Fondazione Eni Enrico Mattei

Trade Liberalisation,
Changing Forest Management and
Roundwood Trade in Europe

Kari Kangas*
NOTA DI LAVORO 53.2001

*European Forest Institute, Finland

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Kari Kangas, European Forest Institute, Torikatu 34, FIN-80100 Joensuu, Finland. Email: kari.kangas@joensuu.fi

Abstract

This paper analyses the development of roundwood trade in Europe in the context of changes in supply and trading patterns due to liberalisation in European transitional economies (CEEC), nature-oriented forest management as well as prospective EU enlargement. First, it is studied whether roundwood imports have extended their share in apparent consumption in the EU and whether liberalisation in CEEC has changed the geographical composition of imports. Next, the development of the export structure of EU accession candidates is examined. Finally, rough assessments of the sustainability of roundwood production in CEEC as well as future of the trade flows in Europe are provided.

JEL Classification: F14, F15, F18, L73, P33, Q23

Keywords: European Union, accession candidates, roundwood, exports, imports, gravity models

Non-technical abstract

The general trend in forest industry has been increasing international trade, not only trade in end products but also in roundwood, which is necessary raw material for the forest industry. This paper analyses the links between European roundwood trade, liberalisation in central and European countries in transition (CEEC) and changing forest management in EU countries. Forest management practises in different countries are connected through international trade, and supply restrictions due to nature-oriented forest management may relocate fellings into other countries. On the other hand, transitional countries have opened up their forest resources for international trade and provide a source of supply also for EU countries. This may be particularly the case with accession candidates which have been strongly intensifying their trade with the EU. The main questions raised in this study were: (1) whether imports have extended their share in apparent consumption in the EU; (2) whether liberalisation in CEEC has changed the geographical composition of EU imports; and (3) whether export structure of EU accession candidates has changed. Finally, a rough assessment of the sustainability of roundwood production in CEEC as well as of future trade flows is provided.

The results indicated that during the 1990s production of industrial roundwood in the EU has been rather steady while imports have almost doubled. The share of imports from total supply has increased from 10% to 19% during the study period but domestic roundwood is still the most important source of supply for EU countries. Accession candidates have been gaining more share in EU markets and together with Russia they hold a bigger share than imports from other EU countries. Based on statistics, fellings seem to be on a sustainable basis in CEEC, even though there are no possibilities for significant increases in annual fellings. It seems that imports from accession candidate countries will provide only a temporary source of roundwood for the EU forest industry and subsequent to enlargement European Union still has to find other sources of supply, probably from Russia and other countries of the former Soviet Union. In any case, CEEC provide the most interesting area for the European forest sector with their growing demand for forest products and strengthening domestic industry.

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1. Introduction

The general trend in forest industry has been increasing international trade. In 1961 the world roundwood imports totalled 38 million cubic meters, representing around 4% of the production of industrial roundwood (FAO 2001). In 1999, the world imports of roundwood already amounted to 111 million cubic meters, 7% of total roundwood production.

Two environmentally related reasons for increasing trade can be identified. In the European context, regardless of expanding forest resources, utilisation rates of forests are approaching the limit defined with sustainability indicators. Also the continuous tendency towards increasing conservation of forests has forced the supply to be met from other forest resources. Multifunctional forest management is gaining an increasingly important role, which raises also the role played by forest conservation (Farrell et al. 2000, Peck 1998). Nature-oriented forest management alters also the felling possibilities, not only within national borders, but also internationally through trading channels (Wardle & Michie 1998, Kallio et al. 1987, Nabuurs et al. 2001). Trade forms a direct link between forest management practises in different countries in Europe and nature-oriented forest management may relocate fellings into other countries (Nabuurs et al. 2001).

Liberalisation in formerly centrally planned countries has opened alternative sources of supply. In this context, four types of possible physical and economic impacts of trade flows and liberalisation on environment can be distinguished. Product effects, technology effects, scale effects and structural effects can be either positive or negative (Environment and trade 2000). Structural effects refer to the tendency of trade liberalisation to change the composition of the economy according to comparative advantages. This would foster development but opening up the domestic natural resources for international demand may cause environmental degradation and rapid depletion of resources without appropriate policies (Environment and trade 2000).

Liberalisation in CEEC fostered by a tendency towards integration into the western markets has had a profound impact on trading patterns in Europe. Studies have found evidence that trade between the EU and Central and Eastern European access candidates could already be above the normal pattern (that would be expected based on income and distance), and thus indicate preferential trade. CEEC trade with the EU was below normal level in the late 1980s (van Bergeijk & Oldersma 1990) and in the early 1990s (Fidrmuc & Firdmuc 2000). Brenton & Kendall (1994) suggested that trade was above average already in 1992, even though mostly driven by Germany. Fidrmuc & Fidrmuc (2000) found that trade intensity between East and West normalised during the 1990s and slightly exceeded the normal level in the late 1990s. In trade in forest products, European Union is already the most important trading partner for the accession candidates (Kangas & Niskanen 2001).

This paper provides a preliminary analysis on the changes that occurred in roundwood trade in Europe in the 1990s. The questions of whether imports have extended their share in apparent consumption in the EU, and whether liberalisation in CEEC has changed the geographical composition of imports are studied. The development of the export structure of EU accession candidates is also studied. Finally, a rough assessment of the sustainability of roundwood production in CEEC as well as of future trade flows is provided.

2. Material and methods

Bilateral trade flows are from EFI/WFSE Forest Products Trade Flow Database, which has been constructed from UN Comtrade data. Some graphs presented in this study are also produced based on the UN FAOSTAT online database (www.fao.org) (FAO 2001).

In addition to descriptive analysis, a gravity equation is used to study the development of trading patterns (Anderson 1979, Bergstrand 1985, 1989, Helpman and Grugman 1985). Typically, in a gravity equation, the exporter's GDP is a proxy of i's national output in terms of units of capital, while exporter GDP per capita is a

proxy of *i*'s capital-labour endowment ratio. Importer GDP is *j*'s national income, and importer per capita GDP is *j*'s per capita income (Bergstrand 1989). When examining aggregate bilateral trade flows, the coefficient estimates are usually all positive.

When aggregate trade flows are distinguished into industries (or goods), Bergstrand (1989) suggests that an increase in an endowment of capital (labour) of a country tends to increase the output of capital-intensive (labour-intensive) industries in a multi-industry world. Consequently, the tendency of the coefficient for exporter's per capita income will be linked to the industry under study, i.e. whether it is capital- or labour-intensive.

Hence, if the elasticity of substitution in consumption for the industry exceeds unity (positive and significant estimate for exporter income), a positive (negative) coefficient for exporter per capita income indicates that the industry under study tends to be capital (labour) intensive (Bergstrand 1989). In addition, a positively (negatively) signed coefficient for importer per capita income is an indication of an industry's output being a luxury (necessity) in consumption.

Distance can be seen as a proxy for natural resistances for trade, which is a composition of transportation cost and time (Aitken 1973). Distance can be expected to have a negative effect on trade between countries.

In the present study, the following gravity equation is used:

$$PX_{ij} = \beta_0 (Y_i)^{\beta_1} (Y_j)^{\beta_2} (Y_i/L_i)^{\beta_3} (Y_j/L_j)^{\beta_4} (D_{ij})^{\beta_5}{}_{ij} (C_{ij})^{\beta_6} \varepsilon_{ij} \qquad (1)$$

where PX_{ij} is the value of trade flow from country *i* to country *j*, Y_i and Y_j denote the value of the GDP in exporting and importing country, respectively, $L_i(L_j)$ is the population of exporting (importing country), D_{ij} is the distance between trading partners, C_{ij} is a dummy variable which indicates that trade is between an EU country and access candidate, and ε_{ij} is a log-normally distributed error term. The countries included in the models were 15 EU members and CEEC accession candidates.

3. RESULTS
3.1 Roundwood trade in European Union

During the 1990s the production of industrial roundwood in European Union has been rather steady, around 220 million cubic meters annually (Figure 1). Exports have been moderately declining while imports have almost doubled from 27 million cum in 1990 to 48 million cum in 1999. Domestic roundwood is still the most important source of supply for forest industry in EU countries, but the share of imports has increased from 10% to 19% during the study period (Figure 2).
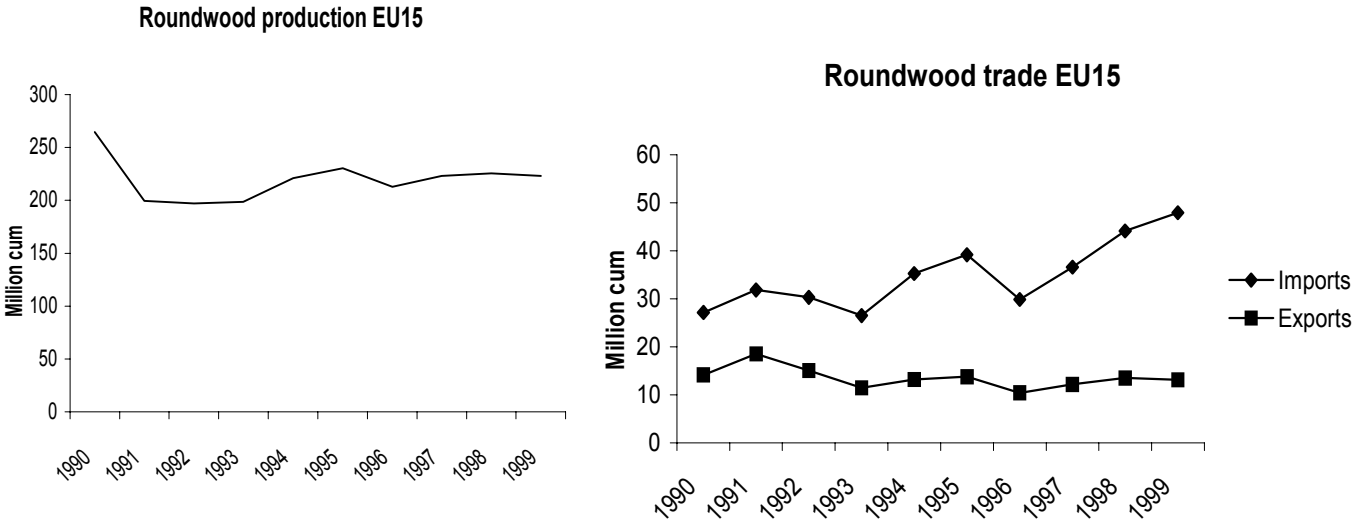
Figure 1. Roundwood production and trade in the EU (FAO 2001).
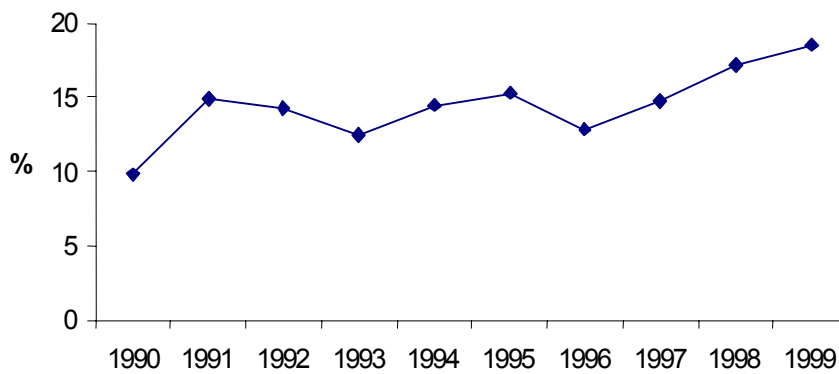
Figure 2. The share of imports from apparent roundwood consumption in the EU (FAO 2001).

Other member countries are still the most important source of imports inside the EU, but their share from total imports has been declining quite rapidly, from 43% to 30% during the period studied (Figure 3). The member candidates have strengthened their position, gaining a larger market share than Russia.

Figure 3. Geographical composition of EU roundwood imports, proportion of total value,% (EFI/WFSE Forest Products Trade Flow Database, constructed from UN Comtrade data).

3.2 The gravity models for European roundwood trade

The basic gravity models (model I) for European roundwood trade in 1994 (Table 1) and 1998 (Table 2) explained around 30% of the variation in bilateral trade flows. Negative and significant coefficient for distance is consistent with expectations. Positive coefficients for exporter's and importer's income were plausible with theory behind gravity equation, suggesting that the siz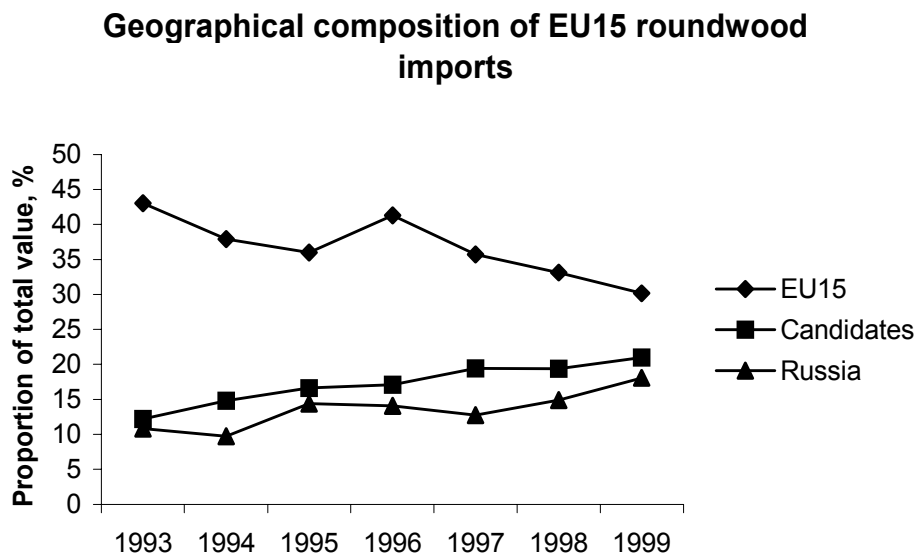e of the economies should enhance trade between countries. Positive and statistically significant coefficient for exporter income in the model for year 1994 (not significant in 1998) indicated that the elasticity of substitution in consumption for the industry exceeds unity. Thus, the negative and significant coefficient for exporter per capita income suggests that products under study tend to be labour intensive in production.

Importer per capita income holds a positive sign, which is not, however, significant in the model for year 1998. Theory would suggest that the positive sign is due to product being luxury in consumption, which in the case of roundwood does not sound very plausible. The likely reason for the sign of the coefficient may reside in the nature of the industry demanding roundwood. The main end-user for roundwood is the capital-intensive paper industry, which in most cases is located in EU countries which have high per capita incomes. Coefficient for exporter per capita income was negative, which plausibly suggests that roundwood production is labour-intensive. However, those coefficients were not significant.

The coefficient for the dummy-variable for EU imports from accession candidate countries was negative and statistically insignificant in 1994, and negative and significant in 1998. This indicated that imports from accession candidates were below the level that could be expected based on gravity variables. On the other hand, the coefficient for intra-EU trade was positive and significant in both years. The coefficient was even higher in 1998 compared to 1994. There are two likely reasons for this. First, forest resources in the EU are much larger compared to those in accession candidates. Second, the coefficient for dummy-variable for trade between accession countries was positive and significant in 1998 (the models are not reported

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here) indicating intensifying trade between accession candidates. This is due to strengthening forest industry in accession countries.

Table 1. Gravity models for European bilateral trade in roundwood in 1994 (logarithmic transformations were used), coefficients (standard errors in parentheses).

Variable	I	II	III
Constant	-6.490*	-6.181*	-0.620
	(2.891)	(2.906)	(3.794)
Distance	-1.893***	-1.869***	-1.964***
	(0.206)	(0.208)	(0.207)
Importer GDP	0.448**	0.460**	0.436**
	(0.133)	(0.133)	(0.132)
Exporter GDP	0.427**	0.420**	0.414**
	(0.131)	(0.131)	(0.130)
Importer GDP/capita	0.592*	0.678**	0.338
	(0.227)	(0.243)	(0.250)
Exporter GDP/capita	-0.376	-0.518	-0.702**
	(0.226)	(0.265)	(0.263)
East-West trade		-0.537	
		(0.527)	
Intra-EU trade			1.183*
			(0.500)
R^2	0.306	0.308	0.318
Observations	314	314	314

*** = significant at 0.1% risk level, *** = significant at 1% risk level, *= significant at 5% risk level

Table 2. Gravity models for European bilateral trade in roundwood in 1998 (logarithmic transformations were used), coefficients (standard errors in parentheses).

Variable	I	II	III
Constant	-2.203	-1.519	6.754
	(2.716)	(2.721)	(3.635)
Distance	-1.872***	-1.815***	-1.943***
	(0.191)	(0.191)	(0.188)
Importer GDP	0.535***	0.559***	0.513***
	(0.118)	(0.118)	(0.116)
Exporter GDP	0.156	0.118	0.098
	(0.115)	(0.116)	(0.114)
Importer GDP/capita	0.358	0.542*	0.038
	(0.209)	(0.225)	(0.228)
Exporter GDP/capita	-0.103	-0.342	-0.513*
	(0.198)	(0.226)	(0.225)
East-West trade		-1.004*	
		(0.470)	
Intra-EU trade			1.613***
			(0.444)
R^2	0.269	0.278	0.295
Observations	357	357	357

*** = significant at 0.1% risk level, *** = significant at 1% risk level, *= significant at 5% risk level

3.3 Forest industry production and export structure in candidate countries

Increasing economic activity in accession candidates can be seen in the figures describing production, imports and exports of selected categories of forest products (Figure 4). Relatively, the most pronounced growth in exports has occurred in wood-based panels, sawnwood and roundwood, product categories which could be regarded as lower added-value. However, when it comes to roundwood, it has largely been produced for domestic industry, and it has represented only around 10% of the value of total forest products exports (Figure 5). In general, lower-added value products have been gaining a slightly increasing share from the value of exports.
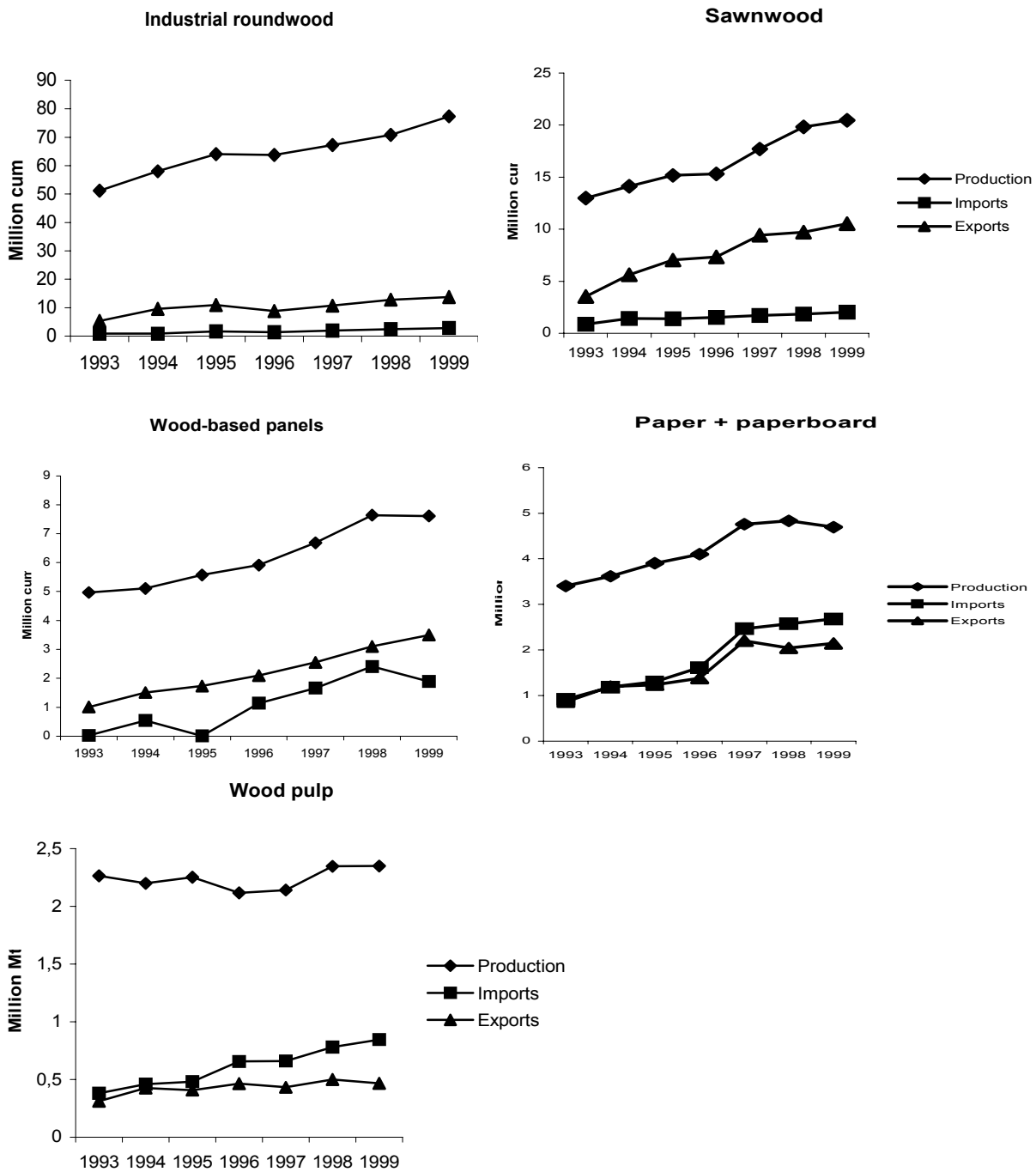
Industrial roundwood

Sawnwood

Million cum

90 80 70 60 50 40 30 20 10 0

1993 1994 1995 1996 1997 1998 1999

Million cur

25 20 15 10 5 0

1993 1994 1995 1996 1997 1998 1999

- Production
- Imports
- Exports

Wood-based panels

Paper + paperboard

Million curr

9 8 7 6 5 4 3 2 1 0

1993 1994 1995 1996 1997 1998 1999

Millior

6 5 4 3 2 1 0

1993 1994 1995 1996 1997 1998 1999

- Production
- Imports
- Exports

Wood pulp

Million Mt

2,5 2 1,5 1 0,5 0

1993 1994 1995 1996 1997 1998 1999

- Production
- Imports
- Exports

Figure 4. Forest industry production in EU accession candidates (FAO 2001).

However, there were large differences between countries in the export structure and in the share of roundwood from the total exports, even though the general trend has been towards a lower share of roundwood in all countries. In 1999, the share of

roundwood from forest products exports was 35% in Estonia, 19% in Lithuania, 17% in Czech Republic, and 15% in Hungary and Latvia.

Measured with the total value of roundwood exports of accession candidates, Czech Republic and Estonia are the most important countries. With equal shares, they represent together half of the value of total rounwood exports. Latvia is the third one, representing 15% of the value of roundwood exports of accession candidates.
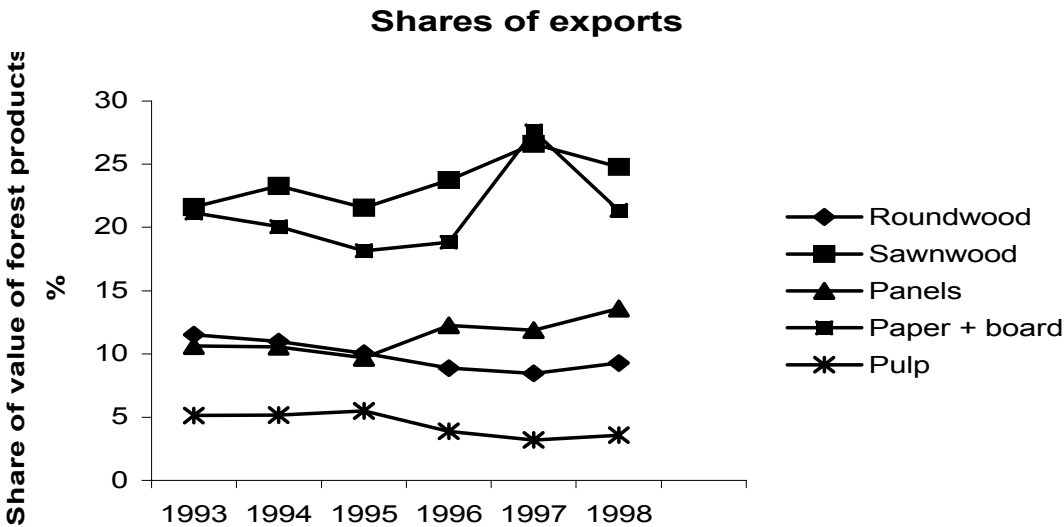
Shares of exports

Figure 5. Composition of forest products exports in EU accession candidates, share of the total value of forest products exports (FAO 2001).

3.4 Assessment of sustainability and trade flows in the future

During the period 1993-1999, most of the accession candidates have increased their roundwood production, particularly Estonia and Latvia with an annual growth rate of 16% (Table 3). A rough assessment of sustainability, based on forestry statistics, does not indicate sustainability concerns. Net annual increment has been higher than annual fellings in every country. On the other hand, there are no possibilities to considerably increase fellings.

In most important wood producers in the EU, roundwood production has been quite steady. While there seems to be some possibilities to increase fellings it is likely that the EU has to find other sources of supply than current and prospective member countries.

Table 3. Annual growth of total roundwood production (%, 1993-1999) (FAO 2001), net annual increments and annual fellings (Forest Resources of…).

Country	Roundwood production, annual growth rate,%	Net annual increment million cum, overbark	Annual fellings
Bulgaria	+0.5	10.2	4.9
Czech Republic	+4.8	20.4	16.2
Estonia	+16.0	7.1	4.0
Hungary	-1.2	9.9	5.9
Latvia	+16.0	11.1	6.6
Lithuania	+1.9	8.5	5.2
Poland	+4.8	39.4	30.5
Romania	+3.2	--	--
Slovakia	+1.1	12.3	7.1
Slovenia	+8.7	6.1	2.3
Finland	+3.4	72.5	54.3
France	-2.3	92.3	60.2
Germany	+1.1	89.0	48.6
Sweden	+1.2	85.4	66.1

4. Discussion and conclusions

The development of roundwood trade in Europe in 1990s was examined. In the EU, roundwood production has remained quite steady and the rising demand has been

increasingly met by imports. During the 1990s the share of imports from the apparent roundwood consumption in the EU has increased from 10% to 19%.

The accession candidates have increased their share from the imports of EU member countries. In 1999, accession candidates and Russia already held a bigger share from total imports than member countries. However, accession candidates have not been profiling themselves as raw material exporters.

On the basis of forest statistics it seems that accession candidates cannot meet the increasing demand for imports in the EU. After accession there still has to be sources of supply outside the EU. Taking into account Russia's net annual increment of 742 million cum and annual fellings of 125 million cum (Forest Resources of…), it seems to be likely that Russia will increase its share from the EU imports of roundwood.

Nabuurs et al. (2001) suggested, based on their sector models, that during the next 100 years eastern Europe starts to become a net importer of wood from central Europe and extra pressure will be put on Scandinavian forests. Even though Russia was not included in that study, the results are in accordance with the conclusions of this study. Taking into account the development of commercial forest resources in Europe as well as the growing demand and forest industry production in eastern European countries, accession candidates provide only a temporary source of roundwood for current EU members.

For example, in 1999 consumption of paper and paperboard in the EU was 111 kg per capita while in the other parts of Europe consumption was 30 kg per capita (Finnish Statistical Yearbook…2000). Paper consumption is strongly related to income level and thus consumption is likely to increase in candidate countries along with economic growth. This makes eastern Europe a huge potential market area for forest products. Whether the growing demand is met by raising and recovering domestic industry or imports is yet to be seen, but it is certain that CEEC provide the most interesting element for forest industry in Europe.

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