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The Development of the Japanese Wood Trade: Historical Perspective and Current Trends

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ABSTRACT

This paper examines Japanese forest products production, consumption and net trade trends, and the factors that have influenced these trends, from 1879 to the present. Prior to 1964, only industrial wood products are considered. After 1964, sawnwood and plywood are included. The reasons for the development of Japan's dependence on foreign forest resources are explained. Domestic wholesale and imported industrial wood prices are considered key factors. Rapidly rising prices following World War I and during the 1950's led to the promotion of imports. During the 1960's, Japan's economy outgrew the potential of its forest resource supply. Foreign competition and high domestic costs caused Japan's domestic production to stagnate during the 1970's and 1980's. Japan's major trading partners are also outlined.

EXECUTIVE SUMMARY

Historical Background

Early Developments: 1879-1921

Japan entered the global forest products market as a net exporter of industrial wood during the 1860's. The introduction of modern pulp and paper technology during the 1890's caused domestic wood prices to rise. As a result, many tree plantations were established at the turn of the century.

By 1907, net exports of industrial wood reached a peak of 1.0 million cubic meters. Japan's rapid economic development placed a constantly increasing demand on the nation's forest resources. New sources of energy allowed fuelwood production to decline, while industrial wood production increased. Until World War I, prices remained stable as net exports declined.

Earthquakes: 1921-1930

During World War I, domestic industrial wood prices increased significantly. In 1920, a large earthquake hit Tokyo. This increased the demand for wood and added further upward pressure on prices. In 1921, the Japanese government responded by lowering the tariffs levied on imported wood and Japan became a net importer of industrial wood for the first time. In 1923, the Kanto Earthquake and Fire devastated the Tokyo-Yokohama region. So much wood flowed into the Tokyo port that by 1924 Japan was importing 29 percent of the wood it consumed. The price of imported wood was falling as a result of the increased supply, causing domestic production to stagnate. In response, the Japanese government raised the import duty on imported timber five times between 1926 and 1933.

The Depression and Recovery: 1931-1939

During the 1930's, Japanese production of industrial wood reached new peak levels. By 1938, Japan was again a net exporter. Throughout this time Japanese colonial expansion increased its forest resource base. In 1940, production reached a peak of 34.0 million cm.

The War Era: 1940-1954

As a result of World War II, Japan lost its colonial resources and a significant portion of its wood processing capacity. In addition, the lack of foreign exchange forced Japan to depend entirely on its own forests during the first ten years of reconstruction. Thus, by the mid-1950's Japan's forests were degraded and prices were rising. At this time many tree plantations were established. In order to help generate foreign currency at this time, Japan began importing logs from the Philippines and manufacturing plywood to be exported to the United States.

Era of Increased Trade: 1955-1973

By 1961 Japan's economy was demanding more wood than domestic resources could supply. In response, the government adopted a policy of promoting imports. Throughout the 1960's, Japan's GNP grew 10 percent per year on average. The volume of imported wood grew substantially as a result. Domestic production of industrial wood grew steadily until reaching a peak of 51.8 million cm in 1967. By this time Japan's forests had been exhausted.

In 1973, imports accounted for 58 percent of consumption which reached a peak level of 99.6 million cm. Fuelwood and other industrial wood production was reduced to the 1.0 million cm level in favor of producing pulpwood and sawlogs. Sawlogs and wood chips accounted for most of the imports. With these resources, Japan produced almost all of the lumber, plywood and pulp it consumed during this period.

The increased consumption of imported wood stabilized prices, while the costs associated with forest management in Japan increased. As a result, the annual area of afforested land has declined since 1960. The most noticeable drops in afforestation occurred between 1970 and 1975.

Post Oil Crisis Stagnation: 1974-1990

The Oil Crisis in 1973 brought about a global recession. By 1975, Japanese forest production had declined to 34.2 million cm. Although the Japanese economy recovered from 1976 to 1979, domestic production remained practically constant while imports increased to meet consumption. In 1979, imports accounted for 64 percent of Japan's industrial roundwood consumption. In fact, Japanese industrial roundwood production has remained consistently near the 33 million cm level since 1975. Therefore, it appears that Japanese forest production is comparatively insensitive to market fluctuations.

Following a recession during the early 1980's the Japanese economy resumed expansion. Housing starts peaked in 1990 at 1.7 million units. Forest products imports increased as well, however the import profile has shown signs of change during this period. Imports of manufactured products such as conifer sawnwood and plywood have increased significantly. On the other hand, hardwood sawlog imports declined and softwood sawlog imports increased only slightly. Thus, Japan has increased its imports of value-added products. The primary factors influencing this change have been supply constraints within exporting nations and the stagnation of Japan's forest sector.

Foreign Suppliers

Japan has imported most of its conifer wood from the United States, Canada and the Soviet Union. The U.S. and USSR have supplied most of the imported sawlogs since the 1960's. Recently, U.S. exports have remained stable, while

Soviet exports have declined. Canada has historically banned most log exports. Japan has imported most of its conifer lumber from Canada and the U.S., with Canada holding the largest market share.

Japan's hardwood imports have come from Indonesia, Malaysia and the Philippines. By the mid-1970's Philippine exports dropped significantly as resources were reduced. Through the 1970's Indonesia supplied about half of Japan's hardwood imports. However, by the 1980's Indonesia had successfully banned log exports. As a result, Malaysia has held more than a 90 percent share of the hardwood import market since the early 1980's.

Conclusion

Recent trends are likely to continue. During the 1990's many Japanese houses, that were poorly built 20 to 30 years ago, are expected to be rebuilt with higher quality materials and more wood. Thus, demand is expected to remain stable.

Foreign log supplies are expected to remain tight, although New Zealand and Chile have increased exports recently. Producers in supplying countries are likely to continue competing for larger shares in the Japanese lumber and plywood markets. Wood chip demand is also expected to remain strong. Given the current state of the Japanese economy, forestry costs will remain high. Unless prices rise substantially, Japan's forests will remain uneconomic to harvest. Therefore, Japan's foreign dependence on forest products is not likely to change.

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INTRODUCTION

Although Japan opened its ports to exchange goods with foreign countries more than 130 years ago, it was not until the early 1920's that Japan began to significantly trade in wood products. Before this time Japan was able to meet all of its needs with its domestic forest resources. Several earthquakes and the lower prices of imported wood caused Japan to become a net importer of industrial wood through the 1920's. During the 1930's, protectionist policies and colonial expansion returned the country to its former position as a net exporter of industrial wood prior to World War II. During the 10 years immediately following World War II (1945 to 1955) Japan depended entirely on its own forest resources, having lost former colonial resources and lacking foreign exchange. The reconstruction and development that followed that War has led Japan to become one of the world's major importers of wood products. Indeed, Japan's wood imports grew at their highest rates through the 1960's and by 1972 imports of industrial roundwood exceeded its domestic production for the first time ever. An examination of the history of Japan's forest products and trade sector can provide a better understanding of Japan's current position as the largest importer in Pacific Rim and global forest products markets.

The strength and size of the post-War Japanese market is the driving factor behind the recent patterns of trade in forest products. Since WW II, Japan's export of any specific wood product has never amounted to more than a very small percentage of its production and imports. Thus, unlike other Japanese industries, Japan has not been importing wood to later re-export finished products. However, Japan's trade profile is primarily characterized by imports of raw and semi-processed material. While sawlog and pulpwood imports have exceeded production for almost twenty years, sawnwood imports have grown only over the last two decades to one-fifth of consumption.

This paper examines the historical trends and patterns of Japan's trade in wood products over the past century. First, a general profile is provided in order to establish a historical perspective. The discussion then concentrates more closely on the years since 1964. Various forest products are compared, and imports are compared with domestic production. In addition, the role of Japan's primary trading partners is outlined. Throughout, other factors influencing trade (including prices, exchange rates and political regulations) are discussed.

HISTORICAL TRENDS

Data pertaining to Japan's forest products sector date back to the at least the 1870's. The historical volume data is reported in kokus, which is the traditional unit of volume measure. In this report kokus volumes have been converted to cubic meters (cm) for consistency (Briggs and Flora, 1991).

Early Developments: 1879 to 1921

Production and Consumption

Fuelwood was the primary forest product being produced from 1888 to the beginning of the first World War. At the turn of the century, fuelwood and charcoal demand exceeded lumber demand by a factor of 4.3 (Murashima, 1988). From 1879 until 1921 Japan consumed most, but not all, of the industrial wood that it produced, making Japan a net exporter of industrial wood[1]. Production grew from 6.2 million cubic meters in 1879 to a peak of 19.6 million cm in 1919. When measured by value, industrial wood accounted for 27 percent and fuelwood 69

[1] Prior to 1964, the industrial wood trade statistics include large squares, thus the term "industrial wood" is used in place of "industrial roundwood" for trade and consumption figures prior to 1964.

percent of the total wood output measured at current prices for the years 1888-92. By 1903-07 this ratio had changed to 47 percent industrial wood and only 49 percent fuelwood (Kumazaki, 1988). When these value ratios are compared to the corresponding volumes, it can be seen that the demand for industrial wood was increasing relative to that of fuelwood. Between 1888 and 1907 industrial roundwood production doubled, while fuelwood production remained largely unchanged. By 1918-22 industrial wood represented 50 percent and fuelwood 46 percent of domestic forest output.

The pulp and paper industry contributed to this increase in demand for industrial wood. In 1890, Japan began manufacturing sulfite and groundwood pulp from spruce and fir species. By 1910, Japan had become self-sufficient in newsprint, primarily through the operation of new mills in Hokkaido (Ishii, 1991). Between 1914 and 1919, the number of pulp mills increased from 13 to 30 and the production of pulp rose from 90,000 tons to 240,000 tons (Murashima, 1988). As a consequence, the demand placed on Japanese forests increased with the introduction of modern pulp and paper production. In order meet the overall demand for raw materials, Japan's paper companies began expanding from Honshu and Hokkaido into Sakhalin to tap the richer forests. Sakhalin had been granted to Japan as an outcome of the Russo-Japanese War of 1904-05.

At the turn of the century railroads also began to exert a significant demand for

timber to be used as ties. The new wave of industrialization was also accompanied by a great expansion of mining production, thus increasing the need for pitprops and adding to the overall demand for industrial wood.

Trade

In 1879, Japan exported 11,400 cm of industrial wood. This trend grew to a peak of 1.0 million cm in 1907, with most of the growth occurring after 1902. Exports of industrial wood remained just under one million cubic meters from 1908 until 1916 when World War I erupted. Between 1916 and 1917 Japanese net exports of industrial wood were nearly cut in half, dropping from 814,300 cm to 445,300 cm. The subsequent import of forest products continued to outgrow exports. Thus, net exports were cut in half again by 1920.

From 1885 to 1901 Japan consistently exported (by value) more forest products than processed wood products (Appendix 2). However, in 1902 this trend reversed, and from 1902 through 1939 Japan consistently exported more wood products (by value) than forest products, in terms of total exports.[2] Several peak years should be noted. In 1907, total exports of wood products reached 10.8 million Yen, current, compared to 6.2 million Yen worth of unprocessed forest

[2] The historical Japanese timber trade statistics record two categories: wood products and forest products. Unfortunately, these terms are not clearly defined. Forest products refer to logs and primary processed materials, while wood products refer to secondary processed goods.

products. In 1920, total wood products exports rose to 32.5 million Yen compared to total forest product exports of 12.8 million Yen. In 1939 Japan exported 147.5 million Yen worth of wood products and 66.2 million Yen worth of forest products. In addition, total export values should be compared to the import values.

In 1916, Japan's net exports of forest products totaled 1.5 million Yen and 13 million Yen, current, for wood products. However, in 1917 Japan became a net importer of forest products (by value) for the first time. By 1920 imports of forest products had grown six-fold, making Japan a net importer of 6.0 million Yen worth of forest products. This however, was offset by an even larger increase of higher valued wood product exports. From 1916 to 1920, net exports of wood products nearly doubled to 25.0 million Yen. In other words, Japan became, in 1917, a net importer of unprocessed wood raw materials while at the same time it increased the value of its processed wood product exports.

Forest Plantings

Along with the new and rapidly increasing demands on Japan's forest resources, there was a notable increase in planting activity. By the turn of the century, 100,000 ha of forest land were being replanted annually (Kumazaki, 1988). The reasons for this went beyond a desire to meet increasing demand and to simply replace timber that was being cut. Timber prices were steadily increasing at the time when private forest ownership was being established through the sale of

government forests. The new class of forest owners sought to maximize the expected return to their forest lands through increased tree planting. In addition to promoting their own forest planting, these forest owners also spread silvicultural information throughout the country (Kumazaki, 1988). The government supplemented the private planting by using the funds from the sale of forests to undertake large scale public sector planting projects. This wave of planting activity peaked around 1910 when 150,000 ha were replanted.

Prices and Consumption

Among other things, World War I significantly affected industrial wood prices (Figure 1). During the period 1916 to 1920 wholesale prices for industrial wood tripled and import prices for forest products doubled (Appendix 3). Although it is difficult to estimate the exact effects these price increases had on demand, it appears that the higher prices clearly caused an overall reduction in consumption and an increased substitution of imported timber for domestic resources. Consumption of industrial wood dropped almost 3.0 million cm between 1919 and 1921. However production dropped by an even greater amount. Thus, in 1921 Japan became a net importer of industrial wood (See Table 1).

It should also be noted that the yen/dollar exchange rate appears to have been administratively controlled at 2 Y/$ from 1895 to 1930. Therefore, exchange rate fluctuations would not have influenced trade with North America during this period.

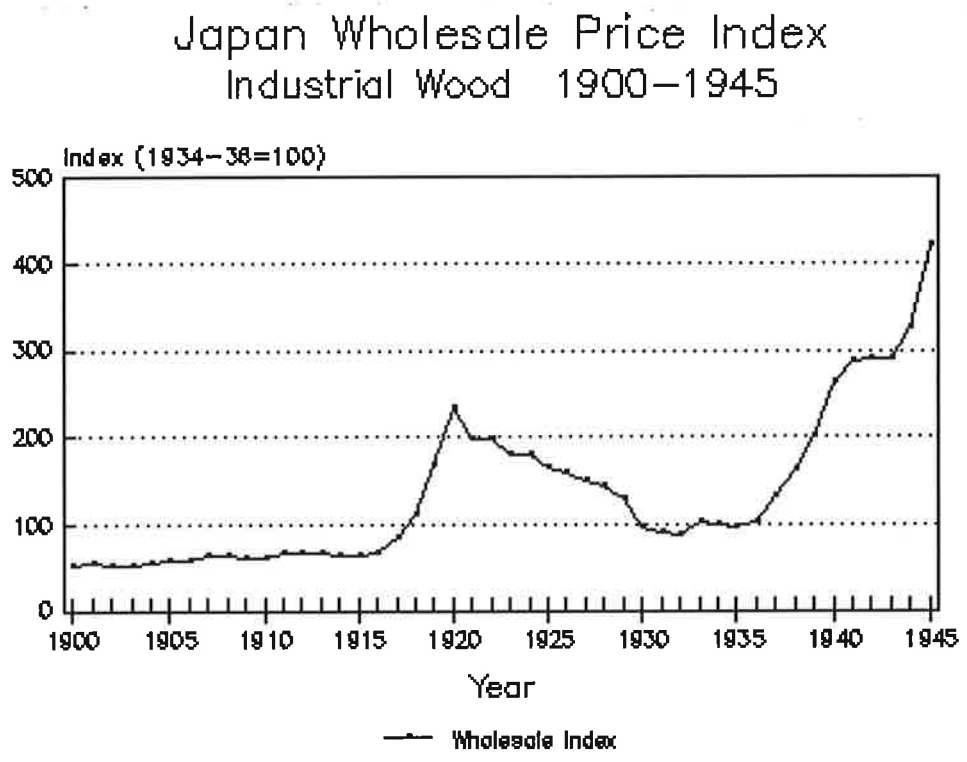

Figure 1

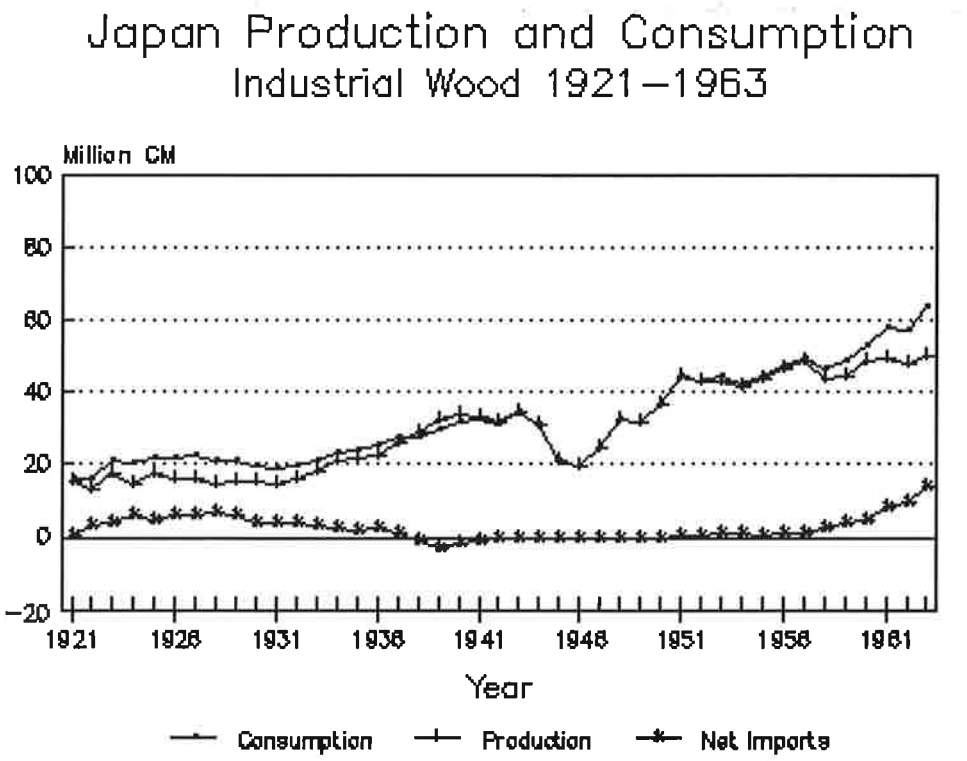

Figure 2

Earthquakes: 1921-1930

In 1920 and 1923 two massive earthquakes devastated the country. First there was the Tokyo Earthquake of 1920, followed by the Kanto Earthquake and Fire of 1923. In order to meet the demand for wood needed to reconstruct the Tokyo-Yokohama region, Japan increased its timber imports. These events caused Japan to become the largest foreign market for the U.S. Pacific Northwest's forest industries.

Production and Consumption

From 1919 through 1922 both domestic production and consumption declined, with production falling at a greater rate, and net imports growing (Table 1). The increased demand following the disasters was great enough to require an increase in both domestic production and in imports. The largest growth in consumption of industrial wood occurred between 1922 and 1923, with an increase of 4.9 million cm. Between these two years, consumption increased by 30 percent while domestic production increased 28 percent. Net imports grew 39 percent. Thus, total imports were growing faster than domestic production. In 1923 imports accounted for 19 percent of the total consumption (Figure 2).

Table 1. Industrial Wood 1919-1930 (1000 CM)

Year	Domestic Consumption	Domestic Production	Net Imports	Net Import/ Consumption
1919	19,266.4	19,643.8	-377.4	-2.0%
1920	17,320.3	17,516.2	-195.9	-1.1%
1921	16,329.3	15,673.6	655.7	4.0%
1922	16,344.6	13,450.0	2,894.6	17.7%
1923	21,247.4	17,230.9	4,016.4	18.9%
1924	20,302.3	14,488.6	5,813.7	28.6%
1925	21,804.5	17,217.0	4,587.5	21.0%
1926	21,692.7	15,729.0	5,963.7	27.5%
1927	22,739.3	16,313.1	6,426.2	28.3%
1928	21,352.3	14,353.9	7,004.0	32.8%
1929	21,049.2	15,018.7	6,038.8	28.7%
1930	19,602.6	15,599.0	4,003.6	20.4%

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Imports

In 1921, lower tariffs and the Tokyo Earthquake caused Japan to become a net importer of 655,700 cm of industrial wood (Table 1). Net imports grew from less than one million cm in 1921 to 7.0 million cm in 1928. The primary softwood products imported at this time were 12 and 24 inch squares for resawing, primarily imported from the United States. In 1920, Japan imported 170,000 cm of lumber from the American Northwest and 769,000 cm in 1921. Likewise, lumber imports from British Columbia grew from 14,000 cm in 1920 to 124,000 cm in 1921

(Elchibegoff, 1949). By 1922, the hardwood forests of Hokkaido had become depleted and the supply of logs for the plywood industry was largely replaced by lauan wood from South East Asia (Funakoshi, 1988).

In September 1923, the Kanto Earthquake and Fire destroyed many parts of the Tokyo area. In the four months following the Kanto Earthquake, Tokyo purchased 430 million feet of lumber (Perrault, 1985). The growth in net imports equalled 23 percent of the growth in consumption between 1922 and 1923. Imports from British Columbia and the U.S. Northwest peaked in 1923 at 250,000 cm and 1.8 million cm, respectively (Elchibegoff, 1949). By 1924, although imports from the U.S. Northwest dropped to 1.4 million cm, total imports from the U.S. reached an unprecedented high of 2.8 million cm (Murashima, 1988).

The quantity of imports might have been greater had it not been for the limitations of Japan's transportation and distribution systems. "North American lumbermen found their efforts to supply wood to rebuild the devastated Tokyo-Yokohama area hampered by port facilities that were soon so clogged with lumber and other supplies needed in the aftermath of the disaster (Cox, 1990)." The resulting abundance of lumber in the ports contributed to the decline of prices for imported timber.

By 1928 net imports had grown to 33 percent of the industrial wood consumed in

Japan. Since there were no significant changes in consumption during this period, the growth of imports offset a decline in domestic production, which was down by 17 percent from 1925 to 1928 (See Table 1). Along with a boom in lumber imports, pulpwood imports also doubled from 1924 to 1926.

Prices

Japanese import pricing policies help to explain the decline in domestic production. As mentioned above, domestic wholesale prices had grown threefold between 1916 and 1920. In 1920 the government reduced the tariffs and import duties for timber products in order to maintain the timber supply and to promote a stable market (Akai, 1988). As a result, in 1921, prices for imported forest products dropped 40 percent from the previous year (Appendix 3). In addition, ocean freight charges fell considerably after WW I. In 1919-20, Japan-U.S. timber freight was $35 (US) per 1,000 bf and decreased to $15 (US) by the end of 1920 (Murashima, 1988).

When net imports are measured by value, 1924 was the pre-World War II high (Appendix 2). However, the volume of net imports did not peak until 1928. This is explained by the fact that import prices declined steadily through the decade. The falling import prices led to an increase in the volume imported. The Japanese forest owners perceived the import boom of the early and mid-1920's as a serious threat to the local industry. Indeed, the import trend set off a gradual decline in

wholesale prices that lasted from 1920 to 1935 (see Figure 1). But by 1926 the domestic forest industries succeeded in pressuring the government to raise the customs duties. As a result, between 1926 and 1933 the duty on imported timber was raised five times (Akai, 1988).

The Depression and Recovery: 1931-1939

Production and Consumption

Having rebuilt much of what had been destroyed by the Earthquakes, Japanese consumption of industrial wood declined from 1927 until 1931. Production fell as well during the depression. However domestic producers were able to regain some of their lost market share during this period. In 1928 Japanese producers held 67 percent of the market, and by 1934 had 91 percent of the market. Thus, Japan was re-entering a period of self-sufficiency in forest products.

By 1932 Japanese expansion and the pre-WW II build-up, which included increasing tensions with the Soviet Union, caused a need for greater amounts of industrial wood consumption. Consumption grew steadily from 1931 until 1941 to a new peak of 32.2 million cm. Production grew as well, peaking at 34.0 million cm in 1940. Once again Japan was producing more industrial wood than the country was consuming (Figure 2).

By the 1930's, more than 70 percent of Japan's pulpwood was produced in Sakhalin. The balance was primarily produced in Hokkaido. Most of the pulpwood produced from these two islands, especially Sakhalin, was shipped to pulp mills in Honshu (Ishii, 1991).

Trade

Although net imports actually grew in 1931, by 1938 Japan had returned to being a net exporter of industrial wood products (Figure 3). According to Robert Ficken, demand for American timber fell in the 1930's due to, among other things, competition from Siberia (Ficken, 1983). Although complete information is not available, both before and after World War I most, if not all, of the trade between Russian Asia and Japan was in wood products. By 1931, Japan imported 337,000 tons of timber from the Soviet Union (Waggener and Backman, 1991). Although this was the case for a brief period, it would not have lasted after 1934 when the total trade between Japan and Russian Asia dropped 90 percent due to increased political tension.

In 1932, Japan was again a net exporter of wood products on a value basis (current Yen) while remaining a net importer of forest products. For the next six years Japan increased its net imports of primary forest products, while increasing its net exports of secondary wood products. In other words, for all forms of wood Japan was a net importer of raw materials and a net exporter of processed goods (Appendix 2). Thus, Japan benefitted from adding value to imported wood via domestic processing.

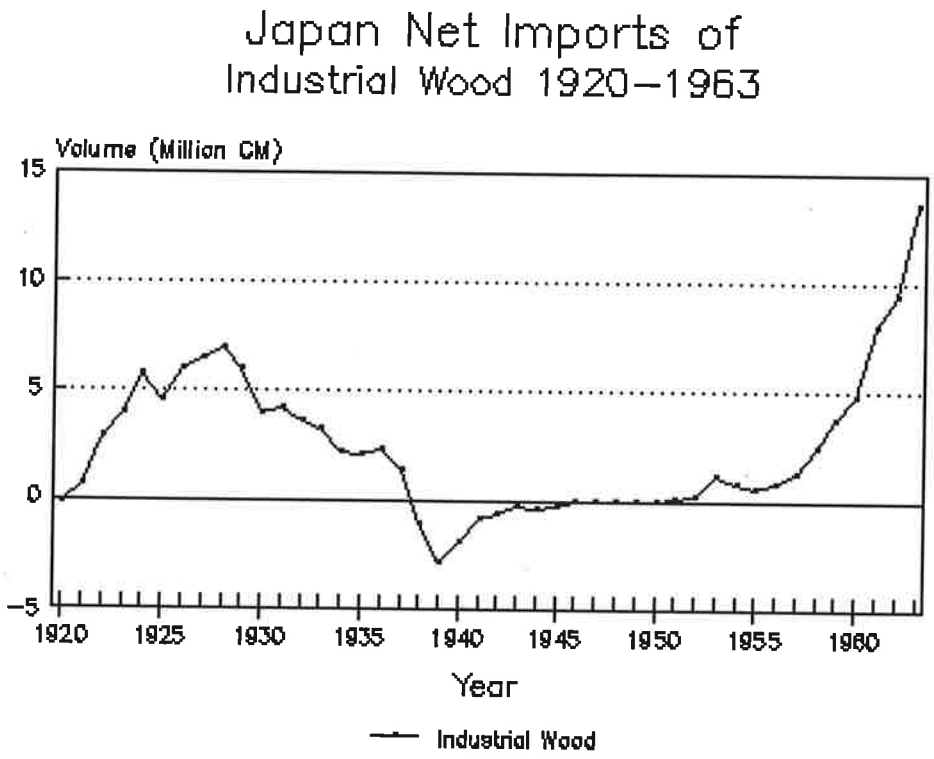
Japan Net Imports of
Industrial Wood 1920–1963
Volume (Million CM)
15
10
5
0
-5
1920
1925
1930
1935
1940
1945
1950
1955
1960
Year
Industrial Wood

Figure 3

By the mid-1930's the early phase of Japanese net imports of forest products was coming to an end. Timber imports would not resume for the next two decades. Import prices for industrial wood had bottomed out in 1931, as did both domestic production and consumption (Appendix 3). In addition to lower domestic prices and higher duties, the exchange rate of the Yen had also fallen in 1932 further inducing imports to decline.

By 1938, domestic production increased to the point where Japan also became a net exporter of unprocessed forest products. In 1939, net exports of forest products totaled 30 million Yen, while net exports of processed wood products were 141 million Yen. When measured by the volume of industrial wood traded, Japan's net exports totaled 2.9 million cm in 1939. Forestry was an important aspect of Japan's pre-War economy, which was characterized by a dense population and a lack of funds. The forest sector absorbed a great deal of labor, with little need of capital, and supplied basic goods needed for industrialization (Kumazaki, 1988).

World War II: 1940-1944

Production and Consumption

Industrial wood production grew from 14.9 million cm in 1931 to a peak of 34.9 million cm in 1943 (Appendix 1). Consumption also peaked in 1943, at 34.6 million cm or 99 percent of the total production (Table 2). Japan became self-sufficient in wood products during World War II even though consumption had almost doubled during the previous decade.

Table 2. Japan Industrial Wood 1940-1944 (1000 cm)

Year	Domestic Consumption	Domestic Production	Net Exports	Net Exports as % of Consumption
1940	32,101.9	34,063.6	1,961.7	6.1%
1941	32,294.2	33,126.0	831.8	2.6%
1942	30,790.8	31,456.0	655.1	2.2%
1943	34,632.5	34,910.0	277.5	0.8%
1944	30,925.3	31,287.6	362.3	1.2%

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Such an increase in domestic production at this time was attributable in part to the first wave of tree plantings that had occurred at the turn of the century as well as exploitation of colonial resources. Before WW II, Japan depended on forest resources of Sakhalin, Korea and Manchuria, which amounted to 38 percent of the supply in 1939. In fact, 80 percent of Japan's pulpwood was supplied by the colonies at this time.

One of the primary aspects of the Timber Control Law of 1941 was to accelerate the rate of domestic timber cutting. Yet growing consumption soon exceeded the additional timber supply available from the maturing plantations, and net exports declined as more timber was consumed at home. Japan was soon consuming more wood than it ever had before. Large quantities were not only used as traditional firewood, but wood was also used as a substitute for crude oil (Yamaguchi, 1991). Although the data sources for fuelwood production and consumption during this time vary, it appears that between 1936 and the middle of the War overall fuelwood production rose by 30 to 65 percent. Thus, by the end of WW II, Japan's domestic forest resources production capacity had been drastically diminished.

Trade

World War II reversed the general trends in both domestic production and consumption of wood products and also significantly reduced Japan's participation in the global forest products markets. As shown in Table 2, net exports declined from almost 2 million cm in 1940 to 277 thousand cm by 1943. Relative to consumption, net exports declined from just over 6 percent in 1940 to less than one percent by 1943. This trend continued for almost a decade. From 1942 through 1952, net foreign trade of industrial wood products was very close to zero (Figure 3).

Regulation

The events surrounding the WW II imposed a heavy demand on Japan's domestic forest resources. When the Sino-Japanese War broke out in 1937 the Japanese government decided it was necessary to control the supply and demand of timber. Up until this time production and consumption had been largely based on the mechanisms of a free economy. The new control measures were manifested in the Nation's Mobilization Law and the Price Control Measures Law of 1938 and also through the provisions of the Regulation of Timber Production Control and the Timber Standard Bylaw of 1939. Although it is difficult to say how effective the control measures were, government intervention lasted until 1949 (Akai, 1988).

Initially, the control was aimed at the foreign trade of all products in order to ensure the supply of goods necessary for the conduct of war. Timber imports were also directly controlled by the government with the result that the volume decreased sharply. The reduction of imports and the increased demand stemming from a general recovery as well as the Sino-Japanese War caused a shortage in the supply of timber. This boosted domestic production and consumption and spurred an increase in domestic timber prices.

Between 1935 and 1940 wholesale prices more than doubled as the government was not able to effectively apply the Price Control Measures Law to timber products. Thus in 1941 the government enacted the Timber Control Law and for

three years the wholesale price of industrial wood remained constant. However, this effort was short lived as prices jumped 40 percent between 1944-1946 (see Figure 1).

After the War: 1945-1954

As a result of Japan's defeat in World War II, the nation lost its former colonies. The loss of the colonies meant that Japan also lost control of 45 percent of its pre-War forest land and a third of its growing stock (Murashima, 1988). In the years following WW II, these losses would contribute to supply shortages and price increases. In addition to losing forest resources, pulp and paper facilities in Sakhalin, Korea and Taiwan were also lost.

Reconstruction and Production

The heavy bombing at the end of the war not only reduced the nation's productive resource base significantly, but destroyed many cities as well. Between 1944 and 1945 industrial wood production dropped 33 percent and reached a low of 19.8 million cm in 1946. In that same year the Timber Control Law was repealed and the domestic industry again became very active.

With lower technology needs, the sawmill and logging industries were able to

recover much faster than other heavy manufacturing industries that would later compete with wood in the building materials markets. In addition, domestic producers faced virtually no competition from foreign timber or wood imports as Japan lacked the foreign currency to buy imported products. Thus, in 1946 and 1947, forestry accounted for 5.0 and 3.7 percent of the national income, respectively--the two highest percentages ever. By 1948, domestic production had returned to the 30 million cubic meter level, and in 1950 reached a new high of 36.4 million cm.

Prices and Forest Planting

The extensive demand for lumber to again reconstruct Japan exceeded available timber supply, causing prices to continue an upward trend. Diminished forests, leveled cities and rising timber prices combined to provide a strong incentive for renewed planting activity. In addition, the Japan government policy at this time was very favorable towards forestry and granted many subsidies and tax breaks along with increased forest road building. Thus, a second wave of extensive planting began at the end of the 1940's. Even small scale forest owners became interested for the first time. During this second wave, 300,000 to 400,000 ha were planted annually. This rate was maintained until the last half of the 1960's (Kumazaki, 1988).

During the latter half of the 1950's there was also much progress in forest

conversion and afforestation. This was carried out in connection with the pulp industry's demand for small diameter trees. In this process many low quality non-conifer trees were cut and the land was replanted with conifer species (Shimotori).

The increasing demand for timber could not be maintained given the state of the country's forests. Thus, domestic wholesale prices for industrial wood almost tripled between 1950 and 1954 (Appendix 3). In order to help stabilize supply and demand, and thereby prices of wood products, a number of measures were developed and put in place with the objective of curbing demand. These measures included the promotion of substitute materials and a greater use of wood residues, prolonging the life of wood materials, and a switch to non-conifer tree species as a source of pulpwood.

Pulp and Paper

Throughout the 1950's Japan's real economic growth rate averaged 9.2 percent--aided by the Korean War. The healthy state of the Japanese economy in the 1950's helped to sustain an increasing demand for timber. Pulp and paper production increased 968 percent between 1945 and 1955, with all wood raw materials coming from domestic forest resources (Appendix 3). Since many pulping facilities had been heavily damaged, destroyed, or captured during WW II, it was necessary for the paper companies extensively rebuild and to purchase new equipment from abroad. Huge sums were invested to purchase the latest

technology available as early as 1955 and continued through 1960. This not only allowed for further increases in production, but for the consumption of non-conifer trees as pulpwood.

Trade Resumes: 1955-1963

In 1953, Japanese net imports of industrial wood were small but significant for the first time in two decades (see Figure 3). In response to increased substitution and the resumption of imports, wholesale prices actually declined slightly in 1955 for the first time in two decades. However, this trend did not last as Japan's economy would grow at an annual average rate of about 10 percent until the 1970's. From 1955 to 1963 industrial wood consumption grew from 44.5 million cm to 63.8 million cm, or by over 43 percent.

Changes in the Supply and Demand of Forest Resources

Pulp and paper production, although less important during and immediately after the WW II, has subsequently developed into a prominent industry. By the mid-1950's this sector was growing faster than the lumber industry. The increase in demand for pulp materials contributed to another jump in the price of domestic industrial wood. Prices grew 33 percent between 1959 and 1963. As a result of these price increases, the demand for firewood and charcoal began to diminish.

However, despite the reduced demand for fuelwood, overall industrial wood prices continued to rise (Appendix 3).

The Need for Trade

In response to the extraordinarily high price levels, the Japanese government decided to stimulate timber imports from North America (Yamaguchi, 1991). As discussed later, 1961 was a banner year for lumber exporters in the Pacific Northwest. Within a year however, U.S. lumber exports to Japan were being replaced by log exports. From 1962 Japanese log imports grew substantially, while lumber imports either dropped or grew only minimally.

Because foreign logs were cheaper in Japan than domestic timber, logs were imported in greater and greater quantity (Shimotori). In 1950, net imports of industrial wood totaled only 800,000 cm, but by 1963 had grown to 13.6 million cm, amounting to 21 percent of overall consumption. As a result of the increase in imports, prices began to stabilize. Wholesale industrial wood prices that had grown by 20 percent between 1960 and 1961, grew only slightly between 1961 and 1962 (Appendix 2).

Plywood

Another domestic wood products sector that prospered during this period was the plywood industry. An early government strategy was to manufacture plywood for

export to the United States in return for hard currency. Ninety-five percent of the plywood was produced from Philippine lauan logs. In 1952, Japan imported 550,000 cm of lauan logs. By the end of the decade, imports of lauan grew to 4.0 million cm. The government was heavily promoting the plywood industry, with many tax breaks and subsidies. By the mid-1950's, Japanese plywood production exceeded 200 million square meters of which 72 million square meters was exported to North America. This made plywood Japan's third largest export commodity in terms of value. By the end of the decade, North American plywood manufacturers began to protest and the Japanese companies were forced to curtail plywood exports (Murashima, 1988).

Era of Increasing Foreign Dependency: 1964-1973

Between 1960 and 1970 the volume of imported industrial timber grew by 850 percent. However, the prices of imports grew by only 37 percent in those ten years. In 1960, net imports of industrial wood totaled 4.8 million cm. Within a decade net imports had increased to 45.5 million cm. By 1967, Japan had again reached the previous high level of dependency on foreign timber at approximately 30 percent of consumption. Throughout the 1960's, the Yen exchange rate was fixed at 360 Y/$.

Trade

The nature of this net import growth is reflected by the value of the imports. In 1960, Japan imported 53,400 million Yen (current) of primary forest products. By 1970, Japan imported 562,100 million Yen of primary forest products, a growth of 953 percent. In comparison Japan was a net exporter of secondary wood products throughout the 1960's. In 1970 Japan's imports of processed wood products (by value) exceeded exports, and Japan switched to being a net importer of both unprocessed forest products and processed wood products (Appendix 2).

Furthermore, trade in secondary wood products was small compared to unprocessed forest products trade. The biggest year for wood products trade was 1962 when net exports amounted to 18,400 million Yen. By 1969 this total had declined to 3,600 million Yen. As noted above, a year later Japan was a net importer of wood products in the amount of 15,000 million Yen. This also indicates that the vast majority of wood and forest products imports (as well as domestic harvest and production) were consumed in the Japanese market, rather than being re-processed or manufactured for export.

From the beginning of the import boom, Japan has preferred to import logs or large squares, i.e. unprocessed or semi-processed raw materials. After the end of WW II large investments had been made in the domestic sawmill industry as growth in lumber production climbed along with domestic roundwood production.

In order to maintain the necessary return to invested capital, Japanese mill owners found it increasingly necessary to purchase raw materials from abroad. Meanwhile, many U.S. sawmills, fighting to hold market shares in the very competitive domestic North American market never placed a high priority on serving overseas markets (Beuter, 1969). Thus, it was natural for the Japan-North American log trade to develop faster than lumber trade. However, it is not clear that Japan would have increased its lumber imports even if North American mills could have increased supply at the time.

The Effects of Trade on Domestic Forestry

The ensuing growth of import dependent costal mills which could provide cheaper products tended to force Japan's interior mill owners and loggers out of business. As a result, the cutting and reforestation of private forests declined. This contraction meant a loss of a stable livelihood for many inland laborers (Shimotori). It also meant that Japan as a whole would be facing an increasing dependence on foreign timber (Table 3).

Table 3. Japan's Industrial Roundwood[3] 1960-1973 (1000 CM)

Year	Domestic Consumption	Domestic Production	Net Imports	Net Imports as % of Consumption
1960	53,406.6	48,525.2	4,770.1	8.9%
1961	57,892.0	49,903.4	7,988.6	13.8%
1962	57,487.9	48,088.0	9,399.9	16.4%
1963	63,778.6	50,203.7	13,574.9	21.3%
1964	64,981.0	50,678.0	14,303.0	22.0%
1965	65,779.0	49,534.0	16,245.0	24.7%
1966	72,319.0	51,023.0	21,296.0	29.4%
1967	79,387.0	51,813.0	27,574.0	34.7%
1968	83,301.0	48,342.0	34,959.0	42.0%
1969	84,809.0	46,217.0	38,592.0	45.5%
1970	90,801.0	45,351.0	45,450.0	50.1%
1971	87,960.0	45,253.0	42,707.0	48.6%
1972	91,785.0	43,114.0	48,671.0	53.0%
1973	99,556.0	41,584.0	57,972.0	58.2%

CINTRAFOR/jlm

In order to help the domestic forest products sector respond to the new internationalization of the timber economy, several government programs were put

[3] The data from 1964 has been obtained from FAO and FAO definitions of product categories have been used. Industrial roundwood production is the sum of saw/veneer logs, pulpwood (round and split) and other industrial wood. Industrial roundwood trade figure included wood chips and residues along with roundwood pulpwood. The data prior to 1964 appears to be consistent, however in earlier periods large squares would have been included as industrial wood. In the early 1960's, Japanese preferences for importing wood shifted from large squares to logs, primarily for economic reasons (Flora, et al., 1991).

in place during the 1960's. Nevertheless, many of the rural workers began migrating to the cities during this time, seeking more stable and higher paying jobs in the rapidly expanding urban service and business sectors. The reduction of the rural labor force caused the average wage rate for silvicultural workers to increase by a factor of 14 between 1961 and 1985, while the average stumpage price for Sugi rose by only 67 percent. As a result, the average internal rate of return from a Sugi plantation since the late 1960's is estimated to have been 6.5 percent (Kumazaki, 1988). In 1975, the estimated return on investments for growing Sugi was only 4.1 percent. More recently, this return has declined even further to 1.7 percent in 1989 (Japan Forestry Agency, 1991).

Industrial Roundwood

In 1967, the level of domestic industrial roundwood production in Japan reached an all-time high of 51.8 million cm. By this time the supply of roundwood from Japan's forests could no longer keep pace with consumption (Figure 4). From 1965 to 1970 industrial roundwood consumption grew from 65.0 million cm to 90.8 million cm, or by 40 percent. However, domestic production dropped from 51.8 million cm in 1967 to 45.4 million cm in 1970, or a decrease of 12 percent. The Japanese share of domestic consumption declined from 75.3 percent in 1965 to 50 percent in 1970. Indeed, imports were beginning to replace Japan's own forests as the primary source of roundwood.

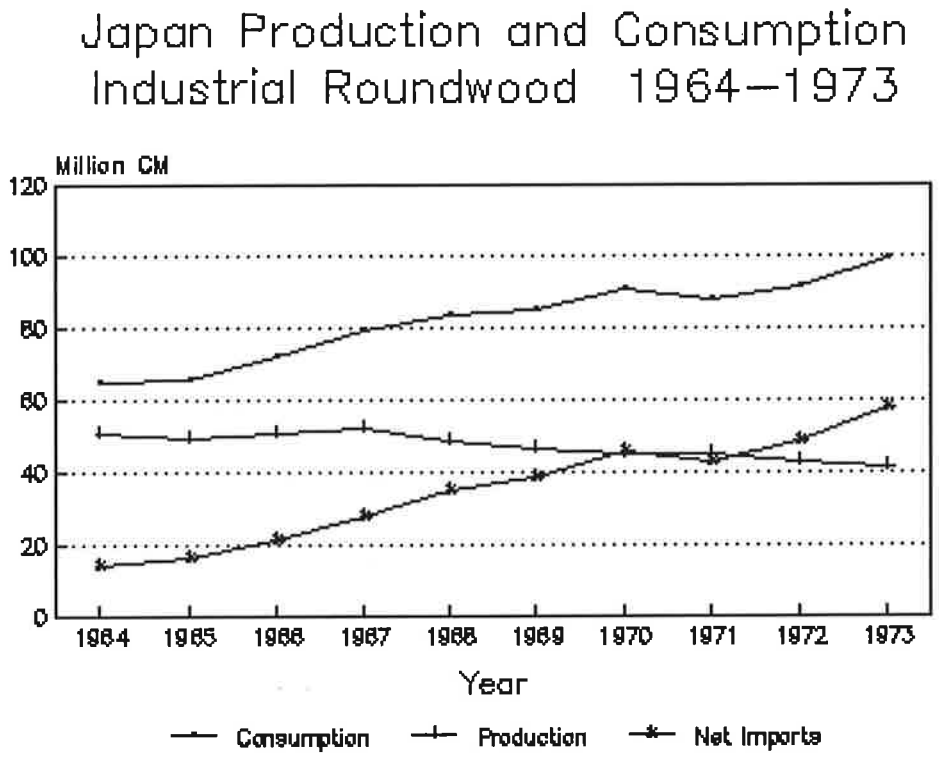

Figure 4

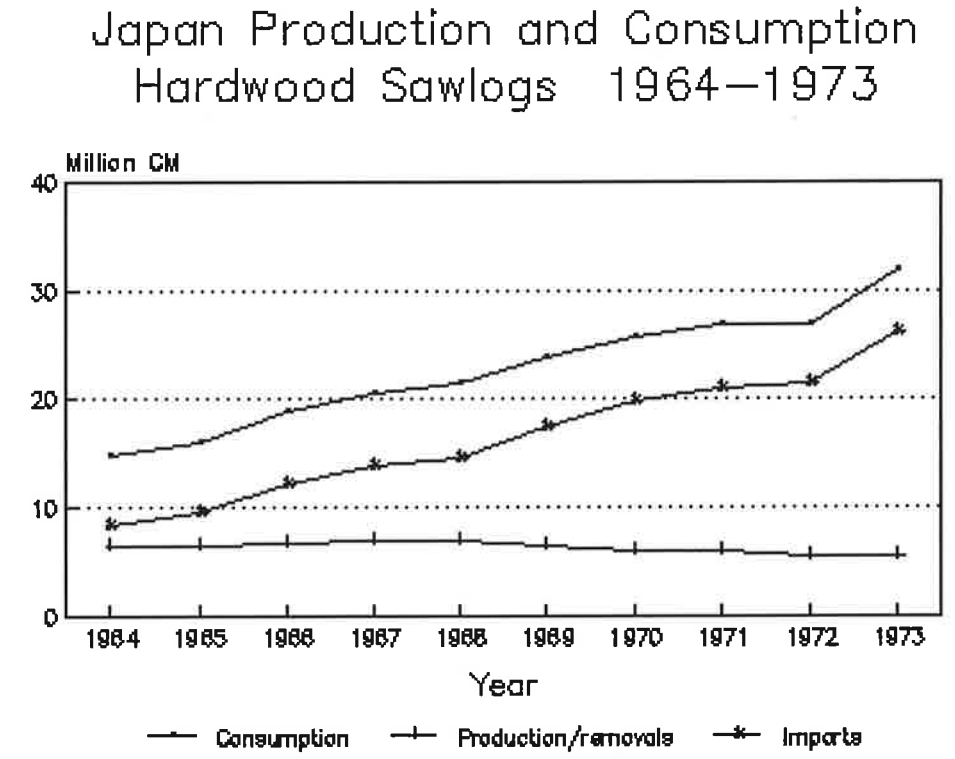

Figure 5

Sawlogs

For the sawlog sector, 1968 was the last year in which domestic production exceeded imports for all species combined. When examined by individual species, it is evident that Japan has relied heavily on imports for its supply of non-conifer sawlogs (Figure 5). Most of these imports have supplied tropical hardwood logs as the raw material for Japan's plywood mills.

Most of the conifer sawlogs were initially imported from the U.S. Pacific Northwest. In 1961, Washington and Oregon exported 1.8 million cm of logs and 257,000 cm of lumber to Japan. By 1965 lumber exports had dropped to 50,000 cm before increasing again to 113,000 cm in 1967. In comparison, log exports from these two states grew consistently, reaching 8.2 million cm in 1967 (Beuter, 1969)[4]. The total Japanese imports of conifer sawlogs reached 11.5 million cm in 1967, and 18.4 million cm by 1970 (Figure 6).

According to Beuter, this trend in the trade of forest products, characterized by a large and growing proportion of logs, was unacceptable to a large segment of the U.S. wood products industry which increased pressure on the U.S. government to restrict or ban log exports.

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[4] The quantities of log and lumber exports in Beuter's research are reported in thousand board feet, however in order to maintain consistency the figures have been converted to metric measurements. The generally accepted conversion factors of 5.5 cm per Mbf for logs and 2.36 cm per Mbf for lumber have been used.

Sawnwood

The trend observed for sawlogs of decreasing domestic production in the face of increasing imports and consumption has not been repeated in the case of sawnwood. From 1964 to 1970 both production and consumption of sawnwood grew steadily. In 1964, conifer sawnwood consumption totalled 25.7 million cm. Of this, 24.8 million cm was produced domestically (Figure 7). Although dropping slightly in 1965, non-conifer sawnwood consumption grew from 7.2 million cm to 10.0 million cm over the period 1964-1970. At the same time, production increased from 7.4 million cm to 9.8 million cm (Figure 8). Japan was actually a net exporter of non-conifer sawnwood until 1967. Japan's ability to produce sawnwood for domestic consumption was thus maintained at levels much higher than for sawlogs. In 1964, Japan produced 98 percent of all the sawnwood consumed. By 1970 this figure had declined by only 4 percentage points, to 94 percent.

In the United States, most sawmills treated overseas trade largely as a sideline operation at that time. Thus, Japan's coastal mills, utilizing imported North American conifer logs, did not face heavy foreign competition in lumber markets within Japan and imports of sawnwood grew only very slowly (Appendix 4). Much of the imported sawnwood at this time was medium to large squares for remanufacturing in Japan. It is important to realize that an increasing share of domestic sawnwood was produced from imported logs. In other words, being self-sufficient in sawnwood production was made possible only through increasing

dependence on imported conifer sawlogs.

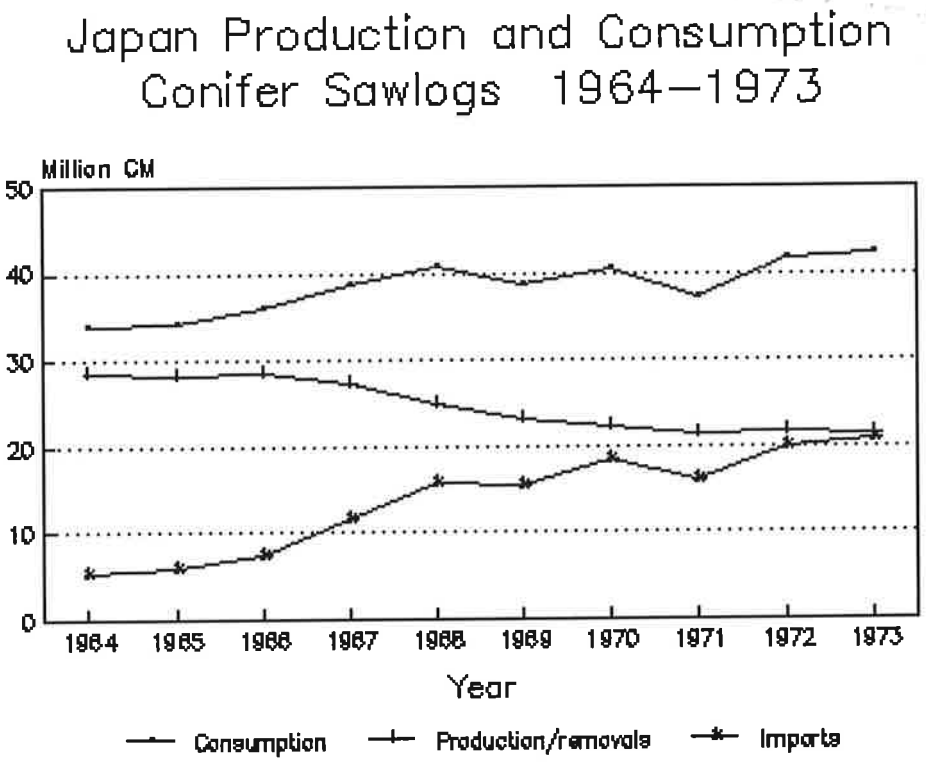


Figure 6

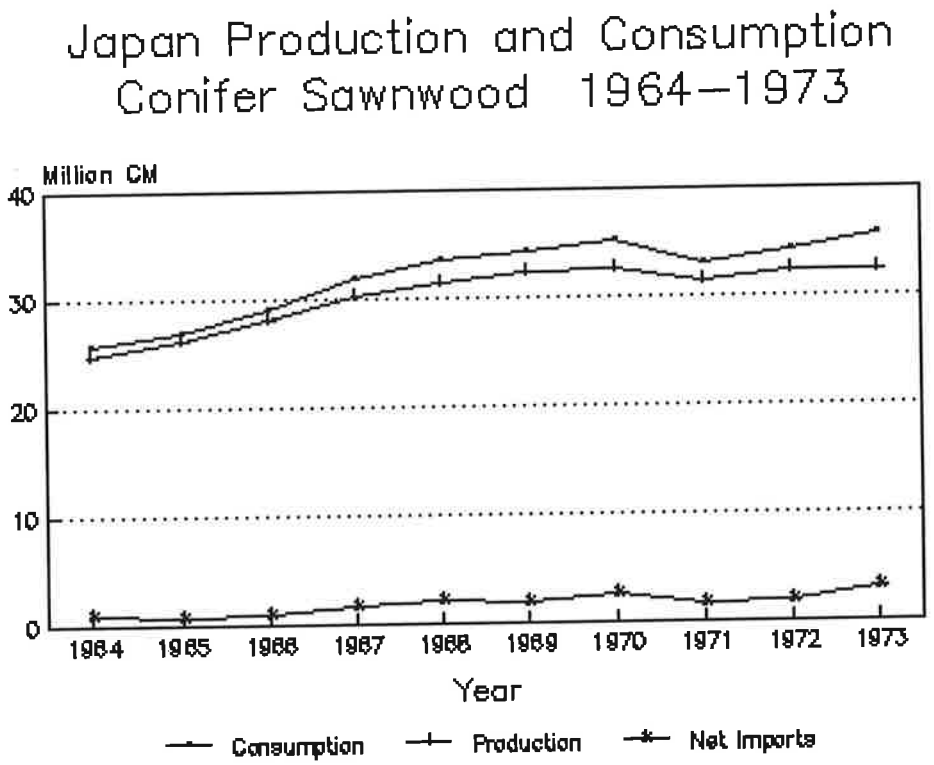
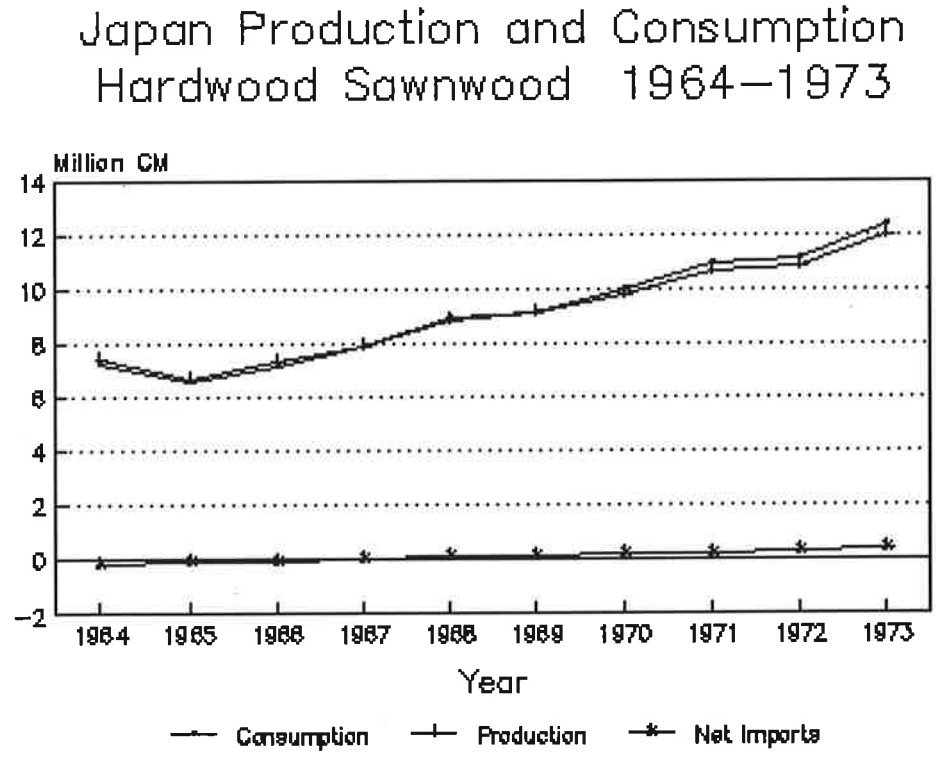


Figure 7



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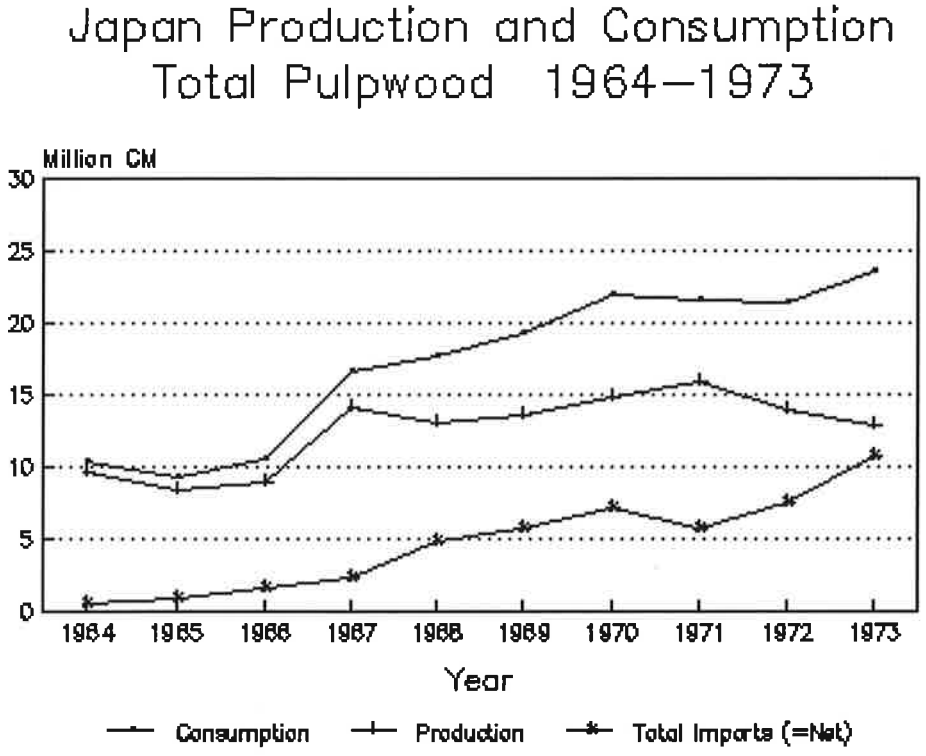

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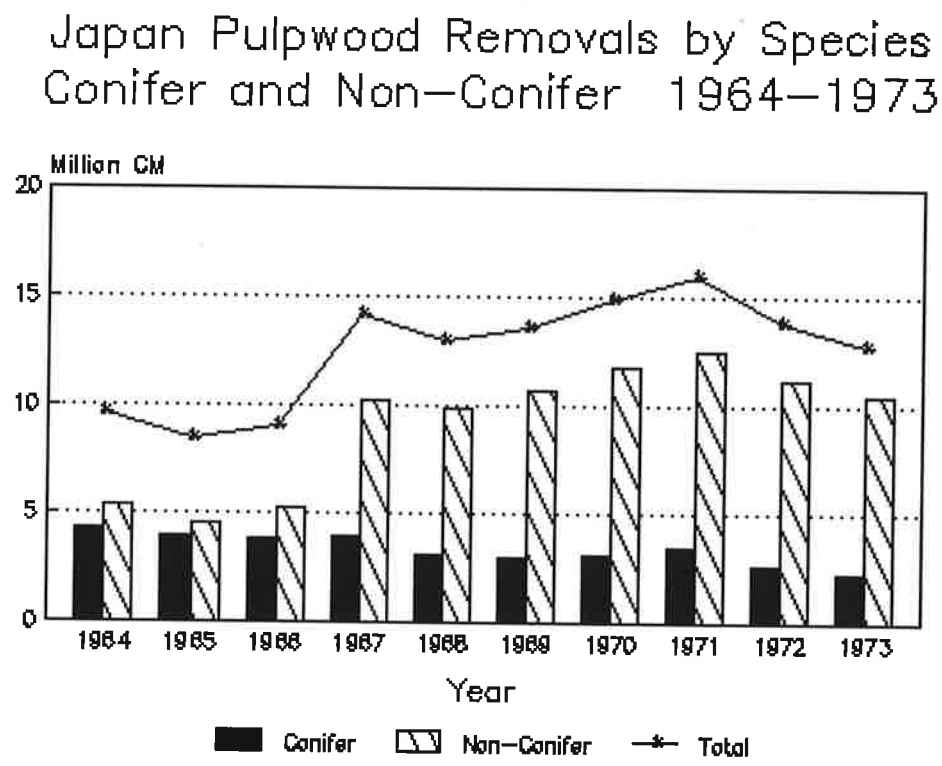

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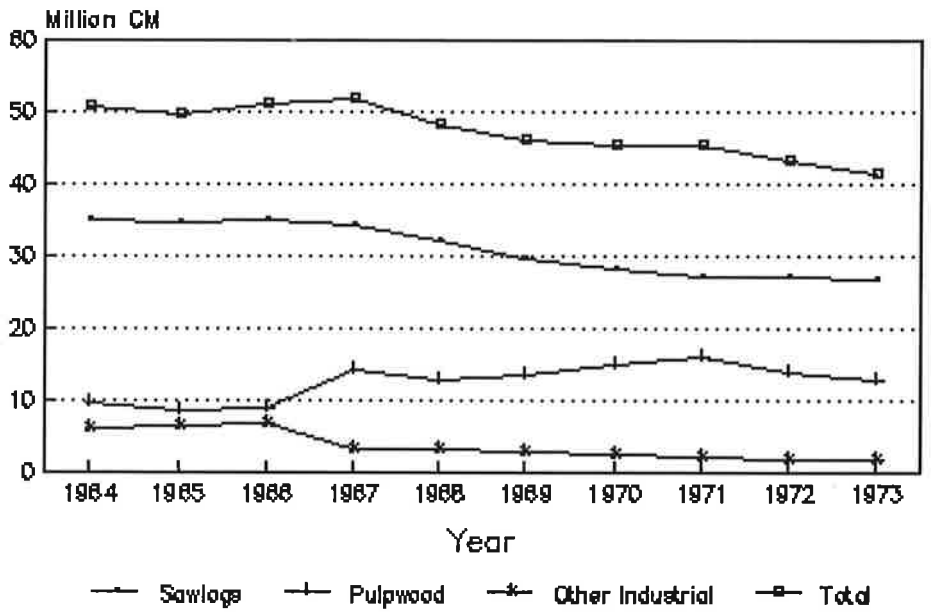

Figure 11

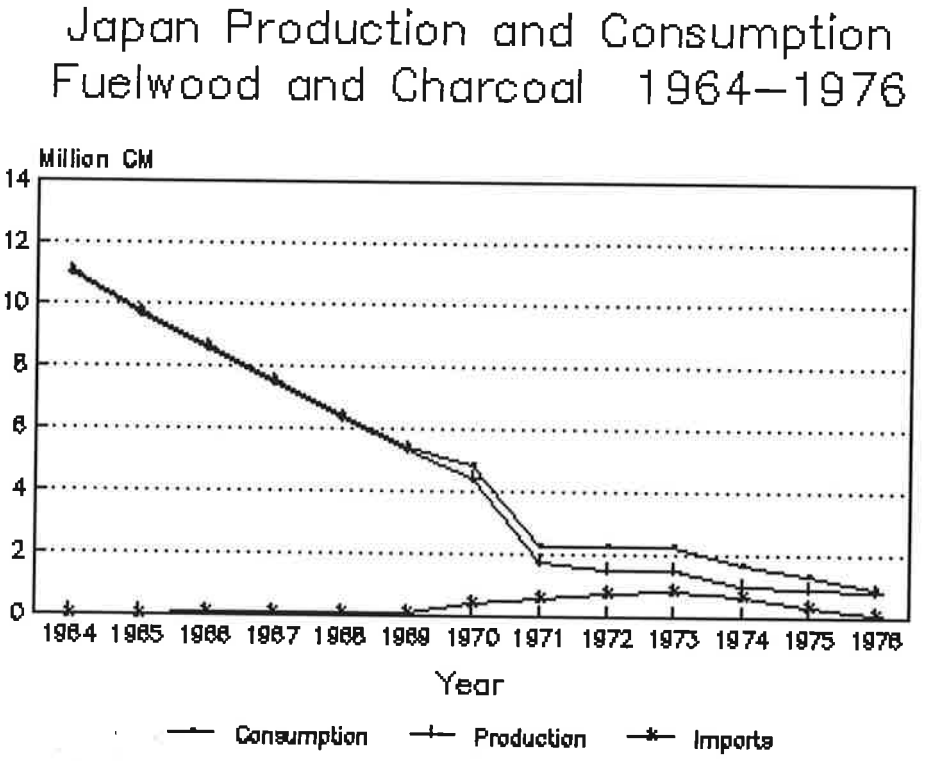

Figure 12

Pulpwood

The trend in pulpwood consumption is similar to sawlogs, but generally lagged by a few years. In 1964, Japan consumed 10.3 million cm of pulpwood. Of this consumption, 9.7 million cm was produced domestically (Figure 9). Production included 4.3 million cm of conifer pulpwood and 5.4 million cm of non-conifer pulpwood (Figure 10). Japan's pulp industry was obviously forced to turn to foreign suppliers in order to be able to increase production during the unprecedented growth of the 1960's. By 1970, total pulpwood consumption had grown to 22.0 million cm, 7.2 million cm of which was imported, primarily in the form of wood chips. Most of the pulpwood consumed by Japan has been for domestic paper consumption.

In 1964, Japan imported only 8,000 cm of wood chips and 586,000 cm of round and split pulpwood. In that year, 94 percent of Japan's total pulpwood consumption was produced domestically. By 1970, only 67 percent of the nation's consumption of pulpwood came from domestic resources, with imports of 7 million cm, including 6.0 million cm of chips and only 1.0 million cm of round and split pulpwood. By 1977, however, more than half of Japan's pulpwood would come from foreign sources.

Although the pulp industry was becoming more dependent on foreign suppliers, it is interesting to note the change between 1966 and 1967. Between those two

years, total consumption increased by 5.9 million cm, from 10.6 million cm to 16.5 million cm. This was almost a 56 percent increase in one year. Of this increase, only 806,000 cm was accounted for by imports. In terms of domestic sources, most of the 5.1 million cm increase was in non-conifer production. This component almost doubled, from 5.3 million cm in 1966 to 10.2 million cm in 1967. Much of the 5.3 million cm increase in non-conifer pulpwood production was offset by a decrease of 3.1 million cm in the production of other non-conifer industrial wood to a low of 532,000 cm in 1967. Clearly, the pulp industry was gaining in relative importance in the overall consumption of industrial wood within Japan's forest industries (Figure 11).

Fuelwood & Other Industrial Wood

The great increase in the demand for pulpwood resulted in rising prices for pulpwood. The higher prices for pulpwood in turn induced a substitution as wood was drawn away from lower valued uses. Wood that was previously consumed as fuelwood and other industrial wood was consumed as pulpwood. Non-wood alternatives were also taking the place of firewood and other industrial wood. Fuelwood and charcoal consumption, which was almost entirely non-conifer, dropped from 11.0 million cm in 1964 to 2.3 million cm by 1971 (Figure 12). The first oil crisis helped to maintain fuelwood consumption at about this same level through 1973-74. The same change occurred for other industrial wood, which dropped from a peak of 6.9 million cm in 1966 to under 2.0 million by 1972 (See

Figure 11). Since many of these lower valued uses were replaced by non-wood substitutes, imports for these categories of wood have been negligible - with one exception. During the several years surrounding the first oil crisis, Japan began importing fuelwood. This reached a peak of 792,000 cm in 1973 (Figure 12).

Plywood

The plywood market in Japan also expanded significantly during this era. Production increased by a factor of three between 1964 and 1970. Production grew consistently, from 2.5 million cm in 1964 to 8.6 million cm in 1973 (Figure 13). Most of the plywood was produced from imported hardwood logs. Thus increases in plywood production were accompanied by increases in tropical hardwood log imports (See Figure 5).

Throughout most of this period Japan was a net exporter of plywood, a trend which peaked in 1968 at 782,000 cm. This industry has been very competitive throughout the Pacific Rim. Japan manufacturers invested heavily during this period in order to produce a high quality product and to differentiate output from other products with waterproofing and fire retardant qualities.

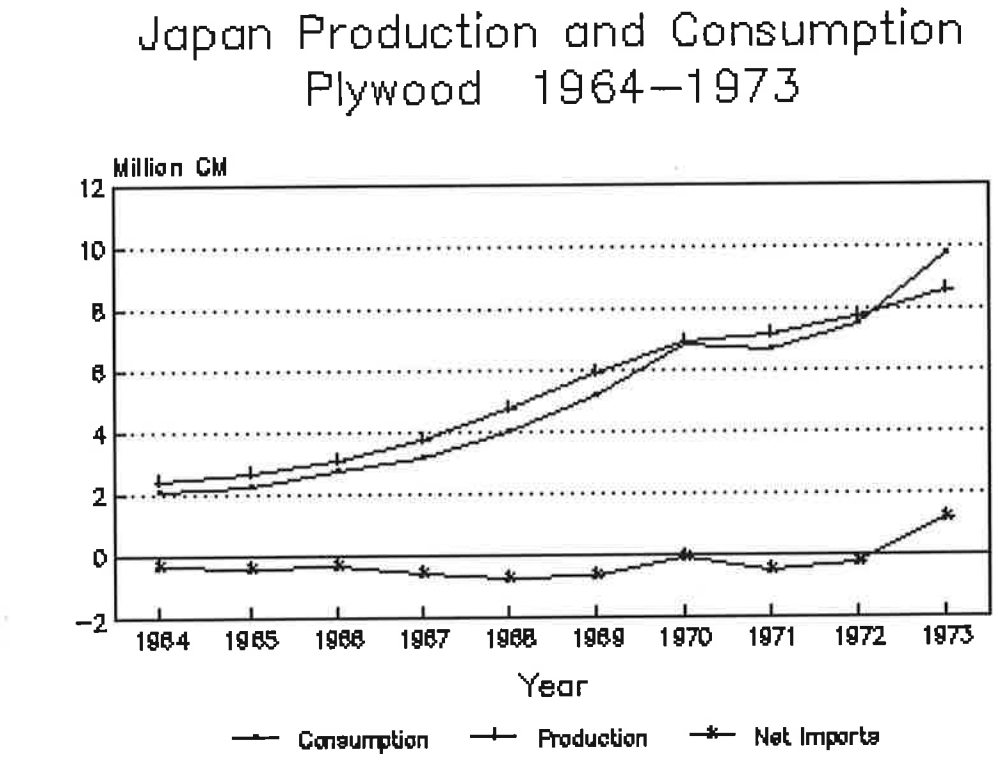
Japan Production and Consumption
Plywood 1964–1973
Million CM
12
10
8
6
4
2
0
-2
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
Year
Consumption
Production
Net Imports

Figure 13

Post Oil Crisis Stagnation: 1974-1990

The oil crisis of 1973 brought a sharp end to the incredible Japan economic growth of the previous twenty years. Except for nominal increases in fuelwood imports, the oil crisis also brought an end to the unprecedented growth of Japan's wood imports. A similar downturn had also occurred at the end of the 1970's. Because of these two "oil shocks" and their effect on Japan's forest products sector, the period from 1973 to the present is often characterized as one of stagnation.

Consumption of Industrial Roundwood

Between 1973 and 1974 Japanese housing starts dropped 31 percent, to 1.3 million units. Between 1979 and 1982 housing starts again declined by 23 percent, to 1.1 million units. The obvious result of these construction market downturns was that the overall demand and consumption of industrial roundwood decreased. After reaching a peak of 99.6 million cm in 1973, total consumption had fallen to 78.5 million cm by 1975 (Figure 14). However, pulpwood consumption reached a peak in 1974 of 25.9 million cm.

Although the recession impacted domestic production, decreasing imports accounted for most of the downturn. Total consumption dropped 21.0 million cm in those two years, with 65 percent of the decline reflected in reduced imports.

Thus, the consumption and import data shows that Japanese imports of industrial wood are much more affected by market fluctuations than is domestic production, which has not responded to the market since 1975. This also means that Japanese sawmills that are cutting foreign timber also experience sharp fluctuations in response to market conditions.

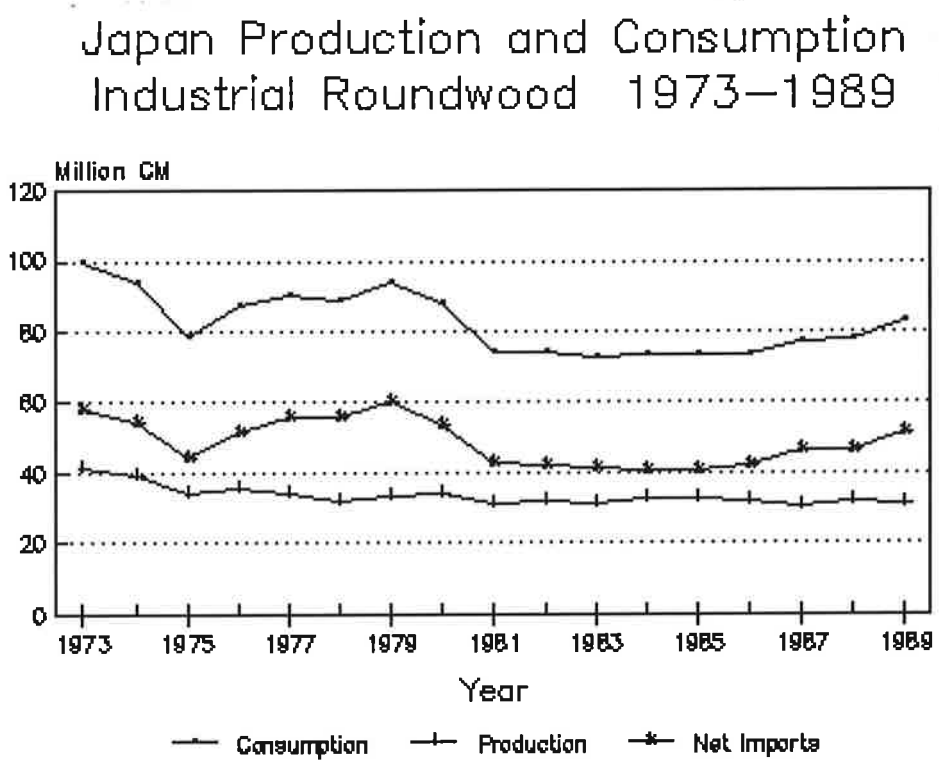

Figure 14

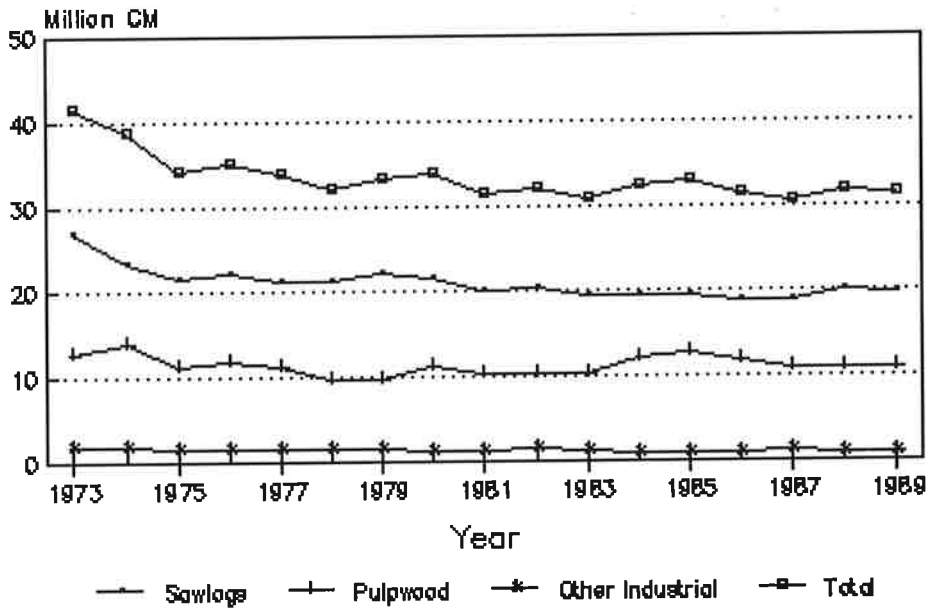
Japan Industrial Roundwood Removals
Total Removals by Product 1973–1989
Million CM
50
40
30
20
10
0
1973
1975
1977
1979
1981
1983
1985
1987
1989
Year
Sawlogs
Pulpwood
Other Industrial
Total

Figure 15

Production of Industrial Roundwood

Industrial roundwood removals (production) reached a peak of 51.8 million cm in 1967. Production of all products have declined since that time, except for non-conifer pulpwood which grew until 1971 before falling. In 1975, Japan produced 34.2 million cm of industrial roundwood. The domestic harvest has remained at or just below that level through 1989 when harvest was 31.4 million cm (Figure 15).

Although total roundwood consumption grew from 1975 to 1979 and again after 1983, domestic production has reflected a continuing gradual decline since 1973 (Figure 15). Japan's domestic production of sawlogs appears to have been largely disassociated from market fluctuations over the last fifteen years (Figure 15). Possible explanations for this trend are discussed below. Those sectors, both foreign and domestic, that are involved in processing imported timber or with trade in forest products thus benefitted the most from periods of renewed market growth in the 1980's.

Sawlogs

Much of the decrease in production was in conifer sawlogs, which dropped from 28.5 million cm in 1966 to 17.6 million cm in 1975, a fall of 38 percent. As noted above, while the level of domestic production was falling throughout 1960's, corresponding imports grew. In 1973 domestic conifer sawlog production

exceeded imports by about 0.5 million cubic meters. Both production and imports had fallen by about 3.5 million cm by 1975 (Figure 16).

Since Japan has a greater domestic capacity and maturing inventory of coniferous stands, imports of conifer sawlogs have exceeded domestic production only during the period 1976-1979 and in 1987 and 1989. On average, domestic production and imports have each accounted for about 50 percent of Japan's consumption of conifer sawlogs since 1973 (Figure 16).

Japan's consumption of hardwood sawlogs dropped significantly following the oil crisis, from 31.8 million cm in 1973 to 21.2 million cm in 1975 (Figure 17). In 1975, 81 percent of the hardwood logs consumed in Japan were imported. Although consumption recovered to the 25-26 million cm level during the last half of the 1970's, consumption dropped significantly when Indonesia banned log exports in 1980 (Figure 17). In 1981, consumption was down to 18.6 million cm, its lowest level in 15 years.

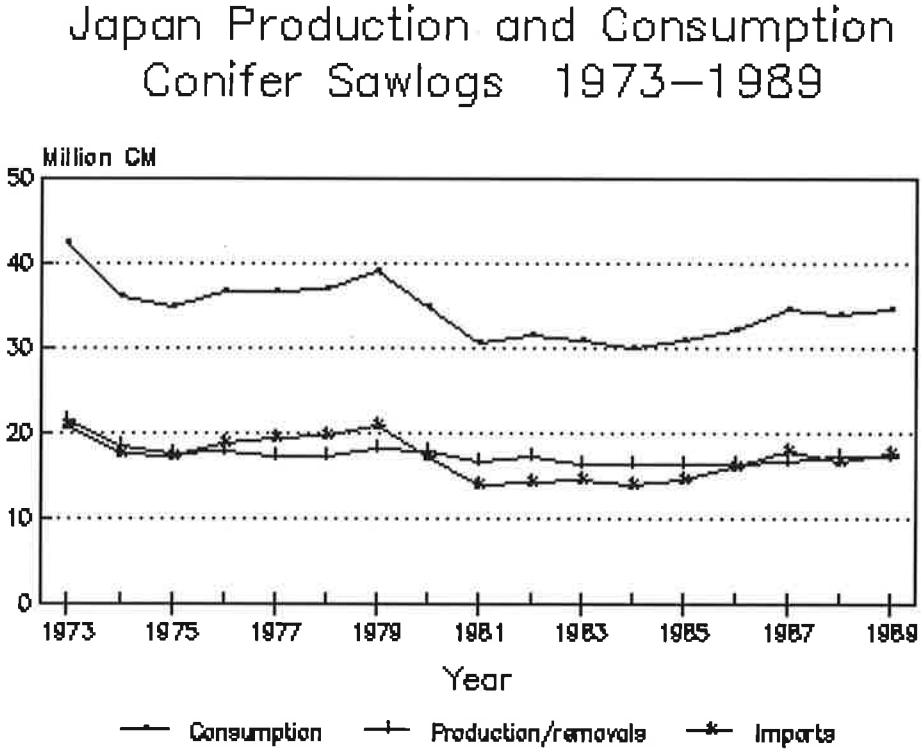

Figure 16

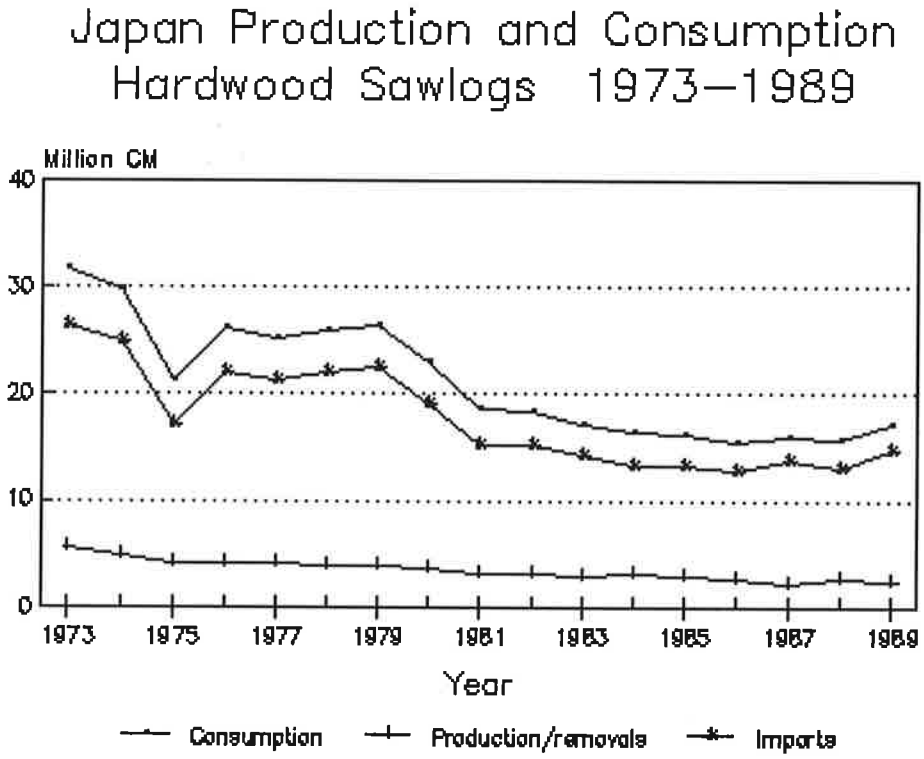

Figure 17

Pulpwood

Pulpwood production reached a peak in 1974 of 13.9 million cm, which accounted for 54 percent of consumption (Figure 18). In 1974, pulpwood production declined to 11.0 million cm. Production has remained at that level, except for a brief period in the mid 1980's when production rose to the 12.5 million cm level. Approximately 80 percent of the roundwood pulpwood is hardwood, although this has declined slightly in recent years (Figure 19). With production having stagnated in 1975, the increase in pulpwood consumption during the late 1970's was met by imported wood chips (Figure 20).

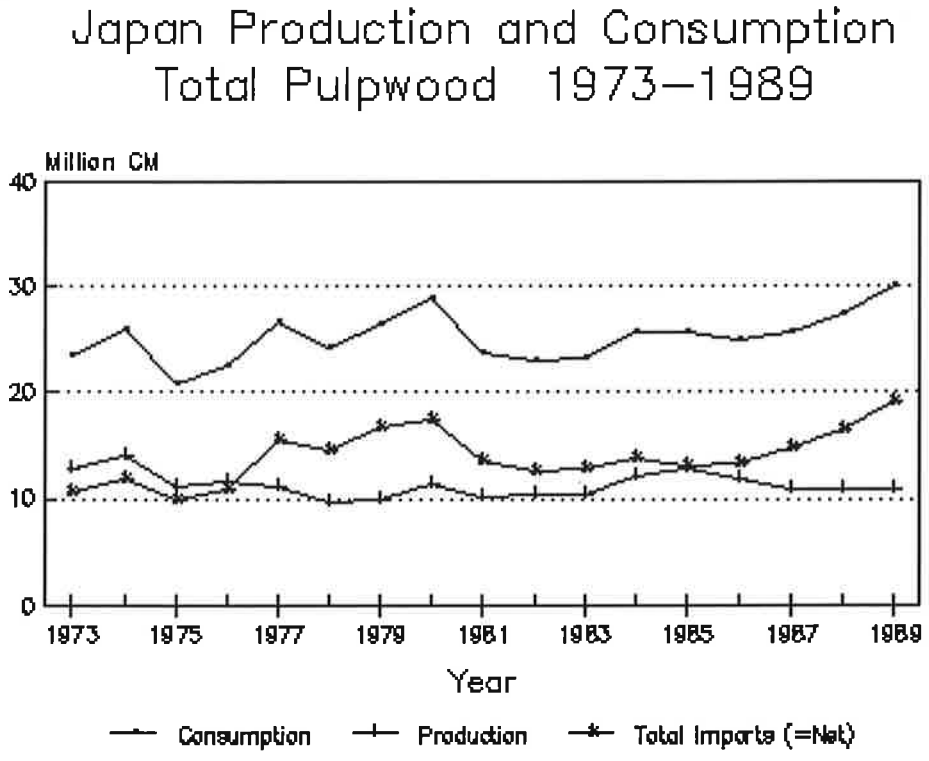

Figure 18

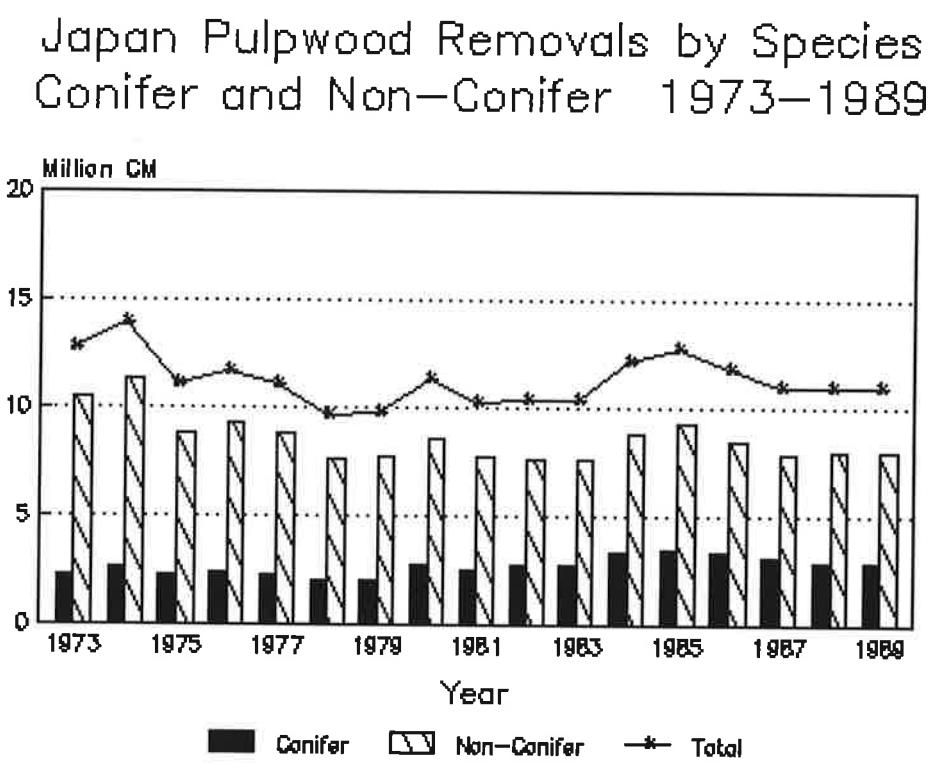

Figure 19

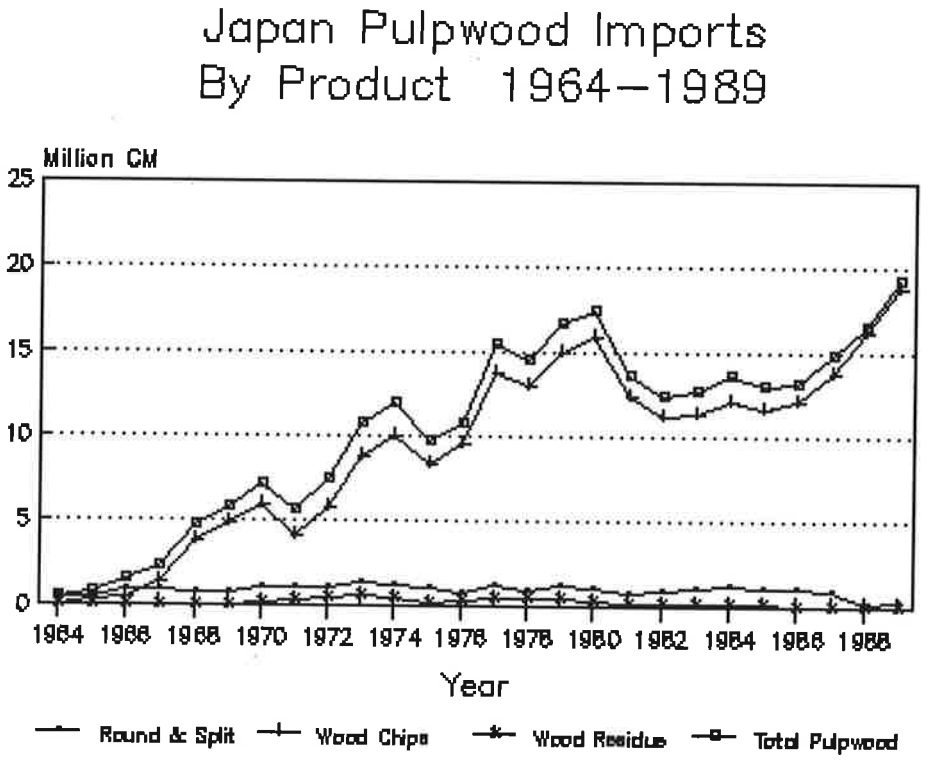

Figure 20

Sawnwood

In 1973 conifer sawnwood consumption reached a peak of 35.7 million cm, almost three times that of non-conifer sawnwood. Since then the trends in conifer sawnwood consumption have reflected the overall trends in wood consumption. In 1978, Japan consumed 36.4 million cm of conifer sawnwood, its highest level ever.

Since 1973, the consumption of non-conifer sawnwood has dropped significantly, primarily due to the reduction in the supply of imported non-conifer sawlogs. Nevertheless, as late as 1980 Japan still cut 93 percent of the non-conifer sawnwood that it consumed.

Plantings

After 1960 there was a notable decrease in tree planting in Japan, particularly for the private sector (Figure 21). The costs of planting had risen above the price of timber and the costs of cutting were higher than the price of pulp--all on top of an increasingly unstable market (Shimotori, 1981). According to Shimotori, in 1980 the World Agriculture and Forestry Census reported 21,174 logging enterprises in Japan, of which only 15 percent carried out reforestation operations in addition to logging. From 1970, this represented a 43 percent reduction in logging enterprises (Shimotori, 1982). The decline in investments for artificial regeneration as well as the decline in production from Japanese forests is summarized in Appendix 5. As mentioned earlier, the expected decline in the rate of return from plantations,

together with foreign competition, has brought about the stagnation of Japanese forestry.

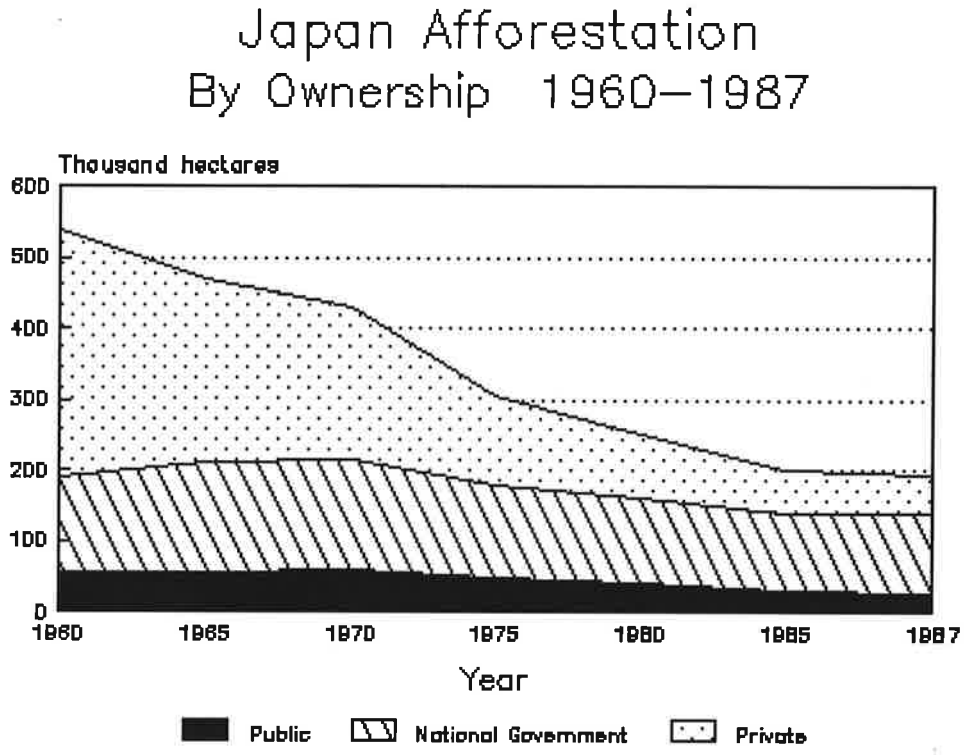

Figure 21

Prices

The huge increases in timber imports during the 1960's helped to substantially ease timber supply pressures. Thus, timber prices remained relatively stable in the 1970's (Table 4). In 1971, the Yen was floated and immediately increased in value. The result was that foreign products became less expensive to Japanese importers, thus helping imports maintain market share. Furthermore, domestic real wages increased dramatically in Japan during the 1970's and 80's, increasing the cost of domestic production. Although the economic growth of the late 1970's boosted forest product prices, the effect was largely temporary. By the 1980's contracting markets again caused prices to decline (Table 4). While prices declined, real wage rates in the Japanese forest sector remained high. These economic forces combined have effectively brought growth to a halt for those forest industries dependent on domestic roundwood production.

Table 4. Japan Forest Sector Price Indexes 1960-1989 (1985=100)

Year	Lbr & Wood Imports	Lbr & Wood Domestic	Pulp/Paper Domestic
1960	35.7	31.7	38.8
1965	39.2	39.0	40.6
1970	48.2	53.0	45.8
1975	72.6	79.2	78.2
1980	128.9	122.4	105.3
1984	107.3	100.3	101.1
1985	100.0	100.0	100.0
1986	78.1	96.8	97.6
1987	89.3	106.6	95.7
1988	86.2	105.0	96.2
1989	101.5	111.8	98.7

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The large increases in lumber and wood prices during the 1970's appear to have resulted in a shift to non-wooden housing construction materials. Between 1978 and 1988 the share housing starts classified as wooden declined from 62 to 41 percent. On the basis of floor space, the share of wood dropped from 66 to 52 percent (Appendix 6).

Trade

With Japanese domestic production stagnant, growth in the consumption of industrial roundwood has been largely satisfied by foreign producers. At the trough of 1975, net imports accounted for 57 percent of consumption. Four years later,

in the peak year of 1979, net imports accounted for 64 percent of consumption, having supplied essentially all of the market growth. However, by the bottom of the recession in 1982 net imports again accounted for only 56 percent of consumption, having absorbed almost all of the contraction. The greater reduction in wood imports during this period of contraction may be explained by the fact that from 1975 to 1980 the prices of imported wood increased 77.5 percent compared to domestic wholesale prices which increased 55.0 percent (Table 4).

Financial Impacts for the Japanese Industries

For domestic processing and manufacturing, the effects of the oil crisis were mixed. Of the three primary wood products industries, pulp and paper, plywood and lumber, the plywood industry was probably the hardest hit by the downturn.

In terms of capital investment, the pulp and plywood industries involve far more capital assets than the sawnwood industry. Even though lumber consumption dropped, the financial effects were not as significant for sawmills. Although the pulp and paper industries have enormous assets, pulp consumption was not as affected by the economic recession and the associated drop in housing starts. At this time, paper consumption was boosted by the development of the photocopier and other innovations. As a result, 1975 was the only really bad year for pulpwood consumption during the 1970's.

Throughout the 1970's plywood consumption followed the housing market. When the market dropped between 1973 and 1975, plywood manufacturers found themselves overextended. In order to survive, the manufacturers formed a cartel and curtailed production by closing down some of their production lines (Yamaguchi, 1991). From a trough of 6.2 million cm in 1975, consumption rose to 8.5 million cm in 1979. By 1982, consumption had fallen again to 6.7 million cm (Figure 22). During this time there was a very high import duty on plywood, approximately 20 percent at the turn of the decade. The high duty helped ensure that consumption would be largely met through domestic production.

At the time of the second "oil shock," Indonesia instituted a log export ban, implemented over a five year period beginning in 1980. Throughout the 1970's Indonesian logs represented about half of the raw material supply for Japanese plywood mills. As a result, the plywood industry turned to Sabah, Malaysia as a new source of logs. Nevertheless, this meant rising raw material costs as well as a limit on Japan's production capacity which remained stagnant throughout the 1980's.

The Industrial Roundwood Market in the Early 1980's

From 1981 to 1986 there were no significant changes in the Japanese market. In 1981, 74.2 million cm of industrial wood was consumed, while in 1986 consumption measured 73.7 million cm. Throughout this period, foreign imports

maintained a stable market share at around 56 percent (Appendix 1).

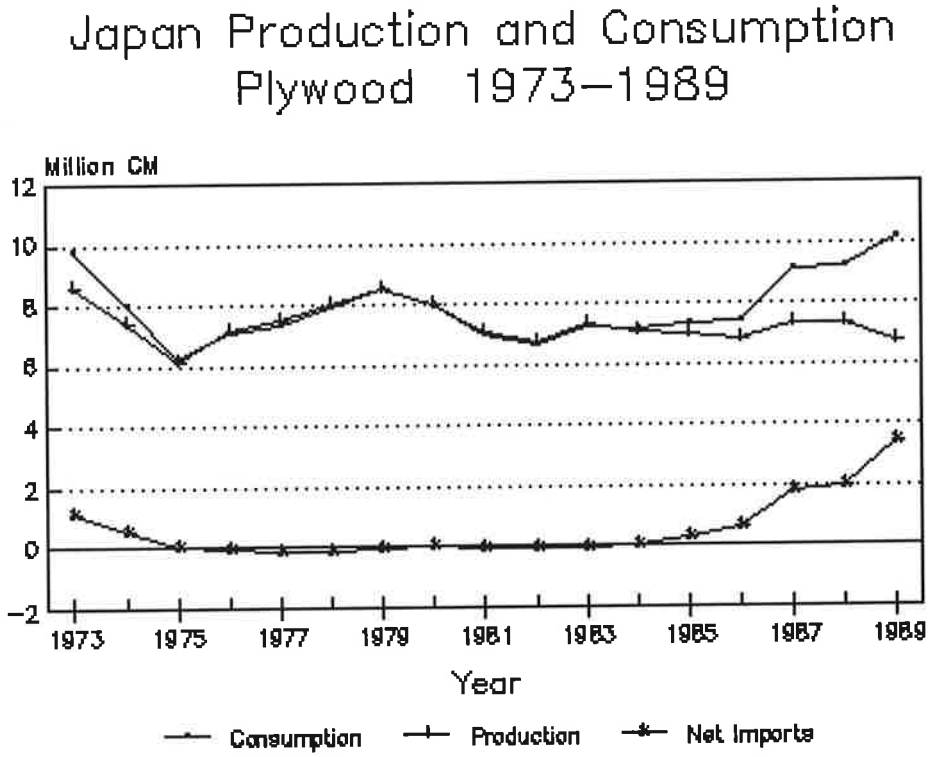

Figure 22

RECENT TRENDS

Increasing Dependence on Foreign Manufacturing: 1986-1990

Although industrial roundwood consumption grew during this time (Appendix 1), consumption growth alone does not adequately reflect the overall dimensions of the Japanese economic recovery nor the demand for wood products. A stronger Yen, favorable money supply and a healthy economy combined to make 1990 the third biggest year for housing starts in Japanese history.

Housing Demand

Housing starts were at a low of 1.1 million units in 1983, but had increased to 1.4 million by 1986, before reaching 1.7 million units in 1990. The number of wooden housing starts grew from 591,000 units in 1983 to 728,000 units in 1990. Thus, wooden houses declined in market share from 52 percent in 1983 to 43 percent in 1990 (Appendix 6). However, the loss of market share of wood products in the residential construction sector is less when measured in terms of floor space. This is because wooden houses tend to be bigger. In 1983, 58 percent of the newly constructed floor space was wooden, this declined to 53 percent by 1990 (Appendix 6). On a total basis, the floor space of wooden housing starts increased from 58.1 million square meters in 1983 to 72.4 million square meters. Thus,

although the recovery might may not have been as great as it could have been, there was a substantial recovery in the sawnwood market.

As mentioned above, the substitution of non-wooden for wooden houses may largely be the result of the increase in lumber prices during the late 1970's. The market share of wooden housing reached a low in 1988. From 1988 to 1990, the share of wooden housing starts increased two percent. This modest increase may be the result of the reduction in lumber prices during the mid-1980's (Table 5).

Sawnwood

The consumption of sawnwood began to increase during the mid-1980's. Between 1984 and 1989 total sawnwood consumption grew 21 percent to 40.0 million cm. Almost all of this growth was in the market for conifer sawnwood, which grew by 7.0 million cm from a low of 27.5 million cm in 1984 to 34.5 million cm in 1989 (Figure 23).

In 1984, the consumption of non-conifer sawnwood totalled 5.6 million cm with 4.8 million cm produced in Japan. Since then the market has stagnated and in 1989 consumption amounted to 5.5 million cm (Figure 24). However, in those five years domestic production dropped to 3.4 million cm, thus Japanese producers have not been able to keep pace with foreign competition. The fact that Japan must import almost all of its non-conifer sawlogs is one reason for this.

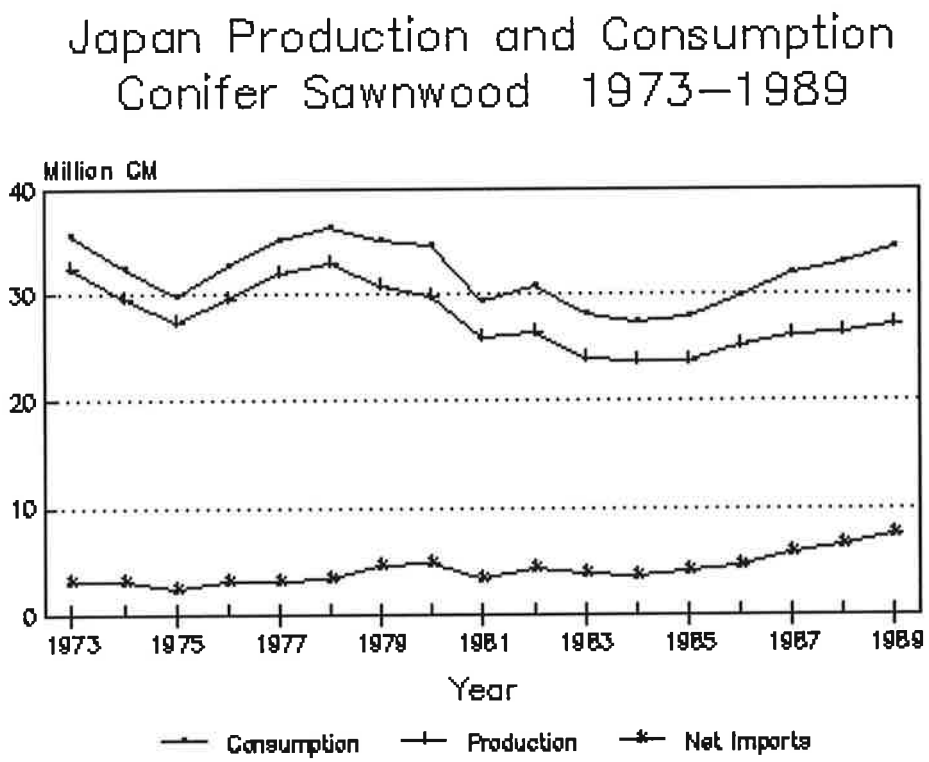

Figure 23

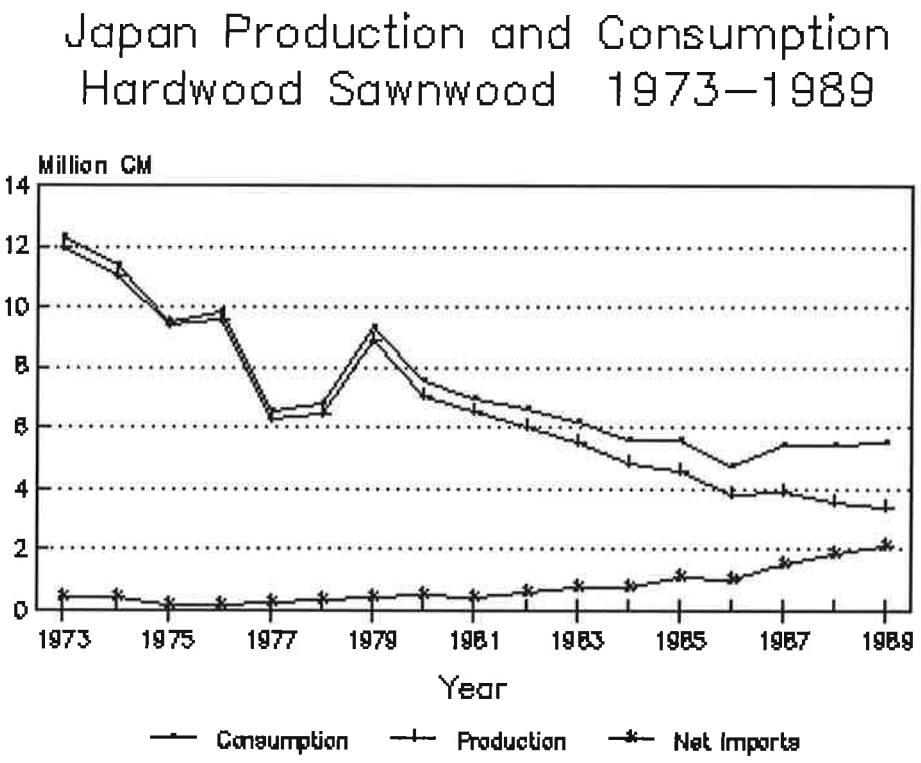

Figure 24

One of the most significant trends occurring in the sawnwood market has been the slowly eroding market share of domestic Japanese mills over the last 25 years. Unlike the drastic changes that occurred in the roundwood markets during the late 1960's and early 1970's, the increasing import of sawnwood has happened slowly but steadily over the last two and a half decades (Figures 23, 24). Only in the last few years have imports been growing at an increased rate, as prices relative to domestic lumber have dropped significantly (Table 5).

The biggest change in market share has occurred in the non-conifer sawnwood market. However, domestic producers have lost market share for conifer sawnwood as well. In 1964, Japan milled 97 percent of its conifer sawnwood and was actually a net exporter of non-conifer sawnwood. Since 1973 roughly half of the conifer lumber would have been produced from imported timber. By 1979, Japan still cut 87 percent of the conifer and 96 percent of the non-conifer sawnwood it consumed, although from a much higher percentage of imported logs. In 1986, the country still milled 85 percent of the conifer lumber consumed, but only 79 percent of non-conifer lumber. By 1989, these shares had declined even further, to 78.5 percent and 62 percent, respectively.

Domestic producers have benefitted from the recent growth of the conifer sawnwood market, but not as much as foreign suppliers. Between 1984 and 1989, consumption increased by 7.0 million cm. Japanese mills accounted for 3.3 million

cm, or 47 percent of this growth, while foreign suppliers accounted for 53 percent. By 1989, imports held a market share of 21.5 percent. With a greater number of foreign mills (primarily U.S. and Canadian) with cheaper raw material costs cutting conifer lumber to Japanese specifications, it is likely that the trend towards greater conifer lumber imports will continue.

Millwork

For the U.S. millwork industry, Japan has been a steadily growing overseas market for windows and doors. In 1988, Japan accounted for 22 percent of U.S. window exports, about one percent of total U.S. shipments, and eight percent of door exports. Between 1979 and 1988, window imports increased from $54,000 to $3.8 million (Auerbach, 1989).

Industrial Roundwood

In 1987 the Japanese market for industrial roundwood began to expand again, growing 5 percent to 77.3 million cm. Between 1986 and 1989, industrial roundwood consumption increased by 8.9 million cm, or 12 percent. All of the growth was accounted for by imports.

Pulpwood

Increased pulpwood consumption was the largest component of market growth between 1986 and 1989 (see Figure 20). The wood chip market was by far the

most active. Chip imports grew 6.8 million cm from 1986 to 1989, while other pulpwood imports actually dropped by 941,000 cm. Thus, the net increase in total pulpwood imports was 5.8 million cm. At the same time, the production of pulpwood in Japan dropped by 849,000 cm. As a result, the market share for wood chip imports increased from 48 percent in 1986 to 63 percent in 1989. Most of the chips are imported from the U.S. and Australia (Foreign Agricultural Service, 1991).

Sawlogs

Sawlog consumption grew by 4.1 million cm to 51.8 million cm between 1986 and 1989. This includes 2.4 million cm of conifer and 1.7 million cm of non-conifer sawlogs. Domestic production of conifer sawlogs grew by 995,000 cm, while imports increased by 1.4 million cm. Thus, foreign suppliers of conifer sawlogs increased the market share for imported sawlogs during this period, but only slightly. However, this four year trend obscures the situation in 1988 when imports fell and production rose. This shift made Japan 50.3 percent self-sufficient in conifer sawlog production. However, this situation was then immediately reversed the following year (see Figure 16). On the other hand, domestic production of non-conifer sawlogs declined by 175,000 cm between 1986 and 1989, while imports grew 1.9 million cm. Thus, foreign suppliers increased their market share almost 3 percent to 86 percent (see Figure 17). In both cases, exports declined by negligible amounts.

Prices

One result of the recession of the early 1980's was a greater decline in the price of imported logs compared to domestic logs (Table 5). Between 1985 and 1986 the price of imported logs dropped 23.4 percent, compared to only a one percent drop in the domestic wholesale log price.

Table 5. Relative Price indexes 1982-1990 (Yen Prices, 1985=100)

Year	Overall Average	Imported Logs	Wholesale Logs	Imported Lumber	Wholesale Lumber
1982	103.7	116.2	110.0	115.5	109.0
1983	101.4	104.1	104.4	109.3	102.1
1984	101.1	109.0	101.2	102.9	99.0
1985	100.0	100.0	100.0	100.0	100.0
1986	90.9	76.6	99.0	85.0	97.1
1987	87.5	88.7	102.7	103.0	112.2
1988	86.6	85.6	102.8	98.5	111.7
1989	88.8	99.7	107.3	116.7	120.4
1990	90.6	103.6	109.2	114.5	127.1

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Plywood

The Japanese plywood market is another market which has begun to open to greater volumes of imports. Indeed, Japan's plywood industry has been through some difficult times and significant changes in the past two decades. However, in the years 1981-83 Japan was actually a net exporter of plywood, albeit by a very slight amount. In 1986, when plywood consumption along with housing starts

rebounded, Japanese manufacturers failed to respond. This was due in large measure to the declining availability of imported tropical logs, resulting from the log export ban imposed by Indonesia and which became fully effective in 1985.

In 1986, Japan produced 92 percent of its own plywood consumption, but by 1989 this figure had plummeted to 66 percent (see Figure 22). Almost of the imported plywood now comes from Indonesia, Japan's former supplier of plywood quality logs. Indonesian manufacturers, with lower raw material and labor costs, are rapidly increasing their share of the Japanese plywood market. In addition, the American Plywood Association has maintained pressure on Japan to lower its import duty on conifer plywood. The duty was scaled down to 15 percent by 1988, still large relative to other wood products (Figure 25). Canada appears to have benefitted the most from lower duties on conifer plywood. Japan imported 3.2 million cm of Canadian plywood in 1988 and 5.4 million cm in 1990. In 1988, Japan imported 1.4 million cm of plywood from the U.S. and 1.2 million cm in 1990.

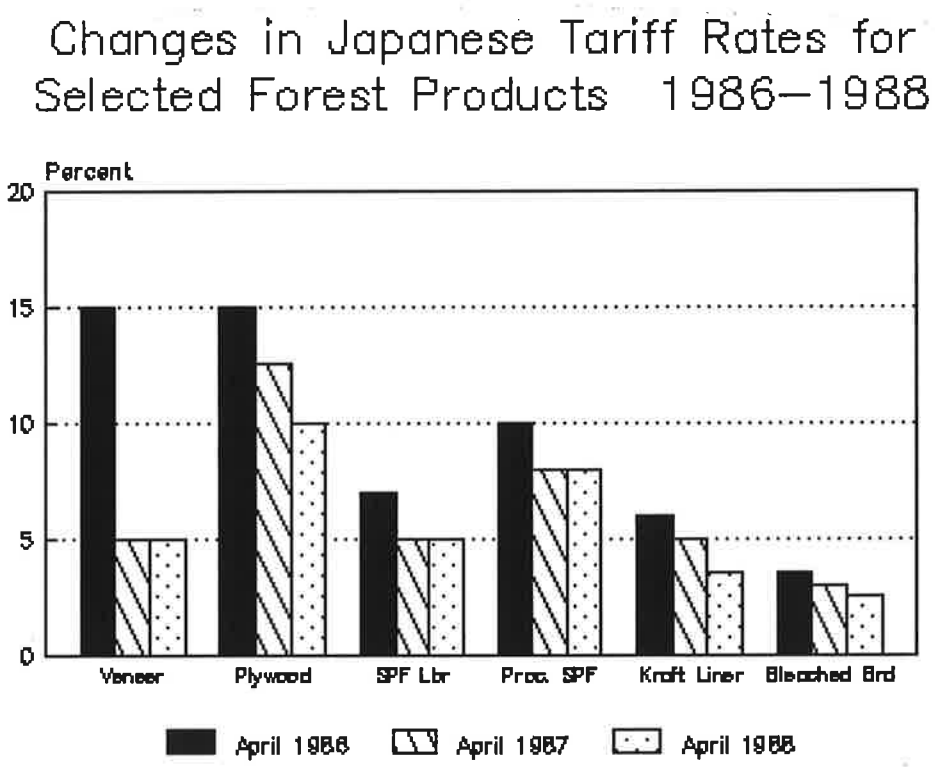
Changes in Japanese Tariff Rates for
Selected Forest Products 1986–1988
Percent
20
15
10
5
0
Veneer
Plywood
SPF Lbr
Proc. SPF
Kraft Liner
Bleached Brd
April 1986
April 1987
April 1988

Figure 25

Fuelwood and Charcoal

By 1978 the consumption of fuelwood and charcoal had dropped to 648,000 cm, with 590,000 cm produced domestically. Production has remained at that level through 1989 (Figure 26). By 1982 consumption had grown to 784,000 cm by increasing imports. In 1987, consumption returned to the 1.0 million cm level, with imports totaling 460,000 cm.

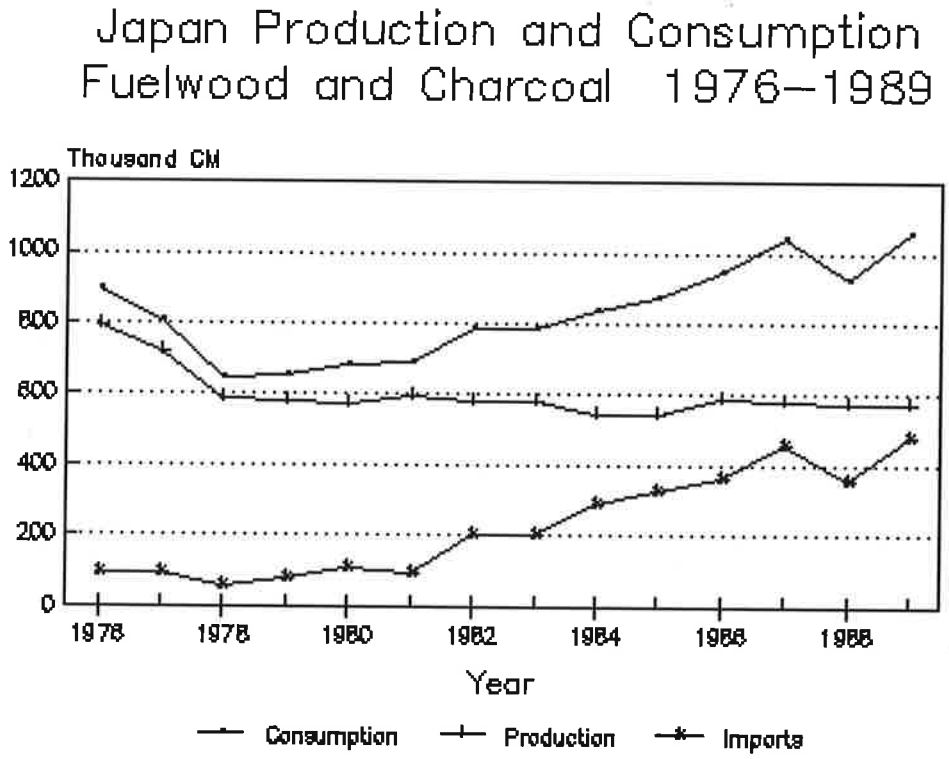

Figure 26

In summary, during the last twenty years Japan has slowly but steadily increased its imports of processed wood products from abroad. The most notable structural change has occurred in the conifer and non-conifer sawnwood markets where imports have increased market share over the last twenty-five years from near zero to the current 20 percent. For the last two decades Japan has depended heavily on foreign sources of pulpwood. Between 1985 and 1989 foreign suppliers increased their market share from approximately one-half to two-thirds of the pulpwood market, primarily in the form of chips. Also in recent years, Japan has liberalized its plywood market and has increased fuelwood and charcoal imports.

OVERVIEW OF FOREIGN SUPPLIERS

Since Japan first began to import foreign timber it has benefitted from its geographical position within the Pacific Rim region. Japan's major trading partners have been the Pacific Rim countries with the greatest wealth of forest resources. Conifer timber has been supplied by the United States, Canada and the Soviet Union (Appendix 7), while non-conifer resources have come primarily from Indonesia, Malaysia and the Philippines (Appendix 8). Although Japan has imported timber from other nations, and historically drew on forests of former colonies, the six nations listed above have been the dominant suppliers.

Conifer Suppliers

USA and USSR Sawlogs

Most of Japan's conifer log imports have originated in either the United States or the Soviet Far East. In 1965 these two countries accounted for over 90 percent of the import supply. Because of Japan's domestic supply of conifer sawlogs, the boom in the consumption of imported logs did not take place until the late 1960's (see Figure 6). Nevertheless, by the mid-1960's the demand for timber had grown far beyond Japan's ability to meet consumption from domestic forests. Japan's primary need was to alleviate the imbalances between supply and demand.

However, trade with the Soviet Union also had a second objective. Japan needed collateral import goods in order to be able to promote exports of industrial manufacturing plants to the Soviet Union (Murashima, 1988).

In the early 1960's when Japan's timber demand was greatly expanding, the U.S. timber companies supplied almost all of the logs imported from North America. In 1961, the Japanese government established a policy of increasing softwood imports to meet its growing lumber demand. In October 1962, a hurricane-force windstorm blew an estimated 7.5 million cm of softwood timber in the U.S. Pacific Northwest. This volume corresponded to 1.5 times the annual harvest in Washington and Oregon (Flora, et al., 1991). Japan provided a necessary market for a large share of the salvaged timber. In 1963, the U.S. exported 3.1 million cm of softwood logs to Japan. This sequence of events helped to establish one of the primary forest products trade flows in the Pacific Rim. By the late 1960's conifer sawlogs had become a major Japanese import commodity from the U.S. Pacific Northwest.

As the volume of logs exported to Japan from the U.S. during the 1960's continued to increase even after the storm damaged timber had been salvaged, U.S. sawmill owners anticipated this would have a negative effect on their industry. Indeed, the Japanese preferred knot-free, tight-grained logs and paid higher prices. In response to the domestic concerns, Congress added an amendment to the Foreign

Assistance Act of 1968 limiting the amount of timber that could be exported from Federal lands to 350 million board feet (826,000 cm) annually (Hines, 1987). This amendment later became know as the Morse Amendment and was added to the Housing and Urban Development Act of 1970. By 1974, further legislation effectively prohibited the export of unprocessed timber from Federal lands in the West (Hines, 1987). In addition to Federal lands, partial or complete embargoes were placed on the exports of logs from State lands in Oregon, California and Idaho (Flora, et al., 1991). The result was that private timber owners and the State of Washington have exported the majority of logs to Japan. Recently, Washington reduced its log exports by 75 percent.

In general, government regulations have had an even greater effect on reducing log exports from Canada. More than 95 percent of the commercial forest land in Canada is owned by the government and log exports from these forests have been restricted since the turn of the century. U.S. companies own a much larger percentage of commercial timberlands, compared to Canadian firms. Therefore, the U.S. forest industry have faced relatively fewer regulations and restrictions, allowing U.S. companies to sell logs to the Japanese without facing serious competition from Canada.

In 1965, Japan imported 3.3 million cm of logs from the United States and 2.6 million cm of logs and lumber from the USSR, for a combined total of 6.0 million

cm--most of which was conifer sawlogs. By 1973, Japan imported 10.6 cm of logs from the U.S.A. and 9.2 million cm of logs and lumber from the Soviet Union, for a combined total of 19.7 million cm of timber[5]. Between 1965 and 1973, Japanese imports of conifer sawlogs grew 237 percent. Japan's total imports of conifer sawlogs in 1973 was 21.7 million cm. The U.S. and Soviet Union together held just over 91 percent of the import market, with the United States accounting for 49 percent and the Soviet Union 42 percent. In addition, between 1971 and 1973 imports of Canadian logs dropped 85 percent from 647,000 cm to 98,000 cm. The decline in Canadian log exports reflect the fact that the log export restrictions are more effective when lumber markets are booming.

After the oil crisis of 1973, Japan's timber consumption dropped as did imports. Between 1973 and 1975, Japan's total imports of conifer sawlogs dropped by 19 percent. Imports from Soviet Asia, which were almost entirely logs, dropped by 14 percent to 7.9 million cm. The U.S. managed to increase market share 5 percent, even though imports from the U.S. fell off by only ten percent. As a result, U.S. exports accounted for about 54 percent of the Japan conifer sawlog import market in 1975.

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[5] The data for Japanese imports of Soviet forest products does not separate logs and lumber until 1976. Disaggregated data for later periods suggests that most of these imports would have been logs. In addition, breakdowns by species and supplier began in 1977 and is shown in Figure 18. Total Japanese imports by product and species is available from 1964 and is shown in Appendix 4.

The recession of the early 1980's also had a major effect on Japan's conifer log imports. Between 1979 and 1981, total imports dropped from 21.4 million cm to 14.1 million cm, a fall of 7.2 million cm or 34 percent. Imports from the U.S. declined by 5.0 million cm, or 40 percent from 12.3 million cm. Conifer log imports from the Soviet Far East dropped 28 percent, from 6.6 million cm in 1979 (Figure 27).

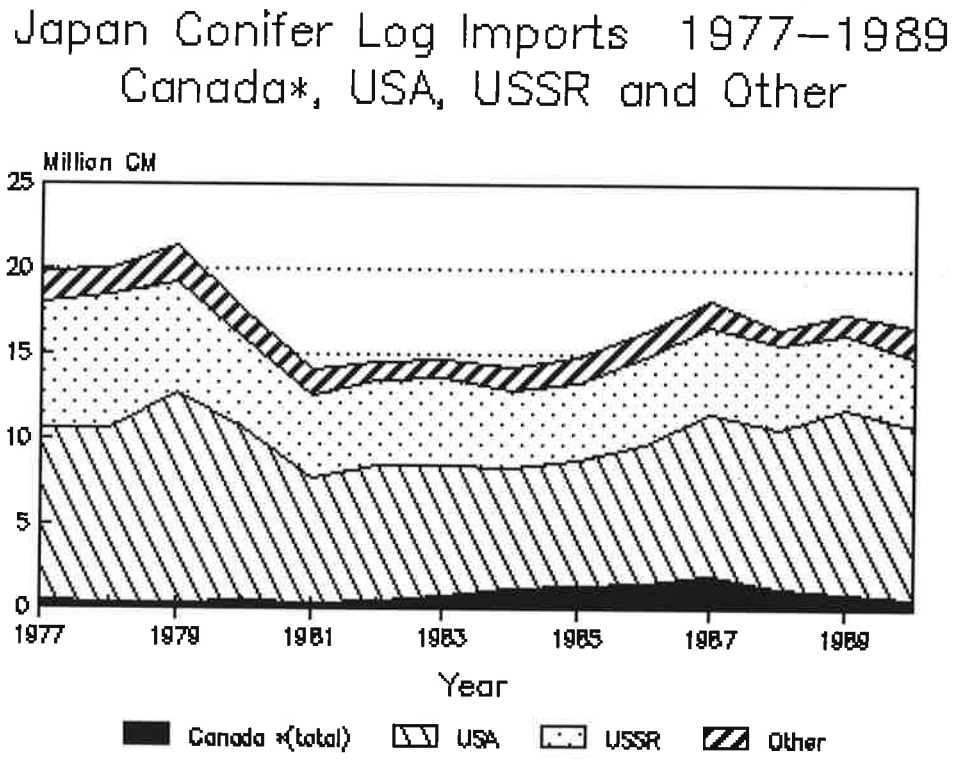

Figure 27

Conifer log imports depressed from 1982 until 1986. U.S. conifer log exports reached a low of 7.2 million cm in 1984, before climbing throughout the late 1980's (Figure 27). The availability of the U.S. conifer log resource is the primary reason for the significant amount of forest products trade between these two countries. Although Japanese imports of conifer logs from the U.S. account for approximately half of the consumption in Japan, they represent a relatively small share of U.S. production. In 1989, the United States produced 224 million cm of conifer sawlogs. Of this, a total of 20.4 million cm were exported, with 13.4 million going to Japan. Thus, the U.S. exported about 9 percent its total conifer log production, with two-thirds shipped to Japan. Put another way, in 1989 Japan imported about 6 percent of the U.S. production of conifer logs by volume. In 1990, the U.S. exported 18.1 million cm of softwood logs, with 11.7 million cm going to Japan (65 percent of softwood log exports).

Canadian Sawlogs

As a result of the recession of the early 1980's Canada found itself more desperate to sell timber. As a result, enforcement of the log export ban was loosened somewhat. In 1982, Canada exported only 361,000 cm of total logs, but by 1987 this had grown to 1.9 million cm. Canadian exports then dropped back to about 0.5 million cm in 1990 (Figure 27). U.S. exports essentially captured the market share lost by Canada during the late 1980's. Soviet conifer log exports never recovered from the 1980-81 recession, and in 1990 total log exports were

at a twenty year low of 4.9 million cm, 4.1 million cm of which were conifer logs (Figure 27).

North American Sawnwood: Canada and USA

The Canadian Province of British Columbia, the country's largest producer of softwood forest products, has maintained a long tradition of restricting exports of logs, dating back to the turn of the century. This ban was put in place to encourage the processing of Canada's natural resources within Canada in order to benefit the domestic economy. As a result, Canada have put forth the greatest effort to sell semi-processed and finished lumber in Japan, and has consequently enjoyed the most success.

As mentioned, 1961 was an epic year for exporting forest products to Japan. Imports of logs and lumber from Canada and the United States jumped to 2.2 million cm from 0.6 million cm in 1960. Lumber imports grew from 153,000 cm in 1960 to 590,000 cm in 1961, and although data is incomplete more than half of the total amount is estimated to have come from Canada.

Not only did Canada concentrate on exporting lumber (primarily conifer), but when trade began to boom in the 1960's it faced little other foreign competition in the Japan market. In the U.S. Northwest, mill owners were focused on the U.S. domestic market. Nor was the Soviet Union (the other major potential supplier)

equipped to compete in processed lumber exports. Between 1965 and 1968 Japan's total conifer sawnwood imports grew from 822,000 cm to 2.3 million cm. Imports from Canada grew from 477,000 cm to 1.3 million cm, respectively, accounting for 55.7 percent of the overall increase.[6] Canada maintained an average market share of 57 percent during the period from 1965 to 1968. By 1970, Canada had achieved a 64 percent market share for lumber imports. In contrast, imports of Canadian logs rarely exceeded 0.5 million cm until 1983.

The economic downturns of the early 1970's had a significant effect on Canadian exports. Between 1970 and 1971, Japanese imports of Canadian lumber dropped from 1.7 million cm to 913,000 cm, or a decline of 47 percent. U.S. imports declined by only ten percent, from 736,000 cm to 661,000 cm between 1970 and 1971. For the next few years U.S. lumber exporters continued to increase market share. By 1975 Japan was importing more U.S. than Canadian lumber. The decline of Canadian lumber exports to Japan preceding the oil crisis was more likely the result of increased Canadian exports to the United States (Canada's primary export market for conifer sawnwood). Between 1967 and 1972, U.S. housing starts grew from 1.3 to 2.4 million units.

Once the Japanese forest products markets began to pick up after the first oil

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[6] The figure quoted for Canadian lumber includes both conifer and non-conifer, however since more detailed data began to be collected in 1977, conifer lumber has accounted for at least 99 percent of the Japanese imports from Canada.

crisis, Canadian exporters were quick to regain their leading position as a supplier of conifer sawnwood. By the early 1980's Canadian producers accounted for half of Japanese imports, with U.S. producers supplying about 30 percent. Canadian mill owners have put substantial effort into market research relating to the preferences of Japanese consumers, and the size and quality standards of the Japanese market. Lacking a substantial domestic market, and faced with log export restrictions, Canadian producers have had no real alternative to developing export markets. They have been quite successful at penetrating the Japanese lumber market (Figure 28). Only during periods of domestic market recession, have U.S. mill owners found the incentive to increase export efforts generally, and to sell more processed lumber to Japan. Nevertheless, this periodic effort has paid off.

Together the U.S. and Canada have significantly increased exports of lumber to Japan in the last few years. In 1984, Japan imported 3.1 million cm of conifer sawnwood from these two countries. By 1986, U.S. mill owners had also become more efficient at selling lumber in Japan. In 1987, Canada held 47 percent of the Japanese import market while the United States held 37 percent. Thus, the combined North American import share was 84 percent. Since 1987, Canada has again been increasing its market share (Figure 28).

By 1989, the combined North American exports to Japan reached 6.3 million cm,

representing a growth of 99.9 percent from 1984. In 1990, U.S. and Canadian conifer lumber exports to Japan totaled 6.2 million cm, accounting for 36 percent of the total log and lumber exports from North America to Japan. In addition to increasing volumes the value of the imported lumber has also increased. The Japan North American Lumber Conference has estimated that in 1990 over 50 percent of the imported lumber was high quality custom cuts for the Japanese market (Kato, 1991).

Soviet mill owners benefitted from the modest growth of sawnwood imports in the late 1980's. In 1990, imports of Soviet lumber reached an all-time high of 267,000 cm.

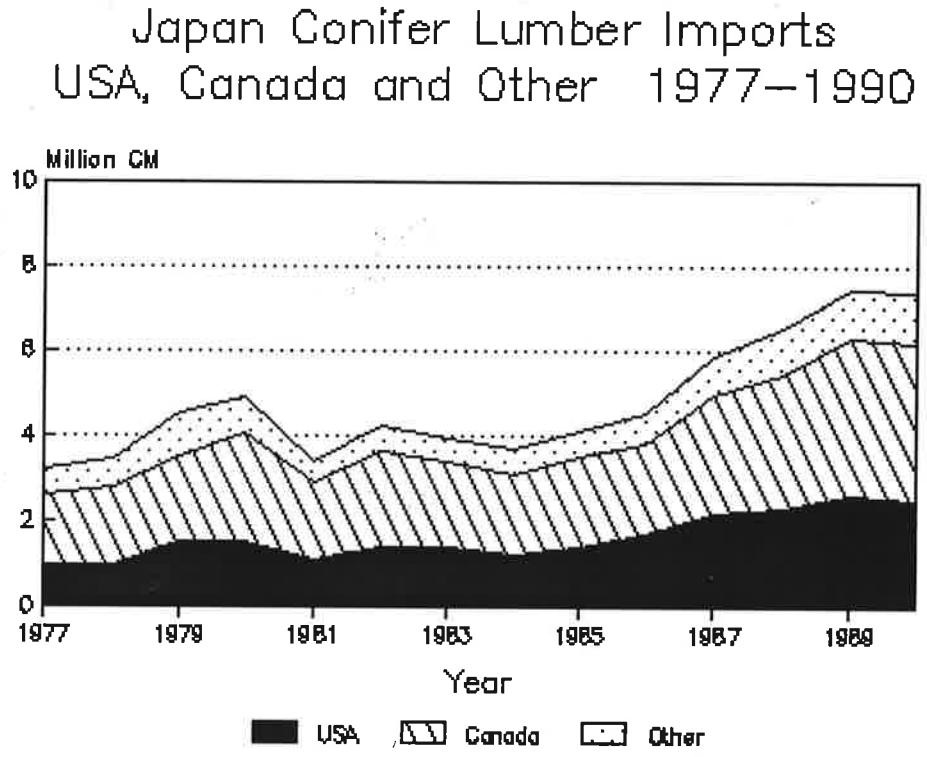
Japan Conifer Lumber Imports
USA, Canada and Other 1977–1990
Million CM
10
8
6
4
2
0
1977
1979
1981
1983
1985
1987
1989
Year
USA
Canada
Other

Figure 28

Non-Conifer Suppliers

Almost all of Japan's non-conifer wood imports originate from Southeast Asia. By 1960, when conifer imports from North America and the Soviet Union were still insignificant, Japan was already importing 4.6 million cm of South Seas timber, primarily lauan logs from Indonesia and the Philippines.

One reason for the early growth of hardwood imports was the almost complete lack of domestic hardwood resources. Japan has had to rely on foreign sources for as much as 85 percent of its non-conifer log supply. Most of this wood is manufactured into plywood. As mentioned above, plywood exports were seen by Japan as a source of foreign exchange. Thus, Japan's plywood industry received special attention after WWII. Japanese consumption of imported non-conifer logs grew steadily throughout the 1960's reaching a peak of 26.9 million cm in 1973 (Appendix 4). At that time Indonesia supplied 42 percent of the total imports, Malaysia (Sabah) 27 percent and the Philippines 22 percent (Appendix 8).

The oil crisis caused hardwood log imports to drop 33 percent from 1973 to 1975. Indonesia managed to maintain its market share of 42 percent. However, the share of logs imported from the Philippines dropped to 16 percent, while imports from Sabah rose to 34 percent in that year.

The share of imports from Sabah rose again during the recovery of the late 1970's. In 1978, imports from Sabah accounted for 42 percent of the Japan import market, outgrowing Indonesian imports which still amounted to 41 percent of the total imports in that year. By this time Philippine forest resources had been depleted to the point where that country only supplied seven percent of the non-conifer logs imported by Japan (Figure 29).

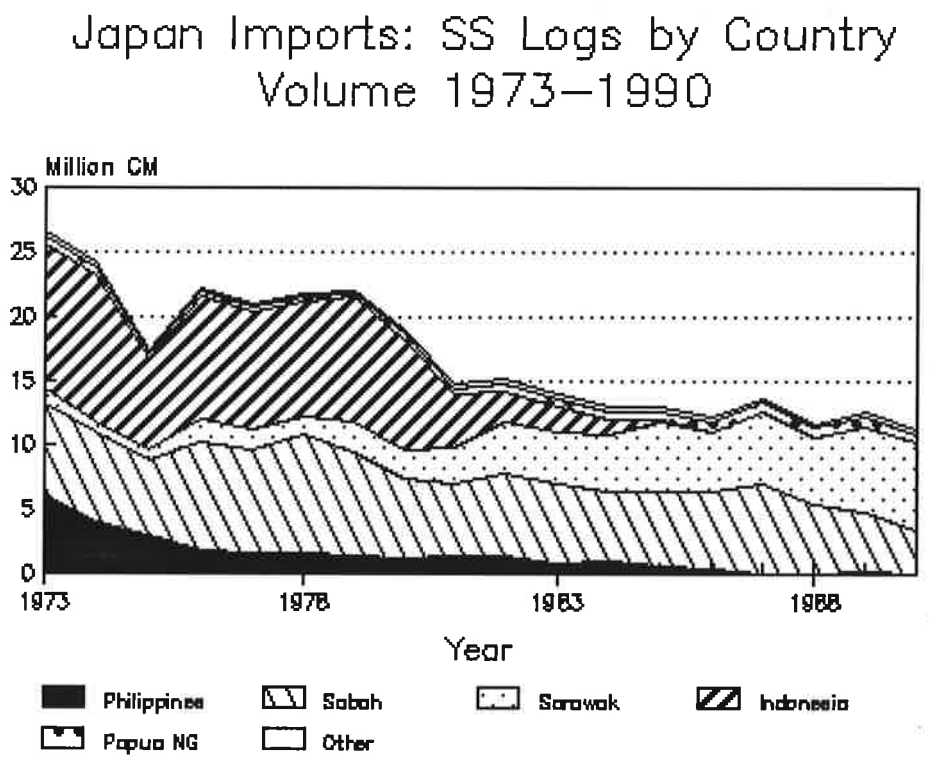

Figure 29

The 1980-81 recession caused another significant (33 percent) drop in hardwood log imports. Since then, Japanese consumption of South Sea logs has continued to slowly decline, from 15.1 million cm in 1982 to 11.1 million cm in 1990. This has resulted from a reduction in the regional supply of logs that has in turn led to a reduction in the consumption of hardwood logs in Japan (see Figure 17).

The 1980 economic recession coincided with the imposition of the Indonesian log export ban, which was designed to ensure that Indonesian timber resources would be processed domestically and thereby benefit the local economy. Thus, between 1979 and 1982 the supply of Indonesian logs dropped 75 percent, and Indonesia's market share dropped to 16 percent. By 1985 the ban was complete and Japan has not imported Indonesian logs since then (Appendix 8).

The reduction in the import of non-conifer logs has been paralleled by a dramatic increase in the importation of plywood from Indonesia, which grew from nearly zero in 1983 to over 400 million square meters in 1989. Thus, the increased consumption of imported plywood has largely offset the reduction in the non-conifer raw material supply.

Together, Indonesia and the Philippines had supplied 64 percent of the South Sea logs imported by Japan in 1973. However, by 1986 this figure had dropped to only two percent. In the wake of the Indonesian export ban, Sarawak, Malaysia

increased its exports to Japan dramatically. Between 1979 and 1990, Sarawak's market share increased from 10 to 61 percent, while in 1990 Sabah accounted for 31 percent. Thus, of the 11.1 million cm of non-conifer tropical logs imported in 1990, 10.2 million cm, or 92 percent, came from Malaysia.

CONCLUSION

International trade in forest products has been an integral part of Japan's timber economy since 1920. The examination of past trends shows that domestic prices have been a determining factor in Japanese forest policy. Rapidly increasing prices led to large tree planting efforts in the 1890's and 1950's. High industrial wood prices also resulted in government efforts to promote imports in the 1920's and 1960's. Recent trends show that the consumption of imported industrial roundwood products fluctuates, closely reflecting changes in market conditions, while domestic industrial roundwood production has remained relatively constant.

During and following World War II Japan depleted much of its forest resources, causing forest production to peak in 1967. Since 1970, Japan has imported more than half of the industrial roundwood it has consumed. The reconstruction following World War II and the country's considerable economic growth during the past 30 years have made industrial roundwood imports a necessary part of Japan's trade profile. More recently, imports of manufactured wood products have increased significantly.

Although many of Japan's forests were replanted after the War, the increased costs associated with forest production combined with the competition from foreign

suppliers brought Japan's domestic forestry sector into decline. Foreign forest products producers have benefitted considerably from the strength and size of the Japanese market. Lumber imports have risen dramatically in the last several years as more and more North American mills have begun to cut lumber specifically for the Japanese market. As imported log prices rise and supplies tighten, North American mills will have greater availability of high quality wood than will Japanese mills. Further, the trend of increasing value added imports, including more custom cuts and laminated products, is expected to continue due to the strong Yen (Kato, 1991). By continuing to research the requirements of the Japanese market, foreign producers of processed wood products will be in a better position to maintain or increase market share. Japanese investments in overseas facilities have helped to facilitate this process.

On the demand side, the average number housing starts is expected to remain at about 1.4 million units through the next decade (Drobnack, 1991). Many people now live in poor quality small houses that were constructed in the early 1970's. With the strength of the economy, many of these people are expected to rebuild these houses, making them bigger and using more wood. Furthermore, the Japanese government has stated policies designed to improve the housing situation in Japan (Drobnack, 1991).

Japan's consumption of imported wood chips should also continue to increase as

pulp and paper consumption is expected to increase. Because Japan already has a very high waste paper recycling rate, approximately 50 percent, increasing the level of recycling will not be an option for increasing pulp production. Whether or not Japan will continue to increase its dependence of foreign plywood is less certain. Indonesia currently supplies most the plywood imported by Japan. Experts are pessimistic regarding Indonesia's ability to sustain sufficiently high harvest levels to meet its plymill capacity (Drobnack, 1991).

In recent years, the supply of timber from producing regions has become uncertain primarily due to environmental concerns, especially in the U.S. Pacific Northwest. The Japanese are concerned about supply reductions in the U.S. Pacific Northwest, as are U.S. producers. As a partial result of U.S. reductions, imports of radiata pine from New Zealand and Chile have increased dramatically in the last several years. Nevertheless, in the near term these suppliers will not be able to fully make up for the supply reductions that could result from environmental restrictions and land use changes in North America as well as in the tropical rainforest regions. Increasing protectionist attitudes worldwide may also restrict the flow of unprocessed wood to Japan. The former Soviet Union has a large potential for increasing supplies in the future. However, if the former Soviet Union develops its forest industry, this would decrease log exports in favor of increasing the amount of processed wood sold to Japan.

One question that remains unanswered is the potential for supply reductions, or other factors, to raise global log prices to the point that Japanese forests would become sufficiently more economic to harvest. In other words, at what price would Japanese forest production begin to increase? Informal conversations in Japan speculate that log prices would need to increase as much as 40 percent to make Japanese plantations economically viable. If this does not happen, it may continue to be uneconomic to harvest Japan's forests and tree plantations. Subsidies for the domestic forest sector could be reduced by the Japanese government as a result. Already many forests that are ready for thinning are not being thinned due to high costs. If the subsidies were lowered, Japan would remain dependent on wood imports indefinitely, while Japanese forests continued to grow.

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APPENDICES

APPENDIX 1

Japanese Historical Data 1879-1989
Industrial Roundwood Production, Consumption and Imports

Japanese Historical Data
Industrial Roundwood 1879-1989

Japan 1000 CM	Domestic Consumption	Domestic Production	Net Imports	Net Imports/ Consumption
1879	6,216.4	6,227.8	-11.4	-0.2%
1880	6,450.2	6,460.2	-10.0	-0.2%
1881	6,397.0	6,405.9	-8.9	-0.1%
1882	6,391.4	6,405.6	-14.2	-0.2%
1883	6,364.4	6,368.6	-4.2	-0.1%
1884	6,315.2	6,311.3	3.9	0.1%
1885	6,766.0	6,779.1	-13.1	-0.2%
1886	7,391.1	7,415.3	-24.2	-0.3%
1887	7,090.2	7,115.6	-25.3	-0.4%
1888	6,349.7	6,380.6	-30.9	-0.5%
1889	6,421.2	6,445.4	-24.2	-0.4%
1890	6,103.1	6,127.6	-24.5	-0.4%
1891	7,032.9	7,056.3	-23.4	-0.3%
1892	6,178.3	6,210.8	-32.6	-0.5%
1893	6,754.9	6,775.8	-20.9	-0.3%
1894	7,514.9	7,544.2	-29.2	-0.4%
1895	8,133.6	8,151.4	-17.8	-0.2%
1896	8,250.5	8,275.8	-25.3	-0.3%
1897	9,569.3	9,716.0	-21.4	-0.2%
1898	10,351.4	10,403.7	-52.3	-0.5%
1899	10,524.2	10,638.0	-113.8	-1.1%
1900	11,071.1	11,244.2	-173.1	-1.6%
1901	11,226.3	11,383.3	-157.0	-1.4%
1902	11,195.7	11,343.0	-147.2	-1.3%
1903	11,204.9	11,455.9	-251.0	-2.2%
1904	12,104.1	12,390.2	-286.1	-2.4%
1905	11,406.7	11,703.6	-296.9	-2.6%
1906	11,501.3	12,302.8	-801.5	-7.0%
1907	11,569.2	12,615.9	-1,046.7	-9.0%
1908	11,846.1	12,587.2	-741.1	-6.3%
1909	11,824.1	12,398.0	-573.9	-4.9%
1910	12,305.6	12,997.7	-692.1	-5.6%
1911	12,416.1	13,141.3	-725.2	-5.8%
1912	12,748.6	13,653.7	-905.0	-7.1%
1913	13,897.7	14,783.0	-885.3	-6.4%
1914	13,688.2	14,560.7	-872.5	-6.4%
1915	13,460.0	14,184.4	-724.4	-5.4%
1916	14,409.5	15,223.8	-814.3	-5.7%
1917	15,395.6	15,840.8	-445.3	-2.9%
1918	17,159.1	17,492.0	-332.8	-1.9%

Japan 1000 CM	Domestic Consumption	Domestic Production	Net Imports	Net Imports/ Consumption
1919	19,266.4	19,643.8	-377.4	-2.0%
1920	17,320.3	17,516.2	-195.9	-1.1%
1921	16,329.3	15,673.6	655.7	4.0%
1922	16,344.6	13,450.0	2,894.6	17.7%
1923	21,247.4	17,230.9	4,016.4	18.9%
1924	20,302.3	14,488.6	5,813.7	28.6%
1925	21,804.5	17,217.0	4,587.5	21.0%
1926	21,692.7	15,729.0	5,963.7	27.5%
1927	22,739.3	16,313.1	6,426.2	28.3%
1928	21,352.3	14,353.9	7,004.0	32.8%
1929	21,049.2	15,018.7	6,038.8	28.7%
1930	19,602.6	15,599.0	4,003.6	20.4%
1931	19,093.0	14,897.7	4,195.4	22.0%
1932	19,401.4	15,770.4	3,631.0	18.7%
1933	21,207.9	17,881.9	3,326.0	15.7%
1934	23,491.0	21,268.8	2,222.2	9.5%
1935	24,078.2	21,946.7	2,131.5	8.9%
1936	25,003.3	22,678.9	2,324.4	9.3%
1937	27,402.3	26,065.3	1,337.0	4.9%
1938	27,626.6	28,703.3	-1,076.7	-3.9%
1939	29,781.7	32,730.0	-2,948.3	-9.9%
1940	32,101.9	34,063.6	-1,961.7	-6.1%
1941	32,294.2	33,126.0	-831.8	-2.6%
1942	30,790.8	31,456.0	-665.1	-2.2%
1943	34,632.5	34,910.0	-277.5	-0.8%
1944	30,925.3	31,287.6	-362.3	-1.2%
1945	20,787.6	21,027.0	-239.3	-1.2%
1946	19,755.1	19,755.1	0.0	0.0%
1947	24,442.3	24,496.2	-54.0	-0.2%
1948	32,553.0	32,605.9	-52.9	-0.2%
1949	31,802.2	31,842.0	-39.8	-0.1%
1950	36,432.3	36,431.4	0.8	0.0%
1951	44,435.9	44,386.9	49.0	0.1%
1952	43,526.1	43,397.0	129.1	0.3%
1953	44,337.1	43,218.9	1,118.2	2.5%
1954	42,470.5	41,663.5	807.1	1.9%
1955	44,474.8	43,909.6	565.2	1.3%
1956	47,313.5	46,555.4	758.1	1.6%
1957	49,813.8	48,547.5	1,266.3	2.5%

Japan 1000 CM	Domestic Consumption	Domestic Production	Net Imports	Net Imports/ Consumption
1958	46,538.7	44,142.3	2,396.4	5.1%
1959	48,679.7	44,886.7	3,793.0	7.8%
1960	53,406.6	48,525.2	4,770.1	8.9%
1961	57,892.0	49,903.4	7,988.6	13.8%
1962	57,487.9	48,088.0	9,399.9	16.4%
1963	63,778.6	50,203.7	13,574.9	21.3%
1964	64,981.0	50,678.0	14,303.0	22.0%
1965	65,779.0	49,534.0	16,245.0	24.7%
1966	72,319.0	51,023.0	21,296.0	29.4%
1967	79,387.0	51,813.0	27,574.0	34.7%
1968	83,301.0	48,342.0	34,959.0	42.0%
1969	84,809.0	46,217.0	38,592.0	45.5%
1970	90,801.0	45,351.0	45,450.0	50.1%
1971	87,960.0	45,253.0	42,707.0	48.6%
1972	91,785.0	43,114.0	48,671.0	53.0%
1973	99,556.0	41,584.0	57,972.0	58.2%
1974	93,525.0	38,874.0	54,651.0	58.4%
1975	78,491.0	34,154.0	44,337.0	56.5%
1976	86,953.0	35,271.0	51,682.0	59.4%
1977	89,987.0	33,793.0	56,194.0	62.4%
1978	88,388.0	32,145.0	56,243.0	63.6%
1979	93,559.0	33,270.0	60,289.0	64.4%
1980	87,941.0	34,051.0	53,890.0	61.3%
1981	74,184.0	31,361.0	42,823.0	57.7%
1982	74,237.0	32,233.0	42,004.0	56.6%
1983	72,455.0	31,017.0	41,438.0	57.2%
1984	73,360.0	32,518.0	40,842.0	55.7%
1985	73,790.0	32,951.0	40,839.0	55.3%
1986	73,741.0	31,558.0	42,183.0	57.2%
1987	77,339.0	30,740.0	46,599.0	60.3%
1988	77,862.0	31,739.0	46,123.0	59.2%
1989	82,680.0	31,365.0	51,315.0	62.1%

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APPENDIX 2

Japanese Net Imports 1874-1979 by Value and Volume

JAPANESE NET IMPORTS 1874-1970
by Value and Volume

Japanese Historical Data	Net Imports constant Yen Wood products	Net Imports constant Yen Forest Products	Net Imports constant Yen Wood and For Pr	Net Imports current Yen Wood Products	Net Imports current Yen Forest Products	Net Imports current Yen Wood & Forest	Net Imports Industrial Wd 1000 CM
1874	0	0	0	0	0	0	
1875	-0	0	-0	-0	0	-0	
1876	-0	0	-0	-0	0	-0	
1877	0	0	0	0	0	0	
1878	0	0	0	0	0	0	
1879	0	0	0	0	0	0	-11.4
1880	0	-1	-0	0	-0	0	-10.0
1881	0	-0	-0	0	-0	0	-8.9
1882	-0	-1	-1	-0	-0	-0	-14.2
1883	0	0	0	0	0	0	-4.2
1884	-0	0	0	-0	0	0	3.9
1885	-0	0	-0	-0	0	-0	-13.1
1886	0	-1	-1	0	-0	-0	-24.2
1887	-0	-1	-1	-0	-0	-0	-25.3
1888	0	-1	-1	0	-0	-0	-30.9
1889	-1	-1	-2	-0	-0	-0	-24.2
1890	0	-2	-2	0	-0	-0	-24.5
1891	-0	-1	-1	-0	-0	-0	-23.4
1892	-1	-1	-2	-0	-0	-0	-32.6
1893	-1	-1	-2	-0	-0	-0	-20.9
1894	-1	-2	-3	-0	-0	-1	-29.2
1895	-1	-2	-2	-0	-0	-1	-17.8
1896	-1	-2	-3	-0	-0	-1	-25.3
1897	-1	-1	-2	-1	-0	-1	-21.4
1898	-2	-2	-3	-1	-0	-1	-52.3
1899	-3	-4	-6	-1	-1	-2	-113.8
1900	-3	-3	-6	-1	-1	-2	-173.1
1901	-3	-3	-6	-1	-1	-2	-157.0
1902	-4	-3	-7	-2	-1	-2	-147.2
1903	-7	-3	-10	-3	-1	-3	-251.0
1904	-5	-4	-9	-2	-2	-4	-286.1
1905	-9	-5	-14	-4	-2	-6	-296.9
1906	-16	-8	-24	-7	-3	-10	-801.5
1907	-21	-10	-32	-10	-4	-14	-1,046.7
1908	-15	-7	-22	-7	-3	-11	-741.1
1909	-12	-5	-17	-6	-2	-8	-573.9
1910	-17	-6	-23	-9	-3	-11	-692.1
1911	-15	-6	-21	-8	-3	-11	-725.2

JAPANESE NET IMPORTS 1874-1970
by Value and Volume

Japanese Historical Data	Net Imports constant Yen Wood products	Net Imports constant Yen Forest Products	Net Imports constant Yen Wood and For Pr	Net Imports current Yen Wood Products	Net Imports current Yen Forest Products	Net Imports current Yen Wood & Forest	Net Imports Industrial Wd 1000 CM
1912	-15	-8	-23	-9	-3	-12	-905.0
1913	-17	-8	-24	-10	-3	-13	-885.3
1914	-15	-7	-22	-9	-3	-12	-872.5
1915	-18	-4	-23	-10	-2	-12	-724.4
1916	-23	-6	-29	-13	-2	-15	-814.3
1917	-28	-0	-28	-16	2	-14	-445.3
1918	-21	2	-19	-16	6	-10	-332.8
1919	-22	1	-21	-26	2	-23	-377.4
1920	-17	2	-15	-25	6	-18	-195.9
1921	1	28	30	-2	34	32	655.7
1922	20	41	60	20	48	68	2,894.6
1923	21	42	64	26	53	79	4,016.4
1924	32	58	90	40	75	116	5,813.7
1925	13	38	51	11	41	52	4,587.5
1926	29	58	87	23	59	82	5,963.7
1927	36	54	90	29	52	82	6,426.2
1928	41	60	100	30	55	85	7,004.0
1929	26	49	75	16	42	58	6,038.8
1930	17	40	58	3	26	29	4,003.6
1931	14	42	57	2	24	26	4,195.4
1932	4	30	35	-2	17	14	3,631.0
1933	-8	23	15	-8	16	8	3,326.0
1934	-11	16	6	-18	15	-3	2,222.2
1935	-26	19	-7	-23	20	-3	2,131.5
1936	-40	25	-16	-29	26	-3	2,324.4
1937	-45	20	-25	-37	28	-8	1,337.0
1938	-59	-28	-87	-65	-6	-71	-1,076.7
1939	-103	-67	-170	-141	-30	-172	-2,948.3
1940							-1,961.7
1941							-831.8
1942							-665.1
1943							-277.5
1944							-362.3
1945							-239.3
1946							0.0
1947							-54.0
1948							-52.9
1949							-39.8

JAPANESE NET IMPORTS 1874-1970
by Value and Volume

Japanese Historical Data	Net Imports constant Yen Wood products	Net Imports constant Yen Forest Products	Net Imports constant Yen Wood and For Pr	Net Imports current Yen Wood Products	Net Imports current Yen Forest Products	Net Imports current Yen Wood & Forest	Net Imports Industrial Wd 1000 CM
1950							0.8
1951	600	8,200	8,800	7,600	6,400	14,000	49.0
1952	1,000	7,900	8,900	2,900	6,000	8,900	129.1
1953	2,800	20,600	23,400	2,900	16,500	19,400	1,118.2
1954	-2,900	22,700	19,800	-3,000	18,000	15,000	807.1
1955	-8,700	27,200	18,500	-9,000	22,900	13,900	565.2
1956	-10,400	20,500	10,100	-8,600	20,200	11,600	758.1
1957	-5,800	26,300	20,500	-4,900	21,700	16,800	1,266.3
1958	-16,100	33,700	17,600	-15,400	23,600	8,200	2,396.4
1959	-17,700	47,500	29,800	-20,300	39,600	19,300	3,793.0
1960	-10,100	60,400	50,300	-11,300	53,400	42,100	4,770.1
1961	-7,100	95,700	88,600	-8,400	86,500	78,100	7,988.6
1962	-16,100	109,900	93,800	-18,400	105,900	87,500	9,399.9
1963	-3,200	138,200	135,000	-6,600	138,500	131,900	13,574.9
1964	-900	155,400	154,500	-2,500	149,900	147,400	
1965	-4,800	169,100	164,300	-4,800	169,100	164,300	
1966	2,500	223,600	226,100	-1,400	234,600	233,200	
1967	6,900	294,600	301,500	1,700	328,400	330,100	
1968	1,100	354,100	355,200	-8,000	410,800	402,800	
1969	3,500	372,500	376,000	-3,600	451,900	448,300	
1970	14,700	456,600	471,300	15,000	562,100	577,100	

*Forest Products = logs, squares and primary materials
*Wood Products = secondary processed goods

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APPENDIX 3

Japanese Historical Indexes 1874-1970

Japanese Historical Indexes
Import prices, wholesale prices and production

Japanese Historical Data	Wood Products Import Price Index (*)	Forest Products Import Price Index (*)	Indust. Wood Wholesale Price Index (**)	Lumber Production Index (***)	Pulp & Paper Production Index (***)
1874		62.2			
1875		53.4			
1876		52.9			
1877		55.1			
1878		56.3			
1879		55.2	23.6		
1880		59.4	34.3		
1881		59.0	44.2		
1882		57.1	36.9		
1883		52.5	30.9		
1884		53.8	25.2		
1885		58.9	19.7		
1886		54.3	19.0		
1887		55.2	21.7		
1888		53.6	23.4		
1889		53.5	23.7		
1890		52.9	23.9		
1891		52.9	23.9		
1892		51.9	26.3		
1893		56.8	25.7		
1894		58.7	28.2		
1895		61.0	33.4		
1896		62.5	41.4		
1897		63.0	44.6		
1898		71.9	48.7		
1899		67.4	49.0		
1900	55.0	77.6	53.3		
1901	55.0	71.4	55.7		
1902	55.0	79.6	51.3		
1903	56.4	75.7	53.2		
1904	51.0	76.0	55.4		
1905	45.3	75.9	58.0		
1906	65.0	87.4	57.4		
1907	74.8	91.8	63.8		
1908	80.4	86.2	65.2		
1909	69.7	85.4	60.0		
1910	79.2	84.4	62.3		
1911	80.6	82.6	65.9		

Japanese Historical Indexes
Import prices, wholesale prices and production

Japanese Historical Data	Wood Products Import Price Index (*)	Forest Products Import Price Index (*)	Indust. Wood Wholesale Price Index (**)	Lumber Production Index (***)	Pulp & Paper Production Index (***)
1912	74.3	91.0	66.1		
1913	87.0	96.4	68.4		
1914	74.4	95.4	65.4		
1915	76.2	93.1	63.9		
1916	111.7	115.2	66.3		
1917	147.0	146.1	85.0		
1918	215.5	201.8	112.3		
1919	188.7	201.0	168.4		
1920	226.9	217.5	233.2		
1921	119.7	128.6	198.2		
1922	115.5	124.3	197.6		
1923	128.4	130.3	180.5		
1924	133.2	133.3	179.7		
1925	119.2	117.8	165.0		
1926	104.7	109.2	159.5		15.9
1927	98.0	105.8	149.3		16.9
1928	91.7	101.6	145.4		18.7
1929	93.7	98.3	129.1		20.4
1930	73.4	78.2	97.6	21.6	17.6
1931	61.5	68.7	89.6	20.7	16.9
1932	77.1	71.3	86.7	21.9	16.9
1933	128.2	91.9	102.8	25.6	18.7
1934	96.9	97.4	99.2	32.7	17.2
1935	100.1	99.6	97.7	36.1	19.0
1936	103.0	103.0	103.1	37.7	22.3
1937	156.3	139.6	131.9	38.2	25.6
1938	175.1	141.3	161.4	37.6	23.0
1939	181.9	147.6	199.4	44.1	26.5
1940			263.7	36.6	26.6
1941			288.1	45.8	27.2
1942			288.6	43.3	21.4
1943			288.6	38.3	18.3
1944			326.7	34.0	10.6
1945			419.6	20.3	5.0
1946			16.2	31.0	5.4
1947			66.5	40.9	7.6
1948			143.9	47.4	11.3
1949			204.4	47.6	15.8

Japanese Historical Indexes
Import prices, wholesale prices and production

Japanese Historical Data	Wood Products Import Price Index (*)	Forest Products Import Price Index (*)	Indust. Wood Wholesale Price Index (**)	Lumber Production Index (***)	Pulp & Paper Production Index (***)
1950			231.8	49.9	21.4
1951	228.4	78.5	342.7	74.8	29.3
1952	132.8	76.1	396.5	79.6	33.5
1953	97.0	80.2	519.3	76.2	42.6
1954	95.6	79.3	565.4	74.6	46.5
1955	101.7	84.2	509.9	74.3	53.4
1956	105.4	91.2	532.0	83.1	61.7
1957	99.2	82.1	614.8	87.6	69.5
1958	100.3	73.1	596.4	84.4	68.4
1959	98.1	84.6	604.1	90.0	86.1
1960	99.2	89.9	632.3	100.0	100.0
1961	98.6	91.2	764.0	105.9	117.4
1962	97.6	96.4	769.7	108.2	122.1
1963	97.6	100.0	786.9	114.5	135.3
1964	99.6	96.5		121.2	153.0
1965	100.0	100.0		124.6	153.2
1966	100.1	105.0			
1967	98.9	111.5			
1968	97.6	116.0			
1969	103.6	121.3			
1970	118.2	123.1			

--Forest Products = logs, primary products
--Wood Products = processed materials

* Index base for 1874-1939: 1934-36=100.
No trade data for 1940-1950.
Index base for 1951-1970: 1965=100.

** Index base for 1879-1945: 1934-36=100.
Index base for 1946-1963: 1934-36=1.

*** Index base 1960=100.

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APPENDIX 4

Japan Total Log and Sawnwood Imports 1964-1990

JAPAN TOTAL LOG AND SAWNWOOD IMPORTS
Conifer and Non-Conifer 1964-1990

Import Volume	-----Total Saw & Pulp Logs----			--------Total Sawnwood-------		
(1000 CUM)	Total	Conifer	Non-conifer	Total	Conifer	Non-conifer
1964	14,269	5,850	8,419	985	962	23
1965	15,925	6,427	9,498	963	822	141
1966	20,700	8,421	12,279	1,191	1,142	49
1967	26,157	12,258	13,899	1,969	1,837	132
1968	31,030	16,185	14,845	2,480	2,289	191
1969	33,687	16,004	17,683	2,035	1,842	193
1970	39,307	18,965	20,342	2,973	2,667	306
1971	38,154	16,477	21,677	2,090	1,767	323
1972	42,294	20,487	21,807	2,420	2,034	386
1973	48,552	21,654	26,898	3,591	3,158	433
1974	43,909	18,183	25,726	3,473	3,021	452
1975	35,576	17,582	17,994	2,591	2,404	187
1976	41,589	19,022	22,567	3,237	3,013	224
1977	41,880	19,812	22,068	3,511	3,208	303
1978	42,653	19,978	22,675	3,858	3,437	421
1979	44,786	21,363	23,423	5,017	4,549	468
1980	37,510	17,540	19,970	5,447	4,892	555
1981	30,032	14,134	15,898	3,898	3,410	488
1982	30,408	14,551	15,857	4,892	4,245	647
1983	29,793	14,762	15,031	4,667	3,917	750
1984	28,432	14,205	14,227	4,492	3,690	802
1985	28,898	14,845	14,053	5,176	4,104	1,072
1986	30,016	16,362	13,654	5,523	4,513	1,010
1987	33,409	18,224	15,185	7,397	5,855	1,542
1988	28,500	16,500	12,000	8,395	6,541	1,854
1989	31,297	17,428	13,869	9,625	7,452	2,173
1990	28,999	16,682	12,317	9,083	7,369	1,714

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APPENDIX 5

Japanese Forest Land 1960-1987
Afforestation and Harvest Data

Japanese Forest Land 1960-1987
Afforestation and Harvest Data

Forest Land	Afforestation by Mgt and Regeneration (ha)						Harvest by Mgt and Method (ha)					
	Total	Nat'l G	Public	Private	Artificial	Natural	Total	Nat'l G	Public	Private	Clear Cut	Part. Cut
1960	539,646	132,329	56,385	350,932	392,043	147,603	697,320	268,893	81,362	347,066	418,075	279,245
1965	469,699	157,190	55,671	256,838	362,665	107,034	485,812	197,153	57,859	230,800	355,333	130,479
1970	431,325	157,751	58,790	214,784	347,765	83,560	383,145	136,794	42,078	204,273	308,494	74,651
1975	305,606	129,403	48,199	128,004	218,652	86,954	316,397	129,259	41,556	145,582	214,429	101,968
1980	250,275	119,900	41,040	89,335	162,584	87,691	253,615	101,224	33,628	118,763	173,109	80,506
1985	199,779	105,821	31,451	62,507	105,515	94,264	218,977	103,168	29,764	86,045	129,402	89,575
1987	192,544	111,972	27,527	53,045	83,030	109,514	213,128	111,543	28,369	73,216	106,934	106,194

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APPENDIX 6

Japanese Housing 1978-1990
Units and Floor Space by Material

Japanese Housing 1978-1990
Units and Floor Space by Material

Japan Housing	Housing Units (# units)				Floor Space (1,000 SQ M)			
	Total	Wooden	Non-wooden	% Wood	Total	Wooden	Non-wooden	% Wood
1978	1,549,362	958,158	591,204	62%	136,249	89,566	46,683	66%
1979	1,493,023	909,534	583,489	61%	136,515	88,621	47,894	65%
1980	1,268,626	750,653	517,973	59%	119,102	75,310	43,792	63%
1981	1,151,699	653,647	498,052	57%	107,851	66,145	41,706	61%
1982	1,146,149	666,960	479,189	58%	107,638	67,859	39,779	63%
1983	1,136,797	590,848	545,949	52%	99,442	58,133	41,309	58%
1984	1,187,282	594,144	593,138	50%	100,228	57,892	42,336	58%
1985	1,236,072	591,911	644,161	48%	103,132	57,988	45,144	56%
1986	1,399,833	648,966	750,867	46%	113,214	62,460	50,754	55%
1987	1,674,300	741,552	932,748	44%	132,526	72,372	60,154	55%
1988	1,684,604	697,267	987,337	41%	134,531	69,842	64,689	52%
1989	1,662,612	719,870	942,742	43%	135,031	71,976	63,055	53%
1990	1,707,109	727,765	979,344	43%	137,489	72,440	65,049	53%

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APPENDIX 7

Japanese Imports 1977-1990
Primary Conifer Suppliers

JAPANESE IMPORTS 1977-1990
Primary Conifer Suppliers

Import Volume	-Log Imports from US-		--Lumber Imports from US-		-----Imports from Canada-----			------Log Imports from USSR-----			
(1000 CUM)	US Log	SW Log	US Lbr	SW Lbr	Can Log	Can Lbr	Can SW Lbr	USSR Log	SW Log	HW Log	Lbr
1977	10,201	10,170	975	966	430	1,657	1,655	8,716	7,492	1,224	117
1978	10,325	10,306	981	981	312	1,816	1,814	8,834	7,886	948	127
1979	12,399	12,329	1,536	1,494	340	2,089	2,042	7,879	6,647	1,232	134
1980	10,279	10,182	1,550	1,521	472	2,564	2,554	6,158	5,185	973	139
1981	7,402	7,376	1,130	1,098	323	1,823	1,815	5,647	4,819	828	123
1982	8,088	8,077	1,420	1,384	361	2,357	2,272	6,000	5,028	972	120
1983	7,689	7,676	1,425	1,363	739	2,011	2,006	6,406	5,271	1,135	129
1984	7,200	7,188	1,326	1,184	1,193	1,938	1,930	5,786	4,503	1,283	147
1985	7,812	7,425	1,398	1,371	1,381	2,168	2,163	5,565	4,452	1,113	153
1986	8,334	8,317	1,831	1,701	1,433	2,094	2,085	6,306	5,115	1,191	170
1987	9,702	9,677	2,404	2,178	1,898	2,787	2,769	6,125	5,038	1,087	181
1988	9,468	9,390	2,618	2,321	1,222	3,184	3,157	5,800	5,027	773	225
1989	11,019	10,926	2,950	2,626	893	3,719	3,696	5,248	4,414	834	263
1990	10,335	10,215	2,795	2,479	515	3,717	3,702	4,865	4,073	792	267

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APPENDIX 8

Japan Imports of South Sea Logs 1973-1990
Primary Suppliers

Japan Imports of South Seas Logs
1973-1990 (1000 Cubic Meters)

SSLog	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Philippines	5,896	3,886	2,853	1,692	1,503	1,559	1,264	1,073	1,418	1,309	648	935	510	264	27	33	52	23
Sabah	7,309	6,997	5,958	8,490	8,137	9,212	8,200	6,306	5,471	6,442	6,238	5,483	5,892	6,019	6,980	5,351	4,641	3,420
Sarawak	1,251	947	702	1,739	1,488	1,496	2,268	2,260	2,917	4,049	4,075	4,256	5,395	4,778	5,494	5,251	6,683	6,749
Indonesia	11,232	11,450	7,299	9,656	9,273	8,987	9,769	8,640	4,138	2,452	2,110	1,328	137	0	0	0	0	0
Papua NG	480	532	304	377	347	326	379	438	469	579	490	640	726	777	949	770	891	626
Other	528	359	218	214	200	213	203	225	315	291	317	301	335	280	202	231	293	283
Total	26,696	24,171	17,334	22,168	20,948	21,793	22,083	18,942	14,728	15,122	13,878	12,943	12,995	12,118	13,652	11,636	12,560	11,101

Source: PacRim Wood Market Report May 1991