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Monthly Stumpage Prices for the Pacific Northwest

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Abstract

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Seasonal variation is found in monthly stumpage price data. Seasonal adjustments indicate that monthly adjustments improve the utility of estimates of monthly stumpage prices. Comparisons of adjusted and unadjusted prices suggest that the unadjusted price series are reasonably robust.

Keywords: Stumpage prices.

Summary

Monthly stumpage prices have been collected since 1975 as part of the process of collecting price data for quarterly publication. This paper reports the various monthly stumpage prices and examines them for seasonal variations that might influence their accuracy in reflecting movements in price trends. Comparisons of seasonally adjusted and unadjusted prices suggest that the unadjusted price series are reasonably robust.

Introduction

The Pacific Northwest (the States of Washington and Oregon—the Pacific Northwest Region of the USDA Forest Service) has for the past several decades been a leading producer of softwood sawtimber. Now, as in the past two decades, the standard measure of stumpage prices is quarterly prices for National Forest stumpage as published by the USDA Forest Service (see, for example, Warren 1989). There was a time in the late 1970s when rapid escalation in stumpage prices (see fig. 1) stimulated an interest in the availability of monthly stumpage prices in the Pacific Northwest. The decrease in stumpage prices after 1980 reduced this interest. Recent interest in stumpage price reporting has focused on greater spatial detail (see, for example, Ruderman and Haynes 1986) and on alternative definitions for stumpage prices such as stumpage prices for timber harvested from National Forests (see, for example, Haynes and Warren 1989 and Adams and Haynes 1989).

Starting in the late 1970s, data were collected on monthly stumpage prices as part of the process of collecting price data for quarterly publication. The purpose of this paper is first to report that monthly price data and second to examine its accuracy in reflecting movements in price trends. For this study, the Pacific Northwest Region is broken into two subregions: eastern Washington and Oregon and western Washington and Oregon.

Price reporting in the U.S. forest sector does not follow the convention observed in many other industrial sectors of relying on seasonally adjusted economic indicators. By seasonal adjustment, I mean the purposeful attempt to eliminate seasonal fluctuations in a series of data that do not contribute to the understanding of the basic trend in a series (Akaike 1984).

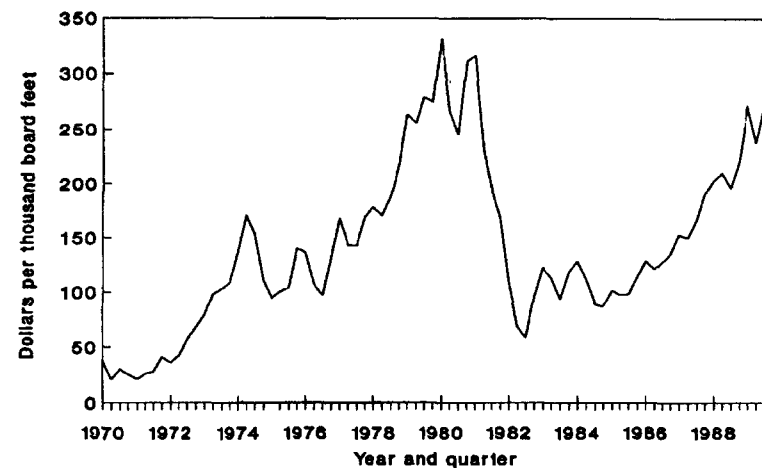


Figure 1—Quarterly National Forest stumpage prices in the Pacific Northwest (Region 6), 1970-89.

The possible use of monthly stumpage price data raises questions about the extent of relative freedom of seasonal fluctuations in these prices. Until now, no attempts have been made to seasonally adjust existing price series (especially those reported quarterly). The problem with prices observed over shorter periods is their increased tendency to display volatile short-term fluctuations. With many agricultural commodities, this has led to using smoothing techniques to reduce such volatility. This can be useful, because often with a smoothed series it is easier to discern trends and cyclical patterns and otherwise visually analyze a price series. Seasonal adjustment has become an accepted practice (especially since the advent of computers) when it is used to simplify a data series with no loss of information (Bell and Hillmer 1984).

In forestry, there is a general supposition that stumpage price data¹ include seasonal components caused by seasonal patterns in both residential construction and public timber sales programs. Because most stumpage price data (see fig. 1) fluctuate considerably, seasonal peaks and troughs will not be distinguishable from other fluctuations. Recognition of seasonality is important because it provides information about regularity in a price series.

The simplest smoothing technique used in forestry is a moving average of several periods. Another approach that could be used for stumpage price series is seasonal adjustment, which is really a special form of smoothing; it removes seasonal (cyclical) oscillations from the series rather than irregular short-term fluctuations.

Seasonal adjustment techniques² are based on the premise that a time series can be represented as the product of four components: the long-term secular trend in the series, a seasonal component, a long-term cyclical component, and an irregular component. The methods for eliminating the seasonal component are ad hoc and do not guarantee removal of all the seasonality from the original series. The process provides information about the existence of seasonal patterns in the price data and indicates any long-term trend in the data.

The Data

The data used in this paper are the prices bid for Forest Service sales over \$2,000 in value in the Pacific Northwest (Region 6). These prices are volume-weighted averages for all species sold in a particular month.³ These prices have been collected and published quarterly since the early 1960s (Warren 1989). Since 1975, data on the month an individual sale occurred have also been collected. The data are available for January 1975 through December 1988.

¹ Published stumpage price data in the United States is for the most part derived from sales of public timber.

² The technique used in this paper is described in Pindyck and Rubinfeld (1981).

³ Before 1983, these prices excluded the cost of new road construction. Prices reported for Forest Service sales are now averages of the high successful bid prices.

Table 1—Volume of timber sold each month in western Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>Million board feet</i>												
1975	80	210	174	184	373	748	171	168	242	278	219	666
1976	99	61	163	177	360	763	148	51	243	358	7	38
1977	181	294	673	236	197	309	355	274	309	116	29	63
1978	163	123	596	101	238	280	202	366	1,008	57	110	77
1979	255	197	776	93	226	304	221	408	822	50	78	167
1980	210	220	782	132	153	477	213	280	605	76	160	335
1981	180	177	630	91	112	361	393	447	797	56	120	219
1982	159	234	596	104	60	489	362	319	462	256	177	192
1983	343	202	722	129	143	365	251	220	249	326	71	216
1984	168	220	511	85	181	257	230	239	665	148	114	321
1985	42	233	718	137	234	232	171	344	363	73	97	128
1986	169	78	526	224	160	496	276	301	673	119	116	447
1987	211	159	512	239	233	565	167	266	340	78	124	302
1988	141	132	436	191	266	678	201	175	466	57	154	187
1989	150	109	302	62	23	27	106	48	54	31	23	863
Average	182.2	189.2	579.8	156.1	211.4	453.7	247.6	279.0	521.3	148.5	121.4	301.5

Table 2—Volume of timber sold each month in eastern Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>Million board feet</i>												
1975	48	43	58	71	173	373	51	58	98	31	67	372
1976	14	20	105	48	204	314	61	63	92	68	13	90
1977	26	47	213	62	145	184	129	26	344	50	21	110
1978	65	82	169	43	77	89	139	167	537	10	32	36
1979	60	40	216	28	80	142	166	255	402	53	87	94
1980	48	77	260	26	89	131	61	140	418	28	27	128
1981	54	68	298	48	103	189	134	181	257	35	54	96
1982	68	79	171	49	18	226	68	138	286	122	49	55
1983	104	121	204	82	46	97	74	107	294	117	66	84
1984	37	139	200	47	121	144	67	91	263	91	52	95
1985	5	101	289	52	81	165	76	85	266	59	28	66
1986	116	70	155	126	171	210	95	205	242	101	86	217
1987	130	31	290	56	131	228	49	148	167	16	96	130
1988	30	97	324	114	135	205	81	104	217	26	80	175
1989	71	63	139	80	107	119	51	95	282	24	67	109
Average	62.6	77.0	220.7	66.6	120.1	201.2	93.0	133.1	297.5	59.3	58.9	132.6

Information on the actual price and sale volume is given in tables 1-6. The tables illustrate many of the common myths surrounding Forest Service timber sales programs and price behavior; for example, timber sale volumes are not evenly distributed across months. Prices seem to display modest seasonal patterns independent of volumes and are highest in winter and lowest in late summer.

Table 3—Volume of timber sold each month in Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>Million board feet</i>												
1975	127	253	231	255	546	1121	221	226	339	309	286	1038
1976	113	81	268	225	563	1077	209	114	336	425	19	128
1977	208	341	886	298	341	493	483	299	653	167	150	173
1978	228	205	765	144	315	368	341	532	1545	68	141	113
1979	316	237	1009	121	306	453	388	664	1224	103	165	261
1980	258	296	1042	158	242	608	274	420	1023	105	186	463
1981	234	245	928	139	214	550	527	628	1054	91	173	315
1982	228	313	766	152	79	716	430	457	748	378	226	247
1983	447	323	925	211	190	462	325	327	543	443	137	299
1984	205	360	710	132	302	401	297	330	928	239	167	416
1985	46	334	1007	189	315	397	247	428	629	132	125	194
1986	286	147	681	350	331	706	371	505	914	220	202	665
1987	341	190	802	296	364	792	216	413	506	94	220	432
1988	171	229	760	305	401	883	282	279	683	84	234	362
1989	221	172	441	142	130	146	157	144	336	55	91	97
Average	244.9	266.2	801.6	222.7	331.4	655.1	340.6	411.9	818.7	208.1	180.2	434.2

Table 4—Nominal prices of timber sold each month in western Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>Dollars/thousand board feet</i>												
1975	154.48	81.34	95.01	98.54	176.20	109.30	89.62	126.44	140.41	133.83	129.09	122.81
1976	156.56	137.64	137.26	117.70	129.99	120.69	97.47	115.57	102.97	142.79	171.76	140.75
1977	271.93	154.35	159.74	177.22	153.78	158.24	164.65	122.42	161.81	192.94	148.60	113.47
1978	224.58	170.39	173.89	203.91	166.15	159.67	190.06	209.79	181.55	212.57	219.18	220.87
1979	237.91	285.96	274.57	224.97	257.24	287.89	231.45	321.93	316.87	354.30	302.08	251.28
1980	359.68	352.53	267.36	306.49	282.13	281.92	341.81	320.39	283.18	204.42	358.48	359.27
1981	355.09	345.50	330.52	249.86	232.24	272.80	220.53	219.17	191.11	242.07	148.93	189.85
1982	103.65	110.80	102.27	87.34	70.94	66.94	61.39	49.82	78.24	84.75	119.82	112.96
1983	96.22	137.39	125.73	111.11	101.28	120.00	109.28	115.30	92.26	104.48	124.46	135.62
1984	110.30	135.37	105.64	98.30	91.93	100.86	99.27	68.20	66.64	69.76	88.75	79.90
1985	117.55	68.17	80.54	88.51	70.03	74.26	73.24	76.48	74.37	105.61	104.62	80.14
1986	103.13	83.26	97.01	139.74	120.40	111.41	103.57	111.72	109.62	135.40	94.00	120.76
1987	117.77	132.89	136.83	121.45	121.54	128.08	148.68	124.53	148.88	163.38	165.54	161.18
1988	163.59	174.98	191.22	189.79	196.65	182.27	177.28	197.77	183.78	215.04	236.32	189.09
1989	259.79	245.11	263.93	241.04	274.95	319.35	339.31	282.07	278.94	290.77	359.33	417.90

Table 5—Nominal prices of timber sold each month in eastern Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>Dollars/thousand board feet</i>												
1975	64.80	34.85	13.23	34.97	41.10	31.79	27.98	26.46	41.07	47.29	22.19	30.26
1976	114.07	46.07	78.90	23.72	44.21	52.84	64.53	49.97	87.75	93.80	53.08	90.87
1977	68.44	138.93	92.34	67.98	74.96	114.64	97.80	42.07	110.26	98.86	123.02	119.88
1978	88.51	164.84	146.63	224.40	83.01	145.36	162.29	173.68	152.54	115.63	163.50	265.10
1979	112.02	207.56	178.09	198.70	226.12	162.20	158.02	116.22	153.95	127.06	186.97	175.16
1980	191.54	158.80	156.40	108.77	97.93	188.95	191.76	186.38	102.05	60.96	119.68	129.85
1981	170.91	109.39	187.03	144.35	126.76	144.35	137.17	104.23	165.18	88.07	55.05	82.42
1982	75.21	97.89	73.62	74.64	25.65	53.20	49.17	46.50	26.32	54.61	35.14	49.83
1983	87.56	99.51	72.51	97.11	50.44	93.13	83.05	94.21	55.71	58.18	116.07	81.13
1984	94.68	98.68	77.24	154.65	109.21	85.89	74.96	68.88	60.19	45.61	71.78	35.76
1985	33.14	79.53	80.96	95.93	92.44	65.75	72.05	71.34	73.38	115.48	115.09	76.56
1986	97.41	178.35	101.71	54.52	69.22	89.32	94.29	107.87	116.55	135.65	79.76	93.33
1987	80.64	110.96	142.90	90.44	159.77	117.95	142.92	138.07	114.64	156.00	170.24	176.72
1988	155.96	163.06	161.51	139.93	189.99	97.11	109.51	155.49	112.33	239.32	127.62	181.00
1989	171.21	196.77	176.64	176.69	198.33	200.60	272.44	223.33	156.99	126.53	126.56	218.02

Table 6—Nominal prices of timber sold each month in Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>Dollars/thousand board feet</i>												
1975	121.00	73.42	74.62	80.89	133.50	83.53	75.46	100.90	111.80	125.07	104.05	89.65
1976	151.28	114.74	114.42	97.83	98.99	100.92	87.88	79.50	98.78	134.99	94.63	105.82
1977	246.41	152.22	143.54	154.47	120.36	141.95	146.87	115.53	134.67	164.48	145.08	117.55
1978	185.60	168.17	167.87	210.08	145.92	156.22	178.72	198.51	171.46	197.56	206.72	234.92
1979	213.89	272.68	254.76	218.95	249.10	246.47	199.92	242.82	263.35	237.69	241.52	223.94
1980	328.50	302.30	239.70	274.43	214.22	261.84	308.25	275.78	209.13	165.66	324.28	295.76
1981	312.44	279.89	284.50	213.50	181.69	228.65	199.30	185.99	184.79	182.31	119.91	157.19
1982	95.11	107.54	95.90	83.26	60.47	62.69	59.47	48.82	58.38	75.04	101.36	98.98
1983	94.21	123.24	114.02	105.66	88.88	114.36	103.31	108.38	72.48	92.26	120.44	120.23
1984	107.48	121.17	97.65	118.46	98.83	95.49	93.79	68.39	64.81	60.55	83.43	69.81
1985	109.04	71.60	80.66	90.54	75.78	70.72	72.87	75.47	73.95	110.00	106.95	78.92
1986	100.80	128.81	98.08	109.14	94.01	104.83	101.21	110.16	111.45	135.51	87.95	111.79
1987	103.64	129.29	139.03	115.55	135.28	125.17	147.37	129.38	137.61	162.12	167.60	165.85
1988	162.24	169.94	178.54	171.15	194.40	162.46	157.79	181.99	161.09	222.72	199.19	185.18
1989	231.43	227.39	236.43	204.82	211.84	222.74	317.42	243.05	176.69	219.19	186.70	395.44

Figure 2 illustrates the average price (after adjustment for inflation) and volume by month. The peaks in average volume coincide with the end of each quarter. The largest peak is for the third quarter ending in September—the end of the Federal fiscal year since 1977. These peaks illustrate patterns introduced by the way the Forest Service conducts its timber sales program. Average prices are higher when sale volumes are the lowest (October through February). Prices then fall (albeit slowly) until September. The rise and fall in prices illustrates both the existence of a seasonal pattern and the relative independence of prices and institutionally introduced changes in volume.

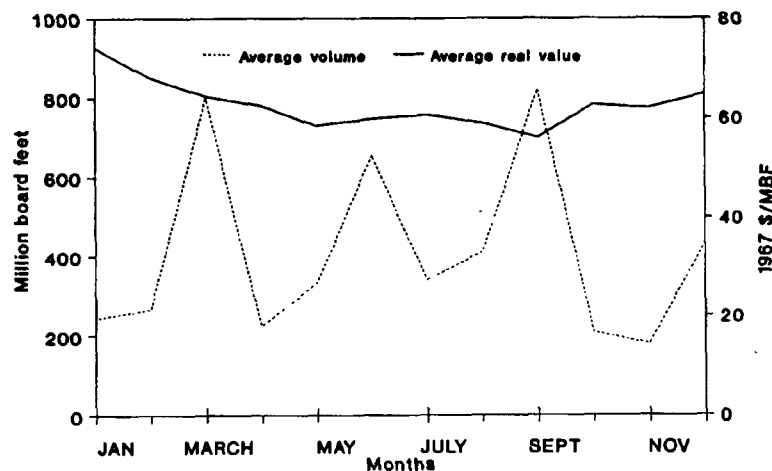


Figure 2—Average monthly volume and deflated prices in the Pacific Northwest.

These observations lead to specific issues. First, is there a definite seasonal pattern in the monthly price data during the last 14 years? Second, does the variability in sales volumes introduce volatility in stumpage prices?

Methods

The price data were deflated by using the producer price index (1967=100) so that changes in prices did not reflect inflationary trends. These prices are shown in the appendix, tables 11-13.

The process for seasonal adjustment was taken from Pindyck and Rubinfeld (1981). The first step is to compute a 12-month centered moving average for each observation. The second step attempts to estimate the combined seasonal and irregular components by dividing the original price by the moving average price. The third step is to eliminate the irregular component and estimate the seasonal index. This is done by averaging the results of step 2 for each month. Final seasonal indices are computed in the fourth step and are shown for both monthly prices and volumes sold (table 7). The final step is to compute the deseasonalized price from the original series. This is done by dividing the original series by the seasonal index (for the appropriate month).

Results

The deseasonalized prices are shown in deflated terms in tables 8-10. Prices for the first and last 6 months of the data period are missing because of the use of 12-month centered averages. The seasonal indices are shown in figure 3 and generally confirm that prices are higher in winter (especially for eastern Washington and Oregon) and lower in summer. Deseasonalized prices and the original prices are shown in figures 4-6. In general, these prices show that seasonal trends have not affected the basic trend in prices. Seasonality can potentially affect intrayear comparisons, such as comparing prices in a winter month with those in a summer month during the same year.

The empirical evidence shows only a small amount of long-term trend in the price data. The sum of the seasonal indices is 11.92. If the indices had added to 12.00, then there would have been no long-term trend in the price data. The volatility in the price data seems due to cyclic trends in the market.

Table 7—Seasonal Indices by month

Month	Price			Volumes		
	Western Oregon and Washington	Eastern Oregon and Washington	Region 6	Western Oregon and Washington	Eastern Oregon and Washington	Region 6
January	1.142889	1.048057	1.163019	0.675522	0.496981	0.618615
February	1.058636	1.208751	1.116392	.662516	.635563	.655643
March	1.034100	1.115988	1.056520	2.183904	1.801295	2.047990
April	1.006953	1.043045	1.029035	.554479	.513071	.543162
May	.938741	.926803	.917495	.697250	.861049	.771056
June	.966844	.992507	.954395	1.593691	1.621986	1.604489
July	.918468	.980729	.932994	.877234	.740901	.835286
August	.924510	.907834	.914330	1.003735	1.030434	1.007894
September	.920493	.921304	.893375	1.860229	2.310289	1.994837
October	1.038470	.965534	1.023101	.544714	.484642	.527766
November	1.052698	.915785	1.014925	.448581	.441322	.446265
December	.997191	.973658	.984412	.898139	1.062460	.946993

Table 8—Deseasonalized real price for each month in western Oregon and Washington, 1975-88

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>1967 dollars/thousand board feet</i>												
1975	—	—	—	—	—	65.08	55.54	77.40	85.84	72.04	68.81	68.92
1976	76.36	72.47	73.86	64.47	76.13	68.14	57.55	68.01	60.53	74.20	87.91	75.44
1977	126.49	76.66	80.45	90.58	83.92	84.15	92.03	68.05	90.01	94.70	71.62	57.38
1978	98.20	79.64	82.55	98.06	85.09	78.79	98.21	107.75	92.86	95.25	96.53	101.84
1979	94.28	120.54	117.12	97.14	118.11	127.52	106.37	146.13	142.25	138.91	116.08	100.92
1980	123.46	127.98	98.72	115.82	113.75	109.78	137.63	126.57	112.03	70.86	122.01	128.31
1981	109.09	113.48	110.10	84.57	84.12	95.71	81.06	79.98	70.21	78.72	47.88	64.36
1982	30.40	35.05	33.19	29.11	25.31	23.13	22.25	17.95	28.40	27.22	37.90	37.67
1983	28.07	43.13	40.45	36.71	35.78	41.04	39.24	40.93	32.83	32.88	38.70	44.43
1984	31.33	41.40	32.85	31.36	31.44	33.51	34.65	23.74	23.41	21.71	27.17	25.86
1985	33.23	20.83	25.24	28.42	24.08	24.84	25.81	26.92	26.45	33.03	32.11	25.91
1986	29.21	25.84	31.24	46.54	42.87	38.54	37.92	40.66	40.03	43.69	29.89	40.62
1987	34.25	41.54	43.71	39.54	42.16	42.98	52.25	43.38	52.11	50.52	50.42	51.86
1988	45.75	52.77	58.87	59.55	65.76	58.79	59.86	66.21	61.74	63.98	69.29	58.15
1989	78.77	74.13	79.31	71.92	81.46	94.87						

The seasonal indices for volume sold each month (shown in table 7) display greater volatility than do the indices for monthly prices. The volume indices also display several patterns introduced by institutional practices; for example, the indices for months at the end of each quarter are nearly twice as large as the average of the first 2 months of each quarter. The highest indices are for third quarter, which for the past 12 years has been the last quarter of the fiscal year. The least volume sold is in the first quarter of each fiscal year. These patterns are the same for both subregions, which suggests that they result from administrative actions rather than from market forces.

Table 9—Deseasonalized real price for each month in eastern Oregon and Washington, 1975-88

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>1967 dollars/thousand board feet</i>												
1975	—	—	—	—	—	18.44	16.24	16.49	25.09	27.38	13.60	17.39
1976	60.67	21.25	39.34	12.54	26.22	29.06	35.68	29.95	51.54	52.43	31.23	49.88
1977	34.72	60.43	43.10	33.54	41.43	59.39	51.19	23.81	61.28	52.19	68.15	62.09
1978	42.20	67.48	64.50	104.18	43.06	69.87	78.54	90.84	77.95	55.73	82.77	125.18
1979	48.41	76.62	70.39	82.83	105.16	69.99	68.01	53.72	69.05	53.58	82.59	72.05
1980	71.70	50.49	53.51	39.68	39.99	71.68	72.31	74.98	40.34	22.73	46.82	47.49
1981	57.26	31.47	57.73	47.17	46.50	49.34	47.22	38.74	60.63	30.81	20.34	28.62
1982	24.06	27.12	22.14	24.01	9.27	17.91	16.69	17.06	9.54	18.87	12.78	17.02
1983	27.86	27.36	21.61	30.97	18.05	31.03	27.93	34.06	19.81	19.69	41.49	27.22
1984	29.33	26.43	22.25	47.63	37.83	27.80	24.51	24.42	21.12	15.27	25.26	11.86
1985	10.22	21.29	23.51	29.74	32.20	21.43	23.78	25.57	26.07	38.84	40.61	25.35
1986	30.09	48.47	30.35	17.53	24.96	30.10	32.33	39.98	42.52	47.08	29.16	32.16
1987	25.57	30.38	42.30	28.43	56.13	38.56	47.04	48.98	40.09	51.88	59.60	58.23
1988	47.56	43.07	46.08	42.39	64.35	30.51	34.63	53.02	37.70	76.58	43.02	57.01
1989	53.17	60.95	54.36	53.99	60.18	61.03						

Table 10—Deseasonalized real price for each month in Oregon and Washington, 1975-88

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>1967 dollars/thousand board feet</i>												
1975	—	—	—	—	—	50.39	46.03	62.45	70.42	68.33	57.53	50.96
1976	72.51	57.29	60.27	52.44	59.31	57.72	51.08	47.31	59.83	71.20	50.24	57.45
1977	112.64	71.69	70.76	77.26	67.20	76.47	80.81	64.93	77.19	81.94	72.52	60.22
1978	79.75	74.54	78.00	98.86	76.46	78.09	90.91	103.09	90.36	89.86	94.43	109.72
1979	83.29	108.99	106.37	92.51	117.03	110.60	90.45	111.44	121.81	94.59	96.27	91.10
1980	110.81	104.07	86.63	101.48	88.37	103.30	122.18	110.16	85.25	58.29	114.48	107.00
1981	94.33	87.17	92.76	70.71	67.33	81.27	72.12	68.63	69.95	60.18	39.98	53.98
1982	27.41	32.26	30.46	27.15	22.07	21.95	21.22	17.79	21.83	24.46	33.26	33.44
1983	27.01	36.69	35.90	34.16	32.13	39.62	36.52	38.90	26.57	29.47	38.84	39.90
1984	30.00	35.14	29.72	36.98	34.58	32.14	32.23	24.07	23.45	19.13	26.49	22.89
1985	30.29	20.75	24.74	28.45	26.66	23.96	25.28	26.86	27.10	34.92	34.05	25.84
1986	28.06	37.73	30.91	35.57	34.25	36.74	36.48	40.54	41.93	44.39	29.01	38.09
1987	29.62	38.32	43.47	36.82	48.01	42.55	50.99	45.57	49.62	50.89	52.94	54.05
1988	44.58	48.60	53.80	52.55	66.51	53.08	52.45	61.61	55.76	67.26	60.58	57.69
1989	71.09	69.66	71.97	61.90	63.57	67.02						

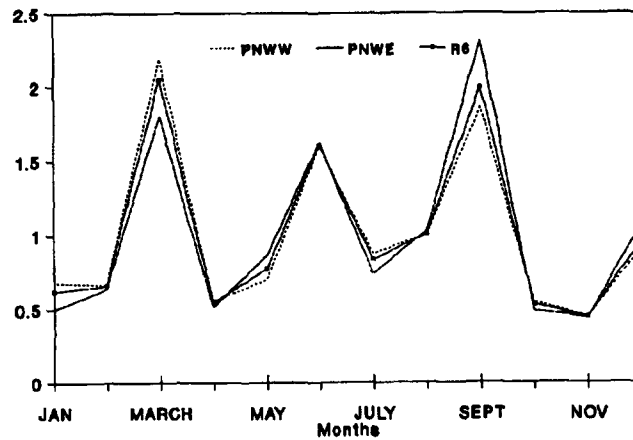


Figure 3—Monthly seasonal indices for western (PNWW) and eastern (PNWE) Oregon and Washington and for Region 6 (R6).

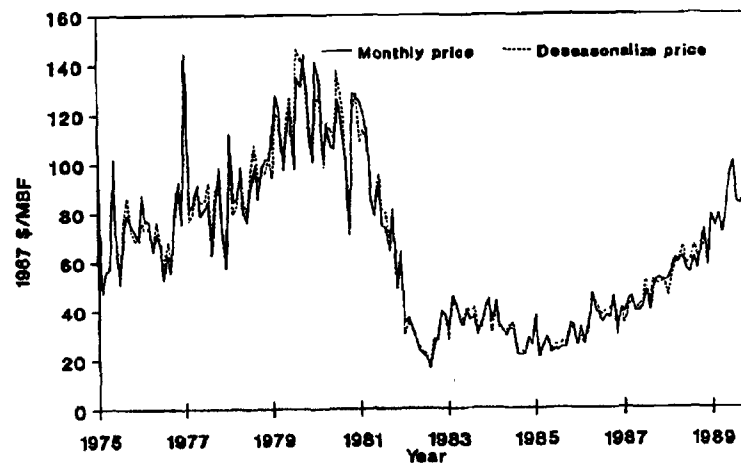


Figure 4—Monthly prices for western Oregon and Washington.

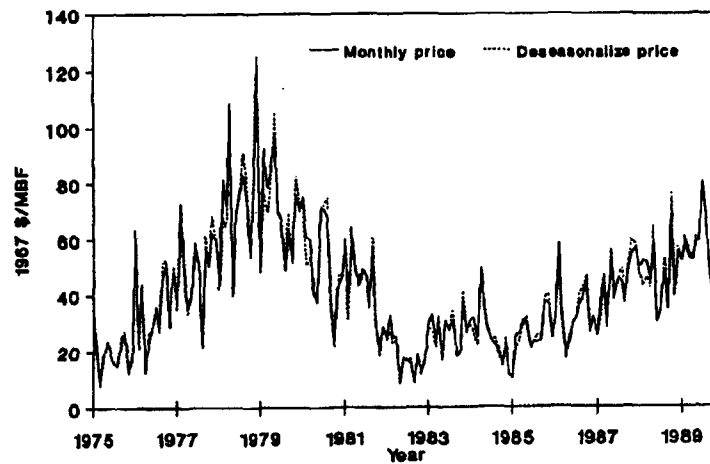


Figure 5—Monthly prices for eastern Oregon and Washington.

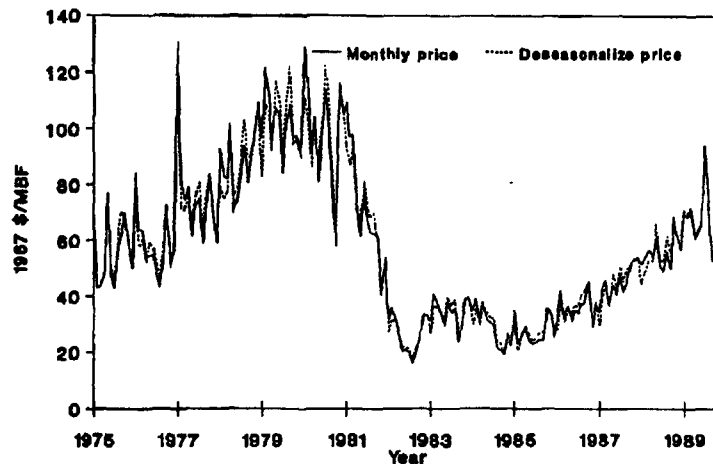


Figure 6—Monthly prices for Region 6.

Implications

A small amount of seasonality occurs in monthly stumpage price data, but the volatility in the series seems due mainly to cyclic trends in the market. These findings suggest that the monthly price data are robust but are affected by seasonal variation. They provide effective measures of the value of timber, and they complement other estimates of stumpage prices measured over longer periods of time. The findings also suggest that the variability in sales volumes from month to month does not affect the accuracy of individual monthly stumpage prices.

Seasonal adjustments can change our view of price changes. Consider the following data for 1987:

Month	Unadjusted price	Adjusted price
<i>1967 dollars per thousand board feet</i>		
January	39.14	34.25
February	43.97	41.54
March	45.20	43.71
April	39.82	39.54
May	39.58	42.16
June	41.56	42.98
July	47.99	52.25
August	40.11	43.38
September	47.96	52.11
October	52.47	50.52
November	53.07	50.42
December	51.71	51.86

Prices in late fall and winter overstate the actual prices, and those in summer understate actual prices. Industry observers noted, for example, a rise in stumpage prices starting in September 1987; adjusting for seasonal changes suggests that prices actually fell slightly in October and then remained constant until December. On the other hand, correcting for seasonality shows (as does the unadjusted price series) that prices rose during the entire year because of cyclical events (strong housing and residential repair and alteration markets). The unadjusted series suggests this change was 32 percent, but adjusting the price series increases the change to 51 percent.

The monthly stumpage prices do not display any greater seasonality than do the quarterly stumpage prices traditionally used to describe stumpage markets. Similar seasonal adjustments for quarterly stumpage prices are:

Quarter	Adjustment
First	1.059
Second	.979
Third	.919
Fourth	1.041

These figures suggest the need for the same cautions as given for the monthly stumpage prices. Custom condones, however, the use of the unadjusted price series.

Price series provide information about supply and demand relations for a given product. The greater the understanding of the nature of these price series, the more information to be discerned about changes in supply and demand forces. Monthly prices, although they show the basic trend in prices, require extra caution when used to measure changes within a given year and when used to measure long-term changes between prices for different months.

Acknowledgment

Florence Ruderman and Debra Warren collected the data as part of their work on "Production, Prices, Employment, and Trade in Northwest Forest Industries." Judy Mikowski helped compute the monthly prices and assisted in the analysis.

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Appendix

Deflated Prices for Oregon and Washington

Table 11—Real price for each month in western Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>1967 dollars/thousand board feet</i>												
1975	89.92	47.48	55.76	57.26	101.73	62.92	51.01	71.56	79.02	74.81	72.44	68.72
1976	87.27	76.72	76.38	64.92	71.46	65.88	52.86	62.88	55.72	77.06	92.54	75.23
1977	144.57	81.15	83.20	91.21	78.78	81.36	84.52	62.91	82.85	98.34	75.39	57.22
1978	112.23	84.31	85.37	98.75	79.88	76.18	90.20	99.62	85.48	98.92	101.61	101.55
1979	107.75	127.60	121.12	97.81	110.88	123.29	97.70	135.09	130.94	144.26	122.20	100.63
1980	141.11	135.48	102.08	116.62	106.79	106.14	126.41	117.02	103.12	73.59	128.44	127.95
1981	124.68	120.13	113.85	85.16	78.97	92.54	74.45	73.94	64.63	81.75	50.40	64.18
1982	34.75	37.11	34.32	29.31	23.76	22.37	20.44	16.60	26.14	28.27	39.90	37.57
1983	32.08	45.66	41.83	36.96	33.59	39.68	36.04	37.84	30.22	34.14	40.74	44.31
1984	35.81	43.82	33.97	31.58	29.51	32.40	31.83	21.95	21.55	22.55	28.60	25.79
1985	37.98	22.05	26.10	28.62	22.60	24.02	23.70	24.89	24.34	34.30	33.80	25.83
1986	33.39	27.35	32.30	46.86	40.24	37.26	34.83	37.59	36.85	45.38	31.47	40.51
1987	39.14	43.97	45.20	39.82	39.58	41.56	47.99	40.11	47.96	52.47	53.07	51.71
1988	52.28	55.87	60.88	59.97	61.73	56.84	54.98	61.22	56.83	66.44	72.95	57.99
1989	78.55	73.92	79.09	71.72	81.23	94.60	100.60	84.15	82.92	86.13	106.53	123.57
Average	82.3	73.0	70.8	68.3	68.6	68.4	66.3	67.7	66.3	72.7	75.0	71.6

Table 12—Real price for each month in eastern Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>1967 dollars/thousand board feet</i>												
1975	37.72	20.34	7.76	20.32	23.73	18.30	15.92	14.97	23.11	26.43	12.45	16.93
1976	63.58	25.68	43.91	13.08	24.30	28.84	34.99	27.19	47.48	50.62	28.60	48.57
1977	36.38	73.04	48.09	34.99	38.40	58.94	50.21	21.62	56.46	50.39	62.42	60.45
1978	44.23	81.56	71.98	108.67	39.91	69.35	77.02	82.47	71.82	53.81	75.80	121.89
1979	50.73	92.62	78.56	86.39	97.47	69.46	66.70	48.77	63.62	51.73	75.64	70.15
1980	75.14	61.03	59.72	41.39	37.07	71.14	70.92	68.07	37.16	21.94	42.88	46.24
1981	60.01	38.04	64.43	49.20	43.10	48.97	46.31	35.17	55.86	29.74	18.63	27.86
1982	25.21	32.78	24.70	25.05	8.59	17.77	16.37	15.49	8.79	18.22	11.70	16.57
1983	29.20	33.07	24.12	32.31	16.73	30.80	27.39	30.92	18.25	19.01	37.99	26.50
1984	30.74	31.95	24.84	49.68	35.06	27.59	24.03	22.17	19.46	14.74	23.13	11.54
1985	10.71	25.73	26.23	31.02	29.84	21.26	23.32	23.22	24.02	37.51	37.19	24.68
1986	31.53	58.59	33.87	18.28	23.14	29.87	31.70	36.30	39.18	45.46	26.70	31.31
1987	26.80	36.72	47.21	29.65	52.03	38.27	46.13	44.47	36.93	50.10	54.58	56.70
1988	49.84	52.06	51.42	44.21	59.64	30.28	33.96	48.13	34.74	73.94	39.39	55.50
1989	51.77	59.34	52.93	52.57	58.59	59.42	80.77	66.63	46.67	37.48	37.52	64.47
Average	44.5	51.6	47.1	45.5	42.0	44.3	46.1	41.8	41.7	41.5	41.8	48.5

Table 13—Real price for each month in Oregon and Washington, 1975-89

Year	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
<i>1967 dollars/thousand board feet</i>												
1975	70.43	42.86	43.79	47.00	77.08	48.09	42.95	57.10	62.92	69.91	58.39	50.17
1976	84.33	63.96	63.67	53.96	54.42	55.09	47.66	43.25	53.45	72.85	50.99	56.56
1977	131.00	80.03	74.76	79.50	61.66	72.98	75.40	59.37	68.96	83.83	73.61	59.28
1978	92.75	83.21	82.41	101.73	70.15	74.53	84.82	94.26	80.73	91.93	95.84	108.01
1979	96.87	121.68	112.38	95.20	107.37	105.55	84.39	101.90	108.82	96.78	97.70	89.68
1980	128.87	116.18	91.52	104.43	81.08	98.58	114.00	100.72	76.16	59.63	116.19	105.33
1981	109.71	97.32	98.00	72.77	61.78	77.56	67.29	62.75	62.49	61.57	40.58	53.14
1982	31.88	36.01	32.18	27.94	20.25	20.95	19.80	16.26	19.51	25.03	33.75	32.92
1983	31.41	40.96	37.93	35.15	29.48	37.82	34.07	35.57	23.74	30.15	39.42	39.28
1984	34.90	39.23	31.40	38.05	31.73	30.67	30.07	22.01	20.95	19.57	26.89	22.53
1985	35.23	23.16	26.14	29.27	24.46	22.87	23.58	24.56	24.21	35.73	34.56	25.44
1986	32.63	42.12	32.66	36.60	31.42	35.06	34.03	37.07	37.46	45.41	29.44	37.50
1987	34.44	42.78	45.93	37.89	44.05	40.61	47.57	41.67	44.33	52.06	53.74	53.21
1988	51.85	54.26	56.84	54.08	61.02	50.66	48.93	56.33	49.82	68.81	61.48	56.79
1989	69.98	68.57	70.85	60.94	62.58	65.98	94.11	72.51	52.52	64.93	55.35	116.93
Average	74.0	68.0	64.3	62.5	58.5	59.8	60.6	59.0	56.1	62.7	62.0	64.8

Haynes, Richard W. 1991. Monthly stumpage prices for the Pacific Northwest. Res. Pap. PNW-RP-436. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 14 p.

Seasonal variation is found in monthly stumpage price data. Seasonal adjustments indicate that monthly adjustments improve the utility of estimates of monthly stumpage prices. Comparisons of adjusted and unadjusted prices suggest that the unadjusted price series are reasonably robust.

Keywords: Stumpage prices.

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