

Lumber and Timber Price Trends Analysis During the COVID-19 Pandemic

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Introduction

The forest products industry proved its importance during the COVID-19 pandemic, from the hoarding of toilet paper to buying lumber for home do-it-yourself projects. Recently, the skyrocketing price of lumber has commanded much attention. According to Random Lengths, the price of framing lumber rose to \$1,494 per thousand board feet (mbf) in May 2021, a 250 percent increase when compared to \$427 per mbf a year ago.¹ Meanwhile, the price of structural panels jumped to \$1,657 per thousand square feet (msf) from \$414 over the same period, a 300 percent increase.¹ Figure 1 shows the trends in framing lumber and structural panel composite prices since 2016. A huge price expansion has been observed since the second quarter of 2020.

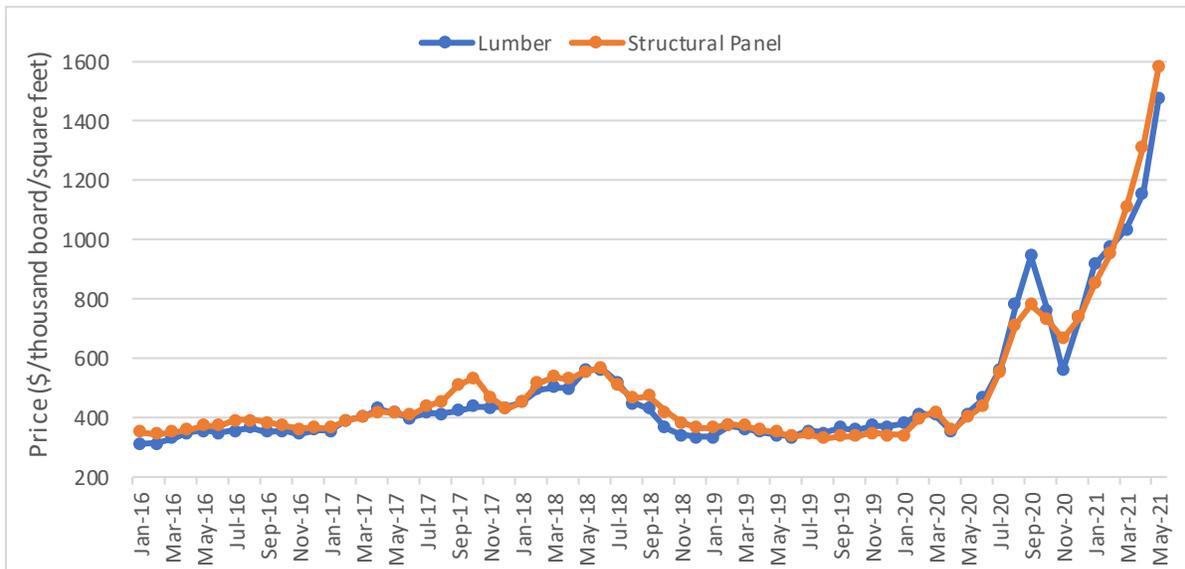


Figure 1. Price of lumber composite and structural panel in recent five years¹

Average sawtimber prices on the other hand were lower in 2020 than either of the previous two years (Figure 2).² The divergence between lumber and timber prices traces back to 2006 and widened even further during COVID-19. Theoretically, timber prices should track lumber prices more closely. However, the timber market has not reacted to the red-hot lumber market. In this article we seek to shed light on two questions: (1) Why have lumber prices skyrocketed? and (2) Why was the disconnect between lumber and timber prices amplified during COVID-19?

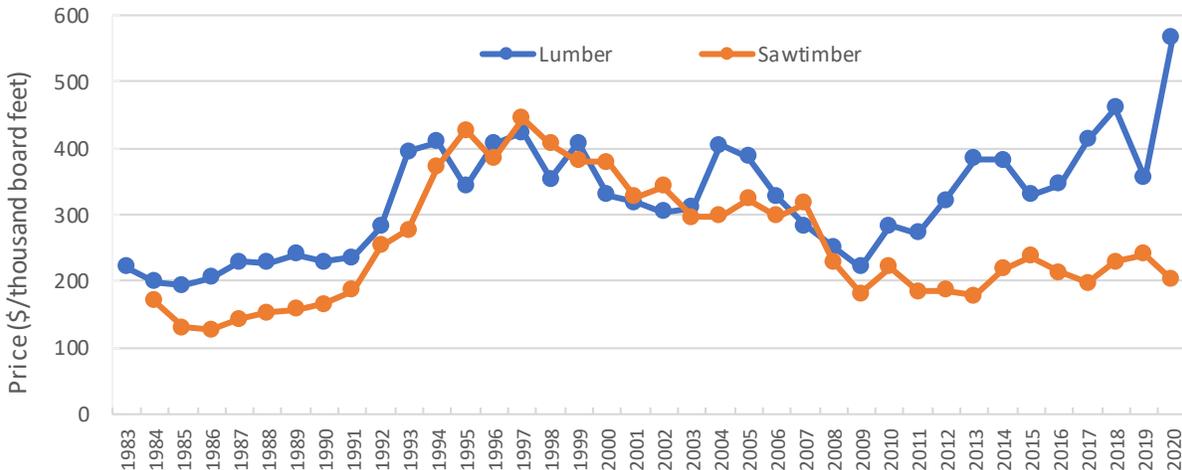


Figure 2. Average annual U.S. framing lumber composite price and pine sawtimber price

Why have lumber prices skyrocketed?

(1) High housing demand and limited supply

Homebuilding, remodeling, and the manufacturing of home furnishings are the biggest drivers of the demand for lumber. The main factor underlying the rising cost of lumber is the red-hot housing market. Figure 3 shows new privately-owned housing unit starts and monthly supply of houses in the U.S. from 2010 to 2021. Except for a large decrease in the first quarter of 2020, housing starts have gradually improved following the financial crisis of 2008. Starting in the second quarter of 2020, housing starts expanded significantly, with an 86 percent increase, from 0.9 million in April 2020 to 1.7 million in March 2021.³

The high demand for houses has resulted in a depleted housing inventory which is reflected in the current for-sale inventory data (Figure 3). Following the financial crisis of 2008, the U.S. housing supply increased to a high of nine months in 2010 and then decreased back to a normal level of five to six months until about a year ago. However, since the second quarter of 2020, the supply of houses decreased to a record low of four months.

The difference between U.S. housing supply and new starts can be used as an indicator of housing supply and demand, respectively (Figure 3). By 2010, the housing bubble had burst, new housing starts were low, and the housing supply was large. By 2012, housing starts began to come back and remained at normal levels with no economic disturbances over several years. However, with the disturbance to the U.S. economy caused by the response to COVID-19, housing demand hit a record high and housing supply hit a record low. In fact, this time the divergence between housing demand and supply is actually larger than the one caused by the financial crisis of 2008. The combination of huge demand for housing and small supply has contributed to dramatic demand for lumber.

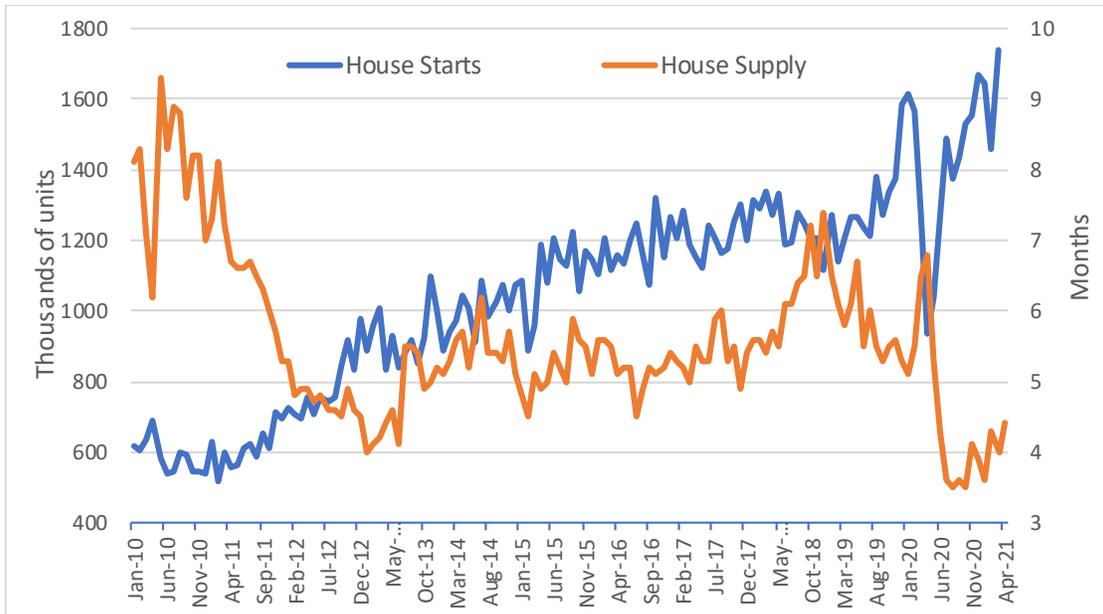


Figure 3. Monthly new privately-owned housing starts and housing supply in the U.S. since 2010

There are several factors underlying the high housing demand and the supply shortage during COVID-19. First, to some extent, the pandemic has changed people’s lifestyles. For example, working from home beginning in March 2020 encouraged many people to perform home repairs or upgrades such as outdoor decks or new wooden furniture. Some employers have allowed their employees to work from home permanently after they demonstrated the ability to maintain high work efficiency during work from home orders. This contributed to the demand for large houses with a good home office.

Rising housing demand is also associated with population growth. Figure 4 shows an increase in the U.S. population by region since 2010. Compared to other regions, the U.S. south accounts for the largest proportion of growth with an increasing trend (linear trendline in Figure 4). The south had a population of 126 million in 2019⁴ which was 38.3 percent of the U.S. total. Incidentally, much of the growth occurred in Texas which has seen its population grow by 40 percent since 2000 to 29 million in 2020, and this trend is expected to continue (Figure 5).

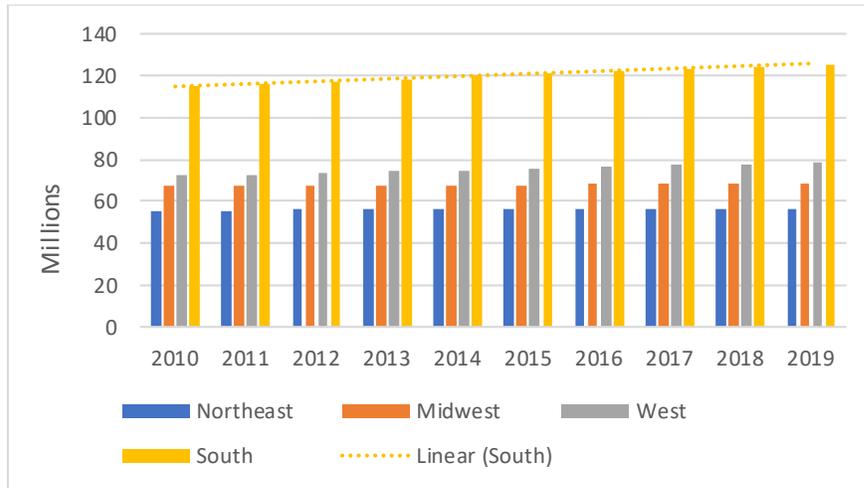


Figure 4. U.S. population by region since 2010

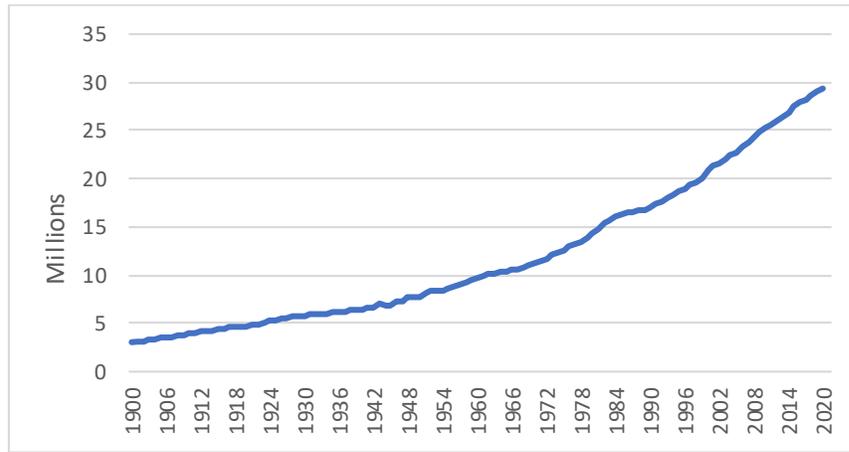


Figure 5. The population of Texas since 1900

(2) Low interest rates

The historically low interest rate is another reason for high housing demand. To support the economy during COVID-19, the Federal Reserve decreased the federal funds rate to zero in March 2020. Even today, the federal funds rate is still between 0.00-0.25 percent.⁵ Figure 6 shows the U.S. average 30-year fixed, 15-year fixed, and 5/1-year adjustable mortgage rates from January 2000 to May 2021. The average mortgage rate in 2000 was around 8 percent while the rate during the beginning of COVID-19 was below 3 percent,⁶⁻⁸ which encouraged people to enter the housing market. In addition, because of the low interest rate, it can make financial sense to buy a house with low or no down payment and pay for private mortgage insurance (PMI). Thus, many otherwise unlikely new home buyers are entering the housing market because they need less cash for a down payment. Historically low interest rates have contributed to high housing demand which, in turn, raises lumber prices.

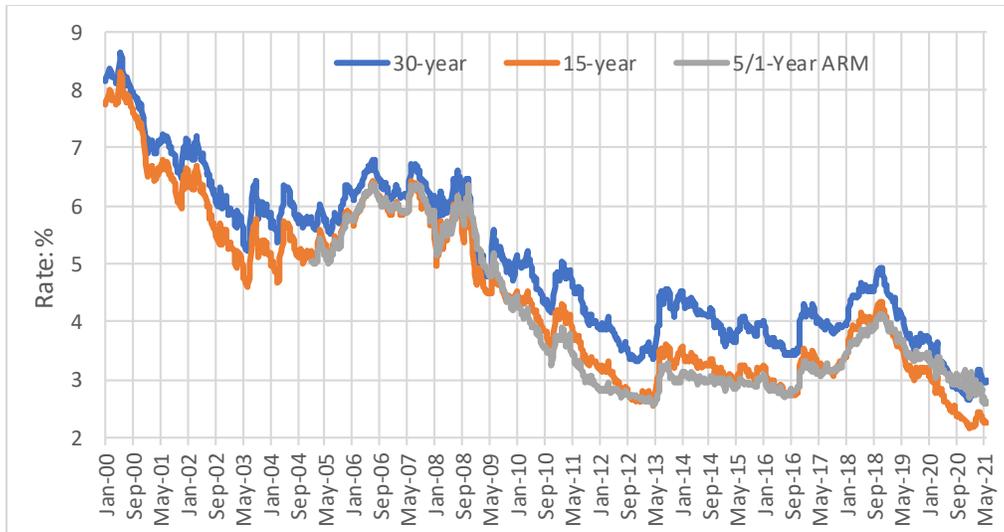


Figure 6. Average rates for 30-year fixed, 15-year fixed, and 5/1-year adjustable mortgages in the U.S. since 2000.

(3) Investing to fight future inflation

In addition to cutting interest rates during COVID-19, the U.S. government has provided several rounds of stimulus relief to support the economy.⁵ These stimulus payments indeed encouraged people to spend money on houses, automobiles, etc. But the sudden demand also drove prices up. To deal with the decreasing buying power of money, more and more people considered investing in tangible assets including rental real estate. Stimulus checks have also helped people to save for down payments on new homes.

Forest products trading markets are also red hot. For example, the lumber future price reached \$1,686 in May 2021, while the average price a year prior was \$332, a 408 percent increase (Figure 7).⁹ The same trends can be observed in the stocks of forest products companies that manufacture products including paper and wooden furniture during the same period. On the one hand, the performance of lumber futures, timber or finished forest products stocks reflect the confidence that investors have in forest products industries. On the other hand, lumber futures in the capital market also drove prices up.¹⁰

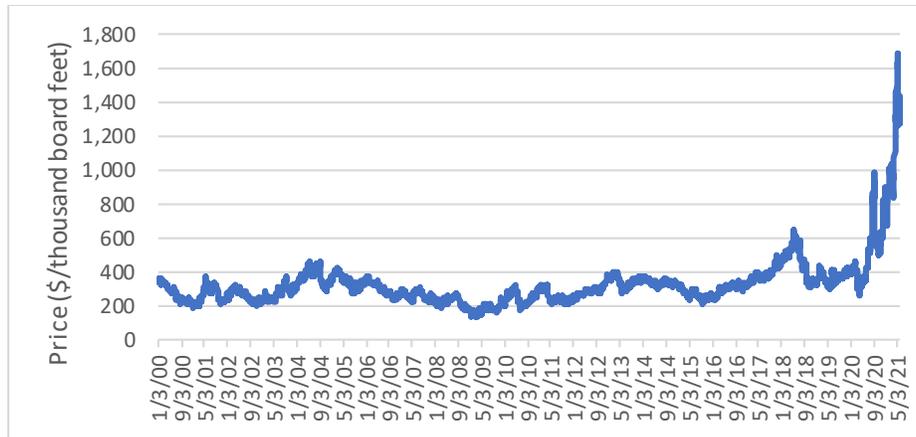


Figure 7. Lumber futures price since 2000

(4) Decreased lumber inventory

The high demand for houses, lower interest rates, investments in rental real estate, and lumber futures have resulted in high demand for lumber and structural panels. However, current lumber and panel inventories have not been able to meet the demand boom. Interestingly, starting in the second half of 2018, lumber and panel prices started decreasing (Figure 1) which likely contributed to lower lumber production in 2020. The lumber futures market has also reflected the lumber market with the same decreasing trend observed on lumber future prices at the end of 2018 (Figure 7). Therefore, the current lumber shortage is at least partly related to predictions that demand would be lower than what has resulted. In fact, many sawmills downsized or shut down between 2018-2019, resulting in a 24 percent decrease in lumber production and a 17 percent reduction in logging employment.¹¹

Shift reductions and shutdowns at sawmills starting in March 2020 as a result of COVID-19 further aggravated inventories. Decreases in lumber and panel production were exacerbated by the winter storm which disrupted forest and mill operations alike across much of the south in February 2021. In summary, lumber and panel inventories have not been able to support the unpredicted demand boom in the housing market which, in turn, has resulted in shortages and record prices of these materials.

(5) Other increasing costs

Other factors that put upward pressure on lumber prices are the increasing cost of manufacturing and transportation. Various stakeholders are involved in the production chain of procuring, harvesting, transporting, and processing logs into lumber. Labor shortages during COVID-19 caused an increase in labor cost which has transferred to the price of lumber. In addition, reduced trucking capacity during COVID-19 and the increase in demand for lumber transportation helped cause a severe trucking shortage. In fact, about one to two weeks have been added to traders' lead times in the south along with increased freight costs.¹ According to the American Trucking Association, the current truck driver shortage will not likely be resolved anytime soon based on their prediction that the gap will continue to grow through 2026.¹³ From the standpoint of importing lumber to U.S. markets from other countries, a shortage of vessel

containers has also contributed to an increase in transportation costs. Finally, shortages of some manufacturing components such as glue resin have driven up costs which ultimately results in higher prices of panel products such as plywood and OSB.

Why are lumber and timber prices disconnected?

(1) Who dominates the game?

The demand for lumber is generated by the end market, which includes new single-family homes and furniture production. Lumber is made from sawtimber, generating a supply chain that consists of three key components: the upstream timber market, the middlestream lumber market, and the downstream end market. As an intermediate between the timber market and the end market, the lumber market is poised to influence both sides of the industry.

One example of this occurred between the lumber market and the end market in October and November of 2020. Figure 1 shows the dramatic increase in lumber price during the second quarter of 2020. During this red-hot lumber market, the price of framing lumber and structural panels decreased unpredictably at the turn of the third quarter, contradicting the trend of increased lumber prices. This happened when consumers such as homebuilders in the end market, delayed buying lumber from mills due to exorbitant prices. Ultimately, though, lumber prices increased back to new highs, overcoming the lull in demand from the end market (Figure 1).

Under these circumstances, it might be assumed that timber prices should also skyrocket, with a price trend consistent with that of lumber. However, timber prices have remained flat, and the divergence between lumber and timber prices actually grew during COVID-19 (Figure 2). In the middlestream market, sawmills play a dominant role in pricing for the timber market, such as when and how much stumpage to buy. If sawmills have full log yards, they lack the incentive to increase the price they pay for logs. Stakeholders such as forest landowners in the timber market may not make additional profit from this red-hot lumber market until sawmills work through their log inventories. In summary, those who are standing in the middle and holding the lumber, such as sawmills and traders, are dominating the game.

(2) What sets the price?

According to economic theory, there are different market forms due to economies of scale for filling consumer demand. Although market types exist in a continuum based on the number of producers, three basic market types can be identified: monopoly, oligopoly, and perfect competition.¹⁴ Monopoly and oligopoly markets represent the market with only one or few producers, respectively. These market types are created when barriers due to economies of scale prevent new producers from entering the market. The demand curve in these two markets is inelastic, since products such as electricity (a monopoly before deregulation) and the airline industry (oligopoly) are essential. The third market type, perfect competition, exists when many competing firms produce homogenous goods so that no one producer can set the price. In the

perfect competition market, there are numerous producers and no barriers to enter or exit the market.

In the lumber supply chain, the middlestream lumber market is currently close to an oligopoly market, while the upstream timber market is closer to a perfect competition market. Compared with the large number of forest landowners, there are very few sawmills. These small group companies in the lumber market are well organized with exceptional resources, including high-technology equipment, expansive capital, and experienced entrepreneurs. It is not easy to build new mills within a short period that can match this high benchmark. This is one barrier that helps contribute to the limited number of mills in the lumber market. Another characteristic of an oligopoly market is when the few producers are all mutually interdependent. For example, in the airline industry, if one cuts the price, others may too, leading to lower profits for all. Thus the small group of airline companies is not likely to break from that set price because it is not beneficial for all.

On the flip side, the upstream timber market is rich with private forest landowners who have less skill in selling their stumpage. According to the USDA Forest Service, 56 percent of forestland (751 million acres) in the U.S. is privately owned. Of that, 62 percent of forestland is family or individually-owned.¹⁵ East Texas is unusual in that 92 percent of its forestland is privately owned, with 53 percent family-owned.¹⁶ Compared with experienced mill managers, private forest landowners are less experienced in the market. The demand curve of timber is more elastic than lumber. Since there is a large supply of stumpage in the timber market, the large and diverse group of forest landowners has little influence over the price of their timber.

Another difference between lumber and timber markets is reaction time. Sawmills can quickly react to market conditions by producing more or less lumber in real time. However, the timber market depends on the organic processes of natural resources. In addition, activities in the lumber market are instant, while timber needs a long period (30-35 years) to produce full-value timber stumpage. In contrast, mills can produce lumber within several weeks of the raw logs being harvested. Lumber producers decide when and how much to manufacture based on end market demand, while timber growers have few options in response to middle-market demands. Therefore, the different market structure is another factor that contributes to the disconnect between lumber and timber prices.

(3) Trade and substitution

In addition to domestic production, the U.S. also imports lumber from other countries. In March of 2021, U.S. softwood lumber imports reached a high of 506 million board feet. This was the highest level since 2006, 23 percent higher than 2019, and 42 percent higher than 2020.¹ Since the 1980s, the majority of lumber imported to the U.S. has come from Canada. After the expiration of the 2006 U.S.-Canada Softwood Lumber Agreement in October 2015, the everlasting softwood lumber trade debate has been active. In response to surging Canadian softwood lumber shipments, the U.S. International Trade Commission levied up to 24 percent antidumping and countervailing duties starting in November 2017.¹⁶ Tariffs have led to a large decrease in the amount of lumber imported to the U.S., further contributing to the current lumber shortage and the sky-scraping lumber prices.

Among all regions, the U.S. south is the largest contribution to domestic lumber production. In January of 2021, the production of softwood lumber in the U.S. west inland, west coast, and south was 400, 798, and 1,741 mmbf, respectively.¹ Figure 8 shows the U.S. south lumber production and import rates from Canada since the expiration of the lumber agreement at the end of 2015. In general, the heavy tariff has contributed to the improvement in U.S. domestic production as a response to the reduction of Canadian lumber imports. To offset the current lumber shortage, lumber imported from Canada started to recover during the second quarter of 2020. Meanwhile, the U.S. decided to drop the tariff on Canadian lumber to 9 percent starting from 2021¹⁷, which has greatly increased the amount of lumber imported to the U.S. to meet the surge in lumber demand. In April 2021, Canadian plywood and OSB output increased 13.7 percent and 9.6 percent over the same period in 2020, respectively.¹

In addition to increasing the amount of lumber imported to the U.S., the surging demand for lumber has also stimulated the production of substitutions such as concrete, brick, steel, and bamboo for construction. The lumber shortage has also put pressure on mass timber construction, which slowed cross-laminated timber (CLT) projects.¹ If lumber prices stay elevated, cost-effective substitutions, such as 3D-printed homes, could take the place of more expensive wood constructions in the long term.

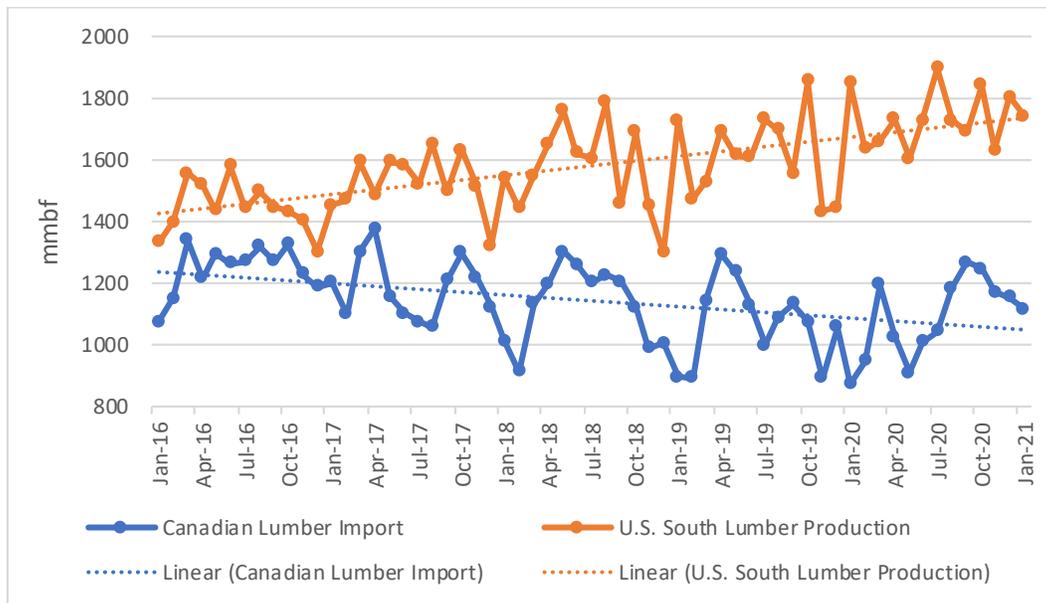


Figure 8. U.S. South lumber production vs. Canadian lumber imports over the last five years

(4) Large timber inventory and the lag effect

While the supply of lumber is short for a myriad of reasons, the state-wide inventory of timber stumpage is relatively oversized. From 1980 to 2020, the volume of wood growing on timberland in the south has more than quadrupled. In the 1980s, the U.S. government subsidized development of tree plantations. A large number of landowners across the south responded by planting pine trees as a long-term investment.¹⁸ Those trees have been growing for decades and are finally ready for harvest, but the result is an excess of timber inventory. After the 2008 economic crisis, the housing crisis compounded this accumulation of timber, with an 8 percent

increase in harvest-ready timber in the south between 2008 and 2014.¹⁹ According to the U.S. Forest Service, before the economic crisis in 2008, pine sawtimber inventory on average was 14 years. In 2020, that figure expanded to 26 years.²⁰ The oversupply of timber stimulates the disconnect between lumber and timber prices.

There is also the issue of a lag effect existing in the timber market. Compared with lumber producers, forest landowners need a much longer time to prepare stumpage. For instance, timber producers need decades from the first planting to the first thinning. In addition, the timing of timber production also largely depends on the natural resources at hand, such as the stumpage location, weather, seasons, etc. As a demand-derived product, there is little need for two-by-four lumber until there is a demand for house construction or furniture production. Once the demand for lumber comes from the end market, sawmills can immediately start to manufacture, as abundant stumpage is available. Meanwhile, sawtimber generally needs decades to grow – and growers are thus at the mercy of the sawmills and end market once their timber is ready for harvest. This creates a lag effect between the upstream market and the downstream market, especially during periods of severe and acute lumber demand.

(5) Other costs and technology

Except for the cost of timber, lumber prices incorporate several other increasing costs, such as transportation and manufacturing equipment. During COVID-19, the shortage of trucks and shipping containers drastically increased freight costs. The production of lumber also involves many stakeholders' activities throughout the supply chain, including landowners, foresters, loggers, truckers, mill managers, traders, wholesalers, retailers, etc. The work from home orders and stimulus relief during COVID-19 have resulted in a labor shortage, which further contributed to the rise in production costs.

Technological advancement is another factor for lower timber prices, even in the face of a large demand for lumber. As an intermediate between the timber market and the end market, a sawmill is a technology-intensive place to manufacture lumber from raw logs. Technological advancements have increased production efficiency, which consumes less timber volume for the same amount of lumber production.¹⁹

Discussion and Conclusion

Through the whole supply chain, there is a disconnect between the upstream timber market and the middle stream lumber market, while trends between the downstream end market and the lumber market are consistent. Sustained high lumber prices have been caused by a combination of the high demand for new housing, lower interest rates, investing to beat inflation, lower lumber inventory, and other increasing costs. However, as a main component of lumber, timber prices have remained flat throughout COVID-19. This disconnect is caused by the role of each market, the market's structure, trade and substitution, large timber inventory and lag effect, as well as technological improvements and environmental effects.

The surge in lumber prices is a reflection of high consumer demand for lumber. This acute lumber demand is coming directly from the red-hot housing market, thanks to the

disturbance of COVID-19. However, this demand is expected to cool down, once those who wanted to build new houses will have settled, and those conducting DIY home improvement projects are nearing completion.

According to Random Lengths, the price of framing lumber and structural panel in May 2021 is four times the price over the same period in 2020.¹⁹ Due to the increase in building costs, housing prices have generally increased. For example, a 2,000 square-foot house generally needs 16,000 board feet of lumber and 6,000 square feet of structural panels. Based on the most recent lumber prices, the cost for those materials alone will have increased by 283 percent or \$25,286 compared with the year before. In addition, other costs such as steel and labor also increased during COVID-19. However, once interest rates return to normal, investors will be more conservative about entering the housing market. As a demand-derived product, lumber will keep consistent with the housing market, which should also eventually return to normal – leading to lower lumber prices.

For the timber market, there is a disconnect between lumber and timber prices. So far timber prices have remained flat despite the high demand for lumber. Looking ahead, changes in lumber demand, possible inflationary pressures, climate variability and extreme weather, wildfire, pests, and other factors could drive future timber markets. Additional opportunities such as carbon offset programs could become available to landowners to help supplement cash flow from forestland investments.

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