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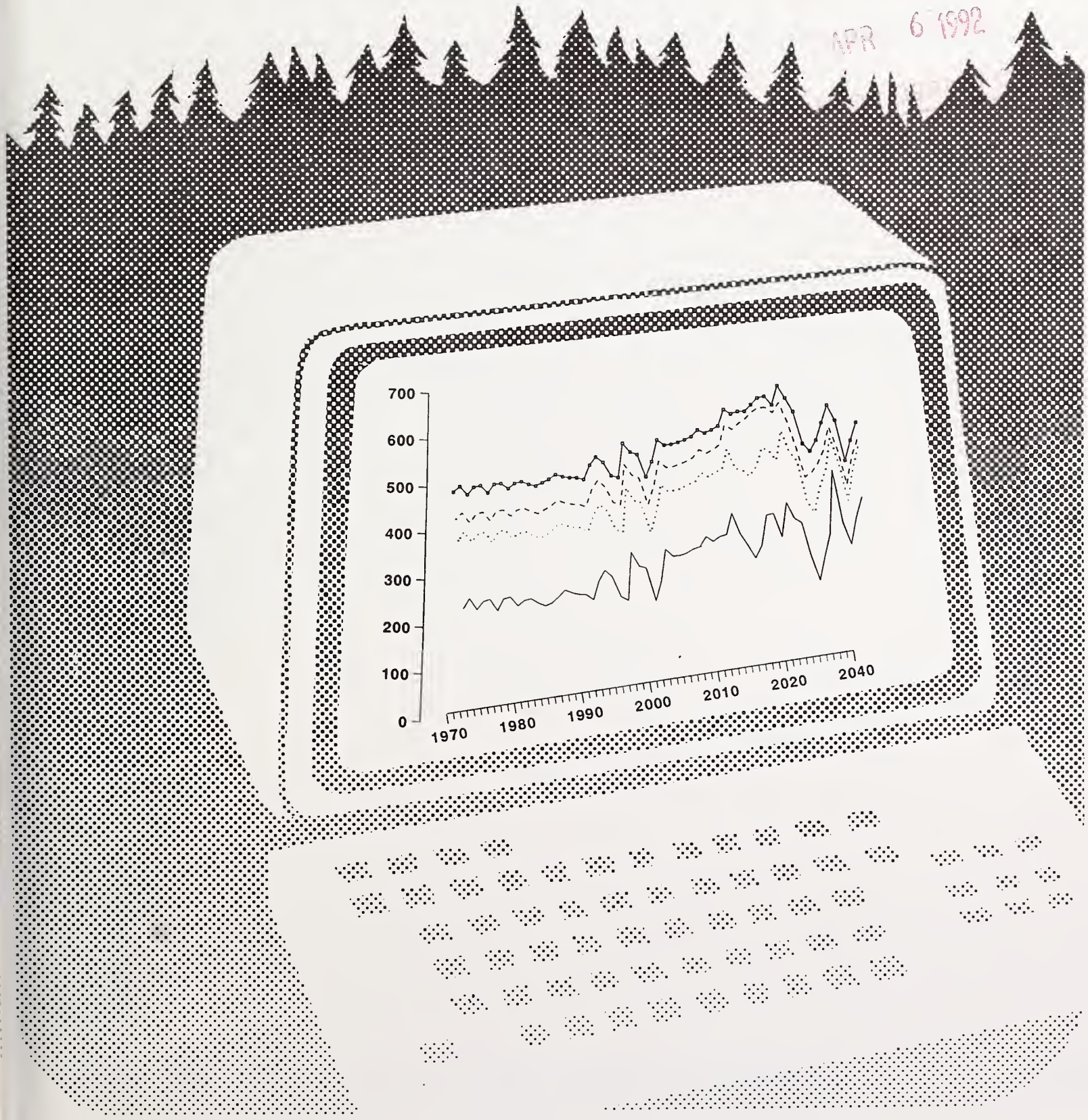
Price Projections for Selected Grades of Douglas-Fir, Coast Hem-Fir, Inland Hem-Fir, and Ponderosa Pine Lumber

Richard W. Haynes and Roger D. Fight



Authors

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Abstract

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Grade-specific price projections were developed for Douglas-fir, coast hem-fir, inland hem-fir, and ponderosa pine lumber. These grade-specific price projections can be used in evaluating management practices that will affect the quality of saw logs produced under various management regimes.

Keywords: Lumber prices, Douglas-fir, coast hem-fir, inland hem-fir, ponderosa pine.

Summary

The prevailing perception among forest managers seems to be that premiums for quality and costs of managing for quality are such that volume production is the overriding consideration. Projections of prices of lumber by grade were developed to help the forestry community determine if it is time to reassess this situation. The results support the thought that increasing scarcity of high-quality material will result in higher prices. Higher prices for what is perceived as higher quality products derived from higher quality logs provide an incentive for stumpage owners and agency land managers to modify management regimes. The extent to which regimes are modified depends on individual assessments of the relative costs and expected returns. The price projections in this paper provide a basis on which to value changes in wood quality when estimating expected returns.

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Silviculturists have long been concerned about the quality and value of timber produced in managed stands. The prevailing perception among most forest management policy makers, however, seems to be that premiums for quality and costs of managing for quality are such that volume production is the overriding consideration. This, in combination with cash flow problems in the solid wood products industry in the Pacific Northwest during the 1980s, has resulted in many stands being managed on relatively short rotations (50 to 70 years) with relatively wide initial spacing (less than 300 trees per acre) to achieve rapid volume production and reduce management costs.

Over the past 20 years, the quantity of high-quality lumber has declined dramatically and the real price of high-quality lumber has increased dramatically. This has occurred in spite of a sharp decline in real prices for wood products since the late 1970s. Real prices for lumber are expected to return to their long-term upward trend. These long-term price increases may increase the difference, or premium, between grades. Because it is the difference in value between high-quality and low-quality logs that determines how much can be spent to improve quality, this effect alone tends to increase the amount spent to produce high-quality wood. These projections indeed show that the prices of higher grades will tend to increase more than the prices of lower grades. Even current price premiums seem sufficient to justify consideration of wood quality in the selection of management regimes, with high-quality lumber currently priced at three to five times the price for average quality construction lumber.

These projections of lumber prices by grade were developed to help the forestry community determine if it is time to reassess conclusions about management regimes that will produce timber best meeting future needs for lumber and other wood products. This paper presents both historical data and projections for prices (and production) by grade categories for major Pacific Northwest species or groups of species: Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco), coast hem-fir (western hemlock and true firs [*Tsuga hetrophylla* (Raf.) Sarg. and *Abies*]), inland hem-fir, and ponderosa pine (*Pinus ponderosa* Dougl. ex Laws). The various grade categories are the same as those for which prices are published in Warren (1990). The specific assignments of grades to categories are shown in appendix 1. Appendix 2 contains all original price and volume data.

This paper updates and expands material available for Douglas-fir lumber (Haynes and others 1988). The methods, data sources, and overall approach are similar to the earlier study but have been expanded to consider the four major species groups for lumber and interactions among these groups.

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Douglas-fir lumber is grouped into seven categories with two perceived as high-quality: C selects, and D selects and shop (table 1). Two other categories (structural and heavy framing) also command premium prices. The proportion of volume in selects and utility has declined, and the proportion of volume in structural items, heavy framing, and light framing has increased (fig. 1)—likely the result of several factors. Because there is a large price incentive to produce selects, the decline in selects reflects a decline in the quality of logs being sawn. Although this may in part reflect export of logs of higher than average quality, it is clear that the quality of timber being harvested has declined. The decline in the utility grade reflects a declining proportion of lumber being sawn from highly defective material included in the harvest of older stands (Howard and Ward 1988, Larsen 1990). The increase in the proportion of volume in structural items and heavy framing is most likely a market-driven phenomenon. The real price of light framing lumber has experienced wide swings and, throughout the 1980s, has been substantially below the prices in the 1970s. This has provided an incentive for producers to change

Summary

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Over the past 20 years, the quantity of high-quality lumber has declined dramatically and the real price of high-quality lumber has increased dramatically. This has occurred in spite of a sharp decline in real prices for wood products since the late 1970s. Real prices for lumber are expected to return to their long-term upward trend. These long-term price increases may increase the difference, or premium, between grades. Because it is the difference in value between high-quality and low-quality logs that determines how much can be spent to improve quality, this effect alone tends to increase the amount spent to produce high-quality wood. These projections indeed show that the prices of higher grades will tend to increase more than the prices of lower grades. Even current price premiums seem sufficient to justify consideration of wood quality in the selection of management regimes, with high-quality lumber currently priced at three to five times the price for average quality construction lumber.

These projections of lumber prices by grade were developed to help the forestry community determine if it is time to reassess conclusions about management regimes that will produce timber best meeting future needs for lumber and other wood products. This paper presents both historical data and projections for prices (and production) by grade categories for major Pacific Northwest species or groups of species: Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco), coast hem-fir (western hemlock and true firs [*Tsuga hetrophylla* (Raf.) Sarg. and *Abies*]), inland hem-fir, and ponderosa pine (*Pinus ponderosa* Dougl. ex Laws). The various grade categories are the same as those for which prices are published in Warren (1990). The specific assignments of grades to categories are shown in appendix 1. Appendix 2 contains all original price and volume data.

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Recent Trends

Douglas-Fir

Douglas-fir lumber is grouped into seven categories with two perceived as high-quality: C selects, and D selects and shop (table 1). Two other categories (structural and heavy framing) also command premium prices. The proportion of volume in selects and utility has declined, and the proportion of volume in structural items, heavy framing, and light framing has increased (fig. 1)—likely the result of several factors. Because there is a large price incentive to produce selects, the decline in selects reflects a decline in the quality of logs being sawn. Although this may in part reflect export of logs of higher than average quality, it is clear that the quality of timber being harvested has declined. The decline in the utility grade reflects a declining proportion of lumber being sawn from highly defective material included in the harvest of older stands (Howard and Ward 1988, Larsen 1990). The increase in the proportion of volume in structural items and heavy framing is most likely a market-driven phenomenon. The real price of light framing lumber has experienced wide swings and, throughout the 1980s, has been substantially below the prices in the 1970s. This has provided an incentive for producers to change

Table 1—Real Prices for Douglas-fir lumber, coast mills, 1971-90[a]

(In 1989 dollars per thousand board feet)[b]

Yeer	C selects	D selects end shop	Structurel items	Heevy freming	Light freming	Utility	Economy
1971	668	428	369	357	308	217	97
1972	785	460	401	395	353	261	115
1973	1,168	536	521	491	399	290	166
1974	989	496	496	383	294	171	98
1975	776	430	354	315	266	161	86
1976	888	504	418	396	318	201	89
1977	867	588	497	370	370	254	105
1978	947	648	519	630	375	271	137
1979	1,263	681	581	474	349	254	122
1980	1,154	629	454	337	257	186	106
1981	851	485	375	299	220	156	95
1982	723	418	316	221	177	141	87
1983	755	469	289	245	221	178	96
1984	740	438	268	240	203	147	77
1985	726	443	269	244	205	142	74
1986	809	451	267	255	213	147	75
1987	909	446	279	280	224	150	72
1988	973	498	312	299	230	145	89
1989	1,078	503	325	330	246	168	110
1990	1,186	500	293	297	223	150	98

[a] Figures are FOB prices computed as a volume-weighted average of green and dry surfaced and rough grades.
[b] The Producer Price Index for 1989 is 111.6.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

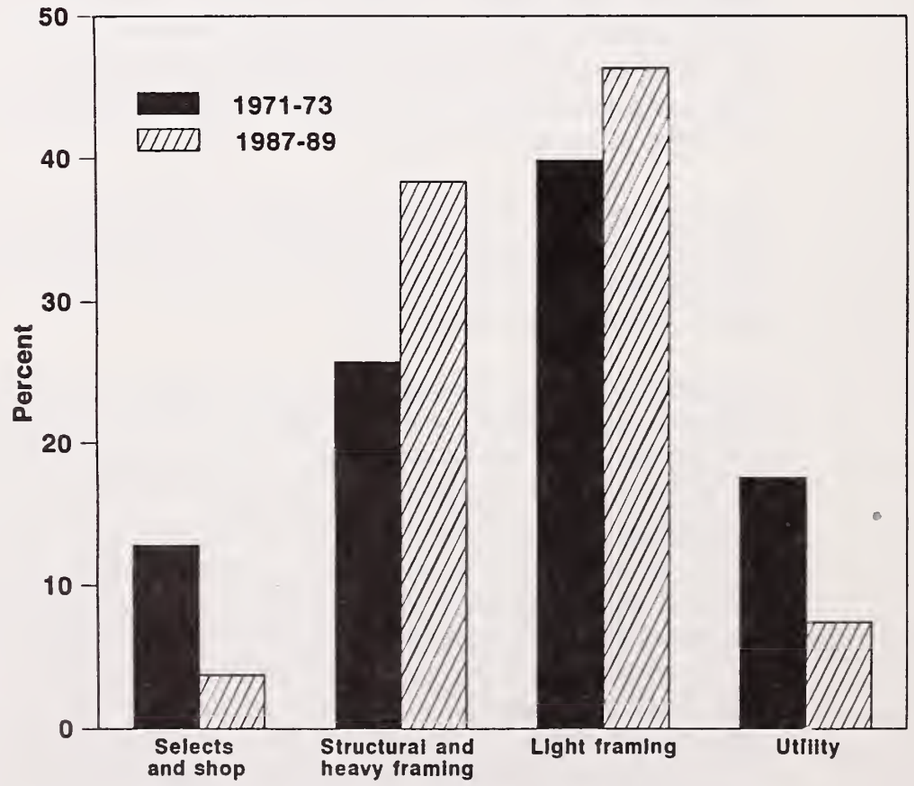

Figure 1—Douglas-fir volume.

sawing patterns to more production in heavy framing. This trend can probably continue for some time even in the face of declining quality of timber harvested.

Coast Hem-Fir

The grade distribution of coast hem-fir lumber has been shifting from higher grades and the utility grades to light and heavy framing grades, just as Douglas-fir lumber has (table 2, fig. 2). Although the select grades were never a large part of the market, C select has disappeared almost completely. Price trends are similar to those for Douglas-fir for the various grades and probably for the same reasons. Prices for some grades, such as light framing and economy, probably reflect price arbitrage across species. The shift of production to structural items and heavy framing is much less pronounced in coast hem-fir than in Douglas-fir, probably owing to a market preference for Douglas-fir because of its greater strength.

Inland Hem-Fir

Inland hem-fir prices move in close proximity to those for coast hem-fir (table 3). This is particularly true since 1977 when heavy framing was separated from light framing lumber in inland hem-fir grades. Note that the clear inland hem-fir goes into moulding and the clear coast hem-fir goes into selects. Changes in production proportions are similar to those for both Douglas-fir and coast hem-fir and for similar reasons (fig. 3). Inland hem-fir is not a significant player in the market for structural items, but it is a major player in the market for heavy framing. The production proportion for heavy framing has increased rapidly during the last 6 years.

Ponderosa Pine

We divided ponderosa pine into 16 groups (table 4) representing several broad categories: 4/4 selects and 1 shop, 5/4 and thicker moulding and shops, 4/4 commons and 8/4 standard and better, and low value. Like Douglas-fir, the highest ponderosa pine prices are for grades in which production shares have been dropping. During the past two decades, a shift in production has occurred from the selects, moulding, and one shop to two and three shop (fig. 4). Prices for two and three shop have increased, but not as much as those for the higher grades. Because of the large price incentive to produce the higher grades, this trend is clearly a result of a long-term decline in the quality of ponderosa pine being harvested. This trend likely will continue and will greatly accelerate as the harvest of ponderosa pine shifts more to thinnings and mature young-growth stands. These changes will require major changes in the moulding and millwork industry using these higher grades of ponderosa pine.

Useful Price Analysis Techniques

Role of Price Arbitrage

Underlying much of this work is the premise of price arbitrage; that is, lumber prices of different species and grades differ with each other in some fixed proportion. Prices of one species and grade will not exceed prices for other species of a similar grade because of the possibilities of substitution. If the price of one species and grade rises (or falls) out of proportion to another species of similar grade, then consumers will substitute one species for another as long as possible. Another form of this arbitrage is between similar grades. In ponderosa pine, for example, the prices for various grades of commons or shop differ in proportion to each other.

Price Markup Rules

In various types of price analysis, some of these forms of arbitrage are institutionalized through what have been called price markup rules (George and King 1971). Classic examples might include the relations among prices for various grades of shop lumber. These rules have been used in past forestry studies (Haynes 1977) on the relation between lumber prices and stumpage prices and implications for the derived demand for stumpage.[1]

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[1] In this case, price markup rules are called marketing margins and are an accepted descriptive model of the relation between factor and product markets.

Table 2—Real prices for hem-fir lumber, coast mills, 1971-90[a]

(In 1989 dollars per thousand board feet)[b]

Year	C selects	D selects and shop	Structural items	Heavy framing	Light framing	Utility	Economy
1971	606	404	369	337	296	208	100
1972	676	423	415	387	342	252	115
1973	853	518	479	449	389	280	154
1974	918	486	373	373	292	169	92
1975	671	397	313	308	254	151	80
1976	780	471	367	376	300	194	88
1977	779	494	394	406	330	232	100
1978	937	551	413	409	355	261	136
1979	959	568	411	429	332	226	110
1980	893	503	320	304	242	164	96
1981	753	412	261	278	209	149	90
1982	795	356	225	233	176	137	78
1983	812	425	269	265	226	172	107
1984	735	375	244	246	201	138	85
1985	690	364	245	251	205	133	85
1986	674	382	269	276	220	143	84
1987	653	449	296	310	233	142	82
1988	662	481	286	302	230	144	93
1989	718	466	274	298	234	155	105
1990	787	480	259	272	215	144	93

[a] Figures are FOB prices computed as a volume-weighted average of green and dry surfaced and rough grades.
[b] The Producer Price Index for 1989 is 111.6.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

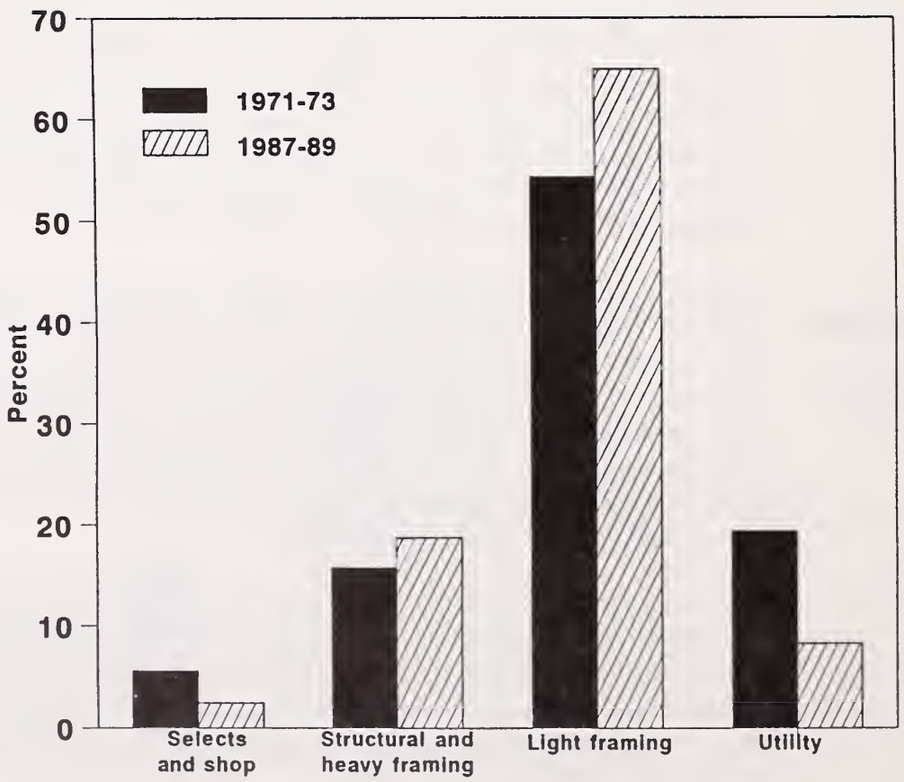

Figure 2—Coast hem-fir volume.

Table 3—Real prices for hem-fir lumber, inland mills, 1971-90[a]

(In 1989 dollars per thousand board feet)[b]

Year	Moulding	Shop	Structural items	Heavy framing	Light framing	Utility	Economy
1971	612	431	364	0	299	209	105
1972	648	451	427	0	360	256	132
1973	758	557	455	0	410	299	178
1974	644	398	353	0	308	175	100
1975	520	287	300	0	264	156	89
1976	678	443	376	0	318	200	95
1977	709	458	421	388	328	227	103
1978	889	494	419	401	352	252	136
1979	927	484	398	419	338	221	121
1980	738	364	282	275	244	163	102
1981	686	363	247	265	211	146	101
1982	652	273	207	211	182	129	86
1983	721	381	271	251	224	171	99
1984	598	290	242	226	199	138	82
1985	552	349	243	239	204	138	82
1986	674	343	267	270	221	147	80
1987	766	385	283	304	232	143	81
1988	748	367	283	287	225	140	89
1989	743	393	277	279	230	154	102
1990	873	383	272	212	249	137	89

[a] Figures are FOB prices computed as a volume-weighted average of green and dry surfaced and rough grades.
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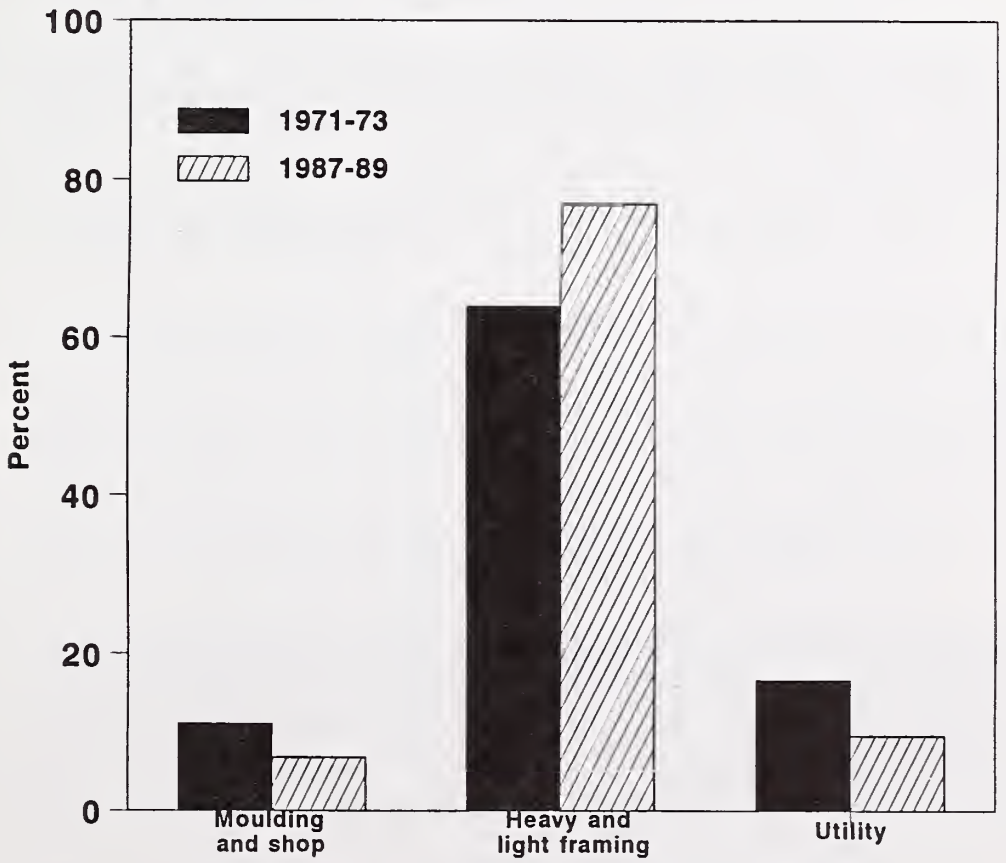

Figure 3—Inland hem-fir volume.

Table 4—Real prices for ponderosa pine lumber, inland mills, 1971-90[a]

(In 1989 dollars per thousand board feet)[b]

	4/4 selects and 1 shop					5/4 and thicker moulding and shops					4/4 commons and 8/4 std. and btr.				Low value	
Year	C and better 6-12 in	D 12 in	C and btr. 4 in D 6-10 in	D 4 in	1 shop	Mldg. and btr.	1 shop	2 shop	3 shop	Shopout	2 com. 12 in	2 com. 4-10 in	3 com. 6-12 in 8/4 dimen.	3 com. 4 in 4 com. 4-12 in	No. 3 and util.	5 com. and econ.
1971	1,126	899	767	577	398	882	645	464	390	249	392	332	273	220	214	110
1972	1,127	937	796	590	442	882	692	519	439	300	462	388	338	283	252	140
1973	1,188	1,017	915	707	514	972	729	575	483	394	601	513	406	356	288	195
1974	1,277	1,147	1,041	636	437	895	655	525	434	277	564	441	295	223	153	119
1975	1,234	1,043	868	490	332	912	531	393	292	185	470	359	238	169	140	90
1976	1,294	1,123	811	610	426	970	727	595	453	261	496	401	304	235	179	105
1977	1,403	1,246	884	618	481	944	781	659	491	297	570	467	337	251	212	123
1978	1,597	1,446	1,071	781	557	1,490	840	738	528	329	596	525	371	293	230	156
1979	1,982	1,779	1,424	754	472	1,355	785	683	431	297	625	509	373	261	206	135
1980	1,475	1,076	758	499	410	1,010	682	588	382	252	559	359	294	206	151	109
1981	1,264	1,099	693	531	379	930	671	579	405	248	438	317	278	187	144	102
1982	1,324	966	681	448	368	907	613	528	343	227	502	323	264	185	136	98
1983	1,337	1,547	726	565	400	1,163	729	628	442	248	428	336	245	176	171	99
1984	1,467	1,251	779	537	396	1,021	669	545	375	218	465	343	253	160	133	90
1985	1,582	933	843	547	370	1,175	665	538	396	221	493	338	225	155	137	81
1986	1,681	1,302	1,137	728	427	1,217	767	641	450	231	479	363	253	182	144	88
1987	1,697	1,451	1,182	764	480	1,418	827	700	449	243	485	398	268	190	143	86
1988	1,977	1,578	1,124	720	473	1,340	780	654	429	240	528	380	257	182	143	91
1989	1,805	1,523	1,016	740	438	1,265	730	589	434	258	532	331	261	189	155	105
1990	1,418	1,394	956	655	417	1,009	650	520	397	237	512	342	238	179	139	95

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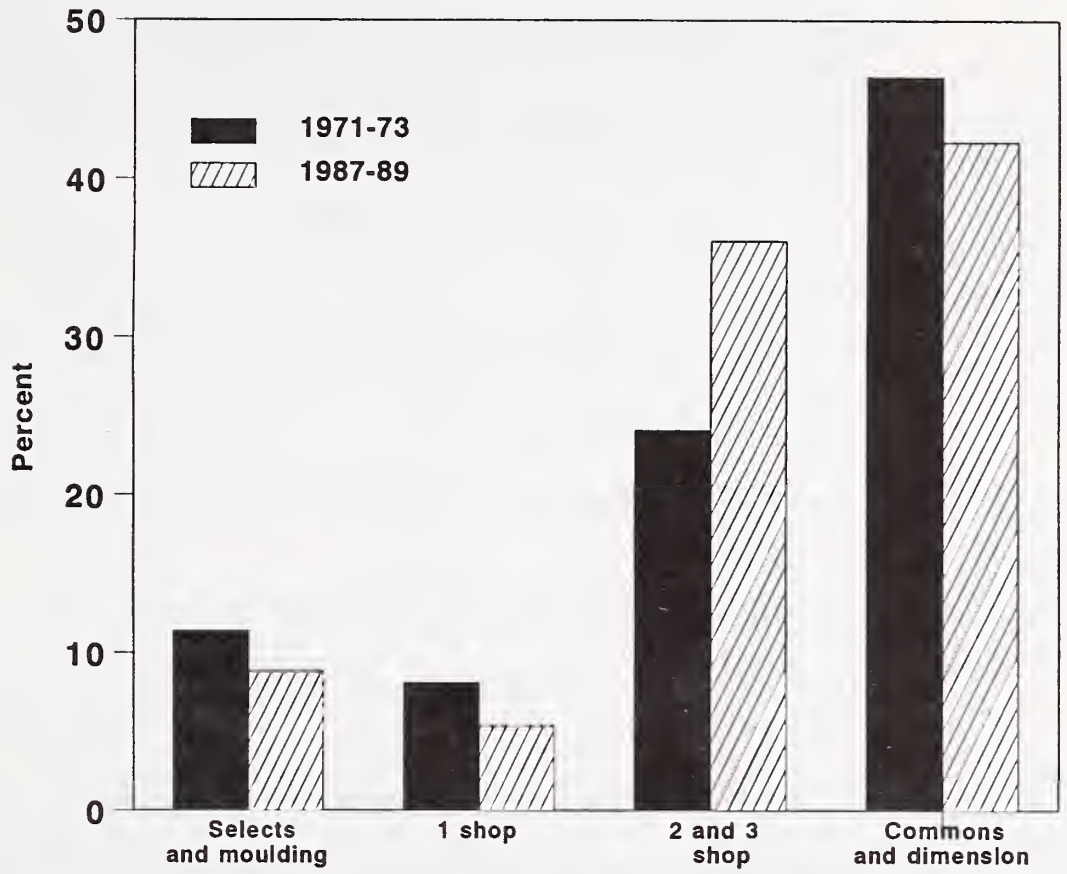

Figure 4—Ponderosa pine volume.

These price markup rules are of the general form,

$$p_i = b_1 + b_2 p_j , \quad (1)$$

where p_i and p_j are prices of related lumber grades and b_1 and b_2 are estimated coefficients. The significance of the estimated coefficients b_1 and b_2 makes a statement about the form of the relation between the two price series. It would be a fixed amount if b_2 was zero,[2] a constant proportion if b_1 was zero, or some combination if both b_1 and b_2 were nonzero coefficients.

Data and Methods

All historical data on the various species and grades were obtained from Western Wood Products Association (1989) reports. Projections of all-species, all-grade lumber prices were obtained from the 1989 Resources Planning Act timber assessment (Haynes 1990). The basic methods for developing grade-specific prices is similar to the method used for projecting the prices of stumpage for individual species in the National Forests (Haynes and others 1980). The methodology was the same as that used for selected grades of Douglas-fir lumber (Haynes and others 1988).

The general method is based on the assumption that projected lumber prices represent the market equilibrium prices of the average of all lumber (all grades and species) produced within a region. This price is the volume-weighted average of species and grades produced, and the method used in this study assumes that it can be decomposed into its individual component parts (prices for each grade and species).

[2] In economic studies, the actual value of the b_2 coefficient may be different than zero but not statistically significant; therefore, it is interpreted as being zero.

The process starts by first estimating the relation between the all-grade average and the price of the species under consideration. The next step is to estimate the relations between the prices of the selected lumber grades and the price of the dominant lumber grade for each species in the general form,

$$s_{jt} = b_{1j} + b_{2j} \ (s_{dt}) \ + \ b_{3j} \ w_{jt} \ , \qquad (2)$$

where

s_{jt} = regional lumber price for the j^{th} species and grade in year t,

s_{dt} = price of the dominant species and grade in year t,

w_{jt} = the proportion of total lumber production in year t that comes from j^{th} species and grade,

b_{1j} = estimated intercept value of the price relation,

b_{2j} = estimated coefficient representing the change in s_{jt} resulting from a change in s_{dt}, and

b_{3j} = estimated coefficient representing the change in s_{jt} resulting in a change in w_{jt}.

The proportion (w_{jt}) of total lumber production that comes from the nondominant grade was used as an independent variable to represent the relative scarcity (or abundance) of that grade. If, for example, we assume that producers always saw to maximize the output of the highest quality grades, the share of output presumably would be negatively related to the grade price.

If we assume that these estimated relations hold for the projection period, then the predicted price for each grade can be developed from a projection of the price for the dominant grade (s_{dt}) and the volume proportion for the grade. The price for the dominant grade is solved mathematically given the various regression coefficients, projections of proportions of total lumber produced in each grade, and projections of the regional all-grade, all-species price. At least for the historical data, this process is relatively robust with goodness of fit correlations between the predicted and actual values that range from 0.86 for Douglas-fir to 0.97 for coast hem-fir.

The data in tables 1-4 (and appendix 2) were used to develop the relations between individual grade prices and the price of the dominant grade (by using the form shown in equation 2) and to develop the trends in shares of production by grade. Light framing was selected as the dominant grade for Douglas-fir and hem-fir species. This is the major category (accounting for at least 40 percent of total production during the last two decades). The number three shop grade was selected as the dominant grade for ponderosa pine. No one grade dominates ponderosa pine, as is the case for Douglas-fir or hem-fir, but the shop grades (5/4 and thicker) collectively have exercised the same influence over ponderosa pine prices.

The estimated price relations in the form of equation (2) are summarized in table 5.[3]

[3] Efforts to estimate these equations as a system of equations proved unsuccessful because of the singular matrices encountered while trying to correct the equations for autocorrelation. Similar problems were encountered in the earlier study of Douglas-fir lumber (Haynes and others 1988).

Table 5—Estimated price relations, by species and grade[a]

Species and grade	B_1	B_2	B_3	R^2	Durbin Watson	Base price
Douglas-fir:						
C selects	449.053	2.088	-2926.022	0.435	1.187	Light framing
D selects	83.078	.337	*518.145	.790	**1.862	Light framing
Structural items	--	.699	--	.802	**1.837	Light framing
Heavy framing	--	1.259	--	.778	2.238	Light framing
Utility	--	.302	--	.937	**1.624	Light framing
Economy	--	.193	--	.674	**1.097	Light framing
Coast hem-fir:						
D selects	81.874	.339	*-453.356	.764	**1.751	Light framing
Structural items	*10.5208	1.185	--	.982	1.438	Light framing
Heavy framing	41.967	1.056	--	.947	1.559	Light framing
Utility	*-14.611	.387	--	.939	**1.408	Light framing
Economy	28.651	.251	--	.620	1.695	Light framing
Ponderosa pine:						
D select 12 inch	1142.521	*1.461	-1758.064	.610	1.888	5/4 3 shop
D select 4 inch	*108.419	1.391	*-71.367	.593	1.268	5/4 3 shop
4/4 1 shop	*48.466	.903	*-1.4155	.772	2.006	5/4 3 shop
5/4 1 shop	81.178	.378	--	.844	**1.494	5/4 3 shop
5/4 2 shop	33.334	.289	--	.850	**1.337	5/4 3 shop
4/4 2 com. 12 inch	--	1.205	--	.151	1.351	5/4 3 shop

[a] The general equation is $s_{jt} = B_1^* + B_2^* s_{1t} + B_3^* w_{jt}$.
* Significant at less than the 95-percent level.
** 1st order autoregressive correlation applied to correct for serial correlation.

Several species and grade relations could not be acceptably estimated in the form shown in equation (2). In these cases, we regressed these species-grade combinations on similar grades within the species (such as the case for several ponderosa pine grades) or against similar grades in different species groups. We argue, in both cases, that the justification is price arbitrage of similar grades or uses, or both. The pricing of inland hem-fir seems to be entirely a function of coast hem-fir prices, and in this case, we relied on price markup rules. Equations for these species and grades are shown in table 6.

Future demands for lumber are expected to change. Total softwood lumber consumption is expected to increase roughly 0.4 percent per year while production in U.S. regions increases by 0.7 percent per year (Haynes 1990). In the Western United States, lumber production is expected to drop, especially in areas where Douglas-fir and coast hem-fir are produced. The extent of this reduction depends on the strategy adopted to protect the habitat for the northern spotted owl *(Strix occidentalis)*. The bulk of lumber consumption is used in new residential construction and in residential upkeep and alteration. After 2000, the relative shares of the two end uses change where upkeep and alteration of existing housing takes a larger share of lumber than does new construction. These market changes suggest continued strong markets for dimension lumber and lumber grades favored in millwork and other finish applications.

The projected production proportions are shown in table 7. In our process, the proportions were projected independently of expected price changes. Except for some of the ponderosa pine grades, most grades were projected as a continuation of current and

Table 6—Estimated price relations using the price markup equation form, by species and grade[a]

Species and grade	B_1	B_2	B_3	R^2	Durbin Watson	Base price
Coast hem-fir, C selects	*93.556	0.526	--	0.639	**1.916	D selects
Inland hem-fir:						
Moulding	*16.672	.646	--	.766	**1.814	Coast hem-fir d selects
Shop	*-9.968	.906	--	.576	1.237	Coast hem-fir d selects
Structural items	*-9.997	1.016	--	.962	1.333	Coast hem-fir structural
Heavy framing	-21.578	1.030	--	.991	1.873	Coast hem-fir heavy framing
Light framing	-12.405	1.069	--	.989	1.131	Coast hem-fir light framing
Utility	*-2.270	.480	--	.989	**1.679	Coast hem-fir utility
Economy	*-13.057	1.192	--	.911	1.132	Coast hem-fir economy
Ponderosa pine:						
4/4 C select and btr. 6-12 inch	406.038	.823	--	.636	1.506	4/4 D 12 inch
4/4 C select and btr. 4 inch, D select 6-10 inch	*112.933	.284	--	.605	**1.649	4/4 D 12 inch
5/4 mldg. and better	296.585	.619	--	.626	2.067	4/4 D 12 inch
5/4 shopout	95.643	.563	--	.686	1.512	Douglas-fir light framing
4/4 2 com. 4-10 inch	76.830	.590	--	.799	**1.764	Douglas-fir light framing
4/4 com., 3 com. 6-12 inch, 8/4 dimension	97.817	.662	--	.792	1.339	Douglas-fir light framing
4/4 com., 3 com. 4 inch, 4 com. 4-12 inch	*19.468	.705	--	.837	1.646	Douglas-fir light framing
3 common, utility	*-10.058	.204	--	.872	1.713	Douglas-fir light framing
5 common, economy	*12.206	.356	--	.738	1.363	Douglas-fir light framing

[a] The general equation is $s_{jt} = B_1^* + B_2^* s_{1t} + B_3^* w_{jt}$.
* Significant at less than the 95-percent level.
** 1st order autoregressive correlation applied to correct for serial correlation.

recent trends. These show declines in the highest grades and increases in framing (both light and heavy). For ponderosa pine, these projections reflect an expected shift from shop to common grades. This shift is contrary to recent historical trends but reflects recent product recovery studies for young-growth ponderosa pine.[4]

The all-species, all-grade lumber price projections for the Douglas-fir and ponderosa pine subregions were taken from the 1989 RPA timber assessment (Haynes 1990). The relevant price projections were those for the Douglas-fir and ponderosa pine subregions of the Pacific Northwest. The next step involved the relation between the all-species, all-grade prices and the various all-grade prices for each of the four species groups considered here. The all-grade price for Douglas-fir during the 1980s was equal to the all-species, all-grade price in the Douglas-fir subregion. This was a change from past studies where Douglas-fir usually was assumed to command a premium price relative to the all-species average for the subregion. Coast hem-fir prices (excluding the C select grades estimated by using the price markup equation form) have been fairly consistent at about 80 percent of the all-grade Douglas-fir price. This relation is expected to continue into the future (fig. 5). The average price for grades of ponderosa pine estimated with the general price equation[5] reflects a substantial price premium relative to the average lumber prices for the subregion (fig. 5). This premium is expected to continue for the foreseeable future.

[4] Personal communication, Susan Willits, research forest products technologist, Pacific Northwest Research Station, P.O. Box 3890, Portland, OR 97208-3890.

[5] Specifically D Selects, 12 inch and 4 inch; 4/4, 1 shop; 5/4, 1, 2, and 3 shop; and 4/4 common, 12 inch.

Table 7—Projected production percentages by species and grade, 1989-2040

Species and grade	1989	2000	2010	2020	2030	2040
Douglas fir:						
C selects	1.0	0.4	0.4	0.4	0.4	0.4
D selects and shop	1.6	2.4	2.4	2.4	2.4	2.4
Structural items	15.9	16.7	16.9	17.0	17.1	17.2
Heavy framing	22.9	23.6	23.8	23.9	24.0	24.1
Light framing	47.4	47.7	47.7	47.7	47.7	47.7
Utility	7.0	5.0	4.7	4.3	4.2	4.0
Economy	4.2	4.2	4.2	4.2	4.2	4.2
Coast hem-fir:						
C selects	.3	.3	.3	.3	.3	0.3
D selects and shop	2.0	2.0	2.0	2.0	2.0	2.0
Structural items	4.2	4.6	4.9	5.8	6.8	7.7
Heavy framing	16.9	19.8	22.4	25.0	27.6	30.2
Light framing	63.6	59.8	56.3	52.8	49.3	45.9
Utility	7.4	8.3	8.3	8.3	8.3	8.3
Economy	5.8	5.6	5.6	5.6	5.6	5.6
Inland hem-fir:						
Moulding	1.9	1.6	1.4	1.2	1.0	0.9
Shop	5.6	4.6	3.8	3.1	2.5	2.1
Structural items	1.9	1.0	1.0	1.0	1.0	1.0
Heavy framing	30.4	26.6	23.2	19.9	16.6	13.3
Light framing	46.1	52.3	57.3	62.2	66.8	71.4
Utility	9.3	10.1	10.1	10.1	10.1	10.1
Economy	4.9	3.8	3.2	2.6	1.9	1.3
Ponderosa pine:						
4/4 selects and 1 shop						
C and better 6-12 inch	.6	.5	.4	.3	.2	.1
D 12 inch	.2	.1	.1	.1	.0	.0
C and better 4 inch, D 6-10 inch	.3	.2	.2	.1	.1	.0
D 4 inch	.7	.5	.3	.2	.2	.1
1 shop	2.2	1.7	1.3	.9	.7	.5
5/4 and thicker moulding and shops:						
Moulding and better	5.6	4.4	3.8	3.3	2.9	2.4
1 shop	2.9	2.4	2.1	1.7	1.4	1.2
2 shop	17.8	13.3	11.1	8.9	7.0	5.1
3 shop	19.9	19.9	19.9	19.9	19.9	19.9
Shopout	6.7	6.7	6.7	6.7	6.7	6.7
4/4 commons and 8/4 standard and better:						
2 common 12 inch	3.8	3.8	3.8	3.8	3.8	3.8
2 common 4-10 inch	5.8	5.8	5.8	5.8	5.8	5.8
3 common 6-12 inch, 8/4 dimension	25.9	31.8	34.8	37.9	40.3	42.7
3 common 4 inch, 4 common 4-12	5.0	6.1	6.7	7.3	7.8	8.2
Low value:						
No 3 and utility	1.2	1.3	1.3	1.4	1.5	1.6
5 common and economy	1.4	1.5	1.6	1.7	1.8	1.8

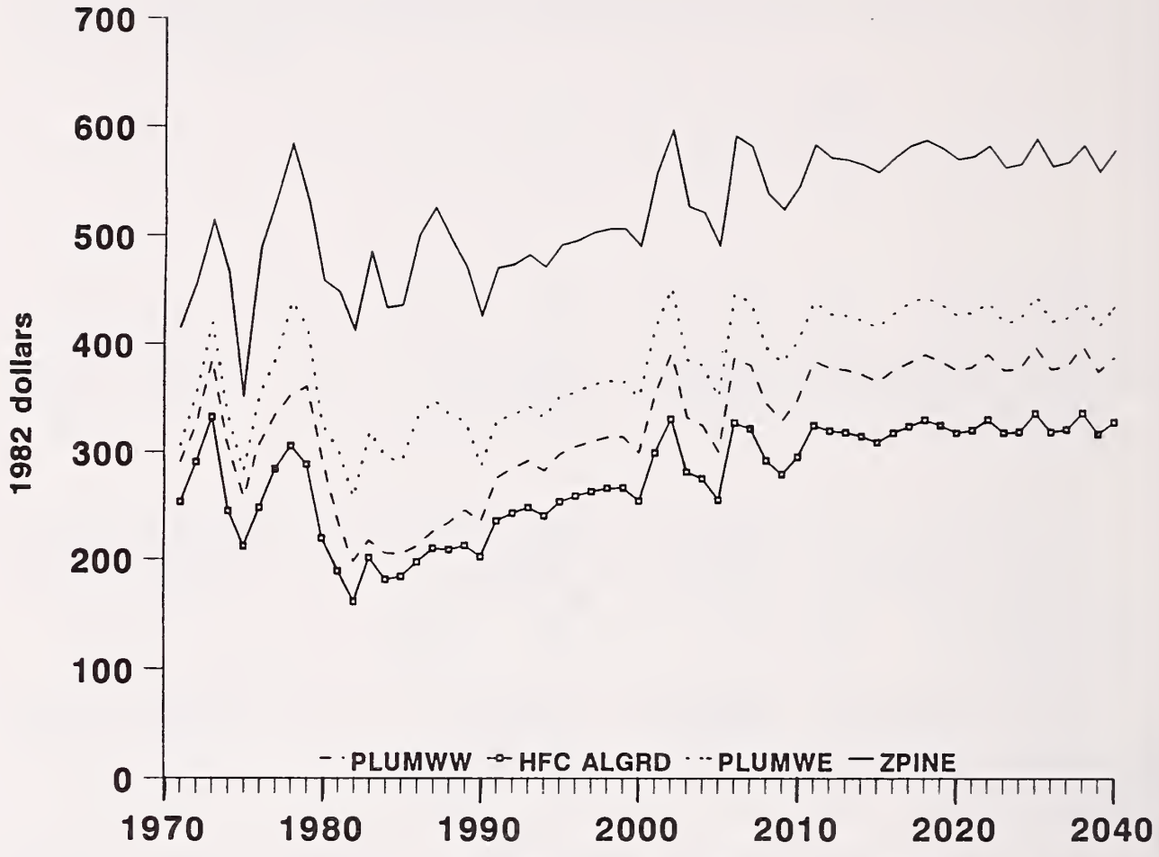

Figure 5—Softwood lumber prices by year: PLUMWW = west-side average price all species, all grades; HFC ALGRD = hem-fir coast average price, all grades except for C select; PLUMWE = east-side average price all species, all grade; ZPINE = average price for selected grades of ponderosa pine.

Results

Price projections by species and grades are shown in table 8. The results mostly are consistent with the various assumptions and estimated relations. One exception is the projections for C select Douglas-fir lumber. These projections are somewhat low relative to the recent (since 1986) increase in export clear prices, which comprise about 10 percent of the C select grade. The impact of recent price increases in the export market have reduced the explanatory and predictive ability of the general price relation for C selects.

The results support the notion that increasing scarcity of high-quality material will result in higher prices. In general, the relative price position for each grade remains unchanged. The historically highest priced grades remain so in the future; in general, they show greater price increases but lower rates of price growth. Price arbitrage and substitution between products, however, act to limit the extent that prices for selected species and grades can increase. The fact that prices of higher priced items generally increase more than lower priced items is significant to forest land management decisions, because it is the dollar difference, not the percentage difference, that determines how much can be spent in forest management to increase quality. We believe that the current and projected premiums for quality are sufficient to warrant a reassessment of the general attitude of the forestry community about the importance of wood quality and the rotation ages and management regimes likely to be commonly employed.

Table 8—Projected prices by species and grade, 1989-2040

(In 1989 dollars per thousand board feet)

Species and grade	1989	2000	2010	2020	2030	2040
Douglas-fir:						
C selects	1,078	1,116	1,220	1,276	1,322	1,300
D selects and shop	503	532	579	603	622	613
Structural items	325	418	488	526	556	542
Heavy framing	330	379	442	476	503	490
Light framing	246	301	351	378	399	389
Utility	168	213	248	268	283	276
Economy	110	111	129	139	148	144
Coast hem-fir:						
C selects	718	848	901	929	950	937
D selects and shop	466	509	554	577	595	583
Structural items	274	344	399	427	449	435
Heavy framing	298	343	392	417	436	424
Light framing	234	281	327	351	369	357
Utility	155	193	230	249	264	254
Economy	105	102	114	120	125	122
Inland hem-fir:						
Moulding	743	790	856	890	917	900
Shop	393	450	490	511	527	517
Structural items	277	339	395	423	445	430
Heavy framing	279	330	380	406	426	413
Light framing	230	287	336	361	381	368
Utility	154	194	232	252	268	257
Economy	102	108	121	129	134	130
Ponderosa pine:						
4/4 selects and 1 shop						
C and better 6-12 inch	1,805	2,049	2,173	2,173	2,208	2,206
D 12 inch	1,523	1,940	2,089	2,090	2,133	2,130
C and better 4 inch, D 6-10 inch	1,016	1,304	1,386	1,386	1,409	1,408
D 4 inch	740	756	886	897	938	936
1 shop	437	466	551	558	585	583
5/4 and thicker moulding and shops:						
Moulding and better	1,266	1,532	1,624	1,624	1,651	1,649
1 shop	730	753	854	863	894	892
2 shop	589	638	741	750	782	780
3 shop	434	456	550	558	587	586
Shopout	258	276	304	319	332	326
4/4 commons and 8/4 standard and better:						
2 common 12 inch	532	550	663	673	708	706
2 common 4-10 inch	331	421	469	494	515	505
3 common 6-12 inch, 8/4 dimension	261	308	341	359	373	367
3 common 4 inch, 4 common 4-12 inch	189	233	269	288	304	296
Low value:						
No 3 and utility	155	193	232	253	271	263
5 common and economy	105	121	138	148	156	152

Acknowledgments

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Literature Cited

George, P.S.; King, G.A. 1971. Consumer demand for food commodities in the United States with projections for 1980. Giannini Found. Monogr. 26. Berkeley, CA: California Agricultural Experiment Station. 161 p.

Haynes, Richard W. 1977. A derived demand approach to estimating the linkage between stumpage and lumber markets. Forest Science. 23: 281-288.

Haynes, Richard W. 1990. An analysis of the timber situation in the United States: 1989-2040. Gen. Tech. Rep. RM-199. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 286 p.

Haynes, Richard W.; Connaughton, Kent P.; Adams, Darius M. 1980. Stumpage price projections for selected western species. Res. Note PNW-367. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 14 p.

Haynes, Richard W.; Fahey, Thomas D.; Fight, Roger D. 1988. Price projections for selected grades of Douglas-fir lumber. Res. Note PNW-RN-473. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 12 p.

Howard, James O.; Ward, Franklin R. 1988. Oregon's forest products industry: 1985. Resour. Bull. PNW-RB-149. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 90 p.

Larsen, David N. 1990. 1984 Washington mill survey: wood consumption and mill characteristics. Series Rep. 10. Olympia, WA: Washington State Department of Natural Resources. 17 p.

Warren, Debra D. 1990. Production, prices, employment, and trade in Northwest forest industries, first quarter 1990. Resour. Buli. PNW-RB-175. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 99 p.

Western Wood Products Association. 1989. Price summary past sales. Portland, OR: Western Wood Products Association. Monthly.

Appendix 1

Grouping	Grades and items combined in group
Douglas-fir and coast hem-fir:	
C selects	C select; export clears
D selects and shop	D select; D and better; all shop grades
Structural items	All laminating stock; all machine stress-rated lumber; 2-inch select structural; 2-inch number 1; 3-inch and thicker select structural; crossarms; scaffold planks; export commons
Heavy framing	2 by 10 and wider number 2 and better; 3-inch and thicker number 2 and better; ties
Light framing	All studs; standard and better light framing; 2 by 6 and 2 by 8 number 2 and better; 1 by 4 and 1 by 6 utility and better; 4 by 4 utility and better; 4 by 4 standard and better
Utility	All utility; all number 3 grade lumber
Economy	All economy lumber
Inland hem-fir:	
Moulding	Moulding and better
Shop	All shops
Structural items	All machine stress-rated lumber; 2-inch select structural
Heavy framing	2 by 10 and wider number 2 and better
Light framing	All studs; standard and better light framing; 2 by 6 and 2 by 8 number 2 and better; 1 by 4 and 1 by 6 utility and better
Utility	All utility; all number 3 grade; shopouts
Economy	All economy lumber
Ponderosa pine:	
4/4 selects and 1 shop—	
C and better 6-12 inch	C and better selects 6-12-inch widths
D 12 inch	D select 12-inch width
C and better 4 inch, D 6-10 inch	C and better select 4-inch width; D select 6-10-inch widths
D 4 inch	D select; 4-inch width; all 4/4 moulding
1 shop	1 shop; 3 clear
5/4 thicker moulding and shops—	
Moulding and better	Moulding and better; C and better select; D select
1 shop	1 shop; 3 clear
2 shop	2 shop
3 shop	3 shop; stained shop; 2 and better common
Shopout	Shopout; 3, 4, 5 common; resaw; box
4/4 commons and 8/4 standard and better—	
2 common 12 inch	2 common; 12-inch width
2 common 4-10 inch	2 common; 4-10-inch widths; 2, 3 common patterns
3 common 6-12 inch, 8/4 dimension	3 common; 6-12-inch widths; 8/4 number 2 and better; 8/4 stud grade; 8/4 standard and better studs; 8/4 select decking; standard and better; 4/4 2 shop
3 common 4 inch, 4 common 4-12 inch	3 common 4-inch width; 4 common 4-12-inch widths; 4/4 shopout
Low value:	
No. 3 and utility	Number 3; utility 4-inch width
5 common and economy	5 common; economy grade

Appendix 2

Table 9—Nominal prices for Douglas-fir lumber, coast mills, 1971-90[a]

(In dollars per thousand board feet)

Year	C selects	D selects and shop	Structural items	Heavy framing	Light framing	Utility	Economy
1971	228	146	126	122	105	74	33
1972	280	164	143	141	126	93	41
1973	471	216	210	198	161	117	67
1974	474	238	238	184	141	82	47
1975	406	225	185	165	139	84	45
1976	486	276	229	217	174	110	49
1977	504	342	289	215	215	148	61
1978	593	406	325	395	235	170	86
1979	891	480	410	334	246	179	86
1980	929	506	365	271	207	150	85
1981	747	426	329	263	193	137	83
1982	648	375	283	198	159	126	78
1983	685	426	262	222	201	162	87
1984	688	407	249	223	189	137	72
1985	671	410	249	226	190	131	68
1986	726	405	240	229	191	132	67
1987	837	411	257	258	206	138	66
1988	927	474	297	285	219	138	85
1989	1,078	503	325	330	246	168	110
1990	1,236	521	305	310	232	156	102

[a] Figures are FOB prices computed as a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Table 10—Percentage of total volume for Douglas-fir lumber, coast mills, 1971-90[a]

Year	C selects	D selects and shop	Structural items	Heavy framing	Light framing	Utility	Economy	Total volume, all grades
				Percent				*Thousand board feet*
1971	13.4	2.2	8.0	15.8	40.3	16.7	3.5	1,244,585
1972	10.9	2.0	10.1	15.8	38.4	18.1	3.8	1,413,467
1973	8.5	1.4	13.4	14.2	40.9	17.8	3.8	1,446,109
1974	7.2	1.2	12.4	17.1	41.7	15.9	4.6	1,523,405
1975	7.9	.7	11.0	17.7	42.8	16.2	3.7	1,569,174
1976	8.2	.8	12.3	17.7	41.6	15.1	4.4	1,832,619
1977	6.5	4.2	11.5	19.7	36.3	17.0	4.8	2,029,086
1978	5.2	4.3	11.1	19.6	38.6	16.3	4.9	2,030,353
1979	5.4	4.7	12.1	18.1	37.5	16.8	5.4	1,702,828
1980	5.8	4.5	11.5	21.3	35.2	16.8	4.9	1,515,924
1981	4.5	4.1	12.9	22.0	37.7	14.8	4.0	1,662,233
1982	4.5	4.3	12.3	22.3	38.1	14.6	3.9	1,551,419
1983	3.3	3.5	12.4	23.8	42.4	10.6	3.9	2,752,061
1984	2.6	3.4	15.3	22.5	42.8	9.4	4.0	3,168,494
1985	2.4	3.2	16.4	23.9	41.8	8.5	3.8	2,927,403
1986	2.1	2.3	15.6	24.0	43.7	8.6	3.6	3,584,260
1987	2.0	2.8	14.5	23.3	45.4	8.2	3.8	3,975,895
1988	1.8	2.1	16.7	21.8	46.2	7.1	4.3	3,691,263
1989	1.0	1.6	15.9	22.9	47.4	7.0	4.2	3,659,762
1990	1.0	1.5	16.1	22.5	47.9	6.5	4.5	3,038,613

[a] Figures are a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Table 11—Nominal prices for hem-fir lumber, coast mills, 1971-90[a]

(In dollars per thousand board feet)

Year	C selects	D selects and shop	Structural items	Heavy framing	Light framing	Utility	Economy
1971	207	138	126	115	101	71	34
1972	241	151	148	138	122	90	41
1973	344	209	193	181	157	113	62
1974	440	233	179	179	140	81	44
1975	351	208	164	161	133	79	42
1976	427	258	201	206	164	106	48
1977	453	287	229	236	192	135	58
1978	587	345	259	256	222	164	85
1979	676	400	290	302	234	160	78
1980	718	405	257	245	195	132	78
1981	661	362	229	244	183	131	79
1982	712	319	202	209	158	123	70
1983	737	386	245	240	205	156	97
1984	683	348	227	228	187	128	79
1985	638	337	226	232	189	123	79
1986	606	343	242	248	197	129	75
1987	601	414	273	286	215	131	76
1988	633	461	273	289	221	137	89
1989	718	466	274	298	234	155	105
1990	820	500	270	283	224	150	97

[a] Figures are FOB prices computed as a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Table 12—Percentage of total volume for hem-fir lumber, coast mills, 1971-90[a]

Year	C selects	D selects and shop	Structural items	Heavy framing	Light framing	Utility	Economy	Total volume, all grades
				Percent				*Thousand board feet*
1971	1.5	4.2	3.6	12.9	54.8	18.2	4.8	744,892
1972	1.1	4.5	3.2	12.9	53.6	19.4	5.3	873,074
1973	.6	4.8	3.2	11.4	54.5	20.5	5.0	758,354
1974	.5	3.7	3.6	10.6	55.4	19.8	6.4	631,208
1975	.9	5.3	3.6	8.8	54.5	21.2	5.8	670,315
1976	.7	5.5	3.4	10.7	53.1	19.8	6.9	750,733
1977	1.4	4.8	6.2	8.7	56.7	15.0	7.2	933,315
1978	1.5	5.2	7.3	7.8	55.3	14.6	8.3	970,882
1979	1.5	5.1	7.7	5.3	58.3	13.8	8.3	835,574
1980	1.4	5.4	7.5	4.9	60.5	14.4	5.9	597,383
1981	1.2	5.4	6.2	7.8	58.0	14.6	6.8	582,672
1982	.4	4.9	6.0	7.2	59.1	17.1	5.3	577,243
1983	.4	4.0	5.6	8.8	61.6	13.8	5.8	857,819
1984	.4	4.2	5.3	12.9	60.8	10.0	6.3	959,799
1985	.4	4.0	3.3	15.0	63.0	8.4	6.0	830,607
1986	.4	2.5	3.1	16.2	64.0	8.4	5.4	1,000,702
1987	.3	2.3	2.9	14.8	64.9	9.3	5.3	1,011,504
1988	.3	2.2	3.2	14.2	66.4	8.2	5.5	946,868
1989	.3	2.0	4.2	16.9	63.6	7.4	5.8	903,323
1990	.2	1.5	5.5	16.4	62.8	7.5	6.1	784,600

[a] Figures are a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Table 13—Nominal prices for hem-fir lumber, inland mills, 1971-90[a]

(In dollars per thousand board feet)

Year	Moulding	Shop	Structural items	Heavy framing	Light framing	Utility	Economy
1971	209	147	124	--	102	71	36
1972	231	161	152	--	128	91	47
1973	306	225	183	--	165	120	72
1974	309	191	169	--	148	84	48
1975	272	150	157	--	138	81	46
1976	371	242	206	--	174	109	52
1977	412	266	245	226	191	132	60
1978	557	309	262	251	221	158	85
1979	654	341	281	295	238	156	85
1980	594	293	227	221	196	131	82
1981	602	318	217	233	185	128	89
1982	584	245	185	189	163	116	77
1983	655	346	246	228	204	155	90
1984	555	269	225	210	185	129	76
1985	511	323	225	221	188	128	76
1986	605	308	240	242	198	132	72
1987	706	354	261	280	214	132	75
1988	712	350	270	274	215	134	85
1989	743	393	277	279	230	154	102
1990	910	399	283	260	221	143	93

[a] Figures are FOB prices computed as a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Table 14—Percentage of total volume for hem-fir lumber, inland mills, 1971-90[a]

Year	Moulding	Shop	Structural items	Heavy framing	Light framing	Utility	Economy	Total volume, all grades
	Percent							*Thousand board feet*
1971	2.2	6.5	0.8	0	66.5	16.8	7.2	999,983
1972	3.2	9.2	1.0	0	62.9	16.4	7.3	1,045,932
1973	3.6	8.7	1.5	0	62.4	16.8	7.0	1,009,912
1974	3.2	8.3	.9	0	62.0	17.6	8.1	920,555
1975	3.8	9.2	.6	0	62.8	16.6	7.0	890,092
1976	3.4	8.1	.9	0	64.4	16.8	6.3	1,010,955
1977	2.6	8.1	1.8	15.2	48.9	16.9	6.5	1,180,716
1978	2.5	8.2	1.3	16.3	47.5	17.1	7.1	1,066,062
1979	2.2	6.8	.8	19.3	43.6	18.5	8.8	1,141,817
1980	2.6	8.9	.6	20.1	41.0	18.7	8.1	872,830
1981	2.4	8.9	.7	20.0	43.2	17.4	7.3	774,018
1982	1.8	6.4	.5	20.6	49.2	15.1	6.3	659,593
1983	1.9	7.0	.7	20.9	50.3	14.0	5.2	812,622
1984	2.2	6.4	.9	22.0	49.5	13.1	5.9	1,065,130
1985	1.7	5.7	.9	24.5	50.2	11.5	5.5	1,101,286
1986	1.9	4.8	.8	28.1	48.5	10.3	5.6	1,382,074
1987	1.7	4.9	.6	29.3	47.8	10.0	5.6	1,562,432
1988	1.7	4.8	1.6	29.7	47.3	9.6	5.3	1,613,020
1989	1.9	5.6	1.9	30.4	46.1	9.3	4.9	1,710,614
1990	1.4	5.4	1.8	29.7	47.6	8.8	5.1	1,563,427

[a] Figures are a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Table 15—Nominal prices for ponderosa pine lumber, inland mills, 1971-90[a]

(In dollars per thousand board feet)

	4/4 selects and 1 shop					5/4 and thicker moulding and shops					4/4 commons and 8/4 std. and btr.				Low value	
Year	C and better 6-12 in	D 12 in	C and btr. 4 in D 6-10 in	D 4 in	1 shop	Mldg. and btr.	1 shop	2 shop	3 shop	Shopout	2 com. 12 in	2 com. 4-10 in	3 com. 6-12 in 8/4 dimen.	3 com. 4 in 4 com. 4-12 in	No. 3 and util.	5 com. and econ.
1971	384	307	262	197	136	301	220	158	133	85	134	113	93	75	73	38
1972	402	334	284	210	157	314	247	185	157	107	165	138	121	101	90	50
1973	479	410	369	285	207	392	294	232	195	159	242	207	164	144	116	78
1974	612	550	499	305	210	429	314	252	208	133	270	211	141	107	73	57
1975	646	546	454	257	173	477	278	206	153	97	246	188	125	88	73	47
1976	708	615	444	334	233	531	398	326	248	143	272	219	166	129	98	58
1977	816	725	514	360	280	549	454	384	286	173	331	272	196	146	123	72
1978	1,001	906	671	489	349	934	526	462	331	206	373	329	232	184	144	98
1979	1,398	1,255	1,004	532	333	955	554	481	304	210	441	359	263	184	145	96
1980	1,187	865	610	401	330	813	549	473	308	203	450	289	237	165	122	87
1981	1,110	965	608	467	333	817	589	509	355	218	385	278	245	164	127	89
1982	1,187	865	610	401	330	813	549	473	308	203	450	289	237	165	122	87
1983	1,214	1,404	659	513	363	1,056	662	570	401	225	388	305	222	160	155	90
1984	1,363	1,163	724	499	368	949	622	506	349	203	432	319	235	149	124	83
1985	1,463	863	779	506	342	1,087	614	498	366	204	456	312	208	143	127	75
1986	1,509	1,169	1,021	654	636	1,093	688	576	404	207	430	325	227	163	130	79
1987	1,563	1,336	1,088	703	442	1,306	762	644	413	224	447	367	247	175	131	79
1988	1,892	1,510	1,076	689	452	1,282	746	625	411	229	505	363	246	174	137	87
1989	1,805	1,523	1,016	740	438	1,265	730	589	434	258	532	331	261	189	155	105
1990	1,478	1,453	996	683	435	1,051	677	542	414	247	534	356	248	187	145	99

[a] Figures are FOB prices computed as a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Table 16—Percentage of total volume for ponderosa pine lumber, inland mills, 1971-90[a]

Year	4/4 selects and 1 shop					5/4 and thicker moulding and shops					4/4 commons and 8/4 std. and btr.				Low value		Total volume, all grades
	C and better 6-12 in	D 12 in	C and btr. 4 in D 6-10 in	D 4 in	1 shop	Mldg. and btr.	1 shop	2 shop	3 shop	Shopout	2 com. 12 in	2 com. 4-10 in	3 com. 6-12 in 8/4 dimen.	3 com. 4 in 4 com. 4-12 in	No. 3 and util.	5 com. and econ.	
	Percent																*Thousand board feet*
1971	1.6	0.5	1.2	1.1	3.8	7.1	4.3	14.3	8.6	5.6	4.3	2.4	29.2	11.2	2.4	2.3	1,995,778
1972	1.5	.5	1.1	1.3	4.1	6.6	4.0	14.8	10.4	5.2	3.7	2.0	30.1	10.0	2.5	2.2	2,029,950
1973	1.3	.4	.9	1.4	3.9	7.4	4.1	14.1	10.0	4.9	3.2	1.8	32.4	8.9	2.9	2.3	1,961,374
1974	1.3	.4	.9	1.5	4.0	6.4	3.4	12.7	9.3	5.0	3.1	2.2	34.6	10.3	2.3	2.6	1,691,282
1975	1.3	.4	.8	1.6	3.9	6.4	3.7	13.8	9.9	4.8	3.0	2.1	33.3	9.9	2.4	2.4	1,842,488
1976	1.3	.4	.9	1.5	4.1	6.5	3.7	14.2	11.2	5.2	3.0	2.4	31.7	10.0	1.9	2.2	2,046,066
1977	1.1	.4	.7	1.1	3.5	6.0	3.4	13.9	12.4	7.0	2.9	5.0	29.2	9.5	1.8	2.1	2,249,864
1978	.9	.3	.6	1.1	2.8	5.6	2.9	13.0	13.3	7.2	2.7	5.3	30.5	9.2	2.2	2.3	2,271,539
1979	.9	.3	.6	1.2	3.3	5.6	3.0	13.2	12.6	5.6	3.0	6.0	29.8	10.5	2.0	2.5	1,849,683
1980	1.0	.4	.8	1.3	3.3	6.5	3.2	14.4	12.8	4.7	3.2	6.9	27.3	9.9	2.1	2.3	1,614,864
1981	1.0	.3	.8	1.1	3.3	5.9	3.1	14.8	13.4	4.7	3.9	8.7	25.7	10.0	1.5	1.8	1,474,420
1982	1.1	.3	.7	.9	3.1	5.8	3.2	15.7	13.5	5.1	4.2	8.0	26.9	8.8	1.3	1.6	1,488,103
1983	1.0	.3	.7	.9	2.8	5.8	3.3	17.2	15.6	5.3	3.9	7.8	25.4	7.1	1.2	1.5	1,876,743
1984	1.0	.3	.6	.9	2.7	5.3	3.5	17.6	15.4	4.2	4.1	7.2	26.8	7.1	1.6	1.7	1,970,046
1985	.9	.3	.6	.9	2.7	5.1	3.4	18.2	16.2	4.1	3.8	7.2	26.7	7.0	1.4	1.4	2,018,896
1986	1.0	.3	.6	.8	2.8	4.9	3.3	17.9	16.6	4.5	4.3	6.7	27.6	6.1	1.4	1.3	2,164,591
1987	.9	.2	.4	.7	2.4	5.7	3.1	17.9	17.5	4.7	4.0	6.0	28.1	5.3	1.6	1.4	2,331,497
1988	.8	.2	.4	.7	2.7	5.8	2.7	17.2	18.0	5.4	3.9	5.5	28.4	5.2	1.7	1.5	2,252,696
1989	.6	.2	.3	.7	2.2	5.6	2.9	17.8	19.9	6.7	3.8	5.8	25.9	5.0	1.2	1.4	2,204,308
1990	.6	.1	.3	.6	2.0	5.3	2.7	17.8	21.3	7.0	3.7	5.4	25.0	5.2	1.1	1.7	2,045,830

[a] Figures are a volume-weighted average of green and dry surfaced and rough grades.

Source: Data are compiled by Western Wood Products Association from copies of invoices submitted to the association by mills accounting for approximately 65 to 70 percent of the region's production; individual groupings from Pacific Northwest Research Station.

Haynes, Richard W.; Fight, Roger D. 1992. Price projections for selected grades of Douglas-fir, coast hem-fir, inland hem-fir, and ponderosa pine lumber. Res. Pap. PNW-RP-447. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 20 p.

Grade-specific price projections were developed for Douglas-fir, coast hem-fir, inland hem-fir, and ponderosa pine lumber. These grade-specific price projections can be used in evaluating management practices that will affect the quality of saw logs produced under various management regimes.

Keywords: Lumber prices, Douglas-fir, coast hem-fir, inland hem-fir, ponderosa pine.

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