TRENDS IN PRICES PAID FOR SOUTHERN PINE TIMBER

Clark Row and Paul Teese
USDA Forest Service
Washington, DC

Summary

Prices for southern pine timber, from evidence available, have increased irregularly for the last 50 years. In the 1970's, pine prices have spurted up spectacularly, but also fell back several times. But projecting trends into the future encounters difficulties, many caused by inadequate data and methods of analyzing supply and demand. It is clear that prices will continue to climb, but at an uncertain rate.

Prices for southern pine timber since 1910

The heavy solid line in figure 1 shows the trend in southern pine timber from 1910 to 1978 in constant 1978 prices. From 1910 to World War II the prices are based on quotations collected by Henry Steer (1938) from timber firms. Steer did not have a statistically valid sample. Since World War II the prices are those of successful high bids for timber sales from National Forests in the Forest Service's southern region. The dashed line indicates the prices paid in current dollars, before adjusting for inflation. Before World War II, the current prices paid were so low they are hard to plot on the scale of the graph.

It is obvious that prices for southern pine timber are increasing. Fitting a logarithmic regression to the 1910-1978 real price data indicates the prices have risen 3.3 percent per year since 1910. Using various segments of the price series would give greater or slower rates of increase. By picking the years, an analyst could obtain almost any rate of real price increase between 1 and 5 percent. Equally obvious is the volatility of stumpage prices. Within the 1970's high prices were 80 percent greater than low prices, or expressed another way, low prices were 40 percent less than the high prices.

Additional information on long-term trends is available from the price series published by the Louisiana Extension Service. The current prices are shown by dots in figure 1. These are based, however, on a relatively thin sample of sawmill price quotations. Information on pulpwood prices, other than from Louisiana, is quite scant.

Interpreting the price trends

Stretching the imagination, one can see stair-step stages of increase. Major steps occurred just prior to World War II, during the Korean War, and then in the late 1960's and continuing into the 1970's. The increases prior to and during the wars were caused by sharply increased demand without corresponding changes in supply.

The traditional Marshallian diagram of supply and demand shown in figure 2 is useful in interpreting these price changes. Prices actually represent the
Figure 1.—Price trends for southern pine sawtimber from 1910 to present in constant 1978 and current dollars
intersection of a downward schedule of timber demand and an upward sloping schedule of timber supply. In the short run, timber supply is relatively stable, while the demand for timber is pushed backward and forward by the building cycle. This alone would cause substantial short-run instability.

For southern pine, data on supply, consumption and price for major years of forest statistics compilation from 1952 to 1976 are:

<table>
<thead>
<tr>
<th></th>
<th>Sawtimber inventory (bill. bd. ft.)</th>
<th>Sawtimber growth (bill. bd. ft.)</th>
<th>Sawtimber removals (bill. bd. ft.)</th>
<th>Price (dollars, 1967 = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>196.6</td>
<td>13.6</td>
<td>11.8</td>
<td>43.5</td>
</tr>
<tr>
<td>1962</td>
<td>245.7</td>
<td>18.0</td>
<td>10.9</td>
<td>27.4</td>
</tr>
<tr>
<td>1970</td>
<td>295.8</td>
<td>21.1</td>
<td>14.9</td>
<td>39.9</td>
</tr>
<tr>
<td>1976</td>
<td>340.0</td>
<td>24.1</td>
<td>18.9</td>
<td>47.5</td>
</tr>
</tbody>
</table>

As indicated by the steady increase in inventory and growth, southern pine supplies have increased. The drop in price and removals (or consumption) from 1952 to 1962 seems to have been caused by a drop in effective demand. Since about 1962 the increase in consumption and prices has clearly been caused by a rate of increase in effective demand greater than the rate of increase in the southern pine market cannot be considered in isolation. Much of the southern increase in demand has occurred because total softwood inventories in the Pacific coast dropped by 15 percent (on forest industry lands by 40 percent) resulting in relatively static sawtimber output. This has focused the bulk of the increased U.S. consumption of 32 percent from 1952 to 1976 on the South. Thus as forest industry has liquidated inventories on their western lands, timber output has shifted to the South.

The intersections for each of the four years are also shown in figure 2. The movement of the intersection is shown by dashed arrows, with associated demand-supply curves in light lines. The slope of supply and demand schedules are arbitrary, however.

What do these price movements represent?

Before discussing in greater detail the implications of southern pine price trends, we need to realistically consider what these price series represent, and specifically, whether they represent prices paid for average southern pine timber.

The prices relied on most heavily since 1950 are for Forest Service timber. Factors that influence these prices are:

1. Sales require lump sum bids for timber on National Forest tracts, sold under a contract which is reasonably uniform in all National Forests at any one time. But the requirements on the purchaser have gradually changed over the years—mostly toward requiring more environmental effect amelioration and
Figure 2.—Demand and supply diagrams showing changes in price and consumption from 1952 to 1976.
protection from loss. The impacts of such gradual changes in requirements would be difficult to separate.

2. The pine forest area managed by the Forest Service is concentrated west of the Mississippi-Alabama border. East of Mississippi the Forest Service manages only a few coastal plain forests and almost no piedmont land.

3. Timber sold from southern National Forests in the 1950's and 1960's was mostly thinnings, with a gradual increase in the proportion cut in final harvests. This proportion is not generally typical of southern sawtimber harvests.

4. In the 1950's National Forest sawtimber was sold separately, with the "topwood" under a separate contract for a relatively low price. Recently the timber has been sold in all-product sales with the purchaser making the decision as to what products the tree is cut into—and often after whole tree logging.

5. Timber cut from National Forests is grown under multiple-use land management where silviculture is by law and regulation conservative. The management emphasizes longer rotations and probably generally heavier stocking than on industry and certainly on non-industrial private land. Thus timber quality is likely to be somewhat higher—in the sense that larger, older, and more frequently thinned trees will produce larger proportions of high-valued product grades.

6. Since buying timber under a detailed formal contract with bonding and other requirements may not be usual for many southern mills, many timber buyers may only bid when timber markets are brisk and prospective product sales pictures are bright. Thus National Forests may be "swing" or optional timber sources. Entry of mills into and out of the National Forest timber market may account for some of the extreme volatility of prices reported.

The influence of changes in thinnings-regeneration harvests, logging technology, quality of timber sold, changes in sales contracts has had on prices is not well known. On an individual timber sale basis, some of these sales attributes have significant influences on price (Guttenberg 1956, Guttenberg and Row 1961, Guttenberg and Fasick 1965, Holley, 1967, and Row 1973).

Thus the trends in prices used for southern may only imperfectly represent average southern pine saw timber. Without other price information, the differences will never be known.

Why is it important to project timber price trends?

Forest owners and managers are interested in both short-term and long-term price trends. In the short run, selling timber in the good markets associated with building booms rather than in slack periods may be extremely profitable tactics.

In the long run producers of any goods want to produce commodities that have value in the future. Rising prices are good indications that efforts to
increase production will be rewarded when the products reach the market place. And the higher the anticipated future timber price, the more intensive management can be justified. Figure 3 shows the relation of present net values for southern pine timber to rates of price increase.

The estimates assume 40 year sawtimber rotations on site 80 (50-year basis) loblolly pine land. Costs of management for site preparation, planting and other treatments are those used by George Dutrow (1978) in his analysis of timber growing opportunities in the South. The prices assumed are $100 per MBF (the average for the last 5 years) and $8 per cord, converted into prices per cubic foot by diameter of timber harvested.

The data in figure 3 show that an increase of 3 percent compounded annually approximately doubles the value per acre. The discounted expectation values have several implications for the forest manager:

1. A forest owner can pay more for forest land. To some extent the expectation of higher future prices are being capitalized into land prices.

2. Intensified forest management is more economic. More thorough site preparation, release, fertilization, and other treatments are likely to be justified by expected returns.

3. Management of lower site quality lands may be justified. In effect, less production is necessary to justify expenditures for regeneration and silvicultural treatment.

4. There is a larger cushion of expected returns to offset potential losses from natural causes or economic conditions. Risk, in effect, is reduced.

How can prices trends be projected into the future?

There are several ways of anticipating the future trends in prices:

1. By intuition. Though the simplest, intuition has the advantage that all sorts of difficult to quantify factors can be considered. But the effectiveness of intuition is difficult to analyze.

2. By mechanical extrapolation of past trends. Extrapolation of southern pine prices at various rates of increase, shown in figure 4, in effect says that the net effect of past influence will continue into the future. Even if we feel that the influence of factors may change, extrapolation may be a basis that can be subjectively modified.

Figure 4 shows the effective prices projected by assuming rates of increase from $\frac{1}{2}$ to 3 percent compounded per year. The base year on the chart is prices with 1967 dollars, still the standard price index year for most economic work. Towards the end of the period prices seem to be extraordinarily high. But then, present prices would have been unimaginable in 1950, when many of the timber stands now being harvested were established.

3. By econometric analysis based on supply-demand relationships. The basis for such analyses is the demand and supply diagram shown in figure 2.
Figure 3.—Values per acre for managing southern pine for assumed rates of increase in prices.
Figure 4.--Increases in prices for various assumed rates of increase in prices.
The crucial task in econometric analyses is to determine mathematical functions to represent the slope and movement of both supply and demand. Recent studies of timber supply and demand relationships have shown steady progress (McKillop 1967, Mills 1974, Robinson 1974).

4. By simulation using relationships of both econometric analysis and of biological-physical processes. In forestry, timber supplies in future years are affected by the flow of land into and out of timber production, and present timber inventory and growth. Several recent studies that have used this approach in multi-regional spatial context (Holley and Haynes 1975, and Adams and Haynes 1979).

What are the problems with econometric simulations?

Much of the recent work in appraisal of future timber supplies by the Forest Service (1979) and others have used econometric or econometric-growth simulation models. While they more realistically recognize the relationships influencing the changes in prices and consumption, they encounter major problems in determining necessary relationships used in them.

The first problem is that the econometric relationships require unbiased representative data on consumption, prices and other influencing factors. We have already discussed the problem of whether prices for southern pine timber are representative. Data for annual southern pine consumption are affected by the somewhat uncertain reporting and compilation of production statistics by the Bureau of the Census and trade associations. For example, lumber production from the numerous small sawmills are incompletely and imperfectly surveyed.

The second problem is untangling of demand and supply relationships shown in figure 2. The sharp fluctuations in the building cycle which move the demand curve backward and forward may tend to mask price and other influences. Studies now show that short run price elasticity is low, resulting in the rather steep demand function shown. It is uncertain whether these studies capture all long-term effects of prices on substitution of materials, research for new materials and processes, and changes in industry and market channels.

Disentangling the effects of biological, ownership and price factors on the supply functions is even more difficult. In the short-run, it is obvious that prices have an important effect on the amount of stumpsage offered on the market. But the long term effects on price on management levels, investment strategy, and land ownership patterns is not known.

Econometric techniques can not foresee major structural change in markets. Such changes might occur if lumber costs for specific end use exceeds a threshold that would allow a competitive material or building technique to become established. This would require a substantial and persistent gap between the price in use of the wood product and the competitive material to justify investment in production capability for the new material. Once that production capability is in place, marginal pricing would allow the competitive material to continue to be produced.

Examples of where such competitive materials might have a substantial impact on present wood prices would be metal studs, roof trusses, or floor
systems in single family houses, or particle-veneer composite products for studs and roof sheathing.

Despite the imperfections and limitations of econometric simulation, the Adams-Haynes model in particular is a significant advance in methods of projecting the timber price trends. Based on their model, the simulations of the market for southern pine indicate a probable pattern of prices shown in figure 5. It indicates an increase in southern pine stumpage prices of more than 3 percent for about 20 years, with a decreasing rate of increase thereafter. The dashed lines on figure 5 indicate the maximum and minimum effects of alternative programs of the Forest Service. Such programs will have relatively little effect, and a much smaller effect than on Douglas-fir prices.

Comparison with the projected rates of increase for Douglas-fir region stumpage prices is interesting. For the next few years Douglas-fir prices will continue to climb faster than southern pine prices, but the decrease in rate of climb will be more pronounced.

Literature Cited


Figure 5.--Increase in prices simulated by the Adams-Haynes model, with the range of effects of forest timber programs.


USDA Forest Service. An assessment of the forest and range land situation in the United States. (Review Draft--Subject to revision).