

Australian wood markets in 2010

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Australian wood supply is projected to rise significantly in the next ten to fifteen years as hardwood pulpwood production increases from the large areas of short rotation blue gum plantation now being established. At the same time, international competitors' wood supplies are also projected to increase, with much of this increase coming from plantations.

Australia is now a small net exporter of wood fibre and the bulk of the projected increase in domestic wood fibre production is likely to be exported. This raises such questions as how much value adding may take place, and which markets have the greatest potential for growth.

Five questions are addressed in this paper:

- *How much industrial roundwood is likely to be available in Australia around 2010?*
- *By how much are international competitors' supplies expected to rise?*
- *What will this mean for wood prices?*
- *Should Australia focus on less or greater value added products?*
- *Which markets have the greatest potential for growth?*

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Outlook for Australian wood supply

The availability of industrial roundwood in Australia is projected to rise significantly in the next ten to fifteen years. Most of this increase is projected to come from plantations, the rate of establishment of which has jumped sharply over the past five years.

New plantation establishment

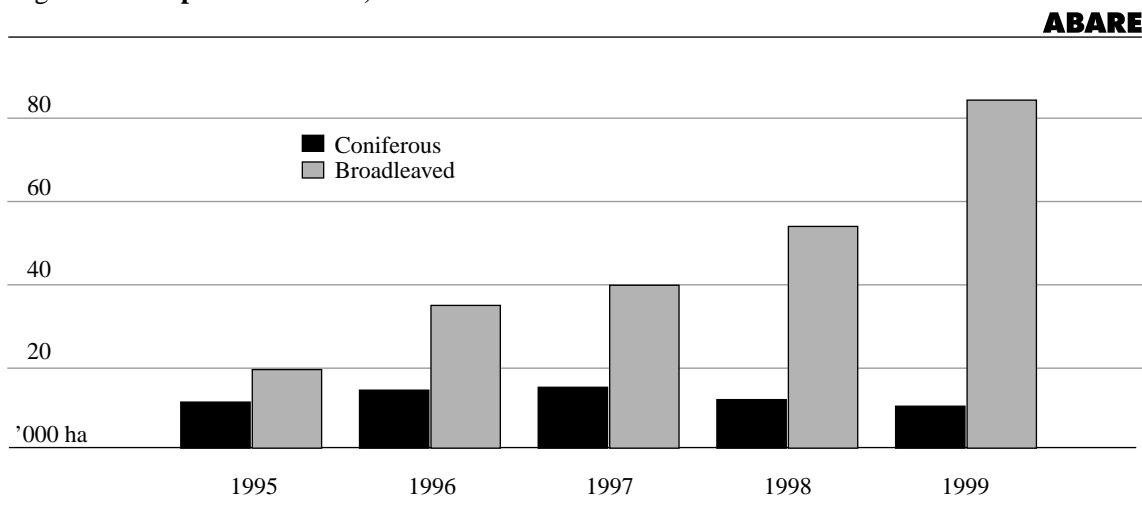
Australia's forest plantations now cover 1.34 million hectares (National Forest Inventory 2000) — 948 000 hectares of coniferous plantation and 389 000 hectares of broadleaved plantation. While representing only a small proportion of Australia's total forest vegetation cover of 157 million hectares, plantations contribute significantly to total log output, now supplying around 55 per cent of Australia's industrial roundwood.

The rate of new plantation establishment fell in the early 1990s but jumped sharply in the past five years. A record 95 000 hectares of new plantations were established in 1999, continuing the trend of successively larger new establishment each year since 1995 (figure 1).

In the 1970s and 1980s there was significant public investment in new plantations, based on a perceived need to develop a new wood resource and to reduce dependence on imported timber. Extensive areas of exotic softwood, mainly radiata pine, were established in this period. As a result, in the past two decades, softwood log removals from plantations rose by around 6 million cubic metres a year. Over the same period, removals from native forest fell by around 1 million cubic metres a year. In total, Australian industrial log removals increased by around 5 million cubic metres a year.

In the past five years, the bulk of new plantation establishment was undertaken by private investors and joint ventures. The principal aim of these new operations was to produce

Figure 1: New plantation area, Australia



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pulpwood from eucalypts (primarily blue gum). Almost 80 per cent of the 294 000 hectares of new plantations established in the five years 1995–99 were to short rotation eucalypts. Reasons for the change in the type of new plantations being established include the limited prospects of the domestic market absorbing further supplies of plantation softwood sawlog, expectations of increasing pulpwood demand internationally, particularly in Asia, and a desire for a faster turnaround on funds invested.

Projected log availability 2010–14

The change in species composition and management objectives will significantly change the profile of industrial log production in the longer term, as the new eucalypt pulpwood operations come on stream from around 2010.

Australia’s industrial roundwood removals are currently around 20 million cubic metres. Removals in 1998-99 were an estimated 20.2 million cubic metres, down from the record 21.2 million cubic metres removed in 1997-98.

Industrial wood removals are projected to rise by at least 8 million cubic metres over the next ten to fifteen years. Removals are projected to average 28.5 million cubic metres in the five years 2010-11 to 2014-15 (figure 2) The availability of sawlogs, removals of which were 9.9 million cubic metres in 1998-99 (excluding sleeper

logs), is projected to rise by around 2.4 million cubic metres. Nearly all of this rise is expected to be plantation softwood. The availability of pulp logs (excluding ‘other’ logs), removals of which were 9.6 million cubic metres in 1998-99, is projected to rise by around 5.7 million cubic metres (Love, Grist and Yainshet 1999).

With little rise projected in removals from native forest, the share of roundwood removals sourced from plantations is projected to rise from under 55 per cent in recent years to over 60 per cent in the next ten to fifteen years (figure 3).

Implications for industry

This change in log availability and log mix has implications both for where new forest product industries may be established and the type of industries they may support.

Figure 2: Projected log availability, Australia

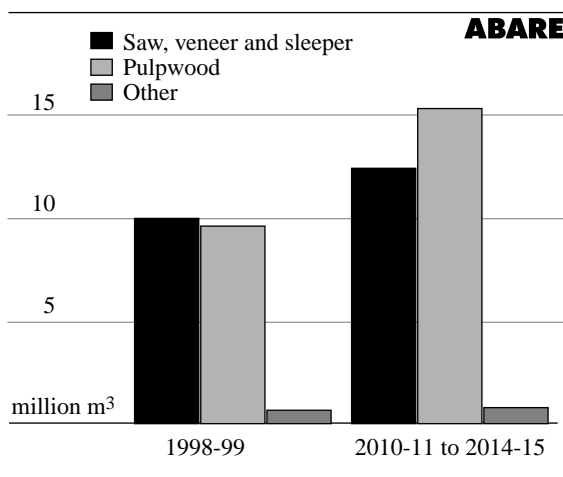
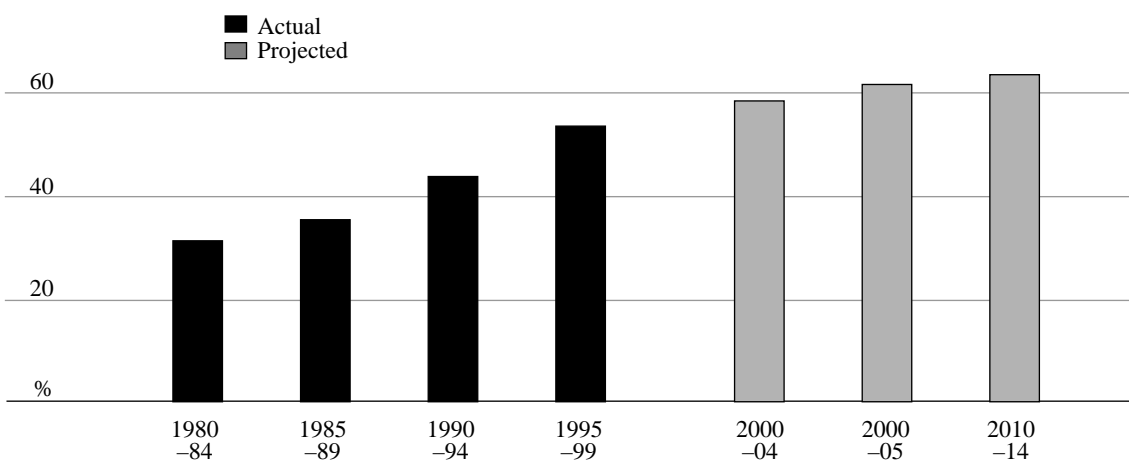


Figure 3: Plantation share of removals

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On location, the bulk of the new plantations have been established in south west Western Australia, the Green Triangle of Victoria and South Australia, and northern Tasmania. Many of the processing facilities that develop to use this new resource may be located in these areas.

On industry type, in the 1980s and 1990s, as the softwood resource increased, the industries that developed were based on sawlogs for softwood sawnwood production and pulp logs, and sawmill residue for wood based panels (primarily particleboard and medium density fibreboard). In the 1990s the export of softwood woodchip and whole radiata logs also increased.

In the next decade and beyond, the industries that may develop to use the new plantation hardwood resource are likely to be based primarily on the processing of pulpwood. Such industries may include woodchip export, and pulp and paper production. It is also possible that some of this pulpwood may be used as fuel for energy generation.

Outlook for international competitors' supplies

What of the competitor countries? Are they also expecting similar increases in production?

Global industrial production of roundwood is currently around 1.5 billion cubic metres a year. The Food and Agriculture Organisation of the United Nations (FAO) has projected that by 2010, production will reach around 1.9 billion cubic metres, an increase of roughly 25 per cent since 1996 (FAO 1999). Australia currently produces around 1.3 per cent of the world's industrial roundwood. The projected increase of around 8 million cubic metres would raise its share to about 1.5 per cent of world production by 2010.

Since the market for forest products is a global one, all other countries may be seen as competitors. However, the most immediate competitors may be countries also expecting large increases in their plantation based wood supply. In the Asia Pacific region, which is Australia's key forest products export market, the bulk of these competitors would be the domestic wood and paper industries in the region themselves, plus traditional suppliers from outside the region, particularly in the Americas.

Plantation forests are expected to play an increasingly important role in meeting global requirements for forest products. Much of the estimated 116 million hectares of plantations is located in the traditional wood producing areas of Europe, the Russian Federation, and North and Central America. However, significant planting has occurred in recent years in the temperate and subtropical areas of Africa, South America, Asia and Oceania (ABARE and Jaakko Pöyry 1999).

Although plantations represent less than 3 per cent of the area of the world's forests, they are estimated to supply around a third of industrial roundwood and 10 per cent of fuelwood. Natural forests have traditionally maintained a competitive advantage over plantations, given the high cost of managing plantations. However, this gap is narrowing as a result of improvements in the productivity and efficiency of plantations, the decreasing availability of wood from natural forests, and the increasing cost of gaining access to these forests.

ABARE and Jaakko Pöyry project industrial wood supply from plantations will increase by 67 per cent over the next four decades — up from 624 million cubic metres in 2000 to 1043 million cubic metres by 2040. The share of global demand for industrial wood met by plantation produced wood is projected to rise from 35 per cent in 2000 to 44 per cent by 2020 and 46 per cent by 2040.

FAO projections, by region

In its analysis of global forest product markets and projections, the FAO uses four geographic regions: the Americas, Europe, Africa, and Asia and Oceania. These are divided into high income (OECD) and low income (non-OECD) subregions. In practice, the seven regions (there being no OECD group for Africa) are still largely geographic. OECD Americas is largely synonymous with North America, non-OECD Americas with South and Central America, and OECD Europe with western Europe. In the Asia and Oceania region, the OECD group consists only of Japan, Korea, Australia and New Zealand.

Examining the 'main competitor' regions in turn, the Asia and Oceania region (OECD and non-OECD) currently accounts for around 21 per cent of global output of industrial roundwood. It is in this region that the FAO expects the largest increase in production in the next decade (154 million cubic metres) (table 1).

Table 1: Projected increase in industrial roundwood production

	Production in 1996	Projected pro- duction in 2010	Projected increase, 1996 to 2010	
	million m ³	million m ³	million m ³	%
Countries within OECD				
Europe	256	327	71	28
Asia and Oceania	72	97	25	35
Americas	596	653	57	10
OECD	924	1 077	153	17
Non-OECD countries				
Europe	113	175	62	55
Asia and Oceania	249	378	129	52
Americas	135	157	22	16
Africa	68	84	16	24
Non-OECD	565	795	230	41
World	1 490	1 872	382	26

Source: FAO (1999).

In the Americas, South and Central America, which accounts for 9 per cent of production, is projected to increase its production by 22 million cubic metres in the next decade, while North America, which currently accounts for around 40 per cent of world output, is projected to increase its production by 57 million cubic metres.

The remaining regions, Europe and Africa, account for 25 per cent and 5 per cent of output respectively, and are projected to increase their production of industrial roundwood by 133 and 16 million cubic metres respectively.

The FAO projections are based on assumed rates of growth, rates of harvest, and permissibility of harvesting in certain areas, and may change in future. In particular, the FAO notes that in both the non-OECD Asia and Oceania, and South and Central American regions, producers source their industrial roundwood from a mixture of tropical natural forests, tropical plantations and temperate plantations, but there are major uncertainties about future supplies from both plantations and natural forest. With plantations, the main uncertainty concerns the yields that might be achieved, while with natural forests, the main uncertainty is the amount of harvesting that may be allowed.

Projections, by country

Projections for some major producing countries are shown in table 2. The FAO projects New Zealand's output of roundwood to rise by over 11 million cubic metres by 2010, while output in Chile is projected to rise by nearly 8 million cubic metres. Based on the expected maturation of existing plantations, roundwood production in China, Japan, Indonesia and Brazil is also projected to rise significantly.

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Australia's role in international forest products trade has historically been as an importer of predominantly softwood and hardwood sawnwood and pulp and paper products (de Fégely and Parsons 1997). The majority of exports have been hardwood woodchips. The maturing plantation softwood resource has the potential to alter this role through import substitution and export of a greater range of products. The development of a plantation hardwood resource also has the potential to add to the range of products. In this regard, however, Australia faces a supply challenge from other net wood fibre exporters who are also expanding plantation resources such as New Zealand, Chile, and Brazil.

New Zealand and Chile have developed similar sized estates to Australia's. Like Australia's current resource, the New Zealand and Chilean resources are based predominantly on *Pinus radiata* (de Fégely and Parsons 1997). De Fégely quotes a projected increase in New Zealand annual harvest volume to about 28–30 million cubic metres by 2010, and a projected increase for Chile to more than 30 million cubic metres in the same period. These projected harvest volumes are of a similar order of magnitude to those projected by the FAO. Up to 30 per cent of New Zealand's log output in 2010 is projected to be of high quality clearwood sawlogs. The bulk of Chile's increased log output is also projected to be in the form of sawlogs, with up to 4 million cubic metres a year of pine clearwood logs available for export.

Brazil's resource is based on eucalypt and tropical pines. The pine plantations established in the early 1970s and eucalyptus plantations established in the 1980s are maturing, projecting a period of increasing fibre supply. According to de Fégely and Parsons (1997), a

Table 2: Industrial roundwood production

	1996	1997	1998 a	Projected 2010
	'000 m ³	'000 m ³	'000 m ³	'000 m ³
World	1 503 779	1 546 882	1 515 688	1 871 574
Brazil	84 601	84 684	83 764	97 405
Canada	184 459	185 859	na	206 213
Chile	19 382	19 570	21 214	28 933
China	108 718	108 000	100 918	151 582
Finland	42 503	47 288	49 638	53 717
India b	24 971	25 064	25 156	46 936
Indonesia	47 242	47 288	36 195	57 256
Japan	22 469	21 545	19 316	33 038
Korea, Rep.	1 195	1 062	1 428	2 413
Malaysia	35 770	31 507	21 735	37 910
New Zealand	16 343	17 109	15 324	26 563
Russian Fed.	73 005	88 374	75 690	94 523
South Africa	18 176	18 571	na	21 677
United States	406 595	416 092	420 458	440 869

a Subject to revision. **b** The FAO notes that based on production of wood products, it is thought that current industrial roundwood production in India is substantially underreported, and that a figure closer to 40 million cubic metres is probably the current level of industrial roundwood production. **na** Not available.

Sources: FAOSTAT; FAO (1999).

simple analysis indicates a current exportable surplus of both hardwood and softwood logs, which may continue if replanting levels are maintained. In general Brazil is not a direct competitor for Australia. The majority of softwood sawnwood exports are to the United States, while the viability of Brazil's softwood pulpwood trade with Japan appears to be marginal. Brazil's hardwood pulpwood exports are predominantly of eucalypt roundwood to European markets.

The FAO projects a significant increase in future wood supply in Indonesia, based on increased wood production from plantations. The size of plantation forests in Indonesia has increased dramatically since the mid-1980s, particularly for short rotation plantations for pulp production. The Indonesian government has launched an ambitious program for rehabilitating unproductive grassland and secondary scrubland into industrial plantation forests. The target is to establish 2.3 million hectares of plantation forests by 2000 and 10.5 million hectares by 2030, mainly to produce wood for paper or medium density fibreboard (Hardiyanto 1998).

Outlook for prices

Long term trends in prices

Prices for wood and wood based products have been relatively constant in real terms for significant periods over the past 25 years. However, with the exception of hardwood sawnwood, the price trend for wood and wood based products has, like that for most commodities, been trending downward in real terms over time.

Love, Grist and Yainshet (1999) examined long term trends in both world and Australian wood and wood based products prices. For world prices, unit values were obtained from world import and export volume and value data published by the FAO for a range of wood and wood based products including roundwood, sawnwood, wood based panels, woodchips, pulp, and paper. These prices were then converted to constant Australian dollar terms and long term trends calculated. Long term trends in Australian prices were calculated using the domestic price indexes published by the Australian Bureau of Statistics. The trends are shown in table 3.

In real Australian dollar terms, world import prices for roundwood and sawnwood have trended downward at rates of around A\$1.50 and A\$1.05 per cubic metre a year respectively. Movements in world sawnwood prices have also tended to mirror movements in world roundwood prices (figure 4).

Examining the three main categories of structural wood (softwood, hardwood and wood based panels) in more detail, wood based panels have had the most rapid price fall in real terms. Over the twenty five years 1972-73 to 1996-97, the world import price of wood

Table 3: Trends in world and domestic wood products prices

	Unit	Period	Trend
World import prices			
Roundwood	1989-90 A\$/m ³	1972 to 1996	-1.47
Sawnwood	1989-90 A\$/m ³	1972 to 1996	-1.05
Wood based panels	1989-90 A\$/m ³	1972 to 1996	-5.98
Softwood sawnwood	1989-90 A\$/m ³	1972 to 1996	-2.03
Hardwood sawnwood	1989-90 A\$/m ³	1972 to 1996	2.53
Wood chips	1989-90 A\$/m ³	1972 to 1996	-0.89
Pulp	1989-90 A\$/t	1972 to 1996	-5.63
Paper	1989-90 A\$/t	1972 to 1996	-2.23
Australian wood chip export prices			
Softwood	1989-90 A\$/t	1981-82 to 1996-97	-0.41
Hardwood	1989-90 A\$/t	1981-82 to 1996-97	-0.71
World import price indexes			
Wood based panels	% points (1989-90 = 100)	1972 to 1996	-1.43
Softwood sawnwood	% points (1989-90 = 100)	1972 to 1996	-0.91
Hardwood sawnwood	% points (1989-90 = 100)	1972 to 1996	0.61
Domestic price indexes			
Wood based panels	% points (1989-90 = 100)	1972-73 to 1996-97	-0.09
Softwood sawnwood	% points (1989-90 = 100)	1972-73 to 1996-97	-0.11
Hardwood sawnwood	% points (1989-90 = 100)	1972-73 to 1996-97	0.13

Source: Love, Yainshet and Grist (1999).

based panels fell by A\$6 per cubic metre a year in constant Australian dollar terms, compared with a fall of A\$2 per cubic metre a year for softwood, and a rise of around A\$2.50 per cubic metre a year for hardwood (figure 5).

The falls in panels and softwood prices were most likely the result of improvements in milling technology and in the scale of manufacturing plants, while the rise in hardwood prices may have reflected the tight supply of hardwood logs that has emerged in recent

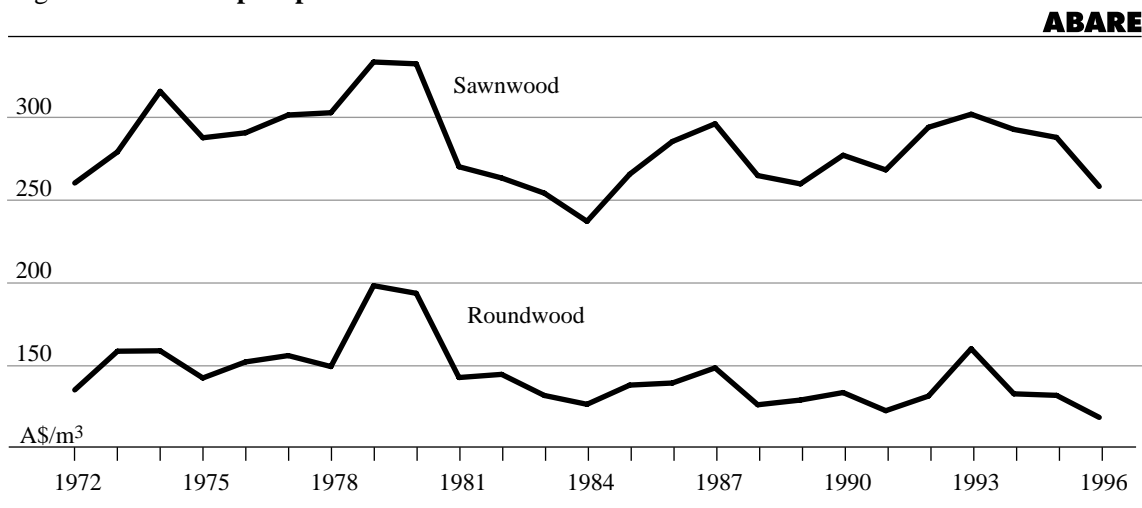
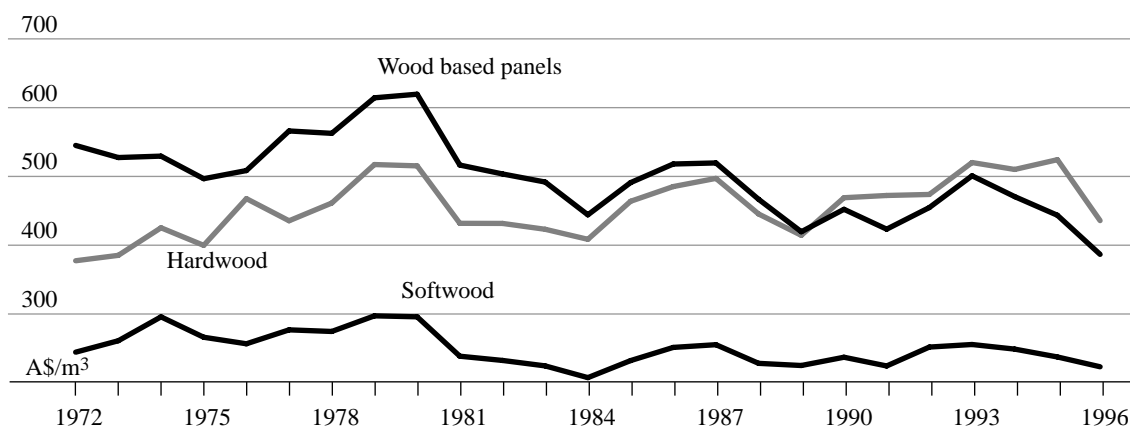
Figure 4: World import prices of roundwood and sawnwood In 1989-90 Australian dollars


Figure 5: **World import prices of structural wood** In 1989-90 Australian dollars

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years. World import prices for pulp, paper and woodchips also fell slightly over the 25 year period in real Australian dollar terms.

Domestic prices for softwood, hardwood and wood based panels had much the same trends as world prices over the 25 year period.

Australian import and export prices 1997 to 1999

In 1998 the Asian economic downturn significantly reduced import demand for forest products in Asia. With the Asian region constituting an important market for all the major forest products including logs, woodchips, sawnwood, wood based panels, pulp and paper, the reduction in Asian demand put downward pressure on world prices. From an Australian point of view, however, the weaker Australian dollar partly offset some of the falls in both import and export prices.

The average unit import value of hardwood sawnwood fell in calendar 1998 but rose again in calendar 1999 as Asian hardwood prices began to recover (table 4). The average unit import value of medium density fibreboard has fallen, while paper prices have generally risen. The unit import value of pulp was lower in calendar 1999 as the increased amounts of pulp being imported were sourced from generally lower cost producers such as Indonesia and Brazil. More recently, world pulp prices have begun to rise, and the average unit import value of pulp is expected to be higher in calendar 2000.

The average unit export value of roundwood fell sharply in 1998 as demand for logs in key markets such as Korea fell. The volume of log exports recovered in 1999 but unit prices remain lower than those prevailing before the Asian economic downturn (table 5). The lower woodchip prices in calendar 1999 reflected the flat demand for woodchips in Japan, the principal market for that product.

Outlook for world prices

The outlook for world prices will be affected not only by the outlook for supplies, but also by expected growth in demand for roundwood and forest products (discussed in a later section). Generally, however, the FAO projects that supplies of wood and other types of fibre required to meet demand for the foreseeable future will be broadly within the productive capacity of the world's forests and other fibre sources (FAO 1999).

The FAO expects there may be situations where local supplies fall short and trade networks are not sufficiently developed to allow imports to fill the gap. For example,

it is expected that South Asia will continue to have to use a wide range of nonforest supply sources. Sawlog production is also expected to approach the capacity of local forests and plantations to provide saw quality logs in some regions, such as Africa, South East Asia, and the Pacific Islands.

Generally, the FAO does not expect product prices to rise significantly over the projection period, although upward pressure on the prices of certain types of wood, typically the higher grades, may occur. At the lower end of the scale, the price and availability of cheaper wood and nonwood substitutes is expected to limit the potential for price rises. Such a growing disparity between prices for higher and lower quality wood may also encourage shifts in processing toward reconstituted panels at the expense of sawnwood and plywood.

Extent of value adding

Factors in competitiveness

As previously mentioned, the bulk of the projected future increase in Australian wood fibre availability is expected to be

Table 4: Australian import unit values

	Unit	1997	1998	1999
Sawnwood				
Softwood	\$/m ³	472	500	499
Hardwood	\$/m ³	840	814	858
Wood based panels				
Plywood	\$/m ³	683	658	659
Medium density fibreboard	\$/m ³	441	438	388
Pulp and paper				
Newsprint	\$/t	800	858	876
Printing and writing	\$/t	1 204	1 377	1 341
Household and sanitary	\$/t	1 636	1 600	1 679
Packaging and industrial	\$/t	1 453	1 721	1 622
Pulp	\$/t	635	680	646

Source: ABARE (2000).

Table 5: Australian unit export values

	Unit	1997	1998	1999
Sawnwood				
Softwood	\$/m ³	534	642	504
Hardwood	\$/m ³	991	964	782
Wood based panels				
Particleboard	\$/m ³	na	304	324
Medium density fibreboard	\$/m ³	na	345	321
Paper				
Printing and writing	\$/t	1 562	1 341	1 318
Household and sanitary	\$/t	3 894	4 162	3 831
Packaging and industrial	\$/t	647	719	723
Wastepaper	\$/t	143	103	99
Woodchip and logs				
Roundwood	\$/m ³	93	65	60
Woodchip	\$/dry t	150	154	143

Source: ABARE (2000).

pulpwood. Value adding will involve processes or products that convert this pulpwood to a higher value stage, such as wood based panels or pulp and paper, in a competitive market environment.

Competitiveness can also be enhanced by 'repositioning' product into potentially higher value added markets. For example, in the Victorian hardwood sector in the past ten years there has been a major shift into kiln dried products such as high strength seasoned structural beams and appearance grade products (Gooding 1999). Hardwood timber is being increasingly repositioned into appearance grade uses and structural applications where its high strength gives it a competitive advantage. The higher world prices for hardwood and technology improvements have made it viable to season a wider range of Australian hardwoods and to use shorter length and smaller sizes for glue laminated products and other short length products such as end matched flooring.

The capacity of a mill or plant is another important factor in determining the competitiveness of a value adding operation. A larger mill will usually have lower fixed costs and lower capital costs per unit of production. Hence, new Australian mills will be most cost competitive if they have the resource available and the market opportunities to support a world scale plant (Connell et al. 1999).

An overview of the size of investment required for new world scale facilities is shown in table 6.

These costs should be regarded as indicative since actual costs are influenced by a wide range of factors. Regional factors such as availability of water, energy costs and access to a port if based on export markets also need to be considered, together with possible infrastructure costs.

Not all investments necessarily have to be of a world scale. Investment in value adding can occur through incremental increases to existing plants. Unit costs would generally be lower in these instances. For pulp mills, a smaller mill may be competitive if it is integrated with a paper mill.

The minimum viable capacity of plants has grown rapidly in recent years. With the paper industry in Asia, the capacity of a newly installed uncoated woodfree machine was around 50 000–100 000 tonnes until the late 1980s. By the mid-1990s capacity had increased to 200 000 tonnes, and current investments have been in the range of 300 000–400 000 tonnes per machine (Jaakko Pöyry 1998).

As part of the Regional Forest Agreement process, a number of cost benchmarking studies were undertaken. These studies examined whether Australian producers have competitive advantages over other producers. Generally, these studies compared the costs of

production within Australia against those in other Asian Rim countries selling to a common market, usually Japan. The results of such studies must be treated with caution as they are based on industry averages. Also, rankings may be influenced by the exchange rate assumptions used in the analysis (Connell et al. 1999).

In general, it was found that Australian producers face slightly higher wood costs, higher distribution costs from higher port costs and the distance to major Asian markets, and higher labor costs. Australian producers generally face lower energy costs and have an overall capital cost advantage because of lower mill construction costs and cost of capital.

Competitiveness may also be enhanced in markets where quality is important and the manufacturing of value added products can be undertaken. The production of particle-

Table 6: Size of investment for world scale facilities

Development option	Minimum economically viable annual capacity	Preferred wood species	Annual wood requirements	Capital cost
	kt		'000 m ³	A\$m
Pulp				
Bleached hardwood kraft	500	Hardwood	2100	1200–1500
Bleached softwood kraft	500	Softwood	2400	1200–1500
Bleached hardwood CTM	250	Hardwood	650	250–300
Paper				
Integrated linerboard, wastepaper and chemi-mechanical pulp	300	10% softwood kraft, 40% recycled paper, 50% hardwood chemi-mechanical pulp	400	275–375
Integrated lightweight coated paper	200	10% softwood kraft, 30% clay, 60% mechanical pulp	250	800–1000
Fine paper	300	Hardwood kraft pulp	540 kt	300–400
	'000 m ³		'000 m ³	A\$m
Wood based panels				
Particleboard	200	Softwood/hardwood roundwood and residues	380	100–130
Medium density fibreboard	150	Softwood/hardwood blend, roundwood or chip	280	110–120
Oriented strandboard	300	Softwood or hardwood roundwood	550	130–160
Hardboard	200	Hardwood/softwood blend, chip or residue	280	80–90

CTM = Chemi-thermomechanical
Source: Beca Simons (1997).

board with a melamine overlay would be an example. Once in production, customer service, rapid delivery and turnabout and consistency of product could further enhance competitiveness.

Value adding – effect of increasing log output

To what extent might future increases in log production result in increases in downstream value adding in the wood and paper industries? What might be the effects on the wider economy?

Australia's forestry industry and wood and paper industries contribute around 1 per cent to gross domestic product and employ around 79 000 people. Examining the processing industries (wood and paper products) in more detail, the value of turnover (sales and transfers of goods) has been around \$11.5 billion in nominal terms in recent years, and employment has been around 65 000 (table 7).

To examine the possible downstream and economywide effects of future increases in log production, an analysis was conducted using the Monash MRF-FOR model (MMRF-FOR). MMRF-FOR is a multiregional multisectoral general equilibrium model of the Australian economy. It is based on the MMRF model developed by the Centre of Policy Studies at Monash University (Peter, Horridge, Meagher, Naqvi and Parmenter 1996). The model has been previously used by ABARE to estimate the economywide effect of changes in log output in the Tasmanian and Western Australian RFA regions (for example, see Connell and Yainshet 1999).

A short description of the model and its main key assumptions is given in box 1.

Separate increases of 10 per cent in total softwood and hardwood were simulated using the model. Baseline log output in the model is around 19 million cubic metres, with soft-

Table 7: **Key characteristics of the forest product industries**

		1993-94	1994-95	1995-96	1996-97	1997-98
Wood and wood products						
Value of turnover	\$m	5 999	6 408	5 964	5 986	6 319
Employment	'000	46.9	48.1	45.8	43.8	45.4
Wages and salaries	\$m	1 107	1 233	1 179	1 214	1 259
Capital expenditure	\$m	na	411	298	499	264
Paper and paper products						
Value of turnover	\$m	4 927	5 190	5 575	5 196	5 179
Employment	'000	17.9	17.8	20.0	17.9	17.2
Wages and salaries	\$m	728	778	823	813	830
Capital expenditure	\$m	na	468	644	364	436

Source: ABARE (2000).

wood and hardwood contributing in roughly equal proportion. Each simulation therefore modeled the potential flow-on for the wood using industries and the economy more broadly of an increase in either softwood or hardwood log output by around a million cubic metres.

In the first analysis the standard version of the model was used. In this version it is assumed that there is a high potential degree of substitution between hardwood and softwood logs. This may not necessarily be the case in the short run, however, since softwood and hardwood sawmills use different technology and switching from one to another may involve large setup costs. Accordingly, a second analysis was undertaken in which it was assumed that the scope for substitution between the two types of logs was extremely limited in the short term.

The results, presented as percentage changes from the baseline scenario values, are shown in table 8.

Box 1: The Monash MRF-FOR model

The MMRF-FOR model consists of 27 sectors including forestry and wood processing industries. The eight regions in the model comprise the six states and two territories of Australia. The simulation results are of a comparative static nature that compare the equilibrium before and after the changes. The simulations are run under short and long run economic conditions.

Key assumptions are:

Short run

- labor is mobile between industries within region while supply of labor remains unchanged in each region;
- aggregate regional and national employment may vary as real wages are given in each region;
- rates of return to capital may vary between industries and regions while aggregate national investment expenditure and industry capital stocks remain unaffected;
- investment is allocated over regional industries on the basis of relative rates of return.

Long run

- labor is mobile between industries and regions;
- aggregate national real wage rate may vary while aggregate national employment remains constant;
- aggregate national capital stock adjusts to maintain the economywide rate of return to capital;
- capital is allocated over regional industries on the basis of relative rates of return and relative rates of capital growth;
- investment by region and industry is determined on the basis of given investment to capital ratios.

In both simulations, interstate wage differentials are assumed not to be affected by the changes to log production. The nominal exchange rate also remains unchanged and is taken as a numeraire — that is, prices are expressed in terms of the exchange rate. With the nominal exchange rate constant, a fall in the consumer price index entails an increase in the international competitiveness of Australia's export and import competing industries. Conversely, an increase in the consumer price index entails a decrease in the international competitiveness of these industries.

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Table 8: Simulated industry impacts of a 10 per cent increase in the production of softwood and hardwood logs
a. Short run substitution between softwood and hardwood logs allowed

	Softwood		Hardwood	
	Short run	Long run	Short run	Long run
	%	%	%	%
<i>Industry output</i>				
Softwood	10.0	10.0	-3.2	-2.9
Hardwood	-3.8	-3.4	10.0	10.0
Other forestry	0.9	0.3	0.9	0.5
Woodchips	8.9	12.8	10.7	14.0
Sawnwood	4.7	4.6	3.2	3.1
Panels	0.2	0.1	0.2	0.1
Fittings	0.1	0.1	0.0	0.1
Pulp and paper	0.4	0.4	0.2	0.2
<i>Industry employment</i>				
Softwood	10.0	1.9	-6.2	-5.0
Hardwood	-7.4	-5.9	10.0	3.8
Other forestry	1.8	0.6	1.8	0.9
Woodchips	12.6	15.2	15.1	16.6
Sawnwood	6.7	5.4	4.5	3.7
Panels	0.2	0.2	0.2	0.1
Fittings	0.1	0.1	0.0	0.1
Pulp and paper	0.8	0.4	0.4	0.2

b. No short run substitution between softwood and hardwood logs

	Softwood	Hardwood
	Short run	Short run
	%	%
<i>Industry output</i>		
Softwood	10.0	-0.1
Hardwood	-0.1	10.0
Other Forestry	1.1	1.0
Woodchips	17.3	15.2
Sawnwood	8.7	4.8
Panels	0.3	0.3
Fittings	0.1	0.1
Pulp and paper	1.1	0.2
<i>Industry employment</i>		
Softwood	10.0	-0.3
Hardwood	-0.3	10.0
Other forestry	2.1	2.0
Woodchips	24.4	21.5
Sawnwood	12.3	6.8
Panels	0.4	0.3
Fittings	0.1	0.1
Pulp and paper	2.1	0.4

As simulated, the initial simulated impact of the increase in the production of softwood (or hardwood) logs was to lower the price of logs. These lower log prices in turn reduced the costs of production to the wood processing industries, causing an increased level of activity and encouraging substitution between softwood and hardwood logs where substitution was allowed.

Log prices fell by a greater amount for the same unit increase in output in the situation where short run substitution was assumed to be limited. These lower log prices resulted in relatively higher increases in the output of processed product, compared with the situation in which short run substitution was allowed.

Increases in output were greatest in those industries where wood costs represented a relatively higher proportion of input costs. Thus the highest increases in production occurred in the woodchipping industry. In reality, however, the short run increase in woodchip production may not be as large as in these simulations because of the strategic buying behavior of the main woodchip buyer, Japan. Concerned not to become too dependent on any single source of supply, Japan may not necessarily increase the volume sourced from any one seller even if prices fell. However, in the future, with a potential diversification of export destinations, production by the woodchipping industry may become more responsive to input price changes.

The other industry that showed significant increases in production was the sawnwood industry. The present model does not distinguish between sawlogs and pulp logs, so the effect on hardwood sawnwood production from an increase in hardwood production may be overstated if, as is likely to be the case, the bulk of the increase in hardwood log production is in the form of pulp logs. The main effect would be indirect as the increased production of pulp logs lowered pulp log prices and this in turn flowed on to lower sawlog prices.

The simulated effect of increasing log production on the processing industries further downstream such as panels and fittings is modest, as is the effect on pulp and paper production. This is largely to be expected as logs constitute a relatively smaller share of the total costs of production in these other industries.

The increase in the output of the wood and paper industries may be expected to increase these industries' demand for primary inputs. As capital is fixed in the short run, expansion in output is largely achieved by increasing employment. The increases in industry employment thus reflect the increases in industry output. In the long run, where both labor and capital are variable there is more flexibility in employment. Changes in employment reflect changes in output as well as substitution between labor and capital. Further, inter-regional mobility of labor, in the long run, allows for more flexibility in employment than in the short run.

Table 9: Simulated macroeconomic impacts of a 10 per cent increase in the production of softwood and hardwood logs
a. Short run substitution between softwood and hardwood logs allowed

	Softwood		Hardwood	
	Short run	Long run	Short run	Long run
	%	%	%	%
<i>Macroeconomic variables</i>				
Real GDP	0.02	0.01	0.02	0.01
Aggregate employment	0.03	0.00	0.02	0.00
Aggregate real investment	0.01	0.03	0.01	0.04
Consumer price index	0.05	0.05	0.03	0.04
Export volumes	-0.04	-0.22	-0.02	-0.15

b. No substitution between softwood and hardwood logs

	Softwood	Hardwood
	Short run	Short run
	%	%
<i>Macroeconomic variables</i>		
Real GDP	0.03	0.02
Aggregate employment	0.04	0.02
Aggregate real investment	0.01	0.01
Consumer price index	0.12	0.05
Export volumes	-0.11	-0.08

Turning to the economywide effects of the simulated increase in production of logs, the cumulative effects of the direct impacts and subsequent reallocation of resources, the altered industry competitiveness, and the changes in relative prices of commodities and primary factors, are reflected in the results shown in table 9.

As the wood and paper industries by themselves account for slightly less than 1 per cent of Australia's gross national product the macroeconomic impacts would not be expected to be large. As shown in table 9, with the exception of the external sectors (volume of exports and imports), the major macroeconomic variables such real gross domestic product, aggregate employment and aggregate investment were all boosted slightly by the simulated increase in log output. The expansion in economic activity also raised demand for commodities and primary factors, increasing the overall level of prices as indicated by the consumer price index. These higher domestic prices in turn reduced the international competitiveness of export industries which put downward pressure on exports.

Potential for market growth

Given Australia's projected growing availability of wood, it will be essential to find new markets. Opportunities exist in both the Australian and export markets.

Australian market

In 1998-99, Australia consumed 4.35 million cubic metres of sawnwood, nearly 1.5 million cubic metres of the three main wood based panels (plywood, particleboard and medium density fibreboard), 1.18 million tonnes of pulp, and 3.46 million tonnes of paper and paperboard. Domestic producers supplied the bulk of the domestic wood based panels market and a large proportion of the domestic sawnwood, and pulp and paper market, as well as exporting wood based panels and paper, mainly to New Zealand and Asia.

Even so, Australia imported 775 000 cubic metres of sawnwood, approximately 200 000 cubic metres of wood based panels (around half of this being plywood), 310 00 tonnes of pulp and nearly 1.3 million tonnes of paper and paperboard, the equivalent of 8.1 million cubic metres of industrial wood.

Imports of chemical pulp in particular rose in 1998-99 following the closure of the small (77 000 tonnes capacity) hardwood based chemical pulp mill at Burnie, and the expansion of printing and writing paper production capacity at Maryvale (Ausnewz 1998). Most of the increase in pulp imports was bleached hardwood kraft pulp from Brazil and Indonesia.

With world pulp prices having fallen from their mid-1990s peak, it may presently be cheaper to import pulp than to expand local pulp production. However, scale will play an

Table 10: **Projections of Australian consumption of forest products, 2010**

	1998-99	2000-01 to 2004-05	2005-06 to 2009-10	2010-11 to 2014-15
	'000 m ³	'000 m ³	'000 m ³	'000 m ³
Sawnwood				
Softwood	2 972	2 813	2 938	2 989
Hardwood	1 374	1 278	1 243	1 348
Total	4 345	4 090	4 181	4 336
Wood based panels				
Plywood	265	273	264	274
Particleboard	846	816	735	716
MDF	364	444	470	533
Total	1 475	1 533	1 469	1 524
Structural wood	5 820	5 623	5 650	5 860
	kt	kt	kt	kt
Paper and paperboard				
Newsprint	666	753	797	800
Printing and writing	1 155	1 062	1 400	1 599
Household and sanitary	233	235	258	282
Packaging and industrial	1 406	1 585	1 852	2 022
Total	3 461	3 635	4 307	4 703

Source: Love, Yainshet and Grist (1999).

important part in the economic viability of new pulp mills. The development of a wood resource of sufficient size to service a world scale pulp mill will be important in assessing when an expansion of local production may be viable.

Examining domestic demand, Love, Grist and Yainshet (1999) project higher domestic consumption of sawnwood, wood based panels and paper and paperboard in the long term. However, little growth is projected in the aggregate consumption of the structural wood over the next decade, with the main trends expected to be continuing substitution of softwood sawnwood for hardwood sawnwood, substitution of wood based panels for sawnwood generally, and within the panels sector, continuing substitution of medium density fibreboard for particleboard (table 10).

On the other hand, consumption of paper and paperboard is projected to increase by around 30 per cent over the decade, with the most rapid growth projected in the consumption of printing and writing paper.

World market

The FAO projects that world demand for wood and paper products will grow in the next decade. Between 1996 and 2010, world consumption of sawnwood is projected to grow at an average annual rate of 1.1 per cent, compared with projected rates of 1.3 per cent for wood based panels and 1.1 per cent for pulp (table 11).

Paper and paperboard consumption is projected to grow at a relatively high 2.4 per cent a year. Although pulp is a key input in the manufacture of paper, the rate of growth in the use of new or virgin pulp is expected to be lower than the rate of growth in paper and paperboard consumption because of the increasing use of recovered paper in the total fibre furnish.

Table 11: **Projected world production/consumption of forest products, 2010**

		Production/ consumption 1996	Production/ consumption 2010	Total growth %	Annual growth %
Industrial roundwood	million m ³	1 490	1 872	26	1.7
Sawnwood	million m ³	430	501	17	1.1
Wood based panels	million m ³	149	180	20	1.3
Pulp	Mt	179	208	16	1.1
Paper and paperboard	Mt	284	394	39	2.4

Source: FAO (1999).

For regional markets, the FAO projects that Asia is likely to increase its share of world consumption of forest products substantially over the next decade. This should be of potential benefit to producers such as Australia that are well placed geographically to service this market.

The FAO also projects that the volume of forest products entering trade relative to production will rise, providing further potential opportunity for forest product exporters. However, developing countries are expected to focus increasingly on expanding their manufacturing and processing capacity, increasing exports of semiprocessed products rather than raw materials. For Australia, this suggests it will be important to focus on value added export products from the increased plantation wood resource.

Asian markets for imported logs, woodchips and recovered paper

Australia is a large exporter of woodchips (7.9 million green tonnes in 1998-99). Although exports of hardwood woodchips have increased only marginally in the 1990s, exports of softwood woodchips have risen significantly. The latter rose from 263 000 green tonnes in 1990-91 to 2.3 million green tonnes in 1998-99. Exports of roundwood (mainly radiata logs) and of recovered paper have also increased significantly. Roundwood exports reached a record 781 000 cubic metres in 1998-99, while exports of recovered paper were a record 273 000 tonnes.

Asia's largest log importers in 1998 were Japan (15.2 million cubic metres), China (6.2 million cubic metres) and Korea (4.4 million cubic metres) (table 12). Asia's imports of logs in 1998 were well down from the previous year due to reduced demand for logs because of the Asian economic downturn. Japan's log imports fell by around 5 million cubic metres and imports by the rest of Asia by around 4 million cubic metres. However, Asia's imports of logs are forecast to recover to pre-downturn levels by the end of 2000.

The main countries to which Australia exported logs in 1998-99 were Korea (338 000 cubic metres), Indonesia (215 000 cubic metres) and Japan (212 000 cubic metres). In total, Australia exported 781 000 cubic metres of logs in 1998-99, the equivalent of around 2 per cent of Asia's normal level of log imports.

For woodchips, the market in Asia is much more concentrated than the market for logs. Japan dominates the market, taking over 90

Table 12: Larger Asian importers of logs

	1996	1997	1998
Japan	21 335	20 407	15 190
Other Asia ^a	16 653	18 510	14 388
<i>of which</i>			
China ^b	5 010	6 472	6 217
Hong Kong	812	881	931
India	335	756	1 684
Indonesia	128	119	na
Korea, Rep. of	8 030	8 266	4 370
Pakistan	130	140	133
Philippines	881	784	435
Thailand	927	896	278

^a Other Asia is FAO's 'Far East' region which includes east, south east and south Asia, and excludes Japan. ^b FAO's statistics do not separate China and Chinese Taipei. **na** Not available.
Source: FAOSTAT.

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per cent of woodchips imports (table 13). The other main importers are Korea and Chinese Taipei. Australia's woodchips export profile reflects the fact that the market is dominated by a single buyer, with 94 per cent of Australian export woodchips going to Japan in 1998-99. The remainder went to Chinese Taipei (3 per cent), Korea (2 per cent) and other markets (1 per cent).

The largest Asian importers of recovered paper are China, Korea and Indonesia. Despite the Asian economic downturn, Asian imports of recovered paper continued to increase in 1998, reaching 8.6 million tonnes (table 14).

Australia exported 273 000 tonnes of recovered paper in 1998-99, the equivalent of around 2-3 per cent of Asian imports of recovered paper. The bulk of Australia's recovered paper exports went to Indonesia (158 000 tonnes) and Korea (51 000 tonnes). Other destinations included Thailand (12 000 tonnes), and India and Chinese Taipei (both 5000 tonnes).

Markets for sawnwood, wood based panels, and paper and paperboard

Japan is the major importer of sawnwood in the Asian region. Other significant Asian regional importers are China, Hong Kong, Korea, Singapore and Thailand. Imports appear to have been particularly affected by the Asian economic downturn, with the FAO reporting Asian sawnwood imports fell to only around 14.8 million cubic metres in 1998, compared with 21.1 million cubic metres in 1997. In the same period, however, sawnwood imports by large traditional importers such as the United States and western Europe, regions not subject to recession, continued to increase (table 15).

Australia's current level of sawnwood exports, at around 50 000 cubic metres, is extremely small relative to total Asian, and world, trade in sawnwood. The higher value of these products per unit volume mean that freight costs are less of a barrier to entry to more distant markets such as the United States and western Europe. As shown in table 12, sawnwood imports by the United States and western Europe continued to grow in 1998 at the

Table 13: Larger Asian importers of woodchips

	1996	1997	1998
	'000 m ³	'000 m ³	'000 m ³
Japan	26 525	26 905	26 610
Other Asia a	3 007	2 910	2 592
<i>of which</i>			
China b	1 921	1 784	1 699
Korea, Rep. of	1 032	1 124	885

a,b See table 12.
Source: FAOSTAT.

Table 14: Larger Asian importers of recovered paper

	1996	1997	1998
	kt	kt	kt
Japan	431	362	294
Other Asia a	6 692	7 238	8 334
<i>of which</i>			
China b	3 031	2 937	2 909
Hong Kong	112	97	148
India	234	359	585
Indonesia	937	1 382	na
Korea, Rep. of	1 426	1 452	1 963
Malaysia	31	36	95
Philippines	238	231	307
Singapore	63	78	152
Thailand	582	622	714

a,b See table 12.
Source: FAOSTAT.

same time that Asian imports of sawnwood were falling.

Turning to wood based panels, Japan again represents the largest Asian market, followed by China, Hong Kong, Korea and Singapore. The Asian region imported nearly 17 million cubic metres of wood based panels in 1997, though imports fell to around 14 million cubic metres in 1998 (table 16). Australia's annual exports of around 280 000 cubic metres of wood based panels are equivalent to around 1–2 per cent of the Asian region's annual imports.

As with sawnwood, imports of wood based panels by other major importers such as the United States and western Europe rose in 1998.

Finally, examining imports of paper, the Asian region imported 16.7 million tonnes in 1997 and 15.3 million tonnes in 1998 (table 17). Australia's exports of paper in calendar 1998 represent the equivalent of around 2–3 per cent of Asia's level of imports of paper. Other major importers of paper such as the United States and western Europe increased their paper imports in 1998.

Concluding remarks

Australian wood supply is projected to rise significantly in the next ten to fifteen years based on expected increased hardwood

pulpwood production from the large areas of short rotation blue gum plantations now being established. Over the next ten to fifteen years industrial roundwood removals are projected to rise by around 8 million cubic metres, to average 28.5 million cubic metres between 2010-11 and 2014-15. Output of sawlogs is projected to rise by 2.4 million cubic metres, while output of pulp logs is projected to rise by 5.7 million cubic metres.

Table 15: Selected importers of sawnwood

	1996	1997	1998
	'000 m ³	'000 m ³	'000 m ³
Japan	12 281	12 590	7 765
Other Asia a	8 578	8 559	7 036
<i>of which</i>			
China b	2 629	3 722	3 269
Hong Kong	636	931	912
Indonesia	33	74	na
Korea, Rep. of	1 161	985	480
Malaysia	342	237	478
Philippines	567	412	296
Singapore	758	588	403
Thailand	2 296	1 463	962
United States	43 503	43 674	44 940
European Union (15) c	29 671	35 598	36 786
New Zealand	39	34	30

a Other Asia is FAO's 'Far East' region which includes east, south east and south Asia, and excludes Japan. b FAO's statistics do not separate China and Chinese Taipei. c Includes EU intra-trade.

Source: FAOSTAT

Table 16: Selected importers of wood based panels

	1996	1997	1998
	'000 m ³	'000 m ³	'000 m ³
Japan	6 817	7 032	5 000
Other Asia a	8 704	9 790	9 048
<i>of which</i>			
China b	4 368	5 006	5 341
Hong Kong	1 277	1 705	1 727
India	20	47	82
Korea, Rep. of	1 644	1 728	802
Malaysia	142	91	117
Philippines	248	244	176
Singapore	657	687	480
United States	7 446	9 283	10 678
European Union (15) c	13 388	15 097	16 086
New Zealand	12	18	20

a,b,c See table 15.
Source: FAOSTAT.

At the same time, international competitors' wood availability is also projected to increase as wood from plantations currently existing or expected to be established comes on stream. By 2010, total global production and consumption of industrial roundwood is expected to reach around 1.9 billion cubic metres, or roughly 25 per cent more than in 1996. Generally, the FAO does not expect product prices to rise significantly over the projection period, although upward pressure on the prices of certain types of wood, typically the higher grades, may occur.

Australia is now a small net exporter of wood fibre and the bulk of the projected increase in domestic wood fibre production is likely to be processed into products for export. Recent studies into the competitiveness of Australian industry have generally concluded that relative to foreign competitors selling into a common market (typically Japan), Australian producers face slightly higher wood costs, higher distribution costs from higher port costs and the distance to major Asian markets, and higher labor costs. However, they generally face lower energy costs and have an overall capital cost advantage because of lower mill construction costs and cost of capital.

Table 17: Selected importers of paper and paperboard

	1996	1997	1998
	kt	kt	kt
Japan	1 857	1 614	1 449
Other Asia a	13 501	15 090	13 888
<i>of which</i>			
Bangladesh	103	125	119
China b	5 137	6 579	6 687
Hong Kong	3 530	4 056	3 443
India	639	657	674
Indonesia	199	273	131
Korea, Rep. of	676	470	257
Malaysia	1 119	993	816
Pakistan	168	130	135
Philippines	393	458	392
Singapore	891	750	716
Sri Lanka	78	89	104
Thailand	468	399	229
Vietnam	71	62	138
United States	13 076	14 381	15 470
European Union (15) c	30 801	35 651	37 885
New Zealand	171	237	281

a,b,c See table 15.
Source: FAOSTAT.

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