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Northeastern Regional Timber Stumpage Prices: 1961-91

Paul E. Sendak

Abstract

State and regional weighted averages were calculated for timber stumpage prices for the northeastern region. The weighting factor was the timber volume harvested. The regional price series for hardwood sawtimber, softwood sawtimber, hardwood pulpwood, and softwood pulpwood are reported for the 31-year period, 1961 to 1991. Hardwood sawtimber prices increased at the average annual rate of 10.3 percent (nominal), softwood sawtimber at 6.4 percent, hardwood pulpwood at 6.5 percent, and softwood pulpwood at 5.3 percent. Inflation, as measured by the All-commodity, Producer Price Index, averaged 5.7 percent per year over the 31-year period.

The Author

PAUL E. SENDAK, forest economist, received a B. S. degree in forestry from Rutgers University in 1965, and an M.S. degree in forestry in 1968 and Ph.D. degree in forest economics in 1972 from the University of Massachusetts. He joined the Northeastern Forest Experiment Station in 1969 and since 1993 has been engaged in research on ecology and management of northern hardwoods and associated ecosystems at the Northeastern Station's Forestry Sciences Laboratory, Durham, New Hampshire. This paper resulted from research conducted while he was forest economist and Project Leader of the research unit on economic potential of forest production in the North at the Northeastern Station's Forestry Sciences Laboratory in South Burlington, Vermont.

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Introduction

Economic models are important tools in planning natural resource programs and in managing natural resources. The U.S. Department of Agriculture, Forest Service uses the Timber Assessment Market Model (TAMM) to model timber markets for the Resource Planning Act (RPA) Assessment (Adams and Haynes 1980, Haynes 1990).

Although relatively good stumpage or mill-delivered timber prices exist for softwood timber in the West and South, such is not true for hardwood and softwood timber in the North. This has been a problem in modeling timber markets in this region. Analysts are forced to develop their own price series from published data, or in some cases, to choose a long running series such as that published in New Hampshire, and let that represent a multi-state region.

On investigation, the problem isn't a lack of data. There are some relatively long price series in the Northeast covering 30 or more years. Now, however, almost all of the 12 Northeastern States publish some type of stumpage price report (Lutz et al. 1992). In particular, hardwood lumber production has been increasing in the North relative to the South (Luppold and Dempsey 1989). As a result, many states began collecting and publishing stumpage prices during the 1980's. The problem is one of aggregating the data in a meaningful way to capture market trends for the region or multi-state sub-region.

Cardellichio and Binkley in 1983 set forth four criteria for a stumpage price series[1]:

- sufficient historical data should be available for each price series to facilitate econometric estimation of...timber supply functions...;
- the price series should be representative of the geographical regions within the model...;
- ...the price series should measure a large volume of sales within that region; and
- data from a single source are preferable to data derived from combining several sources to ensure comparability across regions and over time.

They found that there is no one data source in the Northern States that satisfies these criteria. The next best choice is to find a series or aggregate of two or more series to satisfy as many of the first three criteria as possible.

The specific objective of this study, recognizing the new sources of data that have become available, was to create a price series for timber stumpage that reflects the trends in regional prices over time. The four price series of interest are hardwood sawtimber and pulpwood and softwood sawtimber and pulpwood.

Data and Methods

Table 1 is a summary of the stumpage price information available for the 12 northeastern states (Lutz et al. 1992). It shows major attributes of the reports by state. All were entered into computer files. Information on annual timber cut, by state, was not available for all the states. Since timber-cut volume was used as a weighting factor in computing regional aggregates, Forest Inventory and Analysis (FIA) reports on timber cut, by state, were used to provide these estimates. An advantage of using the FIA reports is that the information is collected for all states using the same methods. A disadvantage is that the period covered by the report is different for almost all the states and the information for any one state is collected and reported approximately once every 10 years. The latest quantity information for each state was used as the weighting factor.

The rule applied was to include the fewest number of species that accounted for at least 85 percent of the total cut as reported by the most recent forest inventory. If the 85-percent level was reached, additional species were included if they accounted for at least 5 percent of the total cut. In most cases, the rule was applied successfully. But there were exceptions due to poor correspondence between reporting categories among the various reports. Within a state and product group, such as hardwood sawtimber in New York, a volume-weighted average price for species in that group was calculated. These averages then were weighted by total timber volume cut for each product group to calculate region-wide averages. A weighted average was used because a simple average of prices would fail to account for the relative importance of different species and different states in determining *an* average price. Through weighting, those species cut in the greatest quantities and those states that harvested the greatest quantities were assigned more importance in calculating an average price.

The method used here is analogous to the calculation of a general price index, such as the Consumer Price Index. The fixed quantity assumption was necessary because the annual quantity of timber cut by state was not available. However, the requirement of a base-year quantity was not met fully because the timber-cut data were not reported for the same year. If the different species within states and the states in the region retain the same relative position from year to year, the aggregate regional prices will provide a reliable measure of stumpage price change over time. This is a reasonable assumption, because relative quantity cut by species tends to change slowly over time. Of more concern are changes in average timber quality and size and local scaling practices. The quality-size factor also changes slowly over time but could be significant if sales reported were biased toward very poor or very good quality timber. The local scaling factor can change more quickly with changes in demand for consumer goods that use wood in their manufacture. As prices for sawn wood products decrease, sawmills may not only decrease

[1] Cardellichio, Peter A.; Binkley, Clark S. 1983. Stumpage prices in the hardwood assessment market model. [Unpublished.] On file with: School of Forestry, Yale University, New Haven, CT.

Table 1.--Summary of important characteristics of timber stumpage price reports published in the Northeast[a]

State	Type of data collected	Year reporting initiated	Reporting frequency	Reporting region[b]	Price statistic(s) reported	Reporting units
			Number/year	*Number*		
CT	All stumpage	1988	4	[d]	Median, high, low	Mbf Int-1/4", cords
DE[c]	All stumpage	1985	1	1	Weighted average	Mbf unspecified scale, cords
ME	All stumpage	1959	2	8	Average of "most common" prices, high, low	Mbf Int-1/4", cords, tons
MA	All stumpage	1988	4	[d]	Median, high, low	Mbf Int-1/4", cords
NH	Private stumpage	1948	1	10	High, low	Mbf Int-1/4", cords
NY	All stumpage	1972	2	14	"Most common," high, low	Mbf Int-1/4", Scribner, Doyle; cords
PA	All stumpage	1983	4	4	Average, standard deviation	Mbf Int-1/4", tons
RI	All stumpage	1988	4	[d]	Median, high, low	Mbf Int-1/4", cords
VT	All stumpage	1981	4	3	Median, high, low	Mbf Int-1/4", cords
WV	All stumpage	1986	1	5	Median, high, low	Mbf Doyle, cords

[a]Maryland and New Jersey do not publicly report timber stumpage prices.
[b]Reporting regions are adjusted occasionally; these represent the regions in 1988.
[c]All states but Delaware publish stumpage prices by species.
[d]Connecticut, Massachusetts, and Rhode Island publish a combined report for Southern New England with two reporting regions--east, or west of the Connecticut River.

their log prices, which are reflected in stumpage prices, but they may tighten their log grading rules or lower their estimate of volume contained in a log. This latter action is not reflected in the stumpage price. All these effects can be gradual or sudden, operate in the same or different direction, but are not measurable by any of the stumpage price sources used in this study.

Maine

The source of stumpage prices was Maine Forest Service (1963-91) and for timber volume cut, Nevel et al. (1985). Three species--spruce, white pine, and balsam fir--accounted for 89 percent of the softwood sawtimber cut. Five species--hard maple, yellow birch, beech, ash, and aspen--accounted for 58 percent of the hardwood sawtimber cut. The "Other hardwoods" category accounted for 42 percent of the hardwood sawtimber cut, but no corresponding category existed in the *Stumpage Price Report,* so the category was eliminated. For the pulpwood groups, all hardwoods and all softwoods accounted for 100 percent of the pulpwood cut.

New Hampshire

The source of stumpage prices was Engalichev (1961-91) and for timber volume cut, Nevel et al. (1986). New Hampshire reports price ranges by timber quality class for most species. When quality was reported, the medium quality class was used. The average price was assumed to be the center of the reported range. Three species--white pine, spruce-fir, and hemlock--accounted for 99 percent of the softwood sawtimber volume cut. Six species--oaks, hard maple, white birch, yellow birch, ash, and beech--accounted for 91 percent of the hardwood sawtimber cut. For softwood pulpwood, prices for spruce-fir in the north and central regions of New Hampshire were used. Hardwood pulpwood prices also were from the north and central regions. For the pulpwood groups, all hardwoods and all softwoods accounted for most of the pulpwood cut.

New York

The source of stumpage prices was New York State Department of Environmental Conservation (1974-91) and for timber volume cut, Nevel et al. (1982). Three species--white pine, hemlock, and red pine--accounted for 97 percent of the softwood sawtimber volume cut. Eight species--hard maple, red oak, soft maple, black cherry, beech, ash, basswood, and white oak--accounted for 92 percent of the hardwood sawtimber cut. For the pulpwood groups, all hardwoods and all softwoods accounted for 100 percent of the pulpwood cut.

Pennsylvania

The source of stumpage prices was Pennsylvania State University (1987-91) and for timber volume cut, Bones and Sherwood (1979). Two species--hemlock and white pine--accounted for 96 percent of the softwood sawtimber cut. Nine species--red-black oak, black cherry, white oak, soft maple, hard maple, chestnut oak, yellow-poplar, scarlet-pin oak, and ash--accounted for 91 percent of the hardwood

Table 2.--Average nominal and real[a] stumpage prices, by product group, in the Northeast, 1961-91

Year	Hardwood sawtimber		Softwood sawtimber		Hardwood pulpwood		Softwood pulpwood	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	Dollars per Mbf				*Dollars per cord*			
1961	13.64	43.17	13.86	43.87	1.31	4.15	1.97	6.25
1962	13.79	43.51	14.21	44.81	1.39	4.38	2.05	6.46
1963	14.34	45.36	14.90	47.15	1.46	4.62	2.15	6.80
1964	14.63	46.29	14.90	47.15	1.56	4.95	2.29	7.25
1965	14.64	45.32	15.47	47.91	1.48	4.57	2.53	7.82
1966	15.79	47.43	15.87	47.66	1.82	5.47	2.49	7.48
1967	14.91	44.64	16.30	48.81	2.07	6.20	2.63	7.88
1968	16.15	47.22	16.78	49.06	1.97	5.75	2.62	7.66
1969	17.92	50.33	18.19	51.10	2.09	5.87	2.58	7.26
1970	19.15	51.90	17.69	47.93	2.67	7.22	2.76	7.48
1971	18.93	49.68	18.66	48.98	2.12	5.56	2.76	7.25
1972	20.64	51.85	19.43	48.83	2.26	5.69	2.86	7.17
1973	21.02	46.71	20.90	46.43	2.48	5.51	3.33	7.39
1974	39.98	74.73	24.36	45.53	2.58	4.82	3.79	7.08
1975	38.65	66.18	28.52	48.84	3.10	5.31	3.79	6.49
1976	42.48	69.53	31.45	51.47	3.50	5.74	4.66	7.63
1977	48.09	74.09	33.14	51.06	3.77	5.81	4.45	6.85
1978	62.19	88.98	38.32	54.83	4.10	5.86	5.16	7.38
1979	81.69	103.79	46.93	59.64	4.69	5.95	5.62	7.14
1980	79.80	88.86	49.12	54.70	5.61	6.25	6.19	6.89
1981	81.25	82.91	48.99	49.99	5.38	5.49	6.42	6.55
1982	85.67	85.67	52.55	52.55	5.86	5.86	6.99	6.99
1983	104.87	103.52	51.19	50.53	6.03	5.95	6.62	6.53
1984	104.67	100.93	52.72	50.84	6.73	6.49	7.09	6.84
1985	104.85	101.70	53.63	52.02	6.48	6.29	6.99	6.78
1986	113.93	113.70	53.35	53.24	6.18	6.17	6.86	6.85
1987	132.65	129.03	58.47	56.88	6.37	6.19	6.62	6.44
1988	163.34	152.80	61.19	57.25	6.74	6.30	7.18	6.72
1989	142.78	127.25	65.50	58.38	6.87	6.12	7.89	7.03
1990	142.74	122.74	66.83	57.46	6.53	5.62	8.07	6.94
1991	139.73	119.94	65.14	55.92	6.54	5.61	8.74	7.51

[a]Adjusted for inflation by the Producer Price Index, All-commodity (1982 = 100).

sawtimber cut. Chestnut oak was grouped with white oak and scarlet-pin oak was grouped with red-black oak to match the price-reporting categories. For the pulpwood groups, all hardwoods and all softwoods accounted for 100 percent of the pulpwood cut.

Southern New England (Connecticut, Massachusetts, and Rhode Island)

The source of stumpage prices was University of Massachusetts (1988-91) and for timber volume cut, Nevel and Wharton (1988). Two species--white-red pine and other softwood--accounted for 100 percent of the softwood sawtimber cut. Three species--oaks, beech-birch-maple, other hardwoods--accounted for 100 percent of the hardwood sawtimber cut. No pulpwood prices are reported for southern New England.

Vermont

The source of stumpage prices was McEvoy (1982-91) and for timber volume cut, Nevel et al. (1986). Three species--white pine, spruce-fir, and hemlock--accounted for 96 percent of the softwood sawtimber cut. Four species--hard maple, oaks, yellow-birch, and ash--accounted for 71 percent of the hardwood sawtimber cut. For the pulpwood groups, all hardwoods and all softwoods accounted for 100 percent of the pulpwood cut.

West Virginia

The source of stumpage prices was Murriner (1989-91) and for timber volume cut, Bones and Glover (1977). Two species--yellow pine and white pine--accounted for 46 percent of the softwood sawtimber cut. There was poor correspondence among categories in the price and timber cut reports, resulting in a small percentage of the total softwood cut included here. Eleven species--northern red oak, yellow-poplar, other red oak, chestnut oak, white oak, hard maple, hickory, soft maple, basswood, black cherry, and ash--accounted for 90 percent of the hardwood sawtimber cut. Northern red oak and other red oak were combined to match the price-reporting category of red oak. All hardwood pulpwood accounted for 100 percent of the pulpwood cut. No prices were reported for softwood pulpwood.

In general, simple averages of prices reported by regions within states were calculated to obtain statewide averages and annual averages from quarterly or semi- annual reports. Adjustments were made when data anomalies were encountered due to changes in reporting format or missing observations. Sawtimber prices reported in Doyle or Scribner log-rule volume were converted to International 1/4-inch-rule volume (Pennsylvania State University 1987-91). Pulpwood prices reported by weight were converted to standard cord (Nevel et al. 1986).

Results

Table 2 shows the average timber stumpage prices for the four product groups for the Northeast from 1961-91. Along with the nominal prices are the real prices, in 1982 dollars. Inflation, as measured by the All-commodity, Producer Price Index, averaged 5.7 percent per year over the time period.

The nominal regional prices are plotted over time in Figures 1 through 4. The individual state price series also are plotted in the same figures. These plots show at a glance the inclusion of states in the regional average and their tracking with the regional average and with the other states. The regional average includes Maine and New Hampshire from 1961 to 1974 when New York was added. Vermont was included starting in 1982, Pennsylvania in 1985, southern New England in 1988, and West Virginia in 1989. Earlier stumpage prices exist for some of these states, but some of the data were reported in substantially different format or sporadically.

For hardwood sawtimber (Fig. 1), the single state that comes closest to tracking the regional series is New York. For softwood sawtimber (Fig. 2), New Hampshire comes closest to tracking the regional series. For hardwood and especially softwood pulpwood (Figs. 3 and 4), the regional series follows the Maine series closely, due to the large pulpwood volume harvested in the state.

Finally, Table 3 presents the annual percentage rate of change in the regional stumpage price series for the 1961 to 1991 period, for both nominal and real prices. The rates were estimated using the regression procedure in Sendak (1991). Generalized least squares (GLS) was used to estimate the real rates of change because the regression residuals were serially correlated (see, for example, Johnston 1972). The result of serially correlated residuals in ordinary least squares regression is an unbiased estimate of the rate of change, but its standard error is underestimated leading to a higher t-value. Because the real rates of change were close to zero, GLS was used to obtain efficient estimates, decreasing the chance of making a Type I error.

Hardwood sawtimber, for both nominal and real prices, had the greatest rate of increase over the 31 years. Real prices increased at an average rate of 4.5 percent per year. Softwood sawtimber prices kept ahead of inflation; real prices increased at an average rate of almost 1 percent per year. Pulpwood, both hardwood and softwood, increased at about the rate of inflation, with real prices showing no increase over the 31-year period.

Table 3.--Nominal and real annual percentage rate (APR) of change in Northeast stumpage prices, by product group, 1961-91

Species and product group	Nominal	Real
	Percent	
Sawtimber		
Hardwood	10.3	4.5
Softwood	6.4	0.7
Pulpwood		
Hardwood	6.5	0.5[a]
Softwood	5.4	-0.3[a]

[a]Not significantly different from zero ($p \leq 0.05$).

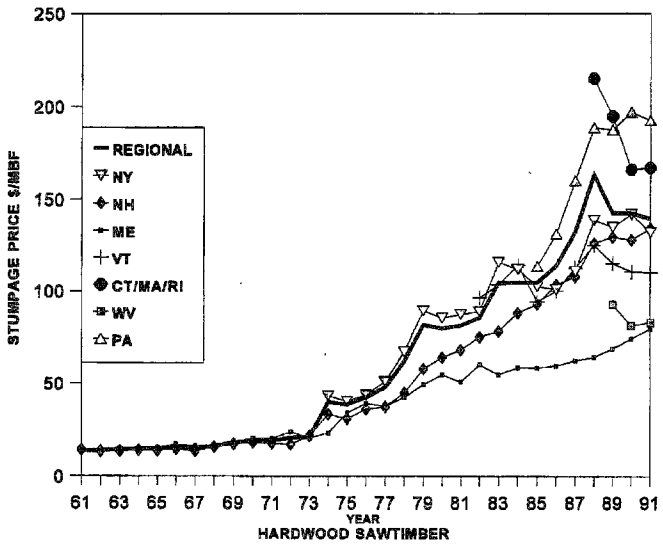

Figure 1.--Hardwood sawtimber stumpage price in dollars per Mbf (International 1/4-inch rule) for the Northeast and by state, 1961-91.

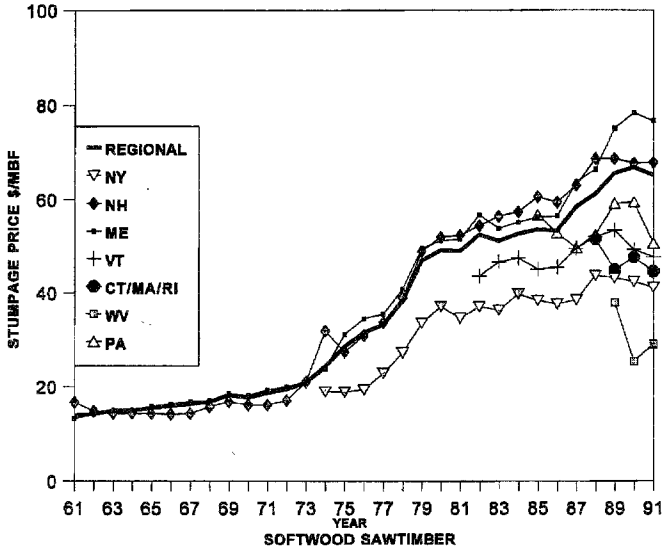

Figure 2.--Softwood sawtimber stumpage price in dollars per Mbf (International 1/4-inch rule) for the Northeast and by state, 1961-91.

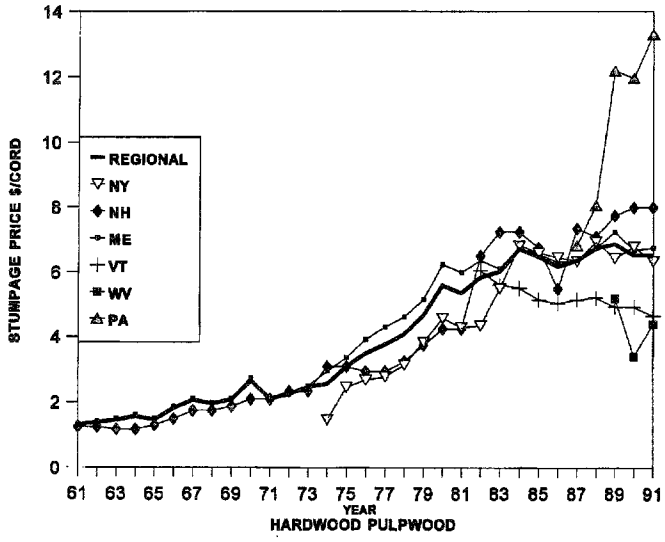

Figure 3.--Hardwood pulpwood stumpage price in dollars per cord for the Northeast and by state, 1961-91.

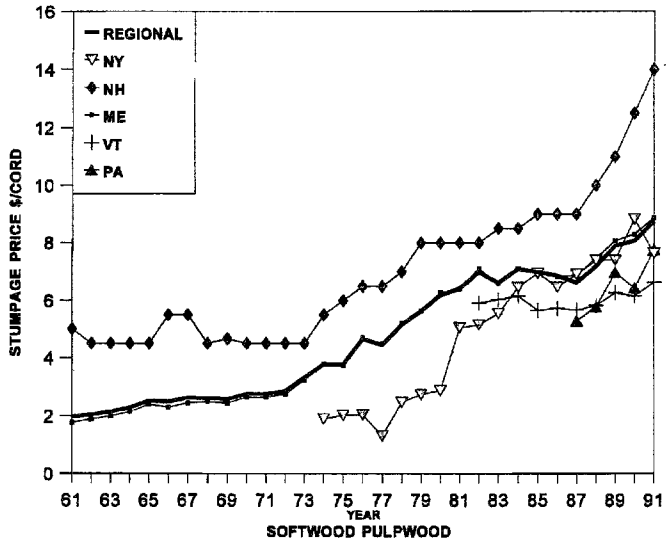

Figure 4.--Softwood pulpwood stumpage price in dollars per cord for the Northeast and by state, 1961-91.

Summary

Timber stumpage prices have been estimated for the Northeast. State reported stumpage prices were weighted by timber cut within states and within the region. Species or species groups that represent large volumes of the timber cut, both within states and within the region, have a greater influence on the regional stumpage prices than do the relatively minor species. The regional prices meet some of the criteria listed by Cardellichio and Binkley cited in the Introduction. A series consisting of 31 years is of sufficient length for econometric estimation of timber supply functions. Prices are included for up to 9 states in the 12-state region for good geographical representation. Although the coverage of sales probably differs from state to state, the weighting by volume harvested somewhat addresses this issue by placing emphasis on commercially important species.

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State and regional weighted averages were calculated for timber stumpage prices for the northeastern region. The weighting factor was the timber volume harvested.

Keywords: Price analysis; regression analysis; price series

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