest sector of the Union markedly, making it almost self-

sufficient in some forest products and a net exporter of others for which it had been a net importer.

EU membership also changed the idea of the export markets for Austria, Finland and Sweden, which export their forest products mainly to the EU area. The common currency changed the former export markets into domestic markets. However, Sweden remains outside the monetary union (EMU) and the typical characteristics of export markets with changing currency value still hold for Sweden. In addition, despite the EU and EMU, European countries are still culturally, geographically, economically and traditionally different from each other. In this sense, nothing in exporting has dramatically changed. The demand for forest products and roundwood still depends on the economic, and also on the social and cultural developments in the export destination countries.

The development of forest industry production in Austria, Finland and Sweden in 1970-1995 suggests that pulpwood use might have grown quite strongly, and the use of sawlogs moderately. Surprisingly, the use of sawlogs has increased heavily but the use of pulpwood only moderately. This is particularly the case in Finland and Sweden, where the paper and sawmilling industries are integrated, which reflects the long-term impacts of technology change on the use of roundwood in the forest industry. Technological development seems to have reduced the need for roundwood in paper production, but the same does not apply to the sawmill industry. Hence, in forecasting the demand for roundwood it is important to take into account that the production of the forest industry indicates the direction in the consumption of wood. In the long term, however, these may not develop at even close to the same rate.

Economic integration is generally believed to enhance the integration of commodity markets. The markets for forest industry products are international and presumably well integrated in Europe. Regarding roundwood markets, it seems that Finland and Sweden already have integrated wood markets (Toivonen et al. 2000). However, general integration of the European roundwood markets probably does not yet hold. On the other hand, in the 1990s the major forest industry companies were global rather than 'Finnish' or Swedish'. The rapid internationalisation and consolidation of the forest industry, and the political and economic integration process within Europe, will probably further enhance integration in European roundwood markets.

Another factor that may increase the integration of roundwood markets is physical trade. Roundwood trade between the present EU(15) countries is

small. However, this paper shows that Austria, Finland and Sweden already are major importers of roundwood even on a global scale. This import creates a link between Finland, Sweden and Austria, and the East-European and Russian wood markets. Therefore, the eastward integration of the EU may particularly deepen the integration of roundwood markets within Europe. The eastward enlargement will also make the EU almost self-sufficient in roundwood and in sawn goods, at least for some time. After the enlargement, only the Finnish forest industry will remain dependent on imports of roundwood from outside the EU area. Overall, studying the impacts of the eastward enlargement of the EU on the forest sector is a challenge for future research.

Neither forest resources nor wood reserves have so far limited the domestic wood supply in Austria, Finland or Sweden; the use of domestic wood has continuously been less than the annual growth in each country. However, interests within society may lead to limitations in wood supply in the future, at least in some regions. For example, discussions on nature conservation apply to all European countries. Increasing imports may help in this situation, but it makes the EU's forest industry increasingly dependent on wood imports, in practice from Russia.

Another real matter that may have notable impacts on the forest sector is climate change and related political processes. It is not clear how the climate change process will impact on forest resources and wood markets. It could increase afforestation and wood supply in some regions; on the other hand, the process may also lead to restrictions in wood supply.

Whatever future shocks take place on the European roundwood markets, price impacts are likely to spread faster and more widely due to the deepening integration of roundwood markets. The impacts will also extend to import prices outside the EU region, presuming that the markets are sufficiently competitive. Therefore, research into the integration of roundwood markets within the EU area is needed, including the applicant countries.

In future, possibilities to supply increasing quantities of industrial roundwood in Europe should be studied. This is interesting from the point of view of forest sector growth. There is also a need for more efficient utilisation of wood. Moreover, the markets of the common goods provided by forests should be studied, as well as the demands in society for benefits other than wood that forests provide.

TIIVISTELMÄ

Raakapuun tarjonta

Tässä tutkimuksessa tarkastellaan Suomen, Ruotsin ja Itävallan raakapuun markkinoiden kehitystä vuosina 1970-1995. Puuvarojen kehitystä (raakapuun tarjontaa) kuvataan tarkastelemalla metsävarojen, metsän omistuksen, hakkuiden ja raakapuukaupan kauppatapojen kehitystä (Taulukko 3).

Taulukko 3. Yhteenvedo: Raakapuutarat, hakkuut ja metsien omistus vuonna 1995

	SUOMI	RUOTSI	ITÄVALTA
Metsäala, % maapinta-alasta (1995)	20 milj. ha , 66% ▪ Kasvaa 3 milj. ha v:sta 1960, voimakas metsittäminen	22 milj. ha , 55% * ▪ Ala pienentynyt. Suojelumetsiä lisätty (1980), ei tilast. metsämaahan	4 milj. ha , 47% ▪ kasvaa 0,2 milj. ha v:sta 1970, metsitys ja mittausmenet. muutokset
Puuston tilavuus ja vuotuinen kasvu (1995)	1900 milj.m³, 80 milj.m³ ▪ Puuston määrä kasvanut 400 milj. m ³ v:sta 1970 (+27%) • Vuotuinen kasvu lis. 20 milj. m ³ (+35%)	2900 milj.m³, 100 milj.m³ ▪ Puuston määrä kasvanut 480 milj. m ³ vuodesta 1970 (+20%) ▪ Vuotuinen kasvu lis. 25-30 milj. m ³ (+35%)	1000 milj.m³, 31 milj.m³ ▪ Puuston määrä lisääntynyt 200 milj. m ³ vuodesta 1980 (+25%) ▪ Vuotuinen kasvu lis. 11 mill. m ³ (+60%)
Metsien omistus (1995)	▪ Yksityiset 62% (-) ▪ Valtio 24% (±) ▪ Yritykset 9% (+) ▪ Muut 5%	▪ Yksityiset 50% (±) ▪ Yritykset 40% (+) ▪ Valtio&muut 10% (-)	▪ Yksityiset 80% (+) ▪ Valtio 15% (±) ▪ Muut 5% (-)
Markkina-hakkuut (1995)	51 milj. m³ ▪ Kasvaa 6 milj. m ³ v:sta 1970 (+13%) ▪ Yksityiset 90% hakkuista (+)	70 milj. m³ ▪ Kasvaa 13 milj. m ³ v:sta 1975 (+23%) ▪ Yksityiset 60% hakkuista	14 milj. m³ ▪ Kasvaa 3 milj. m ³ v:sta 1970 (23%) ▪ Yksityiset 80-85% hakkuista
Kaupan-käyntitavat	Pystykaupat 75% Hintaneuv. lopetettu 1999	Hankintakaupat 65% Hintaneuv. lopetettu 1996	Hankintakaupat 90% Hintaneuv. lopetettu 1995

+ = kasvua - = laskua (±) = ennallaan

- Ruotsissa taloudellisen käytön piirissä olevan metsämaan + luonnonsuojelualueiksi siirrettyjen metsien ala on yhteensä 23 milj. ha.

- Tarkasteltavista maista Ruotsissa metsämaan ala on suurin. Puuntuotantoon käytettävän metsämaan ala on Ruotsissa kuitenkin pienentynyt, kun metsämaata on siirretty suojelualueiksi. Ruotsissa suojelumetsiä ei tilastoida metsämaahan. Suomessa ja Itävallassa metsämaan ala on kasvanut vuosina 1970-1995 pääasiassa metsittämisen seurauksena. Nämä kolme maata ovat EU:n(15) metsäisimmät valtiot.
- Myös puuston tilavuus on näistä kolmesta maasta suurin Ruotsissa. Kaikissa kolmessa maassa puuston määrä on kasvanut noin neljänneksen vuosina 1970-1995. Itävallassa puuston vuotuinen kasvu on lisääntynyt voimakkaimmin. Mittausmenetelmät ovat kuitenkin kehittyneet ja muuttuneet tarkastelujakson aikana näissä maissa. Tämä vaikeuttaa jossain määrin metsämaan alan sekä puuston määrän ja vuotuisen kasvun arviointia.
- Yksityiset metsänomistajat ovat suurin metsänomistajaryhmä ja tarjoavat eniten raakapuuta markkinoille kaikissa kolmessa maassa. Metsäyhtiöiden omistusosuus metsistä on kasvanut erityisesti Ruotsissa, missä metsäyhtiöt omistavat noin 40 % metsämaan alasta. Metsäyhtiöt ovat siten myös tärkeitä raakapuun tarjoajia. Valtio on merkittävä metsänomistaja ja raakapuun toimittaja Suomessa (24 %) ja Itävallassa (15 %). Näissä kahdessa maassa, varsinkin Suomessa, valtio on myös tärkeä toimija raakapuumarkkinoilla.
- Markkinahakkuiden määrä on ollut kasvussa näissä maissa, vaikka yksittäisten vuosien välillä voi olla suuriakin eroja. Ruotsi on määrällisesti EU:n suurin raakapuun toimittaja ja Suomi toiseksi suurin. Hankintakaupat ovat vallitseva kauppamuoto Ruotsissa ja Itävallassa, Suomessa pystykaupat. Puuston vuotuiseseen kasvuun nähden hakkuut eivät ole Itävallassa yhtä intensiivisiä kuin Suomessa ja Ruotsissa. Hakkuut jäävät kuitenkin selvästi alle puuston vuotuisen kasvun kaikissa näissä maissa, kuten koko EU:ssakin. Siten puuston määrä kasvaa jatkuvasti.
- Kaikissa kolmessa tarkasteltavassa maassa on ollut käytössä erilaisia kollektiivisia hintaneuvottelujärjestelmiä, jotka ovat ohjanneet raakapuun kauppaa. EU:n jäsenyyden myötä vuonna 1995 uudistuneet kilpailulait lopettivat perinteiset kollektiiviset neuvottelujärjestelmät näissä maissa.

Metsäteollisuus ja raakapuun kysyntä

Raakapuun kysyntään vaikuttavat metsäteollisuustuotteiden tuotantovolyymit. Yhteiskunnan yleinen taloudellinen aktiivisuus puolestaan vaikuttaa metsäteollisuustuotteiden kysyntään. Raakapuu on siten tyypillinen tuote, jonka kysyntä on johdettua. Siksi raakapuumarkkinoiden kehityksen tarkastelu edellyttää varsinaisten raakapuumarkkinoiden lisäksi myös mekaanisen ja kemiallisen metsäteollisuuden kehityksen tarkastelua.

Metsäteollisuustuotteiden vienti ja raakapuun tuonti ovat lisääntyneet kaikissa kolmessa tarkasteltavassa maassa viime vuosikymmenten aikana. Taulukossa 4 esitetään vuoden 1995 tuotantotasot sekä yhteenveto kehityksestä vuosina 1970-1995.

- Jokaista näistä kolmesta maasta voidaan pitää eurooppalaisittain ja jopa maailmanlaajuisesti merkittävänä puutavaran viejänä. Suomi ja Ruotsi ovat lisäksi suuria paperin ja kartongin viejiä sekä Euroopassa että koko maailmassa. Kaikki kolme maata vievät pääosan niin sahatavaran kuin paperin tuotannostaankin ja viennin osuus tuotannosta on kasvanut jokaisessa maassa vuodesta 1970 lähtien. Kaiken kaikkiaan metsäteollisuuden tuotantomäärät ovat kasvaneet näissä maissa ja metsäteollisuudesta on tullut hyvin selvästi vientisuuntautunutta.
- Sahatavaran tuotanto on kasvanut kaikissa kolmessa maassa. Sahatavaran tuottajana Ruotsi on näistä maista suurin, mutta Itävallassa kasvu on ollut voimakkainta vuosina 1970-1995. Suomi puolestaan vie tuotannostaan suhteellisesti eniten. Sahatavaran tuotanto ja vienti ovat Itävallassa selvästi lähempänä Ruotsin ja Suomen tasoa kuin paperin ja kartongin tuotanto ja vienti.
- Suomessa vanerin tuotanto on lisääntynyt voimakkaasti ja Suomi on näistä kolmesta maasta selvästi suurin vanerin tuottaja. Kaikissa kolmessa maassa vanerin tuotanto menee lähes kokonaan vientiin. Lastulevyn tuotanto on pienentynyt sekä Suomessa että Ruotsissa vuodesta 1980 lähtien, kun taas Itävallassa tuotanto on kasvanut voimakkaasti.

Taulukko 4. Yhteenveto metsäteollisuuden kehityksestä ja raakapuun käytöstä vuosina 1970-1995.

	SUOMI	RUOTSI	ITÄVALTA
<i>Mekaanisen metsäteollisuuden tuotanto (1995)</i>	<p>Sahatavara 9.5 milj.m³</p> <ul style="list-style-type: none"> Tuotannon kasvu 27% vuodesta 1970 V. 1970 64% tuotannosta vientiin, v. 1995 77% Viennin määrä kasvanut 50% vuodesta 1970 <p>Vaneri 0.8 milj. m³</p> <ul style="list-style-type: none"> Tuotannon määrä kaksinkertaistunut v:sta 1960 95% tuotannosta vientiin <p>Lastulevy 0.5 milj.m³</p> <ul style="list-style-type: none"> Tuotanto laskenut v:n 1980 huipusta(0.8 milj.m³) 40% tuotannosta vientiin 	<p>Sahatavara 15 milj. m³</p> <ul style="list-style-type: none"> Tuotannon kasvu 25% vuodesta 1970 V. 1970 56% tuotannosta vientiin, v.1995 70% Viennin määrä kasvanut 43% vuodesta 1970 <p>Vaneri 0.1 milj. m³</p> <ul style="list-style-type: none"> Tuotannon määrä vakaana v. 1970-1990 80% tuotannosta vientiin <p>Lastulevy 0.6 milj.m³</p> <ul style="list-style-type: none"> Tuotanto laskenut v:n 1980 huipusta(1.2 milj.m³) 25% tuotannosta vientiin 	<p>Sahatavara 8 milj m³</p> <ul style="list-style-type: none"> Tuotannon kasvu 45% vuodesta 1970 60-65% tuotannosta vientiin v. 1970-1995 Viennin määrä kasvanut 30% vuodesta 1970 <p>Vaneri 0.2 milj. m³</p> <ul style="list-style-type: none"> Tuotannon määrä kasvanut voimakkaasti 1980-tuotannosta vientiin <p>Lastulevy 1.6 milj.m³</p> <ul style="list-style-type: none"> Tuotanto kolminkert. vuoteen 1970 verrattuna 55% tuotannosta vientiin
<i>Massan tuotanto (1995) Kemiall.+ mekaaninen</i>	<p>Massa 10 milj. tn (yht.)</p> <ul style="list-style-type: none"> Tuotannon kasvu 67% vuodesta 1970 V. 1970 50% tuotannosta vientiin, nyt 20% 	<p>Massa 10.5 milj. tn (yht.)</p> <ul style="list-style-type: none"> Tuotannon kasvu 25% vuodesta 1970 V. 1970 46% tuotannosta vientiin., nyt 25% 	<p>Massa 1.6 milj. tn (yht.)</p> <ul style="list-style-type: none"> Tuotannon kasvu 60% vuodesta 1970 V. 1970 14% tuotannosta vientiin, nyt 14,5%
<i>Paperin ja kartongin tuotanto (1995)</i>	<p>Paperi & kart 10.9 milj. tn</p> <ul style="list-style-type: none"> Tuotannon kasvu 153% v:sta 1970 V. 1960 80% tuotannosta vientiin, nyt 90% Vientimäärä kasvanut 174% v:sta 1970 	<p>Paperi & kart. 9.2 milj. tn</p> <ul style="list-style-type: none"> Tuotannon kasvu 109% v:sta 1970 V. 1970 65% tuotannosta vientiin, nyt 85% Vientimäärä kasvanut 159% v:sta 1970 	<p>Paperi & kart. 3.6 milj. tn</p> <ul style="list-style-type: none"> Tuotannon kasvu 250% v:sta 1970 V. 1970 45% tuotannosta vientiin, nyt 72% Vientimäärä kasvanut 420% v:sta 1970

<i>Raakapuun käyttö (sis. tuonti) (1995)</i>	Sahat 25 milj. m³ ▪ kasvua 30% v. 70-95 Massateoll. 33 milj. m³ • kasvua 32% v. 70-95 Kulutuksen kasvu 31% v. 70-95	Sahat 32 milj. m³ ▪ kasvua 50% v. 75-95 Massateoll. 40 milj. m³ • kasvua 14% v. 75-95 Kulutuksen kasvu 20% v. 75-95	Sahat 12 milj. m³ ▪ kasvua 50% v. 70-95 Massateoll. 6 milj. m³ • kasvua 60% v. 70-95 Kulutuksen kasvu 54% v. 70-95
<i>Raakapuun tuonti (1995)</i>	Tuonti 11 milj. m³ • kasvua 122% v. 75-95	Tuonti 8 milj. m³ • kasvua 120% v. 75-95	Tuonti 7 milj. m³ • kasvua 180% v. 75-95

- Vuonna 1970 Ruotsissa tuotettiin sellua 8 miljoonaa tonnia ja Suomessa 6 miljoonaa tonnia. Tämän jälkeen tuotanto on kasvanut Suomessa voimakkaammin kuin Ruotsissa ja 1990-luvun puolivälissä Suomen tuotanto on saavuttanut Ruotsin. Myös Itävallassa sellun tuotanto on kasvanut tuntuvasti vuoden 1970 jälkeen.
- Suomessa ja Ruotsissa noin 50 % sellun tuotannosta meni vientiin vuonna 1970. Viennin osuus on laskenut 20-25 prosenttiin 1990-luvun puoliväliin mennessä. Itävallassa viennin osuus sellun tuotannosta on pysynyt melko tasaisesti 14-15 prosentissa.
- Paperin ja kartongin tuotanto on kasvanut voimakkaasti kaikissa kolmessa maassa. Voimakkainta kasvu on ollut Itävallassa, mutta myös Suomessa tuotanto on noussut nopeasti. Ruotsissa kasvu on ollut pienintä näistä maista, vaikka Ruotsin tuotanto onkin kaksinkertaistunut vuodesta 1970. Itävallassa tuotantomäärät ovat kuitenkin edelleen huomattavasti alhaisemmat kuin Suomessa ja Ruotsissa.
- Suomi on suurin sekä paperin ja kartongin tuottajana että viejänä 1990-luvun puolivälissä. Tällöin Suomen tuotannosta on mennyt vientiin noin 90 %. Viennin osuus ei kuitenkaan ole lisääntynyt kovin voimakkaasti vuoden 1970 jälkeen, jolloin osuus jo oli yli 80 %. Ruotsin paperivienti on määrällisesti hieman Suomen vientiä pienempi. Viennin osuus tuotannosta on Ruotsissa myös pienempi kuin Suomessa. Ruotsi on kuitenkin lisännyt viennin osuutta Suomea voimakkaammin eli 65 prosentista 85 prosenttiin. Vaikka Itävalta on sekä paperin ja kartongin tuotanto-että vientimäärissä selvästi Suomea ja Ruotsia jäljessä, on tuotannon ja viennin kasvu ollut Itävallassa kaikkein voimakkainta. Sama pätee viennin osuuteen Itävallan paperi- ja kartonkituotannosta.

- Kaikissa kolmessa maassa raakapuun tuonti on kasvanut. Suomi on tuonut raakapuuta määrällisesti eniten 1990-luvun puolivälissä. Itävalta on kuitenkin lisännyt raakapuun tuontia voimakkaimmin vuoden 1975 jälkeen. Raakapuun tuonti Itävaltaan on ollut määrällisesti suurempi kuin Ruotsin tuonti. Joinakin vuosina Itävallan raakapuun tuonti on määrällisesti yltänyt jopa Suomen tasolle. Vuoden 1995 jälkeen raakapuun tuonti on edelleen lisääntynyt kaikissa kolmessa maassa. Ruotsiin ja Itävaltaan puuta on tuotu enimmäkseen EU:n jäsenyyttä hakevista maista, kun taas Suomi on tuonut raakapuuta lähes yksinomaan Venäjältä.
- Ruotsissa ja Suomessa metsäteollisuus käyttää kuitupuuta enemmän kuin tukkipuuta. Itävallassa metsäteollisuus käyttää tukkipuuta kaksinkertaisesti sen, mitä se käyttää kuitupuuta. Tämä heijastaa metsäteollisuuden rakenteiden erilaisuutta: Ruotsissa ja Suomessa massa- ja paperiteollisuus on hallitseva sektori sekä taloudellisessa mielessä että puukuidun kulutuksessa. Itävallassa sen sijaan sahateollisuudella on merkittävämpi asema kuin massa- ja paperiteollisuudella.
- Kaikissa kolmessa maassa tukkipuun käyttö on kasvanut enemmän kuin kuitupuun käyttö. Siitäkin huolimatta, että Ruotsissa ja Suomessa massa- ja paperiteollisuuden tuotanto on kehittynyt sahateollisuuden tuotantoa voimakkaammin: Suomessa ja Ruotsissa sahatavaran tuotanto on kasvanut noin 25 % vuosina 1970-1995, kun kotimaisen tukin kulutus kasvoi Suomessa yli 90 % ja Ruotsissa 50 %. Osittain tätä selittää puutuoteteollisuuden muiden sektoreiden kuten vaneriteollisuuden kasvu. Itävallassa kotimaisen tukin käyttö kasvoi hieman vähemmän kuin sahatavaran tuotanto. Tätä puolestaan selittää raakapuun tuonnin voimakas lisäys Itävallassa.
- Massan tuotanto on kasvanut noin 60% sekä Itävallassa että Suomessa ja 25 % Ruotsissa. Kotimaisen kuitupuun sekä tuontipuun käytön lisäys ovat kasvaneet lähes yhtä paljon ainakin Suomessa ja Ruotsissa, joihin tuodaan pääasiassa kuitupuuta. Paperin tuotanto on kuitenkin kasvanut paljon sellun tuotantoa voimakkaammin kaikissa kolmessa maassa. Taustalla lienee massan viennin väheneminen sekä täyteaineiden lisääntynyt käyttö paperin valmistuksessa. Varsinkin Itävallan paperiteollisuus käyttää runsaasti myös kierrätyskuitua.
- Kaiken kaikkiaan kehitys ei näytä johtaneen sahateollisuudessa tehokkaampaan raaka-aineen käyttöön varsinkaan Suomessa ja Ruotsissa.

Toisaalta massan ja paperin valmistuksessa puun käyttö näyttää tehos-
tuneen huomattavasti viime vuosikymmenien aikana. Puun mittaukses-
sa ja puutavaralajien määrittelyssä tapahtuneita muutoksia ei tässä tar-
kastelussa kuitenkaan ole huomioitu. Lisäksi vanerin
tuotantokapasiteetin kasvu selittää tukkipuun käytön voimakasta lisäys-
tä ainakin Suomessa.

- Kaiken kaikkiaan voidaan todeta, että kaikissa kolmessa maassa met-
säsektorin kasvu on jatkunut 1970-luvulta asti ja 1990-luvulla kasvu pi-
kemminkin kiihtyi kuin hidastui. Myös tuotteiden laadussa ja ympäristö-
teknologiassa on kehitys ollut voimakasta. Siten väite, jonka mukaan
metsäteollisuus olisi "auringonlaskun toimiala", ei tämän tarkastelun pe-
rusteella pidä paikkaansa.

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