

# Relative Price Trends for Hardwood Stumpage, Sawlogs, and Lumber in Ohio

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**Abstract:** During the 1980's, the hardwood lumber industry experienced a rapidly changing domestic and international hardwood product market. These changes have significantly affected prices of hardwood lumber, and subsequently affected prices of hardwood sawlogs and stumpage. To illustrate these changes, this paper examines deflated prices and price trends for hardwood lumber, and Ohio sawlogs and stumpage from 1975 to 1991. Differences between log price trends, and the trends in stumpage and lumber prices also are examined. Results show increasing real prices for red and white oak sawlogs and red oak lumber; high-quality sawlogs showed the largest gains. Real prices of sawlogs and lumber declined for non-select species such as yellow-poplar and hard maple. The analysis of price relationships also indicated that the relative gains in red oak and yellow-poplar stumpage prices exceeded those of sawlog prices. For red oak, sawlog prices also increased at a greater rate than lumber prices. These results indicate that stumpage prices have increased because of transferred efficiencies in milling and harvesting, as well as the growing domestic and international demand for high-quality oak lumber and veneer.

## INTRODUCTION

Since 1975 the hardwood lumber market has experienced considerable change. Although hardwood lumber production is still cyclical, the trend for eastern hardwood production has been upward. Between 1976 and 1991, hardwood lumber production increased by more than 3.5 billion board feet (Luppold and Dempsey 1989); the bulk of this growth occurred in the mid 1980's. The forces behind this growth are increased prices resulting from increased domestic and international demands (Luppold 1991). A disproportionate amount of this increased demand was for higher quality oak, ash, cherry, and hard maple lumber.

The strong market reflecting increased demand for higher quality hardwoods of the more select species caused many of the larger hardwood sawmills to purchase new equipment capable of cutting large volumes of higher quality logs. This change caused greater demands for higher quality logs and stumpage that were already in relatively low supply. As a result, prices of higher quality logs and stumpage of the select species increased at a much greater rate than the price of lower quality logs and logs of non-select species.

The purpose of this paper is to examine the change in log, stumpage, and lumber prices over the last 15 years, and to contrast changes in different species and grades of hardwood logs. This paper will also demonstrate how changing log and stumpage prices have reduced sawmill operating margins, forcing these firms to become even more efficient.

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## METHODS

The price series analyzed include stumpage prices and delivered log prices reported for Ohio from 1975 to 1991 (Ohio Agric. Stat. Serv. 1975-91), and hardwood lumber prices reported in the Hardwood Market Report (Lemsky 1975-91). The four log grade designations used in this report and the corresponding quality and size criteria include; prime logs (USFS grade 1, scaling diameter  $\geq 16$  inches), grade 1 logs (USFS grade 1, scaling diameter 13-15 inches), grade 2 logs (USFS grade 2, scaling diameter  $\geq 12$  inches), grade 3 (USFS grade 3, scaling diameter  $\geq 8$  inches).

To compare real prices, reported nominal prices were deflated with the Producer Price Index for all commodities (1982=100). To compare and plot real price trends for selected price series, ordinary least squares regression analysis was used to estimate the average annual compounded rate of change ( $r$ ) in prices using the log-linear equation  $Y = b_0 + b_1X$ ; where  $Y$  = the natural logarithm of real price,  $X$  = year, and  $r = \text{antilog}(b_1) - 1$  (de Steiguer and others 1989).

Ratios of indexed prices were calculated to relate real price trends for stumpage and lumber to the real price trend for delivered logs. Real prices of stumpage, logs, and lumber were indexed so that real prices for 1975 = 100. The indexed lumber and stumpage prices for each year in the series were then divided by the indexed log price for that year, and multiplied by 100. Index ratios greater than 100 indicate that prices for stumpage or lumber increased proportionately more than log price, or decreased less when all prices were declining. Indexed ratios less than 100 indicate that prices for lumber or stumpage increased proportionately less than log prices, or decreased more when all real prices were declining. Log prices represent grade 1 logs. Lumber prices represent No. 1 common lumber.

## RESULTS

Comparing log price trends reveals important differences in the markets for specific tree species and demonstrates the cyclical nature of the hardwood log market (Figure 1). The real prices of grade 1 red oak and white oak logs significantly outpaced the rate of inflation from 1975 to 1991, with real prices increasing at an average annual rate of 2.6 percent for red oak and 1.5 percent for white oak. These real growth rates reflect the strong domestic and international market for these two species. Weak markets for hard maple and yellow-poplar contributed to the extended decline in real prices that averaged -2.0 percent per year for these two species. The net result of these diverging price trends is a growing spread in real prices between select and non select species, from \$34/Mbf or less in 1975, to approximately \$165/Mbf in 1991. It should be noted that the current market indicates improved demand for yellow-poplar and hard maple, resulting in recent real price gains.

The cyclical nature of the hardwood market, a response to general economic conditions and international demand, is evident from the peaks and valleys in the price trends. Real prices increased from 1975 to 1979, declined from 1979 to 1982, made strong gains from 1982 to 1988-89, and then showed a modest decline (Figure 1). These cyclical affects were most pronounced for oak logs and had minor effects on the declining prices of hard maple and yellow-poplar.

Log price trends are also affected by log quality. The real prices of grade 2 or better red oak sawlogs have increased, while grade 3 sawlog prices have decreased slightly (Figure 2). The very strong growth rates in prime log prices reflect the increased emphasis on quality in both the domestic and international lumber markets. This demand for quality lumber also has increased the price spreads between log grades of red oak sawlogs and amplified the magnitude of cyclical variations in the real prices of grade 1 and prime red oak sawlogs. The modest downward trend in grade 3 prices indicates a weak market for low-quality red oak logs and lumber. Due to the weak market for yellow-poplar, the prices of all log grades have cycled downward with very little change in the price spreads between log grades (Figure 3).

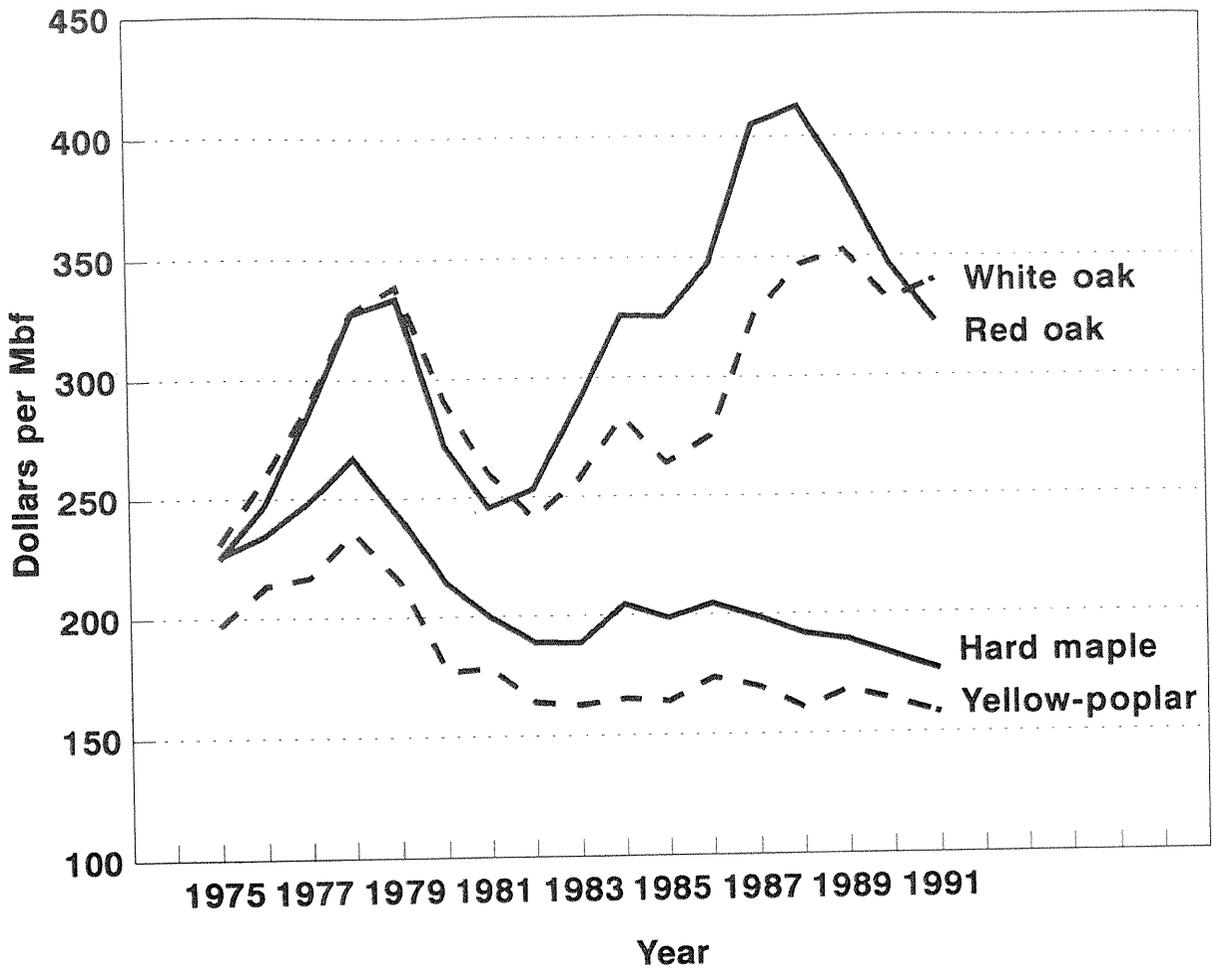


Figure 1.—Real prices of Ohio white oak, red oak, hard maple, and yellow-poplar grade 1 logs, 1975-91 (in 1982 dollars).

Comparing real stumpage prices for red oak and yellow-poplar further defines the differences in the market for select and non-select species (Figure 4). These stumpage price trends are similar, but not identical, to the log price trends shown in figure 1. The average annual rate of increase in real red oak stumpage price (4.8 percent) exceeds the rates for all grades of red oak sawlogs. Whereas the price of all grades of yellow-poplar sawlogs has generally declined from 1975 to 1991, yellow-poplar stumpage price showed a very small increase (0.6 percent per year). Diverging price trends also increased the price spread between red oak and yellow-poplar stumpage from approximately \$25/Mbf in 1975, to more than \$100/Mbf in 1991 (Figure 4).

Prices of No. 1 common lumber show the now familiar upward trend for red oak and downward trend for yellow-poplar (Figure 5). However, the 1.2 percent average rate of increase in the real price of No. 1 common red oak lumber is less than the rate of increase for red oak stumpage (4.8 percent), prime logs (3.2 percent), and grade 1 logs (2.6 percent). For No. 1 common yellow-poplar lumber, real prices declined at an average annual rate of -1.8 percent whereas stumpage prices increased 0.6 percent per year. However, this rate of decline is very similar to the real price trends for yellow-poplar saw logs.

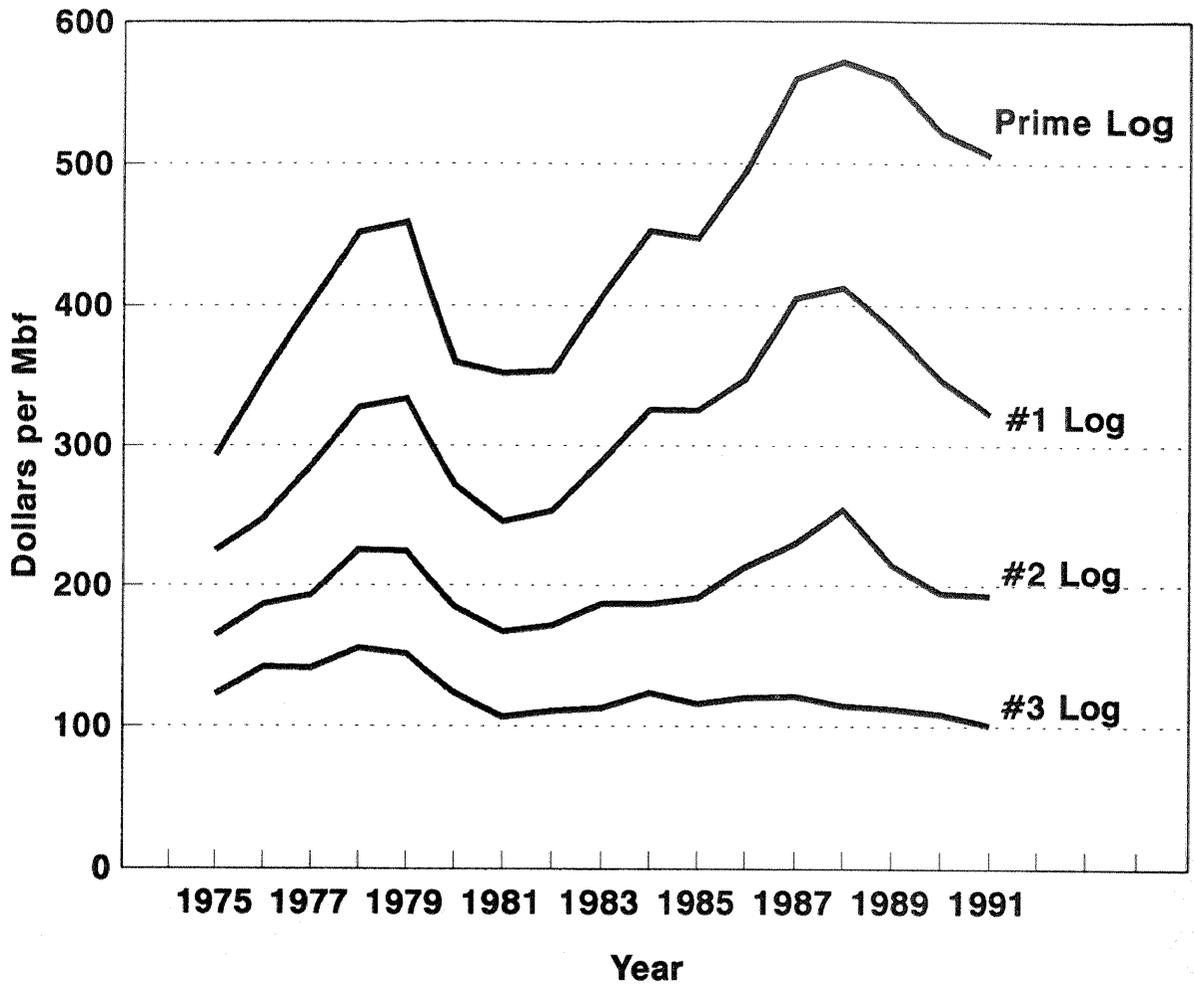


Figure 2.—Real prices of Ohio red oak logs, 1975-91 (in 1982 dollars).

The ratios of indexed stumpage and lumber prices to indexed log prices indicate growth of stumpage and lumber prices relative to the growth rate of log prices. Plotting these ratios and trends illustrates important changes in the hardwood market. For red oak, all three real price series indicate positive growth in real terms. However, the stumpage to log price ratios greater than 100 indicate that stumpage prices have increased faster than log prices since 1980-81 (Figure 6). Even though real prices declined from 1980-83, stumpage prices declined proportionately less than log prices. Conversely, lumber to log price ratios less than 100 indicate that lumber prices generally have not kept pace with log prices since 1980-81. Although both ratios began converging in 1989-90, the lumber to log price ratio has converged more than the stumpage to log price ratio.

The trend in the stumpage price to log price ratio for yellow-poplar is similar to that for red oak (Figure 7). Although yellow-poplar stumpage prices increased very little, log prices have declined. Part of the increase in the stumpage prices relative to log and lumber prices is due to the residual effect of the overall stumpage market. The stumpage price of all species is increasing faster than log and lumber prices because of market expectations and transferred efficiencies in harvesting and milling. Although lumber prices fluctuate more than log prices, yellow-poplar log and lumber prices show similar declines in real prices and are tracking together (Figure 7).

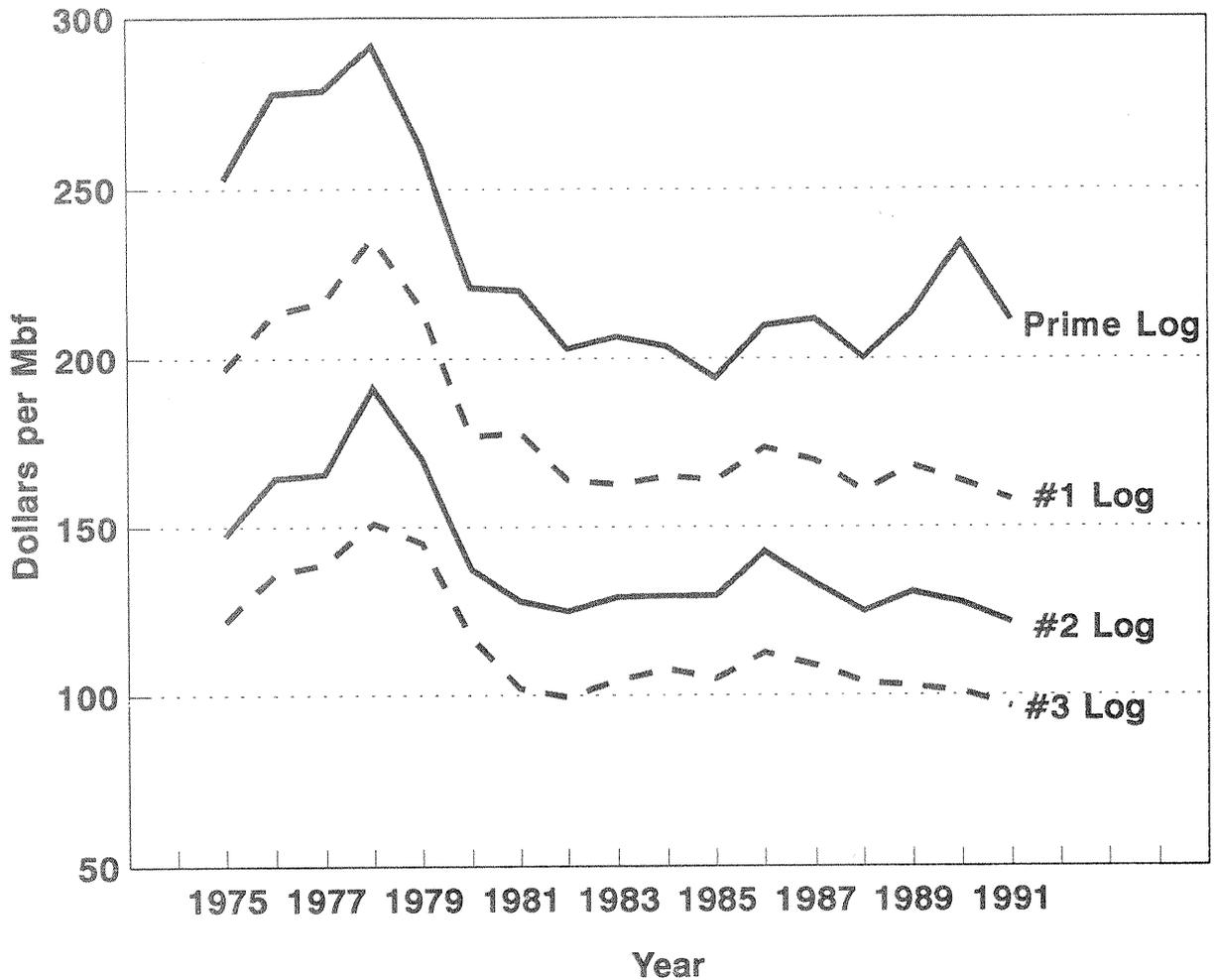


Figure 3.—Real prices of Ohio yellow-poplar logs, 1975-91 (in 1982 dollars).

**DISCUSSION**

The early 1980's marked the beginning of very strong domestic and international markets for high-quality hardwoods in applications such as millwork. Lumber consumption trends from 1977 to 1991 indicate large increases in the volume of red and white oak lumber going into millwork, kitchen cabinets, and flooring and a 250 percent increase in lumber exports (Dempsey and Luppold 1992). This increased demand and competition for quality lumber, together with improved efficiency in harvesting and sawmilling, have transferred down to stumpage prices. Relatively large gains in the oak veneer market also have helped move the stumpage market faster than the sawlog market. The net result is lower margins for timber harvesting and transportation—with stumpage prices increasing faster than log prices—and lower margins for milling—with log prices increasing faster than lumber prices.

The decreasing margin between hardwood sawlog and stumpage prices is not unique to Ohio or the 1975-91 time frame of this analysis. Remington and Dennis (1986) reported declining real harvesting costs (roadside prices minus stumpage prices) for hardwood sawtimber in New Hampshire from 1964-83. However, stumpage and log price trends do exhibit distinct regional differences.

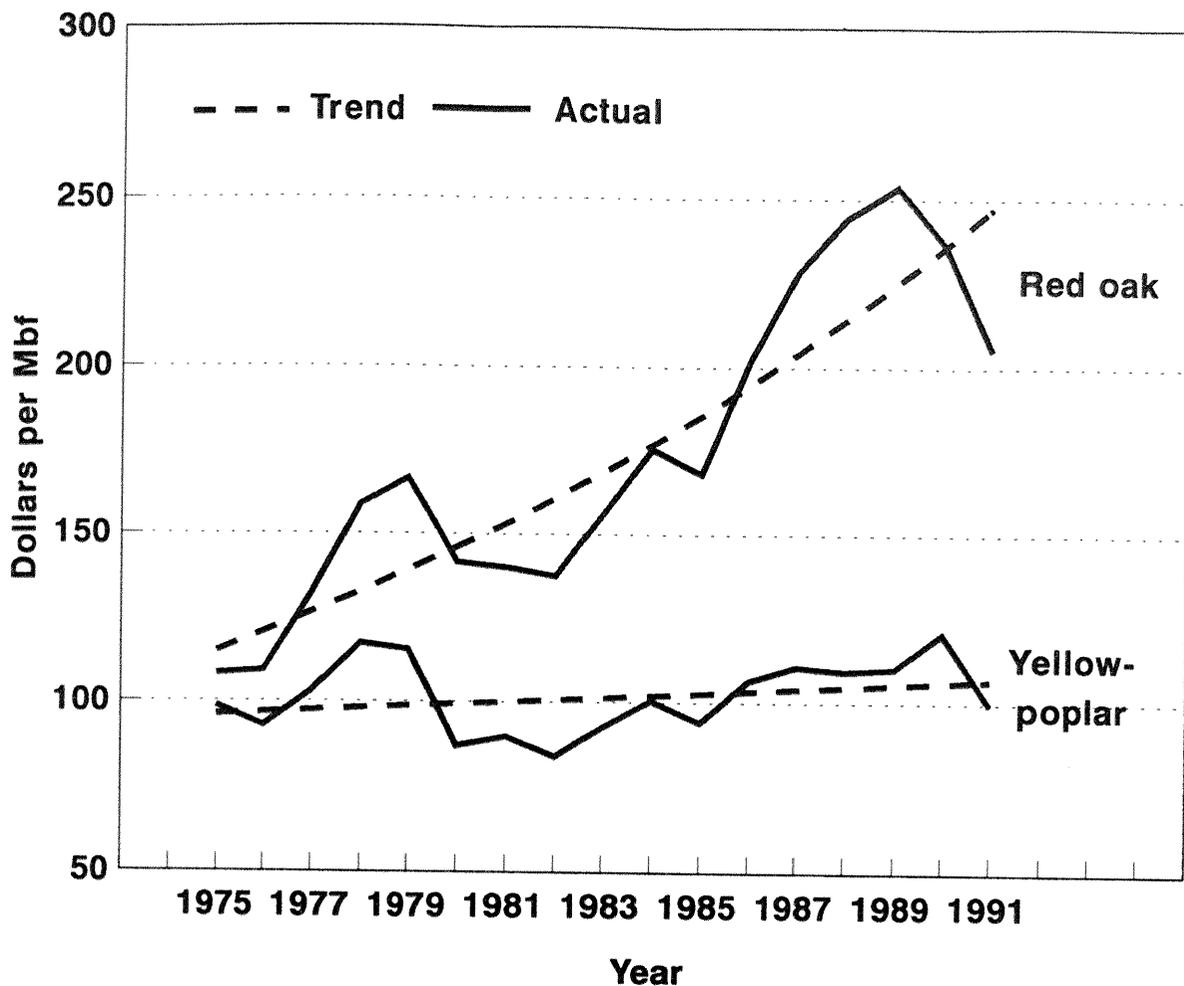


Figure 4.—Real prices and real price trends of Ohio red oak and yellow-poplar stumpage, 1975-91 (in 1982 dollars).

From 1972-83, real prices of hard maple stumpage and sawlogs showed positive price trends in New Hampshire (Remington and Dennis 1986); versus declining trends in Ohio. A study of price trends for hardwood stumpage and delivered log prices between 1976 and 1988, indicate declining real prices for all hardwood species in five southern Appalachian states (de Steiguer and others 1989).

The relatively scarce physical supply of high-quality sawlogs also contributes to the gains in real prices for select species and price spreads between log grades of all species. Forest survey results reported for Ohio show the percentage of sawlog volume in grade 1 logs ranging from a high of 27 percent for red oak, to a low of 10 percent for hard maple (Dennis and Birch 1981). To meet the growing demand for sawlogs, Ohio sawmills have increasingly relied on logs imported from neighboring states. The volume of sawlogs imported, mostly oak, increased from 20 million board feet in 1978, to 62.3 million board feet in 1983 (Widman and Long 1986).

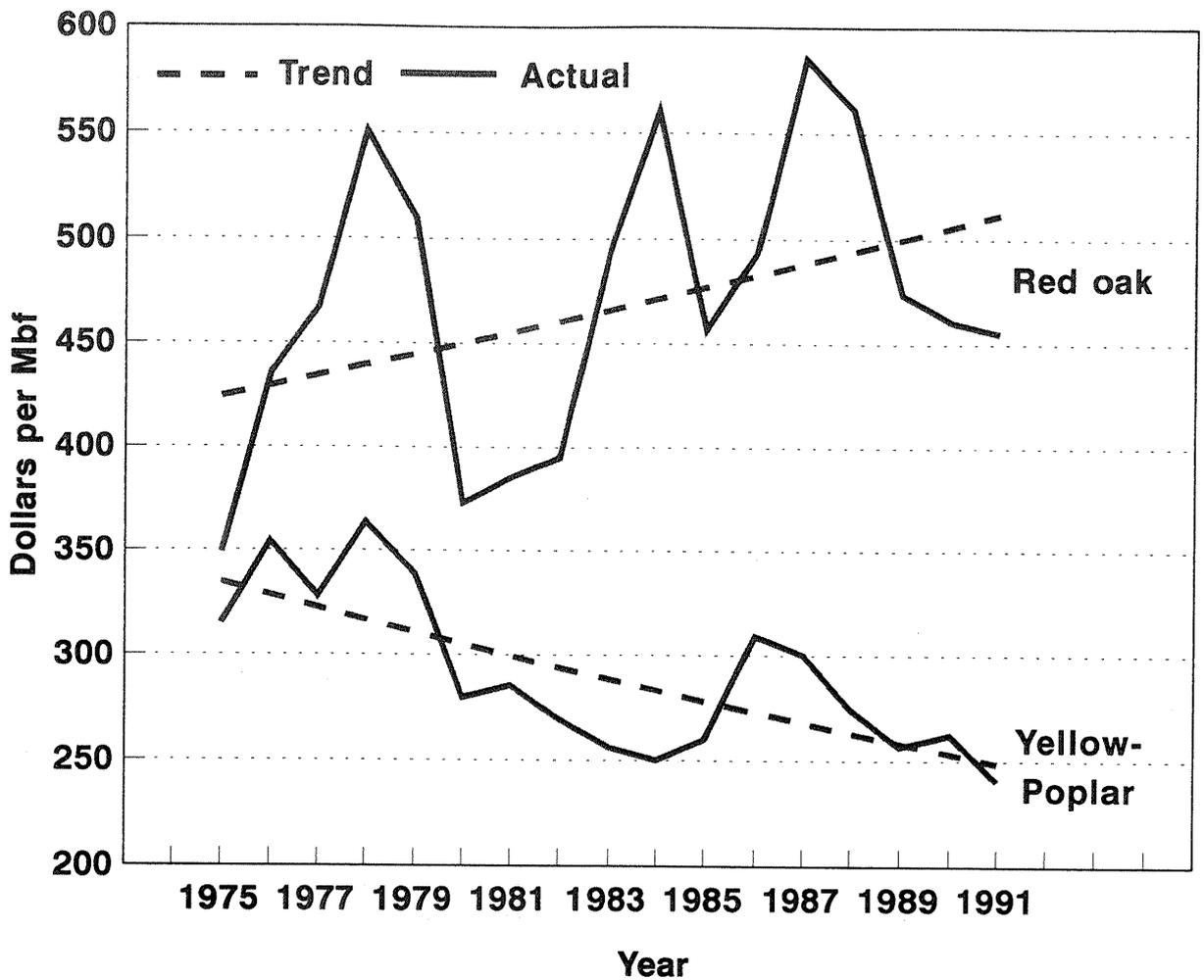


Figure 5.—Real prices and real price trends of No. 1 Common red oak and yellow-poplar lumber, 1975-91 (in 1982 dollars).

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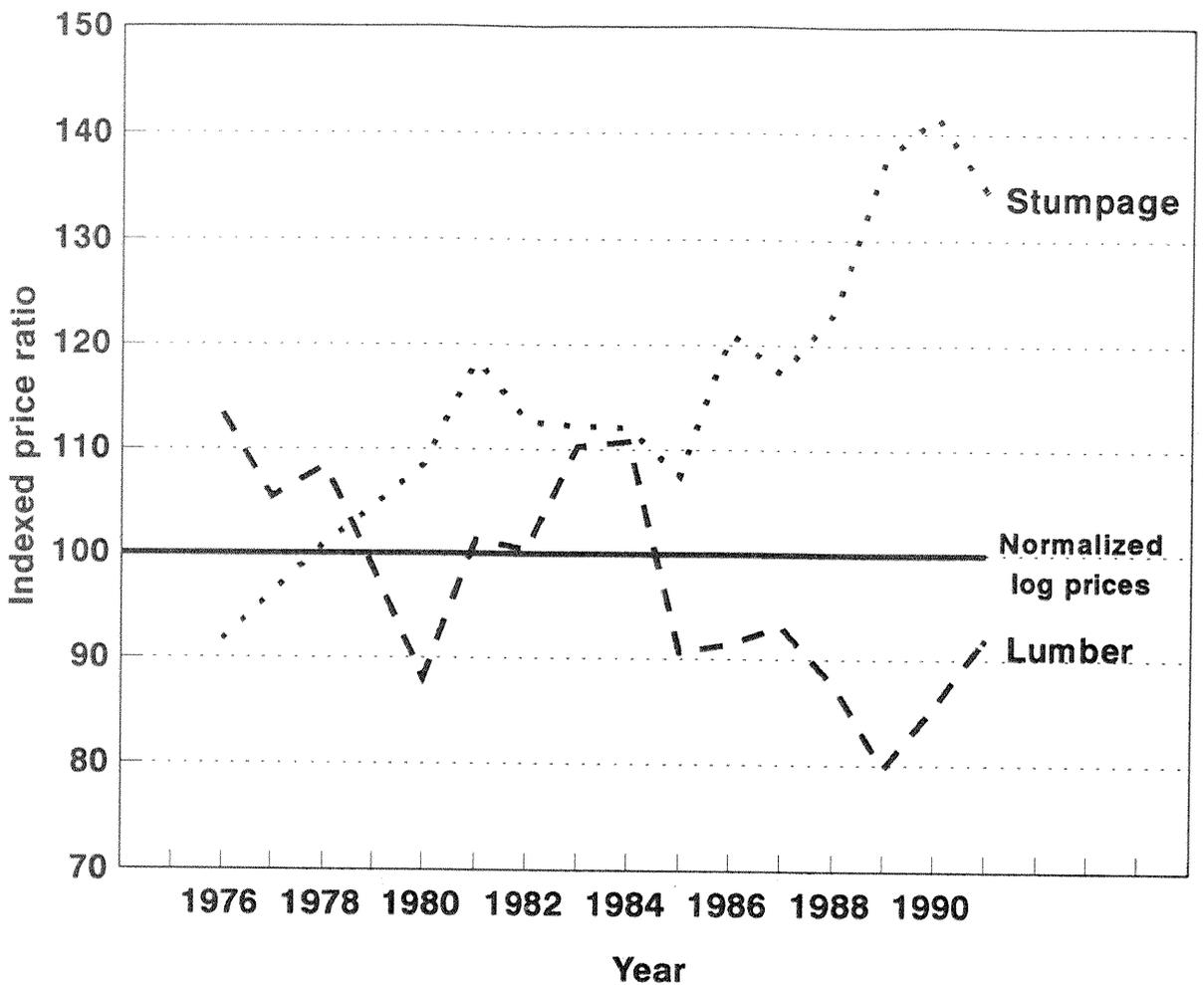


Figure 6.—Ratios of indexed prices of Ohio red oak stumpage and No. 1 Common red oak lumber, normalized on grade 1 log prices, 1975-91.

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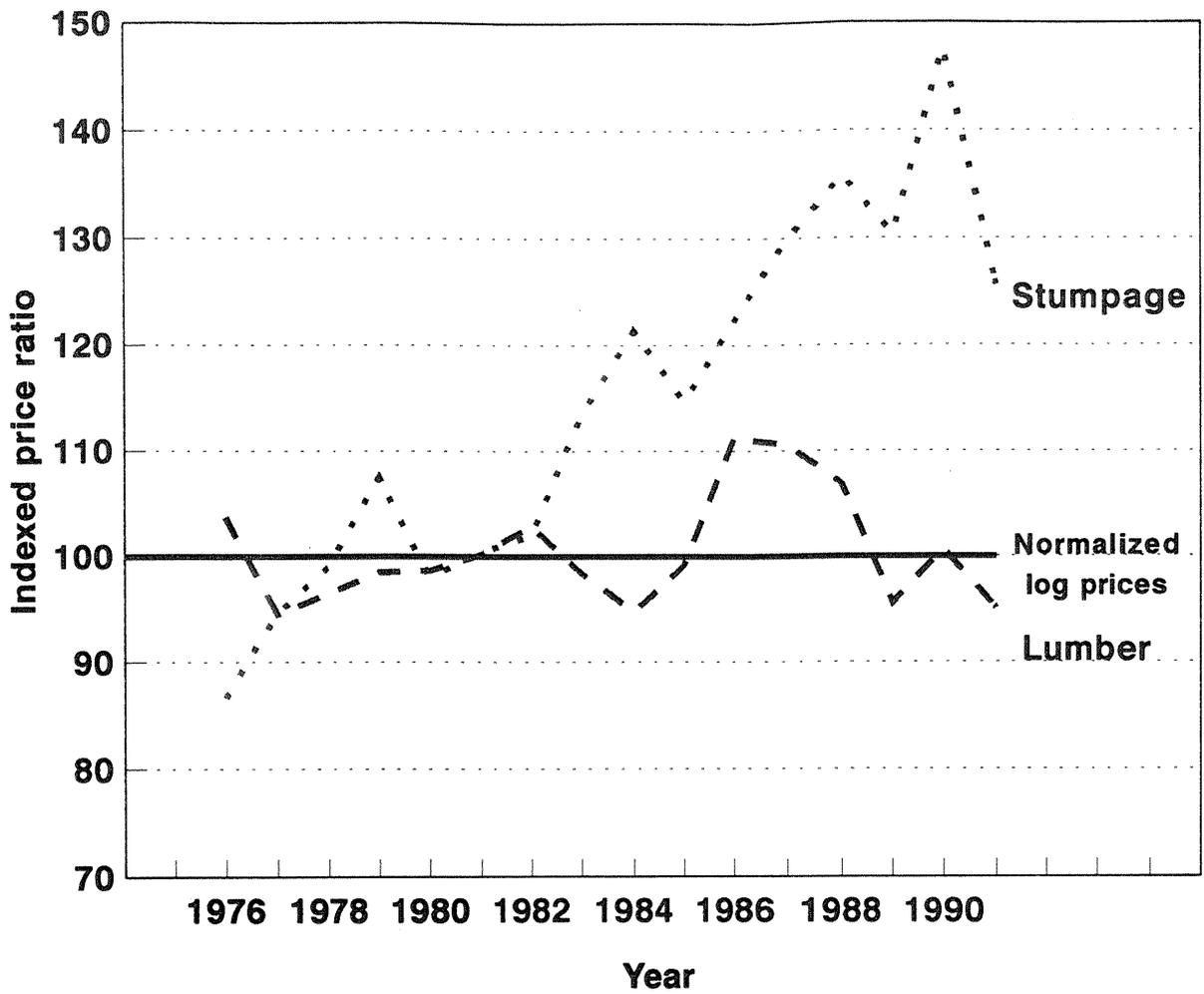


Figure 7.—Ratios of indexed prices of Ohio yellow-poplar stumpage and No. 1 Common yellow-poplar lumber, normalized on grade 1 log prices, 1975-91.