United States
Department of
Agriculture

Forest Service

Pacific Northwest
Forest and Range
Experiment Station

Research Paper
PNW-277

November 1980

The Impact of the Export and Import of Raw Logs on Domestic Timber Supplies and Prices

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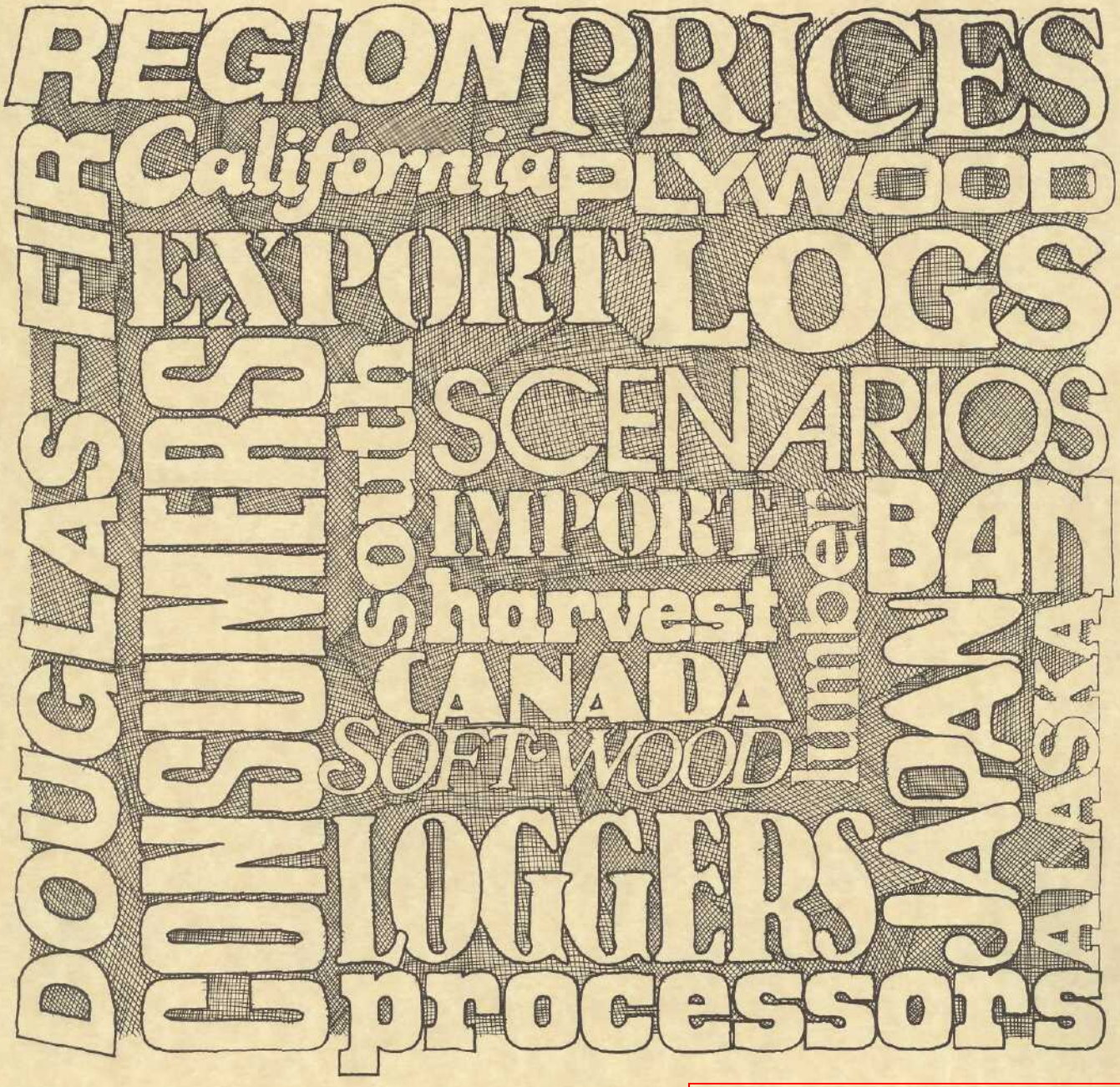
Richard W. Haynes,
and Darius M. Adams



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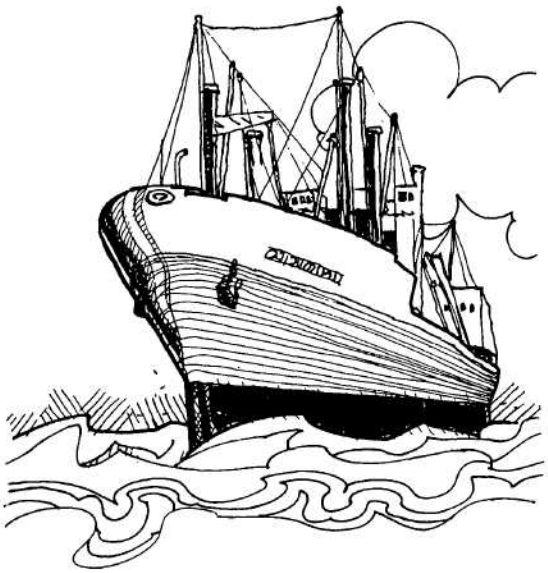
The Impact of the Export and Import of Raw Logs on Domestic Timber Supplies and Prices

Reference Abstract

Darr, David R., Richard W. Haynes, and Darius M. Adams.
1980. The impact of the export and import of raw logs on domestic timber supplies and prices. USDA Forest Service Research Paper PNW-277, 38 p. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Reviews U.S. foreign and domestic markets for softwood construction materials, giving special consideration to trade patterns among Japan, Canada, and the United States. For alternative assumptions about market responses to a ban of U.S. softwood log exports, displays impacts on selected measures of U.S. softwood stumpage, lumber, and plywood markets.

KEYWORDS: Import/export (forest products), markets (internal), trade policy, supply/demand (forest products).



Research Summary
Research Paper PNW-277
1980

Softwood-log exports from the United States grew ten-fold between the early 1960's and the mid-1970[1]s. Shifts in variables driving the U.S. domestic market during this period mask any effect of log exports on domestic timber supplies and prices.

The impacts of a ban on U.S. softwood-log exports on domestic timber supplies and prices would depend in part on the responses of Japan in attempting to replace the equivalent of the construction materials that would have been recovered from U.S. logs. The impacts of a ban would also tend to depend in part on the responses of U.S. stumpage owners and timber processors to the change in market opportunities. These responses are not known with certainty. The effects of log exports upon supplies and prices of domestic timber were simulated under alternative assumptions about the responses of Japanese importers and consumers and of U.S. stumpage owners and timber processors to a ban on softwood-log exports. The analytical model simulated market interactions among U.S. and Canadian softwood-supply regions to changes in offshore markets and to changes in the availability of stumpage, lumber, and plywood in each region.

Domestic market forces will continue to result in rising real prices for softwood lumber and plywood in the United States during the 1980's. A ban on softwood-log exports would tend to contribute to even higher prices, unless lumber-processing capacity expanded significantly on the west coast and unless Japan turned to sources of construction materials other than North America. Prices and U.S. consumption of softwood lumber in the 1980's would be changed less than 2 percent by a ban on softwood-log exports, with the direction of change contingent on market responses in Japan and in the log-exporting regions, Prices of softwood plywood would generally decline by less than 4 percent and consumption would increase by less than 4 percent.

A ban on log exports would reduce stumpage prices in the log-exporting regions, with the size of the decrease contingent on market responses in Japan and on the extent of construction of new processing capacity. A ban would adversely affect stumpage owners—public and private—in the log-exporting regions and enhance the competitive positions of timber processors in these regions relative to processors in other U.S.,and Canadian regions.

Preface

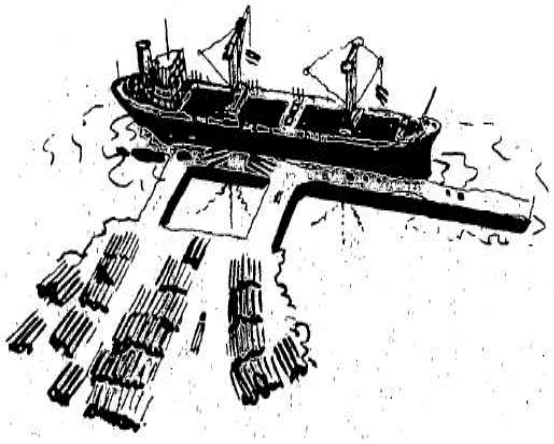
This report contains:

- A discussion of trends in U.S. imports and exports of logs and the development of the logexport issue.

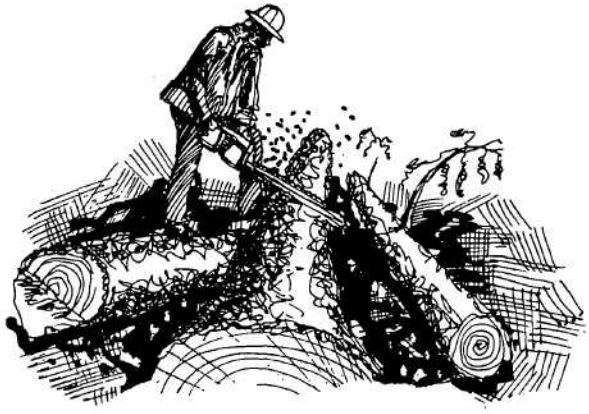
- A discussion of possible future trade patterns, market interactions and their implications for efforts at evaluation of the impact of the import and export of raw logs upon domestic timber supplies and prices.
- A sensitivity analysis of the potential impacts of a ban on softwood-log exports under alternative sets of assumptions about market responses to the change in trade policy. The sensitivity analysis is based on five scenarios or sets of assumptions about market responses. Under scenario 1, we assumed that Japan would purchase from the United States the lumber equivalent of log-export volume that would have been exported and that Canada would not expand sales of softwood lumber to Japan. Under scenario 2, we assumed that Japan would somehow turn to sources of construction materials other than North America. Under scenario 3, we assumed that Japan would purchase from Canada the lumber equivalent of U.S. log-export volume and that U.S. exports of softwood lumber would not increase. Under scenario 4, we assumed that Japan would purchase from the United States the lumber equivalent of log-export volume, that Canadian sales to Japan would not expand, and that lumber-processing capacity would not expand in the Douglas-fir region. Under scenario 5, we assumed that Japan would purchase from the United States half the lumber equivalent of log-export volume and half from Canada.

For each scenario, we display for the period 1980 to 1990, the effect of a ban on log exports on prices, production, consumption, and trade in softwood lumber and plywood, the U.S. balance of trade in timber products, softwood-stumpage prices, and softwood-timber harvest.

By design, we make no recommendation about what log-export policy should be. Our intent in this report is to help provide a basis for understanding how log exports might influence supplies and prices of domestic timber and for placing a range on the size of these influences.



Contents



Background

The impact of the export and import of raw logs upon domestic timber supplies and prices has developed as an issue over the past 15 years. The issue has centered on log exports, which increased in volume from about 300 million board feet per year in the early 1960's to over 3 billion board feet per year in the 1970's. During this period, log imports have generally been less than 100 million board feet per year and have not been a national issue.

The log-export issue rests not only on the distribution of gains and losses from the change in market patterns initiated through growth of the market, but also on the lack of agreement about the size of gains and losses. We do not know how much the export of raw logs has affected domestic timber supplies and prices nor how much domestic timber supplies and prices would be affected if trade policies were changed so as to alter market patterns.

In past market patterns, what would have happened in the absence of growth of the log-export market is not clear. Other variables potentially affecting prices and timber supplies during this time include growth in U.S. housing starts to over 2 million per year in the early 1970's, rapid growth in softwood-lumber imports from Canada, and the emergence of the softwood-plywood industry in the South as a major segment of the industry.

Similarly, in the changing of trade policies to alter market patterns, what would happen to domestic and foreign timber markets in the absence of log-export sales is not clear foreign demands for softwood construction materials would continue even if log exports were not permitted. In the absence of precedent, identifying potential impacts of a change in trade policies on supplies and prices of domestic timber must rest on a their of assumptions about market responses expected after the change in policy. Interest groups potentially affected by a change in log-export policy have not agreed. This lack of agreement will probably continue leading to a continuation of the debate over policies affecting log trade.

Although market reactions to a change in log-export policies cannot be predicted with precision, alternative reactions can be postulated and their implications on supply and demand of domestic timber assessed. This "sensitivity analysis" approach does not resolve the export issue analytically, but it does establish a possible range for the magnitude of the effects of log exports on supplies and prices of domestic timber.

The log-export trade cannot be viewed in isolation from trade in other commodities, especially softwood lumber. A shift in U.S. log-export policy would probably cause significant shifts in patterns of world trade in softwood lumber. A shift in U.S. log-export policy could also affect the supply of raw material available to the U.S. softwood-plywood industry. Although the emphasis in this report is on softwood-log exports, the softwood-lumber and softwood-plywood industries are brought into the discussion as appropriate.

The report also includes:

- A discussion of trends in U.S. imports and exports of logs and the development of the log-export issue.
- A discussion of possible future trade patterns, market interactions, and their implications for efforts at evaluation of the impact of the import and export of raw logs upon supplies and prices of domestic timber.
- A sensitivity analysis of the potential impacts of a ban on softwood-log exports under alternative sets of assumptions about market responses to the change in trade policy.

Our intent is to help provide a basis for understanding how log exports might influence supplies and prices of domestic timber and for placing a range about the size of these influences.

Trends in Log Exports and Imports

The United States became a net exporter of logs in the late 1950's (fig. 1). Log-export volume increased from 10 million cubic feet (64 million board feet) per year in the early 1950's to a cyclical high of 515 million feet (3.2 billion board feet) in 1973. After dropping in 1974 in response to a worldwide recession, log-export volume increased to another cyclical high of 510 million cubic feet (3.2 billion board feet) in 1976. Volume declined in 1977 but recovered in 1978 to 515 million cubic feet (3.2 billion board feet).

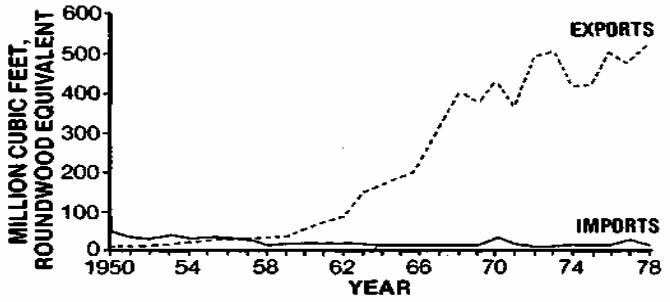


Figure 1.—Imports and exports of logs for the United States, 1950-78. Source: Phelps (1977).

In contrast to the rise in log-export volume over the past 25 years, the annual volume of log imports has declined from about 45 million cubic feet (224 million board feet) per year in the 1950's to about 15 million cubic feet (81 million board feet) per year in the 1970's.

Over the past two decades, U.S. log exports have become increasingly dominated by softwood .species (table 1). In the mid-1970's, softwoods accounted for over 95 percent of total export volume. Japan is the major customer for U.S. log exports, accounting for about 82: percent of the total (table 2). Canada, the second largest customer, takes about 11 percent

Table 1--U.S. exports of logs, 1950-78 (Million board feet, log scale)

Year	Softwoods	Hardwoods	Total
1950	28.9	19.3	48.2
1951	57.9	21.5	79.4
1952	44.4	19.2	63.7
1953	86.0	29.2	115.1
1954	106.4	33.1	139.5
1955	144.2	22.0	166.2
1956	154.9	32.8	187.7
1957	107.3	32.0	139.3
1958	127.3	42.5	169.8
1959	167.6	37.0	204.6
1960	210.3	56.0	266.3
1961	432.2	49.5	481.8
1962	452.7	69.5	522.2
1963	879.6	71.8	951.3
1964	1,022.6	63.7	1,086.3
1965	1,111.4	81.4	1,192.8
1966	1,317.5	75.6	1,393.1
1967	1,873.6	97.1	1,970.7
1968	2,473.2	94.9	2,568.1
1969	2,316.8	80.2	2,379.0
1970	2,684.1	68.9	2,753.0
1971	2,233.4	59.0	2,292.4
1972	3,049.4	93.9	3,143.3
1973	3,107.2	114.4	3,221.6
1974	2,523.7	118.7	2,642.4
1975	2,600.6	66.3	2,626.5
1976	3,155.7	94.3	3,249.9
1977	2,980.0	100.1	3,080.1
1978	3,298.4	110.8	3,409.2

Source: Phelps (1977).

Table 2--U.S. exports of logs by major region of destination, 1950-78 (Million board feet, log scale)

Year	Canada	Western Europe	Japan	Other	Total
1950	42.5	3.6	--	2.1	48.2
1951	71.8	4.7	1.4	1.6	79.4
1952	53.8	3.0	6.5	.4	63.7
1953	69.2	3.8	41.6	.6	115.1
1954	75.4	4.8	54.5	4.7	139.5
1955	138.4	8.9	18.0	.8	166.2
1956	160.2	5.7	20.5	1.2	187.7
1957	97.1	5.3	36.0	1.0	139.3
1958	112.6	7.7	47.9	1.6	169.8
1959	126.6	7.2	70.1	.7	204.6
1960	150.7	15.9	98.6	1.1	266.3
1961	99.6	16.3	364.8	1.1	481.8
1962	167.3	24.8	329.0	1.2	522.2
1963	209.3	32.2	691.1	18.8	951.3
1964	288.5	19.0	755.4	23.4	1,086.3
1965	352.9	29.4	804.4	6.2	1,192.8
1966	266.2	17.3	1,083.0	26.5	1,393.1
1967	335.8	20.8	1,583.6	30.6	1,970.7
1968	341.8	28.8	2,119.2	78.4	2,568.1
1969	324.6	29.9	2,007.8	34.8	2,397.0
1970	291.8	23.6	2,377.3	60.3	2,753.2
1971	343.6	20.8	1,847.1	80.9	2,292.4
1972	519.1	31.9	2,529.9	62.4	3,143.3
1973	417.8	42.0	2,634.7	127.1	3,221.6
1974	332.3	39.1	2,114.2	156.7	2,642.4
1975	277.6	35.3	2,256.4	97.6	2,666.9
1976	362.5	48.6	2,675.1	163.7	3,249.9
1977	350.0	48.0	2,470.5	211.6	3,080.1
1978	368.4	56.4	2,646.1	338.3	3,409.2

Source: Phelps (1977).

No clear pattern appears for the species composition of U.S. log imports (table 3). Canada is the dominant supplier and generally accounts for over half of the annual volume of imports (table 4).

In the mid-1970's, log exports amounted to about 4 percent of the total volume of wood consumed in the United States for lumber, plywood, and veneer production. The corresponding figure for log imports was less than 0.2 percent.

Through an increase in volume and an increase in average value, log exports have gained an increasing share of the total value of U.S. exports of timber products, going from 7 percent in the early 1960's to 21 percent in the mid-1970's (fig. 2). The average value of log exports increased steadily during the late 1960's and jumped in 1972-73 (fig. 3). The sharp increase in average value in 1972 resulted from a combination of factors, including devaluation of the U.S. dollar relative to the Japanese yen and an unprecedented number of housing starts in both Japan and the United States. Average prices held up well even during the decline in demand in 1974-75. Devaluation of the dollar relative to yen contributed to upward pressure on prices during 1977 and 1978. In general, the total value of exports of all timber products has increased, but the value of log exports has increased faster.

Table 3—U.S. imports of logs 1950-78 (Million-board feet, log scale)

Year	Softwoods	Hardwoods	Total
1950	156.5	111.9	268.5
1951	84.8	127.2	212.0
1952	113.8	77.1	190.8
1953	115.5	111.6	227.1
1954	128.2	92.6	220.9
1955	79.4	119.3	198.8
1956	39.7	120.6	160.3
1957	40.5	90.9	131.3
1958	21.6	73.8	95.3
1959	25.4	72.8	98.2
1960	32.3	80.2	112.5
1961	57.1	48.6	105.7
1962	38.1	62.1	100.1
1963	44.1	53.9	97.9
1964	8.7	56.3	65.1
1965	13.5	54.6	68.1
1966	42.5	53.1	95.6
1967	33.9	43.1	76.9
1968	39.4	45.9	85.3
1969	41.7	40.2	81.8
1970	106.5	37.9	144.4
1971	55.7	28.3	84.0
1972	11.3	28.0	39.3
1973	8.5	25.0	33.5
1974	45.6	31.0	76.6
1975	68.5	17.0	85.5
1976	67.4	14.2	81.6
1977	139.5	15.0	154.5
1978	79.1	17.8	96.9

Source: Phelps (1977).

Table 4—U.S. imports of logs by major region of origin, 1950-78 (Million board feet, log scale)

Year	Canada	Other	Total
1950	173.0	95.5	268.5
1951	104.0	108.0	212.0
1952	127.0	63.8	190.8
1953	132.5	94.6	227.1
1954	139.1	81.8	220.9
1955	92.0	106.8	198.8
1956	52.8	107.5	160.3
1957	49.1	82.2	131.3
1958	27.7	67.6	95.3
1959	31.9	66.3	98.2
1960	39.2	73.3	112.5
1961	62.5	43.2	105.7
1962	42.6	57.5	100.1
1963	51.5	46.4	97.9
1964	18.1	47.0	65.1
1965	20.3	47.8	68.1
1966	49.4	46.2	95.6
1967	40.6	36.3	76.9
1968	46.2	39.1	85.3
1969	49.5	32.3	81.3
1970	114.9	29.5	144.4
1971	64.6	19.4	84.0
1972	17.3	22.0	39.3
1973	17.8	15.7	33.5
1974	57.0	19.6	76.6
1975	80.3	5.2	85.5
1976	78.0	3.6	81.6
1977	150.5	4.0	154.5
1978	85.9	11.0	96.9

Source: Phelps (1977).

Despite an increase in average price, log imports have accounted for a decreasing share of the total value of U.S. imports of timber products, going from 1.5 percent in the I960[1]s to less than 1 percent in the mid-1970's.

In 1978, logs accounted for 0.8 percent of the value of all U.S. commodity exports, and log imports amounted to less than 0.1 percent of the value of all commodity imports.

Focus of Interest in Log Trade

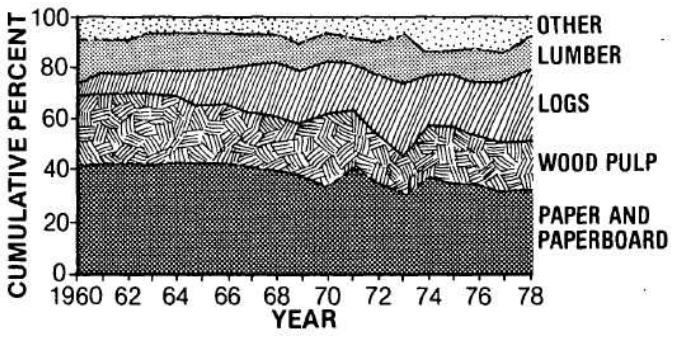


Figure 2.—Cumulative percentage distribution of United States exports of timber products, by product, 1960-78. Source: Phelps (1977).

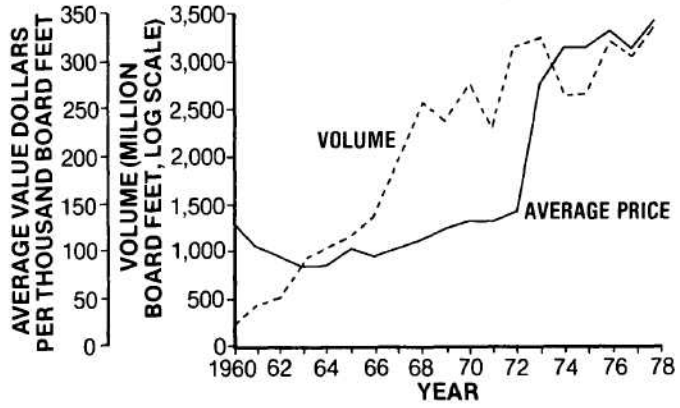


Figure 3.—Average value and total volume of United States log exports 1960-78. Source: Phelps (1977).

Interest in softwood-log exports has been concentrated on trade from the U.S. west coast to Japan. By the mid-1970's, softwood-log exports from the west coast accounted for over 85 percent of total U.S. log-export volume. During the 1970's, the volume of softwood-log export from the west coast became increasingly dominated by shipments from Washington and Oregon, which account for over 95 percent of the total. Exports from northern California peaked at 212 million board feet in 1968 and, since that time, shipments have generally been between 75 and 100 million board feet per year. Softwood-log exports from Alaska have rarely exceeded 50 million board feet per year.

In the four west coast States, export of roundwood is prohibited from Federal and State lands, with the exception of lands managed by the State of Washington Department of Natural Resources (DNR) (Lindell 1978). In addition, export from private lands is subject to limitation if the log exporter also purchases Federal timber. British Columbia has restricted roundwood-log export since 1906. Only volume declared surplus to domestic need can be exported. About 73 percent of the log export from Washington and Oregon originates on private land and 20 percent on DNR land.

During the decade-long debate over policy on softwood-log export, several public hearings have been held, e.g., United States Senate Committee on Banking, Housing, and Urban Affairs (1973). The hearing records are the best available source on the positions of organizations and individuals that participated in the debate. These positions have changed little over time.

Future Trade Prospects and Market Interactions

The potential for log export to affect local communities is concentrated in the Puget Sound, Aberdeen, and Longview areas of the State of Washington, and the Astoria, Coos Bay, and Portland areas of the State of Oregon. In 1978, for example, Puget Sound ports accounted for 46.8 percent of total volume of log export from the west coast of 3 billion board feet. The percentage exported from each area is as follows (Ruderman 1979):

Washington	
Puget Sound	
Tacoma	18.7
Port Angeles	13.0
Everett	10.8
Olympia	2.9
Anacortes and Belling	1.4
Total	46.8
Aberdeen	17.1
Longview	10.9
Other	2
Total	75.0
Oregon	
Portland	9.3
Astoria	5.6
Coos Bay	4.9
Other	.5
Total	20.3
Northern California	2.4
Alaska	2 3
Total	100.0

Any shift in trade policy for softwood logs would directly affect these areas. As discussed later, market interactions tend to dissipate the effects of a change in trade policy when impacts are considered regionally and nationally.

Supplies and prices of domestic timber are only two of the concerns that have been raised in public discussions of policy on softwood-10g export. Other concerns are discussed in Hamilton (1971) and Darr (1975, 1977)

Domestic and foreign demands for softwood logs, lumber and plywood interacting with domestic and foreign supplies of these products have the most potential for affecting the price and availability of softwood construction materials in the United States. Developments in hardwood and fiber-based markets affect markets for softwood construction materials, but only indirectly. The characteristics of these supplies and demands vary among countries and by type of product. The purpose of the following review of domestic and foreign demands and supplies for softwood construction materials is to discuss likely trade patterns without a change in U.S. log-export policy. In addition, we point out the types of interactions that would determine market responses to a change in policy.

Demand

Domestic

In the U.S. domestic market, new housing accounts for about one-third of the lumber and plywood used (table 5). When residential upkeep and improvements and new nonresidential construction are added to the volumes used in new housing, the portion of lumber and plywood consumption attributable to construction rises to over 50 percent.

Of the primary uses for lumber and plywood, new housing tends to be especially cyclical. These cycles are driven in part by the availability of mortgage money, interest rates, and personal income.

Table 5—Lumber and plywood consumption by major end use in the United States, 1970

End use	Lumber	Plywood
	Million board feet)	Million square feet, 3/8-inch basis)
New housing	12,270	6,330
Residential upkeep and improvements	4,690	2,510
New nonresidential construction	3,690	1,700
Manufacturing	4,670	1,656
Shipping	5,720	1/
Other	8,460	5,626
Total	39,500	17,822

1/Not available.

Source: USDA Forest Service (1973).

Cycles in housing starts and other end uses for lumber and plywood are reflected in cycles in lumber and plywood prices. Changes in end-product prices resulting from changes in demand are transmitted back to the timber-resource base to interact with timber supplies to determine timber prices. Average prices of softwood lumber have changed by as much as 28 percent from one year to the next, softwood plywood by 25 percent, and stumpage prices in the Pacific Northwest, 93 percent. These cycles will probably continue.

The wood-pulp industry is becoming increasingly important in determining timber prices in the United States. For example, pulp products accounted for 20 percent of the timber used in the United States in the early 1950's and 34 percent in the mid-1970's (Phelps 1977).

Available information indicates a continuation of strong domestic markets for timber products in the United States over the coming decades. For example, the demographic characteristics of the population suggest that the demand for new housing units might exceed 2 million per year over the next decade (Marcin 1977).

Coincident with the projection of strong markets for timber products in the United States is an expected continuation of the rise in prices for these products. For example, lumber prices historically have risen at an annual rate of about 1.5 percent relative to prices in general, and substantial increases are expected in the future (USDA Forest Service 1979).

Foreign

Foreign demand for U.S. softwood lumber was relatively stable until the late 1960's and early 1970's (table 6). Softwood-lumber exports have never exceeded 6 percent of annual U.S. production. From an annual volume of 1 billion board feet in the late 1960's, export volume increased to 1.8 billion board feet in 1973. Foreign sales declined in 1974, reflecting the effects of a worldwide recession. Exports have yet to recover to the 1973 volume. Small volumes of clear lumber and specialty items are shipped worldwide. The primary markets for U.S. softwood lumber in terms of volume are Canada, Europe, and Japan.

The Pacific Northwest accounts for about 45 percent of the volume of U.S. softwood-lumber export and Alaska, 21 percent. In the Pacific Northwest, export volume in recent years has amounted to about 7 percent of production (Ruderman 1979).

Exports of softwood plywood from the United States were below 100 million square feet until 1969 (table 7). In the 1970's, volume increased to a record high of 791 million square feet in 1975. Volume declined from 1975 through 1978. Softwood-plywood exports have never exceeded 6 percent of annual U.S. production.

Most of the growth in export sales of softwood plywood in the mid-1970's resulted from expanded demand in Canada and Common Market countries. Annual shipments of softwood plywood to Japan have never exceeded 10 million square feet.

Table 6--Exports of softwood lumber from the United States, by destination, 1950-78
(Million board feet)

Year	Destination					
	Canada	Europe	Central and South America	Japan	Other	Total
1950	41.7	83.1	136.8	5.7	139.4	406.8
1951	71.4	324.2	164.6	18.7	296.8	875.7
1952	84.7	109.4	155.3	11.9	204.2	565.7
1953	75.8	71.2	136.8	58.0	170.8	512.6
1954	86.3	97.4	139.3	15.9	245.9	584.7
1955	119.1	95.8	147.6	29.5	260.4	652.4
1956	158.9	85.8	136.6	32.8	156.6	570.7
1957	138.6	88.1	148.4	47.4	200.4	623.4
1958	154.8	64.5	113.2	34.4	183.2	550.1
1959	198.5	80.5	104.2	52.6	172.2	607.9
1960	144.7	134.6	101.2	55.7	257.7	693.8
1961	150.2	108.4	80.3	146.8	132.5	618.6
1962	119.3	142.3	95.6	73.5	197.9	628.6
1963	107.9	198.9	92.0	112.5	231.7	743.1
1964	180.3	214.5	103.9	128.5	184.4	811.5
1965	184.0	229.3	104.8	103.1	157.7	778.9
1966	186.5	230.3	118.3	171.3	161.5	867.9
1967	207.6	241.0	112.5	260.7	143.5	965.2
1968	210.4	288.9	105.3	284.8	158.6	1,048.1
1969	198.3	264.6	102.5	309.6	148.9	1,023.8
1970	202.6	284.0	112.4	405.2	156.9	1,161.1
1971	206.3	213.8	87.6	287.4	141.1	936.2
1972	290.1	267.6	89.1	407.1	137.0	1,190.8
1973	388.4	494.2	101.6	564.5	204.1	1,752.8
1974	382.2	311.3	104.3	570.5	198.3	1,566.5
1975	397.5	218.7	109.1	515.3	164.9	1,405.4
1976	437.9	316.3	130.2	475.5	245.6	1,605.5
1977	377.0	288.6	136.8	436.7	198.2	1,437.3
1978	381.0	250.5	120.0	406.3	196.8	1,354.6

Source: Phelps (1977).

Table 7—Exports of softwood plywood from the United States, by destination, 1960-78
(Million square feet, 3/8-inch basis)

Year	Destination				
	Canada	Europe	Central and South America	Other	Total
1960	3.5	2.0	5.8	1.8	13.1
1961	3.1	2.4	5.4	2.8	13.7
1962	2.3	3.3	6.0	5.1	16.7
1963	1.0	6.2	7.4	2.9	17.5
1964	4.4	7.3	10.3	6.2	28.2
1965	1.7	10.8	10.6	7.2	30.3
1966	3.8	2.0	14.1	27.8	47.7
1967	2.8	49.3	18.0	14.8	84.9
1968	5.4	32.0	18.8	8.0	64.2
1969	47.6	126.2	17.5	8.0	199.3
1970	8.4	81.2	15.2	9.0	113.8
1971	13.9	61.0	14.9	9.2	99.0
1972	73.5	128.7	13.7	4.5	220.4
1973	106.1	269.9	65.2	21.2	462.4
1974	278.1	226.9	22.6	14.4	542.0
1975	394.2	363.3	17.5	15.9	790.9
1976	163.1	517.1	14.9	23.0	718.1
1977	42.7	210.9	13.8	19.6	287.0
1978	42.6	195.9	18.3	40.8	297.6

Source: Phelps (1977).

Producers in the Pacific Northwest have accounted for the bulk of the expansion of export sales. In the mid-1970's, these producers accounted for about 60 percent of total exports of softwood plywood. Foreign sales amount to less than 6 percent of softwood-plywood production in the Pacific Northwest,

Demands for softwood construction materials in Japan and Europe appear to have the most potential for affecting U.S. softwood-timber supplies and prices. The Canadian market for U.S. softwood lumber amounts to about 25 percent of total U.S. exports. It is based in part on the importation of products not readily available in Canada and also in part on the proximity of Canadian consumers to U.S. producers. Competition from Canadian producers and Canada's relatively small population limit the potential draw of this market for softwood lumber. Tariff and nontariff trade barriers on both sides of the border are likely to continue to affect U.S.-Canadian trade in softwood plywood.

Japan

Exports of softwood lumber from the United States to Japan amount to about 500 million board feet—1.8 percent of U.S. production and 35 percent of total exports. About 60 percent of U.S. exports to Japan originate in Alaska. Most of the remaining volume originates in the Pacific Northwest. In Japan, some U.S. lumber is used directly in the home-construction industry, but most of the volume—in the form of cants—is further processed.

In the Japanese market, U.S. softwood-lumber producers face competition primarily from Canadian softwood lumber, softwood logs and lumber from the Soviet Union, softwood logs from the United States, and softwoods from domestic producers in Japan (table 8). Hardwoods from Southeast Asia are also a form of indirect competition in that this lumber is used in home construction.

Almost all of the softwood-log volume imported into Japan is processed into lumber for use in the construction industry. In general, the Japanese construction industry is the driving force behind the markets for solid softwood products and accounts for about 75 percent of all lumber consumption.

Table 8—Timber products consumed in Japan, 1975-77, by source of supply (Million cubic feet, roundwood equivalent)

Item and source	1975	1976	1977
Domestic supply	1,583.5	1,642.5	1,610.2
Foreign supply:			
Logs:			
United States	368.0	397.1	373.9
U.S.S.R.	273.1	292.0	276.6
Canada	6.6	10.1	15.8
Asia	644.5	815.4	784.7
New Zealand	18.1	31.6	30.9
Other	2.3	1.9	5.4
Total	1,312.6	1,548.1	1,487.3
Lumber:			
United States	78.3	78.2	70.2
U.S.S.R.	7.4	8.0	8.4
Canada	71.4	104.6	119.5
Asia	23.3	37.5	43.5
New Zealand	6.0	7.8	13.3
Other	0.6	0.8	2.2
Total	187.0	236.9	257.1
Wood chips and pulpwood:			
United States	232.0	234.0	229.1
Australia	77.0	92.2	111.7
New Zealand	10.6	9.3	14.3
Asia	39.1	30.5	28.5
U.S.S.R.	11.4	36.5	52.1
Other	1.3	10.0	16.5
Total	371.4	412.5	452.2
Woodpulp:			
United States	65.7	64.2	69.7
Canada	70.8	75.6	68.7
New Zealand	24.7	27.0	37.7
Western Europe	2.1	1.7	6.6
Other	3.0	4.8	4.7
Total	166.3	173.3	187.4
Paper and board:			
United States	7.7	7.2	10.5
Canada	2.8	5.6	6.4
Western Europe	4.8	6.7	8.4
Asia	2.7	0.4	0.3
Other	0.1	0.1	0.1
Total	18.1	20.0	25.7
Total other products	94.0	91.3	92.4
Total foreign supply	2,149.4	2,482.1	2,502.1
Total supply	3,732.9	4,124.6	4,112.3

Source: Derived from data published by Japan Forestry Agency, "Timber demand and supply for 1977-78, "Japan Lumber Journal, 19(8), April 29, 2978; and Ministry of Finance, Japan Tariff Association, "Japan exports and imports by county," Tokyo, December 1975, 1976, and 1977.

United States producers have about 43 percent of the Japanese market for imported softwood lumber and about 53 percent of the market for imported softwood logs. In total, imports of softwood lumber and logs from the United States amount to about 29 percent of Japan's consumption of softwood construction materials.

Because of tradition and lower cost, hardwood plywood will probably continue its dominance of the plywood market. The impact of Japanese demand for softwood plywood on U.S. softwood prices and supplies will probably continue to be negligible, at least for the next decade.

Available information indicates a continuing demand for imported softwood construction materials in Japan. For example, projections of the Japan Ministry of Agriculture and Forestry (1973) indicate that total demand for forest products might be 50 percent higher in 1991 than in 1970.

Much of the growth in Japanese imports of timber products over the coming decades is expected to be in response to demands for fiber-based items (Japan Ministry of Agriculture and Forestry 1973). Compared with the rapid growth of the 1960's and early 70's, future demands for solid softwood construction materials in Japan appear relatively stable. The rise in imports of softwoods during this period was keyed to a rise in housing starts and to a reduction in domestic supply. Spurred by the post-World War II recovery of the Japanese economy, annual housing starts increased from about 400,000 in the early 1960's to a record high of close to 2 million in 1973. In recent years, housing starts have been averaging about 1.5 million per year. Although some uncertainties exist about Japanese housing patterns in the future, the number of starts will probably continue around current levels, with some variation because of cyclic ups and downs of the market over the coming decade. The inter-action of this demand and alternative supply sources will ultimately determine the Japanese demand for U.S. softwoods.

Harvest of timber in Japan declined from 51.8 million cubic meters in 1967 to a low of 34.2 million cubic meters in 1975. In recent years, domestic harvest has increased, but still accounts for only about 34 percent of Japan's requirements for timber products. One of the rationales for the reduction in harvest was to give timber inventories a chance to build up after the effects of World War II. Timber-management activities of the past two decades will begin paying off more toward the late 1980's, but even then Japan will probably rely on imports for more than half of its softwood needs.

Over the next decade or so, the potential for expansion of softwood shipments from the Soviet Union to Japan appear limited (North and Solecki 1977). When the "BAM" Railroad is completed in the late 1980's, the potential for expansion appears better, but other priorities might limit increases in solid softwood exports.

Softwood-lumber production in British Columbia has the potential for expansion based on intensification of use and management of accessible timber inventories or through development of untapped timber resources in the northern part of the Province (Reed and Associates, Ltd. 1977). In addition to some expansion potential geared to Japanese needs, B.C. producers, especially on the coast, could shift sales of lumber to Japan from the United States and other markets. Currently, the United States takes 60 percent of B.C. lumber production; Canada, 26 percent; Japan, 6 percent; United Kingdom, 5 percent; and other countries, the remaining 3 percent.

North American timber processors have been promoting the use of the "2 X 4 platform frame" construction (PFC) method in Japan as a means to develop a market for dimension lumber of the sizes and grades used in North America. To date, the promotion efforts have met with limited success. Even if the PFC method is adopted on a wider scale, Canada might capture most of any expansion of the Japanese market for imported softwood lumber. Alternatively, Japanese processors might continue to import logs and manufacture sizes needed for PFC housing. Either way, the impact of PFC housing on Japanese demand for U.S. softwood lumber would tend to be limited.

Construction techniques in Japan, consumer preferences, and the structure of the timber industries in Japan are key considerations in attempting to judge potential Japanese responses to a more restrictive U.S. log-export policy. If U.S. logs were not avai - able to Japan, Japanese importers could not shift rapidly to the purchase of 2 X 4's and dimension lumber from North America. The construction industry in Japan is geared to the use of 4 X 4's and other traditional sizes.

Much of the structural wood in a Japanese house is exposed, and Japanese consumers have a traditional preference for light-colored, straight-grained, relatively knot-free wood—such as western hemlock. If U.S. logs were not available, attempts to substitute logs from the Soviet Union, the other major softwood log supplier, would meet with consumer resistance.

Over the past twenty years, the structure of the Japanese sawmill industry has shifted from relatively small mills near the domestic Japanese timber resource to larger mills near the port of entry for imported logs. A significant share of the capacity represented by the larger mills would not be available for processing domestic Japanese logs if U.S. logs were not available. Transportation patterns and other logistical problems would tend to preclude a matching of Japanese timber resources with processing capacity.

Construction techniques, consumer preferences, and the structure of the Japanese timber industries will tend to constrain Japanese responses to a shift in U.S. log-export policy. In the sensitivity analysis to follow, we have attempted to demonstrate potential impacts on the market resulting from alternative Japanese responses to a ban on U.S. log exports, but anticipating Japanese responses exactly is impossible.

Europe

European demands for construction materials grew in response to postwar recovery of the economies of the area. Consumption of softwood lumber grew from 59 million cubic meters in 1960 to a historic high of 77 million cubic meters in 1973. Plywood consumption increased from 8.7 million cubic meters to 30.8 million cubic meters over the same period. For the most part, the supply sources that fed the increased demand were the Soviet Union, Scandanavia, and increased production in Western Europe. After a slump in demand in 1974, consumption has picked up, but has yet to exceed the record reached in 1973.

In 1973, the record year for U.S. softwood-iumber exports to Europe, volume amounted to 494 million board feet--about 1.6 percent of total U.S. softwoods-lumber production. In Europe, U.SV shipments amount, to 2 to 3 percent of; the market, for imported softwood lumber

Imports of plywood from the United States were a minor factor in the European market for panel products until the 1970's. Volume reached a record high of 517 million square feet in 1976—about 3 percent of U.S. production. Primary competition for the European market comes from Canada, Scandanavia, and domestic producers in Western Europe. After the surge in sales in the mid-1970's, the United States accounted for about 13 percent of the European market for imported panel products. Export volume from the United States to Europe dropped in 1977 and 1978, reflecting in part strong U.S. markets for softwood plywood.

North American trade associations are promoting the use of the PFC technique in Europe as in Japan. Current construction techniques favor use of nonwood construction materials or use of lumber and plywood of sizes and standards that differ from North American products. Widespread adoption of the PFC technique would generate more interest in importing lumber and plywood from the United States, but U.S. producers would still have to meet the competition from other supply sources.

Growth in exports of softwood lumber and plywood from the United States to Europe has been based in part on limited success of promotion efforts. Plywood has been accepted for use as concrete-form material and for packaging. The PFC technique has also met with some success in Denmark and Scandanavia.

The growth in exports of U.S. lumber and plywood to Europe during the mid-1970's was based primarily on expanded shipments from the Pacific Northwest. During 1973-76, for example, the volume of southern pine species amounted to only 6 percent of average annual exports of 1.6 billion board feet of softwood lumber.

European demands for lumber and plywood derive primarily from the construction industry. For example, in 1970, 68 percent of softwood-lumber consumption was attributable to construction and for plywood, 50 percent (United Nations Economic Commission for Europe 1976). The European drain on the U.S. timber resource in the future will depend not only on the course of European demands but also on the availability of supplies from alternative sources.

Projections of future European demands indicate a slowly expanding market for lumber and a more rapidly expanding market for panel products (table 9). Panel products include fiberboard and particleboard, both more widely accepted for use in construction in Europe than in North America.

Table 9—Projected consumption—' of sawnwood and wood-based panels for Europe (Million cubic meters)

Year	Sawnwood	Wood-based panels
1969-71 average	93.2	23.1
Projections:		
1980	99.2-104.8	45.9-47.4
1990	103.2-119.3	79.3-84.1
2000	109.8-144.1	130.1-143.3

1/Range in consumption estimates based on alternative assumptions about future economic growth.

Source: United Nations Economic Commission for Europe (1976).

Expansion of supplies within Europe has some potential, but the expectation is for an expanding deficit in softwood lumber and plywood, which would have to be filled by imports. Questions have been raised about the ability of Scandanavia (United Nations Economic Commission for Europe 1976) and the Soviet Union (North and Solecki 1977) to expand production during the coming decade, suggesting the potential for expanded purchases from North America. Alternatively, European consumers could turn more to fiber-based construction materials and hardwoods as substitutes for softwood lumber and plywood. In addition, Canada might capture the major share of any expansion of shipments from North America to Europe.

Supply

Domestic Sources

Production of softwood plywood in the United States grew rapidly over the 1960's and 1970's (fig. 4). Producers in the South captured most of the growth in the market. Production in the West remained relatively stable, with some responses to changing market conditions. By the mid-1970's, the South accounted for about one-third of U.S. production.

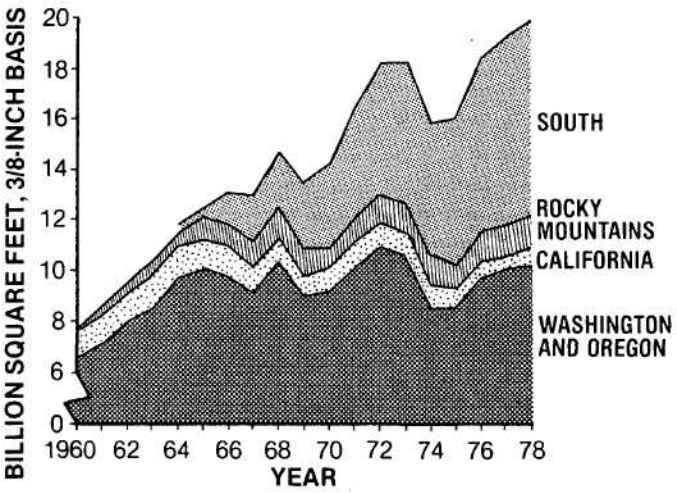


Figure 4.—Softwood-plywood production in the United States, by region 1960-78. Source: Ruderman (1978).

Production of softwood lumber in the United States amounted to about 31 billion board feet in 1976—the same amount as was produced in 1950 (fig. 5). During this period, output declined to a low of 26.1 billion board feet in 1961 and reached a record high of 31.6 billion board feet in 1973.

Output in each region has generally, followed a pattern of declining during the late 1950's and increasing in, the late 1960's and early 70's. By the mid-1970's, the West accounted for 70.2 percent of U.S. production, the South,,25.9 percent, and the North, 3.9 percent.

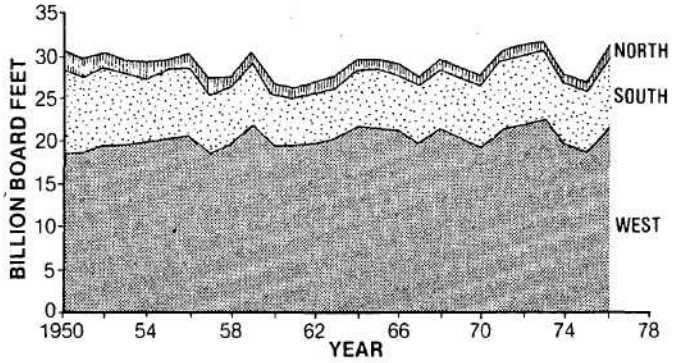


Figure 5.—Softwood-lumber production in the United States, by region, 1950-78. Source: Phelps (1977).

Supplies of softwood lumber and plywood are influenced by the availability of timber supplies, by the costs of labor and materials needed in the manufacturing process, by the motivations of producers, and by the prices of these products. Demands and supplies of softwood end products interact with demands and supplies of standing timber to determine ultimate timber prices and timber-harvest levels. Demand for standing timber varies within the United States, depending on the types and sizes of timber resources available, the types of end products being manufactured, and the degree of competition among timber processors for raw materials.

Regional differences in product mix are but one indicator of the variation in types of demands affecting the timber resource. In the Western United States, mills are generally geared to the processing of softwood lumber and plywood from old-growth timber. Currently, about 70 percent of the softwood-timber harvest on the Pacific Coast is used for lumber manufacture and 17 percent for plywood. Most wood fiber used in pulp manufacture comes from mill residue. In the Southern United States, about 37 percent of the softwood timber harvest is used for lumber manufacture, and 7 percent for plywood. About 52 percent of the roundwood harvest in the South is used for pulp manufacture. In addition, the pulp industry relies on mill residue for about 24 percent of its wood-fiber needs.

The ownership pattern of timber supply also varies among regions in the United States. For example, National Forest lands in the West account for about 39 percent of the total softwood-timber harvest but, in the South, National Forest lands account for only about 3 percent.

Available information indicates some potential for expansion of softwood-plywood production in the United States over the coming decades (table 10). Some potential for expanding softwood-lumber production also exists.

Foreign Sources

The United States is self-sufficient in softwood logs and plywood. Since World War II, however, Canada has supplied an increasing share of U.S. needs for softwood lumber. By the mid-1970's, about 20 percent of U.S. softwood-lumber consumption was of Canadian imports (Phelps 1977). Much of the increase in volume during the 1960's was based on development of the timber resources in British Columbia.

Shipments of softwood lumber to the United States amount to about 80 percent of Canada's total exports of this commodity and about 60 percent of production.

Canada has potential for considerable expansion of softwood-lumber production (Reed and Associates, Ltd. 1977), based in part on development of currently untapped resources and in part on the possibility of management and use to increase timber supplies. One estimate (Aird and Ottens 1979) suggested that softwood lumber output in 2000 might be 22 billion board feet-double the production achieved in 1975.

Table 10—Projected regional production of softwood lumber and plywood and imports of softwood lumber from Canada, 1990-2030

Year	Lumber production and imports (Billion board feet)					Plywood production (Billion square feet, 3/8-inch basis)			
	North	South	West	Total	Imports	North	South	West	Total
1990	1.3	10.7	19.5	31.5	12.7	0.1	10.5	12.2	22.8
2000	1.4	9.7	18.4	29.5	13.7	.1	11.2	11.6	22.9
2010	1.5	9.5	20.6	31.6	13.9	.1	12.2	11.5	23.8
2020	1.6	8.1	22.7	32.4	12.2	.1	12.9	10.5	23.5
2031	1.7	7.1	24.8	33.6	10.0	.1	13.1	9.5	22.7

source: Adams and Haynes (1980).

Summary of Markets and Implications of Interactions

The Uncertain Alaska Situation

Over the decade of the 1980's,[1] ownership of significant volumes and acreages of timber will be transferred from the Federal government to Native Corporations in Alaska. The specific volume and the type of timber-flow policy to be exercised on these lands is uncertain. If the Native Corporations decide to enter the log-export market, annual volumes would probably exceed 100 million board feet and might reach several hundred million board feet, depending on timber-flow policies. Japan would probably be the destination for these logs. Logs from Alaska might be in competition with logs from the rest of the U.S. west coast, or the effect might be to reduce lumber exports from Alaska to Japan. We have not specifically considered Alaska export potential in our sensitivity analysis. The situation should be monitored, however, for developments that might affect market responses to U.S. log-export policy on the rest of the U.S. west coast.

[1]For additional information on the timber market of southeast Alaska, see "An overview of some economic options for southeast Alaskan timber," by D. Darr, R. Glass, T. Ellis, and D. Schmiege. This is a cooperative report done by the Alaska Region, Juneau, Alaska; the Forest Products Laboratory, Madison, Wisconsin; and the Pacific Northwest Forest and Range Experiment station, Portland, Oregon, and Juneau, Alaksa. Copies are available from the Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

In the United States, about 52 percent of the softwood-timber harvest is used for the manufacture of lumber, 12 percent for plywood, 33 percent for pulp, and 5 percent for export (Phelps 1977). Demand for lumber and plywood stems primarily from the domestic market—less than 6 percent of U.S. lumber production is exported and less than 5 percent of U.S. softwood-plywood output is exported.

The supply of softwood construction material originates domestically for almost all plywood and 80 percent for lumber. Most of the imported softwood lumber comes from Canada. Within the United States, lumber and plywood production in the West has tended to stabilize over the past 10 years or so. Supply responses to increased domestic demand during this time have originated in Canada for softwood lumber and in the Southern United States for softwood plywood.

Available information suggests little change in the pattern of U.S. trade in solid softwood-timber products over the coming decade. The domestic market will remain the driving force behind the softwood-lumber and softwood-plywood industries. Softwood-lumber imports from Canada will continue to increase, but more interaction among U.S., Canadian, and offshore markets may occur in the future.

Any impacts of log exports on supplies and prices of domestic timber must originate primarily in the stumpage markets of the Pacific Northwest and work up through an interactive market system to affect end-product prices. If the impacts of log exports on domestic markets are to be assessed, the existence of interactions among supply regions suggests a need for a means to simulate them. Simulation of market interactions provides the basis for the sensitivity analyses to be discussed later.

The Analytical Framework

Market responses and interactions from a change in log-export policy would tend to vary, depending on the period considered. For example, in the short run of a year or so, market responses would tend to be constrained by inventories of logs and end products, availability of capacity, and availability of transportation facilities. Over a longer period, these constraints tend to become variables. In the sensitivity analysis that follows, we have abstracted from shortrun market responses. We have assumed that a ban on softwood-log exports would be in effect long enough so that any shortrun market dislocations would be resolved. This approach should not be interpreted as minimizing possible shortrun impacts of a change in log-export policy. The sizes and types of these impacts would vary, depending on market conditions. For example, if U.S. processors were operating at capacity, less opportunity would be present for processing additional log volumes than if U.S. markets were less active. Some analysts have suggested linking log-export policy to shortrun market conditions (Wiener 1973 Clawson 1975).

With the exception of Haynes (1976), who attempted to bracket the possible price impacts of banning log exports, each of the previous studies of the linkage between prices and exports has generally projected only one scenario for market responses to a change in trade policy. In general, these studies have concluded that Japan would purchase more lumber from Canada and the United States, but in total, a ban on U.S. log exports would not have much effect on U.S. end-product prices (Wiener 1973, Clawson 1975). The Stanford Research Institute concluded that stumpage prices in the Pacific Northwest would be lower after a ban on log exports.[2]

Previous analyses have attempted to account for the interaction of Japanese, U.S., and Canadian markets, but they have not explicitly considered interactions among U.S supply regions.

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[2]Unpublished report for the Pac. Northwest Reg. Comm., Vancouver, Wash., "Benefits and costs of alternative log export policies—phase one report, and alternative log export policies for the long term—phase two report," by the Stanford Res. Inst., 1974.

Sensitivity Analyses

The specifics of how our simulation model operates are discussed in detail in Adams and Haynes (1980) and described briefly in the appendix. No attempt was made to simulate interactions in the timber markets of Japan. In concept, the Japanese timber economy would respond to a ban on U.S. log exports through market interactions that would affect the use of all available construction materials, regardless of source. For example, additional log volumes might be purchased from Siberia, domestic harvest in Japan might increase, or the use of nonwood construction materials might increase. The response of Japanese producers and consumers in using other sources of building materials is uncertain and will likely remain one of the major unknowns in attempting to rationalize U.S. log-export policy.

Regardless of how much detail is used in assessing market interactions, any analysis of the linkage between log exports and supplies and prices of domestic timber must rest on a set of assumptions. Our simulation model is based for the most part on time-series data for 1950-76. As used in this study, the model solves for stumpage prices, timber harvest, and production, consumption, and prices of softwood lumber and plywood in U.S. regions and in Canada. Softwood-lumber imports from sources other than Canada and all softwood exports are specified and fed into the model to interact with U.S. and Canadian supplies and demands.

The simulation model treats a ban on log exports as a decrease in the demand for stumpage in log-exporting regions. Based on historical relationships within and among regions and based on assumptions about offshore shipments, the model determines how timber markets in each region would be affected.

Base Scenario

In the sensitivity analysis, we show the effects of a ban on log exports for each year from 1980 to 1990 under alternative sets of assumptions about Japanese responses. We have assumed that during each year 2.5 billion board feet of softwood logs, Scribner scale, would have been exported from Washington and Oregon without a change in U.S. log-export policy and, from northern California, 100 million board feet. The assumption of constant export volume is consistent with a view of relatively stable Japanese demand for construction materials over the coming decade.

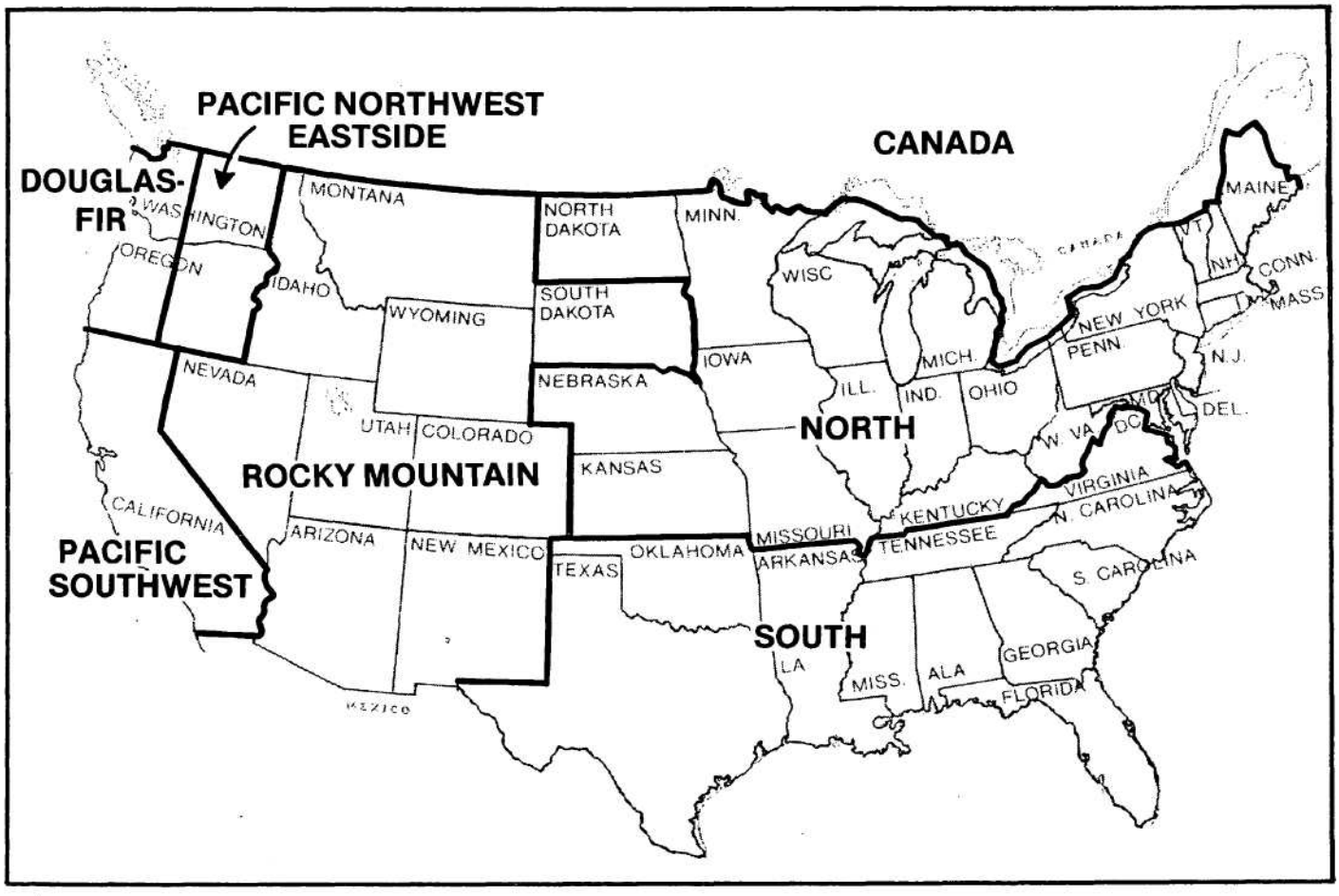
The projected volumes of log exports also have an implicit assumption that the west coast States could produce and sell 2.6 billion board feet to the log-export market each year during the projection period. Available information indicates that over the next two decades, timber harvest on industry lands on the west coast will decline (Gedney et al. 1975, Beuter et al. 1976, and Oswald 1978). In addition, more of the timber from private and public lands will be second growth. These changes in the volume and character of log supplies on the west coast may tend to dampen export volumes below 2.6 billion board feet during the latter part of the projection period.

Using our simulation model, our estimates of log- and lumber-export volumes, and estimates of domestic and other foreign demands and supplies of timber products consistent with the Timber Assessment (USDA Forest Service 1979), we projected timber harvest, stumpage prices, and production and prices of softwood lumber and plywood for each U.S. region shown in figure 6. In addition, the model solves for the volume of softwood-lumber production in Canada and for exports of softwood lumber from Canada to the United States. This projection constituted our base scenario for use in identifying the effects of a ban on log exports under each set of assumptions about Japanese responses to the change in U.S. trade policy.

Alternative Scenarios

As used in the following discussions, a "scenario" describes market responses to a ban on U.S. log exports under a set of assumptions. Scenarios differ according to the underlying assumptions about Japanese responses to a ban and according to assumptions about the response of processing capacity in the Douglas-fir region.

Figure 6.—Product and stumpage supply regions.



For each scenario, we have assumed that Japanese timber processors would recover 4.4 2 billion board feet of softwood lumber from the 2.6 billion board feet of logs that would have been purchased from the United States during each year of the projection period without a change in U.S. trade policy. We have also assumed that U.S. producers would recover only 3.38 billion board feet of softwood lumber from 2.6 billion board feet of logs. Recovery or overrun factors of 1.7 for Japan and 1.3 for the west coast are consistent with current industry averages. The higher recovery in Japan is attributable in part to thinner saws, very little planing or other surface preparation, and sawing of generally larger lumber dimensions. For each scenario, Japanese consumers are assumed to have to replace the equivalent of 4.42 billion board feet of softwood lumber during each year of the projection period.

Under each scenario, a ban on log exports is assumed to decrease annual stumpage demands by 2.5 billion board feet in the Douglas-fir region and by 100 million board feet in the Pacific Southwest region.

The sensitivity analyses were done only for the decade of the 1980's. The 10-year projection, however, adequately demonstrates the types of impacts that a ban on log exports might have on timber supplies and prices in the United States under each of the assumed scenarios.

Scenario 1

What would be the effect of a ban on log exports on U.S. markets if Japan purchased the lumber equivalent of log-export volume from the United States? This scenario favors U.S. lumber processors. It assumes that Japan would purchase an additional 4.42 billion board feet of softwood lumber from the United States. Although favoring U.S. processors, the scenario has the potential to be detrimental to U.S. consumers if significant volumes of lumber would be diverted from the U.S. to the Japanese market, or if Canadian imports would not be able to respond to possibly higher prices in the United States. The scenario also favors U.S. stumpage owners, especially in the log-exporting regions, in that expanded demand for lumber might have the effect of offsetting any reductions in stumpage prices caused by removal of log-export demands from the timber markets. The purpose of the scenario is to get some idea of the effects on U.S. timber markets of replacing Japanese log demand with Japanese lumber demand. No additional direct Japanese drain on the Canadian softwood resource is assumed. Any increase in exports from Canada to the United States in response to higher prices attributable to U.S. softwood-lumber exports to Japan, however, would reflect an indirect Japanese drain on the Canadian resource.

In the model, 96 percent of the expanded U.S. export of 4.42 billion board feet of softwood lumber is allocated to the Douglas-fir region and 4 percent is allocated to the Pacific Southwest region. The west coast is judged to be in the best position to respond to increased Japanese demands for softwood lumber. No assumption is made about the response of processing capacity: Timber harvest and processing in each region are solved by the model.

Scenario 2

What would be the effect of a ban on log exports on U.S. markets if Japan did not buy any additional softwood lumber from North America? The purpose of this scenario is to get some idea of the maximum stumpage and reduction of end-product prices that might be associated with a ban on softwood-log exports. Japan is assumed to find a replacement for the equivalent of 4.42 billion board feet of softwood lumber by using nonwood substitutes, expanding hardwood consumption, increasing domestic harvest, and increasing purchases of softwoods from Siberia. The demand for softwood lumber from North America is assumed to be unaffected. Removal of log-export demand in the exporting regions would have the effect of lowering stumpage prices in these regions. These lower stumpage prices would then interact with other components of the timber economy to affect prices and production in the United States and U.S. imports from Canada.

The scenario would be favorable to U.S. consumers in that end-product prices would be lowered, favorable to U.S. processors in that stumpage prices would be lowered, and detrimental to stumpage owners.

Scenario 3

What would be the effect of a ban on log exports on U.S. markets if Japan bought Canadian lumber as a replacement for U.S. logs?

Under the terms of this scenario, Japan is assumed to purchase an additional 4.42 billion board feet of softwood lumber from Canada. Whether or not the scenario should be considered favorable or unfavorable to any one segment of the U.S. timber economy (consumers, processors, and stumpage owners) depends on how markets interact. Softwood-lumber exports from the United States are assumed to be unchanged.

Scenario 4

What would be the effect of a ban on log exports on U.S. markets if Japan purchased the lumber equivalent of log-export volume from the United States, but lumber-processing capacity did not expand in the Douglas-fir region? Proponents of log-export restriction assume that processing capacity would expand to use any additional log volumes made available through a ban. But what if capacity did not respond and, at the same time, Japan stepped up purchases of softwood lumber from the United States? The purpose of the scenario is to determine the effects of this type of market situation on prices and production in the United States and on softwood-lumber imports from Canada.

As in scenario 1, 96 percent of the increased lumber exports from the United States is assumed to originate in the Douglas-fir region and 4 percent in the Pacific Southwest region. Additional lumber-export volumes are assumed to total 4.42 billion board feet.

Scenario 5

What would be the effect of a ban on log exports on U.S. markets if Japan responded by purchasing lumber from both Canada and the United States?

Under the terms of this scenario, Japan is assumed to replace the lumber equivalent of U.S. softwood-log export volume by purchasing an additional 2.21 billion board feet of softwood lumber from Canada and an additional 2.21 billion board feet of softwood lumber from the United States.

As in scenario 1, 96 percent of the increased lumber exports from the United States is assumed to originate in the Douglas-fir region and 4 percent in the Pacific Southwest region.

Simulation Results

We did the sensitivity analysis in an attempt to come up with general statements about the effects of a ban on log exports on prices, production, and trade in the U.S. softwood-lumber and softwood-plywood industries. Detailed results of the simulations are shown in this section of the report for each scenario.

The results of our sensitivity analysis should be viewed as general indications of how markets would respond to a change in U.S. log-export policy rather than predictions of these responses. In addition, the results of our analysis should be interpreted as indicating future market responses based on historical patterns of interactions among markets. We have little in the way of historical precedent to judge precisely how producers and consumers would respond to a ban on U.S. softwood-log exports.

National Impacts of Alternatives

Production, consumption, and imports of softwood lumber

Under the terms of scenarios 1 and 3, U.S. consumption of softwood lumber would decline in the early 1980’s and increase in the latter part of the decade, reflecting an increase in domestic production (table 11).

Under the terms of scenario 2, Japan is assumed to purchase no additional softwood construction materials from North America after a ban on U.S. log exports. The resulting decrease in stumpage demands on the west coast would have the effect of stimulating lumber production with the domestic market as the intended outlet.

Table 11—Base-level projection and projected changes in softwood-lumber production, imports, exports, and consumption, by scenario, 1980-90 (Million board feet)

Year	Base				Scenario 1				
	Production	Exports	Imports	Consumption	Production	Exports	U.S. Consumption of U.S. Production	Imports	Consumption
1980	31,659	1,369	7,806	38,086	+2,256	+4,420	-2,164	+1,228	-936
1981	31,901	1,392	8,246	38,755	+2,494	+4,420	-1,926	+1,431	-495
1982	32,062	1,415	8,683	39,330	+2,795	+4,420	-1,625	+1,382	-243
1983	31,987	1,438	9,137	39,686	+3,011	+4,420	-1,409	+1,315	-94
1984	32,079	1,461	9,591	40,209	+2,984	+4,420	-1,436	+1,269	-167
1985	32,029	1,485	10,033	40,577	+3,101	+4,420	-1,319	+1,238	-81
1986	31,977	1,508	10,498	40,967	+3,131	+4,420	-1,289	+1,203	-86
1987	31,860	1,531	11,043	41,372	+3,240	+4,420	-1,180	+1,110	-70
1988	31,709	1,554	11,627	41,782	+3,555	+4,420	-865	+869	+4
1989	31,476	1,577	12,206	42,105	+3,964	+4,420	-456	+632	+176
1990	31,416	1,600	12,740	42,556	+3,947	+4,420	-473	+521	+48

Year	Scenario 2					Scenario 3				
	Production	Exports	U.S. Consumption of U.S. Production	Imports	Consumption	Production	Exports	U.S. Consumption of U.S. Production	Imports	Consumption
1980	+863	0	+863	-494	+369	+1,899	0	+1,899	-2,635	-736
1981	+1,142	0	+1,142	-775	+367	+2,251	0	+2,251	-2,574	-323
1982	+1,326	0	+1,326	-972	+354	+2,540	0	+2,540	-2,716	-176
1983	+1,547	0	+1,547	-1,168	+379	+2,699	0	+2,699	-2,789	-90
1984	+1,702	0	+1,702	-1,353	+349	+2,729	0	+2,729	-2,876	-147
1985	+1,977	0	+1,977	-1,595	+382	+2,851	0	+2,851	-2,933	-82
1986	+2,370	0	+2,370	-1,918	+452	+2,883	0	+2,883	-2,996	-113
1987	+2,663	0	+2,663	-2,362	+301	+2,966	0	+2,966	-3,129	-163
1988	+3,184	0	+3,184	-2,866	+318	+3,167	0	+3,167	-3,241	-74
1989	+3,766	0	+3,766	-3,371	+395	+3,414	0	+3,414	-3,429	-15
1990	+3,998	0	+3,998	-3,836	+162	+3,617	0	+3,617	-3,567	+50

	Scenario 4					Scenario 5				
1980	+1,073	+4,420	-3,347	+1,867	-1,480	+2,154	+2,210	-56	+1,333	+1,277
1981	+1,004	+4,420	-3,416	+2,356	-1,060	+2,426	+2,210	+216	+1,088	+1,304
1982	+1,073	+4,420	-3,347	+2,572	-775	+2,683	+2,210	+473	+725	+1,198
1983	+1,087	+4,420	-3,333	+2691	-642	+2,894	+2,210	+684	+356	+1,040
1984	+946	+4,420	-3,474	+2,754	-720	+2,944	+2,210	+734	-63	+671
1985	+924	+4,420	-3,496	+2,885	-611	+3,139	+2,210	+929	-487	+442
1986	+981	+4,420	-3,439	+2,953	-486	+3,152	+2,210	+942	-933	+9
1987	+1,007	+4,420	-3,413	+2,899	-514	+3,186	+2,210	+976	-1,463	-487
1988	+1,137	+4,420	-3,283	+2,809	-474	+3,424	+2,210	+1,214	-2,075	-861
1989	+1,258	+4,420	-3,162	+2,759	-403	+3,632	+2,210	+1,422	-2,695	-1,273
1990	+1,169	+4,420	-3,251	+2,755	-496	+3,599	+2,210	+1,389	-3,263	-1,874

Consumption would decrease under scenario 4, which assumes that U.S. lumber exports would increase by 4.42 billion board feet and that no new processing capacity would be constructed in the Douglas-fir region.

Under scenario 5, consumption would increase initially and then decline in response to a decline in imports from Canada.

Production of softwood lumber in the United States would increase under the terms of each scenario. The increase in production would be least under scenario 4 and generally highest under scenario 1.

Consumption of domestically produced lumber in the United States would increase under scenarios 2, 3, and 5. The increase would be highest for scenario 3, which assumes that Canadian sales of softwood lumber to Japan would expand by 4.42 billion board feet.

Imports of softwood lumber from Canada would tend to offset any effect of U.S. log-export policy on U.S. consumption of softwood lumber. In scenarios 1 and 4, imports would increase in response to higher prices generated by expanded U.S. exports of softwood lumber. Under scenarios 3 and 5, imports would generally decline—production of softwood lumber in Canada would expand by less than the assumed increase in Canadian exports to Japan. Under scenario 2, imports would decline in response to lower prices generated by expanded U.S. production of softwood lumber destined for the domestic market.

Production and consumption of softwood plywood

We have assumed that U.S. imports and exports of softwood plywood would be unaffected by changes in U.S. softwood log-export policy. Thus, changes in production would equal changes in consumption. Production of softwood plywood would increase under the terms of each scenario (table 12). The increase would be largest under scenario 4. Softwood-plywood production would increase by less than 5 percent for any one year and in any scenario.

Table 12—Base-level projection of production and projected changes in softwood-plywood consumption, by scenario, 1980-90 (Million square feet, 3/8-inch basis)

Year	Base	Scenario				
		1	2	3	4	5
1980	20,158	+253	+406	+296	+420	+286
1981	20,467	+270	+422	+304	+450	+282
1982	20,690	+299	+483	+359	+490	+309
1983	20,942	+297	+486	+332	+545	+334
1984	21,220	+294	+455	+336	+511	+296
1985	21,479	+259	+563	+572	+748	+560
1986	21,726	+330	+481	+328	+557	+329
1987	21,993	+334	+452	+340	+654	+343
1988	22,211	+336	+459	+373	+815	+363
1989	22,451	+307	+417	+374	+902	+357
1990	22,693	+286	+423	+327	+1,006	+348

Prices for softwood lumber

Softwood-lumber prices in the United States would decrease under the terms of scenario 2 and increase under the terms of scenario 4 (table 13). Under scenario 2, the ban on softwood-log exports would have the effect of increasing supplies for the domestic market, and we have assumed the absence of increased Japanese demand for softwood construction materials. Increased supplies and decreased Japanese demands would result in decreased prices. Under scenario 4, we have assumed that Japan would purchase the lumber equivalent of log-export volume, resulting in a net increase in demand for softwood construction materials. We have also assumed that no new lumber-processing capacity would be constructed in the Douglas-fir region, thereby diverting production from the domestic to the export market. Increased foreign demand and reduced domestic supplies would result in higher prices.

Table 13—Base-level projection and projected changes in wholesale price index[1/] for softwood lumber, by scenario, 1980-90

Year	Base	Scenario				
		1	2	3	4	5
1980	155.3	+9.9	-4.0	+6.2	+15.9	+9.2
1981	158.0	+4.6	-6.2	+3.2	+10.6	+4.3
1982	162.4	+.9	-6.2	-.7	+8.1	+.2
1983	166.2	+.6	-4.5	-.4	+6.8	+.9
1984	170.2	+1.1	-5.3	-.7	+5.6	+.6
1985	174.3	0	-3.1	-.9	+5.9	+1.2
1986	179.5	-.2	-5.0	-.9	+4.8	-.3
1987	183.8	-.2	-3.0	-.6	+4.7	+.2
1988	188.3	+1.3	-3.1	-1.1	+4.9	+.3
1989	192.8	-.9	-2.6	+.1	+3.8	-.2
1990	199.8	-1.5	-4.0	-3.7	+1.0	-2.5

1/ 1967 = 100.

The patterns of price changes for the other scenarios are mixed, increasing in some years and decreasing in others. In general, the price changes for scenarios 1, 3, and 5 would amount to less than 2 percent in any year. The mixed pattern of price increases and decreases and the relatively small sizes of price changes suggest that softwood-lumber prices would probably change little under scenarios 1, 3, and 5.

Prices for softwood plywood

Softwood-plywood prices would decline under the terms of each scenario (table 14). The decline would be largest under scenario 4, reaching about 7 percent by 1990. Plywood prices would decline by less than 5 percent for the other scenarios. The decline in prices is attributable to increased plywood production brought about by lower stumpage prices. The effect of the ban on log exports on stumpage prices is discussed later.

Year	Base	Scenario				
		1	2	3	4	5
1980	158.3	-3.4	-5.9	-4.2	-5.2	-3.6
1981	162.7	-4.0	-6.5	-3.9	-6.4	-3.7
1982	166.4	-3.4	-6.2	-3.5	-6.2	-3.4
1983	169.7	-3.6	-6.3	-4.4	-6.1	-3.5
1984	173.5	-4.5	-6.8	-5.0	-6.5	-4.8
1985	177.3	-4.7	-6.8	-5.1	-7.3	-4.5
1986	180.6	-4.7	-6.9	-5.1	-8.0	-4.9
1987	183.9	-4.6	-6.5	-4.7	-9.0	-5.1
1988	187.2	-5.0	-6.0	-4.6	-10.2	-4.8
1989	190.5	-4.4	-5.7	-4.8	-11.6	-4.5
1990	193.7	-4.3	-5.5	-4.6	-12.9	-4.8

1/ 1967 = 100.

The balance of trade

According to the patterns of U.S. lumber exports, imports, and log exports implied by each scenario, the U.S. balance of trade would generally be negatively affected by a ban on log exports (table 15). The exceptions are scenarios 1 and 5 towards the end of the 1980's. For these two scenarios, the positive effect of a ban on the balance of trade reflects a decline in imports from Canada.

Table 15—Change in balance of trade, by scenario, 1980-90
(Millions of dollars)

Year	Scenario				
	1	2	3	4	5
1980	-31	-397	-109	-95	-329
1981	-74	-374	-144	-171	-307
1982	-75	-365	-144	-225	-280
1983	-76	-355	-140	-244	-240
1984	-74	-341	-133	-264	-191
1985	-70	-320	-128	-288	-143
1986	-74	-291	-127	-309	-84
1987	-59	-240	-111	-308	-9
1988	-14	-182	-99	-310	+75
1989	+6	-120	-81	-317	+163
1990	+19	-70	-75	-340	+246

Regional Impacts of Alternatives

Stumpage prices

Changes in log-export policy and lumber exports on the west coast would set in motion interactions among softwood markets in the United States and Canada. These interactions would ultimately affect • stumpage prices in other U.S. supply regions. Under each scenario, the effect on stumpage prices would be greatest in the Douglas-fir region, where they would decline under each scenario (table 16). Stumpage prices in the Pacific Southwest region would be affected under each scenario, but less than in the Douglas-fir region. Stumpage prices in other regions would generally be affected most under scenario 4, followed by scenario 2. Under scenario 4, stumpage prices in regions not exporting logs would increase in response to higher lumber prices generated by increased exports and by a lack of additional capacity in the Douglas-fir region. Under scenario 2, stumpage prices in regions not exporting logs would generally decrease. Lumber and plywood production would increase in the log-exporting regions, decreasing end-product prices and eventually decreasing stumpage prices in other regions.

Stumpage prices in regions not exporting logs under scenarios 1, 3, and 5 would be generally affected, but the pattern would be mixed and the changes relatively small. For example, the change in price in the South would generally be less than one dollar in any one year.

Table 16—Base-level projection and projected changes in regional softwood stumpage prices, by scenario and region, 1980-90 (Dollars per thousand board feet, log scale)

	Base						Scenario 1				
Year	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	North	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South
1980	76.20	31.45	39.30	28.23	55.83	27.61	-37.47	+7.18	-1.41	+8.22	+1.46
1981	77.86	38.66	44.48	38.13	59.08	28.20	-32.15	+3.08	-2.96	+5.59	+1.16
1982	80.91	44.88	46.31	35.37	62.68	28.74	-31.33	+1.43	+0.05	+2.72	+0.46
1983	83.53	43.28	47.17	37.68	66.00	29.00	-33.36	-1.57	+0.75	-0.67	+0.36
1984	86.39	45.27	51.84	38.54	69.20	29.39	-36.78	+0.02	-4.76	+1.81	+0.04
1985	88.45	48.32	54.63	41.81	72.20	29.70	-36.61	+0.08	-3.29	-0.53	-0.14
1986	91.08	50.86	56.95	44.79	75.16	29.87	-38.20	-1.42	-2.14	-1.94	-0.49
1987	93.86	52.99	60.49	45.98	77.83	30.08	-37.77	-1.51	-3.07	-1.18	-0.71
1988	97.11	54.38	63.40	48.27	80.33	30.25	-36.57	-1.58	-1.86	-0.75	-0.41
1989	99.86	57.07	65.99	50.65	82.83	30.50	-35.16	-2.84	-0.21	-1.76	+0.08
1990	104.47	58.82	70.84	52.63	85.33	30.62	-36.64	-2.64	-3.19	-0.73	+0.18

	Scenario 2					Scenario 3				
Year	Douglas-fir	Pacific Northwest East side	Pacific South-west	Rocky Mountain	South	Douglas-fir	Pacific Northwest East side	Pacific South-west	Rocky Mountain	South
1980	-45.51	-1.31	-7.04	-2.79	-1.10	-39.73	+4.28	-4.73	+9.09	+1.17
1981	-42.12	-4.57	-7.73	-5.99	-1.56	-34.17	+1.80	-4.03	+5.44	+0.72
1982	-44.09	-7.65	-6.39	-3.99	-1.57	-33.81	-0.14	-0.65	+3.63	+0.04
1983	-45.02	-5.78	-3.51	-4.77	-2.86	-35.78	-2.85	-1.50	+2.29	-0.65
1984	-45.90	-5.78	-3.58	-3.64	-3.15	-39.13	-3.33	-3.72	+2.77	-1.34
1985	-45.13	-5.97	-3.54	-5.61	-3.09	-38.99	-2.82	-2.42	+0.74	-1.22
1986	-43.79	-5.98	-1.96	-9.30	-2.91	-40.32	-3.35	-2.37	+0.44	-1.26
1987	-43.89	-3.56	-3.58	-10.61	-3.04	-41.61	-2.66	-2.71	+1.37	-1.67
1988	-42.05	-1.66	-2.36	-11.68	-5.02	-40.84	-1.46	-3.34	+1.82	-3.69
1989	-39.03	-1.46	-2.47	-12.30	-1.58	-40.10	-0.58	-4.62	+0.85	-0.49
1990	-41.51	+0.49	-3.40	-14.17	-1.57	-40.94	-0.40	-5.94	-0.46	-0.34

	Scenario 4					Scenario 5				
1980	-57.43	+9.87	-1.35	+12.77	+2.75	-38.39	+6.22	-1.72	+9.61	+1.40
1981	-57.76	+5.67	-2.73	+10.26	+2.02	-32.87	+3.79	-3.29	+6.24	+0.80
1982	-59.97	+6.01	+1.65	+10.47	+1.89	-32.58	+1.66	-0.66	+4.79	+0.22
1983	-63.87	+3.27	+6.55	+7.75	+1.05	-33.95	-0.54	-1.27	+1.69	+0.13
1984	-64.39	+0.96	+3.84	+8.76	+1.03	-37.40	-0.14	-3.80	+1.64	-0.14
1985	-67.20	+2.15	+0.31	+6.80	+1.53	-37.09	+1.86	-2.17	-0.06	+0.02
1986	-67.73	+1.74	+0.43	+3.94	+1.67	-38.99	-0.88	-2.48	-0.34	-0.18
1987	-69.57	+1.27	+0.08	+4.62	+1.47	-40.26	-1.63	-2.91	0	-0.36
1988	-71.50	+1.72	-0.33	+4.10	-0.24	-39.28	+1.07	-2.60	+0.11	-2.74
1989	-74.11	+0.87	-0.32	+4.21	+2.63	-38.61	+1.78	-3.20	-1.00	+0.16
1990	-76.91	+0.75	-5.36	+4.22	+2.52	-42.08	+1.25	-5.07	-0.75	-0.03

The size of the stumpage price decreases in the Douglas-fir region under scenario 4—over 50 percent of base-level projections—suggest that at least some new capacity would be constructed. The low stumpage prices would be an inducement for establishment of new capacity. Exactly how much new capacity might be constructed remains uncertain, however; stumpage prices are only one factor considered in the decision to build processing capacity.

Stumpage prices and other aspects of timber markets in the northern region are assumed to be unaffected by changes in log-export policy for the west coast.

Timber harvest

Total U.S. timber harvest would decline after a ban on log exports (table 17). For scenarios 1, 3 and 5, the decline would generally amount to 1 to 1.5 billion board feet per year. Most of the harvest decline under these three scenarios would be concentrated in the Douglas-fir region. Harvest in any one of the other regions would generally change by less than 50 million board feet.

Under scenario 2, harvest would decline by about 10 percent in the Douglas-fir region in response to lower stumpage prices. Harvest would generally decline by several hundred million board feet per year in the South. Harvest changes in other regions would generally amount to less than 50 million board feet per year.

Under scenario 4, annual harvest in the Douglas-fir region would generally decline by over 2 billion board feet. Timber harvest in the South would generally increase by over 100 million board feet per year. In other regions, the change in harvest would be relatively small.

Softwood-lumber production

Under scenarios 1, 4 and 5, the general increase in softwood lumber production in reg4ons not exporting logs is attributable in part to higher lumber prices generated through increased lumber exports (table 18). For scenarios 1 and 5, the net increase in U.S. production is concentrated in the Douglas-fir region. Lumber production is assumed to be unchanged in this region under the terms of scenario 4.

Under scenario 2, softwood-lumber production in the Douglas-fir region would increase by over 2 billion board feet per year during the mid and late 1980's. This increase would be offset somewhat by a decline in production in the South. Output in the Douglas-fir region would also expand by over 2 billion board feet per year under the terms of scenario 3. With the exception of a decline in production in the South during the late 1980's, output would generally increase in other U.S. regions.

Softwood-plywood production

Lower stumpage prices in the Douglas-fir region generated by a ban on log exports would lead to significant expansions of softwood-plywood production for all scenarios (table 19). The increase competitiveness of producers there would generally lead to reduced output in other regions.

Production in the Douglas-fir region would expand least under scenario 1 and most under scenario 4, corresponding with the decline in stumpage prices there. The decline would be largest under scenario 4 and smallest under scenario 1.

Table 17—Base-level projection and projected changes in regional softwood timber harvest, by scenario and region, 1980-90 (Million board feet)

	Base							Scenario 1					
Year	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	North	Total	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	Net change in harvest
1980	13,636	2,958	4,743	4,629	22,585	3,656	52,207	-1,487	+51	-31	+47	+168	-1,252
1981	13,570	3,010	4,808	4,729	23,143	3,727	52,987	-1,302	+19	-63	+31	+95	-1,220
1982	13,560	3,053	4,797	4,754	23,734	3,798	53,696	-1,201	+6	+4	+14	+33	-1,144
1983	13,530	3,037	4,765	4,760	24,287	3,858	54,237	-1,213	-15	+19	-6	+20	-1,195
1984	13,507	3,049	4,814	4,788	24,811	3,923	54,892	-1,273	-3	-97	-22	-15	-1,410
1985	13,454	3,069	4,821	4,831	25,297	3,986	55,458	-1,247	-3	-61	-37	-38	-1,386
1986	13,422	3,085	4,817	4,872	25,762	4,043	56,001	-1,232	-13	-34	-45	-78	-1,402
1987	13,394	3,098	4,838	4,903	26,178	4,104	56,515	-1,139	-14	-51	-41	-102	-1,347
1988	13,380	3,106	4,844	4,941	26,566	4,161	56,998	-1,017	-14	-23	-39	-65	-1,158
1989	13,347	3,124	4,844	4,979	26,940	4,222	57,456	-892	-18	+10	-45	-9	-954
1990	13,374	3,134	4,886	5,016	27,305	4,275	57,990	-870	-21	-47	-40	-258	-1,236

	Scenario 2						Scenario 3					
Year	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	Net change in harvest	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	Net change in harvest
1980	-1,802	-9	-151	-16	-127	-2,150	-1,575	+31	-102	+52	+104	-1,490
1981	-1,677	-33	-158	-34	-140	-2,042	-1,375	+11	-81	+30	+57	-1,350
1982	-1,666	-55	-121	-22	-179	-2,043	-1,288	-4	-4	+19	-5	-1,282
1983	-1,610	-39	-53	+23	-321	-2,000	-1,293	-22	+22	=11	-70	-1,397
1984	-1,549	-37	-51	+49	-349	-1,937	-1,345	-26	-66	+14	-127	-1,550
1985	-1,426	-38	-47	+55	-331	-1,787	-1,316	-21	-36	+1	-115	-1,487
1986	-1,283	-37	-10	+53	-299	-1,576	-1,287	-24	-32	0	-155	-1,498
1987	-1,197	-18	-42	+63	-302	-1,496	-1,253	-19	-37	+5	-147	-1,451
1988	-1,037	-4	-14	+75	-229	-1,209	-1,139	-10	-46	=7	-137	-1,325
1989	-841	-3	-15	+89	-107	-877	-1,030	-3	-69	+2	-49	-1,149
1990	-847	+12	-30	+95	-98	-868	-975	-2	-90	-6	-28	-1,101

	Scenario 4						Scenario 5					
1980	-2,265	+71	-29	+74	+318	-1,831	-1,523	+45	-38	+55	-162	-1,299
1981	-2,268	+37	-58	+57	+217	-2,015	-1,328	+25	-70	+35	+83	-1,255
1982	-2,239	+39	+39	+58	+143	-1,960	-1,046	+8	-11	+26	+7	-1,216
1983	-2,247	+18	+141	+41	+85	-1,989	-1,230	-7	-23	+7	-2	-1,255
1984	-2,222	+1	+77	+15	+81	-2,048	-1,290	-4	-74	-24	-32	-1,424
1985	-2,209	+9	0	-2	+138	-2,064	-1,258	+11	-36	-35	-16	-1,334
1986	-2,157	+6	+3	-15	+149	-2,014	-1,254	-10	-40	-37	-36	-1,377
1987	-2,100	+3	-5	-12	+123	-1,991	-1,222	-15	-47	-35	-58	-1,377
1988	-2,041	+5	-12	-16	+210	-1,854	-1,103	+5	-37	-35	-43	-1,213
1989	-2,008	-2	-13	-16	+247	-1,792	-999	+10	-47	-41	+7	-1,070
1990	-1,968	-2	-109	-17	+224	-1,872	-1,042	+6	-80	-41	-15	-1,172

Table 18-Base-level projection and projected changes in regional softwood-lumber production, by scenario and region, 1980-90
(Million board feet)

	Base							Scenario 1					
Year	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	North	Total	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	Net change in U.S. production
1980	8,177	2,825	5,471	5,193	8,804	1,178	31,648	+1,559	+81	+179	+63	+375	+2,257
1981	7,912	2,875	5,558	5,312	9,056	1,188	31,901	+1,934	+63	+137	+50	+309	+2,493
1982	7,682	2,929	5,544	5,329	9,379	1,199	32,062	+2,288	+49	+226	+35	+198	+2,796
1983	7,349	2,904	5,490	5,320	9,716	1,209	31,988	+2,573	+36	+250	+11	+140	+3,010
1984	7,061	2,907	5,542	5,333	10,017	1,220	32,080	+2,751	+55	+104	-4	+76	+2,982
1985	6,752	2,914	5,539	5,362	10,231	1,230	32,028	+2,883	+63	+149	-16	+24	+3,103
1986	6,461	2,918	5,522	5,389	10,446	1,240	31,976	+2,967	+49	+186	-19	-51	+3,132
1987	6,193	2,921	5,536	5,400	10,558	1,151	31,859	+3,142	+48	+160	-7	-103	+3,240
1988	5,961	2,916	5,534	5,415	10,622	1,261	31,709	+3,391	+48	+187	+16	-88	+3,554
1989	5,711	2,919	5,523	5,426	10,625	1,272	31,476	+3,689	+37	+232	+26	-21	+3,963
1990	5,545	2,916	5,570	5,569	10,665	1,282	31,547	+3,792	+39	+155	-85	-85	+3,816

	Scenario 2						Scenario 3					
Year	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	Net change in U.S. production	Douglas-fir	Pacific Northwest-East side	Pacific South-west	Rocky Mountain	South	Net change in U.S. production
1980	+1,014	+6	-1	-22	-133	+864	+1,426	+71	+61	+69	+273	+1,900
1981	+1,365	-2	+1	-47	-175	+1,142	+1,829	+64	+87	+47	+223	+2,250
1982	+1,565	-27	+50	-30	-231	+1,327	+2,141	+51	+187	+40	+120	+2,539
1983	+1,789	+3	+152	+30	-428	+1,546	+2,437	+39	+180	+34	+8	+2,698
1984	+1,987	+8	+158	+71	-534	+1,690	+2,623	+42	+124	+48	-109	+2,728
1985	+2,261	+12	+163	+92	-551	+1,977	+2,720	+51	+166	+51	-135	+2,853
1986	+2,580	+16	+212	+100	-538	+2,370	+2,798	+48	+172	+67	-202	+2,883
1987	+2,864	+38	+173	+117	-528	+2,664	+2,882	+52	+168	+85	-221	+2,966
1988	+3,217	+54	+211	+132	-431	+3,183	+3,072	+67	+155	+94	-222	+3,166
1989	+3,604	+57	+210	+149	-254	+3,766	+3,238	+80	+124	+96	-123	+3,415
1990	+3,775	+75	+183	+19	-186	+3,866	+3,421	+80	+87	-43	-60	+3,485

	Scenario 4						Scenario 5					
1980	0	+125	+211	+120	+680	+1,074	+1,507	+76	+154	+77	+341	+2,155
1981	0	+115	+200	+107	+581	+1,003	+1,891	+65	+120	+60	+290	+2,426
1982	0	+125	+341	+119	+489	+1,074	+2,218	+49	+198	+56	+162	+2,683
1983	0	+114	+498	+107	+367	+1,086	+2,525	+42	+189	+35	+101	+2,892
1984	0	+111	+430	+89	+316	+946	+2,719	+55	+123	+3	+43	+2,944
1985	0	+129	+344	+85	+368	+926	+2,852	+76	+173	-4	+43	+3,140
1986	0	+130	+362	+88	+401	+981	+2,914	+58	+169	-1	+13	+3,153
1987	0	+129	+368	+115	+397	+1,009	+2,989	+51	+163	+9	-25	+3,187
1988	0	+136	+371	+139	+491	+1,137	+3,185	+74	+175	+22	-31	+3,425
1989	0	+138	+395	+170	+556	+1,259	+3,347	+80	+161	+28	+16	+3,632
1990	0	+143	+280	+67	+549	+1,039	+3,361	+75	+117	-89	+3	+3,467

Table 19–Base-level projection and projected changes in regional softwood-plywood production, by scenario and region, 1980-90
(Million square feet, 3/8-inch basis)

	Base							Scenario 1					
Year	Douglas-fir	Pacific Northwest-East side	Pacific Southwest	Rocky Mountain	South	North	Total	Douglas-fir	Pacific Northwest-East side	Pacific Southwest	Rocky Mountain	South	Net change in U.S. production
1980	8,480	1,022	619	950	9,028	59	20,158	+653	-55	-189	-3	-153	+253
1981	8,597	1,051	620	965	9,174	60	20,467	+721	-95	-188	-23	-146	+269
1982	8,639	1,053	622	987	9,327	61	20,689	+751	-96	-188	-37	-130	+300
1983	8,650	1,084	656	1,012	9,478	62	20,942	+794	-123	-199	-42	-132	+298
1984	8,671	1,123	686	1,055	9,623	63	21,221	+838	-138	-207	-60	-140	+293
1985	8,664	1,171	715	1,099	9,765	64	21,478	+870	-153	-205	-71	-136	+305
1986	8,634	1,217	746	1,151	9,913	65	21,726	+905	-149	-209	-90	-128	+329
1987	8,611	1,259	779	1,205	10,072	66	21,992	+925	-148	-200	-105	-137	+335
1988	8,551	1,304	807	1,274	10,208	67	22,211	+943	-150	-183	-152	-123	+335
1989	8,512	1,356	834	1,350	10,331	68	22,451	+938	-146	-184	-193	-108	+307
1990	8,476	1,405	859	1,421	10,463	69	22,693	+902	-144	-180	-221	-70	+287

	Scenario 2						Scenario 3					
Year	Douglas-fir	Pacific Northwest-East side	Pacific Southwest	Rocky Mountain	South	Net change in U.S. production	Douglas-fir	Pacific Northwest-East side	Pacific Southwest	Rocky Mountain	South	Net change in U.S. production
1980	+1,392	-36	-136	+2	-163	+1,059	+683	-86	-133	-2	-166	+296
1981	+846	-79	-159	-3	-189	+416	+735	-119	-132	-18	-161	+305
1982	+940	-79	-160	+2	-219	+484	+810	-128	-133	-35	-154	+360
1983	+989	-109	-192	+1	-204	+485	+852	-151	-165	-45	-159	+332
1984	+993	-120	-196	-18	-205	+454	+898	-168	-169	-70	-157	+334
1985	+1,013	-128	-195	-41	-189	+460	+921	-174	-172	-108	-153	+314
1986	+1,040	-134	-200	-68	-157	+481	+970	-177	-174	-151	-140	+328
1987	+1,032	-138	-201	-75	-165	+453	+1,010	-172	-179	-176	-142	+341
1988	+1,028	-136	-205	-75	-155	+457	+1,048	-180	-177	-191	-126	+374
1989	+962	-138	-204	-69	-133	+418	+1,048	-192	-173	-211	-99	+373
1990	+930	-143	-191	-53	-120	+423	+984	-190	-154	-216	-97	+327

	Scenario 4						Scenario 5					
1980	+1,049	-105	-248	-54	-223	+419	+659	-60	-155	-10	-148	+286
1981	+1,230	-168	-302	-73	-237	+450	+737	-83	-171	-35	-166	+282
1982	+1,390	-188	-332	-98	-281	+491	+769	-91	-171	-50	-145	+312
1983	+1,538	-217	-384	-120	-272	+545	+843	-117	-187	-57	-147	+335
1984	+1,609	-259	-412	-156	-271	+511	+857	-140	-187	-78	-157	+295
1985	+1,673	-276	-440	-194	-284	+489	+882	-149	-189	-91	-152	+301
1986	+1,837	-286	-469	-243	281	+558	+931	-160	-190	-106	-147	+328
1987	+2,066	-293	-500	-294	-323	+656	+969	-160	-193	-123	-149	+344
1988	+2,323	-302	-527	-360	-319	+815	+1,001	-158	-193	-153	-134	+363
1989	+2,529	-322	-573	-430	-302	+902	+999	-158	-192	-187	-105	+357
1990	+2,732	-338	-597	-496	-297	+1,004	+1,001	-159	-190	-216	-88	+348

Discussion

We again emphasize that the results of the sensitivity analysis should be viewed as general indicators of the responses of U.S. markets for softwood construction materials to a change in U.S. log export policy rather than predictions of what these reponses would be. We have simulated the responses of U.S. markets to a ban on log exports given assumed Japanese responses to the change in U.S. export policy. Under scenario 1, we assumed that Japan would purchase from the United States the lumber equivalent of log-export volume that would have been exported and that Canada would not expand sales of softwood lumber to Japan. Under scenario 2, we assumed that Japan would somehow turn to sources of construction materials other than North America. Under scenario 3, we assumed that Japan would purchase from Canada the lumber equivalent of U.S. log-export volume and that U.S. exports of softwood lumber would not increase. Under scenario 4, we assumed that Japan would purchase from the United States the lumber equivalent of log-export volume, that Canadian sales to Japan would not expand, and that lumber-processing capacity would not expand in the Douglas-fir region. Under scenario 5, we assumed that Japan would purchase from the United States half of the lumber equivalent of log-export volume and half from Canada.

Because historical precedent is lacking and because of the many possible Japanese responses to a ban on U.S. softwood-log exports, the basis for predicting how Japanese importers and consumers might respond to a change in export policy is limited. Intuitively, one would expect an attempt to make the best of available sources of construction materials as replacements for logs that would have been imported from the United States. Available information on alternative sources of supply to meet Japanese needs for construction materials suggests that Japan would have to increase the use of materials from all sources. Availability of the equivalent of 4.42 billion board feet of softwood lumber from sources other than North America is uncertain. The degree of increased use of construction materials from any one source remains a matter of conjecture.

We emphasize that the potential responses of U.S. softwood-stumpage owners to a ban on log exports remains another area of . uncertainty in the attempt to simulate the effects of the change in policy on U.S. markets, with the exception of scenario 4, which assumes that no new capacity would be constructed in the log-exporting regions, we have assumed that U.S. stumpage owners and lumber processors would respond in the future as they have in the past to changes in stumpage and end-product prices. How stumpage owners, especially in the Douglas-fir region, might respond to a change in log-export policy remains a matter of conjecture. Our simulation of market responses under scenario 4 points out for U.S. softwood markets the implications of a lack of capacity to respond in the log-exporting regions.

Within the United States, our sensitivity analysis points out that the impacts of a ban on log exports would be concentrated in the Douglas-fir region, as expected. For example, in 1990, a ban would increase profits from timber processing there by over $300 million per year, regardless of what scenario is assumed (table 20). In table 20, processors are defined as producers of softwood lumber and plywood. As a result of the increased competitiveness of processors in this region, profits from processing would generally decline in other U.S. supply regions.

Table 20—Projected effects of a ban on softwood-log exports on U.S. consumers and on stumpage producers and log processors by U.S. supply region and scenario, 1990[1] (Million dollars)

	Scenario				
	1	2	3	4	5
Consumers	-105.2	-247.6	-111.1	-65.9	-66.8
Processors, by region:					
Douglas-fir	+322.0	+333.7	+308.7	+548.8	+325.4
Pacific Northwest-East Side	-7.4	-5.1	-11.1	-19.4	-9.1
Pacific Southwest	-.1	-2.7	-18.7	-15.3	-16.5
Rocky Mountain	-6.5	-6.2	-11.3	-19.7	-8.4
South	-34.5	-53.4	-48.6	-73.1	-34.2
Total	+220.6	+229.7	+166.1	+418.4	+204.4
Stumpage producers, by region:					
Douglas-fir	-482.8	-547.5	-537.3	-970.5	-550.9
Pacific Northwest-East Side	-7.6	+1.4	-1.1	+2.2	+3.6
Pacific Southwest	-15.1	-16.2	-28.1	-25.3	-24.0
Rocky Mountain	-3.6	-70.1	-2.2	+20.6	-3.7
South	-11.4	-27.1	-9.1	+66.6	-.8
Total	-520.5	-659.5	-578.0	-906.4	-575.7

[1]/All effects were calculated using methodology described in Adams et al. (1977).

The increase in profits from processing in the Douglas-fir region in part would be at the expense of stumpage producers there. As shown in table 20, the amount of money spent for stumpage would decline by $483 million. Reductions in stumpage revenues in other regions would be relatively minor by comparison. In total, stumpage producers would generally lose over $520 million in revenues after a ban on log exports.

Expenditures by consumers for softwood lumber and plywood would decline under the terms of each scenario, ranging from $65,920,000 for scenario 4 to $247,584,000 for scenario 2. This change in consumer expenditure again emphasizes the need for capacity to expand in the log-exporting regions and the need for Japan to turn to all possible sources of construction materials if U.S. end-product prices are reduced by a ban on softwood-log exports.

The sensitivity analyses and review of domestic and foreign supplies and demands for softwood construction materials discussed in this paper provide the basis for the following general conclusions about the impact of the export and import of raw logs upon domestic timber supplies and prices.

Conclusions

- With the exception of softwood-lumber-imports from Canada, the United States-is self-sufficient in softwood-construction materials.
- The impacts of log exports on domestic timber supplies and prices over the past decade are masked by shifts in the variables that determine supplies and prices in domestic softwood markets.
- Japan will continue to be the primary export market for U.S. softwood construction materials during the 1980's.
- The impacts of a ban on log exports on supplies and prices of domestic timber would depend primarily on Japanese responses to the change in policy and on the responses of U.S. stumpage owners and timber processors. These responses are sources of uncertainty that will continue.
- Export markets for U.S. softwood construction materials appear relatively stable during the 1980's. The primary uncertainties are the number and types of housing starts in Japan and the market potential for U.S. softwood lumber if Japan adopts North American construction techniques. Cycles in foreign demands will continue to result in fluctuations in export-sales volumes and prices.
- Domestic rather than export markets have been and will remain the driving force behind U.S. markets for softwood construction materials during the 1980's. The importance of domestic markets compounds analytical problems in attempting to assess the impacts of log exports upon supplies and prices of domestic timber. Even with relatively stable demands-projected for U.S. exports of softwood construction materials, real prices for softwood lumber in the United States in 1990 might be as much. as 29 percent higher than in 1980 and for softwood plywood, 22 percent higher.
- A ban on U.S. log exports would lower softwood-lumber prices in the United States only if capacity expanded significantly on the west coast and only if Japan turned to sources of construction materials other than softwoods from North America. If Japan could obtain from sources other than North America the equivalent of the construction materials that would have been recovered from U.S. logs, softwood-lumber prices in the United States would be reduced by less than 2 percent. The decrease in prices would also be contingent on expanded production of softwood lumber in the log-exporting regions. The projected rise in real softwood-plywood prices in the United States would generally be offset by less than 4 percent if log exports were banned.
- The Japan-Canada-U.S. trade triangle in softwood logs and lumber limits the effect of a ban on export of U.S. softwood logs on U.S. softwood-lumber supplies and prices. Any expansion of U.S. softwood-lumber supplies destined for the domestic market after a ban would tend to be offset by reduced imports from Canada. Any expansion of U.S. lumber exports to Japan would tend to be countered by increased imports from Canada.
- Significant expansion of Canadian exports of softwood lumber to Japan after a ban on U.S. log exports would tend to reduce Canadian shipments to the United States.
- Lumber-processing capacity in the United States after a ban on log exports would probably expand by less than the lumber equivalent that Japanese processors would have recovered from U.S. logs. Domestically produced softwood lumber would be diverted from the U;S. market, stimulating imports from Canada if Japan tried to purchase the lumber equivalent of U.S. logs from the United States
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- Annual consumption of softwood lumber in the United States would generally be affected by less than 500 million board feet after a ban on softwood-log exports, regardless of what response is assumed for Japanese attempts to compensate for the loss of U.S. softwood logs. The responses of producers in other U.S. supply regions and the response of Canadian imports tend to limit the impact of log-export policy on lumber consumption in the United States.

- The U.S. balance of trade would generally be negatively affected by a ban on softwood-log exports.

- The impacts of a ban on softwood-log exports on stumpage prices would fall most heavily in the Douglas-fir region. Lumber and plywood processors there would generally gain in competitive position relative to processors in other regions. Stumpage owners—public and private—in this region would lose net revenue from the change in policy.

- Timber harvest in the United States would generally decline by over 1 billion board feet, regardless of the interactions of markets after a ban on log exports.

- Total timber harvest in the log-exporting regions of the west coast after a ban on softwood-log exports would generally decrease, especially if processing capacity did not increase or if Japan turned to sources other than North America for construction materials.

- Assuming no increase in lumber-processing capacity in the log-exporting regions and assuming no increase in U.S. exports of lumber, the magnitude of the resulting decline in stumpage prices in the log-exporting regions after a ban on log exports suggests that some additional processing capacity would be constructed, but how much is uncertain.

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Appendix: The Simulation Model

The simulation model consists of sets of supply and demand relations (fig. 7). Demand equations were developed for lumber and plywood in each of seven demand regions; supply equations were developed for nine regions including Canada. The cost of transporting wood products from supply to demand regions was considered. Estimates of output of pulpwood, log exports, fuelwood, and miscellaneous products in each supply region were derived from projections of consumption and trade in these products conducted outside of the model. The demand for stumpage in each supply region was derived from supplies of products (lumber, plywood, pulpwood). Supplies of stumpage consist of public harvests set by policies of Federal and State agencies, and private supply, which are responsive to both stumpage price and inventory volumes available. Inventory volumes by ownership and region are projected over time using the TRAS model (Larson and Goforth 1974). In each year of the simulation, the several supply-and-demand equations interact in the several markets to determine market clearing prices and volumes consumed and produced for all products and stumpage in all regions.

The model simulates the effects of a ban on log exports through a change in log-export volume in the stumpage sector depicted in figure 7. Log-export volumes were reduced to zero for the Douglas-fir and Pacific Southwest regions. This has the effect of changing the demand for stumpage in these . two regions. For each of the two regions, the change in stumpage demand interacts with other components of the stumpage sector and with the supplies and demands that form the final product sector.

Lumber exports are treated in the model as a shift in lumber demand for each region. Thus, the lumber demand of each region depicted in figure 7 includes lumber exports. Lumber-export volumes, however, are determined outside of the model and do not interact with its other components.

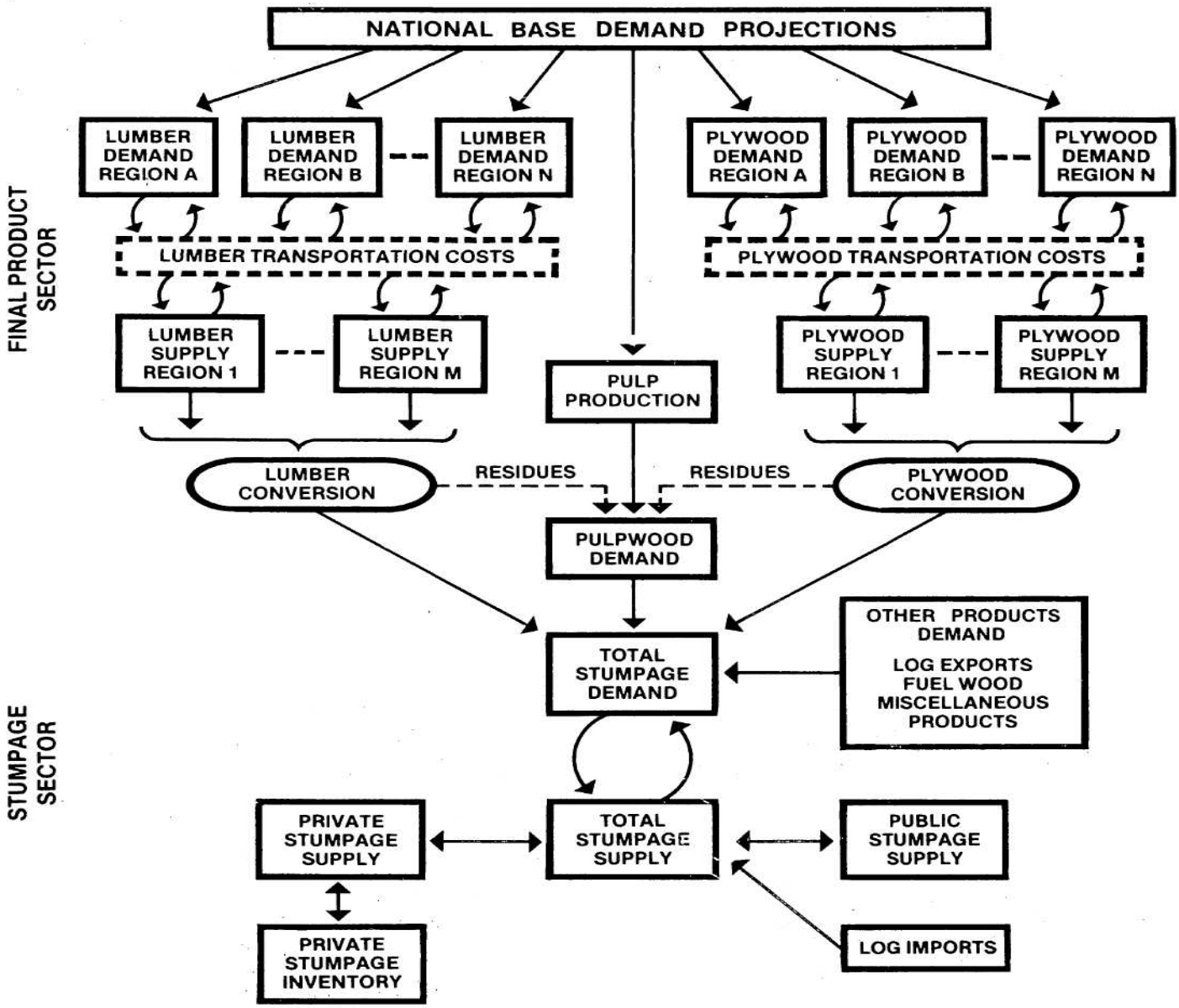

Figure 7. --Major interactions in the timber-assessment -market model, .Curved arrows; indicate where supply and demand interact to determine prices A straight arrow with a single head indicates - that. varia&les.arekexogenousor- determined, outside the model The. straight arrows with two, .heads. in .the stumpage supply sector of the model,. indicate, an endogenous relation between the variables in the .two- boxes' connected by.the arrow The relation however, is not one that determines market prices directly all prices are determined by the interaction of supply and demand.

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Reviews U.S. foreign and domestic markets for softwood construction materials, giving special consideration to trade patterns among Japan, Canada, and the United States. For alternative assumptions about market responses to a ban of U.S. softwood log exports, displays impacts on selected measures of U.S. softwood stumpage, lumber, and plywood markets.

KEYWORDS: Import/export (forest products), markets (internal), trade policy, supply/demand (forest products).

The Forest Service of **the** U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to arrowing Nation.

GPD 992-11.7