C I N T R A F O R

Working Paper

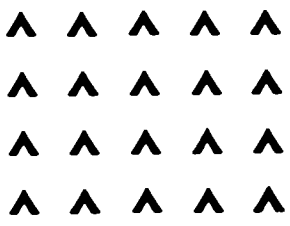
52

THE JAPANESE MARKET FOR SOFTWOOD SAWNWOOD AND CHANGING PACIFIC RIM WOOD SUPPLY CONDITIONS: IMPLICATIONS FOR US PACIFIC NORTHWEST PRODUCERS

Guy Robertson

Thomas R. Waggener

January 1995



CENTER FOR INTERNATIONAL TRADE IN FOREST PRODUCTS
UNIVERSITY OF WASHINGTON
COLLEGE OF FOREST RESOURCES AR-10
SEATTLE, WASHINGTON 98195

CINTRAFOR WORKING PAPER 52

THE JAPANESE MARKET FOR SOFTWOOD SAWNWOOD AND CHANGING PACIFIC RIM WOOD SUPPLY CONDITIONS: IMPLICATIONS FOR US PACIFIC NORTHWEST PRODUCERS

Guy Robertson

Thomas R. Waggener

CINTRAFOR
College of Forest Resources AR-10
University of Washington
Seattle WA 98195

This material is based upon work supported by the Cooperative State Research Service, US Department of Agriculture, and the State of Washington Department of Trade and Economic Development. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the funding agency.

ACKNOWLEDGMENTS

The authors would like to thank Eigo Deguchi and Kazuko Sheridan of the Seattle office of the Japan Wood Products Information and Research Center for their help in locating data used in this report. We would also like to thank Don Flora of the U.S. Forest Service for his advice and for allowing us access to his extensive files of Japanese trade data. John Dirks provided helpful comments in his review of the draft, and Lynn Catlett was instrumental in preparing the final manuscript for publication.

EXECUTIVE SUMMARY

Japan has long been Asia's largest importer of softwood sawlogs and lumber and is the major destination for U.S. Pacific Northwest wood product exports. In the period lasting from 1980 to 1993, Japan imported an annual average of 15.2 million CUM of softwood sawlogs and 5.4 million CUM of softwood lumber. The country's major softwood suppliers are the Pacific Northwest states of the U.S., British Columbia in Canada, and the Russian Far East and Siberia. In recent years, New Zealand and Chile have also supplied increasing volumes of softwood products to Japan, mostly in the form of Radiata pine flowing from these countries' expanding conifer plantations. Recent changes in the supply structure within Japan's foreign supplier countries promise to significantly impact the Japanese softwood market. In particular, reductions in North American harvests related to conservation and a general depletion of old-growth stock will increasingly limit the availability of high quality Douglas fir and Western hemlock sawlogs and lumber, products which have long been the mainstay of Japan's softwood import market. Similarly, moves to restrict exports of raw logs from North America, S.E. Asia and elsewhere have increasingly threatened the supply of both softwood sawlogs and hardwood peelers to Japan's lumber and plywood mills. At the same time, growing quantities of lower quality Radiata pine from New Zealand and Chile, as well as potential increases in medium quality Russian spruce and larch, will likely be available to the Japanese in the near future. While no shortage of softwoods is predicted, higher quality softwood products are expected to be increasingly scarce.

The Japanese softwood market is, in reality, a highly differentiated market where different species and grades of softwood meet specific end market requirements. Prices for different softwood products vary greatly, and substitution between sources and types of wood is often restricted. Japan has long paid significant price premiums for old-growth and higher quality second-growth Douglas fir and Western hemlock products. In view of impending supply restrictions for high quality softwoods, these premiums can be expected to persist. Firms wishing to take advantage of these premiums, either through forest management practices designed to increase quality, or through the export of processed lumber, need to consider not only the nature of their targeted market, but also the strengths and weaknesses of potential competitors. If national concerns over log exports results in a reduction of softwood roundwood exports, it cannot automatically be assumed that standard U.S. grades of commodity lumber can replace or substitute for the decrease. Rather, a more complete understanding of specific Japanese market requirements is needed to best exploit the comparative advantage of higher valued North American wood products.

Japanese Housing Market

The bulk of Japanese softwood sawlog and lumber imports is used in residential housing construction. Due to demographic factors, increasing income, and a comparatively rapid turnover in housing stock, Japan has one of the highest residential construction rates in the world both in gross and in per capita terms. Over the last decade, new housing starts in Japan have averaged over 1.4 million units per year. Predictions for 2000-2010 likewise foresee a level of around 1.3

million units per year. While in the two decades leading up to 1980 the share of nonwooden housing starts (primarily ferro-concrete multiple unit dwellings) increased substantially, shares of wood and nonwood starts have stabilized over the last decade with each commanding approximately half of the total market for housing units. This combined with predictions of stable overall demand for housing leads to the expectation of continued strong Japanese demand for softwood lumber.

Wooden housing styles and construction techniques in Japan can be divided into two general categories: traditional "post & beam" housing, and Western "2x4" platform housing as well as related prefabricated construction techniques. Traditional post & beam housing currently accounts for over 85 percent of Japan's wood housing market. Since this construction style features a great deal of exposed wood (particularly the posts and beams which constitute the major structural elements of the house), aesthetic as well as structural lumber characteristics are extremely important. Pacific Northwest Douglas fir and Western hemlock have been used extensively in Japanese traditional housing construction, and it is this market, more than any other, which has supported the price premiums enjoyed by North American timber exporters in the past.

Since its introduction to Japan in 1974, Western style 2x4 housing construction has made steady gains. At approximately 56 thousand units in 1993, 2x4 housing now commands 8 percent of Japan's total wood housing market. In addition to its cost advantage over traditional methods, 2x4 housing has enjoyed substantial promotion from North American governments, industrial associations and other organizations. Though the market penetration of 2x4 housing has been less than originally hoped for by its promoters, its progress has been consistent, and continued increases in market share should be expected. As North American suppliers have virtually monopolized the supply of dimension lumber to this market, benefits of the expansion of 2x4 housing in Japan to U.S. Pacific Northwest producers have been immediate. There is, however, no reason to believe that other producers will not begin to supply this market. In the medium-term, North American suppliers to the 2x4 market can expect to face increasing competition from mills in Japan and elsewhere cutting lower priced Russian species and perhaps Radiata pine. Due to its demand for higher quality lumber, the traditional housing market will be more insulated from increasing competition from these other suppliers.

In 1992, wooden prefabricated housing stood at 37 thousand starts, accounting for about 5 percent of the total market for wooden units. This represents a strong increase over 1980 levels. Japanese prefabricated housing is generally associated with Japan's major home-building corporations, and it often incorporates factory pre-construction with modular building techniques using "unit-bathrooms" and similar products. Some of the firms engaged in this form of housing construction have developed their own proprietary standards, and foreign firms wishing to export to this market will have to work in close cooperation with their Japanese customers.

Japan's Major Softwood Sawlog and Lumber Suppliers

Japanese Domestic Production

Japan itself is the single largest supplier of softwood logs to its own domestic market. In 1993, Japanese domestic production supplied 15.9 million CUM of softwood sawlogs to Japan's sawmills. This represents a slight decline from the 17.7 million CUM supplied in 1980.

For many years the Japanese have predicted an increase in domestic roundwood production based on the over 10 million hectares of maturing conifer plantations possessed by the country. Economic factors, however, have mitigated against any substantial expansion in domestic harvest. The most pressing problem is the high labor intensity of Japanese forestry combined with a chronic shortage of forest labor and a more than fourteen-fold increase in wages since 1960. In light of these and other problems, predictions of domestic harvest increases are becoming less common, and it is assumed that Japanese softwood production will continue at current or slightly lower levels well into the next century.

The Japanese domestic sawmilling industry is likewise in decline. Between 1980 and 1992, the number of sawmills in Japan fell by 28 percent to approximately 15 thousand mills. Gross material inputs for sawmills likewise fell by 25 percent, though much of this decline has been in the last few years. Currently, Japanese mills are struggling under increased prices for their mainstay Douglas fir and Western hemlock sawlogs as well as increased lumber imports from abroad. Continuing declines in domestic sawmills and production capacity are predicted, and this, in turn, will yield greater opportunities to foreign producers interested in exporting lumber products to Japan.

The United States

The U.S., and particularly the Pacific Northwest states of Oregon and Washington, are Japan's largest foreign supplier of softwood logs. The U.S. has long maintained over half of the total market share of Japanese softwood log imports. Since 1990, however, U.S. export volumes have fallen sharply from 10.9 million CUM to 7.6 million CUM, with market share declining from 63 percent to 52 percent. After making steady gains throughout most of the 1980s, U.S. softwood lumber exports to Japan have experienced similar declines since 1990. In the case of lumber, gross export volumes (2 million CUM in 1993) and market share (24 percent in 1993) are considerably lower those for logs. Continuing harvest restrictions related to the Spotted owl and other conservation issues promise to further limit harvests in the Pacific Northwest region and thereby reduce the amount of U.S. timber available for export to Japan. Likewise, calls for increased restrictions on raw log exports in the hopes of increasing domestic U.S. processing could further decrease the availability of softwood sawlogs to Japanese mills. In the future, U.S. exporters to Japan will face increased competition for raw materials and, perhaps, increased pressure to raise the value added content of their exports. This, in turn, will give added incentives to producers to find the highest value Japanese market niches for their products.

Siberia and the Russian Far East

Siberia and the Russian Far East constitute the second largest softwood log supplier to Japan. After declining throughout much of the 1980s and early 1990s log exports from these regions showed their first signs of recovery in 1993. In that year Japanese log imports from Russia increased to 4.5 million CUM, a gain of 26 percent over the previous year. Russian market share of Japanese log imports likewise increased from 24 percent in 1992 to 31 percent in 1993. Much of this is seen as a response to resource constraints in the United States. Russian productive capacity and the ability of Russian species (mostly larch, spruce and fir) to substitute for Pacific Northwest Douglas fir and Western Hemlock, however, is limited. Inadequate infrastructure and a chronic shortage of capital currently restricts increases in production, and the quality of Russian timber generally does not meet Japanese specifications for the main structural components used in traditional housing. Japanese imports of lumber from Russia have been relatively insignificant. The same sort of processing capacity and quality constraints pertaining to logs apply to lumber as well.

Canada

Except for a brief period in the mid to late 1980s, Canadian exports of softwood logs to Japan have remained well under 1 million CUM. For the most part, this is due to long-standing restrictions on raw log exports from British Columbia (the province supplying the overwhelming majority of Canadian wood product exports to Japan). Canadian exports of softwood lumber to Japan, on the other hand, comprise well over half of the total share of Japanese softwood lumber imports. In 1993, Japan imported 5.4 million CUM of softwood lumber from Canada, representing a 65 percent market share and a 23 percent increase in volume over 1992 levels. Strong increases in Canadian lumber exports to Japan are evident throughout the late 1980s and early 1990s, but continued expansion is limited by resource constraints and conservation issues similar to those in the U.S. Pacific Northwest. British Columbia does have a large available forest resource, but much of this is in the interior where Lodgepole pine and other lower valued species predominate. Though this wood may be suitable for the production of dimension lumber, it is doubtful that much of it will find its way into Japan's traditional housing sector.

New Zealand

In 1993 New Zealand softwood log exports to Japan stood at 1.7 million CUM, accounting for a 12 percent share of Japan's softwood log import market and making New Zealand Japan's third largest softwood log supplier. This 1993 volume was nearly seven times greater than New Zealand's log export volume to Japan for 1986, reflecting strong annual increases from 1987 to 1992 followed by a 7 percent decline in 1993. Over 85 percent of 1993 exports were Radiata pine. Given the species composition of New Zealand's forest resource, this percentage is expected to continue or even increase. Total New Zealand sawlog production is predicted to increase to approximately 16 million CUM in the first decade of the next century (as compared to a 1986-1992 average of roughly 6 million CUM of softwood sawlogs). New Zealand has devoted a great deal of effort to increasing the quality of Radiata pine products through intensive forest management

and new lumber production techniques. To date, however, Radiata pine is used in Japan primarily for packaging materials and other lower valued end-uses (this provides an explanation for the volume decline in 1993, as the Japanese recession impacted the packaging industry more than the relatively robust housing construction industry). New Zealand lumber exports to Japan in 1993 stood at 235 thousand CUM and were likewise dominated by Radiata pine.

Chile

Chile also has a large plantation resource planted predominantly in Radiata pine. Significant increases in Chile's softwood production are predicted beginning in the late 1990s, with total production expected to reach a level of between 21 and 27 million CUM by the turn of the century. The majority of this wood is also expected to be Radiata pine. In 1993 Chile exported 201 thousand CUM of softwood logs to Japan for a market share of only 1.5 percent. Softwood lumber exports to Japan, however, stood at 398 thousand CUM for a share of 4.7 percent of Japan' s softwood lumber import market. This reflects strong increases in Chilean lumber exports to Japan throughout most of the 1980s. Most of these exports are thought to be in the form of cants and flitches for remanufacture in Japan into the same sort of products for which New Zealand Radiata pine is used (i.e. packaging materials and other low priced end-uses). In the case of both New Zealand and Chile, increased exports of Radiata pine are expected to continue to supply the packaging materials market as well as compete with lower-valued products in the residential construction market. However, the species is not thought to be an adequate substitute in the higher-valued end-uses, which Pacific Northwest and Japanese domestic species have dominated in the past.

Other Factors Affecting Softwood Supply

Other factors affecting future softwood supplies available to Japan include rapid economic growth in China and other Asian nations, export restrictions and supply constraints for S.E. Asian hardwoods, and technological innovations in softwood lumber production. Cross border trade in softwood logs from the Russian Far East to China has been substantial, and New Zealand has reported sharply increased exports to China and Korea in the last few years. In general, China and Korea do not possess the same preference for high quality lumber products (residential housing in both Korea and China is constructed mainly of brick and stone), and continued economic growth in these countries is expected to most strongly impact the lower end of the softwood market. Similarly, export restrictions of Indonesian and, more recently, Malaysian hardwood logs have led to rapid price gains in Japan for Lauan logs used in plywood manufacture. Increasingly, the Japanese have substituted softwood plywood in uses previously dominated by hardwoods. With expected technological improvements, this substitution will continue to expand, thus increasing demand for softwood plywood, veneers and other softwood panel products.

While the previous two factors will tend to increase demand for softwood products, technological innovations in the production of lumber will extend softwood supplies through greater efficiencies or, perhaps more importantly in the context of this report, allow for the substitution of lower-priced species in end-uses currently demanding higher priced softwoods. New laminating

technologies that allow for the production of the larger squares commonly used in Japanese traditional housing is one prominent example. Here, clear veneers may be attached to cores produced from lower priced softwoods or composite materials.

Conclusion and Recommendations

In light of supply constraints, it is important that U.S. Pacific Northwest producers locate and fully exploit the best market opportunities for their products. Japan has long provided such an opportunity in the past, but primarily in the form of unprocessed log exports. Given Japan's strong economy (and Yen), stable demand for new housing and well defined preference for quality softwood products, it will continue to provide substantial market opportunities to Pacific Northwest producers in the future. To realize this potential, Northwest producers will increasingly need to understand the characteristics of Japan's differentiated market for processed timber and devise strategies to best exploit the comparative advantage of Pacific Northwest species in higher valued Japanese market niches.

As in the past, the highest premiums will go to those suppliers who can provide the Japanese market with high quality Douglas fir and Western hemlock logs and sawnwood. These premiums, in turn, may justify increased forest management efforts aimed at the production of clearwood and other quality characteristics. Likewise, they may help ameliorate some of the costs entailed in longer rotation lengths and intensive thinnings called for in new forest management regimes designed to produce environmental benefits as well as timber.

While benefits to U.S. Pacific Northwest lumber mills and value-added product exporters from the expansion of 2x4 construction in Japan have been considerable, the current marketing and policy emphasis on expanding the use of western 2x4 construction in that country should be reexamined to include traditional post and beam market niches. A 2x4-only strategy virtually ignores the lion's share of the Japanese wooden residential construction market, and most 2x4 applications do not necessarily highlight the aesthetic and structural characteristics of Pacific Northwest Douglas fir and Western hemlock. Traditional post and beam housing, on the other hand, has resulted in a strong Japanese preference for high quality North American softwoods and has been the driving force behind U.S. softwood exports to Japan and the price premiums associated with this trade. Moreover, in that it allows for increased substitution using lower priced softwoods, 2x4 construction in Japan will, in the future, be more open to competition from the other Pacific Rim producers considered in this study. This is not to argue that the promotion of 2x4 construction in Japan should be abandoned altogether, but rather that greater marketing efforts aimed at expanding lumber and value-added product exports to the Japanese traditional housing market are also called for.

TABLE OF CONTENTS

FIGURES

TABLES

I. INTRODUCTION

Much attention has been given to the changing resource structure of the Pacific Rim's major softwood producers. As the single largest net importer of softwood products in the region (and the World), the Japanese market stands to be severely affected by these changes. While the West coast of the U.S. and Canada are facing major restrictions related to forest preservation and the depletion of old growth stocks, New Zealand, Chile and Japan itself posses relatively large areas of conifer plantations, an increasing share of which is now reaching maturity. The U.S. Pacific Northwest also has a growing plantation resource, located mostly on the private forest lands of Oregon and Washington, which will significantly affect the export potential of products to Japan. Several authors have cited the existence of these plantations and others elsewhere as evidence of the rise of an "emergent" forestry in which comparative advantage will be determined by the productivity and economics of plantation silviculture and not by the quality and extent of a region's virgin forest resource.[1] Another crucial factor in determining future trade flows related to Japan is the huge forest resource located in the Russian Far East, which could have an immense impact on softwood supply throughout the Pacific region.[2] Though the extent and specific forms of the changes arising from these developments are difficult to predict, it is certain that as traditional sources are depleted or reserved for nontimber uses, and new sources are made available, major changes will occur in the types of wood Japan consumes, the prices it pays for these products and where the country obtains them.

One unavoidable shortcoming commonly encountered in general discussions of forest resources and trade in the Pacific Basin is a lack of sufficient detail regarding the types of wood available, the products produced and traded in various regions and markets, and their end-uses and relative values. This is especially true in the case of the Japanese housing market, which is characterized by numerous market niches for specific species and qualities, and which has perhaps the highest price to quality gradient in the world. Given this complex market structure, an increased global supply of a given species (Radiata pine, for example) must be analyzed primarily in terms of its potential impact upon specific market niche(s), and not just in terms of its impacts on the aggregate potential supply of wood fiber to the Pacific Rim or Japanese market as a whole. Accordingly, this study seeks to link developments in Japan's supplier countries with specific product categories in the Japanese residential construction market.

An atmosphere of pessimism currently surrounds the forestry sector in the Pacific Northwest. A great deal of hardship and economic loss is associated with recent moves to protect the spotted owl and other endangered species. Nevertheless, it should be remembered that decreased supply has led, in part, to rapid gains in the real price of Pacific Northwest wood products. The result has been that, in spite of falling volumes in certain major export categories (softwood logs for example), U.S. exports of wood products to Japan in value terms posted strong gains in 1993, attaining a record level of $3.2 billion. Moreover, steady real price increases well into the next

[1]Lyon and Sedjo, 1992.
[2]Backman and Waggener, 1994 .

century have been predicted by several studies.[3] These price increases, in turn, indicate increasing gross returns to forestry in the region.

The impact of increased prices (particularly that for stumpage) has, however, affected each sector in the Pacific Northwest's wood products industry differently. While private stumpage suppliers have realized increased profits, lumber mills and other processors have faced sharp rises in the price of wood inputs.[4] Some mills have closed, and many others have severely cut their workforce. Given the higher prices for stumpage experienced by lumber producers, it is essential that firms identify and fully exploit the best markets for their products. This calls for an understanding of not only projected demand trends but also a knowledge of current and future competitors.

The Japanese traditional (post & beam) housing market constitutes 85 percent of the total Japanese market for wooden residential construction and has long been the primary destination for exports of high quality Pacific Northwest softwoods. Structural and aesthetic wood qualities are emphasized in traditional housing construction, and the Japanese have developed a strong preference for clear grained pieces cut from Douglas fir and Hemlock. This, in part, explains the price premiums the Japanese have been willing to pay for Pacific Northwest logs. The overwhelming majority of Pacific Northwest Douglas fir and Hemlock logs imported by Japan are cut to supply this market. Likewise, a large proportion of finished and semi-finished lumber imports from the West coast of North America (particularly British Columbia) are used in traditional housing construction.

Given restricted availability of sawlog imports from the U.S. West coast, Japan has two options. The first is to substitute with logs from other sources. As we argue in the following sections, economic constraints and quality considerations applying to alternate supply sources will tend to restrict this option. The other possibility is to increase imports of finished and semi-finished lumber products. Such a strategy is already partially in evidence in increased lumber imports from British Columbia. Though constrained supply of quality Douglas fir and Hemlock stumpage will apply here as well, we believe that opportunities for Pacific Northwest mills to expand exports of lumber products to Japan are still considerable.

To date promotional efforts in the U.S. aimed at increasing value added lumber exports have emphasized the expansion of Western style "2 x 4" platform construction and related methods in Japan. While offering immediate benefits to U.S. mills used to cutting dimensional lumber, this strategy does not address the bulk of Japan's residential housing market. Likewise this strategy, arguably, does not fully take advantage of the structural and aesthetic qualities of Pacific Northwest species. This is particularly important given predicted increases in the supply of lower quality softwoods in the Russian Far East, New Zealand and elsewhere. This is not to argue that efforts

---

[3]USDA Forest Service, 1990. Perez-Garcia, 1993.

[4]Montgemery, Brown and Adams (1994) estimate a $15 billion total gain for stumpage suppliers in the region and a $36 billion total loss for regional processors under an intermediate Spotted owl conservation strategy.

to increase Japanese acceptance of Western construction technologies using North American dimension lumber products should be abandoned. Greater attention to the Japanese traditional housing market is nonetheless in order.

A related development is the current emphasis upon alternative forest management practices in the Pacific Northwest. A common element in many of these new management schemes is the potential use of longer rotations, thinning, pruning and other manipulations designed to enhance nontimber forest benefits, including species habitat and watershed preservation. In most cases, the result is a decrease in harvest volumes and an increase in costs. However, it is anticipated that there may also be an increase in the quality of wood harvested and thus the per unit values of products from stands managed in this fashion. In order to assess the economic viability of such alternative forest management practices a realistic appraisal of the market potential of high quality softwood products is essential. Japan provides a particularly promising outlet for such products.

Due to the unique structure of the Japanese construction market, particularly that for traditional housing, price increases (in dollar terms) for quality sawnwood products are expected to be particularly robust in Japan. In order to take advantage of these increases, however, Pacific Northwest producers must be aware of the characteristics of Japanese demand and the comparative strengths and weaknesses of the county's other suppliers. Accordingly, this paper is divided into three main sections. The first describes Japan's major softwood sawlog and sawnwood suppliers and the products and species they currently export to Japan. The second section discusses the specific characteristics of Japan's market for softwood residential construction materials and their implications for foreign suppliers, placing specific emphasis upon traditional housing construction and related sectors. The third section describes current adjustments in the Japanese softwood sawnwood market given recent price fluctuations and the future potential of the softwood suppliers discussed in section one, including changes in their resource base and possible developments in competitive positions.

In general, we see good reason for an optimistic assessment of the potential for select Pacific Northwest products in the Japanese residential construction market in the coming years. While a greater volume of softwood will be available from plantations in Chile and New Zealand, this wood will be of relatively lower quality and will not compete directly in the same market niches as Pacific Northwest products. Likewise, problems associated with the resource base and forest operations in Japan and the Russian far East make it unlikely that they will significantly expand production of higher quality products in the medium term. More generally, due to higher silvicultural costs associated with plantation forestry and to higher extraction costs related to the depletion of more accessible old-growth stock, the price of softwood throughout the Pacific region can be expected to rise. These price increases will be further augmented by continuing declines in hardwood exports from the tropics as well as high economic growth throughout Asia. Rising prices, in turn, can be expected to allow for greater investment opportunities in intensive management and marketing options for Pacific Northwest firms, particularly those which are able to secure adequate stocks of medium to high quality timber.

II. SUPPLIERS TO THE JAPANESE SAWNWOOD MARKET

Overview

Given its rapid economic growth throughout this century and a traditional reliance upon wood as a primary construction material, Japan has long played a dominant role in Pacific Rim wood products trade. Fueled in part by the demand for construction materials resulting from the Kanto Earthquake of 1923, Japanese imports of industrial wood first achieved major volumes in the 1920s and 1930s.[5] After reaching a peak of seven million cubic meters (CUM) in 1927, however, net imports declined throughout the 1930s and were eliminated by 1937. During the period of recovery following the war, imports were insignificant, and it was not until 1960 that import volumes once again achieved their pre-war peak. The following decade saw a rapid expansion of imports of both softwoods and hardwoods, and by 1973 total wood import volumes had reached a level of 75 million CUM, and Japan had established itself as the region's major import market. Presently, Japan is the world's largest net importer of softwood products, and, if trade between the U.S. and Canada is excluded, Japan emerges as the dominant market for softwood product imports in the Pacific Basin and throughout the world.

Japan has relied on a number of different sources to meet its demand for softwood sawlogs and lumber. At approximately 16 million CUM, domestic production still maintains its position as the country's single largest source of softwood sawlogs. The country's other major suppliers are, in descending order, the U.S., Canada, and the Russian Far East. In the last decade, New Zealand and Chile have also emerged as important softwood suppliers, although on a much smaller scale. Taken together, domestic production and the above foreign suppliers collectively account for over 99 percent of total Japanese conifer sawnwood consumption. Following a more general description of developments in the Japanese softwood market, each of these supply sources is treated in turn in subsequent subsections.

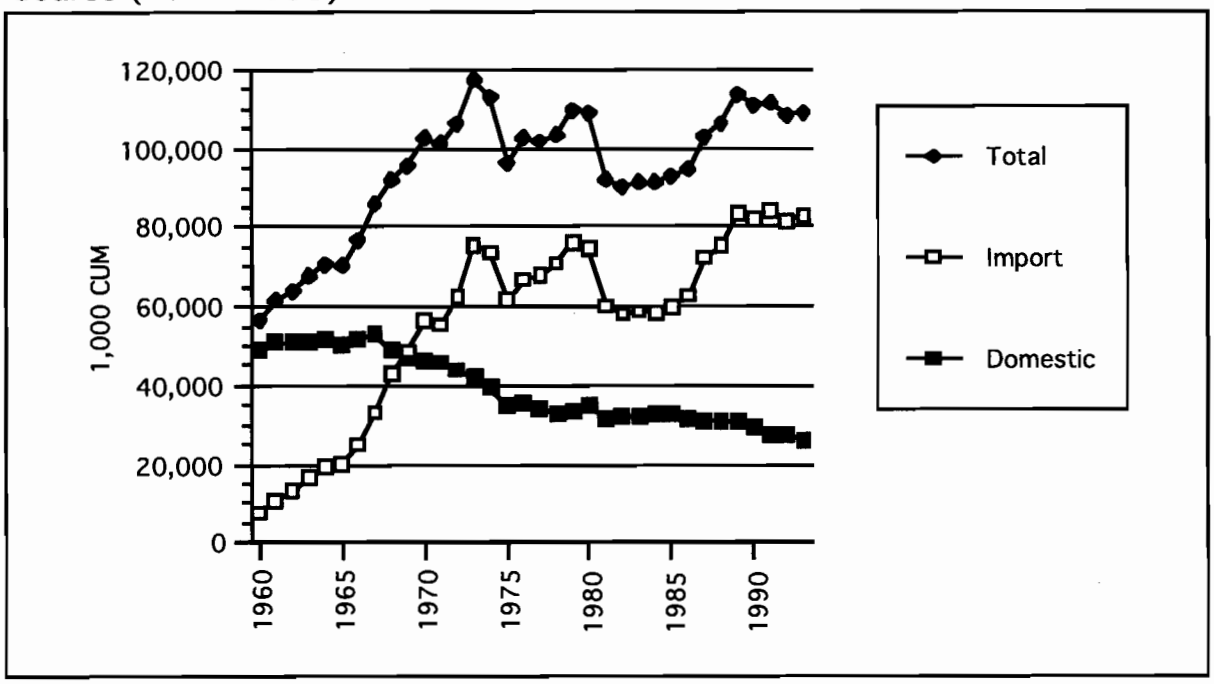
Total Japanese Softwood Sawlog and Lumber Consumption

Figure II.1 displays total Japanese consumption of industrial roundwood by source. The most striking aspect here is the rapid increase in imports which, in conjunction with a steady decline in domestic production, has caused the ratio of domestic to imported volumes to fall from approximately 87 percent in 1960 to a little over 24 percent in 1993. The main factors underlying this reversal in market share are a lack of harvestable domestic timber in the 1960s and 1970s and the growing cost of forestry operations in Japan (to be discussed in the following subsection) which has largely precluded harvests of the mature timber which has become increasingly available in the last decade.

---

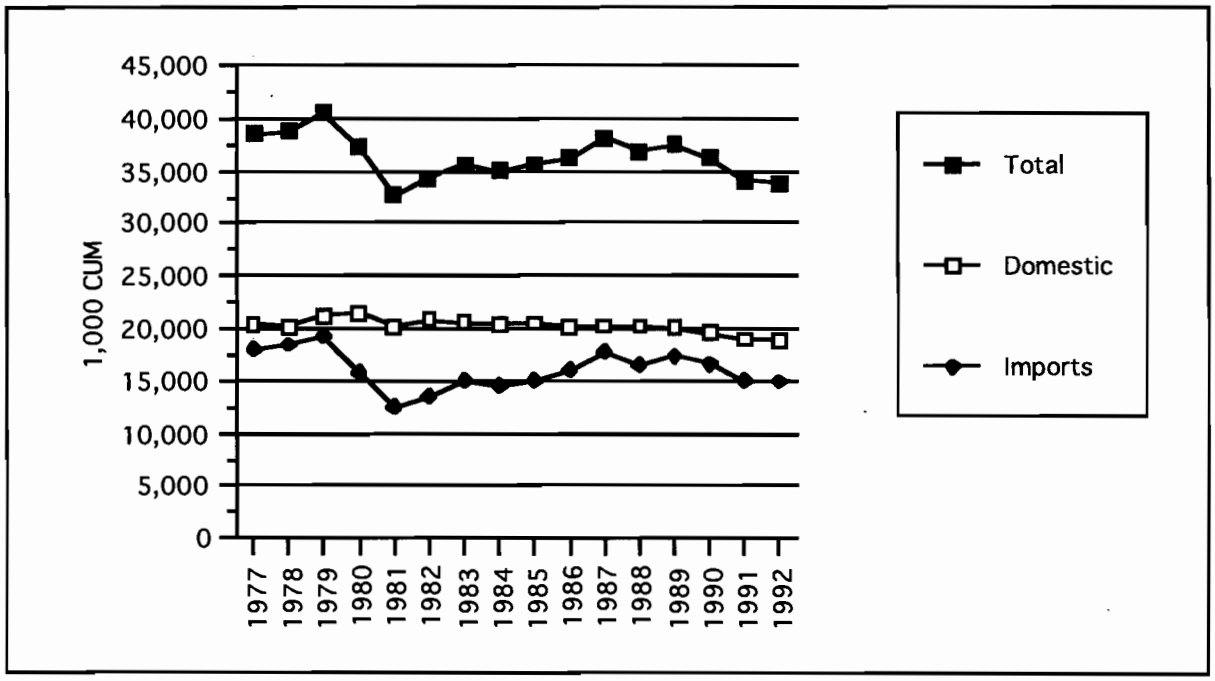
[5]For a more detailed discussion of Japanese historical trade and consumption patterns see Moffett and Waggener, 1992.

Figure II.1 Total Consumption of Wood Products in Japan by Source (1960-1993)



Source: Japan Forest Agency.
Note: Chips and pulpwood included.

Figure II.2 Japanese Softwood Log Production and Imports (1977-1992)



Source: Japan Wood-Products Information and Research Center (JAWIC)

Table II.1 Japanese Consumption of Industrial Wood Products (1992)

Commodity (1,000 CUM)	Production	Imports	Exports	Apparent Consumption
Softwood Logs	18,900	14,967	5	33,862
Softwood Lumber	24,740	7,418	1	32,157
Trop. Hardwood Logs	0	10,582	0	10,582
Temp. Hardwood Logs	8,214	320	1	8,533
Trop. Hardwood Plywood	5,509	2,677	3	8,183
Trop. Hardwood Veneer	5,988	354	0	6,342
Trop. Hardwood Lumber	1,446	1,081	0	2,527
Temp. Hardwood Lumber	1,091	428	8	1,511
Particleboard	1,050	126	1	1,175
Softwood Plywood	260	104	0	364
MDF	260	68	5	323
Softwood Veneer	262	50	0	312
Temp. Hardwood Plywood	185	115	9	291
Temp. Hardwood Veneer	143	53	23	173
Wood Chips(1)	7,540	11,344	0	18,884

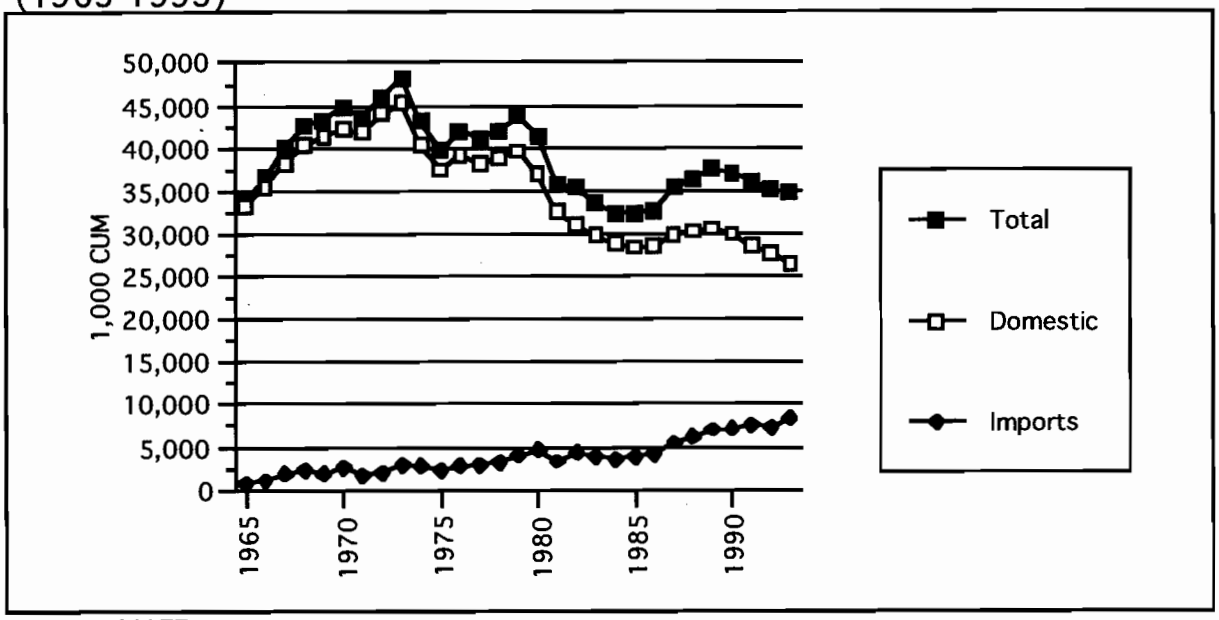
Source: Compilation from MAFF and MOF statistics.
(1) Woodchips measured in metric tons.

Softwood logs comprise the largest single import category in Japan's wood product mix (table II.1). Due to the fact that most of Japan's timber harvest consists of softwood species, Japanese domestic production still maintains a majority market share in softwood log consumption (fig. II.2). Japanese softwood harvests have remained relatively stable throughout the last decade, and fluctuations in total consumption and market share are due mostly to variations in imported volumes.

Most of both domestic softwood production and imported softwood logs are utilized in lumber production. Japanese mills currently produce roughly three quarters of the softwood lumber the country consumes. This situation, however, obscures the gains made in recent years by lumber imports (fig. II.3) which have roughly doubled in volume over the last decade. Moreover, given the higher price of lumber products relative to logs per unit volume, the increasing market share of imported lumber gains further importance. It is the potential of this growing market which has attracted the most attention from Japan's major softwood suppliers.

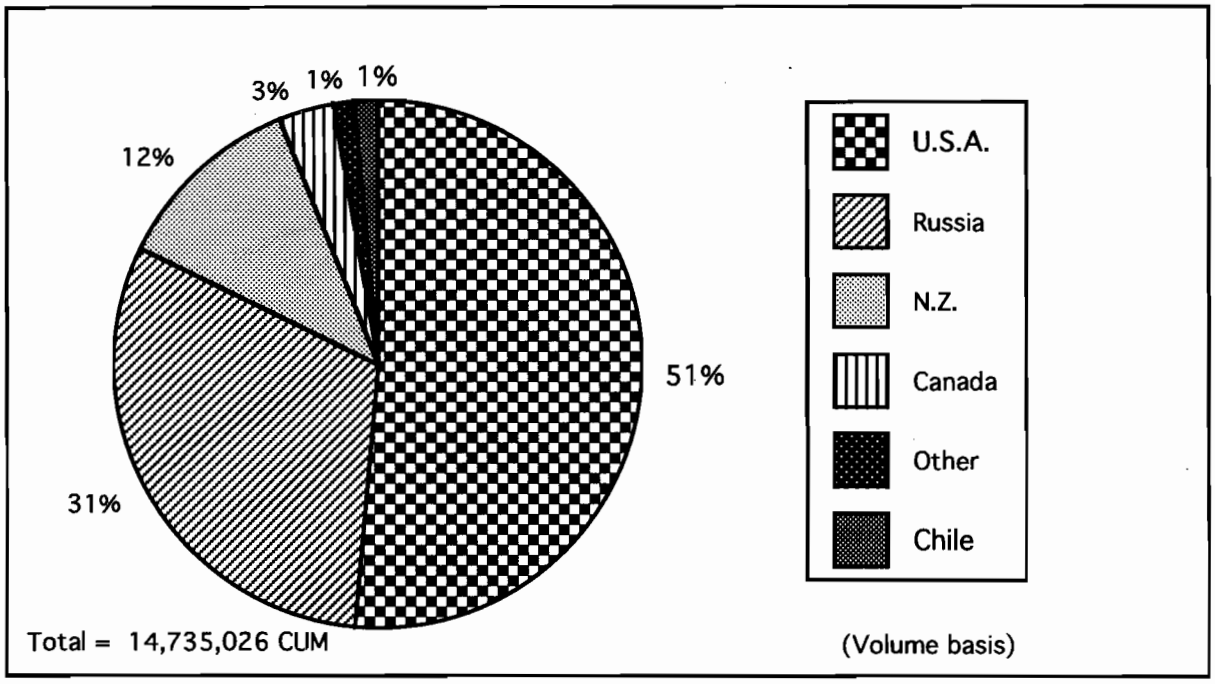
Figure II.4 shows Japanese imports of softwood logs in 1993 by supplier country. The U.S. (51%) dominates this market, followed by Russia (31%) and then New Zealand (12%). Canadian log exports, largely restricted by an export ban in British Columbia, constitute only 5 percent of the total, followed by Chile and the category "other" which is comprised mostly of S.E. Asian softwoods. Import volumes for these same countries over the last 15 years (shown in figures II.5 & II.6) display much the same distribution. Significant trends here include decreased levels of imports in the early 1980s (recession years for the Japanese wood products market) followed by a strong rebound in log imports from the U.S. Imports from Russia, on the other hand, continued to decline throughout the 1980s. The 1990s brought a reversal to this situation with steady

Figure II.3 Japanese Production and Imports of Softwood Lumber (1965-1993)



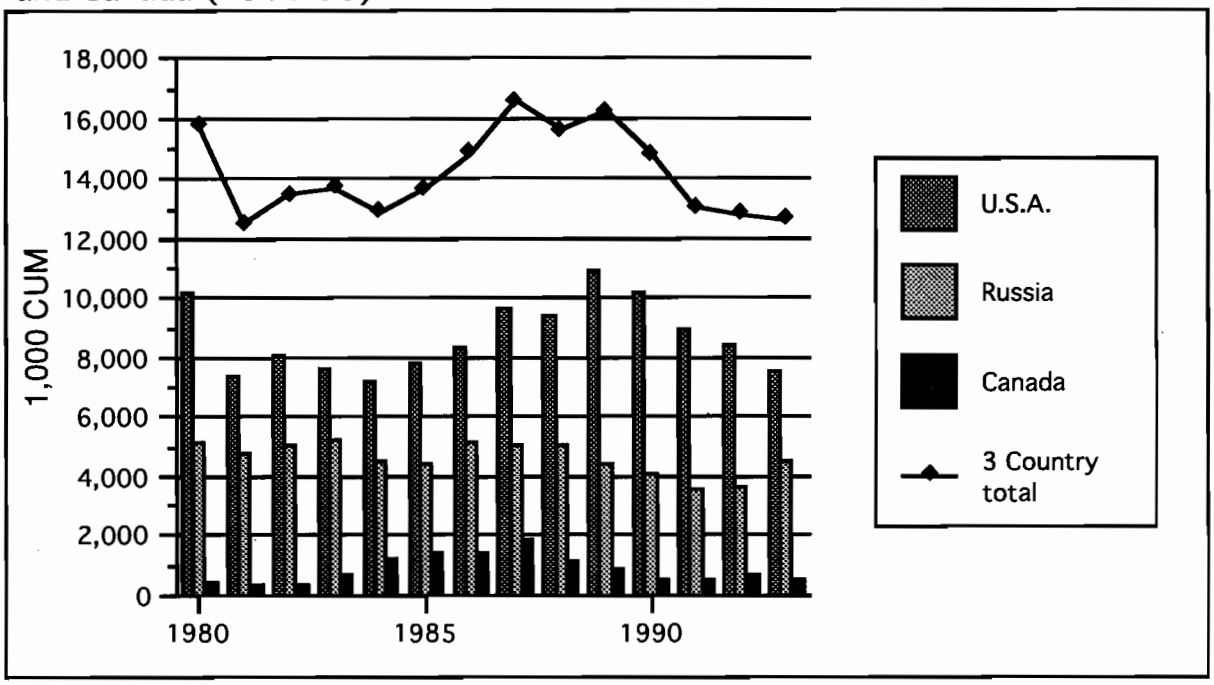
Source: MAFF
Note: Domestic production is shipments reported by Japanese mills

Figure II.4 Japanese Softwood Log Imports by Supplier Country (1993)



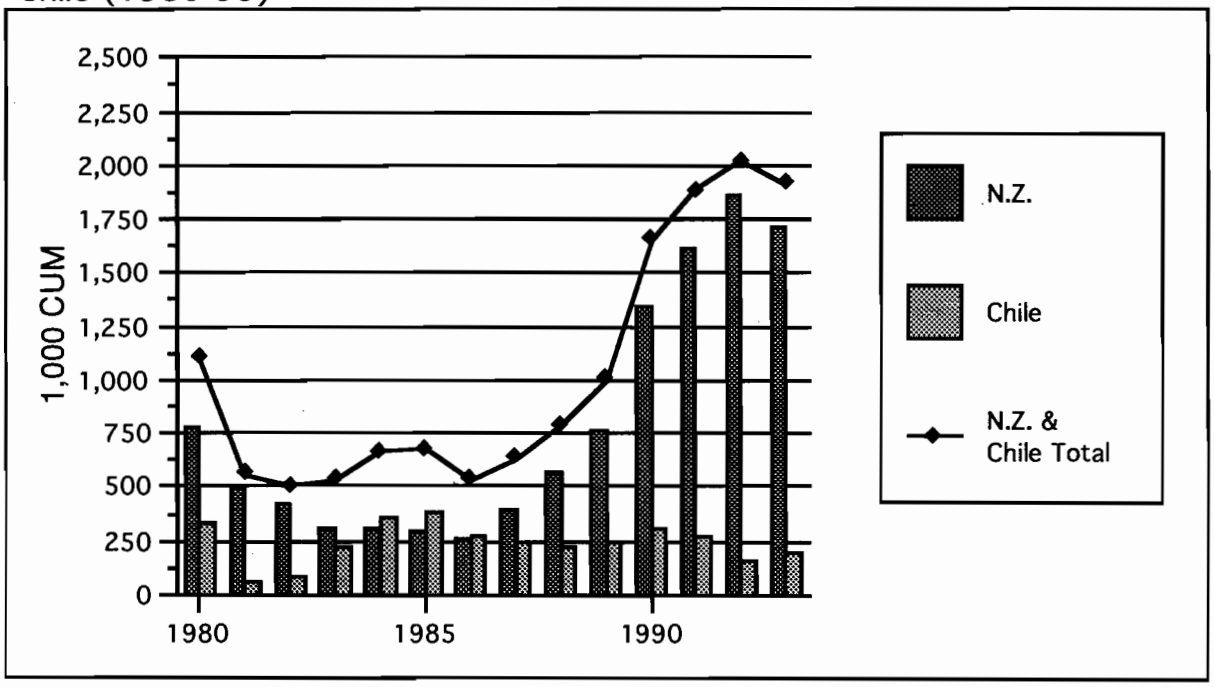
Source: Japan Wood-Products Information and Research Center (JAWIC)

Figure II.5 Japanese Softwood Log Imports from the U.S.A., Russia and Canada (1980-93)



Source: Japan Wood-Products Information and Research Center (JAWIC)

Figure II.6 Japanese Softwood Log Imports from New Zealand and Chile (1980-93)



Source: Japan Wood-Products Information and Research Center (JAWIC)

declines in imports from the U.S. and the first signs of recovery in Russian imports in 1993. Also of note is the strong increase in log imports from New Zealand in the late 1980s and early 1990s.

Softwood lumber imports to Japan are shown in figure II.7. Here, the situation is reversed with Canada accounting for close to 60 percent of the lumber import market. The U.S. is a distant second in this category, with Chile, New Zealand, Russia and others (once again comprised primarily of S.E. Asian softwoods) making up the remainder. In both the log and lumber markets, the rankings, as given above for 1993, have been relatively stable over the last fifteen years (figures II.8 & II.9). Actual market shares, on the other hand, have fluctuated more broadly, with Canada gaining in share throughout the later half of the 1980s, primarily at the expense of U.S. producers. These trends, the reasons underlying them, and possible projections for the next few decades will be further treated following a discussion of Japan's domestic supply situation.

Japanese Domestic Softwood Supply[6]

Log Production

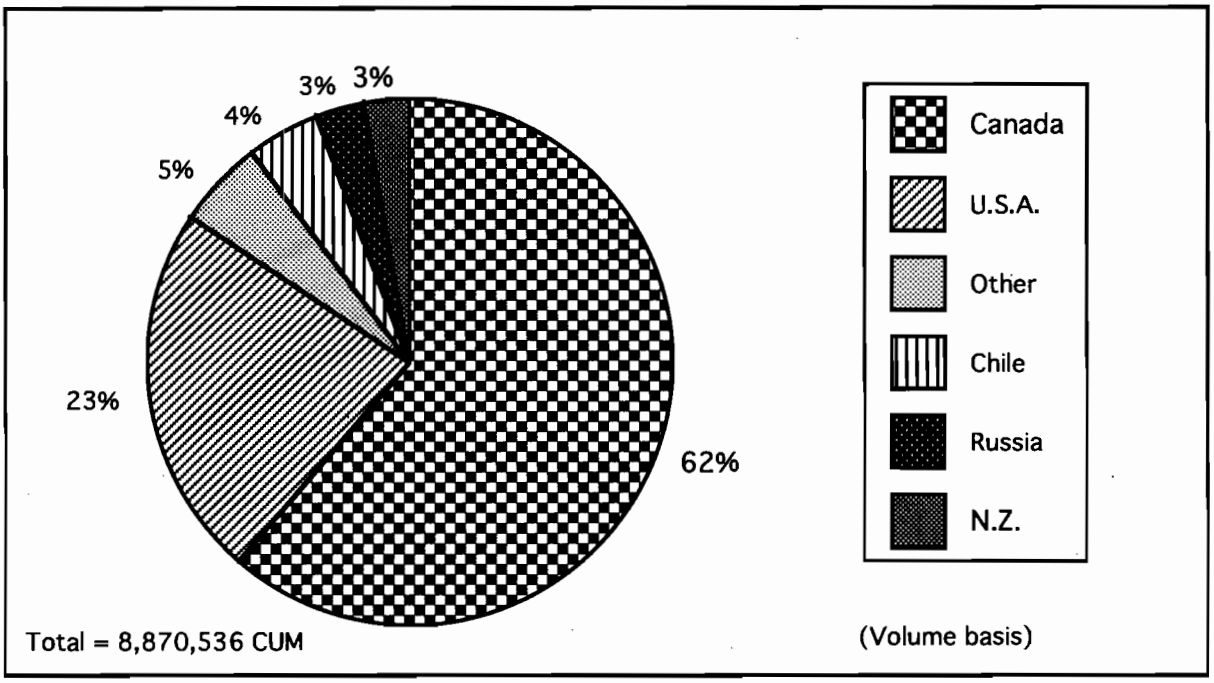
Not surprisingly, Japan itself is the single largest supplier of softwood logs to its own domestic market. In 1993, domestic production supplied approximately 15.9 million CUM of softwood sawlogs to Japan's sawmills. Another three million CUM of softwood harvest went to pulp and chip production or other uses. Thus, sawlogs (for sawmilling) account for an approximate 80 percent share of Japan's total softwood harvest. This percentage has remained relatively constant for at least the last twenty years.

Figure II.10 shows recent trends in Japanese domestic sawlog production by major species group. Following a sharp drop in 1974, domestic softwood sawlog production has fluctuated between 16 million CUM and 18 million CUM while demonstrating a gradual but readily discernible decline. Domestic hardwood sawlog production, in contrast, has fallen steadily and now stands at roughly one fifth of its 1971 level. Discussions of the importance of domestic hardwood species in Japan's domestic sawlog industry have become increasingly uncommon.

The high percentage of the softwood harvest devoted to sawnwood, and the smaller and decreasing volume of hardwood sawlog production, reflect the rising importance of Japan's forest plantations and their underlying economics. Planted mostly during the 1950s and 1960s when securing an adequate supply of building materials was a primary policy concern, these plantations are comprised almost exclusively of conifers, with species which are well suited to lumber production predominating. Traditionally, Japanese forestry has been focused on the production of sawnwood, and current forestry practices are an extension of this tradition. Moreover, high labor costs and intensive silviculture practices yield logs whose cost of production precludes profitable allocation to lower valued end-uses. As a result, the high percentage of domestic softwood log

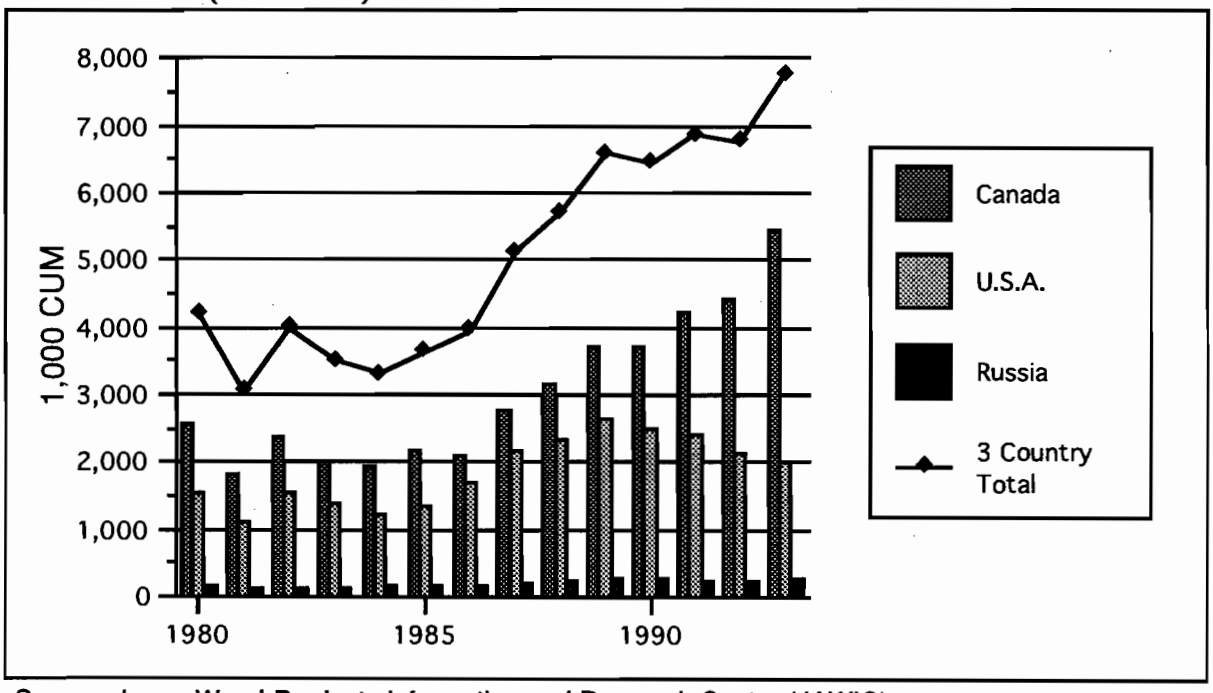
[6]Much of the following discussion regarding Japanese domestic supply potential is based on a more detailed analysis found in Robertson and Waggener, 1992. Another excellent source for information on this topic is Handa, 1988.

Figure II.7 Japanese Softwood Lumber Imports by Supplier Country (1993)



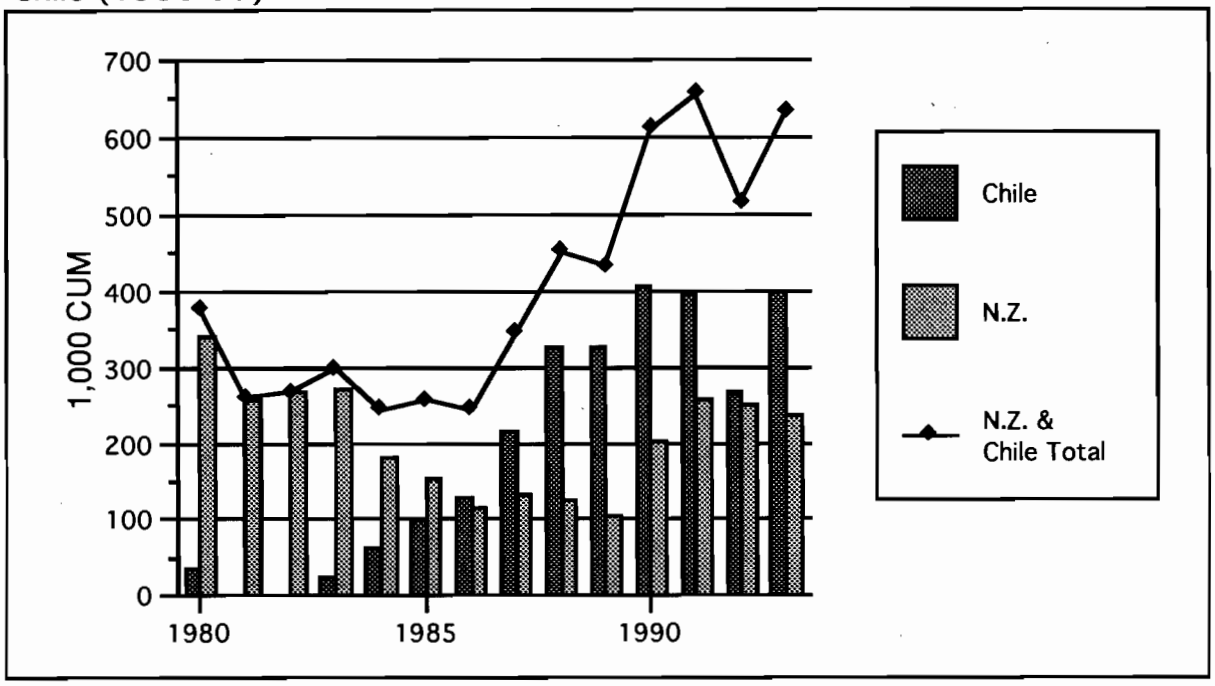
Source: Japan Wood-Products Information and Research Center (JAWIC)

Figure II.8 Japanese Softwood Lumber Imports from the U.S.A., Russia and Canada (1980-93)



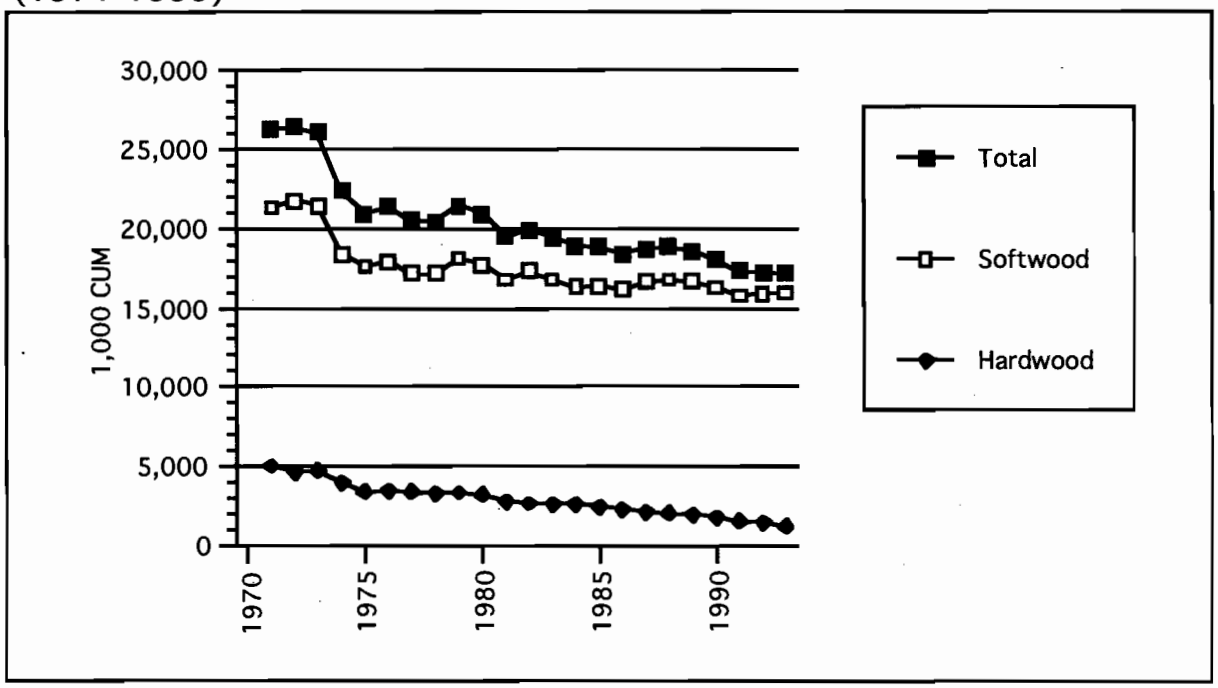
Source: Japan Wood-Products Information and Research Center (JAWIC)

Figure II.9 Japanese Softwood Lumber Imports from New Zealand and Chile (1980-93)



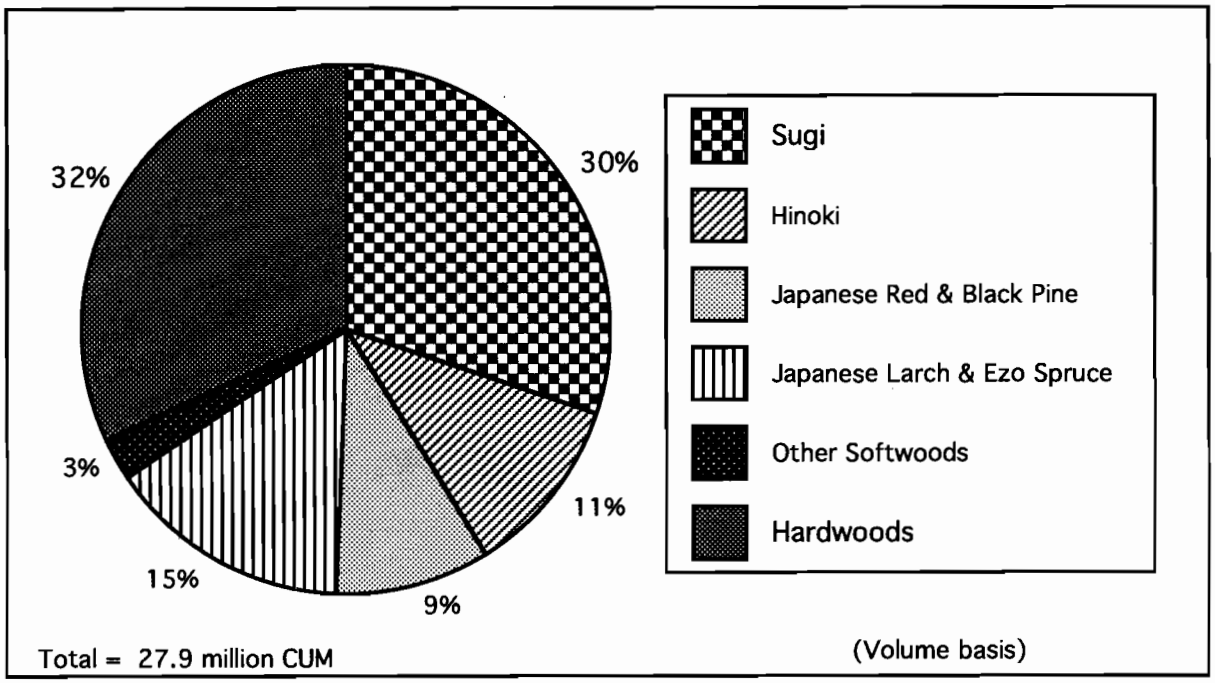
Source: Japan Wood-Products Information and Research Center (JAWIC)

Figure II.10 Japanese Sawlog Production by Major Species Group (1971-1993)



Source: MAFF

Figure II.11 Japanese Domestic Roundwood Production by Species (1991)



Source: MAFF

removals which are devoted to sawnwood can be expected to continue. Any expansion in domestic harvest from Japan's maturing conifer plantations will be felt most in the sawlog and lumber markets.

Table II.2 shows the area of new forest plantings from 1950 to 1985 by species. This can be taken as a rough approximation of the composition of Japan's plantation resource. Sugi (Japanese cedar, *Cryptomeria Japonica*) is by far Japan's most common plantation species. It is followed by Hinoki (Japanese cypress, *Chamaecyparis obtusa*). Japanese red and black pine (*Pinus densiflora, Pinus thunbergii*), Japanese larch (*Larix sp.*), and "other softwoods," (mostly Ezo spruce —*Picea jezoensis*) share approximately the same plantation area.[7]

The species composition of Japan's timber production (shown in figure II.11) roughly matches the distribution of plantations as described in table II.2, except in that the harvest of natural hardwood stands has somewhat reduced the importance of Sugi and Hinoki relative to their plantation areas. For the most part, hardwood extractions (used primarily in the production of wood chips) are obtained from the conversion of native hardwood stands to conifer plantations. This process of conversion has slowed in recent years, and with it the amount of hardwood production has been declining. Larch and Spruce are harvested from natural stands growing in the

[7]These numbers somewhat obscure recent trends in plantings: due to a severe infestation by the pine nematode, plantings of pine have virtually halted. Plantings of Hinoki, on the other hand, have been roughly equal to those of Sugi since the 1970s.

Table II.2 Area of New Plantings in Japan by Species (1950-1985)

(1,000 ha.)	Area	Percent
Sugi	4,349	40%
Hinoki	2,476	23%
Pine	1,480	14%
Larch	1,080	10%
Other Conifers	1,125	10%
Hardwoods	271	3%
Total	10,781	100%

Source: Handa, 1988

Northern provinces. These species are also cultivated and managed to a limited degree on low productivity sites. They are considered to be of relatively low quality.

In contrast, the primary plantation conifers, especially Sugi and Hinoki, are of high quality and figure most prominently in discussions of Japan's current supply and future potential. This is particularly true in the case of Sugi, which comprises the bulk of Japan's plantation stock and is well suited for use in the posts and beams which constitute the major components of traditional housing. Sugi is also the major competitor with U.S. Pacific Northwest species, selling for prices similar to those of Western hemlock.[8] Hinoki, on the other hand, is more of a specialty product, often commanding prices two to three times higher than Sugi or U.S. Pacific Northwest conifers. Though sometimes used for the main structural components of the most expensive houses, the primary end-use for Hinoki is in decorative pieces and prominently displayed posts or beams. As such, it is a competitor for only the most expensive grades of Pacific Northwest old-growth.

Much attention has been given to the increasing volume of maturing timber in Japan's softwood plantations. In the decades immediately following World War II, the Japanese undertook a major reforestation program aimed at rehabilitating the country's forests which had been devastated prior to and during the war. This was followed by the further conversion, mentioned above, of native hardwood stands to conifer plantations. At present the Japanese possess a large and rapidly maturing plantation resource. The potential supply from these plantations, were they to be managed to maximize biological yield, has been calculated at over 65 million CUM per year.[9] Assuming that an average of two thirds share of Sugi and Hinoki across all age classes,[10] it can be estimated that the potential yearly average harvest of these species could be 39 million CUM of high quality (albeit relatively smaller diameter) Japanese softwood sawlogs, competing in essentially the same market as Pacific Northwest sawlogs and sawnwood. Harvest volumes of this magnitude would virtually eliminate the Japanese need for conifer imports for construction purposes, as well as a substantial proportion of the demand for softwood imports for other uses.

[8]A more detailed analysis of relative prices is given in section IV.

[9]Takahara, 1989.

[10]Aggregate figures for Sugi and Hinoki have actually varied from 57 percent of new plantings in 1961 to 74 percent in 1982.

The Japanese have long been looking forward to the coming of age of their softwood plantations. Until the mid 1980s, predictions of a dramatic increase in total harvests and a rising ratio of domestic production to imports were common. In recent years, however, it has become increasingly apparent that the high cost of Japanese forestry relative to foreign producers, coupled with a growing concern for conservation on the part of the Japanese public, will severely limit, if not completely forestall, any significant increase in domestic production in spite of the growing physical potential. The primary factor underlying high domestic forestry costs is found in a combination of high labor intensity in Japanese silviculture, a sharp increase of wages relative to stumpage prices and an aging and rapidly shrinking work force.

It has been estimated that it may take up to six times the amount of labor input to grow a hectare of Sugi to harvestable age than that needed for Douglas fir or Western hemlock grown in the Pacific Northwest under current management practices.[11] High labor intensities are also apparent in lumber manufacturing and transportation. Compounding the problem is the fact that labor costs have risen steadily, showing close to a fourteen-fold increase since 1961 (as compared to a two to three-fold increase in the price for domestic stumpage). As a result, a recent calculation of the internal rate of return for Sugi plantations in 1991 estimated a rate of 1.3 percent (down from 1.9 percent in 1986).[12] This figure is well below the prevailing discount rate. Perhaps the most striking indication of Japanese forestry's labor problems, however, is the fact that approximately 69 percent of all forestry workers are over the age of fifty, and, at 44 years, the average age of workers in the wood products industry as a whole is the highest of any category reported.[13]

Given these problems, optimistic assessments of Japan's future potential for domestic softwood harvest and lumber production have become less and less common. Undoubtedly, certain producing regions will expand (at the margin) as a result of recent price increases. The continuing long-term increases of real prices in wood products which have been predicted can be expected (if realized) to further stimulate domestic harvests in regions where favorable conditions hold. Nonetheless, the industry as a whole will have to contend with serious structural problems which will largely negate the impacts of higher prices in stimulating increased harvests of available domestic softwood timber, on both an absolute and a relative basis.

Lumber Production

The Japanese softwood sawmilling industry is characterized by numerous small scale establishments relying on either domestic or imported sawlogs, or, most commonly, a combination of both. Typically, these mills supply a large array of products (often cut to order) primarily for the traditional housing market. As of 1990, there were 16,793 sawmills operating in Japan. This number has been falling steadily since a peak of 25,130 mills in 1968, and represents a 21 percent decline since 1981 (table II.3). Further, as a partial result of rising prices for raw materials

[11]Ministry of Agriculture, Forestry and Fisheries (MAFF), 1988.
[12]Japan Forest Agency, 1993. Kitabatake, 1992.
[13]Japan Ministry of Labor.

Table II.3 Sawmills in Japan by Sawlog Source (1981-1990)

(No. of Mills, 1,000 CUM)

Year	Total		Domestic Sawlogs only		Import & Domestic		Imported Sawlogs only	
	Mills	Consumption	Mills	Consumption	Mills	Consumption	Mills	Consumption
1981	21,511	45,945	7,736	11,723	10,615	18,165	3,160	16,057
1982	20,929	44,070	7,825	12,185	10,116	17,373	2,988	14,512
1983	20,249	42,526	7,731	12,057	9,648	16,369	2,870	14,100
1984	19,504	41,218	7,552	12,065	9,202	15,609	2,750	13,544
1985	18,825	40,792	7,605	12,341	8,661	14,851	2,559	13,600
1986	18,220	41,238	7,201	11,719	8,474	15,005	2,545	14,514
1987	17,854	43,354	6,964	11,849	8,309	15,597	2,581	15,908
1988	17,576	43,891	6,794	11,805	8,163	15,817	2,619	16,269
1989	17,233	44,490	6,594	11,781	7,989	15,573	2,650	17,136
1990	16,793	43,526	6,455	11,415	7,744	15,271	2,594	16,840

Source: Japan Forest Agency

(particularly North American sawlogs) increased mill closures have been reported in the last few years. In 1992 mill numbers stood at 15,825, a further decline of 6 percent from 1990 levels. In comparison to North American sawmills, Japanese mills are generally of smaller size and, on average, possess less advanced processing technology. One study, for example, placed the average yearly production capacity of Japanese mills at just 1,800 CUM per mill. Estimates for the U.S. Pacific Northwest and British Columbia, on the other hand, were 49 thousand CUM and 90 thousand CUM respectively.[14]

Another important characteristic of the Japanese sawmilling industry is the two-tiered structure which has evolved as a result of large-scale softwood log imports during the post-war period. As shown in table II.3, 6.5 thousand Japanese mills (38 percent of the total number of mills) utilized domestically produced sawlogs exclusively in 1990. Another 2.6 thousand mills (15 percent of total) specialized in processing imported sawlogs, and 7.7 thousand mills (46 percent of total) processed both domestic and imported sawlogs. When viewed in terms of sawlog inputs, however, the relative shares listed above are reversed. Mills processing foreign timber exclusively account for 39 percent of the 44 million CUM consumed by Japanese mills in 1990, mills sawing both domestic and imported timber account for 35 percent of total consumption, and mills utilizing domestic timber account for only 26 percent of the total. When viewed in terms of average consumption per mill, mills processing imported timber exclusively (6.6 thousand CUM per mill per year) are nearly four times larger than mills processing domestic timber (1.8 thousand CUM per mill per year) and three times as large as mills processing both domestic and imported logs (2 thousand CUM per mill per year).

As indicated above, mills processing mostly imported softwoods generally possess higher capacity and more advanced technology than the national average. Also, they are usually more centrally located around Japan's major port facilities and its major urban consumption centers. Mills processing domestic species exclusively, on the other hand, are usually located in mountainous

[14]Sakai, 1992.

Table II.4 Manufacturing, Transport and Selling Costs(1) of PNW and Japanese Domestic Lumber Mills to Produce 1 CUM of Specified Product (March 1990)

Product	Western Hemlock 4 1/8" Square Imported from Washington, USA	Western Hemlock 10.5 cm Square Cut in Shizuoka Pref. Japan	Sugi 10.5 cm Square Cut in Shizuoka Pref. Japan
	¥/CUM of Lumber		
Wood(2)	24,800	36,200	40,000
Labor(3)	3,600	5,400	7,500
Energy	1,400	2,500	2,000
Depreciation	2,100	1,200	1,000
Transportation(4)	10,300	1,800	1,500
Administration	3,200	3,300	3,800
Chip Return	-2,400	-2,000	-1,000
Total	43,000	48,400	54,800
Conversion Rate(5)	60%	75%	70%

Notes: 1) Sold in Japan
2) Includes cross cutting and debarking costs.
3) Direct cost of labor.
4) Includes ocean freight and other import costs.
5) Differing conversion rates between the two countries may be overestimated due to different log scaling procedures.

Source: Estimates provided by the Japan Forest Agency, Forest Products Research Institute. Ibaraki, Japan.

areas close to Japan's major forest producing regions. These mills are often quite small. Moreover, their equipment is often much older, and their business style is more traditional, involving close contacts with small scale home builders and a high proportion of cut-to-order products.

In spite of the falling number of establishments and their relatively small size, the Japanese sawmill industry continues to suffer from chronic excess capacity. Two reasons underlie this situation. The first is the steadily increasing volume and market share of direct lumber imports noted in the previous section. Confronted with a growing labor shortage, rising domestic wages, a gradual relaxing of trade restrictions, and a drastic appreciation of the Yen since 1986, Japanese mills have found it increasingly difficult to compete with overseas lumber producers. In spite of higher shipping costs and a lower log to lumber conversion rate, the costs of imported lumber in the Japanese market sourced from the U.S. are considerably lower than those of Japanese mills cutting both domestic species or logs imported from North America (table II.4). As a result, Japanese mills are supplying a decreasing share of total sawnwood demand.

Another factor contributing to excess lumber production capacity is the growing scarcity of imported softwood sawlogs from the U.S. Pacific Northwest, the traditional mainstay of the Japanese sawmilling industry. Given the sharp increase in the price of North American logs arising from supply constraints, Japanese mills have found it extremely difficult to obtain sufficient volumes of raw material at a price which allows for profitable operations. Although 1993 imports

of North American softwood logs have remained relatively strong, many Japanese mill operators reported losses, and mill closures are expected to increase further.[15]

Many Japanese lumber mills are currently developing strategies to deal with the problems arising from high production costs and increasingly short supply of sawlogs. The first is to diversify raw material sources. This is especially so for mills cutting U.S. Western hemlock. These mills are often involved in cutting specialty pieces and have long suffered from market encroachment from newer, more cost efficient mills cutting Douglas fir on a commodity basis.[16] With Douglas fir also experiencing short supply, both types of mills are seeking to develop new log supply sources, Russian spruce and fir being chief among them. However, quality concerns associated with Russian species have reportedly been an emerging problem.[17]

Another strategy often cited is to increase remanufacturing of North American softwoods, a practice already firmly established in processing exports from Canada. This is similar to other attempts to increase value added processing, such as the production of custom and specialty products, and thereby further differentiate Japanese mills from major foreign suppliers which often produce more general market commodities. Finally, a third and apparently paradoxical strategy involves sawmills handling an increasing volume of lumber imports and the distribution of this lumber in an attempt to maintain product throughput and sales in spite of their own unprofitable sawmilling operations and a lack of raw materials. This practice was reported throughout 1993 in response to high log prices in relation to lumber prices. However, this is seen by most mills as only a stop-gap measure.[18]

Any present competitive advantage enjoyed by Japanese mills lies in their market proximity, close connections with distributors, and their knowledge of the specific multiple products demanded by the Japanese lumber market. This last aspect of marketing advantage is especially strong in Japan, where a wide array of specific sizes and species are used and where long-term relationships with customers and distributors are often a key element to success. However, the general trend in the Japanese housing industry is towards increasing efficiency and economies of scale. It is in this area that Japanese mills are least able to compete, and hence it is no surprise that a growing number of Japan's large-scale integrated home manufacturers are directly importing lumber purchased overseas. Many mills will undoubtedly weather the current crisis, but many others will be increasingly hard pressed by high operating costs and a shortage of raw materials.

As a result, there is good reason to expect an acceleration of the recent trend of primary mill closures. In the future, Japan's sawmill industry will be characterized by lower capacity, higher efficiency, and innovations in product lines or business strategies designed to cope with the industry's chronic problems. This, in turn, will yield increased opportunities for foreign producers supplying either finished goods or intermediate products for remanufacture in Japan. A

---

[15]Japan Lumber Reports, 8/20/93.
[16]Japan Lumber Reports, "Forest Products Manual Series (2): Lumber Business in Japan, 1990.
[17]Japan Lumber Journal, 12/20/93.
[18]Japan Lumber reports, 9/10/93.

majority of these opportunities will occur in the lumber market for traditional housing, the primary outlet for domestic mill production using both domestic and imported sawlogs. The ability of Japan's foreign suppliers to provide acceptable products and raw materials for this market, however, will vary depending on the characteristics of resource stocks and the production capabilities and flexibility of each supplier country.

The United States

Softwood Logs

In 1993, Japanese customs reported imports of 7.5 million CUM[19] of softwood logs from the United States at a value of roughly $2.2 billion.[20] This accounted for approximately 70 percent of total U.S. softwood log exports by volume and over 80 percent of the total on a value basis. The overwhelming majority of this quantity was supplied by the Pacific Coast states, with Oregon and Washington dominating. Both of these states are currently facing severe supply restrictions due to demands for increased conservation of remaining old-growth stands and a general decline in the volume of harvestable high quality sawlogs. As a result of these restrictions and the high prices they have precipitated, Japanese log imports from the U.S. have been in decline. The 1993 log import volume cited above was 10 percent lower than 1992, 30 percent lower than the most recent peak in log imports (occurring in 1989), and 12 percent less than the 1982-1992 average of 8.7 million CUM (fig. II.12). It must be noted, however, that in spite of the volume decline the total value of imports has been increasing. The gross value of 1993 softwood log imports from the U.S., for example, was close to 20 percent higher than that for the previous year.

Figure II.13 displays 1993 Japanese log imports from the U.S. by species. Douglas fir logs accounted for well over half of the total. These logs are sawn for a variety of high-valued products in Japan. Primary among these is the production of the major support beams used in traditional housing, a use reflecting Douglas fir's superior structural characteristics.[21] Main competitors in this product category are Japanese red pine (*Akamatsu, Pinus densiflora*) and black pine (*Kuromatsu, Pinus thunbergii*), both of which have been severely impacted by a chronic infestation of pine nematode. Radiata pine is also used for beams, but only very rarely due to the lack of pieces of sufficient size and quality. The dark color of Douglas fir (relative to traditionally favored species such as Sugi) and its high pitch content has limited its use in the exposed posts which are the other major elements in traditional housing.[22]

---

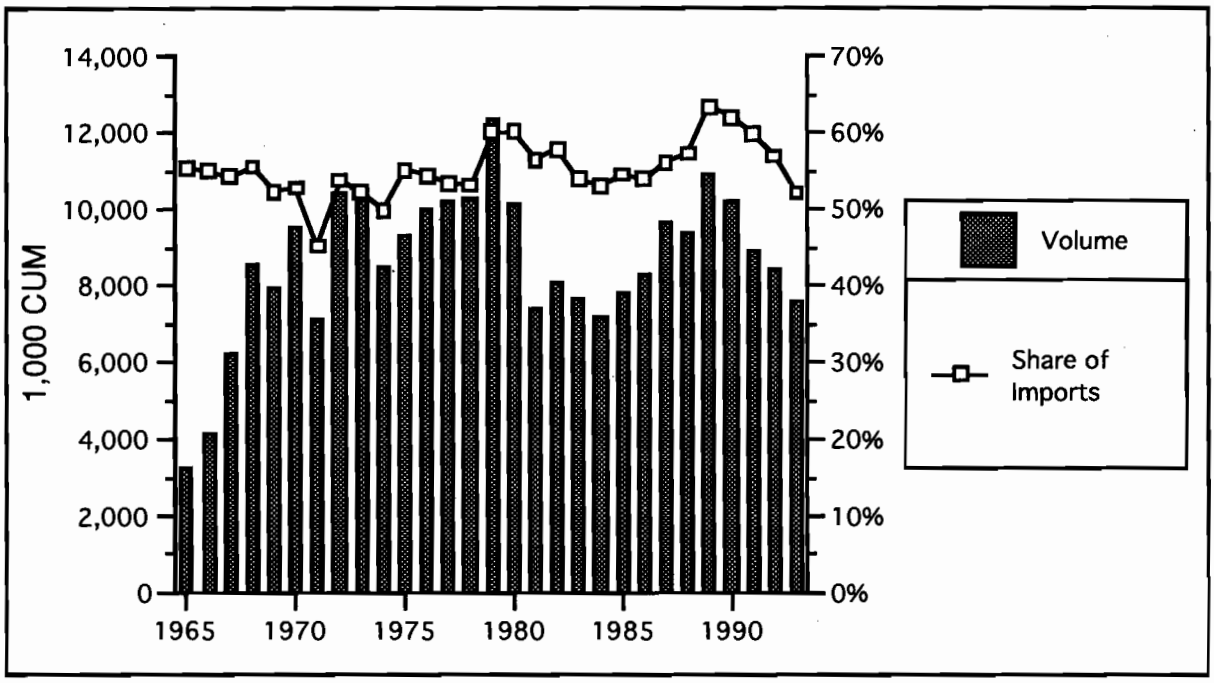
[19]The U.S.D.A. Foreign Agricultural Service reports significantly different figures for both lumber and logs. For consistency we have relied upon Japanese data wherever possible throughout this study, but we have not been able to assess the relative accuracy of these conflicting data sources.

[20]All values are reported in current U.S. dollars unless otherwise noted.

[21]A more detailed discussion of lumber types used in Japanese traditional housing construction is included in the following section on Japanese sawnwood demand.

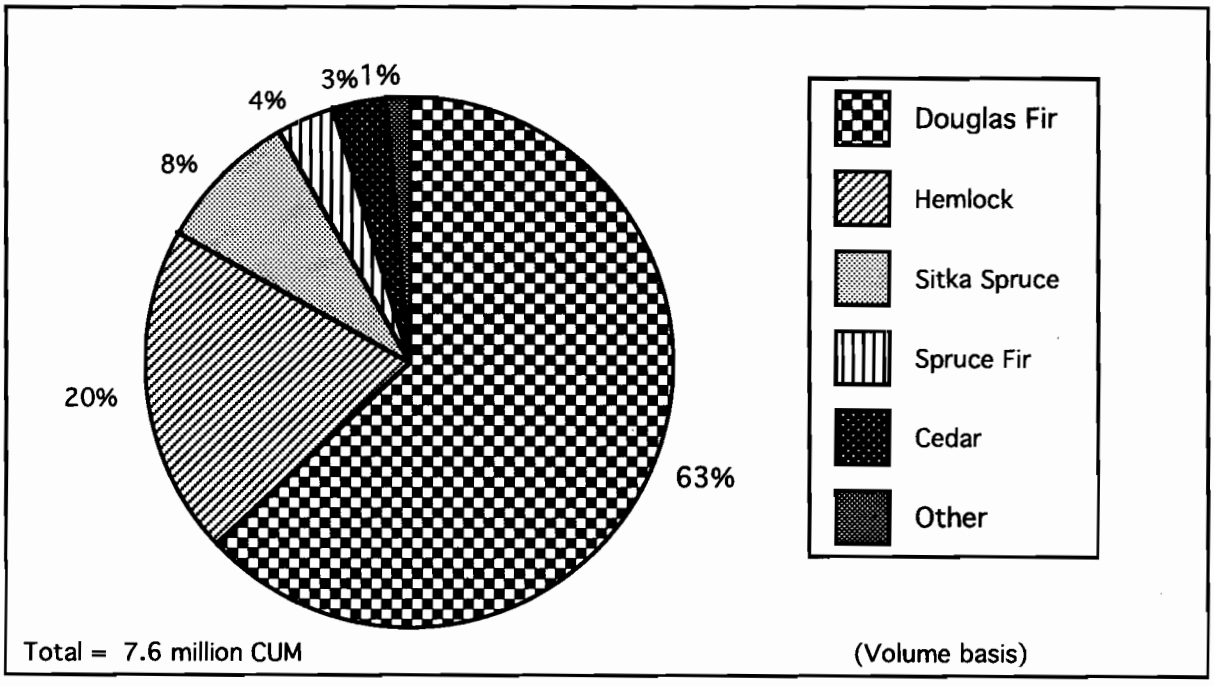
[22]The foregoing utilization information is from Japan Lumber Reports, 1989. This source is used for utilization information throughout this section.

Figure II.12 Japanese Softwood Log Imports from the U.S. (1965-1993)



Source: Japan Lumber Journal

Figure II.13 Japanese Softwood Log Imports from the U.S. by Species (1993)



Source: Japan Lumber Journal

Western Hemlock, the second leading log import species by volume, is used primarily for the vertical posts which are another major structural component of traditional housing. Many of these posts are exposed to the house's interior, and aesthetic qualities are considered to be extremely important. As a result, clear wood produced from old-growth Hemlock has been favored in this category. Hemlock is further preferred due to its light color which resembles that of Sugi, the other major species for this end-use. Specifications for the posts and other pieces for which hemlock is commonly used vary from region to region, and are most often produced on a cut-to-order basis by regional sawmills (this is often cited by the Japanese as a major reason for the inability of foreign mills to cut finished lumber for this market). Consequently, Japanese mills specializing in cutting hemlock lumber are thought to be, on average, more labor intensive than their Douglas fir counterparts, and increasing substitution of Douglas fir for hemlock has been reported in recent years.[23] Lower grade Hemlock logs are used for rafters and other smaller pieces, for which a wide variety of competing species may be used.

Though accounting for only 8 percent of the total, Sitka Spruce comprises the third largest volume of Japanese log imports from the United States. Sitka spruce logs of sufficient quality are used for interior decorative pieces such as joinery, door frames and window frames. Only fine grained, clear wood is accepted for these end-uses. Otherwise, Sitka spruce is used for low grade lumber such as packaging materials. Other U.S. species imported include Spruce, Fir, Pine, and Port Orford and Red cedars, with the latter two species commanding extremely high prices in the Japanese market.

Softwood Lumber

In 1993, Japan imported 2 million CUM of softwood lumber from the U.S. at a value of $785 million. This accounted for slightly less than half of total U.S. softwood lumber exports for that year on both a volume and a value basis. As with softwood logs, import volumes for softwood lumber have declined in recent years, falling 22 percent since 1989 (fig. II.14). In spite of this decline, 1993 lumber Imports from the U.S. were still higher than their average of 1.7 million CUM for the 1977-1992 period. U.S. market share of lumber imports, however, has fallen from a peak of 48 percent in 1979 to a little over 24 percent in 1993, reflecting increasing market penetration by other foreign lumber producers, most notably Canada.

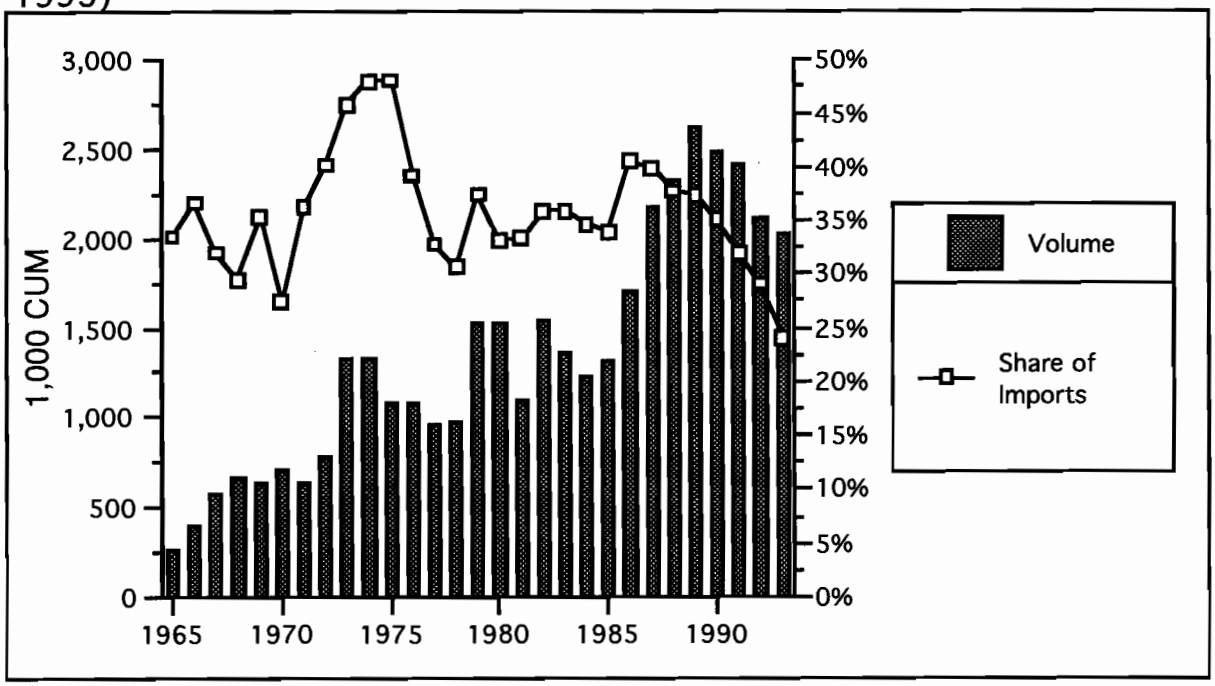
U.S. softwood lumber exports to Japan display much the same breakdown by species as logs (fig. II.15), except for the large category termed "non-SPF, planed." Though the statistics cited here do not further differentiate this category, it is likely that it represents dimension lumber[24], produced from Douglas fir and Hemlock, which is used predominantly for 2x4 platform construction and similar construction methods. Other lumber categories include cants and squares for remanufacture in Japan, and finished products in both metric and English sizes (most notably squares and baby squares produced from Western hemlock).

---

[23]Japan Lumber Reports, 1990.

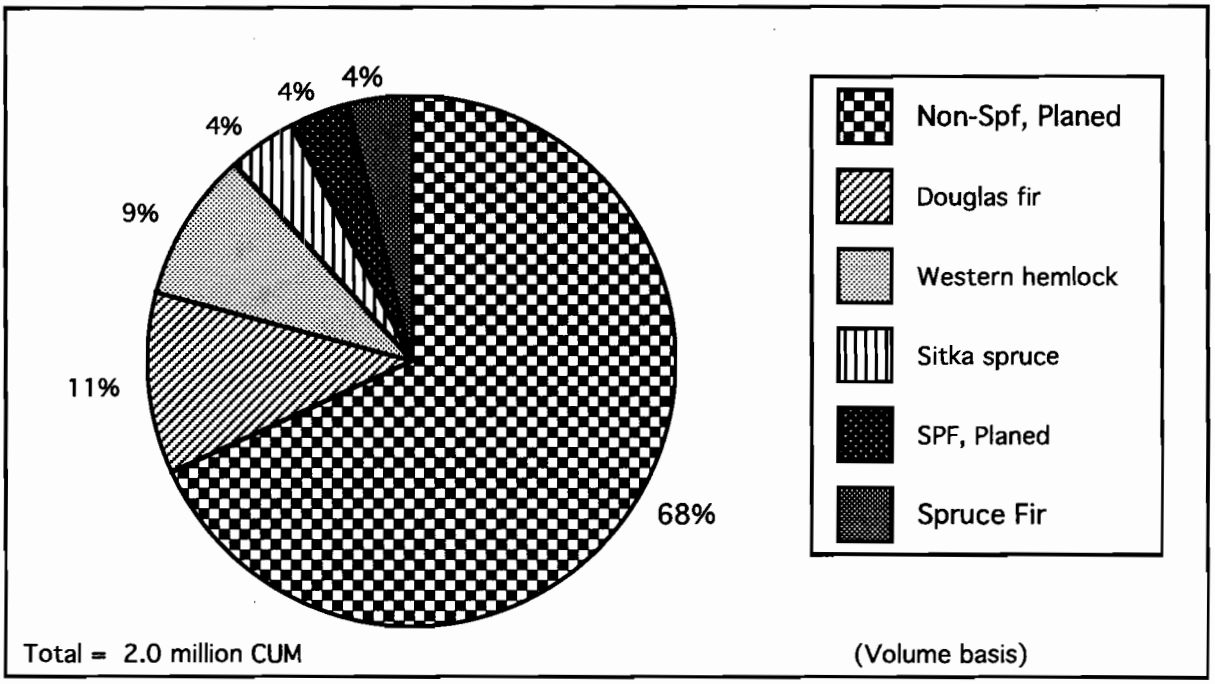
[24]Dimension lumber is defined here as standard lengths of 2x4 and similar pieces commonly used in housing construction in the United States.

Figure II.14 Japanese Softwood Lumber Imports from the U.S. (1965-1993)



Source: Japan Lumber Journal

Figure II.15 Japanese Softwood Lumber Imports from the U.S. by Species (1993)



Source: Japan Lumber Journal

As mentioned earlier, U.S. lumber exports to Japan have made substantial gains in the recent decade, following the relatively sharp declines during the down market years of the first half of the 1980s. Much of this increase has been fueled by gains in dimension lumber. The impact of other lumber products, especially metric cuts for remanufacturing and finished products is less discernible. Certain mills have experienced notable success in penetrating these markets in Japan. Others, however, have found the risks and costs associated with producing and exporting products targeted specifically at the Japanese traditional housing market to be prohibitive, especially in light of perceived trade barriers (tariff and otherwise) and competition from Japanese domestic mills processing both domestic species and conifer logs imported from the Pacific Northwest, British Columbia and the Russian Far East.[25]

Canada

Softwood Logs

In 1993 Japan imported 486 thousand CUM of softwood logs from Canada at a value of $144 million (U.S.). This relatively small volume is the result of long-standing restrictions placed by the British Columbia provincial government upon unprocessed log exports. Only those logs deemed to be in excess of domestic mill demand may be exported,[26] and as a result, the amount of Japanese log imports from Canada has fluctuated broadly but seldom has exceeded a million CUM except for a brief period in the mid 1980s (fig. II.16). Figure II.17 shows 1993 Japanese log imports from Canada by species. At 44 percent, Western hemlock was the largest species category, followed by Spruce and fir, and Sitka spruce. In contrast to the U.S., Douglas fir constitutes only a small proportion of log exports. Given expected harvest restrictions, particularly in British Columbia's coastal region where the great majority of the country's Hemlock and Douglas fir are harvested, it is doubtful that log imports will approach even the levels experienced in the mid 1980s. Little attention is given to Canada's role as a log supplier to Japan's sawmills.

Softwood Lumber

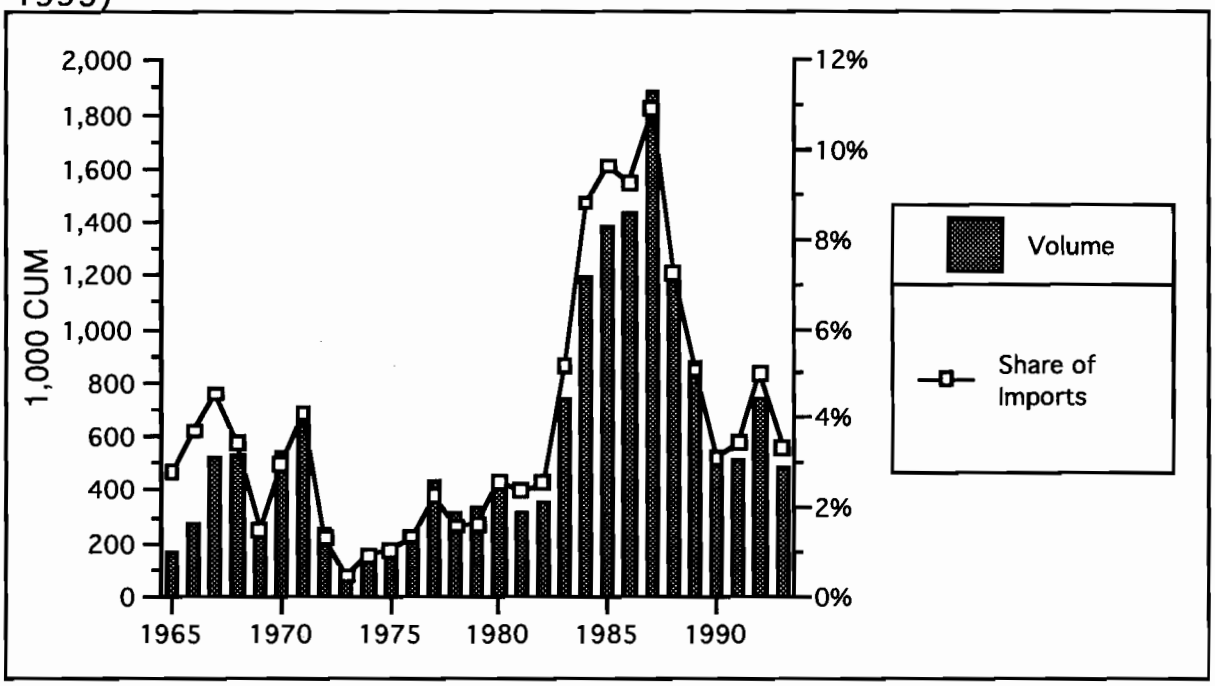
As a result of the aforementioned log export restriction, Canada has concentrated on producing lumber for the Japanese market and has maintained over 50 percent of market share of Japanese imports of softwood lumber for most of the last fifteen years (fig. II.18). In line with gains by other foreign suppliers of softwood lumber to Japan, Canadian exports of softwood lumber to Japan have experienced steady and rapid increases since 1984, more than doubling during this period. In 1993, Japanese Customs reported 5.5 million CUM of softwood lumber imports from Canada with a value of $1.9 billion (U.S.). This figure represents, on a volume basis, a 24

---

[25]At present, U.S. customs classifications do not identify many specific categories for lumber exports to Japan. In upcoming publications, CINTRAFOR hopes to further explore the specific product categories included in the overall "Softwood Lumber" classification under the U.S. Customs Harmonized classification system for exports, especially as they relate to metric cuts produced for use in non-2x4 Japanese construction methods.

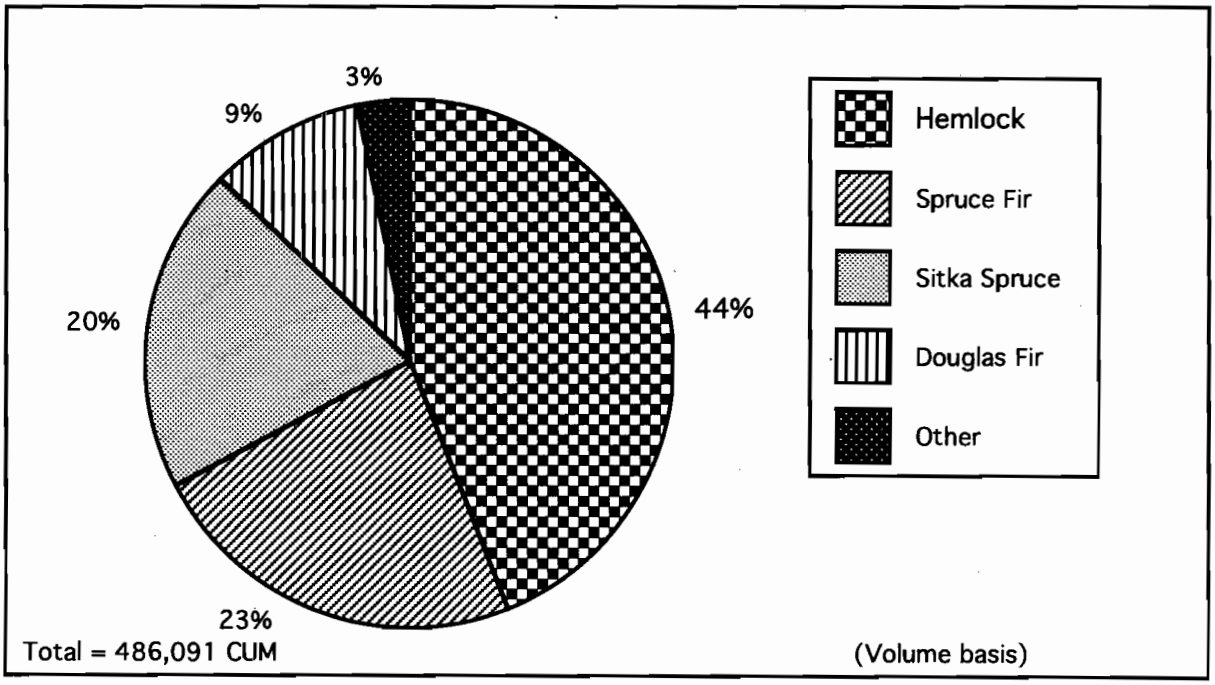
[26]For a detailed description of Canadian log export policy see: Shin, 1993

Figure II.16 Japanese Softwood Log Imports from Canada (1965-1993)



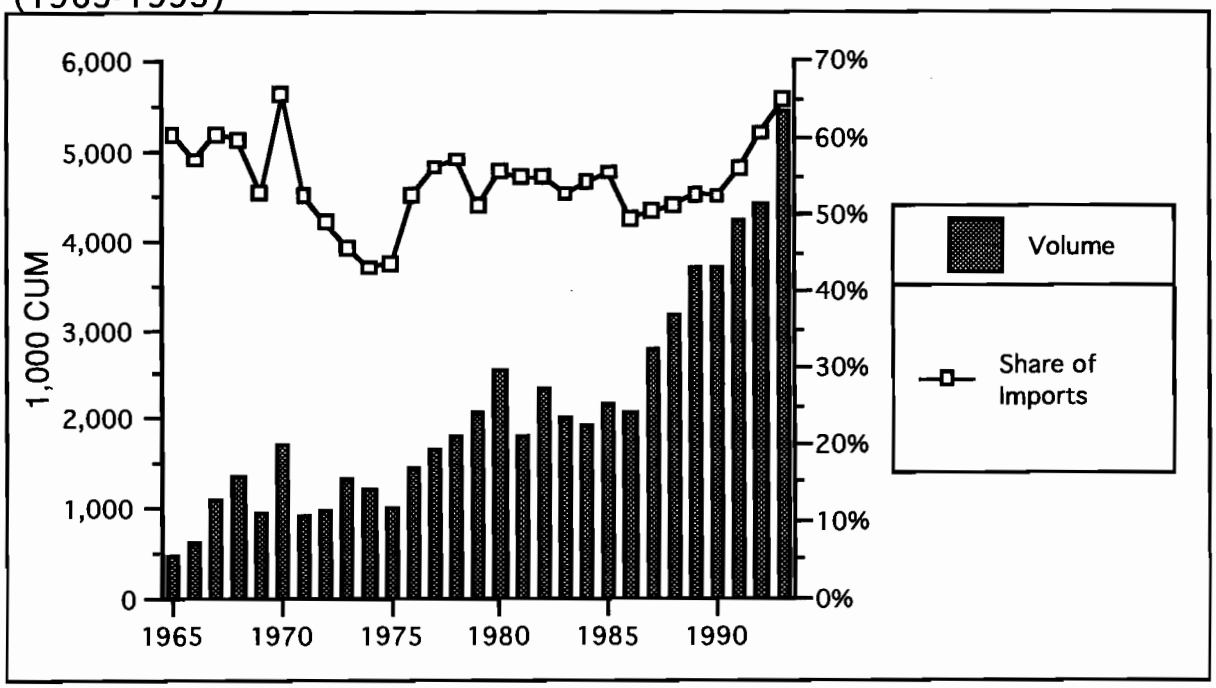
Source: Japan Lumber Journal

Figure II.17 Japanese Softwood Log Imports from Canada by Species (1993)



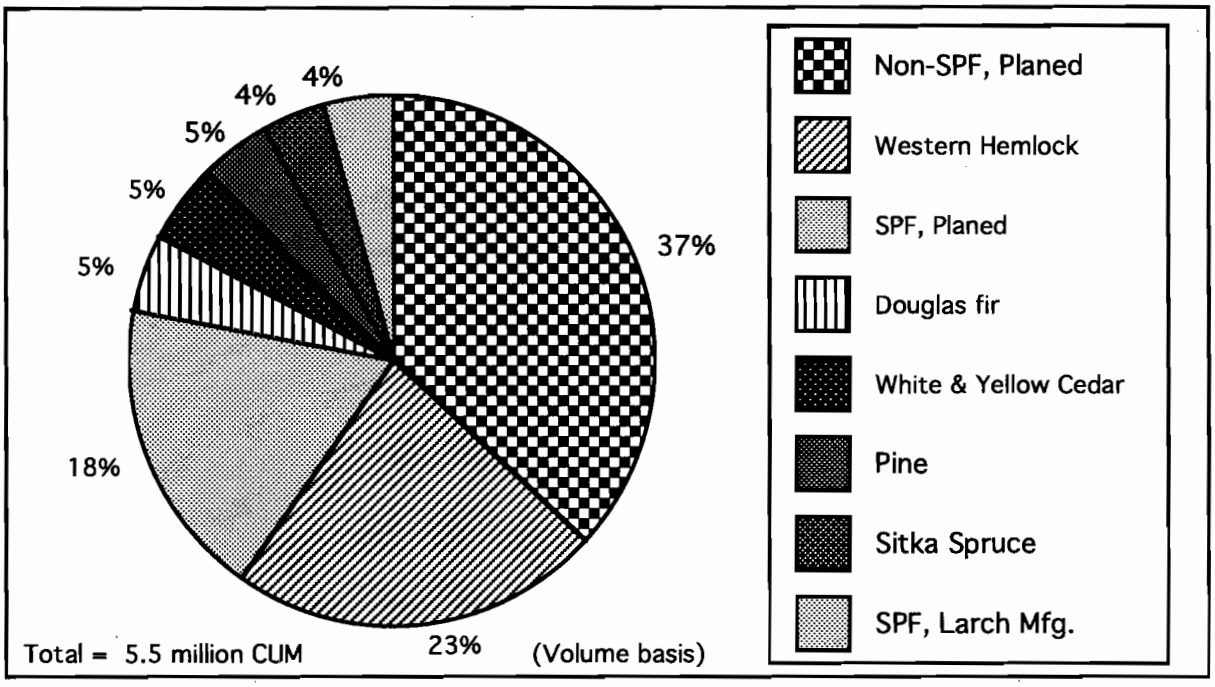
Source: Japan Lumber Journal

Figure II.18 Japanese Imports of Softwood Lumber from Canada (1965-1993)



Source: Japan Lumber Journal

Figure II.19 Japanese Softwood Lumber Imports from Canada by Species (1993)



Source: Japan Lumber Journal

percent increase from 1992 and fully an 84 percent increase on the 1982-1992 average volume of 2.9 million CUM. These gains reflect not only the overall increase of Japanese purchases from all foreign suppliers, but also an increase of more than 10 percent in the Canadian share of lumber imports since 1990.

The breakdown of Canadian lumber exports to Japan by species differs considerably from that of the United States (fig. II.19). The largest species category is, as with the U.S., "non-SPF, planed." Again, this category most likely corresponds with Western hemlock and Douglas fir dimension lumber. However. an almost equivalent amount of Hemlock is exported, mostly in the form of squares for remanufacture or as finished products. While wholly absent in the figures reported for the United States, "SPF, planed" accounts for 15 percent of lumber exports, reflecting, in part, greater volumes flowing from British Columbia's interior where Lodgepole pine is the most abundant species. In contrast with the United States, the export share of Douglas fir is reversed, and is the smallest volume category reported. Though information regarding specific pieces and sizes exported by Canada was not obtainable, it is known that Canada place a greater emphasis upon metric cutting of oversized and/or semi-processed products for further remanufacture in Japan.

Due to log export restrictions and a greater reliance upon foreign markets (the United States being principal among them), Canada and, in particular, the province of British Columbia, has developed a reputation for being more export oriented in terms of the processing and marketing of lumber products to meet foreign market standards and preferences. Canadian mills are seen as being more sensitive and responsive to concerns of the Japanese about dimensions, product quality and stable supply, issues which the Japanese have often used to criticize U.S. suppliers. Undoubtedly, certain Canadian mills have adapted to the higher degree of precision and the unique (metric) sizes demanded by the Japanese market. Whether the success of the Canadian industry as a whole is a result of this sensitivity or merely a result of log export restrictions is open to question.

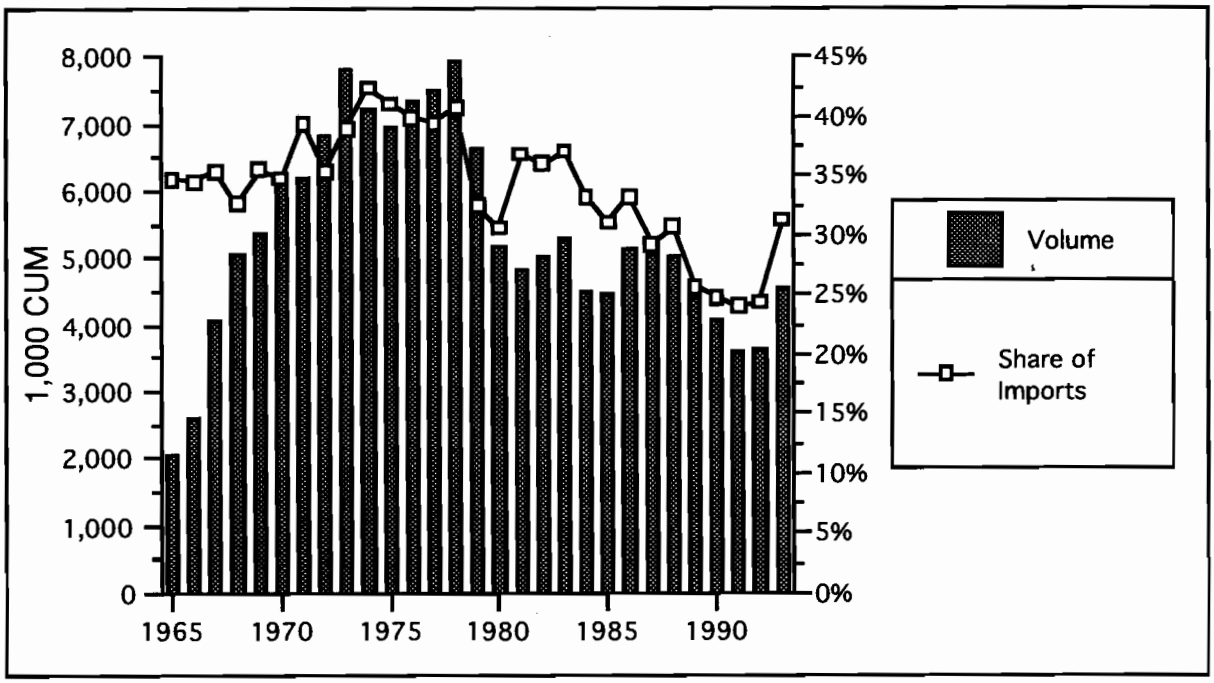
The Russian Far East and East Siberia[27]

Softwood Logs

The Russian Far East is the second leading foreign supplier of softwood logs to the Japanese market. As recently as 1978, Russian timber accounted for more than 40 percent of total Japanese softwood log imports. In the intervening years its market position deteriorated significantly before rebounding again in 1993 (fig. II.20). In 1993 Russian softwood log exports to Japan were approximately 4.5 million CUM and, in value terms, $522 million (U.S.). On a volume basis, this

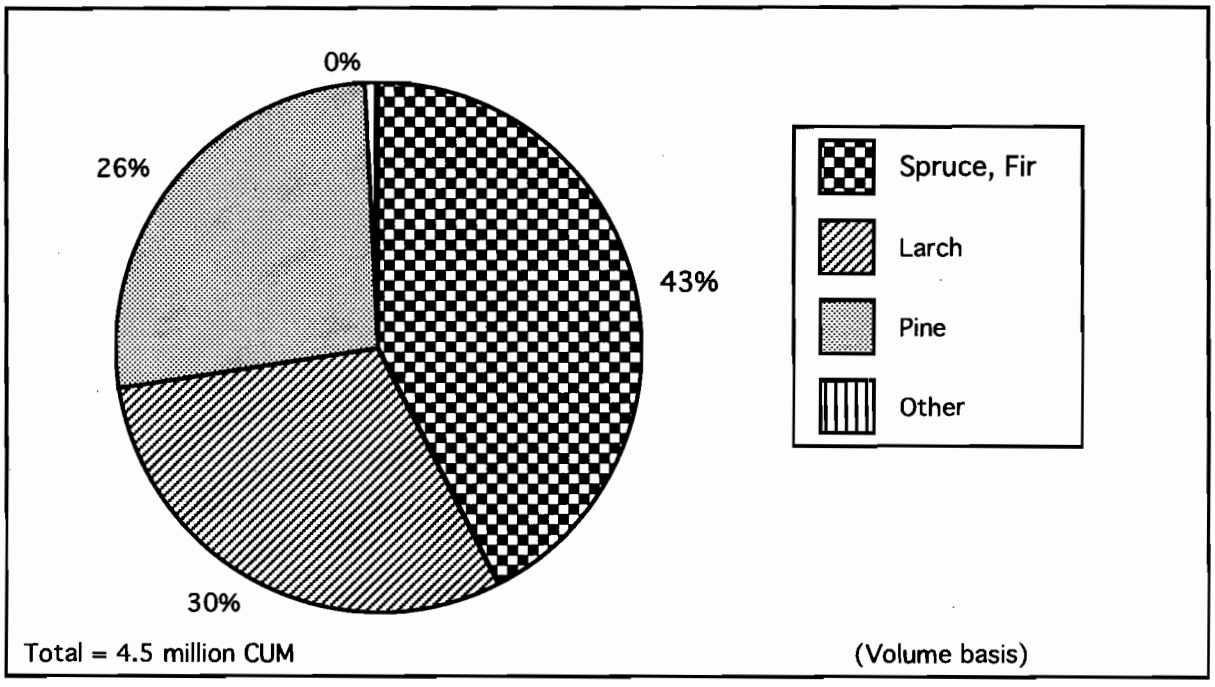
[27] For a detailed analysis of the Russian timber supply potential see Backman and Waggener, 1994 and 1990.

Figure II.20 Japanese Softwood Log Imports from Russia (1965-1993)



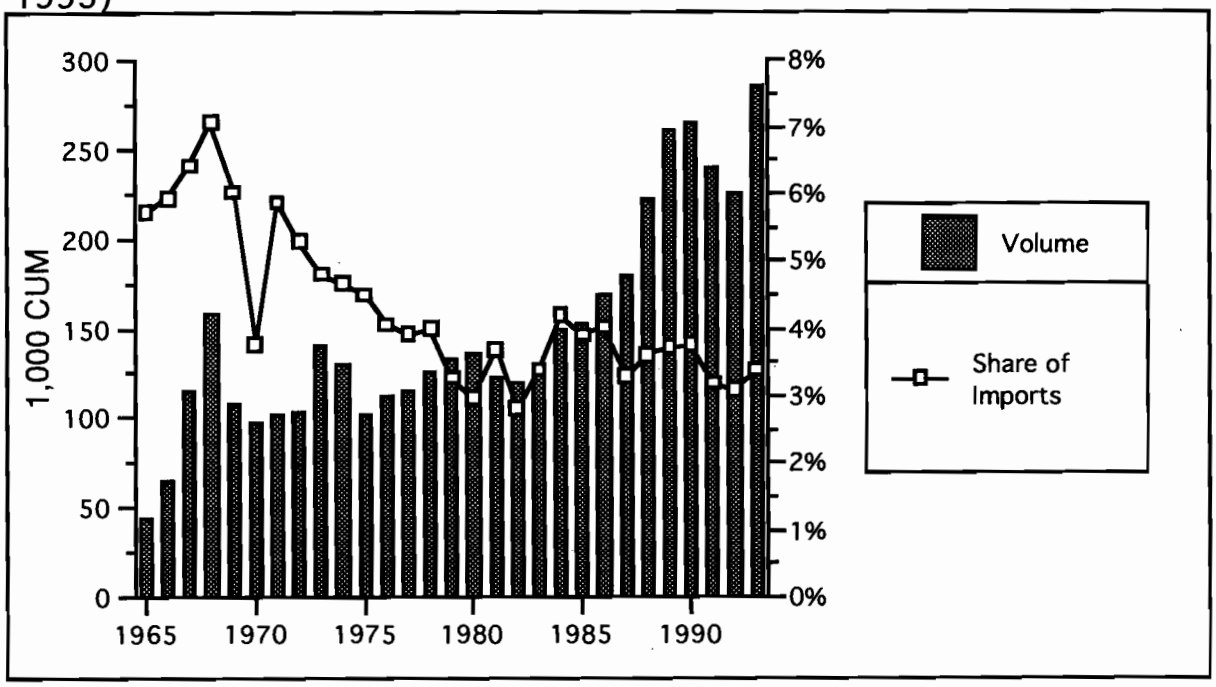
Source: Japan Lumber Journal

Figure II.21 Japanese Softwood Log Imports from Russia by Species (1993)



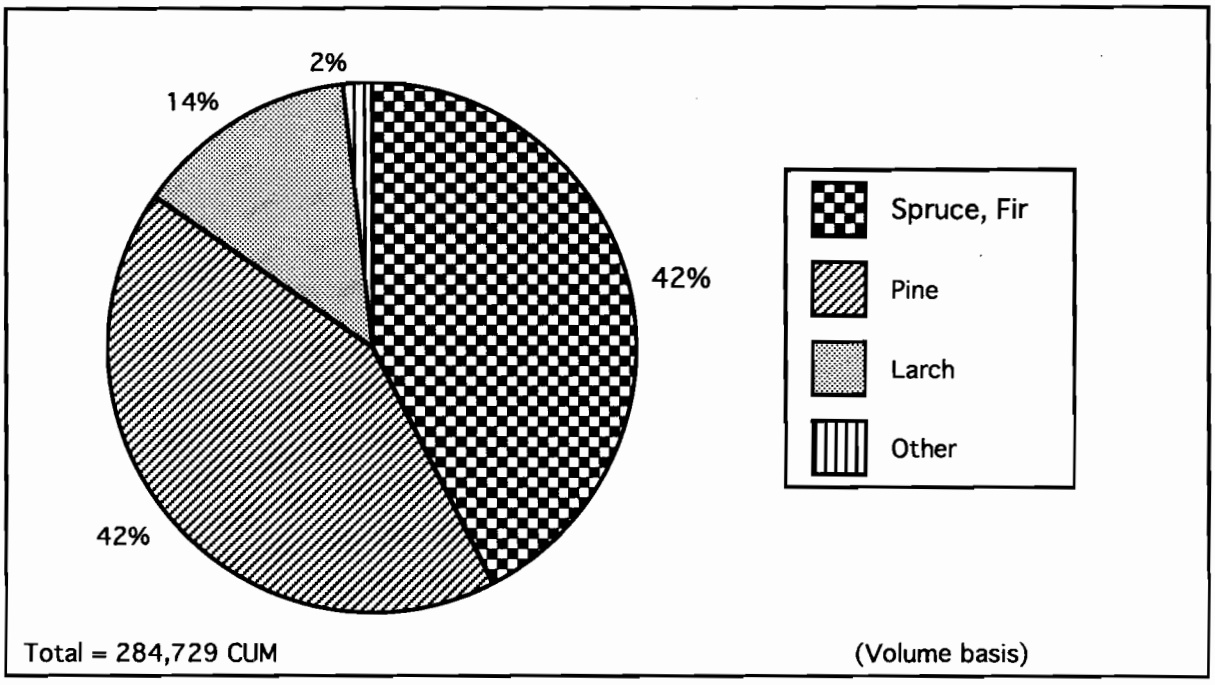
Source: Japan Lumber Journal

Figure II.22 Japanese Softwood Lumber Imports from Russia (1965-1993)



Source: Japan Lumber Journal

Figure II.23 Japanese Softwood Lumber Imports from Russia by Species (1993)



Source: Japan Lumber Journal

represents a gain of 26 percent on the previous year and is equal to the 1982-1992 average but still far below the 1978 peak of 7.9 million CUM.[28]

The species composition of Russian softwood log exports displays a relatively even distribution between spruce/fir, larch and pine (fig. II.21). The largest is the spruce/fir category (commonly referred to as "Russian Whitewood" in Japan) which is comprised primarily of Ezo Spruce (*Picea jezoensis*) and Hondo Spruce (*Abies sachalinensis*). These species are also found to a limited extent on Japan's Northern island of Hokkaido.[29] Much of this wood is harvested from virgin stands in the Southern regions of the Russian Far East, adjoining the major timber ports of the Pacific and inland areas close to the Trans-Siberian railroad. These exports constitute, on average, Russia's highest value exports of wood products to the Japanese market. Nevertheless, diameters and quality grades seldom match those of logs exported from the U.S. Pacific Northwest, and Russian whitewood is most often used for smaller, lower valued components such as rafters in traditional housing construction. Larch (*Larix, spp.*) is more often sourced from Russian forests located on poorer sites further to the North or in the more remote interior of the Far East or Eastern Siberia. Larch is also considered to be of relatively low value.

Softwood Lumber

In contrast to softwood logs, softwood lumber imports from Russia increased throughout the 1980s. 1991 and 1992 saw a sharp reversal in this trend, but 1993 imports rebounded strongly and are the highest on record (fig. II.22). In that year, Japan imported 285 thousand CUM of softwood lumber from Russia at a value of approximately $58 million (U.S.). This was, on volume basis, 27 percent higher than 1992 and almost twice the 1982-1992 average of 192 thousand CUM. Russian softwood lumber exports, however, account for only 3 percent of total Japanese imports of softwood lumber and only a small proportion of total Russian softwood exports. Infrastructure problems, political and economic uncertainty, and a lack of modern processing capacity have been commonly cited as a major reason for the small proportion of processed lumber in Russia's export mix. These reasons have also been given for the steady decline of log exports in the 1980s as well as a pessimistic appraisal of Russia's ability to significantly expand exports of either logs or lumber in the future.[30]

1993 Japanese softwood lumber imports by species from Russia are displayed in figure II.23. Once again the category termed "Spruce, fir" is the largest. Trade in pine lumber, however, was almost as large. At 14 percent, the share of larch is considerably lower than the 30 percent reported for logs. Whether processed in Japan or imported from Russia, the end-uses and associated values for Russian timber are roughly the same.

---

[28]Russian Far East exports, including forest products, were significantly disrupted in 1991-92 by political and economic reform efforts and the resulting uncertainty at all levels of Russian industry. For a more complete description of this problem see: Backman and Waggener, 1994.
[29]Japan Lumber Reports, 1989.
[30]Backman and Waggener, 1994.

New Zealand

Softwood Logs

Japan is now the largest purchaser (on a value basis) of New Zealand solid wood products, having surpassed Australia in 1990. The majority of New Zealand's exports is in the form of logs. Japanese sawlog imports from New Zealand and the associated market share have fluctuated broadly over the last three decades (fig. II.24). After the peak of 1.8 million CUM in 1972, volumes fell to a low of 260 thousand CUM in 1986. Since that year New Zealand sawlogs have made rapid gains, particularly in 1990 when the volume exported to Japan nearly doubled. Japanese imports from New Zealand stood at 1.7 million CUM in 1993, with a value of $238 million (U.S.). On a volume basis, this was over 130 percent higher than the 1982-1992 average of 739 thousand CUM and fully six times the 1986 low. However, it is important to note that, in contrast to Russia, Canada and Chile, New Zealand export volumes fell approximately 8 percent in 1993. Volumes for the first half of 1994 are reported to be comparable to 1993.

Radiata pine dominates Japanese softwood log imports from New Zealand (fig. II.25). Sawlogs imported from New Zealand are cut into packaging materials, pallets and other low value end-uses by Japanese mills.[31] To date, Radiata pine has been seen by the Japanese market as largely unsuitable for use in any but the lower valued uses in traditional housing construction. Consequently, this species is seldom in direct competition with U.S. Pacific Northwest sawnwood and sawlogs. Reflecting this fact, Radiata pine has made no substantial gains in market share in the last year, in spite of a sharp increase in the price of Hemlock and Douglas fir. Instead, demand for Radiata pine has remained stagnant due to the current recession in Japan which has more heavily impacted demand for packaging materials than for lumber to be used in the relatively robust housing market.[32] The other major New Zealand log export species is Douglas fir, which is harvested from plantations established approximately sixty years ago.[33] Reportedly, many of these plantations received regular prunings and other silvicultural treatments, and the timber harvested from them is of comparatively high quality. These plantations, however, constitute a relatively small resource and Douglas fir is expected to play an increasingly small role in New Zealand's export profile.[34]

---

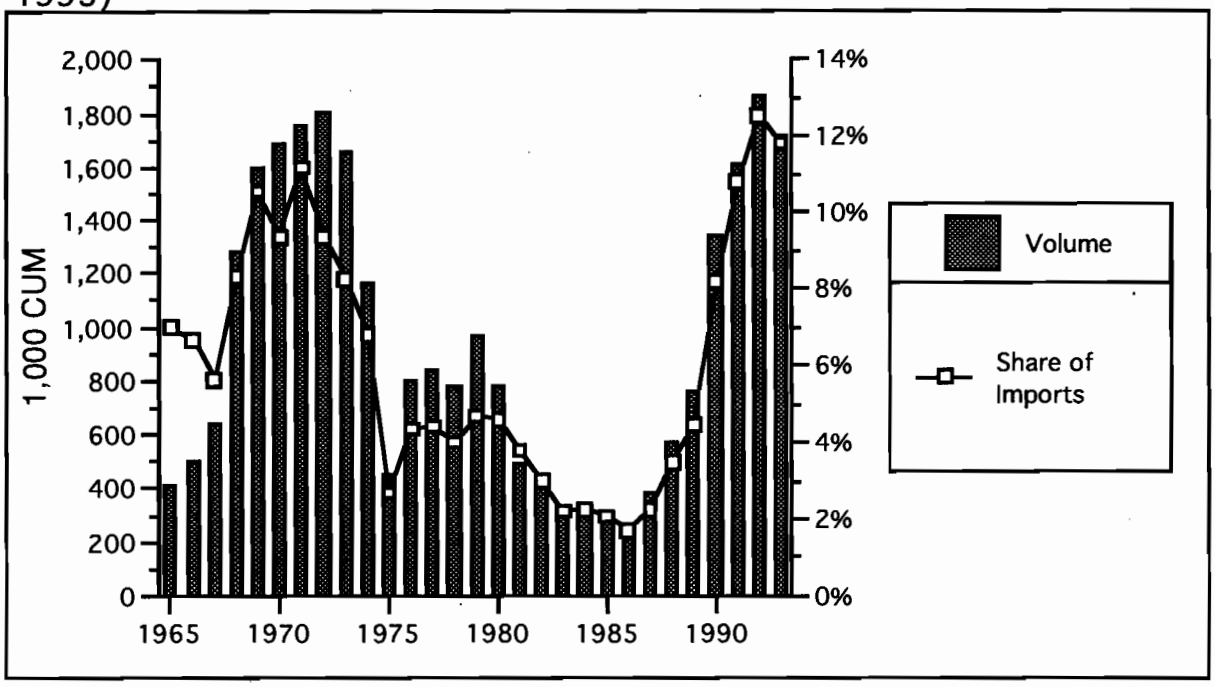
[31]Japan Lumber Reports, 1989.

[32]Japan Lumber reports, 9/10/93.

[33]New Zealand has experienced several phases or periods of rapid establishment of plantations using exotic species. During the initial phase, Douglas fir was planted on modest areas as a trial species. It is this timber that is now maturing. In general, New Zealand concluded that other species, primarily Radiata pine, were superior, and less Douglas fir was subsequently planted. The species distribution of New Zealand's conifer plantations is further discussed in section IV.

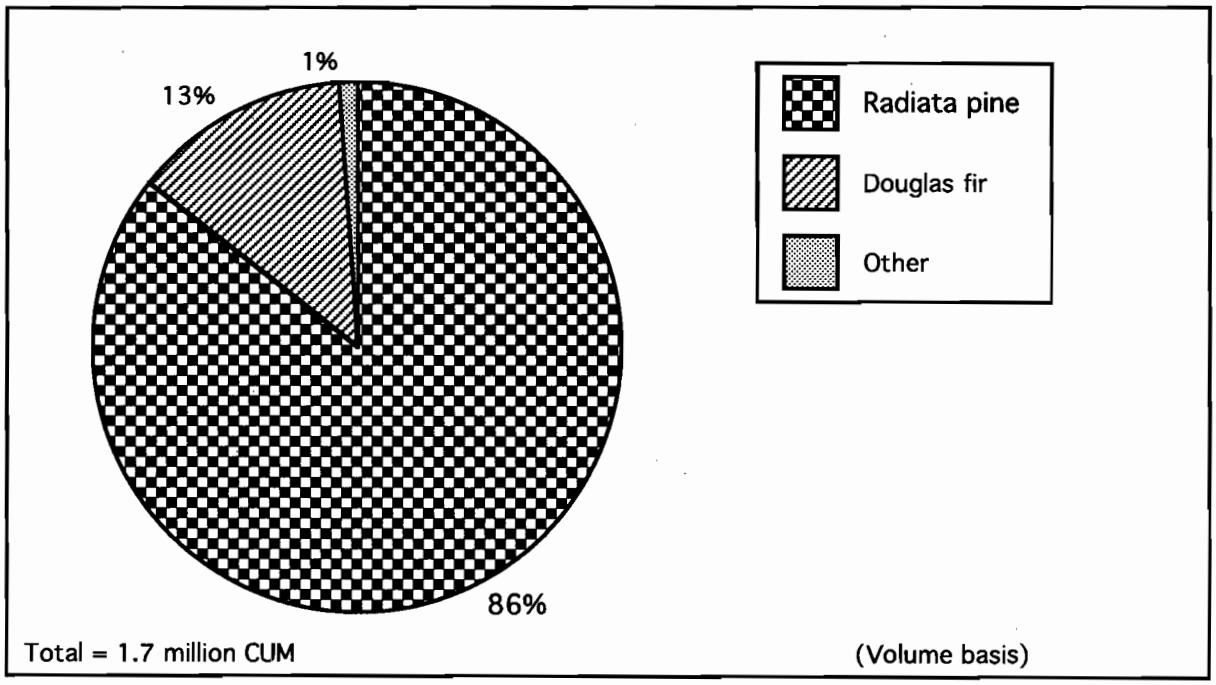
[34]The species distribution of New Zealand's forest plantations is discussed in more detail in the subsequent section on future potential.

Figure II.24 Japanese Softwood Log Imports from New Zealand (1965-1993)



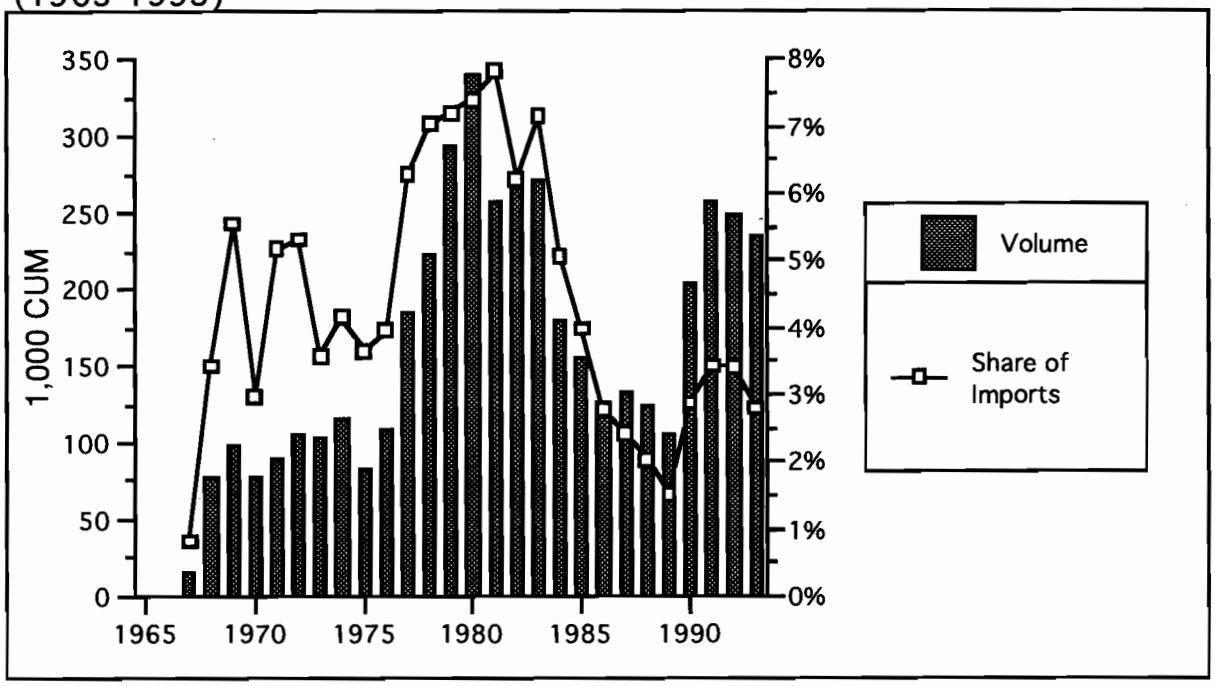
Source: Japan Lumber Journal

Figure II.25 Japanese Softwood Log Imports from New Zealand by Species (1993)



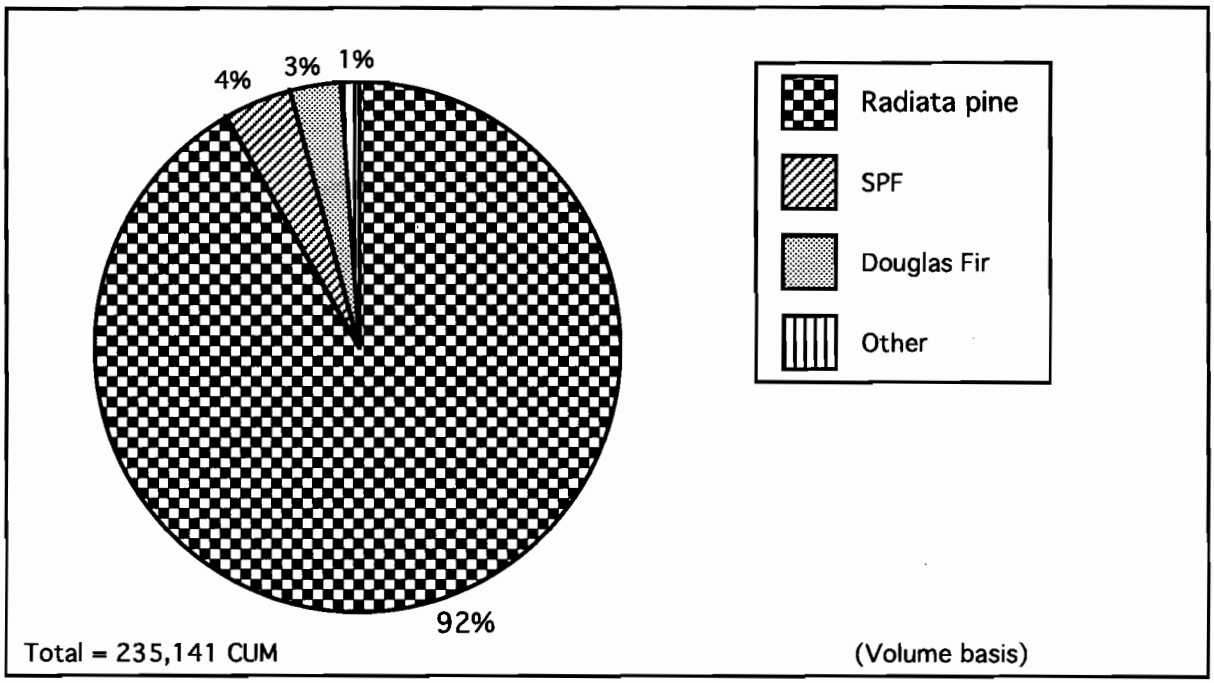
Source: Japan Lumber Journal

Figure II.26 Japanese Softwood Lumber Imports From New Zealand (1965-1993)



Source: Japan Lumber Journal

Figure II.27 Japanese Softwood Lumber Imports from New Zealand by Species (1993)



Source: Japan Lumber Journal

Softwood Lumber

Lumber comprises a much smaller proportion of Japanese softwood imports from New Zealand (fig. II.26). Imports in this category were slower to recover from the slack years of the mid 1980s and posted a recent low of 106 thousand CUM in 1989. In the following two years volumes more than doubled, but again fell in 1992 and 1993. In contrast to the net gains made by all other foreign suppliers during the last decade, the 235 thousand CUM ($57 million U.S.) of softwood lumber imported by Japan from New Zealand in 1993 is still considerably less than the 271 thousand CUM exported in the peak year of 1983. Consequently, New Zealand's share of the Japanese market for imported softwood lumber has fallen by over half during this period. While close to 25 percent higher than the 1982-1992 average of 187 thousand CUM, the 1993 import volume cited above is 5 percent below the 1992 volume. This is again in contrast to the trend for Canada, Russia and Chile. The 1992-93 decline in volume imported from New Zealand exceeds the 4 percent drop reported for U.S. softwood lumber imports. The same factors determining suitable end-uses and demand trends given for Radiata pine log imports from New Zealand apply to softwood lumber as well.

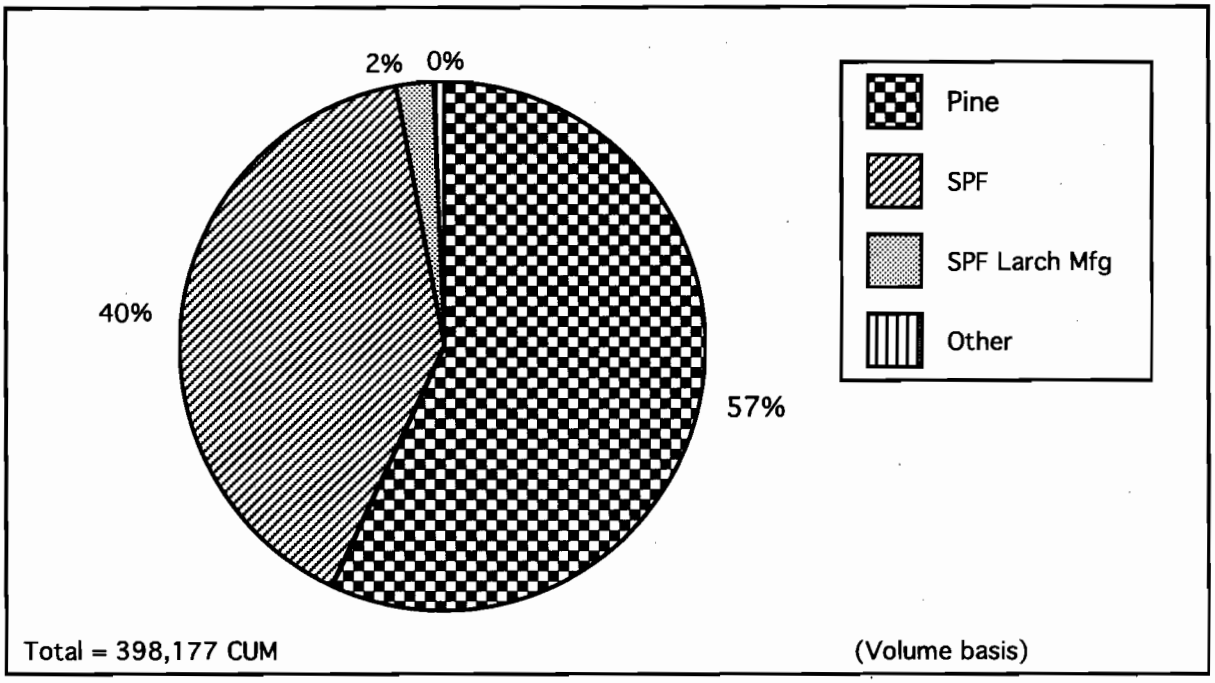
Radiata pine accounted for 96 percent of Japanese softwood lumber imports from New Zealand in 1992 (fig. II.27). The majority of Radiata pine lumber exports to Japan take the form of small squares, or flitches, for Japanese remanufacture into the same array of products for which Radiata pine log imports are most commonly utilized (packaging materials). Other species imported in lumber form from New Zealand include Douglas fir and SPF, but volumes of these exports are relatively insignificant. As a result, little information is available about their particular specifications and end-uses.

Chile

Softwood Logs

Another emerging softwood supplier to the Japanese market with large potential is Chile, which, owing to its Radiata pine plantations, is often compared to New Zealand. Unlike New Zealand, however, Japanese softwood sawlog imports from Chile have not experienced marked net gains in the last six years (fig. II.28). 1993 imports stood at 201 thousand CUM with a value of $23 million (U.S.). This volume is 20 percent lower than the 1982-1992 average of 250 thousand CUM. However, and also in contrast with New Zealand, the 1993 log import volume was approximately 19 percent higher than the previous year, indicating a considerable divergence in market behavior in spite of the dominance of Radiata pine in the export profile of each country. One possible reason for this difference in market performance is the relatively small proportion of Chilean production which is directed to the Japanese market due to transportation costs, market access, and the prominence of other foreign customers. This, in turn, provides an incentive for Chile to supply higher quality grades to the Japanese market. Other major consumers of Chilean softwoods include the Middle East and neighboring countries in South America. Korea also

Figure II.30 Japanese Softwood Lumber Imports from Chile by Species (1993)



Source: Japan Lumber Journal

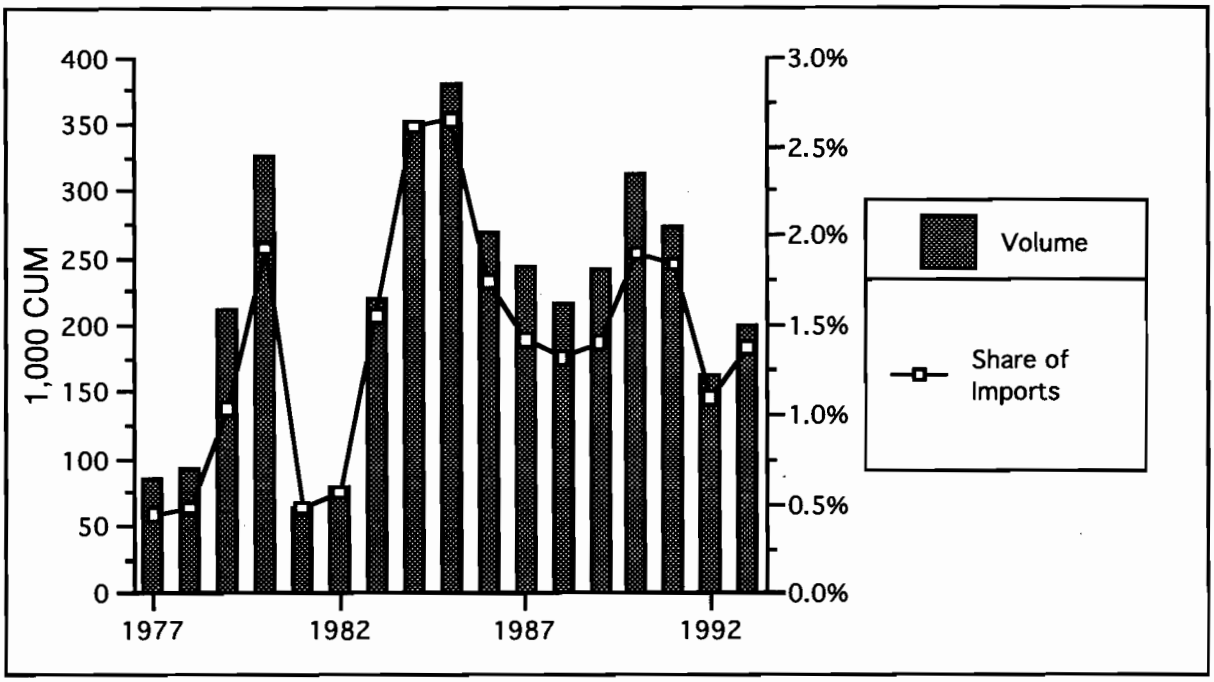
consumes a large share of sawlog exports, while Chile's own domestic demand is much greater than that of New Zealand.[35] As a result, recent increases in harvests are distributed more evenly between domestic use and multiple export markets, and Chilean log supply to Japan will vary in accordance to a more complex set of competing markets.

Another likely explanation of the shift towards Chilean pine in 1993 would be price differences for essentially comparable products. Unit values for Japanese Radiata pine imports, for example, were $114/CUM for Chile and $134/CUM for New Zealand, indicating that Chile had a considerable cost advantage. But unit values do not always adequately represent price, and these figures should be interpreted cautiously.[36] Radiata pine logs accounted for virtually all of Japanese softwood log imports from Chile. At 268 CUM, Douglas fir was the only other species reported in this category.

[35]Jelvez, Blatner and Mcketta, 1988.

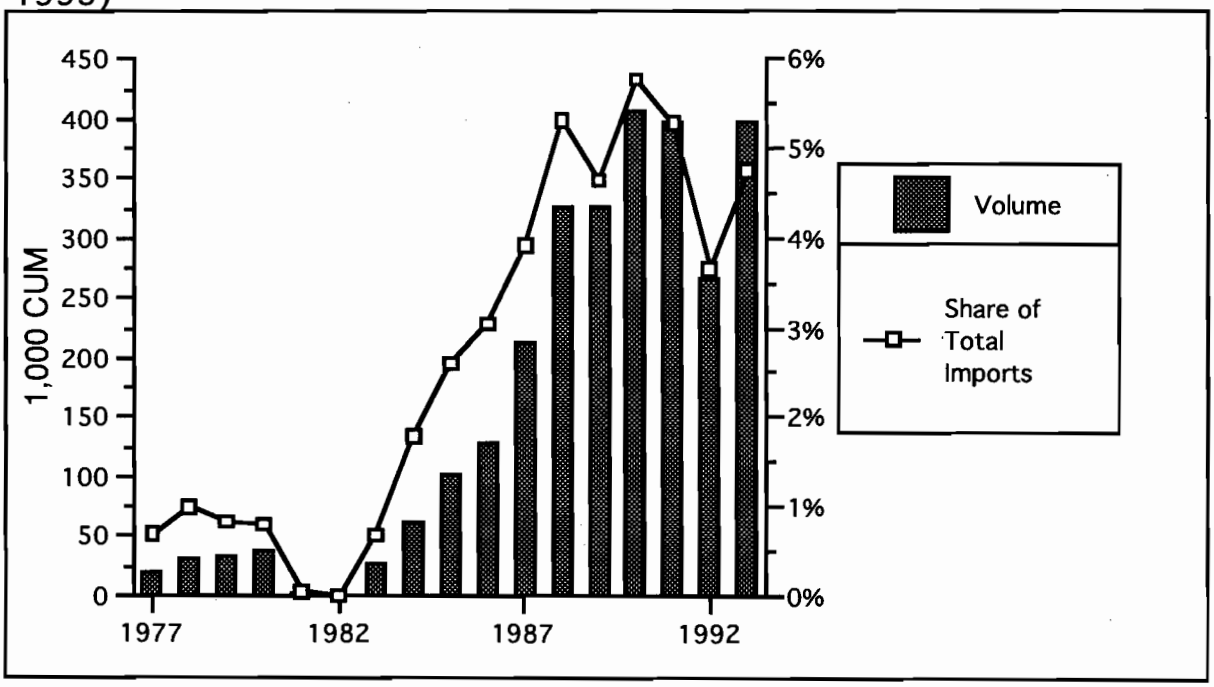
[36]Unit values are derived by dividing total value of a given category of imports by the total volume imported. The data from which these values were calculated came from the same source and are therefore assumed to be comparable. The details of how and where total dollar values were measured, however, are not available, and the unit values presented here should be viewed merely in relation to each other.

Figure II.28 Japanese Softwood Log Imports from Chile (1977-1993)



Source: Japan Lumber Journal

Figure II.29 Japanese Softwood Lumber Imports from Chile (1977-1993)



Source: Japan Lumber Journal

Softwood Lumber

Another contrast between Chile and New Zealand is that, while both countries export similar species, Chile exports a far greater proportion of its total softwood volume destined for Japan in the form of lumber. This is, in part, a result of a partial Chilean log export ban in effect since 1975. An estimated 398 thousand CUM of Chilean softwood lumber was imported by Japan in 1993 at a value of $101 million (U.S.). On a volume basis, this was 33 percent higher than the 1992 level, representing a significant recovery after the sharp decline which occurred between 1991 and 1992 (fig. II.29). Prior to 1983, Japanese lumber imports from Chile were insignificant, and the 1993 volume is nearly double the 1982-1992 average 205 thousand CUM. The largest export lumber species is again Radiata pine, which accounts for 55 percent of Japanese imports of Chilean lumber (fig. II.30). SPF accounted for most of the remainder, and is used for a variety of products. It should be noted that the same discrepancies between New Zealand and Chilean market performance in logs is also present in the case of lumber. Unit cost analysis, however, gives no indication of a relative cost advantage for Chilean lumber products.[37]

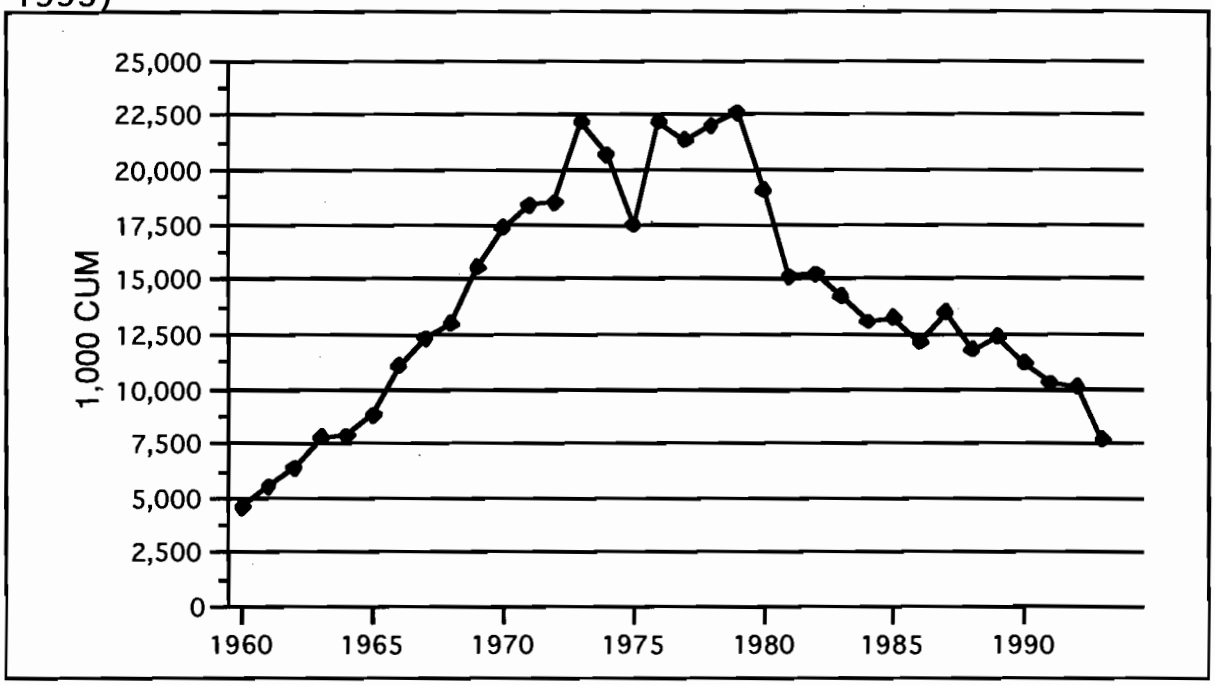
Other Supply Related Developments

Tropical Hardwoods

Another factor impacting the Japanese market for softwood products is the overall situation relative to tropical hardwood supplies. As Japan's major source of materials for panel products (particularly plywood for concrete forming) tropical hardwoods constitute another major timber import category along with softwood sawnwood and sawlogs. Due to export restrictions, conservation efforts, growing resource depletion and efforts by Indonesia and Malaysia to increase value-added exports, the availability of hardwood logs to Japan's plywood manufacturers has been increasingly threatened. In 1993, Japanese hardwood log imports from Southeast Asia totaled approximately 7.6 million CUM, down 24 percent from 1992 and 35 percent below the 1983-1993 average of 11.7 million CUM (fig. II.31). Hardwood supplies from Southeast Asia and elsewhere are expected to decrease further in the coming years. As a result, Japanese firms have devoted growing effort to developing technologies and markets aimed at substituting softwoods for hardwood in the production of panel products. The Japanese government has been actively involved in the promotion of these efforts. As new technologies are developed (especially in the area of softwood panel products), decreased hardwood supplies could have a substantial expansionary impact upon demand in selected sectors of Japan's softwood market, primarily plywood.

[37]The unit values are $224/CUM and $245/CUM for New Zealand and Chile respectively for 1993.

Figure II.31 Japanese Hardwood Log Imports from S.E. Asia (1960-1993)



Source: Japan Ministry of finance

Rapid Growth of Other Asian Economies

Another factor of significance is the rapid growth of other Asian economies and the concomitant growth in their consumption of wood products.[38] Even at more moderate rates of economic growth (relative to recent years), China alone could drive major shifts in regional demand for softwoods. Imports of softwood logs from the Russian Far East to China have been substantial and are probably larger than reported due to underestimation since China's official trade statistics do not account for unofficial barter trade. Likewise, New Zealand has reported increased exports to China in the last few years, with 1993 first quarter exports over four times those of 1992.[39] Given the general lack of sufficient softwood supplies both in China and throughout much of Asia, overall regional demand from Asia's rapidly expanding economies will undoubtedly continue to increase the competition for available softwood supplies in the coming years. Many of these countries, however, do not express the same quality preferences regarding wood products as does Japan. Much of the growing regional demand is therefore expected to impact the middle and lower end of the wood products market. Japan will remain as Asia's (and the World's) premier market for high quality foreign softwoods.

[38]Flora, 1991.

[39]N.Z. Ministry of Forestry, 1993.

III. THE JAPANESE HOUSING MARKET

Overview

Housing construction is the single largest end-use market for softwood sawnwood in Japan. It is the specific nature of Japanese housing construction which has given rise to the strong preference held by Japanese consumers and builders for North American species. This is a result of the high percentage of Japanese houses which are constructed in the traditional post & beam style, a style which places heavy emphasis on aesthetic as well as structural concerns. Clear wood with tight grain structure and superior structural characteristics is highly valued in this construction method. Consequently, Pacific Northwest old-growth and clearwood lumber have long been favored in the Japanese sawnwood market, as have been domestic species raised under intensive management systems which include frequent thinnings, prunings and other silvicultural treatments designed to enhance aesthetic characteristics. The Japanese market for wooden housing, however, has been slowly diversifying into 2x4 and prefabricated construction methods over the last two decades in partial response to marketing initiatives from the U.S. and Canada. Nevertheless, the traditional Japanese house still commands over 85 percent of wooden housing starts.

Differences between construction methods and appearance of wooden components strongly impact the demand for softwood lumber, and foreign suppliers are faced with a number of choices when deciding how to position their products relative to these different construction styles and different product requirements. Since traditional architectural styles still account for over three fourths of the Japanese wooden housing market, this construction technology will undoubtedly maintain a majority market share well into the foreseeable future. This segment of the Japanese housing market will substantially determine future Japanese demand for foreign softwoods. Moreover, with the emphasis upon quality, traditional housing construction may well constitute the best market niche for high quality U.S. Pacific Northwest timber. This market segment could provide a substantial opportunity to further exploit the comparative and competitive advantages of this region through the expansion of appropriate value-added processing, while addressing public concerns over the export of unprocessed logs.

As indicated, housing construction is the major component of sawnwood consumption in Japan. Domestically produced lumber (from both domestic and imported sawlogs) flowing to the construction industry is displayed in table III.1. In the period lasting from 1988 to 1992, construction markets consumed on average approximately 79 percent of total Japanese sawnwood production. Other end-uses include (in descending order of importance) pallets and packaging, furniture, and civil engineering uses. Given the relative scarcity of large-scale wooden structures or multi-unit buildings in Japan,[40] it is apparent that a great majority of the softwood lumber in the construction category is used in the construction of single family dwellings, most notably of the

[40]Previous Japanese building codes have restricted wooden structures to under three storeys. Recent changes in the code, however, now allow for larger structures, and the use of wood in multi-unit buildings and public facilities is expected to rise.

Table III.1 Japanese Mill Shipments of Lumber by End-Use Category

Year	Total	Building Construction Products				Other Uses
	(1,000 CUM)	Subtotal	Ita(1)	Hikiwari(2)	Hikikaku(3)	
1983	29,732	22,523	4,900	7,892	9,731	7,209
1984	28,797	21,704	4,557	7,787	9,360	7,093
1985	28,476	21,563	4,581	7,726	9,256	6,913
1986	28,553	22,071	4,608	7,866	9,597	6,482
1987	29,836	23,344	4,742	8,497	10,105	6,492
1988	30,287	23,858	4,781	8,765	10,312	6,429
1989	30,563	23,994	4,698	8,749	10,547	6,569
1990	30,012	23,477	4,568	8,842	10,067	6,535
1991	28,549	22,275	4,330	8,289	9,656	6,274
1992	27,711	21,931	4,228	8,146	9,557	5,780

Source: MAFF

Includes lumber produced from imported logs.

(1) Boards appx. 3 cm in thickness.

(2) Sawn strips or smaller squares not exceeding. 7.5 cm in thickness (includes Showari & Hirawari).

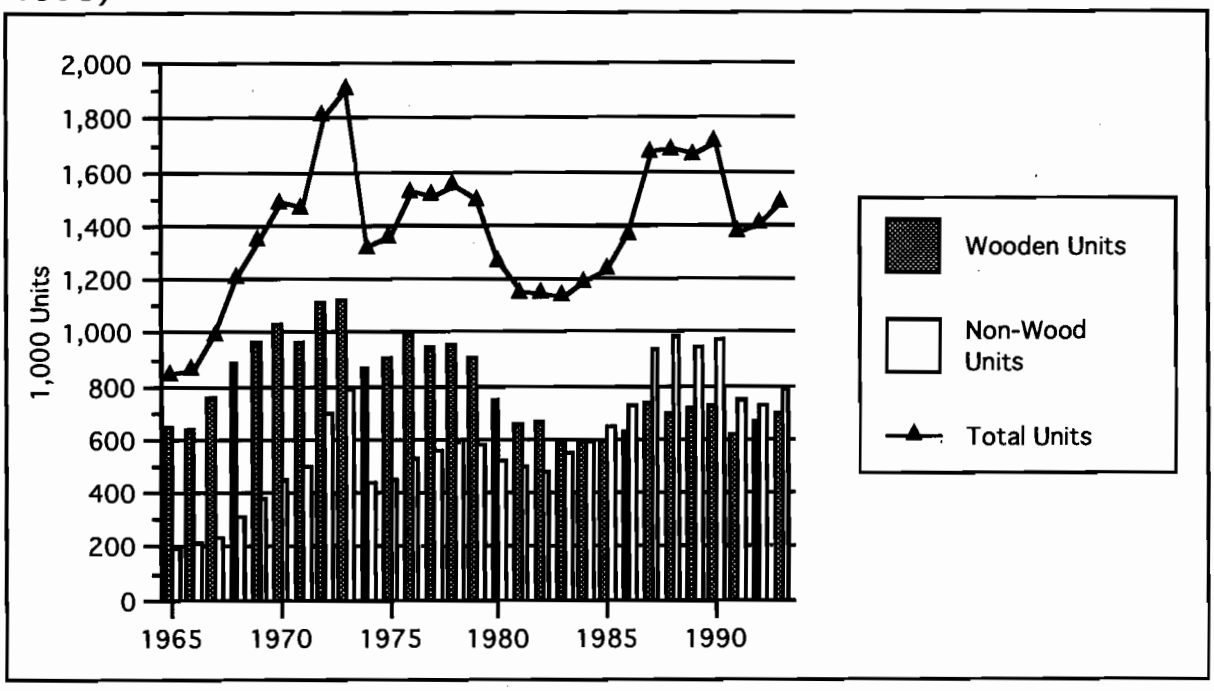
(3) Sawn squares and beams exceeding 7.5 cm in thickness (includes Shokaku & Hirakaku).

traditional post & beam construction type. The product categories given in table III.1 represent wood components commonly used in post & beam construction.

Japanese imports of North American lumber can also be divided into much the same the same size categories, with the addition of dimension lumber used primarily in the growing "Western 2x4" housing industry. Taken together, Japanese domestic sawnwood production (including lumber produced from imported logs) and softwood lumber imports from North America totaled 34 million CUM in 1992. Single unit housing construction consumed the bulk of this material. As mentioned earlier, Radiata pine imports of both lumber (633 thousand CUM in 1993) and logs (1.9 million CUM in 1993) are largely used in the production of pallets and packaging materials. Information regarding the end-uses for the small volumes of lumber imported from Russia are unavailable, but it can be assumed that most of this is also used in housing construction.

It is not surprising that housing construction should play such a dominant role in Japanese consumption of sawnwood. The Japanese housing construction industry is one of the largest in the world and has been a major factor in determining Japan's position as the world's largest net importer of wood products. Accordingly, the medium to long term future potential of the Japanese market for imported softwood sawlogs and lumber clearly depends upon developments in the Japanese housing construction sector. Furthermore, the market potential and comparative advantage of specific softwood products, North American Douglas fir for example, will increasingly be determined by specific market niches within the general housing market.

Figure III.1 Japanese Housing Starts by Construction Type (1965-1993)



Source: Japan Ministry of Construction

Housing Starts: Trends and Projections

Concomitant with rapid economic growth following World War II and lasting until the relative slowing of the Japanese economy in the early 1970s, Japanese housing starts posted substantial year on year increases, reaching a peak of 1.9 million units in 1973 (fig. III.1). In 1993, housing starts totaled 1.49 million units, a level roughly equivalent to the average number of yearly starts since 1975. In 1993 this was the largest number for any single country in the world, exceeding the estimated U.S. total of 1.25 million units. The number of housing starts per capita in Japan has remained among the highest in the world for almost two decades, and forecasts indicate the potential for demand for new housing to remain strong for years to come.

Several factors have combined to support Japan's extraordinary construction boom. Most obvious is the sustained growth of Japanese per capita income combined with a growing population. Another major factor determining high rates of housing construction in Japan is the rapid turnover of the existing housing stock. Japan emerged from World War II with a severe housing shortage. At the time, Japan was quite impoverished, and much of the construction immediately following the war was of low quality units that could only be termed provisional. With sustained and rapid economic growth in the 1960s and 70s, the number of new starts saw significant gains throughout the period, but many of these units were also of small size and relatively low quality. As a result, Japan now has a housing stock which is recognized, both by foreigners and Japanese alike, as

largely sub-marginal. These are the "rabbit hutches" for which Japan's major cities are famous, and the target of yearly government reports which identify the lack of adequate housing as one the largest, if not the largest, detriment to the quality of living in Japan.

The Japanese can increasingly afford to rectify this problem. Much of the housing construction activity of the 1980s was devoted to tearing down existing stock and replacing it with units more in keeping with the rising incomes of the Japanese. This, in combination with a humid climate which contributes to a relatively rapid deterioration of building materials, has resulted in markedly shorter replacement cycles for housing stock. Consequently. the average turnover of housing stock in Japan has been calculated at approximately 30 years, compared with 50 years in the U.S. and over 80 years in France and Germany.[41]

Another factor contributing to Japan's sustained high level of housing construction has been the rapid increase in population and new household formation occurring throughout much of the post war period. Now totaling 123 million, the Japanese population has increased by almost 50 percent since 1950. During this same time, the average number of individuals per household has fallen from 5.02 to 3.01. As a result of these developments, the total number of households in Japan has reached 41 million, or approximately two and one half times the 1950 figure.[42]

A third contributing factor is the migration of Japanese from rural areas to the major urban centers of Tokyo and Osaka, and, more recently, from urban areas to the suburbs and satellite cities. This latter phenomenon has been driven, in large part, by high urban land prices which make life in the suburbs more attractive. It is common for couples to seek the amenities of suburban life soon after the birth of their first child. Additionally, upon retirement many Japanese choose to move to the country, either returning to their rural hometowns or moving to a smaller city or town where the quality of life is perceived to be considerably better and the cost of living lower. Additionally, growing affluence and leisure time has led to a rapidly increasing rate of construction of vacation homes and second homes in the country side.

The majority of units constructed in suburban and rural areas is comprised of single family units, and most of these units are made of wood. In contrast, housing in denser urban areas is much more concentrated in multiple-unit housing using non-wood construction technologies. Consequently, patterns of demographic change and migration over the last forty years have fueled strong demand for new housing units with the recent trend favoring single family units of wood construction.

As noted, Japanese demand for new housing should remain strong well into the first decade of the next century. A recent government report, for example, has predicted a yearly construction rate of 1.4 million starts through the year 2000 and 1.35 million starts for the following decade.[43] At that time, the number of available housing units should be adequate for the number of households seeking homes. Many of the units built during the construction boom in the 1970s, however, will

[41]Yorimitsu, 1992.
[42]Demographic statistics in this paragraph are from Yorimitsu, 1992
[43]See Japan Lumber Reports, 9/24/93.

be facing upgrading or replacement. Also, as Japanese consumers demand larger living spaces and a higher "quality" in housing, the average floor space per unit is expected to rise from a current level of approximately 86 square meters per unit to over 100 square meters. The willingness of the Japanese to replace older units with more spacious homes will depend primarily on the long-term health of the Japanese economy, a question which is beyond the scope of this analysis. Nevertheless, it is safe to assume the level of new housing starts in Japan will remain over one million units per year for the foreseeable future. Both in terms of total numbers of housing units and units per capita, Japan's housing market will continue to be one of the world's largest.

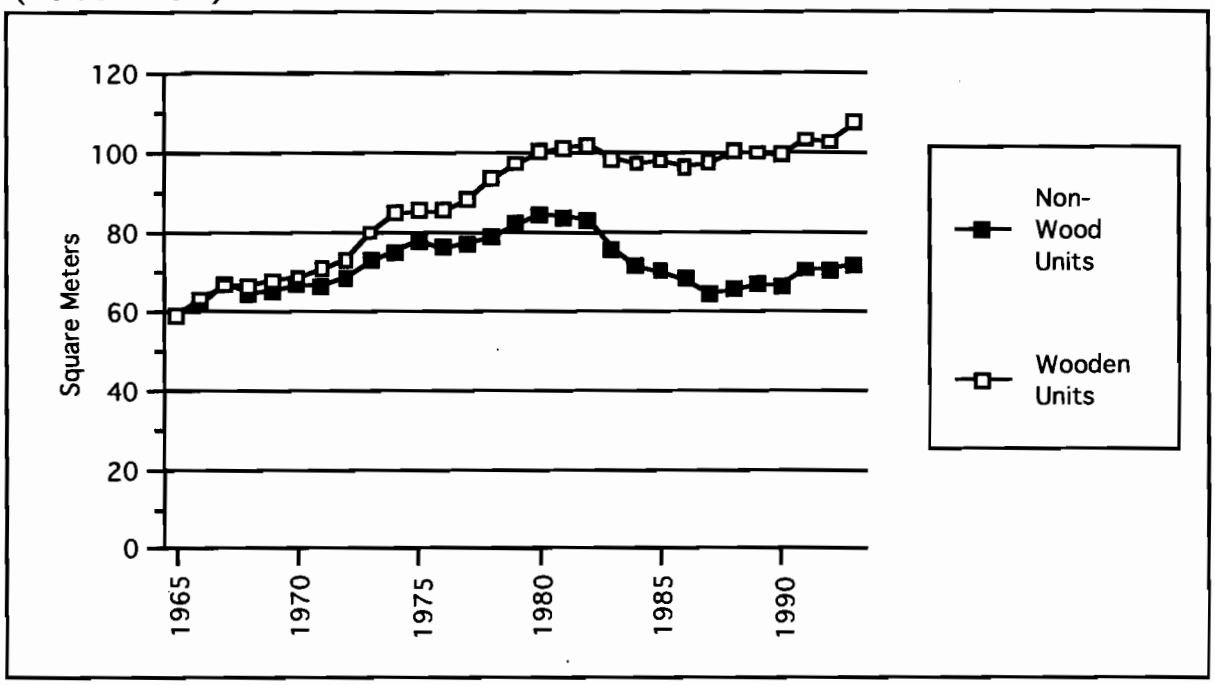
Housing Construction Types in Japan

Wood and Non-Wood

The primary division in construction types in Japan is between wooden and non-wooden units. Due to urbanization and the high cost of land, new construction methods, and the availability of wood substitutes, non-wooden structures have made rapid gains over wooden structures since 1965 (fig. III.1). After first surpassing wooden starts in 1985, the market share of non-wooden units now stands at approximately 53 percent. The majority of non-wooden structures is comprised of multi-unit apartment buildings including the vast apartment complexes, or *danchi*, for which Japan's major urban centers are famous. These buildings are well suited to the high population density of major cities, and it is no wonder that, on a unit basis, they would comprise an increasing proportion of housing starts.

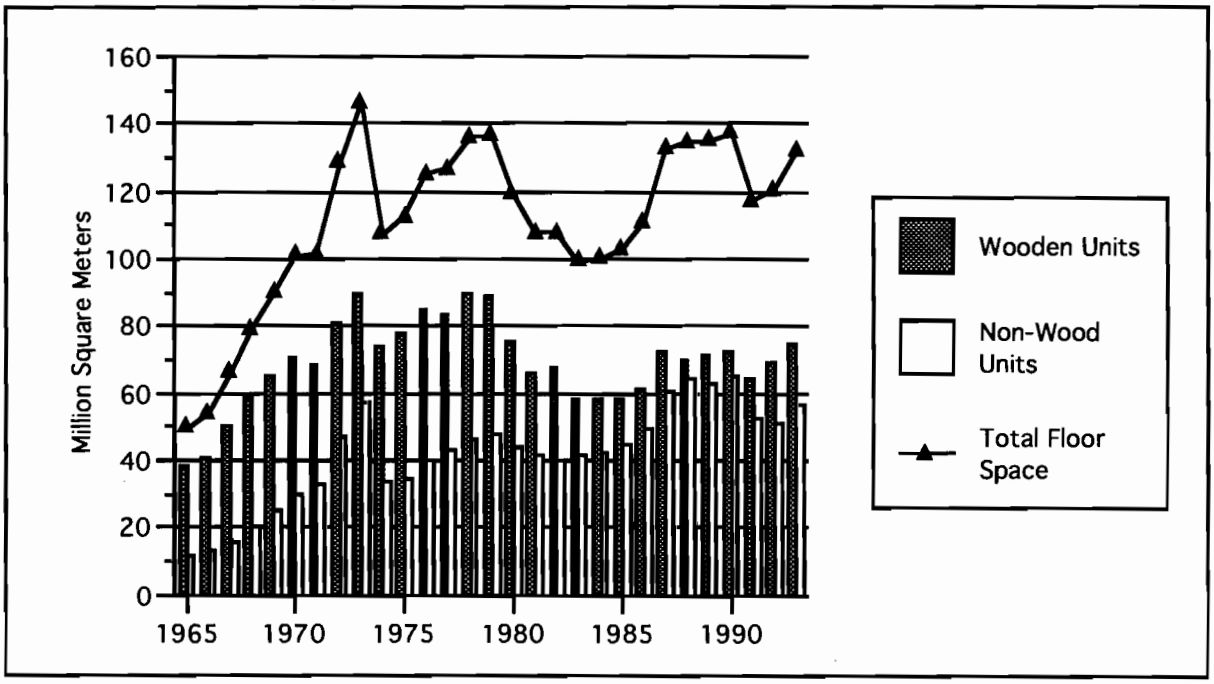
On average, however, non-wood units are considerably smaller than their wooden counterparts, which are devoted almost exclusively to single family dwellings. In 1993, for example, the average floor space of wooden and non-wooden units stood at 107 and 71 square meters per unit respectively (fig. III.2 & III.3). Consequently, When viewed in terms of total floor space, the market share of these two construction types is reversed, with wooden units commanding over 57 percent of the total market. For reasons discussed above, the market position of wooden units has been improving in the last five years, with the share of wooden units increasing from 41 percent in 1988 to 47 percent in 1993. While the number of wooden starts increased by 8 percent in 1992, non-wooden starts fell by 2 percent. This is the first time this has occurred since 1965 (the first year for which figures for wooden vs. non-wooden starts are available). However, 1993 figures indicate another slight decline in wooden unit market share indicating the difficulties in projecting year to year market trends. In any case, fears expressed in the 1980s that wood substitutes would continue to substantially diminish the wood housing market share have been substantially allayed by recent developments.

Figure III.2 Average Floor Space per Unit by Construction Type (1965-1993)



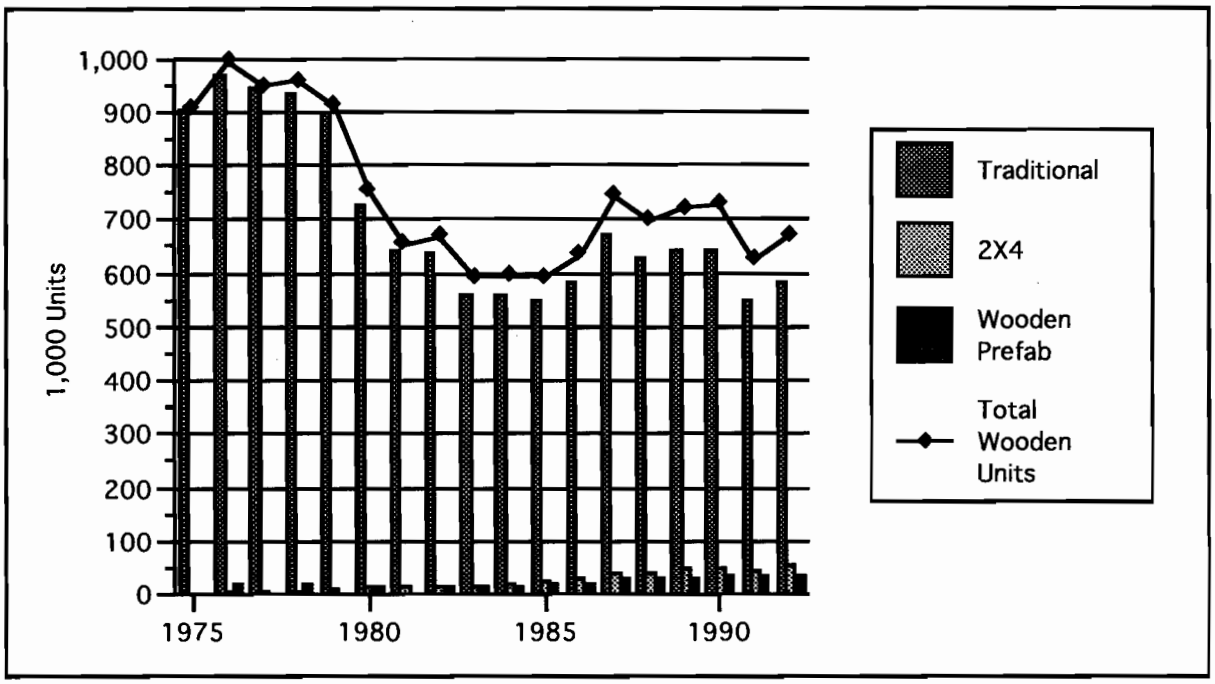
Source: Japan Ministry of Construction

Figure III.3 Japanese Residential Housing Construction by Floor Space and Construction Type (1965-1993)



Source: Japan Ministry of Construction

Figure III.4 Japanese Wooden Housing Starts by Construction Type (1975-93)



Source: Japan Ministry of Construction

Wooden Housing Types and Market Trends

Wooden units can be further categorized into traditional post & beam construction, 2x4 frame construction, and prefabricated housing. Each type of construction is discussed below.

Traditional Housing Construction

Japanese construction of wooden housing units has utilized two alternative construction technologies over the last two decades: the traditional post & beam method and the "Western" platform construction and related methods adopted from North America (here termed "2x4" and "prefabricated"). Traditional housing construction accounts for the great majority of new wooden units constructed in Japan (figure III.4). Though exact figures for post & beam market share are not available, they can be extrapolated from 2x4 and prefabricated figures (discussed in subsequent subsections). Accordingly, in 1991 post & beam construction starts are estimated to have been

approximately 585 thousand, accounting for an 87 percent share of the wooden housing market and a 39 percent market share of total housing starts. Post & beam housing commonly uses a larger percentage of higher quality (and priced) lumber than the other methods here discussed, and post & beam construction would, in terms of the value of lumber used, account for a considerably higher share than the 88 percent of wooden housing starts noted above.

Post & beam construction uses a wide array of lumber pieces, each with its own dimensions and set of preferred species. Most common are Hashira (vertical load supporting posts), Hirakaku (crossbeams), Taruki (rafters), and Dodai (groundsills).[44] Figure III.5 displays the relationship of these components and other items in a typical post & beam house. This figure, however, is simplified and does not depict the entire range of specific pieces (each with its own name) used in this form of construction. When reported in aggregate (such as in table III.1) the components are commonly divided into three general categories: 1) "Ita," or boards of various lengths and widths but seldom exceeding 3 cm in thickness; 2) "Hikiwari," or small squares and strips of varying widths but not exceeding 7.5 cm in thickness; and 3) "Hikikaku," or squares and beams over 7.5 cm in thickness. In recent years Ita, Hikiwari and Hikikaku have averaged 20, 37 and 43 percent respectively of total Japanese mill shipments of lumber to the construction industry.[45]

In the past, Sugi, Hinoki, and old growth Western hemlock and Douglas fir have been used in the Hikikaku category which includes the main posts and beams. These components, , in turn, comprise the bulk of the wood volume and value of lumber used in traditional post & beam construction. Because traditional housing in Japan features a great deal of exposed wood, most of which is composed of the Hikikaku components of the frame structure, a great deal of care and attention is given to the type and quality of wood used. As a result, clear woods command a significant price premium, especially for larger squares which are suitable for the major support posts. The tight grain structure associated with old growth is also highly valued, though availability has been drastically curtailed in recent years due to the changing supply conditions discussed elsewhere. Nonetheless, aesthetic quality remains a key consideration in supplying this market. Acceptable visual and structural characteristics will be extremely important in relation to the possible choice of substitute wood products. It is questionable whether significant quantities of Radiata pine or lower quality Russian logs will meet the standards needed to find ready acceptance within this specific end-use category.[46]

Because of high labor intensity and the higher priced components used, traditional construction is at a considerable cost disadvantage in relation to the 2x4 and prefabricated construction methods discussed below. Nevertheless, traditional construction methods maintain a strong market preference due to consumer tastes. A public opinion survey conducted in the mid 1980s, for example, found that 73 percent of those Japanese households surveyed prefer wooden homes of traditional construction over other construction methods and non-wooden structures. As a result, traditional post & beam construction should still be seen as the housing technology of choice in Japan. The type and quality of wood used in these houses will remain a major component both in consumer satisfaction and in the traditional preferences of Japanese builders. While this type of

[44]For a more detailed description of sizes, species and standards used in traditional housing construction see Briggs and Dickens, 1984.

[45]Japan, in contrast with North America, uses construction methods based on metric units (or traditional units which are converted to metric sizes). This difference in measurement applies to both widths and lengths, and it results in a significant difference between lumber manufactured for traditional housing and the "Western 2x4" market.

[46]These species may be suitable for the production of laminate squares and related pieces where high quality veneers are attached to cores of relatively cheap species or composite materials. New Zealand has reported sharply increased exports of laminated lumber to Japan, though how much of this wood is used in traditional housing is unclear.

Figure III.5 Traditional Japanese Three-Storey House

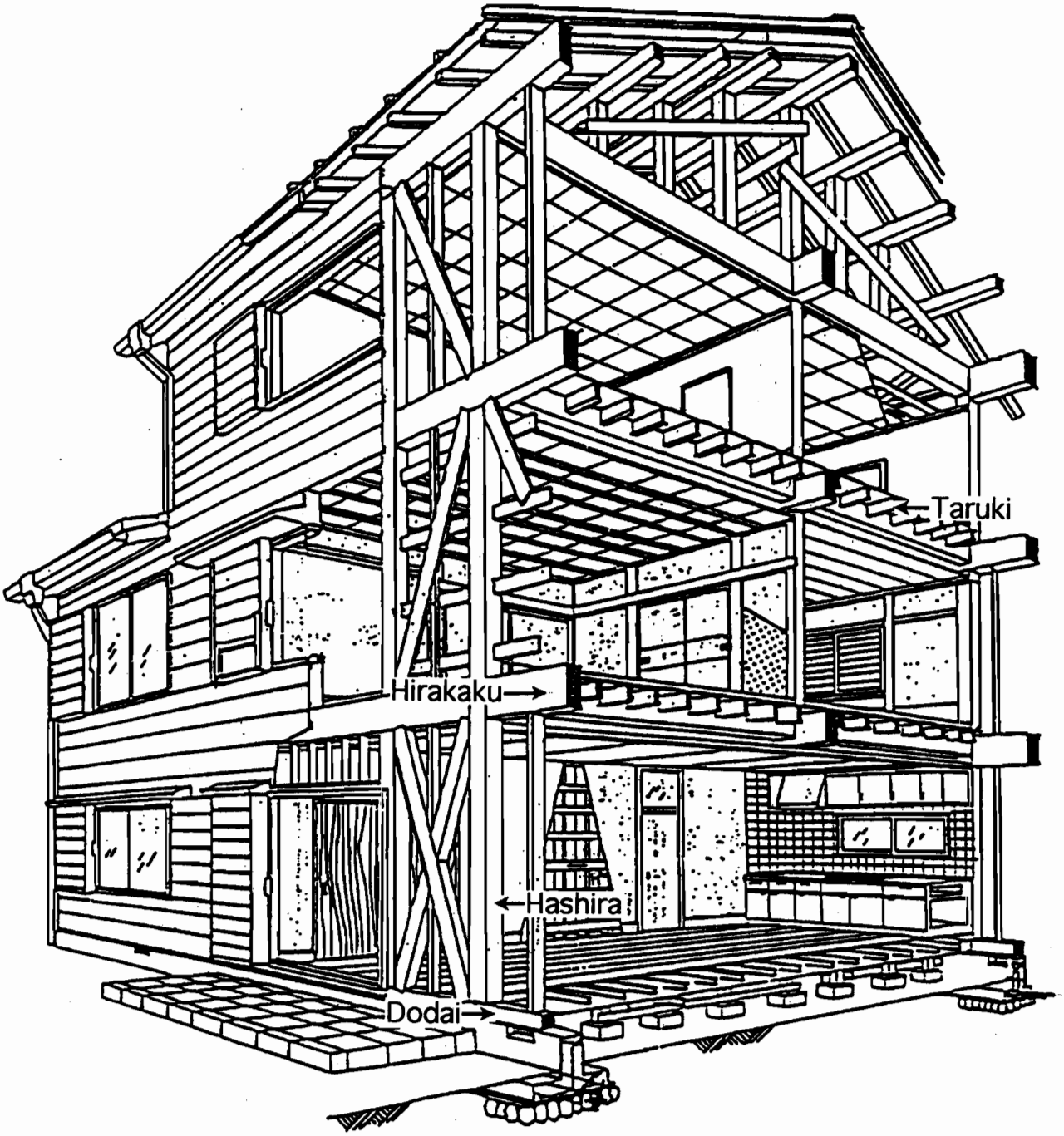
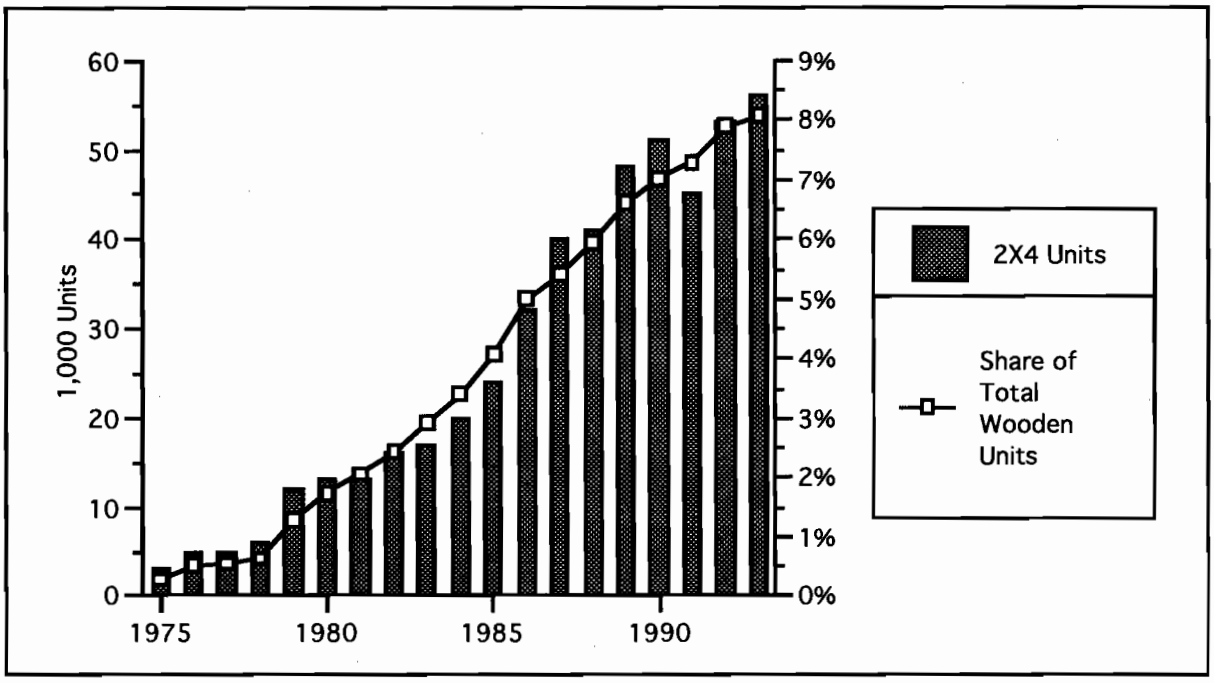


Figure III.6 Japanese 2x4 Housing Starts (1975-1993)



Source: Japan Ministry of Construction

construction involves higher labor and lumber costs compared to alternative methods, the high price of land in Japan is the dominant consideration in the total cost for constructing a house. Hence the increased expense for "quality" construction need not constitute a major change in the total price for a new house. Moreover, Japanese consumers have in the past demonstrated their willingness to pay high premiums for quality goods. These preferences can be expected to continue to fuel a sustained demand for traditional housing and the derived demand for the specific lumber components required in its construction.

Western "2x4" Platform Housing Construction

Since being introduced to Japan in 1974, Western platform housing construction (known as "2x4" construction) has made steady gains in the Japanese housing market (fig. III.6). From an initial level of only 168 units in that year, 2x4 starts climbed to approximately 56 thousand units in 1993. 2x4 units now account for over 8 percent of the total market for wooden housing units (3.8 percent for all units). Though the number of starts has fluctuated in recent years, market share for this type of construction has consistently posted year on year increases since 1974.

There are numerous reasons for the growing success of 2x4 construction methods. First is the lower cost of this construction type relative to traditional methods. A 1989 study, for example, estimated that a 1,800 square foot home of 2x4 construction would cost at least $180 thousand to build in Japan (excluding land costs) compared to $250 thousand for a traditional home of

comparable size.[47] Much of this cost advantage stems from the high degree of standardization of materials and rationalization of construction techniques for this type of construction relative to traditional methods. The traditional carpentry skills and millwork associated with post and beam housing are increasingly in short supply, and the relative cost advantages enjoyed by 2x4 methods will most likely increase in the coming years.[48] Consequently, in spite of consumer preference for traditional housing styles, the incentives to purchase 2x4 housing will remain considerable.

Increased fire resistance (a major concern in Japan's densely populated urban and suburban areas) comprises another advantage of 2x4 units over the traditional counterpart. Tests conducted by the Japan Ministry of Construction have shown that with proper methods and treatment, 2x4 houses can be certified as "fire resistant" and thus qualify for increased loans from the government sponsored Home Loan Corporation as well as lower premiums for fire insurance. Given the relative frequency and severity of earth quakes in Japan, structural integrity has also been a major concern, and Japanese building codes have long restricted the size of wooden residential and commercial structures. Recent revisions of the code, however, now permit larger wooden buildings (up to 3 thousand square meters of floorspace), allowing for the construction of three-storey multi-family dwellings, hospitals, hotels, and other commercial buildings. Many of these new structures are expected to be built using 2x4 frame construction technology.[49]

Another key factor in the success of 2x4 housing technology is the substantial market promotion it has received from North American lumber and plywood producers in conjunction with the Japan 2x4 Homebuilders Association. Much of this promotion has been focused on changes in Japanese building codes and import product standards in order to gain acceptance of the new method and qualification for government based financing, with the ultimate aim of stimulating imports of North American 2x4 lumber and plywood. Another major promotional activity has been the construction of demonstration projects and the training of Japanese carpenters in 2x4 construction methods. These efforts have included the construction of major demonstration housing projects such as the U.S. "Summit House," "Washington Village" and, earlier, "Seattle Village," as well as similar efforts by the Canadian forest products industry. The three U.S. projects utilized U.S. Pacific Northwest lumber products exclusively, and were built under the close supervision of U.S. architects and builders. In spite of some initial problems,[50] the projects have reported positive acceptance from Japanese consumers.

---

[47]U.S. Dept. of Commerce, 1989. The floorspace of the home cited in this study greatly exceed the current average for a traditional style house (100 square meters or, approximately, 1,000 square feet).

[48]Considerable rationalization of the traditional housing sector may, however, serve to somewhat mitigate this trend.

[49]One notable example is the 32,000 square foot Super House, a three-storey multiple unit demonstration project built in Yokohama in 1992 with funding provided by the U.S. Foreign Agricultural Service and supervision from the American Plywood Association.

[50]Exterior siding pre-treated in the U.S., for example, has experienced blistering and peeling after a relatively short time in Japan's more humid climate. Other reported problems have been related to packaging concerns and a lack of familiarity of Japanese builders with Western 2x4 materials and practices. With growing experience on both sides of the Pacific, many of these problems have disappeared (personal communication with Greg Schelberg, Director, Evergreen Partnership).

Although gains in 2x4 market share have been steady, this construction method has not yet achieved the high expectations held by promoters at the time of its introduction. 2x4 construction methods are still largely alien to rural Japan, and there are a number of factors, structural and otherwise, which still limit its market access. The tastes of Japanese home buyers are perhaps the most important factor, but there are many other obstacles, ranging from a lack of carpenters knowledgeable in the method to various codes and standards which are still oriented to more traditional methods. By targeting this market segment, however, North American producers have gained immediate benefits. 2x4 housing starts in Japan use North American lumber almost exclusively,[51] and North American producers do not need to alter their production methods or product specifications to supply this market. Moreover, if recent trends continue, both the absolute number of units constructed and the relative market share of 2x4 starts can be expected to increase in the coming years, leading to increased economies of scale in marketing and distribution of component products. Though this technology may never dominate Japan's wooden housing market (as was perhaps hoped for at one time by North American lumber producers) it will be a stable and increasingly important component of the Japanese housing market.

There is no reason to expect, however, that U.S. and Canadian suppliers will be able to maintain their virtual monopoly in supplying this market segment. A few domestic Japanese mills have already stated their intentions to produce 2x4 dimension lumber for Japan's market using domestic species and lower grade imported logs. Other producers around the Pacific Rim can also be expected to supply this market niche should Japanese 2x4 construction continue to expand. Western style construction using Radiata pine is well accepted in New Zealand and is rapidly growing in Australia. If widely adopted in Japan, 2x4 construction could well open the market for structural applications of Radiata pine lumber imported from both New Zealand and Chile, as well as expand the use of timber from the Russian Far East.

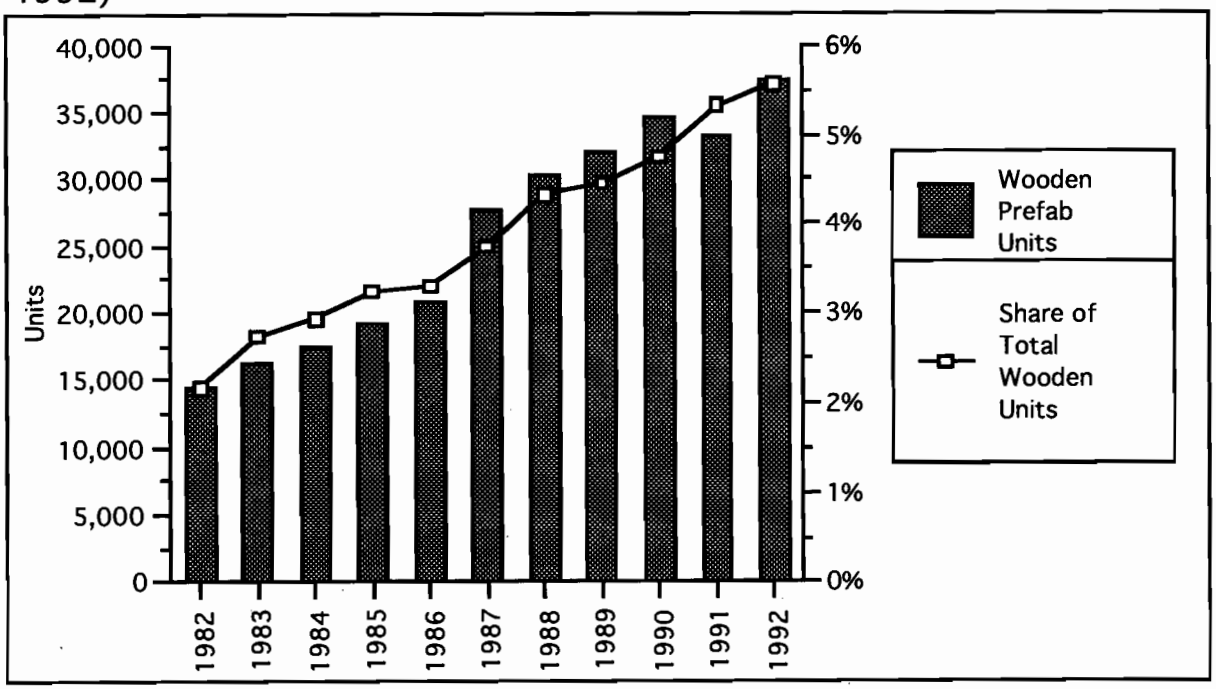
As North American supply shortages exert further upward pressure on long-term prices for high quality softwoods, lumber producers in the U.S. Pacific Northwest must question whether 2x4 dimension lumber exports constitute the best use of the region's mainstay species of Douglas fir and Western hemlock relative to the market opportunities in Japan. Dimension lumber does not require the same sort of structural or aesthetic characteristics as does lumber targeted for traditional Japanese post & beam construction, and it cannot be expected to command the same market prices in Japan as traditional post & beam lumber components. Consequently, dimension lumber may be a more appropriate end-use for lesser quality species, most notably SPF. This view is supported by the fact that a recent survey by the Japan 2x4 Lumber JAS Conference concluded that in 1990 Hemlock comprised 25 percent of volume shipments of structural dimension lumber (2x4 stock) and Douglas fir only 4 percent. SPF accounted for the remaining 71 percent.[52]

---

[51]Due to import tariffs designed to protect the Japanese plywood industry, North American structural plywood has gained little access to this market.

[52]Japan Lumber Reports 1/24/92

Figure III.7 Japanese Wooden Prefabricated Housing Starts (1982-1992)



Source: Japan Ministry of Construction.
Note: Prior to 1989 2x4 starts were included in total wooden prefab starts. Subsequent statistics ommitted 2x4 starts. Figures presented here follow the latter convention with 2x4 starts subtracted from pre-1989 figures.

Prefabricated Housing Construction

Another major construction technology utilized for wooden residential units is prefabricated housing which, like 2x4 housing, has steadily gained acceptance in Japan's wood housing market (fig. III.7).[53] In 1992, prefabricated wooden starts stood at 37,400 units, or 5.6 percent of total wooden starts (2.7 percent of total starts). This represents a 60 percent increase in number of units over 1982. This trend is expected to continue, due largely to cost advantages similar to those experienced by 2x4 construction. Further, the need for on-site construction labor is greatly reduced—an important consideration in rural and other remote locations.

There is a great deal of confusion as to the precise definition of prefabricated housing in Japan. The category covers a number of different construction types, ranging from traditional homes produced from pre-cut components to modular homes constructed mostly from plywood. Hence, prefabricated housing should be seen more as a highly rationalized approach to a number of different construction styles which rely heavily upon factory production and automation.

[53]This section will consider wooden prefabricated units only. Non-wood prefabricated units (which account for over 80 percent of the prefab market) will not be treated.

The advantages enjoyed by prefabricated housing are primarily those associated with cost reductions arising from mechanization and economies of scale, and the increase in the number of prefabricated starts has generally paralleled the rise of major housing manufacturers, such as Sekisui Home and Mitsui Home. These firms (and others) are heavily involved in the production and promotion of this type of construction. In an attempt to upscale their products, a growing number of these companies have begun producing what are essentially traditional houses, but which use highly streamlined construction methods. Given the cost advantages and advertising resources these companies enjoy, this form of construction can be expected to increase. Moreover, due to product standardization and the close affiliation of many of these companies with major trading firms, this market segment can be expected to provide increased opportunities for foreign producers. Several of the major Japanese home builders involved in prefabricated construction have developed their own proprietary standards regarding lumber specifications, and successful foreign exporters to this market niche will have to work in close cooperation with their Japanese customers.

IV. CURRENT TRENDS AND FUTURE POTENTIAL OF JAPAN'S FOREIGN SOFTWOOD SUPPLIERS

Recent Trends in Prices and Trade

Wholesale Log Prices

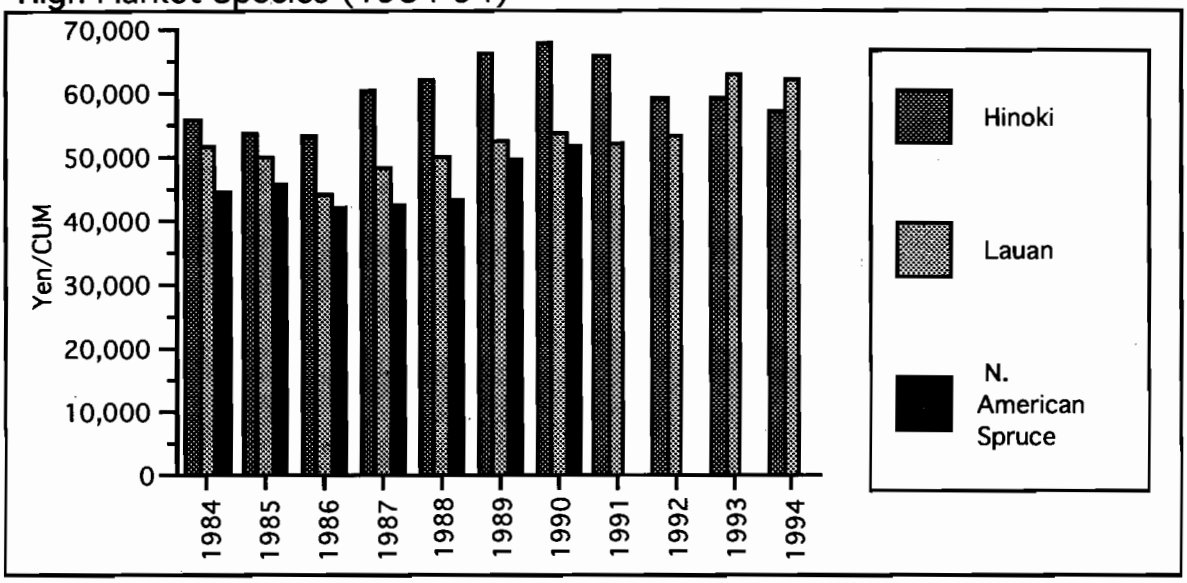
As noted in previous sections, the Japanese softwood sawnwood market is characterized by an array of species and sizes, each commanding different prices in the market place. When viewed in terms of wholesale log prices, the species Japan consumes may be differentiated into three broad categories: a high category with average prices per species of ¥ 50,000-60,000/CUM ($500-600 U.S.); a medium price group with prices of approximately ¥22,000-26,000/CUM ($220-260 U.S.); and a low priced category with prices of roughly ¥ 13,000-19,000/CUM ($130-190 U.S.).[54] It should be noted here that Japanese wholesale yen prices are the prices paid for lumber and logs at the major level of market distribution. These prices include transportation to the wholesale market and, for imported items, all tariffs and other import fees.

Figure IV.1 shows 1984-94 wholesale log price trends for the high price group. With prices ranging from ¥ 53,000 to 66,000, Hinoki constitutes the highest priced softwood species consumed by Japan. Sitka spruce from North America is the only other reported softwood species in this price grouping, with prices more than ¥ 10,000 below that of Hinoki. If listed, prices for North American cedars would probably rival or surpass those of Sitka Spruce, but Japanese import volumes of these species (as well as those for Sitka spruce) have been extremely small in comparison to mainstay species such as Douglas fir or Sugi. Though a hardwood species and rarely used for sawnwood, S.E. Asian Lauan is also included in figure IV.1 because the species is a major component of Japan's total wood import demand and because the increasing price trend resulting from supply restrictions is clearly displayed.

Log prices for the medium price group are displayed in figure IV.2. This category contains the major species used in housing construction in Japan. Japanese domestic species within this category include Japanese Red and Black pine. and larger logs of Sugi. Imported species include Douglas fir, Western hemlock and Russian Spruce. At an average price of ¥ 26,000 over the ten year period surveyed, Douglas fir constitutes the highest priced species within this category. This, however, reflects recent (post 1990) price increases for the species rather than long standing price differentials. Though in 1984, and again in 1990, Sugi and Douglas fir prices were roughly equal, over the four years since 1990 an approximate ¥ 9,000 price difference has opened between the two species. During this four year period, prices for Sugi fell by 16 percent while those for Douglas fir rose by an equivalent amount, indicating a surprising divergence in price behavior for the two species. Western hemlock price trends have mirrored those of Douglas fir, but with less

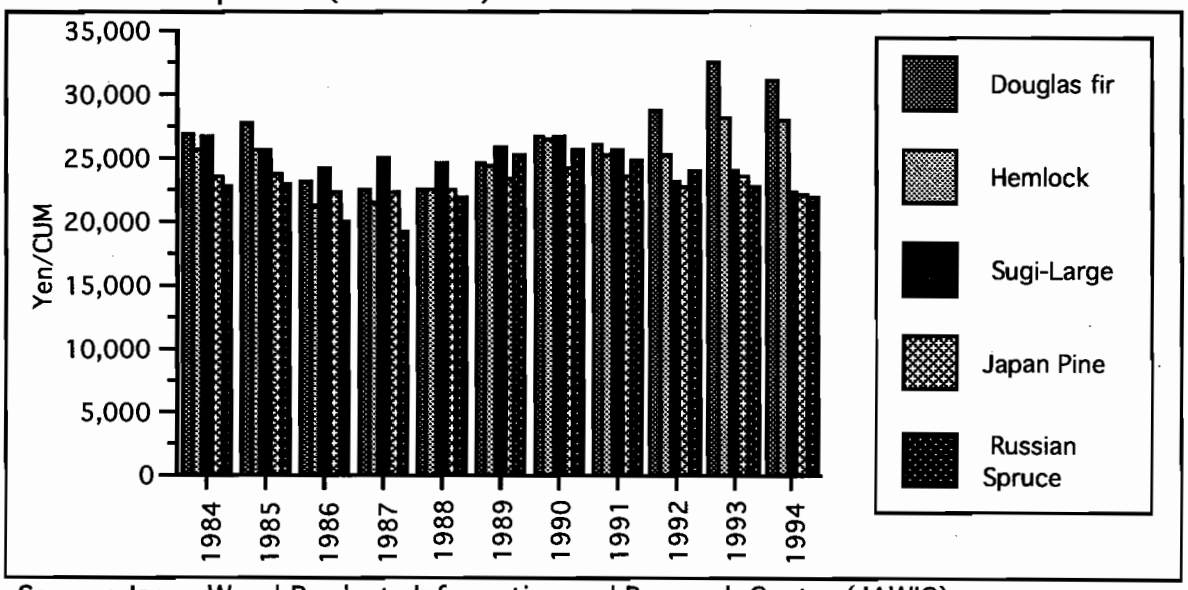
[54]Prices given here are wholesale log prices in yen values as reported by the Japan Wood-Products Information and Research Center (JAWIC). U.S. prices are derived using a ¥100/$ exchange rate and are intended for reference only. Species categories are likewise as reported in the JAWIC statistics. See appendix for tables of actual values for species and sizes.

Figure IV.1 Japanese Wholesale Log Prices
High Market Species (1984-94)



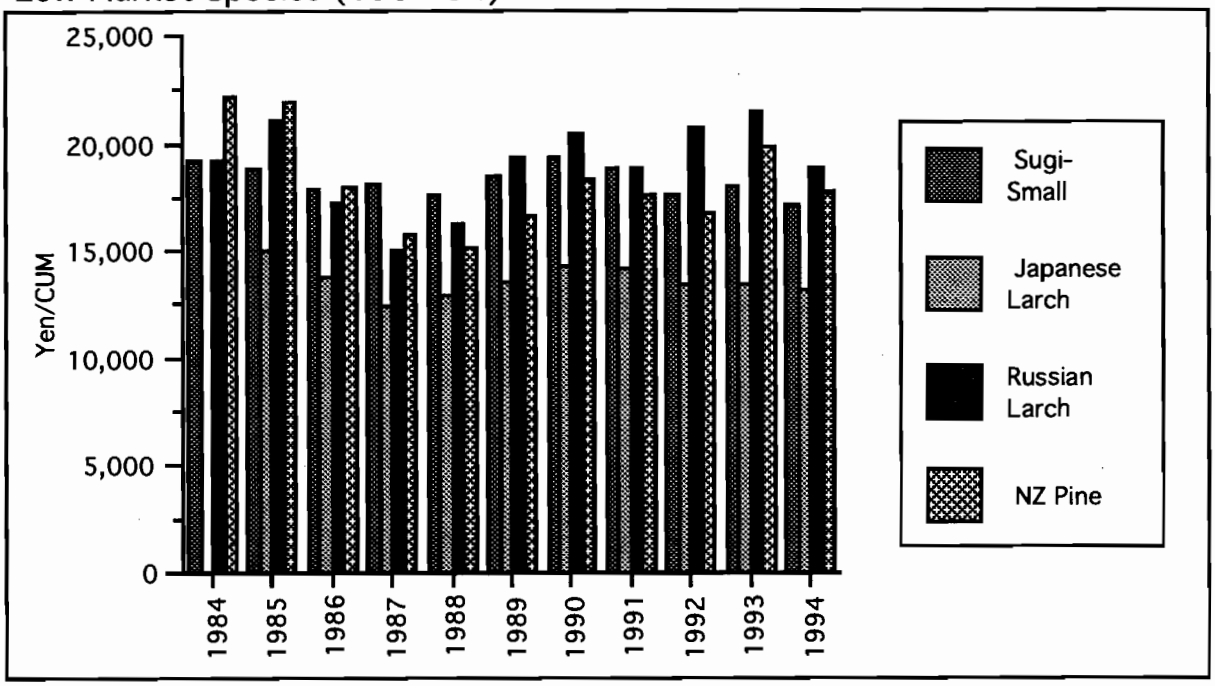
Source: Japan Wood-Products Information and Research Center (JAWIC)
Hinoki: 14-22 cm X 3.65-4.0 m; Lauan: 60+ cm X 4.0 m;
North American Spruce: 30+ cm X 6.0 m

Figure IV.2 Japanese Wholesale Log Prices
Mid Market Species (1984-94)



Source: Japan Wood-Products Information and Research Center (JAWIC)
Douglas fir: 30+ cm X 6.0+ m; Hemlock: 30+ cm X 6.0+ m; Sugi Large: 14-22 cm X 3.65-4.0 m; Japanese (Red & Black) Pine: 24-28 cm X 3.65-4.0 m; Russian Spruce: 20-28 cm X 3.8+ m

Figure IV.3 Japanese Wholesale Log Prices
Low Market Species (1984-94)



Source: Japan Wood-Products Information and Research Center (JAWIC)
Sugi Small: 8-13 cm X 3.65-4.0 m; Japanese Larch 14-28 cm X 3.65-4.0 m; USSR Larch: 20-28 cm X 3.8+ m; NZ Pine: 30+ cm X 4.8+ m

variation[55] and generally lower price levels. Japanese pines and Russian spruce comprise the lower end of this medium price group, with prices ranging from approximately ¥ 20,000 to ¥ 25,000 per cubic meter. As in the case of Sugi, log prices for these species have been falling in recent years. Note that log sizes (see notes on figures) as well as species are an important determinant of price. In general, prices for Japanese domestic species pertain to smaller log sizes than those for imported species.

Japanese larch, Russian larch, New Zealand (Radiata) pine and smaller log sizes of Sugi constitute the lowest price category (figure IV.3). Russian larch is the highest priced species in this group, with price levels in 1984 and 1985 equaling those found in the lowest tier of the medium price category described in the previous paragraph. Sugi and Radiata pine are in the middle with generally comparable prices. As previously noted, however, Radiata pine is used primarily in the production of packaging materials, and price equivalencies do not necessarily imply that the two species are substitutes. With an average price of ¥ 13,600/CUM over the ten year period displayed, Japanese Larch is by far the lowest priced species considered.

[55]Not surprisingly, Douglas fir prices exhibited the highest variance of any species in the medium and low price ranges. In general, domestic species showed much less price variation than imports, with standard deviations two to three times lower than those of imported species in the same price category.

Price Indexes for Logs and Lumber

Figures IV.4 and IV.5 display indexes for the nominal Yen wholesale price of selected log and lumber products from 1990 to July of 1994. The effect of North American supply restrictions is clearly discernible in the sharp increase in Douglas fir and Western hemlock prices beginning in 1992. However, owing too the more than 30 percent appreciation in the Yen against the U.S. dollar since 1990, these increases are much smaller than those experienced by log and lumber sellers in the United States and elsewhere. Following a peak in the Spring of 1993, log prices for Russian larch and New Zealand Radiata pine have fallen well below their 1990 level. Prices for domestic Japanese species have declined even further. Lumber prices show a similar trend, with Douglas fir prices posting significant gains and Western hemlock increasing slightly. The Douglas fir price indexes shown here for logs and lumber both stand at 121 percent of 1990 levels. Prices for hardwood logs (also in short supply) have followed a trend similar to that of Douglas fir, with nominal Yen prices for S.E. Asian Lauan logs (not shown here) up 30 percent over 1990.[56]

Rather than simply reflecting cyclical market fluctuations, the observed increases in the price of Douglas fir and Western hemlock (and tropical hardwoods) reflect the ongoing major structural adjustment of global timber markets to long-term supply constraints. As a result, predictions of persistent increases in the real price for wood products have become common. The USDA Forest Service has predicted an annual real price increase for stumpage in the U.S. Pacific Northwest of 2.8 percent through 2020.[57] Similarly, a recent CINTRAFOR analysis, based on a simulation run of the CGTM trade model, predicts a 20 percent increase in real log prices in the U.S. Pacific Northwest by 2030 assuming pre-1990 public lands harvest plans. A 50 percent real price increase for logs results under a "preservation alternative case" which is more in keeping with current land-use and wildlife habitat preservation developments in the region. Other producing regions considered in the study exhibit greater relative price gains (due primarily to their lower prices at the beginning of the simulation period).[58]

Recent gains in the value of the Yen have greatly reduced the price increases (in Yen terms) for many of the wood products imported by Japan. Nevertheless, strong price increases persist for Douglas fir, and the prices of all the products considered in this study have changed considerably relative to each other. These changes have begun to exhibit strong impacts on the Japanese market. In the first half of 1993, the total volume of imports of North American (Canada and the U.S.) logs fell by only 0.06 percent relative to the same period for 1992,[59] This level of trade, however, was sustained largely through "panic buying" by Japanese mills anxious to secure log inventories in order to maintain production and sales. Consequently, inventories at ports and mills increased rapidly, and imports (along with prices) fell sharply in the last half of 1993. North American log

---

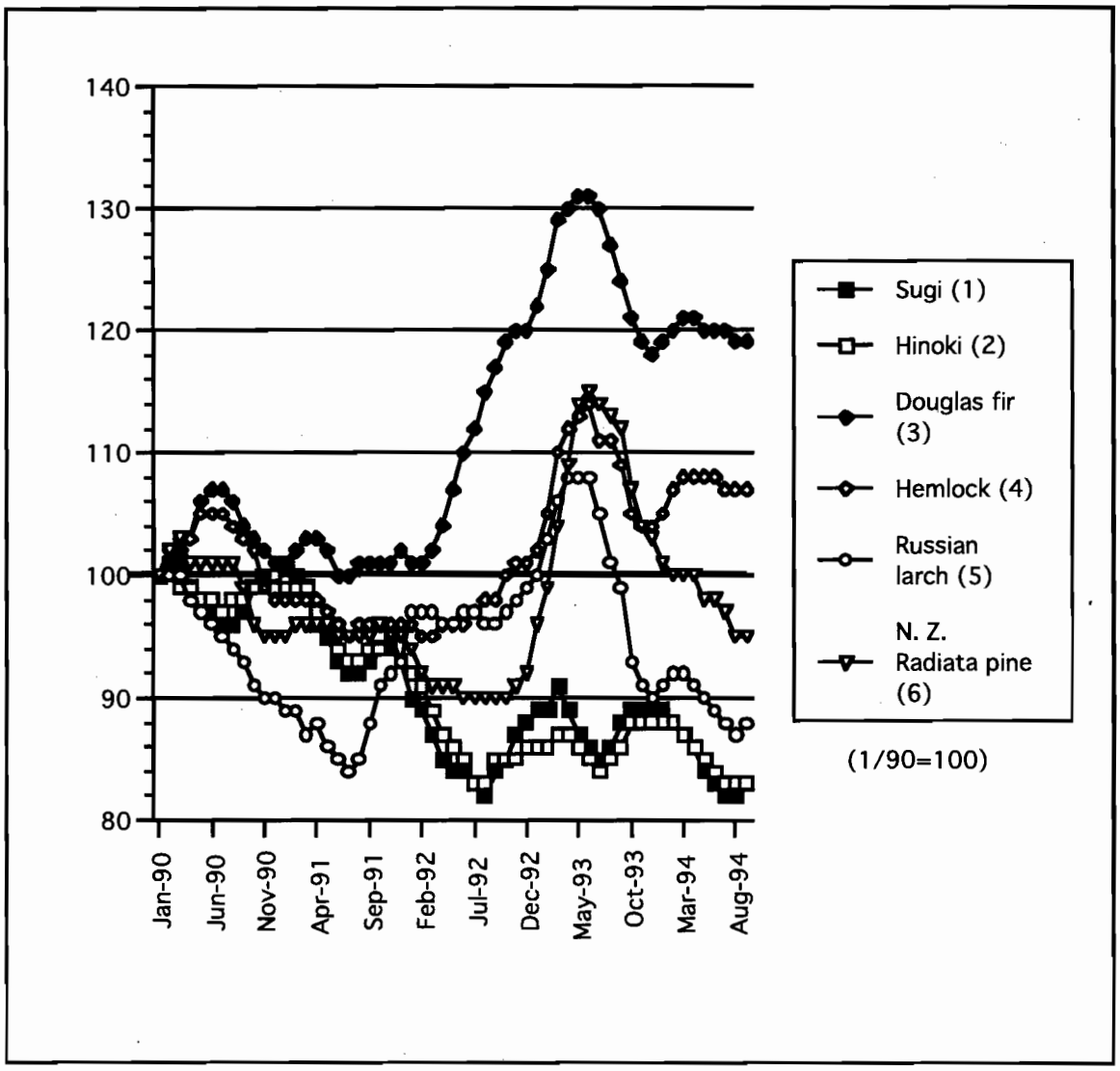
[56]This figure represents a significant decline from the early Summer of 1993, when Lauan log prices peaked at 170% of their 1990 level.

[57]USDA Forest Service, 1990.

[58]Perez-Garcia, 1993.

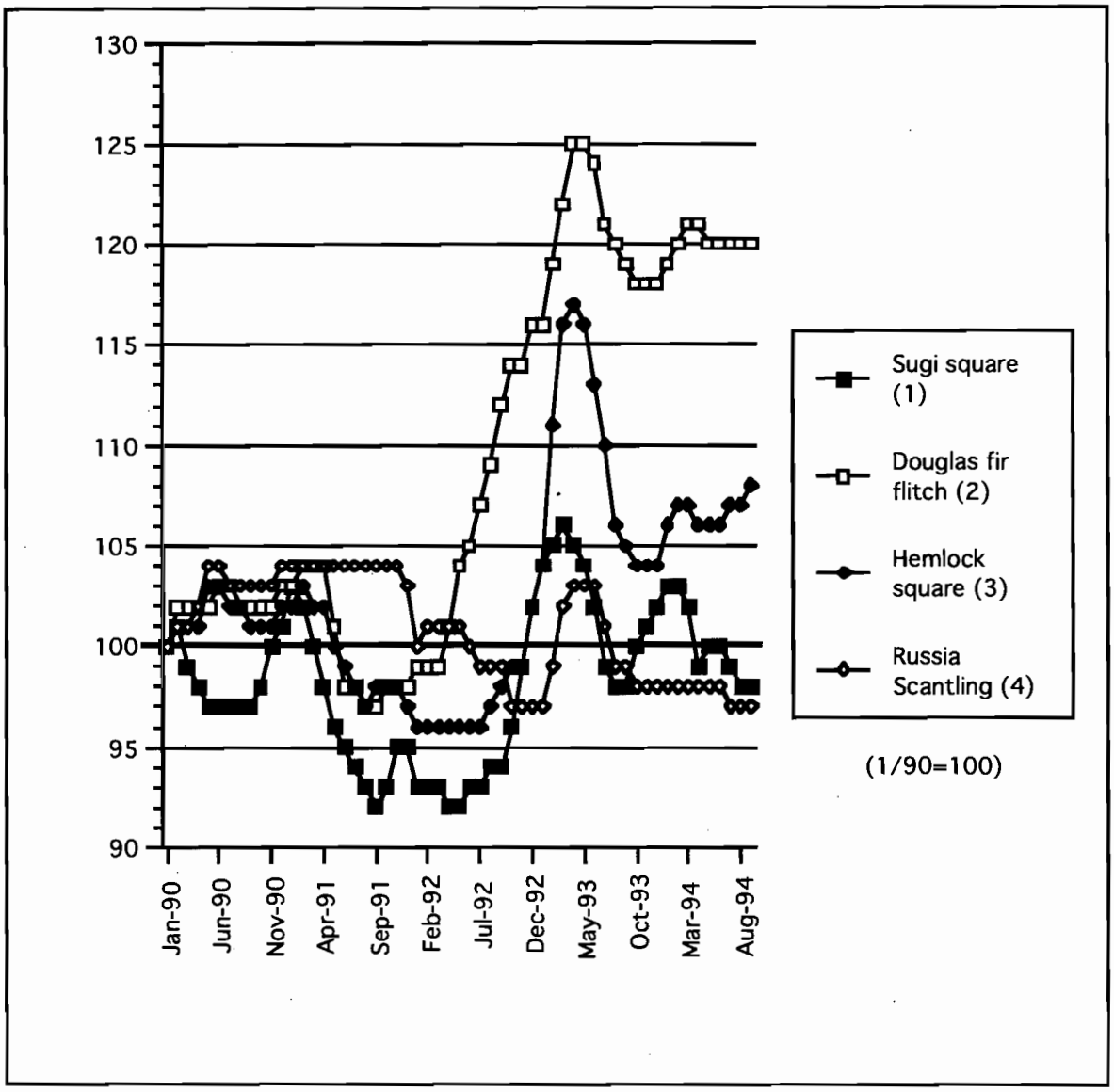
[59]Japan Lumber Reports, 8/20/93. Species breakdown is: Douglas fir +8.3%; Western hemlock -7.7%; Sitka spruce -33%.

Figure IV.4 Wholesale Price Indexes for Major Japanese Sawlogs by Species (1/90-9/94)



Source: Japan Wood-Products Information and Research Center (JAWIC)
(1) Sugi sawlog mixed grades 14-22cm X 3.65-4m; (2) Hinoki sawlog mixed grades 14-22cm X 3.65-4m; (3) Douglas fir no. 3 sawlog 30+cm X 6+m; (4) Western Hemlock no. 3 sawlog 30+cm X 6+m; (5) Russian larch mixed grades 20-28cm X 3.8+m: (6) New Zealand Radiata pine mixed grades 30+cm X 4.8+m

Figure IV.5 Wholesale Price Indexes for Major Japanese Sawnwood Items by Species (1/90-9/94)



Source: Japan Wood-Products Information and Research Center (JAWIC)
(1) Sugi Square no. 1 grade 10.5cm X 10.5cm X 3m; (2) Douglas fir flitch no. 1 grade 10.5-12cm X 24cm X 3.65-4m; (3) Hemlock Square no. 1 grade 10.5cm X 10.5cm X 3m; (4) Russia Scantling no. 1 grade 3.5-4.5cm X 3.5-4.5cm X 3.65-4m

imports in July 1993 , for example, were 19 percent below those of July 1992, while consumption of imports fell by only 10 percent over the same period.[60]. The year end result was an 11 percent decline in U.S. log imports in 1993. Conversely, North American lumber imports increased by 22 percent in the first half of 1993, partially as a result of lumber purchases by Japanese mills attempting to substitute lumber for logs in order to maintain their product throughput for remanufacturing and marketing. Year end figures, however, show a slight decline in lumber imports from the U.S. as well.

Price and consumption trends for other suppliers demonstrate the stratified nature of the Japanese softwood market. Russian timber has made gains in the Japanese softwood import market during the last year. Imports of Russian logs and lumber during the first half of 1993 showed a 34 percent and 17 percent increase (in volume) respectively over levels for the first half of 1992. Year end figures for 1993 show an approximate 25 percent increase for both log and lumber imports from Russia over the previous year. The widening price differential between Russian products and those from North America is undoubtedly the primary cause for this increase.[61]

Even at the relatively lower prices, however, some Japanese wholesalers and mills are reporting a lack of profitability in their Russian whitewood operations. This, in turn, indicates the generally lower valued end-uses for which Russian species are used and the inability of these products to penetrate the market for higher-valued lumber uses in traditional housing construction. New Zealand Radiata pine has experienced greater price gains, but demand has fallen more recently due to a decrease in demand for packaging materials and paper products resulting from the Japanese recession. Here again, this species has not been able to establish itself as a viable substitute for North American sawlogs and lumber in housing construction end-uses.

Future Potential for Suppliers of Softwood to Japan's Market

USA

Due to growing uncertainties surrounding questions of forest land conservation and habitat set-asides (notably spotted owl habitat and the protection of anadromous fish populations), the future timber supply potential of Oregon and Washington is very much unclear.[62] Restrictions will be most acutely felt in the supply of high quality sawlogs from old-growth forest stands (currently the focal point of the majority of preservation efforts in the region). The majority of such forests are in Federal and state ownership, however, and timber on these lands has been subject to log export bans for a number of years. Even in the absence of conservation-driven land-use changes, standing volumes of Pacific Northwest old-growth timber are rapidly declining, and recent levels

[60]Japan Lumber Reports 9/10/93.

[61]It should be noted that Russian exports of timber were significantly lower in the first half of 1992 due to the impact of economic reforms, export license and tax policies, and greatly increased rail transportation charges. Gains in 1993 essentially restored pre-1992 levels of trade after this disruption.

[62]Adams, 1992. Perez-Garcia, 1991.

of harvest could not be maintained for more than a few years These forests, if available for harvest, can only be utilized at greater cost since many remaining stands are on less accessible sites. Added uncertainty about future harvests also applies to stands of larger diameter second growth sawlogs on both public and private lands, which provide potential spotted owl habitat and are thus potentially subject to harvest restrictions. In either case, it is the stands which possess the highest stumpage value which are the most highly valued by the conservation community.

Although predictions of future harvests from the U.S. Pacific Northwest vary widely, it is certain that volumes harvested in the coming decade will be well below the averages of the mid to late 1980s. A 1991 study predicted a 19 percent decline in Pacific Northwest harvests by the year 2000.[63] Given current political developments, it is likely that this estimate will prove to be somewhat optimistic. As a result of the increases in real stumpage prices resulting from the supply constraints, it is expected that private owners in the region may temporarily increase harvests and management intensity, but in the near to mid-term, gains from these ownership classes will be modest at best due to a lack of mature standing volume. This is especially so for industry lands which form the bulk of private harvests.[64] Likewise, any gains from increased forest management intensity are expected to have little impact in the medium term as stands subjected to such treatments will be several decades from harvest age. A common estimate for the decline in Oregon and Washington total harvest (public and private) relative to the latter half of the 1980s is 25 to 30 percent.[65] In volume terms, this would mean a reduction from an 1985-90 average of 15 billion board feet to a approximately 11 billion board feet.

As a result, Japan can expect to obtain a shrinking volume of high quality and old-growth logs which have been purchased from the Pacific Northwest in the past.[66] Already there have been significant price impacts in the Japanese softwood market. This will stimulate the acceptance in Japan of lower quality wood products which have not been imported in comparatively large volumes in the past. Indications of this have already be seen in the increasing volumes of imported second-growth logs and baby squares (3 1/2' to 4 1/2' squares) for use in traditional housing construction. In the past four-sides-clear squares were primarily demanded, whereas two-sides and even one-side-clear products are now often accepted.[67] This trend can be expected to continue, along with the substitution of other non-wood products. Much of the U.S. Pacific Northwest's supply potential in relation to the Japanese sawnwood market will depend on the availability of relatively high quality second-growth. Top quality second-growth sawlogs, however, are predicted to be in short supply until at least 2010, as a majority of the region's tree plantations are in the younger age classes.

---

[63]Mills and Haynes, 1991.

[64]Adams, 1990.

[65]Forest Ecosystem Management Assessment Team, 1993.

[66]Due to long standing restrictions on the export of federal timber and, more recently, state timber, old-growth has not been a significant factor in total log exports in recent years.

[67]"Four-sides-clear" refers to sawn "squares" with all four faces clear of knots or other defects.

Canada

Although exporting a different species and product mix to Japan, British Columbia, and Canada as a whole, will likely experience many of the same types of supply restrictions currently facing Oregon and Washington. Like its neighbors to the South, British Columbia has depleted much of its stock of high-value coastal old-growth, and forest stands which remain are increasingly inaccessible (a large problem throughout British Columbia's undeveloped mountain regions) and/or subject to growing demands for preservation. Moreover, natural regeneration in the B.C. region is slower than in the U.S. due to climate differences, and active planting to restock cuttover lands is a fairly recent development. As a result, British Columbia has not yet developed a substantial volume of intensively managed plantation stock or naturally regenerated second-growth in the coastal region. Recent years have seen an increase in planting and management intensities, and the national government is actively promoting these efforts,[68] but the expansion of inventory available for harvest resulting from this activity is not likely to be felt for many years.

This, however, does not mean that British Columbia will be facing an overall supply shortage. Large volumes remain in the Province's interior and more Northern areas. Increased potential harvests in these regions are thought to be adequate to offset an anticipated shortfall in coastal harvests.[69] Interior stands are most often Lodgepole pine and associated species which have regenerated after relatively recent fire disturbances and are considered to be of much lower quality than coastal old-growth. Likewise, Northern stands are comprised of different species and/or seldom reach the volumes and diameters of old-growth stands in the Southern coastal region. Consequently, it is expected that, while the current volume of total provincial harvest may be sustained or even increased, the quality of timber extracted from British Columbia's forests will decline. Much of this timber will be sufficient for the production of dimension lumber which Canada has traditionally supplied to the United States in large quantities. However, it will be more difficult to meet the current structural and aesthetic specifications of the Japanese traditional housing market. Domestic processing, with the export of selective products meeting the requirements of remanufacture, in contrast to whole log exports, is favored as exporters seek only the best components of each tree.

Russia

A great deal of recent attention has been given to the future economic supply potential of the Russian Far East's vast forest resources.[70] Though Russian exports of softwood to Japan have been initially responsive to supply restrictions elsewhere, it is expected that, in spite of the physical volume of standing timber, Russian harvests in the near to medium-term will be substantially constrained by both economic and environmental factors. Capital is desperately needed to develop more remote stands and to provide the infrastructure needed to transport logs to export ports and, ultimately, destination markets. Due to a lack of adequate capital formation in Russia itself, much

[68]Manning and Wilson 1991.

[69]Dellert, 1991.

[70]Backman and Waggener, 1994 and 1990.

of the necessary money will have to come from foreign sources. Significant foreign investment in the region seems unlikely in the near-term given the current climate of economic uncertainty and political instability in the former Soviet Union. This problem is further exacerbated by the lack of an adequate financial system to support and insure foreign investments in the face of rapid political and economic change.

In addition to restricting the volume of log exports, the lack of adequate plant and infrastructure will also tend to restrict domestic processing of sawnwood products. At present, the small volume of lumber Russia does export to Japan is reported to be of relatively poor quality. Consequently, Russian exports to Japan will continue to favor logs over lumber until such time that substantially improved production capacity utilizing modern technology is installed.

Due to the reasons noted above, an increasing number of observers have voiced reservations about the ability of the Russian Far East to substantially increase softwood supplies to the Pacific Rim. Trends over the last year have shown that Japanese mills are willing to seriously consider the feasibility of substituting Russian timber for Douglas fir and Western hemlock in the production of lumber for traditional housing. But many mills have reported a lack of profitability in doing so, and North American species are still preferred. As a result, increases in Russian harvests and exports, should they occur, can be expected to be primarily competitive in lower-valued products such as dimension lumber and the smaller pieces in traditional housing for which Russian wood has been used in the past. Moreover, a large proportion of any increase in Russian harvests may be diverted to other growing Asian economies (particularly China) where high quality considerations are not as significant as in the Japanese market.

New Zealand

In recent years New Zealand's fast growing Radiata pine plantations have attracted increasing attention due to their international supply potential. During the first half of this century, New Zealand began an extensive program to restock its forest lands. Beginning in the 1960s, the forestry sector began planting and intensively managing (pruning and thinning) plantations with the express purpose of fostering a major export industry based on relatively greater volumes of higher grades and clearwood. The result has been a large softwood plantation resource, an increasing proportion of which will reach harvest age in the next two decades. Substantial increases in New Zealand Radiata pine are a near certainty. One study, for example, has projected a more than two-fold increase in sawlog removals from their 1986-92 yearly average of roughly 6.1 million CUM to close to 16 million CUM for the period 2016-20, with much of this increase potentially occurring at the turn of the century.[71] In response to both market developments and increasing stocks, sawlog removals have already shown strong growth, reaching a level of 8.5 million CUM in 1992 (an increase of close to 60 percent over 1989 levels).

---

[71]Evison, 1990. The USDA Foreign Agricultural Service (1992) cites a New Zealand government prediction of 23 million CUM of roundwood removals in the year 2005. In recent years, sawlogs have comprised roughly 60 percent of total roundwood removals, and thus the 16 million CUM figure for sawlogs cited in the Evison paper is generally in agreement with government predictions.

Table IV.1 New Zealand Stocked Plantation Forest Area (1991)
(ha.)

Age Class	Radiata Pine	Douglas fir	Other Softwoods	Hardwoods	Total	% of Total
1-5	195,714	5,748	1,721	5,113	208,296	18%
6-10	258,521	9,913	5,711	6,301	280,446	24%
11-15	231,658	7,265	4,254	6,877	250,054	21%
16-20	206,582	5,782	1,998	1,905	216,267	19%
21-25	97,207	9,786	3,147	1,279	111,419	10%
26-30	37,501	7,123	4,243	455	49,322	4%
31-35	10,850	4,051	2,600	197	17,698	2%
36-40	3,960	1,622	989	104	6,675	1%
41-50	2,480	859	1,936	277	5,552	0%
51-60	490	2,944	5,749	165	9,348	1%
61-80	2,489	4,198	5,291	491	12,469	1%
Total	1,047,452	59,291	37,639	23,164	1,167,546	100%
% of Total	90%	5%	3%	2%	100%	

Source: NZ Forestry Stats; Ministry of Forestry

Further increases will be the direct result of the high percentage of New Zealand plantations in the younger age classes. Table IV.1 shows that fully 82 percent of the 1.2 million hectares of tree plantations are under 20 years of age. About 90 percent of total plantation area is Radiata pine, and an even higher percentage of the younger plantations is planted in this species. Given the short rotation of Radiata pine and active planting on the part of New Zealand forest owners, predicted increases in harvests should be sustainable.[72] The plantation species composition also indicates that current exports of Douglas fir products will not expand in the future, and that Radiata pine will continue to dominate both production and exports. These exports, in turn, will have to rely upon greater market acceptance of Radiata pine abroad.

Current efforts in New Zealand are directed towards raising the quality of their product through intensive forest management and improved processing techniques aimed at limiting and/or removing defects. Pruning to create clear wood has been undertaken on many plantations, and, in the area of processing, the removal of knots and subsequent finger-jointing of lumber is common. This has helped Radiata pine gain better acceptance in the area of dimension lumber. New uses for the species are also emerging in Japan's traditional housing sector where larch and Japanese domestic pines presently predominate.

It is questionable, however, whether Radiata pine will be accepted as an adequate substitute (both aesthetically and structurally) for Hemlock, Douglas fir or Sugi in the higher valued residential construction end-uses. Moreover, pruning in New Zealand's Radiata pine plantations has reportedly not been sustained as extensively as initially planned, nor has it always achieved the anticipated quality gains. Similarly, techniques used to remove defects common to the species will

[72]Rotation ages of approximately 28 years have been envisioned for intensively managed (thinned and pruned) Radiata pine plantations. In practice, rotations can be expected to vary from about 25 to 35 years based on market conditions and other economic factors.

add significantly to waste and increase processing costs. Consequently, a substantial increase in the use of New Zealand Radiata pine for traditional post & beam housing construction in Japan is not anticipated. This is especially the case for the specific end-uses for which North American Douglas fir and Western hemlock are commonly used. In other markets, such as Western 2x4 frame housing and prefabricated construction, the market potential for Radiata pine is more favorable. Additionally, growing demand from other Asian countries where quality considerations are not as important could divert significant quantities of New Zealand logs and lumber away from the Japanese market.

Chile

Chile accelerated establishment of conifer plantations beginning in the early 1970s. During the period from 1978 to 1986 an average of about 75 thousand hectares of conifer species, mostly Radiata pine, were planted annually. As shown in table IV.2, Chile now possesses over 1.3 million hectares of Radiata pine plantations, with almost 80 percent of this area planted in stands which are currently less than 15 years of age. Both in terms of size and age structure, this resource is very similar to that of New Zealand.[73] The species composition of Chile's total plantation resource is given in table IV.3. Eucalyptus comprises the bulk of the remainder, and, consequently, Chilean plantation softwoods other than Radiata pine will have virtually no effect on Pacific Rim trade in softwood products.[74]

The similarity between New Zealand's and Chile's forest plantations has given rise to similar predictions of increased production. Significant increases in Chile's softwood production are predicted beginning in the late 1990s. Total production is expected to reach a level of between 21 and 27 million CUM by the turn of the century, with sustained or slightly increasing volumes to the year 2015.[75] These figures represent roughly a doubling of current harvest.

Chilean softwood production presents the potential of increased supply to the Japanese market, but with the same problems faced by New Zealand. These, together with logistical and transportation factors, could restrict increased market penetration. Without a significant change in Japanese traditional preferences and building practices, Radiata pine will be largely constrained to mid to low values end-uses in the Japanese softwood market. Chile will most likely face increasingly stiff competition from New Zealand, and from lower grade products from the Russian Far East and the interior of Canadian British Columbia. Moreover, demand for Chile's available supply by South American neighbors, Mexico, the U.S., and other Asian countries could greatly reduce volumes of Chilean softwoods available to Japan.

---

[73]In the past, pruning, thinning and other management activities aimed at increasing the quality of Radiata pine products have been less common in Chile than in New Zealand. Beginning in the early 1980s, however, Chile began to expand management efforts in this area considerably. The impact of these efforts is expected to begin sometime in the latter half of the 1990s. See Jelvez, Blatner and Govett, 1990.

[74]Figures for production of non-plantation conifers by species were not available. However, Radiata pine comprised 90 percent and 99 percent of 1992 sawnwood and sawlog exports, respectively, indicating the overwhelming importance of Radiata pine in Chile's sawlog and sawnwood exports.

[75]USDA Foreign Agricultural Service. 1993

Table IV.2 Chilean Radiata Pine Plantations (1992)

(ha., 1,000 CUM)

Age Class	Area	Volume	% of Total Area	% of Total Volume
<1	81,868		6%	
1-5	337,235		26%	
6-10	314,457		24%	
11-15	301,866	62,273	23%	37%
16-20	208,987	73,722	16%	43%
21-25	59,323	28,763	5%	17%
26-30	6,175	3,522	0%	2%
>30	2,901	1,830	0%	1%
Total	1,312,812	170,110	100%	100%

Source: Estadisticas Forestales 1992, Instituto Forestal

Table IV.3 Chilean Industrial Plantations by Species (1992)

(ha.)

Species	Area	Percent
Radiata Pine	1,312,812	84%
Eucalitptus	171,520	11%
Atriplex	46,003	3%
Tamrugo	20,600	1%
Douglas fir	12,135	1%
Ajamo	3,718	0%
Algarrobo	3,201	0%
Others	2,155	0%
Total	1,572,144	100%

Source: Estadisticas Forestales 1992, Instituto Forestal

Technological Change

Throughout this paper the stratification of the Japanese structural lumber market has been stressed. Market differentiation supports high prices for increasingly scarce quality softwood products. Technological innovations which allow for the substitution of lower quality species in end-uses which have been traditionally dominated by North American conifers as well as domestic Japanese species could moderate price increases resulting from supply restrictions. A major development could be the use of new laminate technologies to produce large-sized Japanese lumber pieces using clear conifer veneers glued onto lower priced softwood cores or other low-cost composites. Anecdotal information suggests increasing use of such innovative products and further efforts to develop and perfect such technology. It should be noted, however, that this technological innovation and others like it, increasingly stress capital intensive processing, an area where the United States presently has a comparative advantage over the other softwood supplier-exporter countries reviewed in this paper (with the possible exception of Canada).

V. CONCLUSION AND RECOMMENDATIONS

Russia is Japan's other major long-standing supplier of softwood sawlogs. In spite of the great size of the Russian resource, economic and political problems make it doubtful that exports to Japan will be significantly increased in the near future. Furthermore, whatever increases do occur will not be of the quality level that Japanese mills and home builders have come to expect from North American products. New Zealand and Chile also possess the potential to increase exports to Japan. However, Radiata pine, which comprise the bulk of both New Zealand's and Chile's forest resource, is also not felt to be of sufficient quality to adequately substitute for North American species.

Japan imports a variety of softwood sawnwood and sawlog products from countries around the Pacific Rim. Each of these countries supplies a different product mix due to the size, species composition and other characteristics of its resource base and the nature of its processing capacity. The West coast of North America has long been Japan's largest foreign softwood supplier, providing not only the highest volumes but also the highest value products. Western hemlock and Douglas fir imported from British Columbia, Washington and Oregon have become a mainstay of the traditional residential construction lumber market, and whole log imports from the U.S. Pacific Northwest have fostered a substantial sawmilling industry in Japan serving this important market.

At the same time that the supply of softwood products used in Japanese residential construction is contracting, demand for housing is predicted to remain strong well into the next century. While substitute wood construction technologies have made inroads into the market, traditional post and beam construction still maintains over 85 percent share in the Japanese market for wooden housing construction. It is this market segment which has maintained the high prices enjoyed by North American producers in the past and which will continue to offer some of the best market opportunities in the future.

In particular, it has been argued throughout this paper that the traditional housing market provides a specific market where for Pacific Northwest Douglas fir and Western hemlock can further develop their comparative advantage in higher valued housing components. Products aimed squarely at this market can expect the greatest insulation from expected supply increases in lower quality softwoods from Russia, New Zealand and Chile. A great deal of promotional effort has been devoted by U.S. governments and firms to promoting Western 2x4 and similar construction methods in Japan. While producing substantial benefits, these efforts do not necessarily emphasize the strong points of Pacific Northwest species. Greater stress needs to be placed on ways to increase value-added exports to the traditional construction sector.

These value added exports could take one of two forms. The first would be increased quality through more intensive management practices. Lengthened rotations, thinning and pruning have been discussed as a means of increasing quality while achieving greater environmental amenities and levels of employment. The Japanese traditional housing market would be a natural outlet for

products flowing from these new management regimes. There are risks associated with this approach however. In particular, changing preferences and technological innovations (allowing for lower quality substitutes) could lessen expected price increases over the years between investment in management and final harvest. Nevertheless, measures directed towards increasing quality should be seriously considered given the changing supply and demand situation described in this paper.

The other approach to exploiting the value-added potential of Japan's traditional housing market lies in increased exports of finished and semi-finished products cut to the appropriate (metric) specifications. Steady and continuing declines in Japan's domestic sawmilling industry promise to further increase opportunities to export lumber in the future, but to fully exploit this opportunity U.S. producers will have to gain increased access to the traditional construction sector. Due, in part, to policy constraints on log exports, Canada has already made significant inroads in this area. But here again there are risks, including product rejections, increased information costs and other risks and costs involved in supplying a complex foreign market. However, while some U.S. companies have reported difficulties, others have enjoyed strong successes. Opportunities for such successes will likely grow in the future, but they will be contingent upon the availability of medium to high quality stumpage. Higher quality second growth Douglas fir and Hemlock have already gained broad acceptance in the Japanese traditional housing market, and it will be the extent of this resource which will largely determine the U.S. Pacific Northwest's competitive advantage in the Japanese market in the future.

To maintain competitiveness in the highest value markets for wood products in Japan will be a continuing challenge to U.S. Pacific Northwest producers given decreased overall timber supplies, pressures for reducing unprocessed log exports and a rapidly changing raw material mix away from old-growth to intensively managed second-growth. Northwest species have enjoyed a high reputation in Japan—primarily gained by the local processing of imported U.S. logs for premium components for use in traditional post and beam residential construction. In devising successful strategies for replacing log exports with value-added wood products it is important to recognize this source of comparative advantage and act accordingly.

BIBLIOGRAPHY OF SOURCES CITED

Adams, Darius M., "Public Policies, Private Resources, and the Future of the Douglas-Fir Region Forests Economy," in the *Western Journal of Applied Forestry*, 5(3), 1990.

Adams, Darius M., R .J. Alig and D. J. Anderson, *Future Prospects for Western Washington's Timber Supply*. College of forest Resources, University of Washington, 1992.

Backman, Charles and T. R. Waggener, *The Russian Forestry Sector Outlook and Export Potential for Unprocessed Logs and Primary Forest Products Through 2000*. Working Paper 46, CINTRAFOR, University of Washington, Seattle, 1994.

Backman, C.A., and Thomas R. Waggener, *Soviet Forests at the Crossroads: Emerging Trends at a Time of Economic and Political Reform*. Working Paper 28, CINTRAFOR, University of Washington, Seattle, 1990.

Briggs, D. G., and N. Dickens, *An Evaluation of Japanese Softwood Lumber Grading Systems and their Implications for North American Export Lumber Producers*. CINTRAFOR Working Paper #2 : Seattle, 1984.

Dellert, Lois H., "What is British Columbia's Timber Supply Forecast to the Year 2050," in Brand, David G., ed., *Canada's Timber Resources, Petawawa National Forestry Institute*, Information Report PI-X-101, Forestry Canada, 1991.

Evison, D., "New Zealand Wood Products Industry in the 1980s and Beyond," *New Zealand Forestry*, May, 1990:22-27.

Flora, Donald F., "Trade Issues in the Northern Pacific Rim Countries," in *Pacific Rim Forestry: Bridging the World*, Proceedings of the 1991 SAF National Convention, August 4-7, 1991.

Forest Ecosystem Management Assessment Team. *Forest ecosystem management : an ecological, economic, and social assessment / report of the Forest Ecosystem Management Assessment Team.* United States Department of Agriculture, Forest Service ... (et al.). U.S. Government Printing Office, (1993).

Handa, Ryoichi, ed., *Forest Policy in Japan*. Tokyo : Nippon Ringyo Chosakai, 1988.

Japan Forest Agency, *Ringyo Hakusho* 1992 (Forestry White Paper), Nihon Ringyo Kyokai, 1993.

Japan Lumber Reports, *Forest Products Manual Series (1): Log Business in Japan*, 1989.

Japan Lumber Reports, *Forest Products Manual Series (2): Lumber Business in Japan*, 1990.

Japan Ministry of Agriculture, Forestry and Fisheries (MAFF), Department of Statistics, "Survey Report on Plantation Cost, Survey on Forest Household Economy, Fiscal Year 1986." Tokyo : Norin Tokei Kyokai, 1988.

Jelvez, A., K. Blatner and R. Govett, "Forest Management and Production in Chile." J. of Forestry, March, 1990.

Jelvez, A., K. Blatner and C. Mcketta, *A Profile of the Chilean Forestry Sector*, Working Paper 17, CINTRAFOR, University of Washington, Seattle, 1988.

Kitabatake, Yoshifusa, "What Can Be Learned from Domestic and International Aspects of Japan's Forest Resource Utilization," in *Natural Resources Journal*, Vol. 32, 857-881 (1992).

Lyon, Kenneth S., and Roger A. Sedjo, "Comparative Advantage in Timber Supply: Lessons from History and the Timber Supply Model," in Nemetz, Peter N., ed., *Emerging Issues in Forest Policy*. Vancouver : UBC Press, 1992.

Manning, G. H., and W. R. Wilson, "Will Canada Remain Competitive in Pacific Rim Markets," in *Pacific Rim Forestry: Bridging the World*, Proceedings of the 1991 SAF National Convention, August 4-7, 1991.

Mills, John R., and Richard W. Haynes, "Resource Conditions Around the Pacific Rim: The Pacific Coast States," in *Pacific Rim Forestry: Bridging the World*, Proceedings of the 1991 SAF National Convention, August 4-7, 1991.

Moffett, Jeffrey L., and Thomas R. Waggener, *The Development of the Japanese Wood Trade: Historical Perspective and Current Trends*. CINTRAFOR Working Paper No. 38, 1992.

N.Z. Ministry of Forestry, Statistical Release, SR 11/1993.

Perez-Garcia, John M., *Global Forestry Impacts of Reducing Softwood Supplies from North America*, Working Paper 43, CINTRAFOR, University of Washington, Seattle, 1993.

Robertson, Guy C., and Thomas R. Waggener, *Japan's Forest Production for Increasing Self-sufficiency: A Reassessment of Near-term Capacity and Economic Potential.* CINTRAFOR Working Paper No. 40, 1992.

Sakai, Masahiro, "Changes in the Location of the Sawmill Industry in Japan in the 1980s," in *The Current State of Japanese Forestry (VII): Its Problems and Future.* IUFRO Division 4. Tokyo : The Japanese Forest Economic Society, 1992.

Shin, Craig W., *British Columbia Log Export Policy: Historical Review and Analysis.* U.S.D.A. Forest Service, P.N.W. Research Station, Research Paper. PNW-RP-457. 1993

Takahara, Shigeru, *Potential Supply of Japanese Man-made Forests*. Masters thesis presented to the University of Washington School of Forest Resources, Seattle, Washington, 1989.

U.S. Dept. of Commerce, International Trade Administration, Office of Forest Products and Domestic Construction, Basic Industries Sector, *The Japanese Wood Products Market: Profile and Outlook*. U.S. Department of Commerce, April 1989.

USDA Foreign Agricultural Service. 1993. Forest Products Annual Report-New Zealand. #NZ3035.

USDA Forest Service, Richard W. Haynes, Coordinator, *An Analysis of the Timber Situation in the United States: 1989-2040*, General Technical Report RM-199, December, 1990.

Waggener, Thomas R., "The Near Term Outlook for Soviet Far East Timber as a Competitive Supply in Asia Markets," in *Pacific Rim Forestry: Bridging the World*, Proceedings of the 1991 SAF National Convention, August 4-7, 1991.

Yorimitsu Ryozo, "Thriving Housing Construction in Japan and the Factors Contributing to It," in *The Current State of Japanese Forestry (VII)*. IUFRO : Tokyo : The Japanese Forest Economic Society, 1992.

STATISTICAL APPENDIX

Much of the statistical information in section II regarding Japanese softwood log and lumber imports was obtained from the Japan Lumber Journal. For more than thirty years this journal has published yearly figures (typically in their March 20 edition) for Japanese imports of logs and lumber by species and lumber size. Though the source of this data is not cited, it is assumed that it is obtained from the Japan Ministry of Finance, which compiles statistics for all Japanese import categories. Statistics used from this source are presented in tables A.1 through A.4.

Price data used in section IV were obtained from the Japan Wood-Products Information and Research Center (JAWIC, formerly the Wood-Products Stockpile Corp., Japan). Since 1977, this organization has published monthly statistics on Japanese imports of logs, lumber and plywood, wholesale prices for these products, housing starts, and general Japanese economic indicators. Average Yen wholesale prices from this source are listed in tables A.5 through A.7.

New housing starts by number of units and floorspace are shown in tables A.8 and A.9. These statistics were compiled from a number of different publications, all of which cite the Japan Ministry of Construction as their original source. While statistics for the number of new starts in the wood and non-wood categories are consistent across all publications, some discrepancies exist in the reported number of 2x4 and prefabricated housing units.

A useful recent compilation of statistics related to Japanese production, consumption and trade in wood products is found in The Forest Products Yearbook of Japan 1994-95, published by Japan Lumber Reports (see bibliography). Additionally, Handa (1989) provides an extensive statistical appendix with an emphasis upon Japanese domestic forest resources and production prior to 1985.

Table A.1 Japanese Softwood Log Imports from Major Foreign Suppliers

(1,000 CUM)

Year	Canada	Chile	N.Z.	Russia	U.S.A.	Total
1960	22		150	922	356	1,450
1961	142		241	850	1,421	2,655
1962	285		255	1,196	1,444	3,180
1963	296		233	1,371	2,392	4,292
1964	207		318	1,754	2,979	5,258
1965	164		412	2,045	3,264	5,886
1966	279		498	2,584	4,109	7,470
1967	518		643	4,044	6,196	11,401
1968	534		1,283	5,034	8,564	15,416
1969	231		1,599	5,383	7,931	15,144
1970	538		1,686	6,271	9,511	18,005
1971	647		1,757	6,196	7,098	15,699
1972	252		1,808	6,837	10,409	19,307
1973	93		1,658	7,831	10,486	20,068
1974	157		1,160	7,224	8,507	17,048
1975	176		454	6,932	9,314	16,877
1976	248		800	7,359	10,037	18,444
1977	430	85	842	7,517	10,192	19,066
1978	312	93	777	7,919	10,317	19,417
1979	334	213	963	6,648	12,339	20,497
1980	435	326	777	5,178	10,180	16,896
1981	313	63	497	4,816	7,384	13,072
1982	358	80	421	5,023	8,074	13,956
1983	737	220	313	5,270	7,673	14,213
1984	1,192	353	306	4,502	7,186	13,539
1985	1,379	379	294	4,451	7,807	14,311
1986	1,427	270	260	5,120	8,319	15,395
1987	1,880	244	389	5,035	9,686	17,233
1988	1,186	216	569	5,027	9,390	16,388
1989	875	241	763	4,414	10,926	17,219
1990	512	312	1,343	4,073	10,215	16,455
1991	513	274	1,609	3,583	8,922	14,901
1992	741	162	1,861	3,615	8,443	14,822
1993	486	201	1,716	4,543	7,582	14,528

Source: Japan Lumber Journal

Table A.2 Japanese Softwood Lumber Imports From Major Foreign Suppliers

(1,000 CUM)

Year	Canada	Chile	N.Z.	Russia	U.S.A.	Total
1960	4				124	128
1961	259			1	279	539
1962	372			1	262	635
1963	622				252	874
1964	566		1	34	306	907
1965	477			45	264	786
1966	630			65	403	1,099
1967	1,092		15	116	576	1,798
1968	1,347		77	159	664	2,246
1969	947		99	108	633	1,788
1970	1,710		78	98	714	2,600
1971	911		90	102	630	1,733
1972	965		105	104	789	1,963
1973	1,337		104	140	1,338	2,919
1974	1,201		116	130	1,337	2,784
1975	989		83	102	1,086	2,260
1976	1,450	1	109	112	1,077	2,749
1977	1,656	20	185	116	966	2,943
1978	1,814	31	222	126	969	3,162
1979	2,083	34	293	133	1,522	4,064
1980	2,554	37	340	136	1,522	4,589
1981	1,816	2	258	122	1,100	3,297
1982	2,347	0	266	120	1,535	4,268
1983	2,005	26	271	129	1,363	3,793
1984	1,929	63	180	149	1,233	3,555
1985	2,162	101	155	152	1,319	3,888
1986	2,083	128	117	169	1,703	4,200
1987	2,767	214	132	179	2,180	5,472
1988	3,157	327	125	222	2,321	6,153
1989	3,696	326	106	261	2,626	7,015
1990	3,702	407	203	265	2,479	7,056
1991	4,217	397	258	240	2,405	7,516
1992	4,413	266	249	225	2,115	7,267
1993	5,457	398	235	285	2,023	8,398

Source: Japan Lumber Journal

Table A.3 Japanese Softwood Log Imports from Major Foreign Suppliers by Species. (1993)

(Cubic Meters; $1,000 Current U.S.)

USA	Vol.	Val.
Douglas Fir	4,784,105	1,446,003
Hemlock	1,518,015	372,915
Sitka Spruce	639,612	200,442
Spruce Fir	279,941	76,964
White & Yellow Cedar	155,677	81,524
Red Cedar	98,015	26,319
Pine	95,867	15,943
Larch	4,232	981
Others	3,433	1,255
Misc	2,611	764
Total	7,581,508	2,223,110

Canada	Vol.	Val.
Hemlock	213,821	52,812
Spruce, Fir	112,883	29,152
Sitka Spruce	97,594	33,704
Douglas Fir	45,181	20,497
White & Yellow Cedar	11,857	6,756
Red Cedar	2,927	703
Other	1,412	388
Pine	416	127
Total	486,091	144,139

Russia	Vol.	Val.
Spruce, Fir	1,931,869	224,233
Larch	1,368,412	145,099
Pine	1,201,161	150,623
Other	42,029	1,752
Total	4,543,471	521,707

New Zealand	Vol.	Val.
Pine	1,468,733	197,122
Douglas Fir	229,956	39,474
Larch	12,949	1,193
Cedar	4,190	507
Misc	273	118
Others	211	204
Total	1,716,312	238,618

Chile	Vol.	Val.
Pine	200,805	23,027
Douglas Fir	268	35
Total	201,073	23,062

Source: Japan Lumber Journal

Table A.4 Japanese Softwood Lumber Imports from Major Foreign Suppliers by Species. (1993)

(Cubic Meters; $1,000 Current U.S.)

USA	Volume	Value
Non-Spf, Planed	1,377,475	493,297
Douglas fir	221,807	113,902
Western hemlock	189,802	66,250
Sitka spruce	84,099	41,474
SPF, Planed	71,700	27,011
Spruce Fir	77,973	43,462
Total	2,022,856	785,396

Canada	Volume	Value
Non-Spf, Planned	2,013,285	654,787
Hemlock	1,240,805	403,296
SPF	1,008,582	312,828
Douglas Fir	257,024	135,593
White & Yellow Cedar	251,178	167,123
Pine	248,396	67,021
Sitka Spruce	207,751	99,177
SPF, Larch Mf;	229,868	80,380
Total	5,456,889	1,920,205

Russia	Volume	Value
Spruce, Fir	120,643	22,096
Pine	120,453	28,625
Larch	38,948	6,035
Other	4,685	1,124
Total	284,729	57,880

New Zealand	Volume	Value
Pine	215,634	48,225
SPF	9,588	5,057
Douglas Fir	7,467	2,147
Other	2,452	1,128
Total	235,141	56,557

Chile	Volume	Value
Pine	226,411	55,151
SPF	160,165	43,858
SPF Larch Mfg.	9,227	2,316
Non-SPF	2,374	617
Total	398,177	101,942

Source: Japan Lumber Journal

Table A.5 Average Yearly Wholesale Yen Price for Domestic and Imported Softwood Sawlogs Sold in Japan

(Average yearly price, Yen/CUM)

	Domestic Species					
	Red & Black Pine	Sugi-Large (2)	Sugi-Small (3)	Hinoki (4)	Japanese Larch (5)	Yezo & Todo spruce (6)
1984	23,500	26,700	19,200	55,600		
1985	23,700	25,600	18,800	53,900	15,000	20,400
1986	22,400	24,100	17,900	53,300	13,800	18,800
1987	22,300	25,000	18,100	60,400	12,400	16,800
1988	22,500	24,700	17,600	62,200	12,900	18,800
1989	23,400	25,900	18,500	66,200	13,500	20,200
1990	24,200	26,600	19,400	67,800	14,300	22,700
1991	23,500	25,600	18,900	65,700	14,200	22,200
1992	22,700	23,200	17,600	59,100	13,400	21,000
1993	23,600	23,900	18,000	59,100	13,400	22,100
1994*	22,200	22,300	17,100	57,100	13,200	21,700

	Imported Species						
	S.E. Asian Lauan (7)	Douglas fir (8)	Western hemlock (9)	N.A. Spruce (10)	Russian Spruce (11)	Russian Larch (12)	N.Z. Pine (13)
1984	51,600	26,800	25,700	44,500	22,700	19,200	22,200
1985	50,100	27,700	25,600	45,800	22,900	21,100	21,900
1986	44,200	23,100	21,200	42,200	20,100	17,200	18,000
1987	48,200	22,500	21,500	42,500	19,200	15,000	15,800
1988	49,800	22,500	22,500	43,500	22,000	16,200	15,200
1989	52,400	24,700	24,500	49,500	25,300	19,400	16,600
1990	53,800	26,700	26,500	51,700	25,600	20,400	18,300
1991	51,900	26,100	25,200		24,900	18,800	17,600
1992	53,300	28,700	25,300		23,900	20,700	16,800
1993	62,900	32,500	28,200		22,700	21,500	19,800
1994*	62,000	31,100	27,900		21,900	18,800	17,800

Source: Japan Wood Products Information and Research Center (JAWIC)

* 1994 prices are for August of that year.

(1) Japanese Red & Black Pine, 24-28 cm X 3.65-4.0 m; (2) Sugi Large, 14-22 cm X 3.65-4.0 m; (3) Sugi Small, 8-13 cm X 3.65-4.0 m; (4) Hinoki, 14-22 cm X 3.65-4.0 m; (5) Japanese Larch, 14-28 cm X 3.65-4.0 m; (6) Yezo & Todo spruce, 30-38 cm X 3.65-4.0 m; (7) S.E. Asian Lauan, 60+ cm X 4.0+ m; (8) Douglas fir, 30+ cm X 6.0+ m; (9) Western hemlock, 30+ cm X 6.0+ m; (10) "North American" (Sitka) spruce, 30+ cm X 6.0+ m; (11) Russian spruce, 20-28 cm X 3.8+ m; (12) Russian larch, 20-28 cm X 3.8+ m; (13) "New Zealand" (Radiata) pine, 30+ cm X 4.8+ m.

Table A.6 Wholesale Prices for Selected Softwood Sawlogs Sold in Japan (1/90-9/94, Monthly)

(Yen/Cum)

Date	Jan-90	Feb-90	Mar-90	Apr-90	May-90	Jun-90	Jul-90	Aug-90	Sep-90	Oct-90	Nov-90
Sugi (1)	27100	27500	27300	26900	26500	26200	26000	26000	26200	26700	27200
Hinoki (2)	68400	68200	67900	67700	67300	66700	66400	66700	66800	67400	68000
Douglas fir (3)	25900	26300	26500	26800	27500	27700	27600	27400	27000	26600	26400
Hemlock (4)	26000	26500	26700	26800	27300	27300	27300	27000	26700	26400	25800
Russian larch (5)	21300	21400	21200	20900	20700	20500	20200	20000	19800	19400	19200
N.Z. Radiata pine (6)	18400	18800	18900	18600	18500	18600	18600	18600	18300	17700	17500

Date	Dec-90	Jan-91	Feb-91	Mar-91	Apr-91	May-91	Jun-91	Jul-91	Aug-91	Sep-91	Oct-91
Sugi (1)	27200	27300	27100	26700	26100	25700	25300	25000	25000	25200	25500
Hinoki (2)	68100	68000	67800	67500	66600	65400	64100	63800	63800	64200	64600
Douglas fir (3)	26100	26100	26500	26600	26600	26300	26000	25900	26100	26200	26200
Hemlock (4)	25400	25400	25600	25600	25500	25100	24900	24800	25000	25000	25000
Russian larch (5)	19100	18900	18900	18600	18800	18400	18200	17900	18100	18800	19300
N.Z. Radiata pine (6)	17500	17400	17600	17700	17700	17600	17500	17500	17500	17500	17700

Date	Nov-91	Dec-91	Jan-92	Feb-92	Mar-92	Apr-92	May-92	Jun-92	Jul-92	Aug-92	Sep-92
Sugi (1)	25400	25100	24400	24100	23500	23000	22800	22700	22400	22300	22700
Hinoki (2)	65000	63500	63100	62200	61000	59800	58600	57800	56800	57100	57800
Douglas fir (3)	26200	26300	26100	26200	26500	27000	27800	28500	29100	29800	30400
Hemlock (4)	24900	24900	25000	24700	24800	25000	25000	25000	25100	25400	25600
Russian larch (5)	19600	19800	20600	20700	20700	20500	20400	20700	20600	20500	20500
N.Z. Radiata pine (6)	17500	17400	17300	17000	16800	16700	16700	16500	16600	16600	16600

Date	Oct-92	Nov-92	Dec-92	Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93
Sugi (1)	23000	23500	23800	24100	24200	24600	24100	23700	23200	23000	23400
Hinoki (2)	58100	58200	58600	58900	59100	59500	59200	58900	58000	57700	58200
Douglas fir (3)	30800	31000	31200	31600	32400	33300	33700	33900	34000	33600	33000
Hemlock (4)	26000	26200	26200	26600	27400	28700	29200	29500	29600	28900	28800
Russian larch (5)	20700	20900	21000	21300	21900	22500	22900	23000	23000	22300	21600
N.Z. Radiata pine (6)	16600	16700	16900	17600	18200	19100	20100	20900	21100	21000	20800

Date	Sep-93	Oct-93	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94
Sugi (1)	23800	24100	24000	24000	24100	23900	23600
Hinoki (2)	59100	60200	60300	60500	60100	60300	59600
Douglas fir (3)	32200	31300	30800	30600	30800	31100	31400
Hemlock (4)	28300	27300	27100	27100	27400	27800	28200
Russian larch (5)	21000	19900	19400	19200	19400	19600	19600
N.Z. Radiata pine (6)	20600	19700	19200	19000	18500	18400	18400

Source: Japan Wood Products Information and Research Center (JAWIC)

(1) Sugi sawlog mixed grades 14-22cm X 3.65-4m

(2) Hinoki sawlog mixed grades 14-22cm X 3.65-4m

(3) Douglas fir no. 3 sawlog 30+cm X 6+m

(4) Western Hemlock no. 3 sawlog 30+cm X 6+m

(5) Russian larch mixed grades 20-28cm X 3.8+m

(6) New Zealand Radiata pine mixed grades 30+cm X 4.8+m

Table A.7 Wholesale Prices for Selected Lumber Pieces Sold in Japan (1/90-9/94, Monthly)

(Yen/CUM)

Date	Sugi square (1)	Douglas fir flitch (2)	Hemlock square (3)	Russia Scantling (4)	Date	Sugi square (1)	Douglas fir flitch (2)	Hemlock square (3)	Russia Scantling (4)
Jan-90	63,900	51,400	55,600	56,200	Jan-93	66,300	59,700	58,000	54,600
Feb-90	64,500	52,300	56,300	56,500	Feb-93	67,400	61,200	61,500	55,500
Mar-90	63,500	52,400	56,400	56,700	Mar-93	67,900	62,600	64,500	57,500
Apr-90	62,700	52,300	56,400	57,600	Apr-93	67,100	64,200	65,000	58,100
May-90	62,300	52,300	57,000	58,400	May-93	66,200	64,400	64,500	58,000
Jun-90	62,300	52,700	57,100	58,300	Jun-93	65,000	63,800	62,900	57,900
Jul-90	62,000	52,700	56,900	58,100	Jul-93	63,400	62,400	61,000	56,700
Aug-90	62,100	52,600	56,700	58,100	Aug-93	62,700	61,600	59,100	55,900
Sep-90	62,000	52,600	56,400	57,900	Sep-93	62,500	61,300	58,400	55,600
Oct-90	62,400	52,500	56,200	58,000	Oct-93	63,600	60,800	58,100	55,200
Nov-90	64,100	52,600	56,100	57,900	Nov-93	64,500	60,700	57,900	55,300
Dec-90	64,800	52,900	56,700	58,200	Dec-93	65,200	60,800	57,900	54,900
Jan-91	65,500	53,000	56,500	58,200	Jan-94	65,500	61,200	58,800	55,100
Feb-91	65,300	53,500	57,100	58,400	Feb-94	65,500	61,600	59,500	55,300
Mar-91	63,600	53,500	56,900	58,500	Mar-94	64,900	62,000	59,400	55,300
Apr-91	62,400	53,200	56,500	58,500					
May-91	61,500	51,700	55,800	58,600					
Jun-91	60,400	50,600	55,100	58,300					
Jul-91	59,900	50,400	54,500	58,200					
Aug-91	59,200	50,000	54,100	58,200					
Sep-91	58,700	50,100	54,300	58,500					
Oct-91	59,700	50,400	54,300	58,600					
Nov-91	60,700	50,400	54,300	58,700					
Dec-91	61,000	50,600	54,100	57,900					
Jan-92	59,700	50,700	53,300	56,400					
Feb-92	59,700	50,700	53,200	56,900					
Mar-92	59,400	50,900	53,200	56,800					
Apr-92	58,900	51,800	53,200	56,700					
May-92	58,900	53,400	53,300	56,600					
Jun-92	59,300	54,200	53,500	56,000					
Jul-92	59,300	55,100	53,600	55,700					
Aug-92	59,800	55,800	53,900	55,500					
Sep-92	60,300	57,500	54,600	55,400					
Oct-92	61,400	58,500	55,200	54,400					
Nov-92	63,400	58,600	55,100	54,500					
Dec-92	65,100	59,700	56,800	54,600					

Source: Japan Wood Products Information and Research Center (JAWIC)
(1) Sugi Square no. 1 grade 10.5cm X 10.5cm X 3m
(2) Douglas fir flitch no. 1 grade 10.5-12cm X 24cm X 3.65-4m
(3) Hemlock Square no. 1 grade 10.5cm X 10.5cm X 3m
(4) Russia Scantling no. 1 grade 3.5-4.5cm X 3.5-4.5cm X 3.65-4m

Table A.8 Number of New Residential Housing Starts in Japan (1965-1993)

	TOTAL	Non-Wood Units	Wooden Units			
			Total	Traditional (1)	2X4	Prefabricated
1965	842,596	196,060	646,536	646,536		
1966	856,579	214,275	642,304	642,304		
1967	991,158	233,393	757,765	757,765		
1968	1,201,675	315,744	885,931	885,931		
1969	1,346,612	385,664	960,948	960,948		
1970	1,484,556	449,056	1,035,500	1,035,500		
1971	1,463,760	496,655	967,105	967,105		
1972	1,807,581	695,735	1,111,846	1,111,846		
1973	1,905,112	784,628	1,120,484	1,120,484		
1974	1,316,100	446,463	869,637	869,469	168	
1975	1,356,286	448,897	907,389	904,817	2,572	
1976	1,523,844	530,878	992,966	987,849	5,117	
1977	1,508,260	561,771	946,489	941,326	5,163	
1978	1,549,362	591,204	958,158	952,043	6,115	
1979	1,493,023	583,489	909,534	897,814	11,720	
1980	1,268,626	517,937	750,653	737,650	13,003	
1981	1,151,699	498,052	653,647	640,161	13,486	
1982	1,146,149	479,189	666,960	636,360	16,208	14,392
1983	1,136,797	545,949	590,848	557,415	17,233	16,200
1984	1,187,282	593,139	594,144	556,504	20,240	17,400
1985	1,236,072	644,161	591,911	548,616	24,095	19,200
1986	1,364,609	730,751	633,858	581,250	31,708	20,900
1987	1,674,300	932,748	741,552	673,747	40,105	27,700
1988	1,684,644	987,377	697,267	625,574	41,493	30,200
1989	1,662,612	942,742	719,870	640,298	47,572	32,000
1990	1,707,109	979,344	727,765	642,072	51,093	34,600
1991	1,370,126	746,123	624,003	545,366	45,437	33,200
1992	1,402,590	731,460	671,130	580,797	52,933	37,400
1993	1,485,684	788,188	697,496	641,197	56,299	NA

Source: Japan Ministry of Construction

(1) Traditional Post & Beam housing figures derived by subtracting 2 x4 and wooden prefab from total wooden units. Small error may result from absence of reliable prefab figures prior to 1982.

Table A.9 Total Floorspace and Average Square Meter per Unit for New Residential Housing Starts in Japan (1965-1993)

(1,000 square meters, square meters per unit)

	TOTAL		WOODEN UNITS		Non-wood	
	1,000 SM	SM/Unit	1000 SM	SM/Unit	1000 SM	SM/Unit
1965	49,668	59	38,079	59	11,589	59
1966	53,856	63	40,580	63	13,276	62
1967	66,174	67	50,488	67	15,686	67
1968	79,179	66	58,814	66	20,365	64
1969	90,117	67	64,994	68	25,123	65
1970	101,069	68	71,022	69	30,047	67
1971	101,544	69	68,568	71	32,967	66
1972	128,746	71	81,234	73	47,512	68
1973	146,543	77	89,520	80	57,023	73
1974	107,238	81	73,769	85	33,469	75
1975	112,422	83	77,587	86	34,853	78
1976	125,281	82	84,917	86	40,363	76
1977	126,818	84	83,559	88	43,259	77
1978	136,249	88	89,566	93	46,683	79
1979	136,515	91	88,621	97	47,894	82
1980	119,102	94	75,310	100	43,792	85
1981	107,853	94	66,145	101	41,706	84
1982	107,638	94	67,859	102	39,779	83
1983	99,442	87	58,133	98	41,309	76
1984	100,228	84	57,892	97	42,337	71
1985	103,132	83	57,988	98	45,144	70
1986	111,004	81	61,184	97	49,820	68
1987	132,526	79	72,372	98	60,154	64
1988	134,530	80	69,842	100	64,689	66
1989	135,028	81	71,976	100	63,055	67
1990	137,492	81	72,440	100	65,049	66
1991	117,219	86	64,547	103	52,672	71
1992	120,316	86	68,883	103	51,432	70
1993	131,683	89	75,115	108	56,568	72

Source: Japan Ministry of Construction