

Solid Wood Products

Rising Consumption and Imports, Modest Price Growth

Darius M. Adams

ABSTRACT

Based on findings of the current Resources Planning Act (RPA) Timber Assessment, residential construction and spending on upkeep and improvement will drive softwood lumber consumption to record levels over the next five decades. Near-term supply increments will come largely from imports, and long-term expansion from both domestic output and imports. Consumption of oriented strand board (OSB) will also reach record levels, based largely on expanded production in the United States. Real prices of solid wood products will rise slowly (0.6 percent per year or less), despite significant consumption growth.

Keywords: economics; engineered lumber products; industry; timber

More than half of the timber harvested each year in the United States finds its way into some form of solid wood product: lumber; panels of veneer or chips for both structural and nonstructural applications; and miscellaneous products such as posts, poles, and pilings. Although a significant amount is used in manufacturing and shipping, construction activity accounts for the lion's share of solid wood products consumption (more than 60 percent of lumber, more than 80 percent of structural panels). As a consequence, consumption and prices in this sector are highly sensitive to fluctuations in new housing and other construction activity.

The solid wood products sector is also characterized by episodes of new product development and periods of rapid substitution of new products for traditional ones. For example, during the 1960s and 1970s, plywood replaced lumber in an array of sheathing and decking applications. More recently, oriented strand board (OSB)

has been displacing plywood in some of the same uses. Despite the volatility induced by substitution and markets, consumption of most major classes of solid wood products has continued to rise. Between 1970 and 1999 lumber consumption increased by nearly one-third, while structural panel use more than doubled.

Projections from the current Resources Planning Act (RPA) Timber Assessment (Haynes, in press) suggest that consumption of solid wood products will continue to grow in the future, through a mix of expansion in construction and nonconstruction uses. Substitution will remain a central feature of these markets. Older products, such as plywood, will continue to lose ground to newer products, such as OSB, and the overall use of solid wood products per unit of end-use activity will decline further. It will be possible, however, to accommodate projected consumption growth with modest long-term growth in real prices for solid wood products.

Housing and Other Industries

Demographic developments, particularly slower population growth and population aging, dominate the long-term outlook for the US economy. Slower growth in the population means smaller gains in the labor force and slower growth in the gross domestic product (GDP). Low interest rates and a stable inflationary structure (despite continued growth in petroleum prices), however, will stimulate investment and keep productivity growing at the historical trend rate. The growth rate of GDP and disposable income is expected to average about 2.0 percent over the next five decades, 0.9 percent from growth in the labor force and 1.1 percent from improvements in output per worker. This growth rate is substantially below the post-World War II average of 3.1 percent but still portends significant expansion in consumer income.

Combining considerations of an aging population and growing income, the baseline projection foresees nearly a two-thirds increase in the number of households between 2000 and 2050, some 71 million additional separate living units at an annual rate of about 1.43 million new households. Total new housing starts of all types will average some 1.93 million per year. The gap between starts and new households results from an aging but healthy retired population acquiring second homes and an aging housing stock re-



quiring higher-than-historical replacement of existing units. Most of the increase in housing starts relative to new households is likely to occur in single-family dwellings because (1) the proportion of young adults in the population will decline, leading to less demand for multiple-family housing; and (2) rising income will increase the likelihood that home ownership will be attainable (Montgomery 2001).

A key indicator of materials use in residential construction is the total floor area of new units, calculated by multiplying the number of housing units built by the average floor area per unit. The average size of single-family homes has roughly doubled in the past 50 years. Reflecting the aging population and declining number of people per household, the average size of new housing units is projected to stabilize over the next 40 years, then rise in the final decade of the projection. The average size of single-family units will increase from the current average of 2,160 square feet to 2,600 square feet by 2050, multiple-family housing from 1,000 to 1,200 square feet, and mobile homes from 1,350 to 1,950 square feet.

Expenditures on residential upkeep and improvement experienced a major jump in the 1980s. This spending is heavily dependent on income; age of household occupants (middle-aged

households spend more); and an array of considerations surrounding interest rates, inflationary expectations, and taxation. In the projection, continued steady income growth and an aging population drive upkeep and improvement spending to roughly 80 percent above its current levels by 2050. Al-

percent higher than peak levels observed in the first half of the 20th century and exceeds the previous post-World War II peak set in 1987 by 6.7 bbf. Lumber consumption is projected to rise throughout the projection period, reaching 83.0 bbf by 2050. On a per capita basis, consumption peaked

By 2050, the South, North, and Canadian imports will split the OSB market in the United States in nearly equal proportions.

though this is a substantial increase, it actually entails roughly constant expenditures per household until 2030 in amounts no larger than those observed on average during the 1986–98 period. After 2030, expenditure per household begins to rise slowly, reflecting continued growth in income.

Changes in Future Consumption

Historical and projected use patterns for lumber, the largest category of solid wood products, are shown in *figure 1* (p. 16). Growing steadily from its recessionary low in 1991, US lumber consumption reached a historical high of 68.2 billion board feet (bbf) in 1999. This volume is more than 50

in the 1980s, fell in the 1990s, and declines in the projection until 2040.

The most important end uses for hardwood lumber are shipping (primarily as pallet stock), manufacturing (furniture), floors and millwork, and a diverse array of miscellaneous applications. The advent of wide-scale pallet reuse, recycling, and repair has slowed growth in new pallet production appreciably and with it the rate of growth in hardwood lumber consumption. In the late 1990s hardwood lumber consumption averaged about 12.5 bbf per year, roughly one-fourth the level for softwoods. In the base projection, hardwood lumber output and consumption continue to grow, although

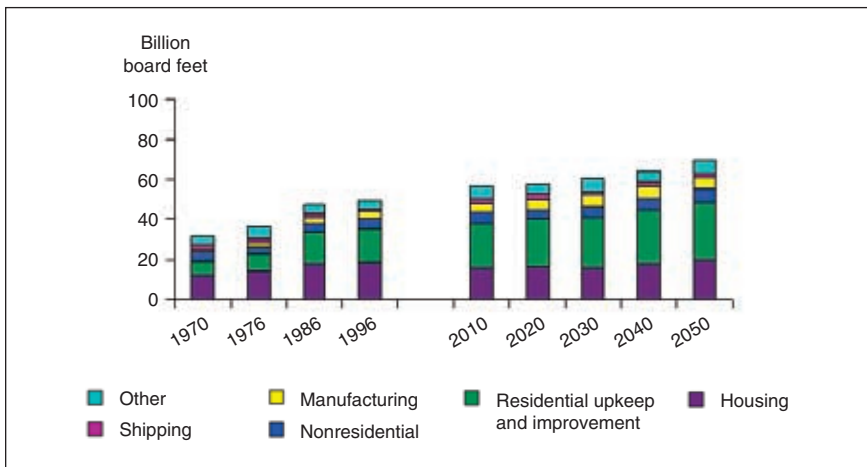


Figure 1. US consumption of lumber (softwoods and hardwoods combined) by end-use category, with projections to 2050.

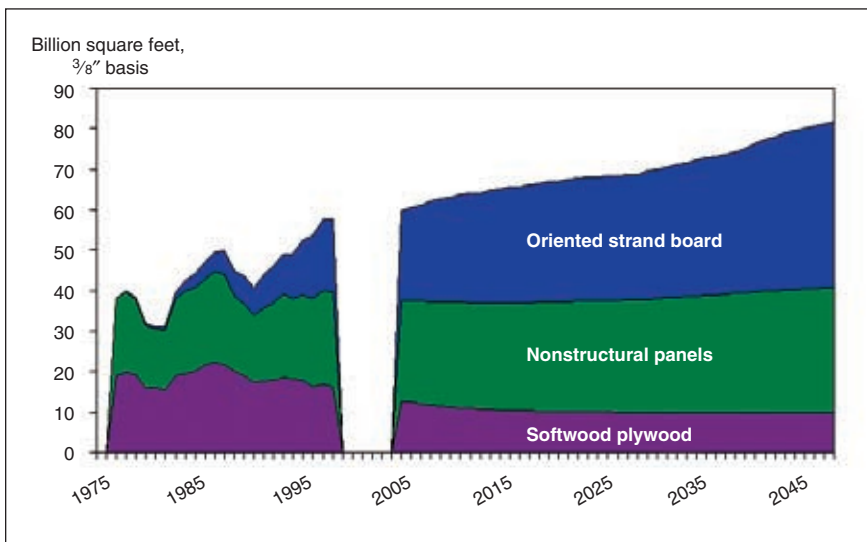


Figure 2. US wood-based panel consumption by major product category, with projections to 2050.

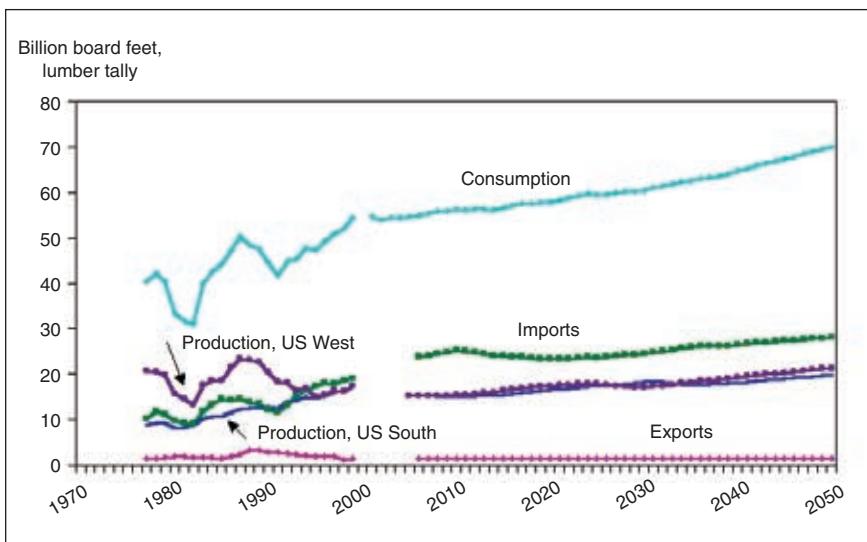


Figure 3. US consumption, imports, exports, and regional production of softwood lumber, with projections to 2050.

at slower rates than observed in the 1970–2000 period, based on (1) modest increases in lumber use in pallets in the face of slow growth in new pallet production, (2) rising use in millwork derived largely from continued growth in residential upkeep and improvement expenditures, and (3) expansion in miscellaneous uses.

For softwood lumber consumption, the most dramatic historical trend has been its growth in residential upkeep and improvement applications. Use has increased both because of steadily rising expenditures on upkeep and improvement and because more softwood lumber is being used per dollar of expenditure. In new housing construction—by the late 1990s the second largest end use—consumption trends depend on use per square foot of floor area, floor area per start (house size), and the number of starts. Over the past 50 years, softwood lumber use per housing unit has risen because growth in average house size has more than offset the steady decline in lumber use per square foot. Coupled with growth in numbers of new starts, total consumption in new housing has increased steadily.

Aggregated across all uses, softwood lumber consumption rises steadily over the projection period, reaching some 70 bbf by 2050, or 16 bbf above the estimated 1999 level. Continuing the trends of the past decades, residential upkeep and improvement is the primary source of growth, with rising income driving up repair and improvement expenditures. Consumption in new housing is expected to be relatively stable over the next two decades, then rise strongly after 2030 with a surge in replacements and second-home construction. As GDP grows, lumber use in manufacturing, shipping, and “other” categories also rises steadily. (The “other” category includes a sizable component of nonresidential upkeep and improvement; an array of other applications not fully captured in the wood use accounting for construction, manufacturing, and shipping applications; and measurement error.)

US wood-based panel consumption has grown dramatically in the past three decades. Between the 1979 and 1999,

use increased nearly 45 percent (*fig. 2*). Within this group, however, there are sharp differences between products. Consumption of structural panels (softwood plywood and OSB) reached 31.6 billion square feet in 1996 and some 34.4 billion square feet by 1999, more than 30 percent higher than just a decade earlier. Initial growth of softwood plywood consumption in the United States was caused in part by substitution of plywood for lumber in new housing construction. Since the late 1970s, plywood in turn has faced the loss of key markets to OSB. As shown in *figure 2*, plywood consumption has shown no trend over the past 20 years, drifting up and down with movements in housing starts, while OSB consumption has grown to exceed plywood use. In the base projection, softwood plywood consumption declines slowly to just below 10 billion square feet, losing market share in all end-use categories. OSB consumption is expected to grow less rapidly in the future, as it approaches saturation levels in many end uses, but it is expected to capture all future growth in structural panel use and reach nearly 41 billion square feet by 2050.

Nonstructural panels—hardboard, particleboard–MDF (medium-density fiberboard), hardwood plywood, and insulation board—represented more than 40 percent of total wood-based panel use in recent years (*fig. 2*). Consumption of these products grew rapidly between 1950 and 1970, but only the particleboard–MDF component has expanded significantly over the past three decades due to its growing use in furniture production. In the projections, nonstructural panel use rises at less than 0.5 percent per year. Particleboard–MDF remains the only growth element in this group.

Regional Projections

US softwood lumber consumption is projected to rise by 16 bbf over the next 50 years, driven by a changing complex of growth in end-use industries. The mix of supply sources for this additional consumption will vary over time as well (*fig. 3*). From 2000 to 2010, domestic production is expected to remain roughly stable, as it did dur-

ing the 1990s. Imports from Canada and elsewhere will continue to rise to fill the gap, reaching roughly 25 bbf by 2010. After 2010, demand will continue to grow, but both imports and domestic production will rise to provide the additional volume.

The origins of these shifts in domestic and import growth lie at the resource level. Between 2000 and 2015, some key private timberland owner groups in the United States face limitations on the merchantable volumes of timber on their lands and will stabilize or reduce their harvest. With the pas-

taled nearly 1.1 bbf (about 2.1 percent of US consumption). Attracted by continued high prices and with lower production costs, the share of non-Canadian regions in US consumption continues to rise in the base projection, reaching 12.5 percent by 2020 and 15 percent by 2050 (an annual volume of 10.5 bbf).

The base projection suggests that, over the next decade, no US region has the potential for significant softwood lumber supply expansion based exclusively on harvest from private lands. In the West, lumber output rises in the



Per capita lumber consumption peaked in the 1980s, fell in the 1990s, and declines in the projection until 2040.

sage of time, young stands mature and forest inventories grow, in some cases dramatically. As a result, harvest on many of these groups will rise after 2010.

In Canada, public forestlands face an array of pressures to broaden the objectives for their management, to limit harvests to sustainable levels, and to provide land for native peoples. As a result, allowable annual cuts have been falling in some provinces, and in the British Columbia Coast and Interior Canadian regions, actual or realized harvest has fallen as well. This is, at present, a highly controversial issue in Canada, and the extent and timing of any future reductions in allowable cut and harvest are uncertain. The base projection assumes that harvest restrictions will continue in western provinces and be enacted in eastern provinces within the next decade, gradually reducing softwood sawtimber harvest and exports of softwood lumber to the United States.

Imports from non-Canadian sources are projected to substitute for restricted flows from Canada. In recent years imports from Europe, South America, and South Pacific–Asia have increased substantially. In 2000, non-Canadian softwood lumber imports to-

long term—by some 24 percent between the 1990s average levels and 2050—but there is little prospect of significant near-term growth. Southern production follows a pattern similar to the West, a major departure from the rapidly rising output trends of the past 30 years.

For hardwood lumber, projected limitations in southern hardwood inventories and timber growth will lead to rising wood costs and restrict options for future lumber production. Production in the North, in contrast, will rise more rapidly based on expanding hardwood inventories on private ownerships.

Softwood plywood production and capacity have fallen sharply in the West since the late 1980s. This decline is expected to continue over the first decade of the projection, as western regions remain the high-cost producers in North America. Plywood output in the South will follow a trajectory similar to that in the West, with the largest losses in the next decade. Domestic producers will provide the largest part of the continued, if less rapid, growth in OSB consumption. By 2050, the South, North, and Canadian imports will split the US market in nearly equal proportions.

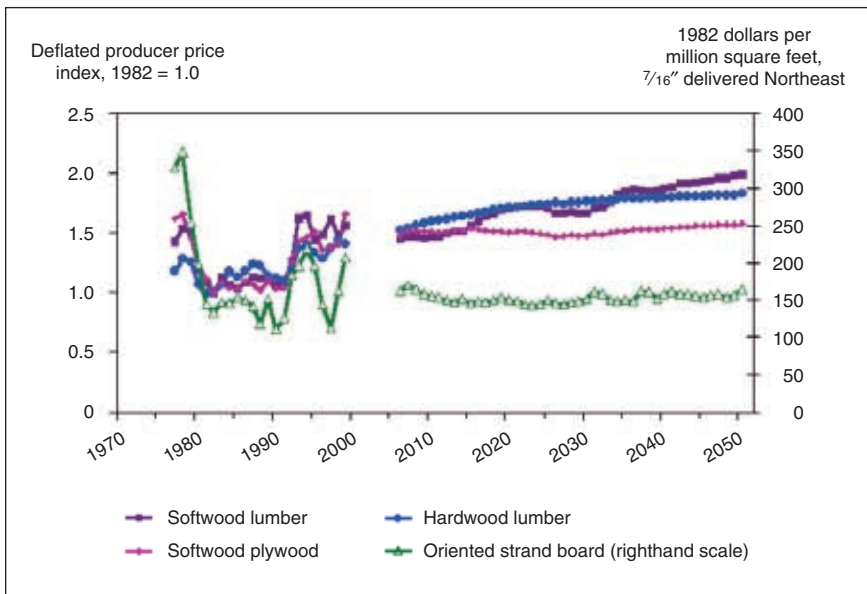


Figure 4. Deflated prices of solid wood products in the United States, with projections to 2050.
Note: Indexes and OSB price have been adjusted to remove the effects of general price inflation.

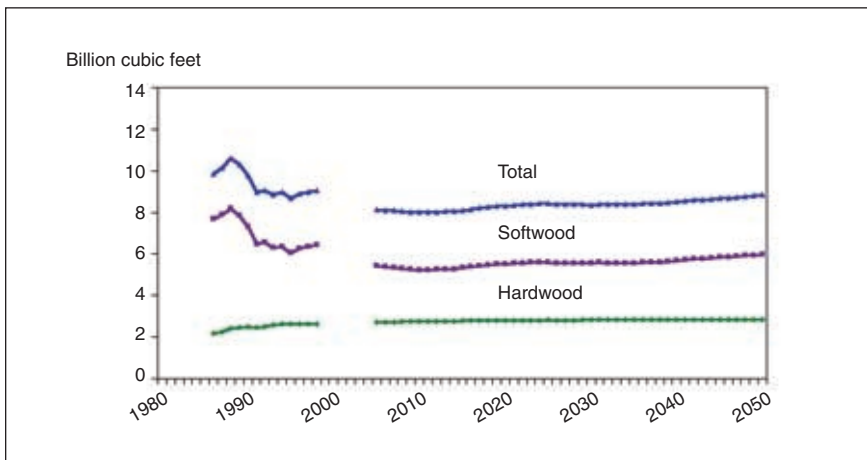


Figure 5. Consumption of roundwood in solid wood products in the United States by species group, with projections to 2050.

Product Price Movements

The base projection envisions modest trend growth in long-term prices for all classes of solid wood products over the next five decades. This, in turn, reflects (1) slow growth in stumpage prices for many (but not all) classes of timber, (2) declining softwood plywood output and associated sawtimber demand, (3) continued expansion in non-Canadian imports of softwood lumber, and (4) continued improvement in product recovery per unit of wood input in US production. Despite fairly substantial projected increases in the consumption of solid wood products in the United States, a combination of domestic and import

supply expansion will act to offset much of the tendency toward price growth.

Price behavior varies across products as illustrated in *figure 4*. For softwood lumber, real prices rise at about 0.6 percent per year (computed from the average level of the 1990s) with a cycle centered around 2020. The cycle is caused by reductions in Canadian imports before 2020 and gradual, compensating expansion in US output and non-Canadian imports, which eventually restore slower growth. Pushed by rising wood costs, future prices of hardwood lumber also grow at about 0.6 percent per year. Faced with strong competition from OSB, softwood ply-

wood prices show little growth.

For all three products, prices do not return to the lower levels enjoyed before or during the 1980s. Prices have been shifted upward by a combination of timber supply limitations originating in the 1990s and higher demand in the projection. In contrast, OSB prices showed considerable volatility in the 1990s but no major growth. Projected prices continue at the average of the past two decades with no upward shift, enabled by limited growth in wood costs, particularly for softwoods in the South and hardwoods in the North.

Roundwood Harvests

The implications of the preceding projections for roundwood use and timber harvest are summarized in *figure 5*. Over the past two decades, the use of roundwood for solid wood products has grown modestly from 8.4 to 9.2 billion cubic feet per year, or about 10 percent. Nearly all of this growth has been in hardwoods, where lumber output has expanded steadily in the eastern United States. Wood use in softwood solid wood products, in contrast, was no higher in the late 1990s than the average of the 1970s. Softwood roundwood consumption has been falling in softwood plywood. At the same time, the sharp harvest decline in the West after 1989 was only partially offset by harvest expansion in the South.

For the future, total wood use is expected to rise to nearly 10.4 billion cubic feet per year by 2050, an increase of some 13 percent over levels in the late 1990s. The bulk of this increase will be in softwoods, primarily because of the growth in lumber output in the West and South. Expanded wood use in hardwood solid wood products will come in the North, also due to rising lumber output.

Summary of Major Findings

Over the next 50 years, the timber assessment projects that

- Housing will remain the primary driver of consumption of solid wood products.
- Residential upkeep and improvement will become the major end use for softwood lumber, while new hous-

ing construction will continue to dominate the markets for structural panels.

- Consumption of softwood lumber will resume a strong growth pattern after 2015. Additional supply to meet this growth will come from the US South and West and continued expansion of imports.

- Canadian imports will fall, but the share of non-Canadian imports in US softwood lumber consumption will continue to rise after 2010.

- Wood-based panel consumption also will rise, with modest increments in nonstructural panels, continued decline in softwood plywood, and major growth in use of OSB.

- Pallets and shipping will remain the primary market for hardwood lum-

ber, but consumption growth will be much reduced compared to the past 30 years.

- Future expansion in hardwood lumber output will occur almost exclusively in the North.

- Prices of softwood lumber and structural panels will show modest trend growth.

- A decline in Canadian softwood lumber exports will accelerate softwood lumber price growth beginning in 2010, but prices will return to trend levels by 2030.

- Hardwood lumber prices will rise modestly because of increasingly limited hardwood sawtimber supplies and rising wood costs in the North and South.

Literature Cited

HAYNES, R.W. In press. *An analysis of the timber situation in the United States: 1952–2050*. General Technical Report. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

MONTGOMERY, C. 2001. *The future of housing in the United States: An econometric model and long-term projections for the 2000 RPA Timber Assessment*. Research Paper PNW-RP-531. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

Darius M. Adams (darius.adams@orst.edu) is professor, Department of Forest Resources, Oregon State University, Corvallis, OR 97331.