Log Exports From The Pacific Northwest

by

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SUMMARY

The sale of raw logs from the Pacific Northwest (PNW) was at first considered a desirable market for the sale of unwanted logs. It became a rapidly growing market, and with its growth also came demands from some in the PNW for restrictions against exporting logs. Some believed that the export of logs reduced employment opportunities for PNW mill workers. There does not appear to be any trend that would support this claim.

Another contested point was the higher prices received in the log export trade. There does seem to be a trend for stumpage prices to increase faster in the PNW than in some other regions of the United States, and the log export trade may be partly responsible for this. Some contend the high prices paid for logs increased stumpage prices beyond a point where many PNW mills could no longer compete in the domestic wood products market. Others believed the sale of logs to foreign buyers was a legitimate trade, and resulted in increased investments in forest lands.

The demands for restrictions on log exports has led to a virtual prohibition of log exports from all public lands in the western states, with the exception of Washington State Department of Natural Resources holdings.

As an aid in predicting the general trend of the impacts following a ban on log exports, three studies using sensitivity analysis were examined. The results indicate that a ban may result in an increase of lumber production, but a considerable decrease in stumpage prices and log production. Domestic prices and consumption vary depending upon the quantity of the increased foreign demand for PNW lumber after a ban was enacted. Distributional analyses indicates that the effect of a log export ban would be an overall economic loss to the region.

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INTRODUCTION

The Douglas-fir region of the Pacific Northwest states of Washington and Oregon (hereafter referred to as the PNW) supply the majority of the logs sold in the log export trade, 84.2 percent in 1976 (Phelps, 77; Ruderman, 82). This region is also undergoing a severe economic crisis at this time, especially in the forest products industries. This is nothing new; the forest industries are noted for their cyclic prosperity and famine. Yet in the PNW, the combination of high unemployment and log exports often bring forth complaints by mill workers and their representatives that the sale of a raw material such as logs to foreign buyers represents the "exporting of jobs". Almost equally vocal are those who profit by such sales, citing many benefits, both real and assumed, in the log export trade.

Thus, the subject of log exports from the PNW is embroiled in controversy, with sides being chosen more often than not by the effect log exports are perceived to have on the participant's own interests. Many questions have arisen from this controversy. Darr (80) presents a list of major questions:

1. How much of the log volume that would have been exported would instead be processed into lumber and plywood in the PNW?

2. If additional log volumes were processed after initiation of a more restrictive export policy, would the end products be exported or sold in domestic markets?

3. If there are increased sales of lumber to Japan from the United States, would this lumber be processed in new capacity or would it be processed with existing mill facilities?

4. Would reduced cash flows following a ban on exports from private or State of Washington lands be made up by market options available after the change in export policy?

5. By how much would Canadian exports of softwood lumber to the United States and Japan be affected by a ban on softwood log exports from the United States?

6. Would additional trade restrictions on logs provoke restric-

tions, in Japan and elsewhere, that would reduce market potentials for United States exports?

I have added another question:

7. Do the high prices received for logs in the export trade lead to increased forest investment (more intensive forest management)?

These questions are virtually impossible to answer, yet a plethora of answers are provided by participants in the debate. The answers do not agree, for the participants in this controversy tend to use data and assumptions that support their viewpoints. Thus, opponents in this controversy may select diametrically opposite assumptions, and interpret hard data to fit their contentions. This presents a problem to those interested in the effects of log exports in the PNW; whose assumptions and arguments are closer to the truth?

This problem is discussed in several parts: the controversy as perceived by various participants in the PNW; the impact of log exports in the past, and possible future consequences if a total ban should be enacted; and short discussions of several facets of the log export question that have been brought up by the participants.

A note on data sources: Since the region examined in this paper is the Pacific Northwest, the quarterly "Production, Prices, Employment, and Trade in Northwest Forest Industries", prepared by the PNW Forest and Range Experiment Station, will provide the source for the bulk of the data used in this paper. These reports are currently compiled by Frances Ruderman, and all reports in the series are referenced as such, regardless of who the earlier compilers were. Other sources may be used for comparison or to provide data not available in these quarterly reports.

THE CONTROVERSY

The export of logs to Japan was viewed in the 1950's as a satisfactory means whereby unwanted logs (Darr, 77) or logs of little value, such as western hemlock, could be sold. It also provided a market for logs salvaged after the 1962 Columbus Day storm (Darr, 75a; Holcomb, in USGPO, 73). Yet in the mid 1960's, the propriety of exporting logs began to be questioned, and a schism developed within the PNW forest products industry. Other special interest groups became involved in the controversy for a variety of reasons.

Several authors have listed the arguments of the participants in this controversy (Darr, 80; Gruenfeld, 81; Haynes, 76). Even more revealing are the transcripts of the various congressional hearings concerning log exports, such as the 1973 hearings in Portland, Oregon (USGPO, 73). As could be expected, people tended to emphasize their problems and deemphasize or ignore others. The participants' perspectives of the controversy were greatly influenced by the effect, good or bad, they believed log exports had on their personal interests.

Major Assumptions:

In examining the positions of the participants, it is perhaps appropriate to begin with some of the conflicting assumptions made by the opposing factions. For example, how many logs now exported would be domestically processed after a total ban? The proponents of the ban generally reply, "all of them", and the opponents reply, "little or none"; both answers for the most part being assumptions. This leads into the question of mill capacity. The proponents generally assume there is ample mill capacity to process the logs being exported, whereas the opponents often assume that mills are already close to capacity, or that the mills with excess capacity are too far from the source of export logs to utilize these logs.

A critical question which is often answered by opposite assumptions is the reaction of the foreign buyers. Those proposing further restrictions insist that PNW wood is the commodity desired by foreign buyers, and if they can't get the logs, they will buy it in the form of lumber. Opponents counter this argument by stating that the foreign buyers would probably turn to other sources for their wood, and the United States would lose in the international market.

These are a few of the many assumptions made in the log export controversy, but are the most critical. The conflicting prognostications made by participants in this debate are frequently due to the underlying assumptions upon which their predictions are based.

Positions of the Participants:

The impact of log exports on domestic employment is the argument most often heard, and the one generating the most emotion. Thus, mill workers and their representatives become a major faction in log export discussions. Mill workers, especially in times of high unemployment, view the exporting of logs as the "exporting of jobs". They tend to make the assumption that if this trade were stopped, these logs would then be processed in PNW mills, thus improving employment for mill workers. The export of logs has come under frequent fire as being a major cause of unemployment in the PNW wood products industries, notably lumber and plywood. Thus, millworkers argue that if log exports were halted, mill employment would not only increase, but may become more stable (Casseday, Van Curen, Botkin, Scott, in USGPO, 73).

Not all laborers and their representatives agree. The stevedores prefer the exporting of logs, as they believe it increases their employment, and they are not certain that the foreign buyers will purchase more PNW lumber to compensate for a log ban (Parks, Stewart, in USGPO, 73). Log truck drivers also oppose a ban, in that they may lose the jobs involved in transporting logs for export (McKeller, in USGPO, 73).

The owners of the mills have mixed reactions. Some support a log export ban, others oppose it. The dividing line is apparently dependent upon land ownership: if the mill has its own lands, it opposes a ban on log exports (Murphy, Orell, Mayr, in USGPO, 73). If the mill does not have its own timberlands, or few land holdings, and must compete for logs in the market which also includes logs for export, they oppose the export of logs (Howard, Vincent, Rose, in USGPO, 73). Mill owners proposing further restrictions may also cite the high export log prices as driving up the regional average stumpage prices, which then makes the processed wood products from the PNW less competitive against those from other United States regions and Canada (Haynes, 76).

Many United States construction and real estate businesses oppose the export of logs. They state that the high prices paid for export logs is reflected in higher prices for lumber and plywood, thus increasing the cost of housing. They believe that halting the export of logs will halt the price spiral of building materials, and make housing more affordable (Rogers, in USGPO, 73; Haynes, 76).

Those who own the timberlands from which logs can be exported oppose any further restrictions on the export of logs. They hold that higher prices paid for export logs tend to increase the price expectations of private landowners, hence more investment would be made in the forests. This would lead to an increase in yield in the years to come (Gould, Woods, in USGPO, 73; Haynes, 76). This could also apply to public forests, as Commissioner Cole of the State of Washington has maintained. The increase of stumpage prices on Washington State Department of Natural Resources (DNR) lands allow, "...sound forestry (to) be conducted as a responsible business." (for Evans, in USGPO, 73).

Environmental groups oppose log exports, stating that the economic gains from exports are not worth the environmental costs of harvesting (Mellem, Zimmerman, in USGPO, 73; Haynes, 76).

The balance of payments issue has also become a point of contention in the debate. Those in favor of continued log exports point out that the money brought in by log exports decreases somewhat the United States balance of payments deficit (Grove, Jackson, in USGPO, 73). Those desiring further restrictions note, however, that United States purchases of Canadian lumber offset these log export sales. They also add that greater value would be realized if only finished products could be exported (White, in USGPO, 73).

Even educators have special interests in the log export controversy. State educational systems receive revenues from timber sales from public lands; however, the only public lands still open for the log export market are the Washington State DNR lands. Thus, with renewed attempts to limit the export of logs from these lands, the Washington State educators are expounding the virtues of free trade (Gruenfeld, 81; Stanley, in USGPO, 73).

The main arguments for further restrictions on log exports tend to vary with the ups and downs of the lumber market. For example,

employment was high in 1972 and 1973, due to a housing boom in the United States. Japan was also experiencing a housing boom, and bought more PNW logs for Japanese mills. Log prices rose and timber became "scarce". The calls for further restrictions during this time tended to emphasize the need for PNW mills to overcome this "shortage", produce more lumber and plywood, and allow the price of wood products to decrease (from USGPO, 73). When the market was down and mill unemployment high, as in 1975, the "exporting jobs" argument seemed to gain dominance.

I have not assessed the validity of these various arguments in this section. In the next section, several aspects of the log export market's impact in the PNW will be discussed on an historical basis, which may lend credence to some of the arguments. Following that section, several specific factors of the log export controversy will be discussed directly relating to some of the above arguments, and the section covering the possible effects of a complete prohibition of log exports will indirectly address some of these arguments.

PAST IMPACTS OF LOG EXPORTS FROM THE PACIFIC NORTHWEST

The United States has imported and exported logs at a low level for decades, with imports exceeding exports until the mid 1950's (figure 1). In 1951, Japan began to purchase logs from the PNW. The log export market grew rapidly due to these sales from the PNW, which at times almost doubled in one year's time, as in 1953 and 1963 (table 1). Log imports began to decrease nationwide, including the PNW, where they decreased by half the previous year's volume in 1956. This and the rise in exports marks the year, 1956, in which the PNW became a net exporter of logs, and exports equalled, then began to exceed, imports for the United States, as shown in figure 1.

Table 1. PNW softwood log trade (Adams et al, 79)

Million cubic feet, log scale

Year	Exports	Imports
1950	4.30	32.94
1951	8.72	19.58
1952	6.73	26.02
1953	12.60	25.73
1954	15.14	25.58
1955	20.98	12.73
1956	22.40	5.33
1957	15.13	5.29
1958	17.64	6.22
1959	23.21	6.18
1960	29.22	6.14
1961	59.53	12.14
1962	62.27	5.22
1963	120.37	6.48
1964	133.60	1.28
1965	143.26	1.91
1966	175.22	6.64
1967	246.80	5.18
1968	305.97	3.41
1969	288.13	6.16
1970	339.05	15.15
1971	266.37	8.70
1972	382.36	1.16
1973	382.66	2.90
1974	317.40	4.50
1975	322.62	7.98
1976	396.86	6.38

This suddenly developing log export market has had some impact on other sectors of the PNW forest products industry. The extent of these impacts is virtually impossible to define precisely due to the complexities of the market, and the effects of other events affecting the PNW which are unrelated to log exports. Some trends may be deduced by reviewing the past, and the stumpage price, lumber and plywood production, and employment issues are discussed in an historical perspective.

The Extent of the Log Export Trade:

Log exports comprise a significant portion of the total United States exports of wood products. In 1975-76, this consisted of about 22 percent of the total wood products exported (Darr, in Sedjo, 80; Radcliffe, in Sedjo, 80; Darr et. al., 80). Looking at the value of all exported commodities, log exports account for 0.8 percent of the total United States exports (Darr et. al, 80).

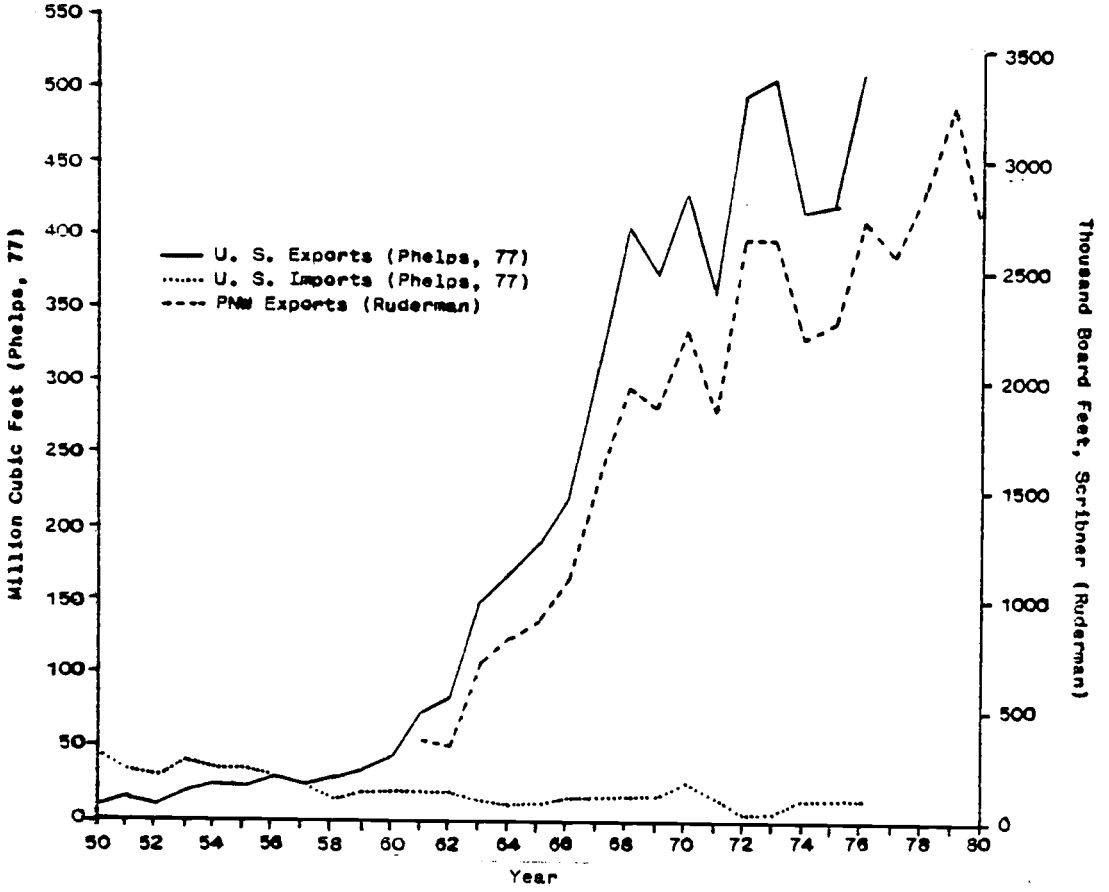


Figure 1. United States log exports and imports (Phelps, 77) and log exports from the Pacific Northwest (Ruderman).

The Pacific states, including Alaska, account for most of the log exports from the United States, 84.9 percent in 1976 (Phelps, 77; Ruderman). Narrowing the focus to the PNW, 99.2 percent of the Pacific states' exports came from Washington and Oregon (84.2 percent of the total United States log exports), as illustrated by figure 2. Furthermore, almost all of these export logs were cut from the western part of the two states, the Pacific Northwest Douglas-fir region.

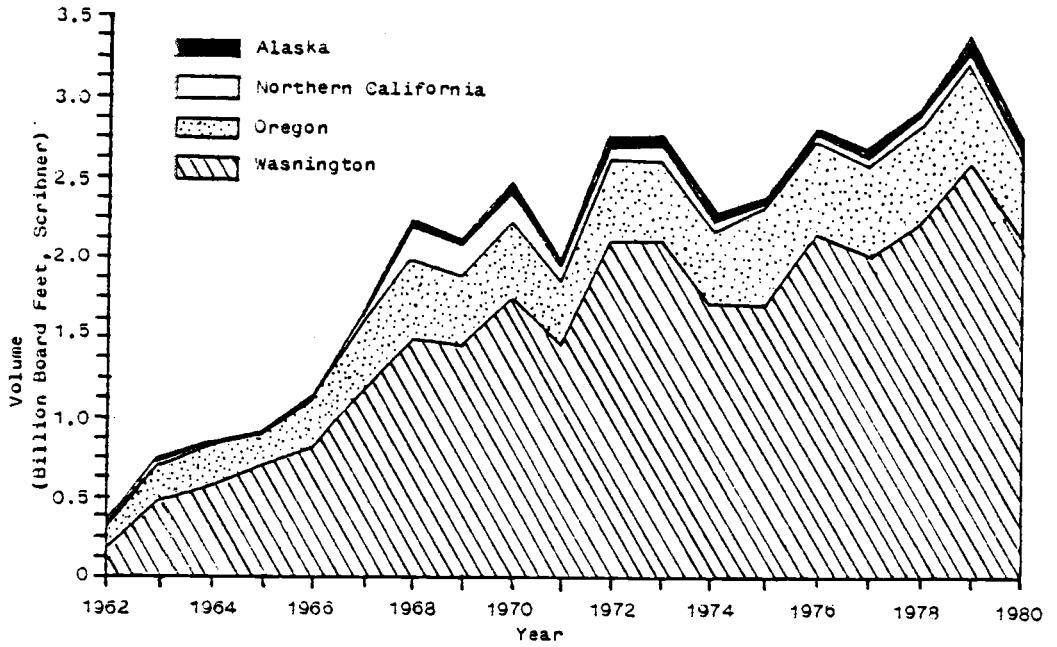


Figure 2. Softwood log exports from Pacific Coast states. Source: Ruderman.

Table 2 provides a further breakdown between Washington and Oregon. Washington supplies the bulk of the logs in the export trade, not only in the PNW, but also nationwide (67.4 percent of the total United States log exports in 1976).

Table 2 also indicates the extent of the log export trade in the PNW by comparison with the total timber harvest. Logs sold for export constituted 21.9 percent of the harvest in 1979. This percentage has been increasing, mostly due to exports from Washington, although Oregon also had some increase in the proportion of log exports to harvest.

This increase in the proportion of log exports to harvest serves to illustrate the source of some of the opposition to log exports by mill owners and their employees. From this data, it appears that logs are increasingly being diverted from the domestic processing market to

Table 2. Comparison of log exports to harvest and proportion of log exports between Washington and Oregon. Volumes in million board feet, Scribner log scale. Source: Ruderman.

	Washington				Oregon				Total PNW
		Log Exports		% of Log		Log Exports		% of Log	
Year	Harvest Volume	Volume	% of Harvest	Exports From PNW	Harvest Volume	Volume	% of Harvest	Exports From PNW	Log Exports % of Harvest
1964	6241	711	11.4	79.4	9418	184	2.0	20.6	5.7
1965	6522	696	10.7	77.8	9394	199	2.1	22.2	5.6
1966	6075	815	13.4	73.5	8921	294	3.3	26.5	7.4
1967	5936	1181	19.9	74.9	8357	395	4.7	25.1	11.0
1968	6971	1456	20.9	78.8	9743	393	4.0	21.2	11.1
1969	7004	1404	20.0	77.6	9150	405	4.4	22.4	11.2
1970	6459	1739	26.9	78.5	7982	477	6.0	21.5	15.4
1971	6450	1446	22.4	78.7	9028	391	4.3	21.3	11.9
1972	7081	2110	29.8	80.6	9630	508	5.3	19.4	15.7
1973	7809	2114	27.1	81.4	9366	484	5.2	18.6	15.1
1974	6876	1730	25.2	79.3	8361	452	5.4	20.7	14.3
1975	6185	1726	27.9	75.4	7371	562	7.6	24.6	16.9
1976	6968	2191	31.4	80.1	8153	545	6.7	19.9	18.1
1977	6592	2003	30.4	78.4	7878	553	7.0	21.6	17.7
1978	6751	2241	33.2	78.7	8201	606	7.3	21.3	19.0
1979	6969	2616	37.5	80.9	7768[1]	618	8.0	19.1	21.9

Note 1: 1979 harvest volume for Oregon estimated by summing Ruderman's preliminary figures and adding an estimated 20 MMbf for "Other Public" lands.

be sold in the more lucrative export market. Certainly, there is some truth in this argument, yet I tend to believe that this data reflects the shifting of resources from a portion of the United States market (which has been weakening recently) to a stronger foreign market which has been developing over the past 20 years. Private landowners selling timber for export may well be expected to share this viewpoint.

Further defining the source of export logs in the PNW leads to land ownership. Current restrictions limit the lands from which export logs can be harvested to private and Washington State DNR holdings. The bulk of the exports are from private lands, even in Washington, where about 69 percent of the exports in 1976 came from private holdings (Gruenfeld, 81). Much of these exports from Washington apparently are from Weyerhaeuser lands (Gruenfeld, 81). For both states, the sources for exported logs in 1972 are shown in table 3.

Table 3. Percent of log exports by landownership, Washington and Oregon, 1972 (Darr, 75).

Ownership	Percent
Forest industry	59.8
Farmer and miscellaneous private	10.8
State of Washington	20.3
National Forest	7.8
Other public	.8

As is well known, the major timber species of importance in the PNW is Douglas-fir. This is not the major species of importance in the log export trade. As shown in table 4, western hemlock is the major exported species, and may be responsible for bringing this species uo from a low value, almost weed tree, to a significant contributor to the PNW timber harvest.

Table 4. Percent of log consumption by species, 1972 (Darr, 75).

Species	Sawmills	Veneer and Plywood Mills	Log Exports
Douglas-fir	49.4	81.4	27.4
Hemlock	17.6	4.9	56.3
True firs	5.1	4.7	4.7
Spruce	.6	2.0	3.6
Western redcedar	4.0	1.2	4.9
Other species	23.3	6.0	3.1

Impact on Log/Stumpage Prices:

This aspect of the log export trade leads to much of the differences in this controversy between the two major sectors of the forest products industry in the PNW, the timber producers and the lumber and plywood producers. (Note: logs and stumpage are discussed interchangeably, in that high log prices are reflected back into higher stumpage prices.) As discussed in an earlier section, the mill owners who do not have

their own timberlands and must compete in the timber market against log exporters, view the high prices paid for export logs as unnecessarily raising the price of stumpage to such a level that they cannot afford to purchase timber for processing. The landowners view the log export trade as a satisfactory return to their investments, and as a means of increasing their investments in forest lands. They tend to view the log export trade as a legitamate and worthwhile market.

Before pursuing either of these arguments further, let's examine the apparent dichotomy of the log export market. As illustrated in figure 3, prices for logs in the export market have been consistently higher than prices for domestic processing. Much of this dichotomy can be explained by the unusual nature of the log markets. Domestically, it is a raw material to be used for value added processing. In the export market, it is a separate commodity in its own right. Thus the log market overall does not fit the simple derived demand schedule studied in basic forest economics texts, but rather faces a complex market structure, with two distinct markets. Without restrictions, there would be a great degree of substitutibility between markets, although not perfect substitution due to the difference in species composition in demand. Yet current restrictions severly limit substitution between markets. Thus the dichotomy in the overall log market: Federal lands and State of Oregon lands which can only supply logs for domestic processing, and private and Washington State DNR lands which can supply logs to both domestic processors and the export market.

The 1973 Price Jump: Referring again to figure 3, a great increase in prices for exported logs is evident in 1973. This increase was so great, that as Darr (75) stated, the prices received for logs in the export market ($319.10 per thousand board feet) exceeded those of the finished lumber in the domestic market ($287.40 per thousand board feet). This price differential between a raw material and a finished product indicates that foreign purchasers, mostly Japanese, placed a far greater value on these logs than United States producers and consumers. (Why this occurs is discussed in the Appendix) For the "blowup" of prices in 1973, Adams (74) provides a series of possible causes.

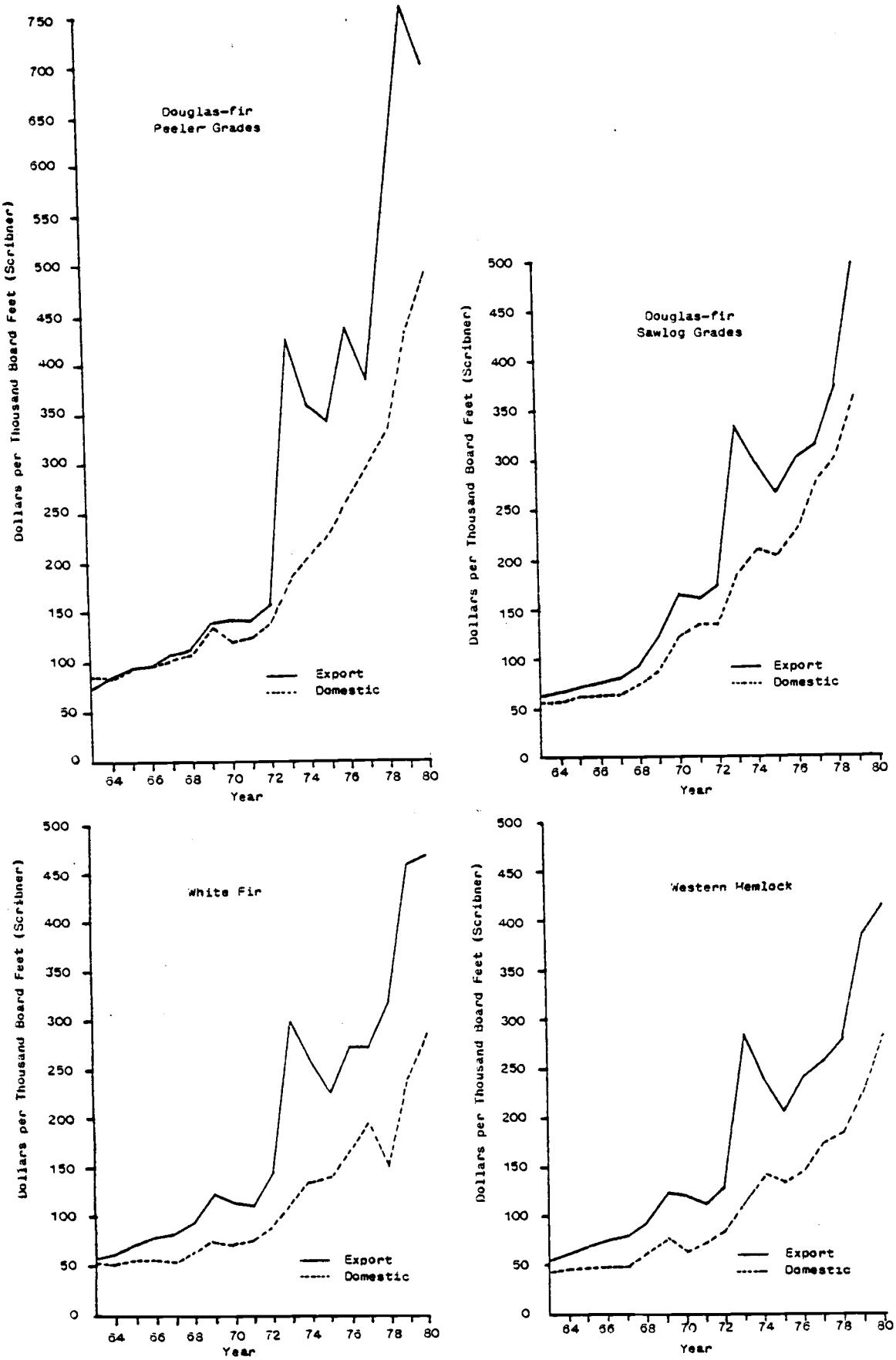


Figure 3. Comparison of log prices of selected Pacific Northwest species for the United States domestic and export market. Sources: Adams (74) for 1963 to 1969; Ruderman for 1970 to 1980.

The first cause was a strong increase in housing demand in Japan in 1972 and 1973. This possibility is echoed by Darr (77) and Darr, Haynes, and Adams (80). The second factor was the wage and price freeze of 1973, which was applied against domestic United States prices, but did not apply to exported products. The third factor was the implementation of the 1973 Appropriations Rider which virtually halted log exports from Federal lands in the contiguous states. The fourth was the fear that direct controls or antisubstitution measures might reduce the level of exports available from private lands. The fifth factor was the relatively higher value placed on lumber and wood products in the Japanese economy, and the final factor was the introduction of floating exchange rates in international trade, with the Japanese yen gaining considerably over the United States dollar. Darr, Haynes, and Adams (80) also agreed with this factor.

Regional Comparison of Stumpage Price Increases: To return to the issues raised at the beginning of this section, did the consistently higher prices realized in the log export trade cause a more rapid increase in stumpage prices than would have occured if this market was not available? This could well be partially true. Figure 4 compares the stumpage prices between Douglas-fir and western hemlock from the PNW

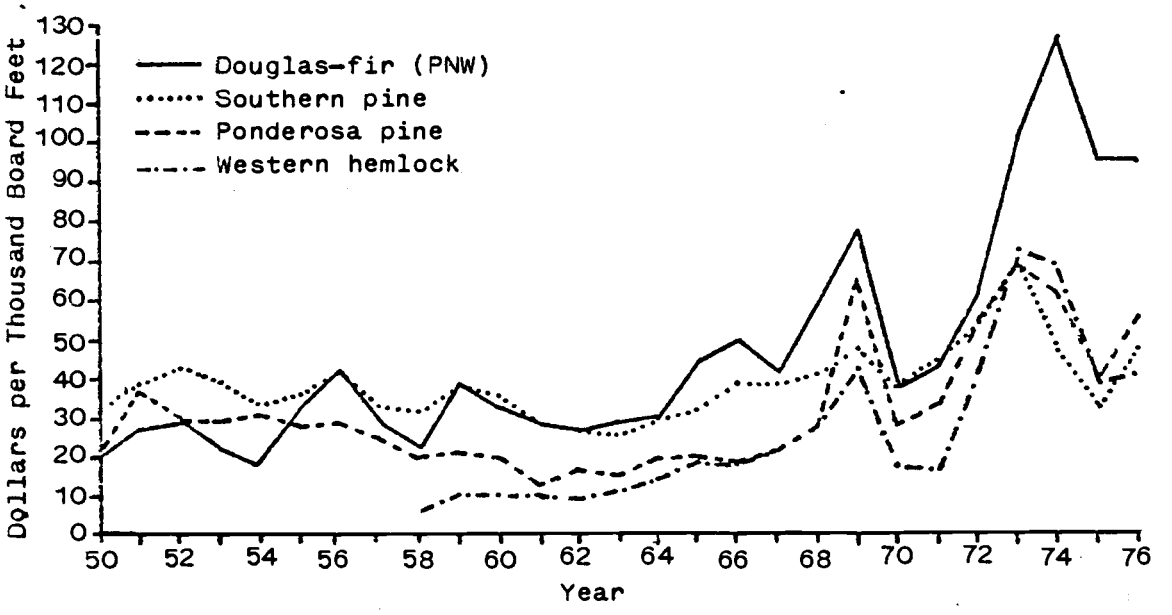


Figure 4. Historical comparison of stumpage prices between selected timber species, representing different regions of the United States. Source: Phelps (77).

against the stumpage prices of southern pines and ponderosa pine, in constant 1967 dollars. Until about 1962, Douglas-fir prices tended to stay in line with stumpage prices from the other regions. They then began to exceed the value of these other regions, making a great increase in 1973, matching the sudden large increase in export prices. Western hemlock also increased in value more than the southern pines and ponderosa pine, perhaps not as dramatically as Douglas-fir, but coming from a position as a low valued species to about the same as the other species.

Timber Shortage Impact: Another factor which has been used to explain the greater stumpage price increase in the PNW is the decrease of available timber. This in itself is another controversy, with data evident to support either view that there has been and may contine to be a shortage of timber (not enough logs to keep mills operating at current output), or that there is no shortage of timber, although perhaps the mills have exhausted the region's "cheap timber" supplies. As some indication of both a declining inventory and a decline of "cheap timber", figure 5 illustrates a general decrease in timber inventory held in private hands. Of greater significance is the changing proportion, other private holdings increasing at the expense of industrial holdings (from 22 percent of the total private holdings in 1950 to 33 percent in 1975). These other private owners may well be those criticized by some as "nonprice responsive", which could be interpreted as the reservation price of these owners is higher than what the buyer wishes to pay.

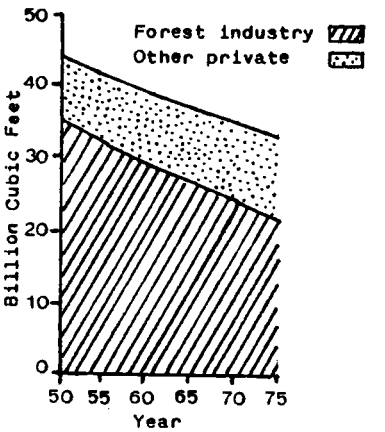


Figure 5. Inventory of forest industry and other private ownership in the West. Source: Adams et al, (79).

The objective of this short disscussion in timber supply was not to open another argument, but to indicate that perhaps the rise in stumpage prices in the PNW was not entirely caused by the log export trade, although it must surely share some of the responsibility.

Effect of High Prices for Export Logs on Other Stumpage Markets: The emphasis on two separate markets for logs discussed above may lead one

to question how log exports could drive up the prices in an almost separate domestic processing market. Part of the answer is that it is not completely separate, there can be some substitution, although perhaps not by the same firm. Another part of the answer may be provided by Gregory (72).

Log exports provided the subject for Gregory's section concerning discriminatory pricing in his "Forest Resource Economics" textbook, using a back-to-back graph of public and private stumpage supply (figure 6). If public timber is prohibited from being exported, some private landowners may stand to reap the profits of the more lucrative foreign trade. Yet this increase in stumpage price realized by some landowners may increase the price expectations of all private landowners, overcoming the reservation price of some who would not have sold at the old price. Thus, the private stumpage supply curve tends to shift upwards (to S_2' in figure 6). This shift would tend to increase prices of private timber to domestic processers (p_d'), which implies the price of public timber would also increase. (To move towards equilibrium, D_1 and/or S_1 should also shift, although Gregory does not address any further shifts in the curves.)

This appears to be an effect that feeds upon itself. It does not eliminate the difference in price between the two stumpage markets, but seems to keep edging upwards, with each succeeding cycle increasing the price of stumpage, thus overcoming even higher reservation prices, leading to a creeping private stumpage supply curve. These continual,

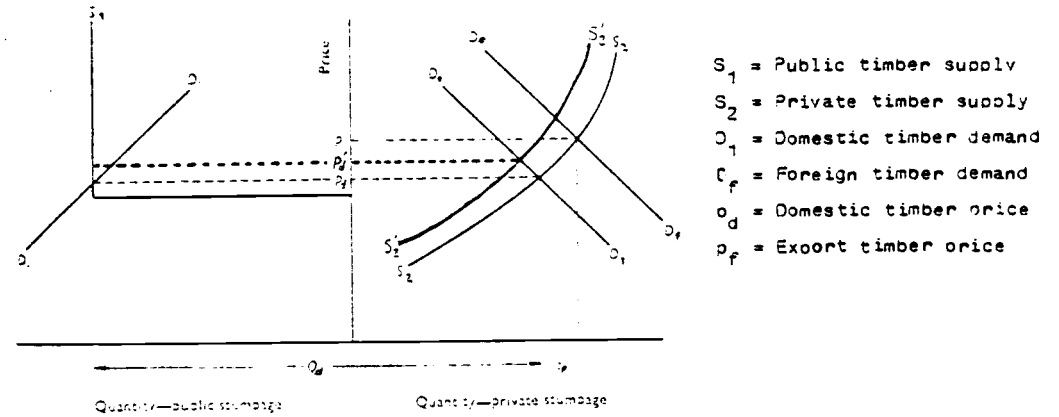


Figure 6. The effect of the log export market on public stumpage prices (Gregory, 72)

creeping rises in both the domestic and export market prices for logs (stumpage) may provide some of the explanation for the continual rise in stumpage depicted in figure 4, although other market factors surely enter.

Lumber and Plywood Production:

Some have claimed that the export of logs has led to a decrease in log supply, hence a decrease in lumber and plywood production in the PNW. Figure 7 (page 18) compares the lumber and plywood production with the log export trade from 1964 to 1980.

Examination of this comparison indicates little to support this argument. There are some periods when the lumber and plywood markets decline as log exports increase (1964 to 1967, and 1970). In 1977, log exports decreased with lumber and plywood production increased, yet the following year all markets increased, and in 1979 they all dropped. Thus, the cycles of the log export market generally tend to match the cycles of the other markets.

As an aside, lumber exports to Japan from the PNW are increasing (figure 8), although much of this is in the form of cants which receive further processing in Japan (Darr et. al., 80). In conjunction with this increase of lumber exports to Japan, the proportion of lumber imports by Japan from Canada is decreasing in favor of lumber imports from the PNW (Lindell, 79), as indicated by figure 9 (on page 19). Of further interest is the increase in lumber exports to Japan in the mid 1970's and early 1980's at a time when the log exports are decreasing.

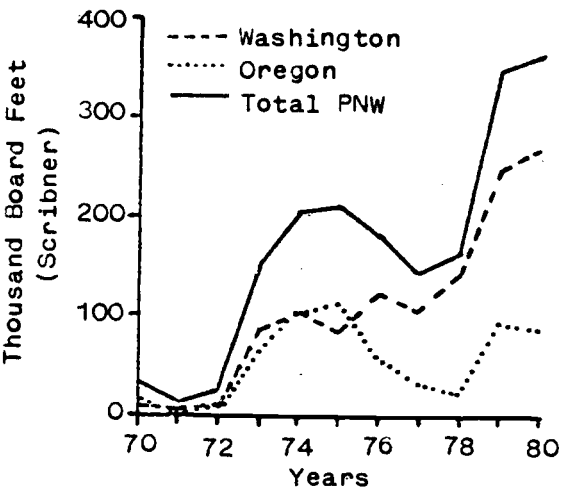


Figure 8. Lumber exports to Japan from the PNW (Ruderman).

Employment:

The employment issue has been, and probably continues to be, the most emotionally charged issue in the log export controversy. Even mill closures were frequently regarded more as a loss of jobs than a

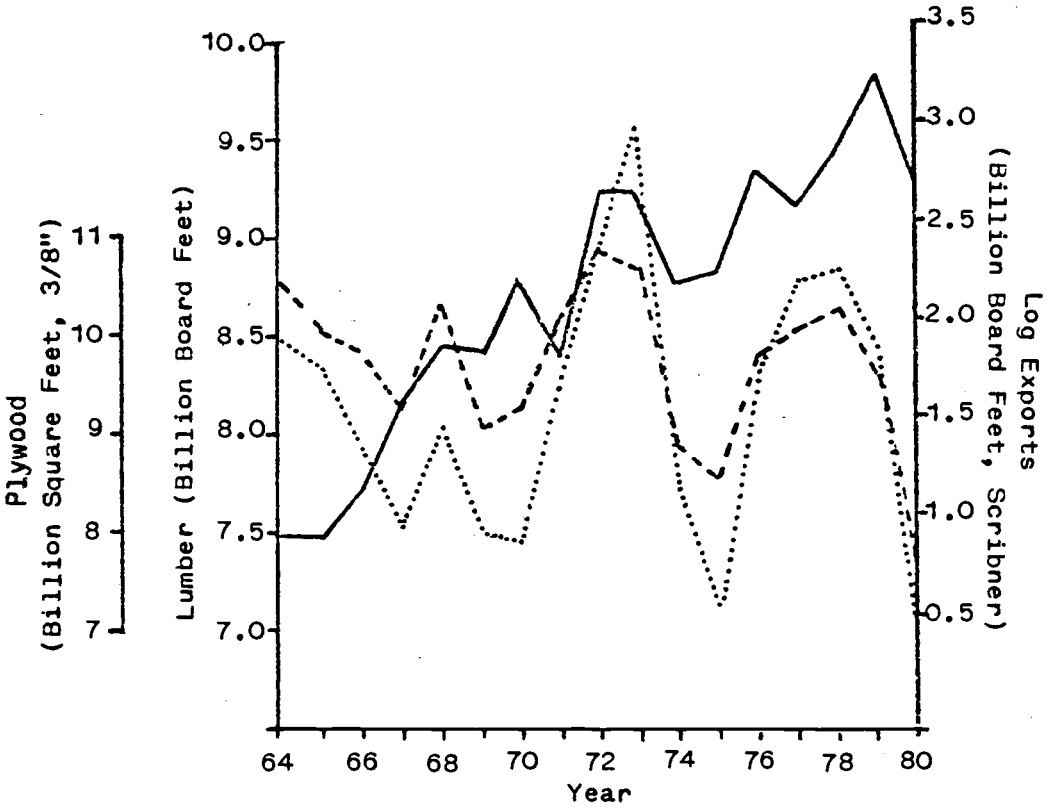


Figure 7. Historical comparison of log exports and lumber and plywood production in the Pacific Northwest. Source: Ruderman.

loss to the mill owners.

The employment in the PNW forest products industry has been quite cyclic (figure 10). Much of this cyclical behavior can be attributed to the general health of the United States economy, especially in the area of new housing starts. Approximately 33 percent of the PNW lumber and plywood production is used for new housing construction (Darr et. al., 80). Thus, the fortunes of the PNW forest products industrial employees tend to follow the new housing starts, although lagging somewhat (that is, peaks in employment occur later than peaks in housing starts) as illustrated in figure 11 (page 20). Comparing employment

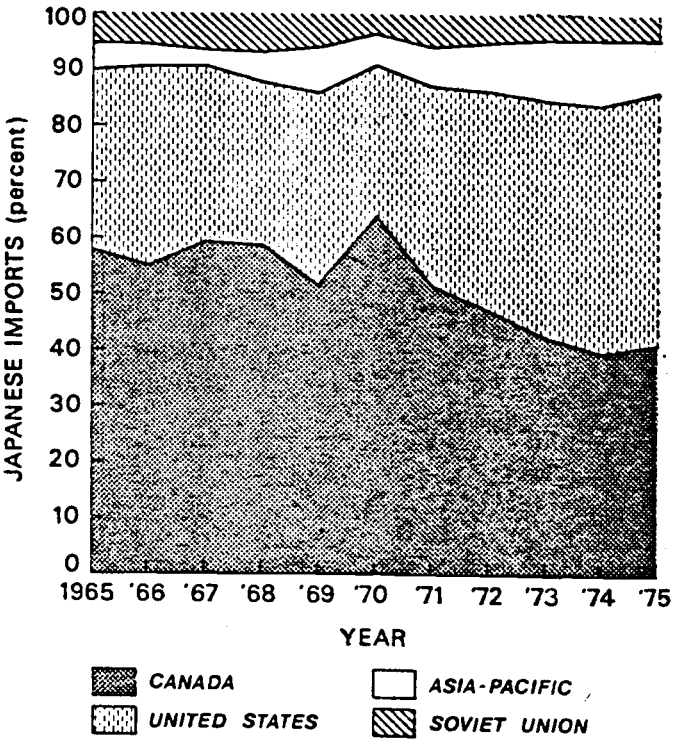


Figure 9. Country of origin for Japanese imports of softwood lumber (Lindell, 79).

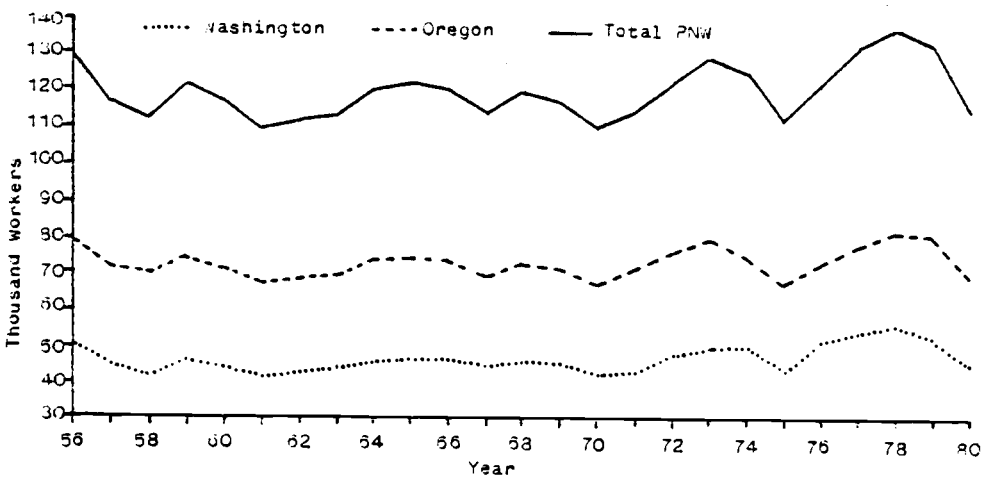


Figure 10. Lumber and wood products employment in Washington and Oregon (excludes pulp and allied products). Source: Ruderman.

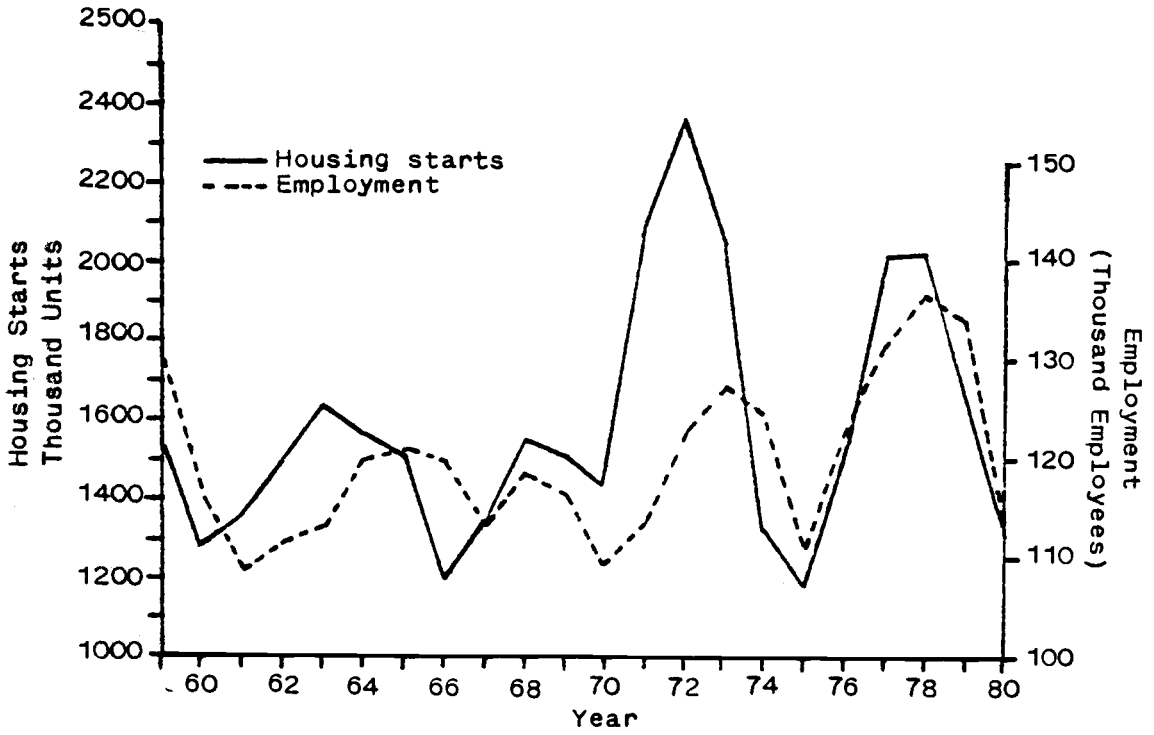


Figure 11. Comparison of Pacific Northwest lumber and wood product employment with housing starts. Sources: Employment, Ruderman; Housing starts, U. S. Department of Commerce Construction Review Series, Housing Starts, Private and Public Housing Units (Including Farm).

Figure 12. Comparison of Pacific Northwest lumber and wood product employment with log exports. Source: Ruderman.

with log exports (figure 12) reveals no such pattern. Even so, when unemployment is high in the forest Products industry, the mill workers and their representatives increase their opposition to the export of logs.

OTHER LOG EXPORT ISSUES

Many arguments have been expounded in the log export controversy, and almost every facet of the log export trade has come under scrutiny. Many of these issues do not permit easy discussion in an historical context, or were expressed in the debates to more firmly fortify a participant's position. These miscellaneous issues are discussed in this section.

Labor Production Comparisons:

I have already discussed the impacts of log export on employment in an historical context. Yet a facet of the employment issue frequently invoked deserves further discussion, that is, the comparison of manhours required to process logs for lumber or export.

Unquestionably, there is a great difference between the manhours required to export logs and to process them domestically. Adams and Hamilton (65) reported a study which determined the manhours per thousand board feet required for log exports and for processing in different sizes and types of mills. Using a base of 4.46 manhours per thousand board feet for log production (logging, transportation, overhead), an additional 3.01 manhours per thousand board feet were required to export logs. For small sawmills, an additional 9.76 manhours were needed to process the logs for lumber. Integrated plywood plants required an additional 15.85 manhours (table 5). Darr (75) also provided a comparison of the manhours per thousand board feet required for various forest products, although reporting only on direct labor (table 5). Surprisingly, he indicated an increase in manhours per thousand board feet for lumber processing from 1964 to 1973 rather than the decrease I would expect due to more capital intensive mills being constructed during this time.

Table 5. Average manhours per thousand board feet of logs processed for various commodities.

Industry	Adams & Hamilton[1] 1964	Darr[2] 1964	Darr[2] 1973
Log exports	7.47	6.27	4.72
Lumber		12.44	12.58
Small mill	14.22		
Medium mill	12.84		
Large mill	12.47		
Plywood & veneer		22.33	19.47
Integrated plant	20.31		
Veneer	7.40		

Notes: 1. Includes overhead personnel.
2. Direct labor only. Data for 1964 taken from Adams & Hamilton study.
Sources: Adams & Hamilton (65); Darr (75).

This great differential between the manhours required to export

logs and to process them domestically is viewed by mill workers as lost employment. How much so can be indicated by manipulating some data.

Using Darr's figures for 1973, an additional 7.86 manhours per thousand board feet is gained by processing logs into lumber in the PNW. With the volume exported in 1973, 2,639 billion board feet, this equates to roughly 10,370 manyears that could conceivably be added to the employment rolls of the PNW, or as mill workers would view it, as jobs exported in 1973. This was a peak year for both employment and log exports. Using a more lean year, 1975, which saw significant decreases in both employment and log exports, this data manipulation yields about 8750 manyears. This provides a powerful argument against log exports, yet it is fraught with problems.

This argument assumes that all the logs previously exported are processed for lumber. (Conceivably, some could also be processed into plywood, which has an even greater potential for increasing jobs.) This may well be a dangerous assumption, it certainly is not a clear issue, as discussed in the "Controversy" section of this paper. To add to this possibility of a less than 100 percent processing of previously exported logs is the question of substitutibility. As mentioned by Lippke (in Sedjo, 80), hemlock logs from the coast are not substitutable for peeler logs of the Willamette Valley. Furthermore, there may be distributional problems; the mills that can utilize the exportable logs may be too far away for economical transport (Orell, in USGPO, 73).

Nevertheless, the "keep the jobs home" argument is perhaps the one heard most often by the general public, evokes the most emotion, and may have led to the passage of restrictive legislation more than any other argument.

Multipliers:

Sales Multipliers: A regional multiplier using sales as a measure is an economic analytical means of expressing the amount of additional sales that would be induced by an influx of money into a region, such as from the sale of logs or lumber to a purchaser outside the PNW. Darr (75) provides a succinct summary of the results of this influx of "new" money:

"Recipients of the money spend it for things they need. The

money continues to change hands, creating a multiplier effect. This effect stops when the money leaves the Pacific Northwest to buy imports from other areas."

Thus the regional multiplier measures the total sales that are induced in a defined region by injecting a dollar from outside the region. In this paper, this means the total sales induced in the PNW for a dollar's worth of logs or lumber and plywood sold to a buyer outside the PNW. Using the multipliers reported by Darr (75) as an example, for every dollar brought into Washington by the sale of logs to purchasers outside the state, an additional $1.47 in sales is induced within the state. Thus, the regional multiplier for logs sold out of state is 2.47, as the original dollar is included in the measure.

To estimate the total value of the export trade to the region (Washington in the example), the export sales total is multiplied by the regional multiplier. For example, in 1980 the softwood log exports from Washington totaled about $1,034 million. When expanded by the regional multiplier, this indicates that the total effect of the log export sales in Washington was $2,554 million.

Darr (75), quoting an earlier source, provided the only reference found for sales multipliers (termed "output multipliers", but still the same) which could be applied to log exports. These multipliers were for Washington, and were determined in 1967. The multiplier for the logging industry was 2.47, which Darr stated should be the same for log exports. Multipliers for lumber and plywood export sales were 2.45 and 2.10 respectively.

At this point there may be some confusion concerning the near identical multipliers for logs sold out of state and for lumber sold out of state. It must be borne in mind that these multipliers measure the amount of induced sales that occur in a region due to an influx of money from outside the region; it does not matter what commodity is sold. Unfortunately, in this facet of the log export trade, as in other facets, the dichotomy of the log market is misleading. We have logs sold for use in the domestic processing sector, and logs sold in the export sector. Although logs are used to make lumber, the multipliers for each export market are not additive.

There are a number of factors which may lead one commodity to

have a different regional multiplier than another. For example, an industry may obtain most of its raw material from another region, thus a great portion of the money brought into the region would be lost in the first cycle, and the regional multiplier for this industry would be lower than an industry which obtains most of its raw material from within the region.

Since the log export and sawmill multipliers are for all practical purposes equal, especially considering the complexities of such measurements and the variables in the market, the argument of encouraging the export of the commodity with the greatest multiplier seems inappropriate. Yet between these two markets (logs and lumber), the lumber represents sales of value added processing, as opposed to raw material sales of logs. Therefore, it could be reasonable to expect that more money would be brought into the region by sales of lumber. Although the proportion of induced sales is the same for both, the lumber export market may be expected to inject more money for the same volume of wood.

This provides a nice argument for those opposing log exports; unfortunately, like most attempts to make issues clear cut and simple, it becomes mired in "ifs" and "howevers". The greater injection of money would occur <u>if</u> the previous volume of logs exported were processed into lumber and sold in export. The value added by processing the logs would increase the money injected; <u>however</u>, the high prices of export logs reduces this difference considerably, perhaps even to a negligible level in some years (Darr, 75).

<u>Employment Multipliers:</u> Almost all the arguments surrounding employment and the log export market concerns only those directly employed in the forest industries. Other employment has also been discussed, usually in passing, by participants in the controversy; that is, those jobs affected indirectly by log exports. In this sense, jobs were used as a measure of the multiplier effect rather than sales. This means that for every job involved in a market sector (lumber mills or log exports) other jobs were formed to supply goods and services to this sector, including its employees. Yet there appears to be a scarcity of information in the literature concerning the multiplier effect of

employment in the PNW forest products industry. I have encountered only one instance where employment multipliers were specifically mentioned, and this was a radio broadcast in 1981. In this broadcast, someone made the statement that for each person employed in Oregon lumber and plywood mills, there were two other jobs created in the state, or a multiplier of three.

The sales multipliers cited above may also provide an indication of the extent of indirect labor induced by exporting industries; someone must be employed to sell these goods and services implied by the sales multiplier.

Balance of Payments and International Monetary Policies:

The United States balance of payments has been an issue often discussed by participants on both sides of the log export controversy. Related to this is another issue of international sales, the monetary exchange rates (the relative value of one nation's currency to another's). This is especially of interest in log exports, as the relative value of the currency of the principal purchaser of United States logs, Japan, is among those gaining the greatest over the United States dollar.

"Balance of payments" is defined as the measure of the flow of payments between one country and another, and must always balance. Deficits or surpluses in the flow of payments must be adjusted to balance the ledger, and is done so by transfers of national reserves (gold, currency) or loans between central banks. These deficits or surpluses may be termed "deficit/surplus on an official-settlements basis" (Mansfield, 77). Balance of payments is only applicable to fixed exchange rates.

The term "balance of payments" is often used quite loosely by participants in the log export debate, who are actually referring to either the balance of trade, or more often, the balance of payments deficit on an official-settlements basis.

Until about the early 1970's, the United States generally enjoyed a surplus in the balance of trade, that is, more goods exported than imported, which is often considered as a favorable balance of trade. Unfortunately, other payments and asset transfers to foreign countries has led to a chronic balance of payments deficit on an official-

settlements basis (Mansfield, 77).

This led to a loss in the strength of the dollar in international markets, which eventually led to devaluation of the dollar. This meant that United States products became effectively cheaper to other countries, hence imports from the United States should appear more attractive to these countries. Kaiser and Mills (73) provide an example: the average price paid by the Japanese for softwood logs from the United States in 1971 was $127 per thousand board feet, or at the 1971 exchange rates, 45,400 yen per thousand board feet. After the 1973 devaluation of the dollar, logs purchased in the United States for $127 per thousand board feet would cost the Japanese 33,000 yen, or a decrease of 26 percent in the effective price. Using a log export demand elasticity of -1.5, this inferred a 39 percent increase in Japanese demand for United States logs (more likely a shift in the curve to match the new relative prices). Although not stated by Kaiser and Mills, this infers that more money (dollars) would be spent in the PNW, but since the log supply curve is not perfectly elastic as inferred by their example, much of this increase of money was needed to raise the price of logs to increase supply. This may help to explain some of the sudden increases in the price of logs experienced in 1973, and could have aided the balance of payments deficit (official-settlements basis) of the time, save for another significant economic occurence in 1973.

By April of 1973, all the major world currencies were on a floating exchange rate. That is, rather than have the value of a nation's currency in the world market fixed by decree, the relative values of the monies would be allowed to float, or operate in a free market atmosphere. Thus, open market forces determine what the relative value of one currency was against another. Governments could intervene to counter short term fluctuations, especially due to speculation, but the exchange rates were free to reflect the long term strengths of the economies of the affected countries.

This has had a drastic effect on the balance of payments issue, in that under the new criteria, any deficits in payments would be compensated in the market by a relative devaluation of the currency. Therefore, domestic programs to correct deficits or surpluses in payments

have a much lower significance than under fixed exchange rates. Balance of payments deficits and surpluses became meaningless, and the United States government ceased publishing such statistics in 1976 (Mansfield, 77).

Darr (77) discussed the floating exchange rates in relation to log exports. In addition to the decrease of importance of the official-settlements balance of payments deficit/surplus, he pointed out that log exports even less affect the floating exchange rate than many other commodities. The definition of the short term in which countries may act to modify fluctuations in their currency exchange rate was not well defined, but appeared to be a period of several months. These actions were to be generally cooperative actions between countries to offset speculative flows of short term monies, and log exports could not be reasonably varied to correct currency flows over this short time period. Darr basically concludes with this statement:

> "Because of the long-term self-correcting nature of floating exchange rates, the United States should not continue to have chronic balance of payments deficits, and neither maintenance of log exports nor curtailment of lumber imports would necessarily be advantageous."

Comparative Advantage:

An economic factor which seems to have received comparatively little attention in the controversy is the comparative advantage one country may have over another in producing similar goods. Cartwright (in Sedjo, 80) provided a short discussion of this, pointing out that,

> "...efficiency of allocation of resources in the economies of each of the trading partners, requires that resources be allocated in each economy toward the production of those products in which each country has a comparative advantage."

This was one of only two references found which discussed comparative advantage, indicating that the United States obviously has a comparative advantage over Japan in growing timber, but Japan may well have a comparative advantage in processing. This would be an argument for the sale of logs to foreign purchasers, as the textbook examples of comparative advantage state that countries should specialize in those products in which it enjoys an advantage (Mansfield, 77). Yet, as in many other commodities, this argument would probably be countered with arguments citing the need for employment in forest products industries,

maintaining a domestic processing capacity, and remaining free from dependence on foreign sales, although these counter arguments were not found in the literature review.

Intensive Management:

The value of the log export trade to landowners has been cited many times as a means whereby more intensive forest management may be realized through the increased price expectations of the landowners. This would lead in the future to greater yields and perhaps even increased quality of wood. Whether or not anyone has increased their investments in growing stock because of the expected high prices of logs which can be exported or because of the expected higher prices due to decreasing timber availability is uncertain. I have encountered no specifics in the literature to indicate if forest investment has increased as log exports increase.

Overbidding on Public Sales:

Recently, many successful bidders on public timber sales have expressed concern that it is not presently economically feasible to harvest the timber at the stumpage prices which won the bids two or three years ago. Although much of the blame is laid on the current depressed economy, log exports have received their share of the blame.

The possibility that the high prices paid for export logs may have caused an increase in stumpage prices was discussed earlier. It may well be that this trend towards higher stumpage prices has caused log processers to overanticipate future prices and overbid on public sales to insure a log supply. Then again, it may be possible that the industry has used most of the "cheap timber" (owned by the forest industry) formerly available and must now face the higher reservation prices of other private owners, thereby bidding up public sales to insure a log supply.

It is also likely that this problem stemmed from a combination of these two factors. It may provide an example of Gregory's discriminatory pricing discussed earlier, with the pushing of the price of public timber far too high to survive any of the cyclic downturns frequently observed in the wood products industry.

Reciprical Trade Restrictions:

One fear mentioned by those opposing further restrictions on log exports is the possibility of retaliatory restrictions from previous customers, chiefly the Japanese. As a personal opinion, I believe there would be little to concern United States producers from further restrictions to imports or exports from their country. The ban on log exports would only be a small part of the current mass of trade controversies between Japan and the United States, and if a ban was levied over a time period, allowing some adjustments in the Japanese wood products industry, there would probably be no reciprical restrictions imposed by the Japanese. To somewhat substantiate this claim, I refer to an interview with Mr. Hayashi (81), in which a gradual change from logs to lumber was deemed acceptable, the current increase of lumber purchases from the United States (figure 8, page 17), and the acknowledgement by the Japanese that logs from the United States may decline (Anon, 80a).

LOG EXPORT RESTRICTIONS

Often, the first response to problems such as are perceived by some in the log export controversy is, "There ought to be a law". Obviously their legislators were listening, for there are a number of laws and regulations restricting the exporting of logs from the Western states. Most of the restrictions were for the stated goal of increasing the domestic wood processing capacity and employment. Whether they do so or not is debatable.

Included in this regulatory problem is the question of when is a log no longer a log, or how much primary processing is required before the wood can be exported. Also included is the question of substitution in processing facilities of logs which can not be exported for logs which are exported. That is, if substitution is not allowed, a firm cannot export logs that could have been processed in their mills, then replace these logs from sources which prohibit log export.

Austin (69) provides an early review of these regulations. Austin's summary table, updated, is included as table 6. Lindell (78) presents a more timely review, and the following is a short synopsis of these regulations taken from his report, updated as necessary.

Although this paper is concerned primarily with the PNW, other North American restrictions affect the log export trade in this region. Federal restrictions will be discussed first, then those imposed by the states, and finally the Canadian restrictions.

Federal: Among the first moves in restricting log exports from the PNW was a joint statement by the Secretaries of Agriculture and Interior in 1968 concerning log exports from National Forest and Bureau of Land Management (BLM) lands in the PNW Douglas-fir region. This agreement limited the total amount of unprocessed logs that could be exported from these lands to 350 million board feet (290 from Forest Service land, 60 from BLM land, to be divided among their respective administrative units). The maximum thickness of a cant which could be exported was eight inches (Austin, 69). This was a temporary limitation, due to expiration and reconsideration after about 14 months time; however, prior to this time, it was superceded by the Morse Amendment.

Wayne Morse, a senator from Oregon and long an opponent of

Table 6. Summary of log export restrictions. Sources: Austin (69); Lindell (78).

Restriction	Dates Effective	Area Covered	General Limitations	Exemptions	Definition of Primary Processing	Substitution Restrictions
Secretaries' determinations	April 22, 1968 to December 31, 1968 (Superceded January 1, 1969 by Morse Amendment	Western Washington Western Oregon	Foreign export of logs from Forest Service lands of Western Washington and Western Oregon in excess of 290 million bd. ft. annually and BLM timber from Western Oregon in excess of 60 million bd. ft. outside Washington, Oregon, and California	Port Orford cedar	Cants and squares 8 inches or less in thickness, poles, veneer, pulp, or chips	
Morse Amendment to Foreign Assistance Act of 1968	January 1, 1969, to December 31, 1971	All areas west of 100th meridian	Foreign export of logs from Federal lands west of 100th meridian in excess of 350 million bd. ft. annually	Alaska yellow cedar and Port Orford cedar in Washington, Oregon, and California; Alaska yellow cedar and western redcedar in Alaska	Cants and squares 8 inches or less in thickness, poles, lumber veneer, pulp, or chips (except Alaska chips)	Not permitted
Small Business Administration's Set-Aside Sales	July 18, 1958	Decided or agreed to on a sale-by-sale basis	Processing of logs by other than U. S. small business firms	30 percent of the volume volume each sale (50 percent in Alaska)	Logs manufactured into lumber and timber	
Sustained Yield Units:						
Shelton Cooperative	January 1, 1947, to December 31, 2046	Area within a 10 mile radius of the towns of Shelton and McCleary	Must process in area covered, a volume equal to 80 percent of commercial timber harvested from unit	None	Logs converted into salable manufactured products for which they are best suited	
Grays Harbor Federal	November 2, 1949	An area lying within Grays Harbor County	Export from area of 100 percent of commercial timber harvested	On a sale basis providing no economic market can be found in area	Rough green lumber and veneer, chips, shingles, and shakes	
Lakeview Federal	October 10, 1950	6 mile radius of Lakeview and 3 mile radius of Paisley	Export from area of 100 percent of commercial timber harvested	None	Logs converted into lumber with an average of 5 additional manhours of work per thousand bd. ft. of logs used in remanufacturing or an equivalent degree of employment	
Act of April 12, 1925 (16 USC616) on Alaskan federal log exports:						
Forest Service	Implemented January 6, 1928	Alaska	Foreign or domestic export of logs from federal lands	On a case by case determination	Cants and squares 8 inches or less in thickness, poles, veneer, pulp, or chips produced from mill wastes	
Bureau of Land Management	Implementation uncertain					
Rider to Department of Interior Appropriation Act of 1973:						
Forest Service	Implemented March 13, 1974	Contigous states west of 100th meridian	Foreign export of logs from federal lands	Surplus species as determined by public hearings	Cants 8 inches or less in thickness, lumber milled on all four sides, veneer, plywood, chips, poles, oilings, and pulp	Not permitted
Bureau of Land Management	Implemented April 1, 1976					
State of Oregon	1961	Oregon	Foreign export of logs from State owned lands	Port Orford cedar	Next stage of manufacture beyond log form	
State of Alaska	1960	Alaska	Foreign or domestic export of logs from State owned lands	None	Cants 12 inches or less, slabbed on 2 sides, cants over 12 inches slabbed on 4 sides, chips from wood waste	
State of California	1974	California	Foreign export of logs from State owned lands	None	Lumber sawn on 4 sides not to exceed 12 inches.	Not permitted
British Columbia (Forest Act)	1906	British Columbia	Export of logs from the province	By permit	Limited only in quantity of wane allowed (varies by size)	

unrestricted log exports, added an amendment to the Foreign Assistance Act of 1968, commonly called the Morse Amendment, which placed into Federal law the limits previously agreed upon by the Secretaries of Agriculture and Interior, including the definition of primary processing. This act also expanded the area of restriction to all Federal lands west of the hundredth meridian, including Alaska. Also added was the prohibition of the substitution of Federal timber for non-Federal logs which were exported, and provisions for declaring specific species as excess to domestic needs, thus freely open for export.

The Morse Amendment was scheduled for expiration at the end of 1971, but was extended for two years. Of interest is that during this time of the 350 million board feet limit, this level of export logs from Federal lands was never achieved, although Austin (73) does not credit this to any lack of effort by the Federal agencies involved.

The issue flared up about 1972 with housing booms in both the United States and Japan creating a tight supply situation and a sudden jump in log prices, leading to several congressional hearings. Although bills introduced to halt log exports did not pass, a rider was attached to the Department of the Interior and Related Agencies Appropriation Act in October, 1973, which did effectively halt all export of logs from Federal lands west of the hundredth meridian in the contiguous states. Surplus species could be exempted, and substitution was not allowed.

This rider was included on subsequent appropriation acts, and along with the changes made in the Federal Code to reflect these requirements, form the basis for the current restrictions on log export from Federal lands in the western states.

Under the terms of this legislation, the Forest Service in 1973 defined processed timber as lumber and construction timbers sawn on four sides, cants 8 3/4 inches in thickness, chips and pulp, veneer and plywood, and poles and pilings. Douglas-fir cull logs were excluded from the definition of unprocessed timber, thus open for export. Also, a rather complicated definition of substitution for export was adopted. Surplus species, as determined by Secretary of the Agriculture hearings, and sales appraised at less the $2000 total value were exempt from the export/substitution restrictions.

The BLM's definition of processed timber followed the Forest Service's definition. Substitution was defined slightly different, however, in that the buyer was guilty of substitution if he increased both his log export volume and purchase of Federal timber, whereas in the Forest Service definition, it was an either/or situation. Also, surplus species may be designated by the Secretary of Interior after public hearings.

The ban on log exports from Alaskan National Forests have a relatively long history, beginning with the 1926 Export of Timber Act (Austin, 69). This was apparently implemented by the memorandum from Chief Forester W. B. Greeley in 1928, which Lindell claimed was the source of the prohibition of log exports from these lands. The purpose of the ban on logs from Alaska was to develop an adequate wood processing capacity for the region, hence not only foreign sales were banned, but also log sales to other states. Surplus species could be exported by approval of the Regional Forester, but must be approved on a case-by-case basis, and must satisfy other specific conditions, such as salvage of dead timber.

Lindell states that BLM lands in Alaska had no specific regulations concerning log exports due to the then undecided implementation of the Native Claims Settlement Act. Austin included the BLM under the 1926 law, which includes the phrase, "...National Forest, or the public lands of Alaska...", and makes reference to "...the respective Secretaries concerned..." in the statute (16USC616). To clarify this discrepancy, I contacted the Portland BLM office, and was told that there were no restrictions on exporting logs from Alaskan BLM lands in their regulations. It was considered a moot point, as there have been no recent BLM timber sales in Alaska, evidently due to most of the readily available timber lands being claimed under the Native Claims Settlement Act.

States: Lands owned by the State of Alaska have had primary processing restrictions since 1960. Small amounts of selected species may be exported as logs for "experimental purposes". Cants must be no greater than 12 inches thick, or cut on all 4 sides with a wane limitation.

The State of Washington does not restrict the export of logs cut

from Department of Natural Resources holdings, and a referendum attempt in 1968 to prohibit such exports was defeated by the voters. Another attempt at a legislative ban was introduced in March of 1981 (Gruenfeld, 81).

The State of Oregon considered the problem of such significance that an emergency act was passed in 1963 prohibiting the export of logs from State lands, except by special permit from the Department of Forestry. Port Orford cedar was the only exemption from this restriction. Permits have been granted, but sparingly. For 12 applications, only 4 have been approved, and of these, 1 permitee eventually found a domestic buyer for his timber (Anon, 81). Timber may be exported after it has recieved primary processing, defined as, "...that stage of manufacture next beyond the log form..." (ORS 578.805).

The State of Oregon still considers the export of logs to be a serious matter. In the 1981 regular session of the Legislative Assembly, SB549 was passed which prohibited all log exports from State lands by deleting the previous permit requirements. In addition, the Legislative Committee on Trade and Economic Development was tasked to study whether or not substitution limitations should be imposed, or perhaps even barring log exporters from bidding on State sales.

California imposed export restrictions in 1976. The definition of processed timber available for export was perhaps the most stringent of all. Exportable timber must be sawn on all 4 sides, and not exceed 4 by 12 inches in cross section. Also, no substitution was allowed, and to insure this, cut logs were to be followed by accounting procedures until such time as they receive primary manufacture.

Canada:

British Columbia figures prominently in any discussion of log exports for two reasons: it is a major supplier of timber for the Japanese, and it was often used as an example by those proposing further restrictions on log exports from the United States. The control over log exports dates from 1906, with the passage of the Forest Act (now the Department of Forests Act) which stated that all timber cut from lands under Provincial control be used in the Province or processed in the Province. The Canadian Federal control stems from the Export

and Import Permits Act, and includes all log exports, even from Provincial lands, although actual control is in the hands of the Province.

Logs surplus to domestic needs can be exported with special permission. Such permission is not freely granted, less than one percent of the total harvest was exported as logs in 1975 (Lindell, 78).

Summary: In essence, except for the Washington DNR lands, the export of logs cut from public lands in the western states is prohibited, leaving the only source of exportable logs in private or DNR holdings.

THE EFFECTS OF A TOTAL BAN ON LOG EXPORTS

We have examined the impacts of the log export trade in the past, and the resulting mixture of laws and regulations designed to provide some measure of protection to PNW wood products industries. Some say these regulations are not enough, and citing any of a number or reasons, insist that the United States needs a total ban on log exports. Yet the effects of halting log exports are not certain.

Many have made predictions, some little more than ideas expressed by a participant in the controversy to emphasis his arguments. Others are prognostications made by economists applying their knowledge to predict the effects of a ban on log exports. Some of the economists have utilized economic models and sensitivity analysis, by varying one or two factors in the model and determining the change (sensitivity) in the other factors. In this section, I have virtually ignored the first type of prediction, and briefly discuss a few general predictions by some economists. The bulk of this section on predicted effects concerns the predictions provided by three groups of authors utilizing economic models and sensitivity analysis.

Prior to discussing the effects of a ban on log exports, I will discuss the future of log exports with no change in current restrictions.

The Future of Log Exports With No Further Restrictions:

Japan is the major purchaser of PNW logs, and events in Japan will markedly affect the log export trade. As discussed in the Appendix, Japan's forests planted after World War II are now beginning to reach maturity. Additionally, the boom in Japanese housing construction seems to have ended. Ueda and Darr (80) predict a decline in Japanese housing starts after 1987, and others state that the decline has already started (Anon, 80). Because of these factors, the Washington State University's Forest Policy Project (Anon, 80) predicts a decrease in log exports over the next three decades (figure 13, page 37).

Darr (in Sedjo, 80) agrees with this projection, showing a gradual decline after peaking in 1976. Figure 13 includes Darr's predictions after 1980.

A report prepared by the Japanese Ministry of Agriculture, Forestry and Fisheries (Anon, 80a) agrees with the declining log export projec-

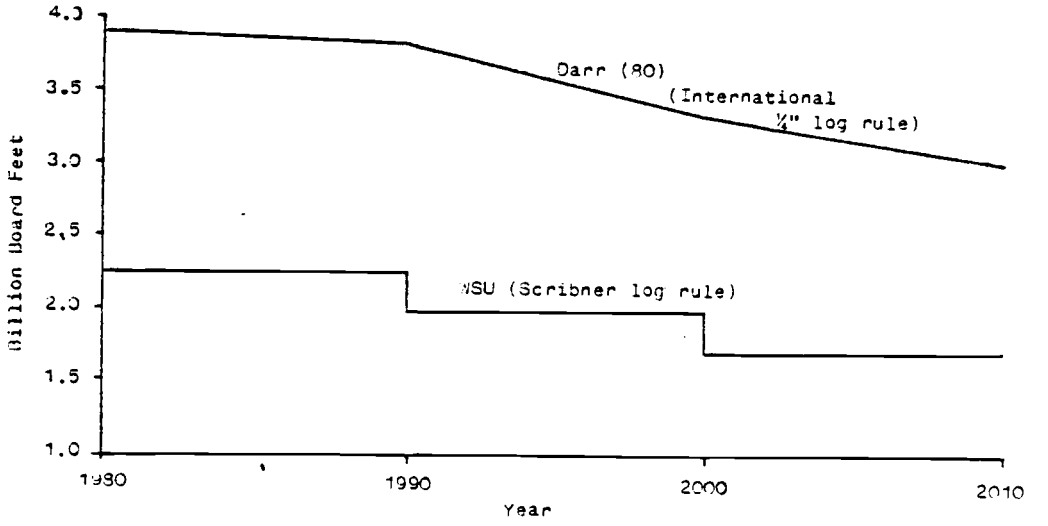


Figure 13. Projected log exports from the PNW. Sources: Darr (80), and the Washington State University (WSU) Forest Policy Project (Anon, 80).

tion. Total imported wood is expected to increase slightly, although the ratio of imports to total supply is expected to decrease. This is due mainly to the Japanese domestic supply increasing to 57.7 million cubic meters by 1990, due to the forests planted after World War II reaching maturity. Of interest to this paper is that the composition if Japanese imports is expected to change as South Asia and North American log imports decrease and finished product imports increase.

Thus, it appears the log export market with Japan may have reached its highest level. The great increase in logs sold to Japan over the past 20 years may be viewed as an emerging market, now stabilized and providing a constant, perhaps even decreasing, market factor in the PNW.

Yet with the entry of Communist China into the log export market, those prooosing further restrictions have become concerned that the cycle may begin again (Oregon Statesman-Journal, January 12, 1982).

Projections Using Economic Models and Sensitivity Analysis:

There were three authors/groups of authors who addressed this problem of what may happen after a ban on log exports by using models and sensitivity analysis. They were: Haynes; Darr, Haynes, and Adams; and Wiseman and Sedjo. I will provide comparisons between these authors/groups by categorizing their results using the lumber equivalent replacement percentages of log export volumes.

Lumber Equivalent Replacement: One of the crucial unknowns in this controversy is the response of foreign buyers to a total ban on log exports. The possible responses can be roughly categorized by the extent of the increased foreign demand for PNW lumber following a ban on log exports. This increased demand is expressed in this oaper as a percentage of the volume of logs previously exported, and is termed the "lumber equivalent replacement", or LER. A 100 percent lumber equivalent replacement (100% LER) category implies that the foreign buyers of PNW logs will ouy an equal volume of PNW lumber after the ban is imoosed. The 50 percent (50% LER) category implies that only half the log exoort volume is replaced by increased lumber purchases, and the 0 oercent category (0% LER) means there is no increase in foreign demand for PNW lumber after the ban. These three categories form the framework for the comparison of the results between these studies.

The Authors: Prior to comparing the results of these three sets of studies, a review of the author's methodology and major assumptions is appropriate. Following this review, each LER category will be discussed individually to allow comparisons in predictions among the authors for each situation.

Haynes: Haynes (76) provided the first attempt to analyze the problem of the impacts of a log export ban by sensitivity analysis. His approach was to estimate the price changes with two extreme scenarios, then test the sensitivity of prices due to an increased volume of lumber injected in the United States domestic supply (milled from logs formerly exported).

Conceptually, the model prepared by Haynes was a basic supply and demand equilibrium model (figure 14). The United States lumber supply schedule was composed of two parts; that portion produced in the United States, and that imported from Canada. For analytical purposes, this conceptual model was reduced to mathematical expressions for the computer simulation runs.

The extreme scenarios as presented in his report portray the shifting of the United States supply curve following a ban on log exports. The first alternative concerns a situation where domestic mills are operating at less than full capacity production, and can increase production using logs formerly exported. Haynes also assumed that foreign buyers do not increase their purchases of United States lumber, which

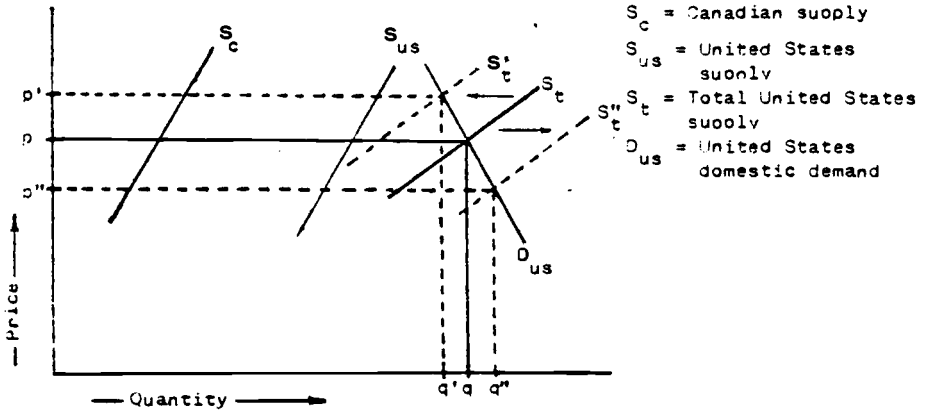


Figure 14. Haynes' (76) lumber supply and demand model, with supply schedule shifts. Extreme scenarios represented by S'_t (no increased production and 100% LER) and S''_t (increased production and 0% LER).

equates to the 0% LER. Thus, with no foreign drain on the increased domestic lumber supply, the Unites States total lumber supply curve shifts outward. This is illustrated in figure 14 by the shift of the total supply schedule (S_t) out to S''_t, resulting in a decrease in price and increase in quantity.

The second extreme scenario as stated in Haynes' report had domestic mills operating at full capacity (no increased production possible) and foreign buyers offset the loss of the logs by increased purchases of lumber. This would be depicted in the conceptual model (figure 14) as a decrease in lumber availability in the domestic market, resulting in a shift of the total United States lumber supply curve inward to S'_t, with the resultant increase in price and decrease in quantity.

This situation as portrayed seems unrealistic. Perhaps a better means of expressing the second scenario is by adding the increased foreign demand for lumber to the United States domestic demand, as shown in figure 15. With no increase in production allowed, this infers that the United States domestic supply schedule would be completely inelastic after price p. The total supply will have some elasticity, as it is a summation of the United States and Canadian supply schedules, and there were no restrictions placed on the Canadian production. Thus, prices increase, for both foreign and domestic buyers, and the quantity

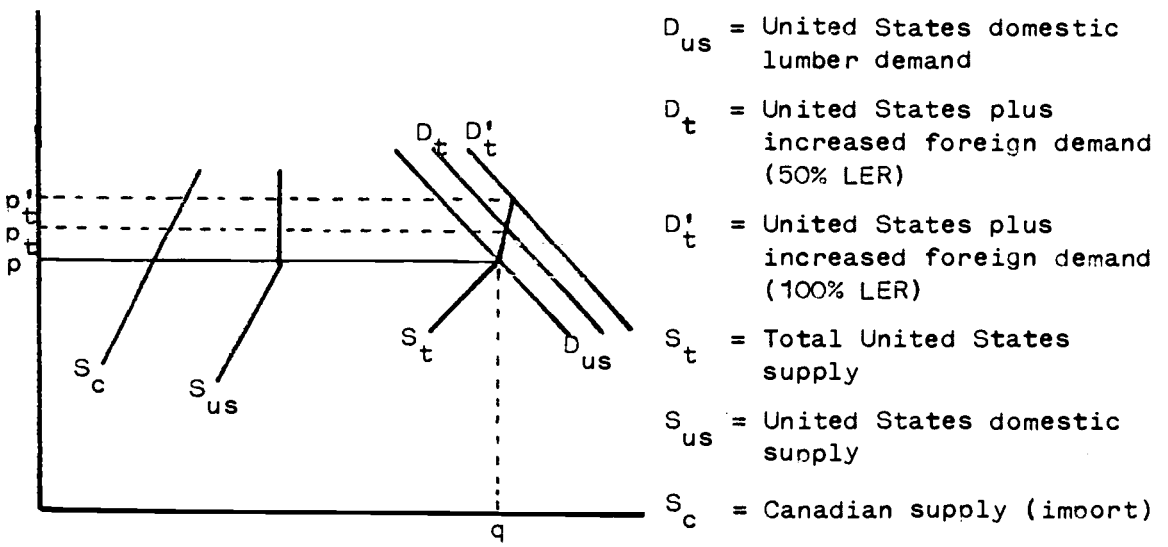


Figure 15. Alternate depiction of Haynes' second extreme scenario.

increases slightly.

For this analysis, Haynes used a data base of the 1973 to 1975 period in order to utilize actual data rather than incur possible inaccuracies with projected data. Therefore, his hypothetical log export ban started in 1973.

To provide a base for the magnitude of the United States supply schedule shift (or, as I have added, the addition to demand in the second scenario), Haynes used the volume of logs exported in 1973, 3.4 billion board feet, and assumed that the lumber produced from these logs would equal this volume. He included three additional assumptions about the extent of the supply schedule shift. For the situations as presented in his report, these were:

1). The United States supply schedule was unaffected by the ban.

2). The curve would shift by half the lumber equivalent of the exported logs (that is, in figure 14 q - q" and q' - q equals 1.7 billion board feet).

3). The supply schedule would shift by the full lumber equivalent of the exported logs (that is, q - q" and q' - q equals 3.4 billion board feet).

The supply schedule shift would be in or out, depending upon which extreme scenario was under consideration.

This sequence is satisfactory for the first scenario, but once again seems deficient for the second scenario. This presents a problem; how to portray the extent of the shifts in the second scenario? I have chosen to assume that the foreign buyers obtain all, half, or none of the lumber equivalent from the United States. The first two assumptions match the 100% LER and 50% LER categories, and are discussed in this context. The last assumption matches the 0% LER category, but in this study infers no change in any of the schedules, thus it will not be discussed further.

For the remainder of the discussion concerning Haynes' 1976 study, the situations as described in his report will be used. I would assume the use of a zero elasticity for the United States supply in the second scenario would yield different results, but the direction and relative changes would probably be similar.

The model was further modified by more assumptions concerning the timing of the shifts over the three year period. Combined with the assumptions made concerning the magnitude of the shifts, this provided seven groups of assumptions (table 7).

Table 7. Assumptions about the extent and timing of the total supply shifts following a restriction of log exports in 1973 (Haynes, 76).

(Billion board feet, lumber scale)

	Assumptions						
	No Shift	Half Shift			Full Shift		
Year	I[1]	II[2]	III[2]	IV[2]	V[3]	VI[3]	VII[3]
1973	0	1.70	0.68	1.02	3.40	1.36	2.04
1974	0	0	.51	.51	0	1.02	1.02
1975	0	0	.51	.17	0	1.02	.34

Notes: 1. Assumes that the U. S. supply curve was not affected by a change in log export policy.
2. Assumes that the U. S. supply curve shifts (over a 3 year period) by the lumber equivalent of 50% of the logs exported in 1973
3. Assumes that the U. S. supply curve shifts (over a 3 year period) by the lumber equivalent of 100% of the logs exported in 1973.

With the quantity side of the model illustrated in figure 14 determined by these assumptions, the problem of what price changes are associated with these changes in quantities becomes a matter of the elasticities of the various schedules. (Note: this varies somewhat from most economic analysis using supply and demand models: in Haynes' study, the quantity supplied determines price, instead of price determining quantity.) These elasticities are not absolute known values, estimates vary widely in the literature. Therefore, Haynes assumed sets of values for each schedule. These elasticities are given in table 8.

Table 8. Haynes' assumed elasticities.

United States Lumber Supply	United States Lumber Demand	United States Derived demand For Logs	Canadian Lumber Supply (Imports to United States)		
0.6	-0.2	-.1153	0.4	0.6	0.8
1.0	-0.8	-.4611	0.8	1.0	1.2
1.6	-1.6	-.9221	1.4	1.6	1.8

Source: Haynes (76).

Haynes did not find a suitable source for the elasticity of the Canadian supply, and assumed it was closely related to the United States market. He then assumed a set of elasticities for the Canadian supply which were -0.2, equal to, and +0.2 of each of the assumed United States elasticities. This yielded the nine Canadian elasticities shown in table 8.

A large number of price changes (756) were computed for various combinations of these assumptions, and the results presented as a series of tables. The maximum change in lumber price was -15.8 percent for the

second scenario (for the 100% LER), and +17.4 percent for the shift of the supply curve inwards. Of more interest is the distribution of the changes, expressed as the dollar change per thousand board feet, included as table 9.

Table 9. Distribution of Haynes' price change results.

Price Interval (Dollars)	Distribution of Price Changes (Percent)
0 - 5	26.5
5 - 10	35.2
10 - 15	21.7
15 - 25	12.4
25+	4.2

Source: Haynes (76).

I have other reservations about this study, especially concerning the direct linkage of the stumpage price with the price of lumber, which yields parallel demand curves. Any change in the price of lumber infers a change in the same direction for stumpage prices. This was due to the emphasis on the derived demand for logs, with no substitute markets, and is acceptable for other stumpage market analyses. Yet for determining changes in price due to a log export ban, this may not be appropriate due to the dichotomy of the log market (logs sold for domestic processing and logs sold for export, with export logs bringing a higher price). Haynes' approach basically ignores the high value of the logs cut for the export trade. If this trade is lost, it would be reasonable to expect the logs previously sold in the higher value export market would now have to be sold at the lower values of the domestic processing market. This could also be expected to increase the supply of timber in this market, as with the closure of one market, much of the timber that would have been sold in this market would have to be sold in the other market along with the timber already being sold. Thus it appears that the price of stumpage should decrease, with any increases in lumber price helping only the processors, not the timber producers.

Another reservation is the complexity of the model itself, with the great number of assumptions attempting to bracket all possible "true" values. To be fair, Haynes did not claim to present the actual fact of what a ban on log exports would precipitate in price changes, but attempted to supply an estimate of the extreme changes possible in lumber and stumpage prices (even stating that,"This finding adds to rather than clarifies the uncertainty surrounding the trade-offs from different trade policies.") In this context, it seems to be little more than an exercise in supply and demand elasticity relationships.

Although these reservations may detract from the worth of the study, it is included in this paper due to its pioneering effort in using sensitivity analysis in the log export controversy, and the general effects predicted for lumber prices.

Darr, Haynes, and Adams: Adams and Haynes (80) devised a rather sophisticated simulation model for assessing various impacts on the United States softwood market. This Timber Assessment Market Model

Note: The discussion of the TAMM in this paper derived from the Appendix of the Darr, Haynes, and Adams 1980 report, which described TAMM as basically the same as presented by Adams and Haynes (80). Therefore, I included the division of the United States into supply and demand regions as depicted in the Forest Science monograph. Yet in discussing the model in the log export report, the authors divided the United States into six supply regions (total of seven, including Canada). Apparently, the four supply regions east of the Rocky Mountains were combined into two, that is, the North and South.

stumpage prices and a 61 percent increase in lumber production by 1990. Of more interest is the use of TAMM in later studies, most significantly, that of Darr, Haynes, and Adams in 1980.

This relatively comprehensive report assumed five scenarios, and a base scenario of no log export change which provided the base against which the results of the simulations were compared. The analysis was run for the period 1980 to 1990, with the assumption that any log export ban would be in effect long enough to resolve short run market dislocations. The effect of a ban on log exports was simulated by decreasing stumpage demand in the affected supply regions.

For the base scenario, an assumption was made that the Japanese would annually purchase 2.5 billion board feet of logs from the PNW and 100 million board feet from California. The assumption of a constant volume of log export sales through the 1980's was held to be consistent with log export forecasts. The results of this simulation is included as table 10 (page 45).

The five scenarios depicted were:

1). Japanese buyers purchase the entire lumber equivalent from the

United States, and that Canadian sales to Japan are not increased (100% LER).

2). Japan would turn to sources other than North America to replace the wood supply (0% LER).

3). Japan would purchase the entire lumber equivalent from Canada and United States exports of lumber would not increase (0% LER).

Year	Production	Exports	Imports	Consumption
1980	31,659	1,369	7,806	38,086
1981	31,901	1,392	8,246	38,755
1982	32,062	1,415	8,683	39,330
1983	31,987	1,438	9,137	39,686
1984	32,079	1,461	9,591	40,209
1985	32,029	1,485	10,033	40,577
1986	31,977	1,508	10,498	40,967
1987	31,860	1,531	11,043	41,372
1988	31,709	1,554	11,627	41,782
1989	31,476	1,577	12,206	42,105
1990	31,416	1,600	12,740	42,556

Figure 10. Results of Darr, Haynes, and Adams' base scenario simulation. (Darr et. al., 80)

4). Japan purchases the entire lumber equivalent from the United States, Canadian sales to Japan would not increase, and the lumber processing capacity of the PNW Douglas-fir region would not expand (100% LER).

5). Japan would buy half the lumber equivalent from the United States and half from Canada (50% LER).

For each scenario, it was assumed the Japanese would need 4.42 billion board feet of lumber to replace the 2.6 billion board feet of logs previously imported from the United States. United States producers would only realize 3.38 billion board feet of lumber from the same logs. This was due to the difference in mill overrun factors between Japanese mills (1.7) and American mills (1.3).

The results were presented for several aspects of the log export controversy in a series of tables listing the absolute changes from the base scenario. The changes were detailed for each year in the decade studied.

Also included in their report was a table listing the projected effects of a ban on log exports for the year 1990, and represents some of the distributional impacts of a ban.

The authors presented a paper at the "Issues in United States International Forest Products Trade" workshop in 1980 (Sedjo, 80) which consisted mostly of the base scenario and scenarios one and three.

Although results were expressed in a somewhat different format, they did not differ from the above work.

Wiseman and Sedjo: In the same workshop, Wiseman and Sedjo presented a paper discussing the welfare economics aspect of a complete ban on log exports. This also provided amplification of an earlier article (Sedjo and Wiseman, 80) by providing a discussion of the model used for their simulations.

The welfare economist's approach to the log export question may deviate somewhat from the market economist's sensitivity analysis, in that not only are price and quantity changes considered, but how these changes affect the sectors involved in the market, expressed as a change in well-being. Yet the results are valid, and applicable to ths discussion.

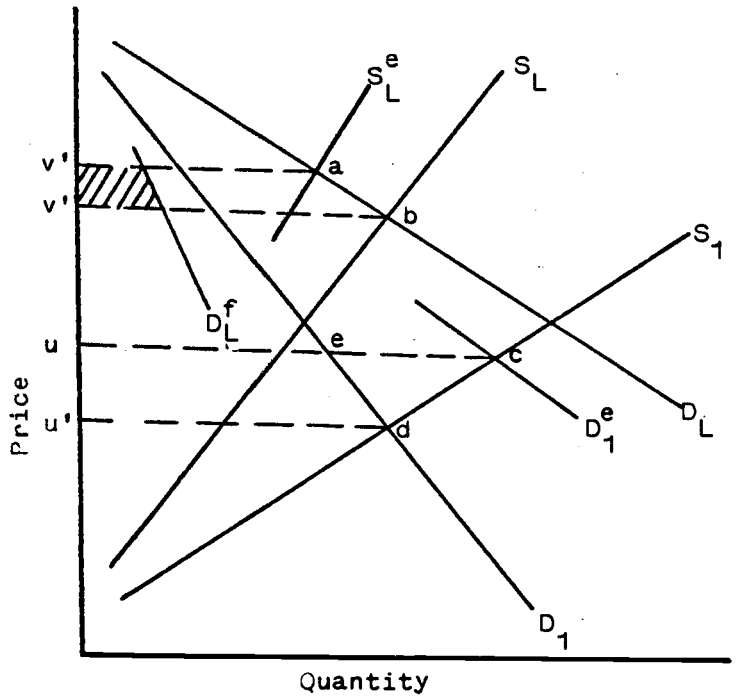
The model used in this analysis was basically a derived demand model for sawlogs, with several complications added. In the presentation of this model (Sedjo, 80), the model was developed through several steps. For brevity, I have included only the final model, with parts of previous steps included (figure 16 , page 47).

In figure 16, the domestic lumber supply schedule after a log export ban is represented by S_L. S_L^e represents the domestic supply curve for lumber prior to a ban on log exports. The derivation of this curve is somewhat involved. In one of the earlier steps, point (a) was determined by adding the processing cost of lumber (a value represented by v - u) to the worldwide price of logs (u). I have taken the liberty of extending this point into a supply schedule based on the authors' note that:

> "The supply curve of lumber is drawn assuming no log trade, giving the appearance that point (a) is not on a supply curve. In fact, S_L shifts to the left through point (a) when log exports are (ec)."

I have included D_1^e to represent the derived demand for sawlogs prior to a ban, and was expanded from point (c) in Wiseman and Sedjo's model. D_L represents the total demand for lumber, both foreign (D_L^f) and domestic, and does not shift. The derived demand schedule for sawlogs after the loss of the export market is indicated by D_1.

The model indicates that a ban on log exports would result in an



S_L = Domestic lumber supply, no log exports

S_1 = Domestic sawlog supply, no log exports

S_L^e = Domestic lumber supply, with log exports

D_L = Total lumber demand, foreign and domestic

D_1 = Domestic sawlog demand, no log exports

D_1^e = Domestic sawlog demand, with log exports

D_L^f = Foreign demand for U. S. lumber

Figure 16. Wiseman and Sedjo's economic model for determing the effects of a log export ban. Source: Sedjo (80).

increase in domestic lumber supply (shifting S_L results in more lumber produced), but this increase in lumber is not enough to compensate the log market for its lost trade, as the quantity of logs supplied decrease.

In an unrestricted market, the lumber and log markets would clear at the equilibria indicated by a and c. With log exports prohibited, the lumber and log markets would clear at the equilibria indicated by b and d, leading to a drop in lumber prices from v to v', and log prices from u to u'. The trapezoid ucdu' represents a loss in producer's surplus from the previous free market, and uedu' represents a gain in the United States consumer's surplus. The difference, triangle ecd, is the net welfare loss in the log market (ec represents the quantity of logs previously exported). The trapezoid vabv' represents a gain in the consumer's surplus in the lumber market. Since lumber is still open to free trade, part of this gain is realized by foreign purchasers of lumber, that portion crosshatched in figure 16. This represents some loss to United States consumers, in that the full benefits of the lowered costs of lumber are not realized by American buyers.

Wiseman and Sedjo pointed out that the change in consumer's surplus may not be as great as indicated by the model. Halting log exports could well cause the foreign demand for American lumber (D_L^f) to shift to the right. Therefore, log and lumber prices would not decline as much as if there were no change in the foreign demand for lumber.

To bracket the possible effects of a ban on log exports, two scenarios were assumed. These scenarios equate to the 100% LER and 0% LER categories.

Wiseman and Sedjo's region of concern was the Pacific Coast states of Washington, Oregon, and California. Since California supplies only a small portion of the logs in the export trade, 0.8 percent in 1976, the authors' results can be applied directly to the PNW.

Distributional Impact Comparison: Wiseman and Sedjo's distributional impacts were included with Darr, Haynes, and Adams' estimated impacts for 1990 to form a comparison table (table 11, page 49). These results are not as directly comparable as could be desired, due to the difference in the method of presenting the impacts to the sectors. Wiseman and Sedjo present their results in terms of the impact on the sector

Table 11. Comparison of the distributional effects of a total log export ban (millions of dollars).

Sector	Lumber Equivalent Replacement Categories						
	100%			50%	0%		
	Wiseman & Sedjo[1]	Darr, Haynes, & Adams[2] Scenario[3]		Darr, Haynes, & Adams[2] Scenario[3]	Wiseman & Sedjo[1]	Darr, Haynes, & Adams[2] Scenario[3]	
		1	4	5		2	3
Consumers[4]	-10.9	-105.2	-65.9	-66.8	+99.5	-247.6	-111.1
Processors							
PNW[5]	+76.2	+322.0	+548.8	+325.4	+60.3	+333.7	+308.7
Other[6]		-46.5	-127.5	-68.2		-67.4	-89.7
Total U S		+275.5	+421.3	+257.2		+266.3	+219.0
Log Producers							
PNW	-66.2	-482.8	-970.5	-550.9	-209.8	-547.5	0537.3
Other		-37.7	+64.1	-24.8		-112.0	+40.7
Total U S		-520.5	-906.4	-575.7		-659.5	-578.0
Net change							
PNW	-0.9	-173.6[7]			-50.0		-239.8[7]
Total U S		-350.2	-551.0	-385.3		-640.8	-470.1

Notes: 1. Estimated annual change in welfare of the affected sectors in the Pacific Coast region. Sources: Wiseman and Sedjo, (Sedjo, 80); Sedjo and Wiseman (80).

2. Estimated change in sales/expenditures in 1990 from a base scenario which assumed no change in log exports. Sources: Darr et. al. (80); Haynes et. al. (Sedjo, 80).

3. Scenarios are described on page 44.

4. Wiseman and Sedjo report the changes in welfare of the consumers in the Pacific Coast region. Darr, Haynes, and Adams report the change in expenditures by the consumer sector in the United States.

5. California contributes little to the log export trade, thus Wiseman and Sedjo's results are applied to the PNW with no changes. The model used by Darr, Haynes, and Adams (TAMM) presents results for several regions of the United States. Their PNWW equates to the PNW Douglas-fir region and is reported in this row.

6. The remaining regions of the United States from the Darr, Haynes, and Adams study.

7. The net impact for the PNW was only available for scenarios 1 and 3 (Haynes et. al, in Sedjo, 80).

(their change in well-being). Darr, Haynes, and Adams present their results as the change of expenditures or sales for each sector. Thus, if the price of lumber decreases, this is a boon for consumers, and would be presented as a plus by Wiseman and Sedjo. On the other hand, this may lead to a decrease in expenditures by consumers, and would be presented as a negative by Darr, Haynes, and Adams.

The change in expenditures is not necessarily a good indicator of the well-being of the consumer sector. A decrease in sales can mean either a lowered price, which infers a more favorable situation for the buyer (at the expense of the producer), or a loss of availability of the product, which would be unfavorable for the buyer, as less wood is available than is desired. However, dollar sales are often used to express the economic health of a region, and as such the results from Darr, Haynes, and Adams are presented.

Comparison of the Results of the Sensitivity Analyses: Table 12 (page 51) provides a comparison of the results of the three groups of authors discussed, listing the projected impacts by LER category. Included in each category is a "general consensus" row which indicates the direction of the general trend for each factor listed in the column.

In Haynes' study, the direction of change was the same within each LER category, only the magnitude varied. Therefore, for comparison purposes, only Haynes' maximum change for each extreme scenario and the changes resulting from simulation runs using the median elasticity values are presented.

To further simplify the comparison table, only two years were included from Darr, Haynes, and Adams' results: the final year, 1990, and the midpoint year, 1985.

100 Percent Lumber Equivalent Replacement: Haynes' 100% LER category was included in the second extreme scenario, and as I believe it was depicted, infers that the United States supply was decreased by the full 3.4 billion board feet of lumber purchases by foreign buyers to compensate for the loss of the logs. This scenario assumed that there could be no increase in production, and is recorded as zero in table 12. As depicted in the conceptual model (figure 14), this situation would tend to increase prices. (Viewed as added demand, as in figure 15, this

Table 12. Comparison of the authors using sensitivity analysis for the projected effects in the Pacific Northwest of a total ban on log exports

	Lumber (Percent change)			Logs/Stumpage[1] (Percent change)	
	Consumption	Price	Production	Price	Production
100% Lumber Equivalent Replacement Category[2]					
Haynes[3]					
Full shift					
Maximum change		+17.44	0	+31.87	
Midpoint change		+6.31	0	+11.38	
Darr, Haynes, & Adams[4]					
Scenario 1					
1985	(-0.2)[5]	(0)	+42.7	-41.2	-9.3
1990	(+0.1)	(-0.7)	+68.4	-35.1	-6.5
Scenario 4					
1985	(-1.5)	(+3.4)	0	-76.0	-16.4
1990	(-1.2)	(+0.5)	0	-73.6	-14.7
Wiseman & Sedjo[6]	-0.2	+0.4	+15.3	-3.7	-1.2
Overall Consensus	Decrease	Increase	Increase	Decrease[7]	Decrease
50% Lumber Equivalent Replacement Category[2]					
Darr, Haynes, & Adams[4]					
Scenario 5					
1985	(+1.1)	(+0.7)	+42.2	-41.9	-9.4
1990	(-4.4)	(-1.2)	+60.6	-40.3	-7.8
Haynes[3]					
Half shift					
Midpoint change		+3.34	0	+5.39	
Overall Consensus	Decrease	Increase	Increase	Decrease[7]	Decrease
0% Lumber Equivalent Replacement Category[2]					
Haynes[3]					
Full shift					
Maximum change		-15.77	+15[8]	-26.53	
Midpoint change		-6.29	+15	-11.20	
Half shift					
Midpoint change		-3.20	+7.5	-5.48	
Darr, Haynes, & Adams[4]					
Scenario 2					
1985	(+0.9)[5]	(-1.8)	+33.5	-51.0	-10.6
1990	(+0.4)	(-2.0)	+68.1	-39.7	-8.3
Scenario 3					
1985	(-0.2)	(-0.5)	+40.3	-44.1	-9.8
1990	(+0.1)	(-1.8)	+61.7	-39.2	-7.3
Wiseman & Sedjo[6]	+1.3	-3.7	+13.1	-12.0	-4.0
Overall Consensus	Increase	Decrease	Increase	Decrease	Decrease

Notes: 1. Log and stumpage markets included interchangeably, as there was no conformity between the groups of authors on reporting which commodity, standing timber or cut logs, changed.
2. Lumber Equivalent Replacement is discussed on page 38.
3. Haynes reported the expected changes in the 1973 to 1975 time frame as a result of a ban on log exports in 1973. Details of his study are on page 39. Source: Haynes (76).
4. Darr, Haynes, and Adams report the expected change from a base scenario of no change in log export restrictions. Details and descriptions of the scenarios are on page 44. Source: Darr et. al. (80); Haynes et. al. (Sedjo, 80).
5. The model used by Darr, Haynes, and Adams is a national model which includes several separate supply and demand regions. Results were not always presented for the PNW Douglas-fir region; thus, changes in the national economy are indicated by parentheses.
6. Wiseman and Sedjo reports the expected annual changes, with short run market limitations excluded. Source: Wiseman & Sedjo (Sedjo, 80); Sedjo & Wiseman (80).
7. Haynes' methodology for determing stumpage impacts was questioned (page 43); thus only the other authors were considered for consensus.
8. Changes in this column for Haynes were estimated using the data base included in his report. Source: Haynes (76).

situation would also tend to increase prices.)

The stumpage price also increases, even more so than the lumber price. As established in the model, this would be the expected result. Yet as discussed earlier, this is probably an inaccurate portrayal of the changes expected in stumpage price due to the halting of the log export trade.

The results of Wiseman and Sedjo's analysis indicates that the long run effects of a log export ban with 100% LER would result in log prices decreasing by 4 percent, with a 1 percent decrease in harvest, and a 16 percent increase in mill production, with a slight increase in lumber price. In discussing the efficiency and distribution impacts, the authors concluded that those directly concerned with log production, that is, landowners, loggers, and so forth, would lose about $66 million a year. The consumers would also spend an additional $11 million more due to the increase in prices. Some of these losses are transferred as gains to the processing sector; those directly concerned with lumber processing would gain about $76 million annually. The overall loss to the Pacific Coast region would be about $1 million annually.

Darr, Haynes, and Adams offer two possible situations which can be categorized in the 100% LER category, scenarios one and four.

Scenario one uses TAMM to estimate the impacts of Japanese purchasers replacing the entire lumber equivalent of the logs previously exported from American lumber producers. This situation favors American processors, with an increase of 4.42 billion board feet of lumber which is sold in the export market. Although timber owners would no longer receive premium prices for exported logs, this scenario also favors them more than the other scenarios, in that the increased demand for lumber (which includes that additional amount needed to compensate for the differences in mill overrun between the American and Japanese mills) offsets to a great degree the decrease in stumpage prices. It appears detrimental to United States consumers in that higher lumber prices may occur if significant volumes of lumber are diverted to the export market.

As expected, the net lumber production increases, drastically for the PNW Douglas-fir region which is the most affected by log exports,

and in the most advantageous position for lumber exports. Also as expected, the stumpage price drops; however, the production of logs also drops, which is not expected. Under this scenario, American, mostly PNW, lumber producers, would sell 4.42 billion board feet of lumber to Japanese buyers. In the early years, much of this would be diverted from domestic consumption (almost half in 1980), and compensated by increased lumber imports from Canada. But this is a long term analysis, and no restriction was made on the increase of production facilities. Thus, it could be expected that production expansion would occur, requiring more timber, eventually nearing a point where at least the same volume of logs are processed domestically. Further leading to this reservation of a declining harvest is the difference in efficiency between American and Japanese mills: one of the assumptions made is only 3.38 billion board feet of lumber could be recovered by United States mills using the same volume of logs previously exported, hence to turn out 4.42 billion board feet of lumber for export would require about 800 million board feet of logs more than previously cut.

Scenario four differs in that the full 100% lumber equivalent is purchased from the United States, but the lumber processing capacity in the PNW Douglas-fir region does not expand. This rather restrictive situation results in an overall decrease in consumption in the United States, with much of the 4.42 billion board feet of lumber exported compensated in the American market by Canadian imported lumber. As expected, prices for lumber in the United States would increase, and log production and prices would decrease with the loss of the log export market.

The distributional impacts for the 100% LER category for both groups of authors basically agree in the direction of change; that is, the 100% LER situation should result in gains to the lumber processors, a loss to log producers, and a negative change for the consumers. For the consumer sector, Wiseman and Sedjo infer that the consumers lose (spend more) by $10.9 million due to higher lumber prices. In the Darr, Haynes, and Adams analysis, this is reflected as a decrease in expenditures by the consumer sector from what sales would be if log exports continued (change from the base scenario). In scenario one, total United

States consumption decreases until about 1988, then increases slightly (+0.1 percent in 1990), along with a slight decrease in lumber price in 1990 (table 11). Yet it apparently was not enough to increase lumber sales to the same level as projected for the base scenario, thus a decrease in consumer sales was projected. Both sets of authors agree that the overall result would be an economic loss to the region.

50 Percent Lumber Equivalent Replacement: Haynes' 50% LER Category was also in the second extreme scenario, and as I believe it was depicted, inferred that the United States supply was decreased by only half the volume of the 1973 log export volume, by foreign buyers only purchasing 1.7 billion board feet of lumber from the United States to compensate for the loss of the logs. Once again, the lumber production change was zero, and prices would be expected to increase.

In Darr, Haynes, and Adams' scenario five, the Japanese obtain half the lumber replacement from Canada and half from the United States. The results indicated that American lumber (and plywood) production increases, first to meet the increased lumber export demand from Japan, then increasing each year to eventually provide an additional 1,389 million board feet of lumber over the base scenario projection for consumption in the United States in 1990. Imports from Canada increase the first year, 1980, by 1,333 million board feet, then decreases each year to 3,203 million board feet less than the base scenario in 1990. Combining the increased domestic consumption and decreased imoorts from Canada, United States total consumption decreased by 1,874 million board feet in 1990.

The response of the Canadian imports to this scenario does not seem logical. In a one year period, it would seem safe to assume the Canadian supply schedule would not shift, or shift very little, thus any increase to meet a new demand would infer a change along the schedule (also increasing price). The new demand would be met by a combination of the increased production inferred by the change along the curve, and by diverting portions of the Canadian domestic consumptions and exports to the United States. Therefore, one could expect a reduction in American imports of Canadian lumber, although not by the full 2,210 million board feet of lumber exports to Japan, rather than an increase.

Why this sudden increase of Canadian lumber imports depicted by TAMM? It appears to be a result of the complex interrelationships between several parameters of the model. Also, one must keep in mind that the results are presented as changes from the base scenario projection. The Canadian supply function is the most elastic component of the total American lumber supply, given a "full adjustment product price elasticity" of 7.34, over 3.8 times that of the closest United States supply region, the Rocky Mountains, and almost 17 times that of the PNW Douglas-fir region (Adams and Haynes, 80). With the increase in scenario 5 of the wholesale price index of softwood lumber of +9.2 over the baseline, this implies an increase of Canadian lumber sold in the United States. The extent of the responsiveness of the Canadian supply is further shown by examination of the function which estimates the supply available for the American market. This is an "excess supply" function, that is, the volume available for sale in the United States is determined by subtracting the Canadian domestic demands and sales to foreign countries (other than the United States) from the total Canadian supply. Therefore, the responsiveness of the Canadian supply to price allows not only an increase of 2,210 million board feet of lumber exports to Japan, but also an increase of 1,333 million board feet to the United States.

The gradual decrease of Canadian lumber imports is also apparently price driven. Scenario 5 depicts a gradual decrease in the wholesale price index from the +9.2 over the base scenario in 1980 to -2.5 in 1980 (absolute change, in 1967 dollars). This does not mean that the price index decreases; these changes from the base scenario equate to 164.5 in 1980 to 197.3 in 1990. This leads to a decrease in lumber imports from Canada from the base scenario projection, or from +1,333 million board feet in 1980 to -3,263 million board feet in 1990. The level of imports projected does not change much; the changes from the base scenario equate to 9,139 million board feet of Canadian lumber imports in 1980 to 9,477 million board feet in 1990.

Whether or not this is an accurate portrayal of the market situation between the United States and Canada is beyond the scope of this paper. This discussion does serve to illustrate the complex

interrelationships between the many sectors and markets involved in the log export trade, and how seemingly illogical and unexpected results may occur due to a change in one segment of the trade.

Zero Percent Lumber Equivalent Replacement: Haynes' 0% LER was the first extreme scenario described, where Pacific Coast producers could readily increase production using the logs formerly exported, and no additional lumber was purchased from this region by the foreign buyers. As dictated by the model, all prices drop, including stumpage. The objection to the method of determing the change in stumpage prices still applies, and the changes depicted are in question. This senario implies an increase in lumber production, and the percent change was determined using the data base reported by Haynes.

Wiseman and Sedjo's 0% LER category equates to no increase in foreign demand for American lumber after the ban. They estimated a decline in log prices of 12 percent, with a 4 percent decrease in harvest. The price of lumber was predicted to decline by 3.7 percent, with production expected to increase by 13 percent, leading to an increase in domestic consumption of 1.3 percent.

Darr, Haynes, and Adams' scenarios two and three fall in the 0% LER category. In scenario two, the Japanese buyers purchase no additional lumber from North America after the ban. This loss of the export market led to the expected decrease in stumpage prices and harvest, with the other segments of the economy reacting through the relationships with stumpage. With the decrease in stumpage, lumber prices drop and production increases, leading to an increase in domestic lumber and plywood consumption and a decrease of lumber imports from Canada.

For scenario three, the assumption was made that the Japanese purchasers obtain the full lumber equivalent of the previous American log exports from Canada. The same trend as in scenario two is evident, but in less magnitude of change from the base scenario. Although domestic consumption of United States lumber and plywood increase, due to the large decreases in Canadian imports, overall American consumption was less than the base scenario projection until 1990, which had a 50 million board foot increase over the base scenario.

The distributional impacts table (table 11) illustrates the major

difference between the two groups of authors for the consumer sector. Wiseman and Sedjo's analysis indicates a decrease in price and increase in production (table 12), hence the consumer is better off. The Darr, Haynes, and Adams analysis also indicates a decrease in price and increase in production, and the expected increase in consumption. Yet TAMM evidently indicates a decrease in expenditures from the base scenario, thus decreased sales and a negative impact on the economy. Once again, both groups agree that a log export ban would result in an overall economic loss to the region.

Other Authors:

Wiener: Wiener (73) provided a discussion of several possible trade impacts that may occur should the United States adopt a log export ban. For production impacts, he assumed there would be no increase in the wood supply, nor would there be a decrease in demand. He assumed the Japanese buyers would purchase their needs from Canada, thus restricting Canadian exports to the United States. Something had to give, and Wiener somewhat implies a change in the equilibrium ("...artificially tilted..."), but even so, not much different than at the time of the article. The United States would use more domestically produced wood in lieu of Canadian wood. Thus, there must be some change in American supply inherent in his analysis . His outlook is obviously of a short term nature, and actually provides little insight into the problem.

Clawson: Clawson (75) also refrains from stating an exact lumber equivalent replacement, but his statements tend to lean to more of a 100% LER category. This includes the indirectly induced demand generated by less Canadian imports due to purchasing of lumber by the Japanese from Canada. He also implies that mill production would increase to supply this lumber equivalent, in that the American domestic supply (or consumption) would still remain about the same. He acknowledges that perhaps the log export trade may tend to increase lumber prices in the United States, but this disadvantage seems to be outweighed by the benefits of log exports. He even suggested increasing log exports, perhaps as a means of converting old growth stands.

Summary of Predicted Effects of a Log Export Ban:

The exact magnitude of the effects of further restrictions on log

exports is extremely difficult, probably impossible, to predict. The studies discussed in this section provide a general trend of these impacts, and the distributional impacts table (table 11) provides a rough summary of the possible gainers and losers that would be directly affected by a total prohibition on log exports.

Much depends on the response of the major purchaser of exported logs, the Japanese. Should they purchase 100 percent of the lumber equivalent of previously exported logs, more lumber may be produced in PNW mills, but less will be used in domestic consumption. The price of lumber may increase, although the change may be small. The log producers, that is, the landowners, loggers, and so forth, stand to lose considerably, although not as much as if less than the full lumber equivalent were to be purchased by the Japanese. The overall impact to the PNW appears to be an economic loss.

Should the Japanese turn elsewhere to obtain replacement wood for American log exports, the PNW mills may increase production, although less than if they were able to sell more lumber for export. Some of the increased production could be used to offset losses of imported Canadian lumber which may be diverted to the Japanese trade, or perhaps even replace Canadian imported lumber in the domestic American market. This last possibility is inferred by the decrease in lumber prices generally predicted by the authors. Although everyone else in the PNW would seem to gain by this situation, the log producers lose significantly. Lumber producers may gain in this situation, but not as much as if they could sell more lumber in export, and this, with the great loss to log producers, leads to this situation providing the greatest loss to the PNW region.

Should the Japanese purchase half the lumber equivalent from the PNW, lumber production may increase, and prices may remain little changed, even though domestic consumption could be expected to increase. Once again, log producers lose, and so does the overall economy. As a personal observation, I tend to believe the 50% LER situation would be the more likely response from the Japanese (perhaps more than 50 percent, but not too much more), based on their preference for North American wood as discussed in the Appendix. Much of the lumber replacement may

be purchased from Canada, in part due to the already established lumber market with Japan.

The Possibility of a Total Log Export Ban:

Gruenfeld (81) citing the current conservative administration and the probable stablization of the market, stated that there would probably be no further restrictions on the export of logs. I agree with this statement, yet there are other forces which may keep this controversy alive.

One is the entry of Communist China into the log export market. The other is the prediction made by Stevens (78) of an overall decline in the wood products labor force due to the substitution of capital for labor in new processing facilities, and a decrease in timber supply. As discussed in the "Employment" subsection, a decrease in employment generally leads to an increase in demands for a log export ban. Therefore, the argument may continue for many years.

CONCLUDING STATEMENTS

The sale of logs for export have increased from a relatively small part of the PNW forest products industry to a major sector, with 19.9 percent of the harvest in 1979 sold for export. At the same time, it has changed from a desirable market where unwanted logs could be sold, to a highly contested issue within the forest products industry and the public in the PNW. The demands for protection from the foreign log buyers have resulted in virtually complete restrictions against the exporting of logs cut from public lands in the western states, with the lone exception of the Washington Department of Natural Resources lands. Yet many believe that this is not enough, and the banning of log exports is still an issue in the PNW.

Much of the controversy concerned the employment issue. There appears to be little hard data to substantiate any conclusion that the log export trade has directly reduced the employment level in the PNW. Most statements concerning the impact on employment were made on the basis of assumptions of what would or would not have been if there were no export of logs.

Another controversial issue was the price of stumpage. There does appear to be a trend for prices in the PNW to increase at a greater rate than other regions in the United States. Although other factors may enter into this increase, log exports probably contributed a significant amount. This leads to another contested issue: are the higher stumpage prices forcing PNW mills out of the market, or do they allow landowners the proper incentive to practice intensive forestry on their lands, thus increasing the yield in the future? Answers to this question may well depend on whether the respondent has an interest in mills or forest land.

In attempting to answer some of the questions concerning the effects of a complete prohibition of log exports, several papers were examined to determine a general trend in predictions. Much depended upon the response of the foreign buyers, whether they would switch from buying logs to lumber, or turn to other sources for their wood supply. The projections studied tend to agree that a complete ban of log exports would result in an increase of lumber production, and a decrease in

stumpage price and production. The effect of the foreign response would be in the magnitude of the change. American consumption and price of lumber does vary, and if the foreign buyers increase their purchases of PNW lumber, prices may rise and consumption drop.

In analyzing the distributional impacts of a log export ban, it appears the lumber (and plywood) processors stand to gain from a log export ban, but the log producers stand to lose even more. The consumers are split. If the foreign buyers purchase increased volumes of finished products, consumers may expect to pay more for their lumber and plywood. If the foreign buyers do not increase purchases of PNW lumber, the consumers may stand to gain by having lower prices on domestic wood products. In either case, distribution analysis tends to point out that the region would show an overall loss should a total ban on log exports be enacted.

If the region is expected to lose by restricting the sale of logs overseas, why is there such a demand for an end to these exports? Hamilton (71) provides some insight with this statement:

> "...because free trade helps everyone - but just a little - and protection from trade helps just a few people - but helps them a great deal."

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APPENDIX

APPENDIX

THE FOREIGN BUYERS

Table A1 lists the major foreign purchasers of PNW logs and their respective proportions of the trade for the past 20 years. The greatest proportion of logs sold for export have been bought by the Japanese.

Japan:

The logs purchased by Japan from North America constitute a significant portion of the raw material for Japanese mills (figure A1). The two sources reported in this chart differ, the Japanese trade journal reporting about 20 percent of the logs milled as originating in North America, and the importer's association reporting about 30 percent. Either source illustrates the major effect North American logs have on Japanese lumber production. Because of the Canadian log export restrictions most of these North American logs come from the United States, and the greatest part of these are cut in PNW forests.

There are several reasons why the Japanese lumber processing sector is so heavily dependent on PNW logs. The major reasons appear to be: the increase in housing demand in Japan and the inability to meet this demand from Japanese forests; differences in Japanese and American lumber standards, especially dimensional differences; and the characteristics of the wood itself.

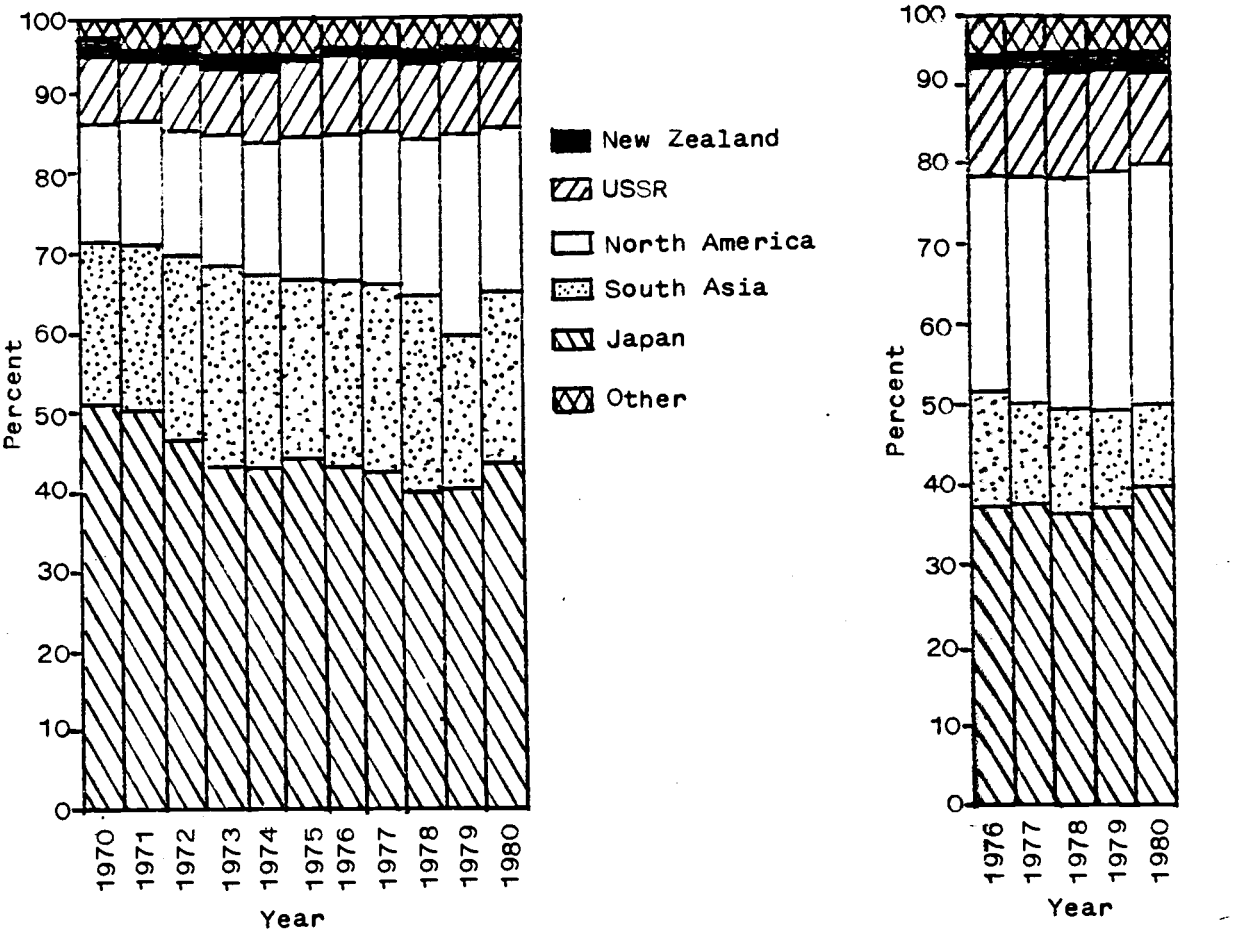
Housing: The Japanese economy has been enjoying a great increase in prosperity since the early 1950's, creating not only new industrial demands, but also raising the standard of living of the Japanese. This leads to an increased demand for housing apart from any increase due to population growth. As evidence of this, Darr and Ueda (80) reported that the proportion of households with multiple family groups (usually of different generations within the same family) is decreasing. With the increasing prosperity, some individuals can afford two lodgings, such as a vacation home in the country for a city dweller.

To add to the increased demand for housing, much of the housing built after World War II was of quick, short-lived construction, and are being replaced. This rapid increase in housing demand obviously leads to a rapid increase in lumber demand, although the increase in lumber demand was somewhat lessened by a decrease in the proportion of

Table A1. Foreign purchasers of PNW logs, proportioned by volume. Source: Ruderman.

Year	Japan	South Korea	Canada	Other
1961	97.8	>.1	2.0	.1
1962	98.1	.1	7.5	.3
1963	98.1	2.5	7.2	.2
1964	88.6	3.0	8.0	.4
1965	86.0	.1	13.5	.4
1966	92.3	2.3	5.3	.1
1967	95.1	1.9	2.9	.1
1968	94.6	3.1	2.4	.3
1969	96.6	1.4	2.4	.6
1970	96.8	1.5	1.3	.4
1971	93.1	3.5	3.0	.4
1972	90.6	1.8	6.5	1.1
1973	93.0	3.9	2.7	.4
1974	90.2	6.3	3.4	.1
1975	90.5	3.6	2.6	3.3
1976	93.1	4.8	1.8	.3
1977	91.9	7.4	.6	.1
1978	88.6	10.8	.4	.2
1979	91.5	7.6	.8	.1
1980	89.1	7.3	>.1	3.6[1]

Note 1: "Other" for 1980 includes 3.3% of the exported logs purchased by Communist China.



Source: "Japan Lumber Journal", August 31, 1981

Source: Japan Lumber Importer's Association (Anon, 81).

Figure A1. Source of logs for processing in mills in Japan.

wood used in the construction of more recent Japanese houses (Darr & Ueda, 80).

Japanese Forests: The Japanese timberlands have not been able to supply much of the increased demand for wood, even though about 67 percent of the country is forested (Matsui, 80). About 49 percent of this is in plantation management, much of which are lands replanted after World War II (Anon, 80a). The massive harvesting of Japanese forests in World War II may have lead to the decrease in harvests reported by Matsui (30) after 1967. From 1953 to 1967, roughly 70 to 75 million cubic meters were harvested from Japanese forests, dropping after 1967 to a low of 45 million cubic meters in 1975.

Other sources vary in magnitude, but still reflect this downward trend in domestic Japanese timber production. However, the plantations established after World War II are beginning to achieve maturity, and domestic supply is now increasing. The Japanese Ministry of Agriculture, Forests and Fisheries (Anon, 80a) expects domestic supply to increase to 46.2 million cubic meters in 1986, 57.7 million cubic meters in 1996, with a goal of 87.9 million cubic meters by 2026. Even then, it is not expected to meet the demand for wood products, and imported wood is expected to supply 56.7 percent of the consumption in 1996, although the importing of logs from the United States is expected to decline by this time because of the increased domestic harvest in Japan.

Difference in American and Japanese Lumber Standards: The lumber produced by American mills for home construction is based on the 2-by-4 platform frame construction method used in the United States, and is not compatible with the traditional post and beam construction of Japanese homes. Some of the differences in grading have been reduced to allow more lumber imports by the Japanese (White, 78), but dimensional differences still exist. Attempts to introduce the platform frame construction technique to Japan has met with little success (Darr, Haynes, & Adams, 80). To solve the problems of increased lumber demand and differences in standards between the United States and Japan, the Japanese took the logical steps of importing the raw material and milling it to fit their needs.

Preference for North American Wood: The Japanese obtain logs from

several sources, as shown in figure A1, but the wood from North America seems to be preferred for home construction. Japanese homes are seldom painted, including the interior, and homeowner's express a preference for light colored, straight grained, relatively knot-free wood. Apparently the best source for this wood is North America.

Alternate Sources of Wood Following a Log Export Ban:

One of the unknowns concerning a ban on log exports is where the Japanese purchasers will turn to replace this wood. This question is at the heart of much of the debate over the subject. The international market is quite complex, with many interactive forces, not all dictated by pure economics. Thus, any forecast can at best be only an educated guess.

A common contention among United States lumber producers is that the Japanese consumer will not accept substitutes for North American wood (White, in USGPO, 73). This is further echoed by Darr, Haynes, and Adams (80). They state that if American logs were not available, the substitution of wood from other sources, such as the USSR, would meet with consumer resistance. This infers that the Japanese builders would purchase lumber from North America to overcome this consumer resistance. Unfortunately for PNW lumber producers, the Japanese builders may purchase their lumber from Canada.

The Canadian source is quite probable. Japan already purchases a major portion of its lumber from British Columbia, 41 percent of its lumber imports in 1975 (Lindell, 79), or 65 percent of the lumber imported from North America in 1980 (Anon, 81). Thus the market is already established, both for lumber and cants, and an increased supply could be provided (Darr, Haynes, & Adams, 80).

The next largest source of imported logs for Japan is South Asia (variously called Asia, Southeast Asia, or more broadly, the South Pacific). Most of the logs imported from this region are lauan, most of which is used for plywood and cannot be expected to provide a direct substitute for softwood logs from North America, although Darr, Haynes, and Adams implied some substitution in that it was listed as a source of competition for American lumber producers. Other markets in this broad area may become developed; for example, Gruenfeld (81) reported a first

shipment of plantation grown Caribbean pine logs shipped from Fiji to Japan.

Next in importance is the Union of Soviet Socialist Republics. The Russian supply is generally expected to remain constant, although there is some controversy concerning their forest products policies. Darr, Haynes, and Adams (80) suggest that the completion of the trans-Siberian BAM railroad may increase the potential for more log and lumber exports to Japan, but other authors state that internal demands may prevent any increase in exports, and may even lead to a decrease (Lindell, 79). As a personal observation, the Soviets are not above using market structures for political gains, even if it may decrease internal well-being, and may well increase exports to Japan to help build closer political ties.

Another source of logs for the Japanese is New Zealand. Lindell (79) noted that Japanese imports of logs from New Zealand are increasing slightly; however, this source may not increase much (Kaiser & Mills, 73).

A possible source mentioned briefly in the 1973 log export hearings in Portland, Oregon was South America (McCracken, in USGPO, 73). This was then considered as an undeveloped source, but Gruenfeld (81) reports that Chile is exporting some Monterey pine logs to Japan.

Canada:

Some of the Canadian purchases of PNW logs in the early 1970's may be attributed to labor problems in the woods. Logs were exported from the United States to process in Canadian mills that otherwise may have been idle. Currently, they have sufficient logs to provide the raw material, especially in the depressed lumber market being experienced in 1981 - 1982. This resulted in a gradual change in relative standings of the Canadian and South Korean purchasers in the PNW log export market.

South Korea:

As indicated in table A1, Canada has gradually decreased purchases of PNW logs, and South Korea has gradually increased purchases, becoming the second largest purchaser of PNW logs in the mid 1970's. The South Korean participation in the PNW log trade received some impetus in 1963, when the Agency for International Development provided South Korea with

six million dollars for purchasing logs from the United States (Ruderman, second quarter, 1963).

Communist China:

A new entry in the PNW log export market is Communist China. With the recently relaxed trade policies with Red China, they have begun importing logs from the PNW, accounting for 3.3 percent of the trade in 1980, or 87.8 million board feet. This may or may not increase: for the first half of 1981, a total of 43.5 million board feet was exported to Communist China