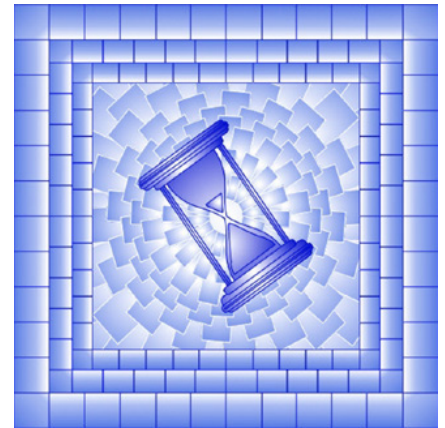


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Prices through the supply chain: Softwood lumber

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Prices through the supply chain: Softwood lumber

Context

In 2021, the cost of constructing a single-detached home increased by 22.5%.¹ This record annual increase in construction costs was driven by higher prices for softwood lumber. Between June 2020 and May 2021, the producer price² of softwood lumber more than tripled, amid various COVID-related developments in the economy. Demand for softwood lumber increased as declining interest rates and excess household savings³ underpinned greater spending on new home construction and pandemic home-improvement projects, key downstream markets for the commodity. Domestic supply of softwood lumber declined initially amid mill closures and curtailments following the COVID-19 outbreak. Even as production picked up in the summer of 2021, longer-term supply constraints in British Columbia due to beetle infestations and wildfires limited increases in Canadian softwood lumber production.

To better understand the unprecedented volatility in lumber prices and the ensuing price transmission, this analysis evaluates the price movements across the domestic supply chain for lumber since the summer of 2020 using producer price indexes.

Highlights

- The increase in producer prices for lumber was not passed along proportionately to consumers. This partly reflects the fact that wholesalers and retailers reduced their markups, presumably to remain competitive.
- Even though wholesalers and retailers reduced their percentage markup on lumber, they still earned a higher gross profit on each unit of lumber sold.
- Roughly two thirds (65%) of the record increase in construction costs for single-detached homes between the first quarter of 2020 and the first quarter of 2022 can be attributed to rising prices for wood, plastics, and composites, specifically, softwood lumber prices.

Analysis

Overview of the supply chain for softwood lumber

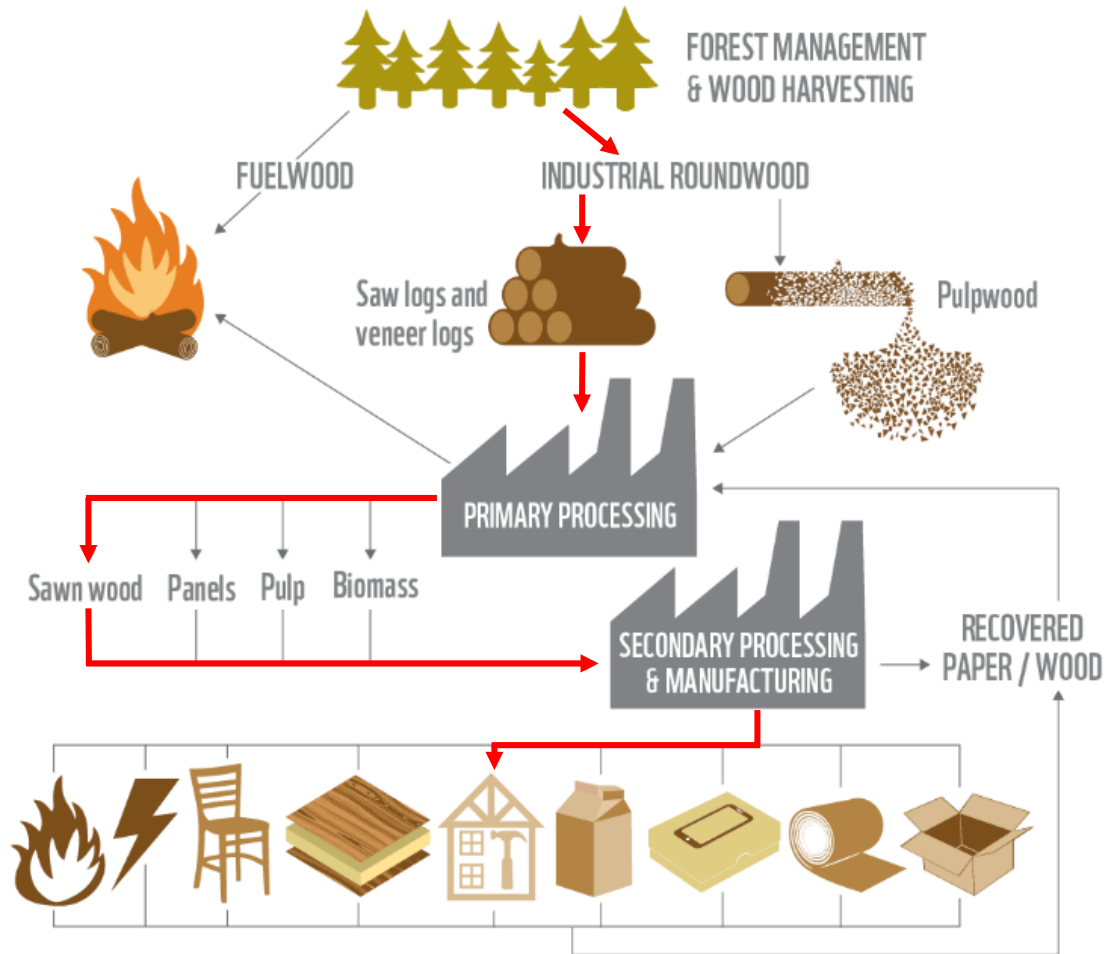
Figure 1 illustrates a simplified supply chain for lumber, excluding international trade. First, logs are harvested from the forests. Next, these logs are sorted for their intended end uses. Logs that are deemed suitable for dimensional lumber are transported to sawmills for processing. Producers sell their lumber to wholesalers, who distribute it to various downstream users. This includes contractors, who purchase the lumber for use, notably in residential construction, where it is used in walls, floors, and ceilings. It also includes retailers who purchase lumber for resale, at a markup, to household consumers. While lumber has other uses, this analysis focuses on its journey from log to end-use, in single-home construction and home improvement.

1. This cost increase was recorded across a composite of 11 Census Metropolitan Areas (CMAs), including St. John's, Moncton, Halifax, Montréal, Ottawa-Gatineau (Ontario part), Toronto, Winnipeg, Saskatoon, Calgary, Edmonton and Vancouver. In 2021, these 11 CMAs accounted for a combined 42.1% of single home building permit value.

2. The producer price represents the price received by producers for the sale of softwood lumber.

3. Net household saving rose to \$211.9 billion in 2020, due to lower household spending on discretionary services such as travel and dining out, and government transfers to manage the economic impacts of the COVID-19 pandemic. This compares to an average annual net household saving of \$25.0 billion between 2015 and 2019. (Source: Statistics Canada. Table 36-10-0612-01 Adjusted household disposable income, Canada, provinces and territories).

Figure 1
Forest products supply chain (excluding international trade)



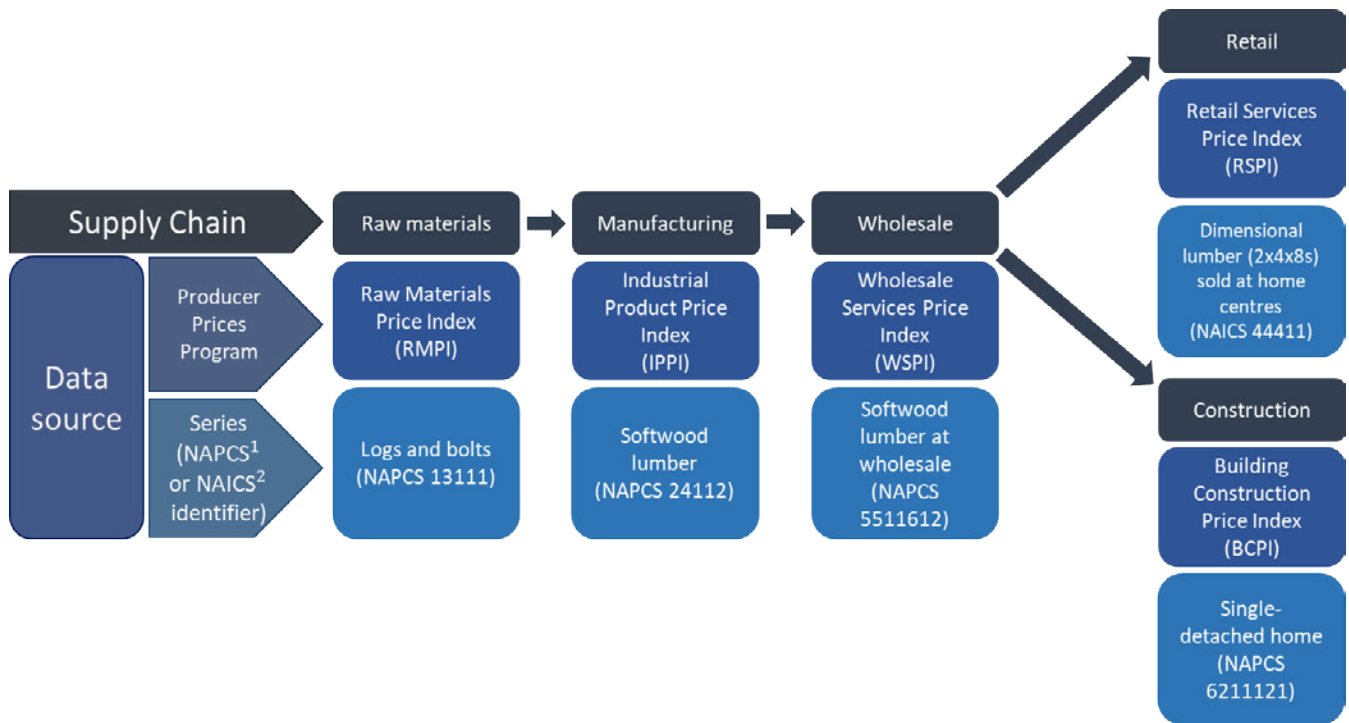
Note: This figure was altered from the original figure to highlight a specific path, represented by the red arrows.
Source: WWF Living Forests Report, 2012.
https://files.worldwildlife.org/wwfcmsprod/files/Publication/file/5ub3o4pav8_living_forests_report_ch4_forest_products.pdf?_ga=2.97272157.354968229.1646840601-364187257.1646840600

Measuring prices across the supply chain

Figure 2 outlines the specific data used to monitor price movements along the supply chain for lumber. To begin with, the Raw Materials Price Index (RMPI) measures price changes for logs and bolts that are purchased for further processing by manufacturers operating in Canada. Moving downstream, the Industrial Product Price Index (IPI) tracks changes in producer prices, in this case, the prices that producers receive for the sale of softwood lumber.⁴ The Wholesale Services Price Index (WSPI) quantifies price movements for lumber distributed to, and sold by, wholesalers. There is no retail selling price index for lumber per se. However, the Retail Services Price Index (RSPI)⁵ measures movements in the price that consumers pay for lumber at home centres. Finally, the Building Construction Price Index (BCPI) measures price movements for wood products used in home construction as well as aggregate price movements in construction costs for single-detached homes. The BCPI measures quarterly price changes, whereas each of the four other indexes measures monthly price changes.⁶

4. While export prices are not considered in this analysis, they were found to closely mirror producer prices for lumber. This reflects the influence of the larger U.S. market on prices in Canada.
 5. Each of the five series chosen to analyze price movements across the supply chain for lumber represent products. However, the retail price index is the only index where the product is not strictly defined through the North American Product Classification System (NAPCS). Instead, the index represents movements in average prices for a detailed category of product sold across home centres, as defined by the North American industry Classification System (NAICS).
 6. The aggregate index for the BCPI represents a composite of indexes for 11 Census Metropolitan Areas (CMAs).

Figure 2
From logs to single-home construction - Measuring prices along the supply chain for lumber



1. NAPCS–2017. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=347883>

2. NAICS–2017. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1181553>

Contributors to unprecedented inflation

The first significant price change in the supply chain for lumber since the start of the pandemic was captured by the IPPI. In July 2020, producer prices for softwood lumber increased 22% from the previous month. At that point, demand for lumber had begun trending upwards, mostly driven by new residential construction and spending on home improvement. Housing starts across Canada rallied in May and June, following a decline in April. As a result, housing starts in the second quarter of 2020 totalled roughly 74,600 - their highest levels since the second quarter of 1987, and 35% higher than their annual average over the second quarters of the previous five years. Likewise, housing starts in the U.S., a key driver of demand for Canadian lumber, increased after an initial decline in April. In July 2020, the U.S. recorded 138,700 housing starts⁷, up 21% year-over-year.

Amid the ongoing uncertainty surrounding the impacts of the COVID-19 pandemic, some sawmills shut down, while others curtailed production temporarily, resulting in a dip in domestic [softwood lumber production](#) in the second quarter of 2020. Domestic lumber production increased over the following three quarters, averaging 8% higher in the first quarter of 2021 compared to the first quarter of 2020. However, demand for lumber outgrew this increase in supply.

Domestic [residential construction investment](#), including spending on new construction and renovations, surpassed pre-COVID levels by August 2020. Thereafter, it increased steadily and peaked in April 2021, to a level 34% higher than its average level over the decade spanning from 2010 to 2019, adjusted for inflation. At the same time, U.S. housing starts increased in the third quarter of 2020 and rose even further thereafter putting significant upward pressure on lumber prices.

Other factors may have contributed to inflation across the supply chain for lumber. Indeed, during COVID-19, businesses were exposed to various forms of supply chain disruptions, such as truck driver shortages, interruptions to trade, and reduced workforce productivity. To the extent that these disruptions reduced the supply

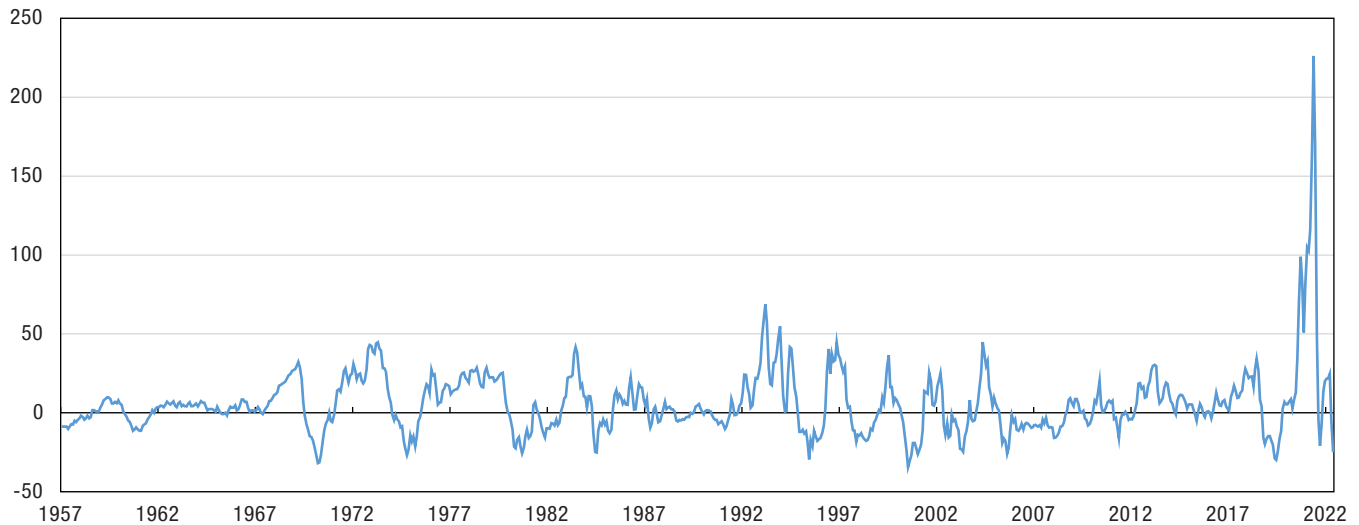
7. United States Census Bureau, [New Residential Construction-Historical Data](#).

of production inputs, the relative scarcity for these goods would have created upward pressure on their prices. The ensuing increase to production costs, or a portion thereof, would have then been passed on to customers.

Against this backdrop, producer prices for softwood lumber rose steadily, increasing in eight of the ten months beginning in August 2020. Double-digit price growth was recorded in six of these eight months. Prices peaked in May 2021, 209% above their June 2020 levels. This volatility in lumber prices was unprecedented, as illustrated in Chart 1.

Chart 1
Unprecedented volatility in lumber prices

Year-over-year percentage change in producer prices for lumber



Source: Statistics Canada. Table 18-10-0266-01 Industrial product price index, by product, monthly.

Most of the increase in lumber prices between June 2020 and May 2021, dissipated over the following three months. As some consumers became increasingly reluctant to pay higher prices for lumber, domestic renovation spending moderated. This decrease in demand was accompanied by higher North American lumber supply.⁸ In Canada, easing supply pressures for lumber were evidenced by rising [inventory levels](#) at sawmills. Overall, producer prices for lumber declined by 53% between May and August 2021, at which point prices were 44% above their levels in June 2020.

More recently, in December 2021, producer prices for lumber were trending upward again, underpinned by robust residential construction in the U.S. and supply constraints resulting from severe flooding in Vancouver. As of May 2022, producer prices were 132% above their levels in June 2020.

Price movements across the supply chain

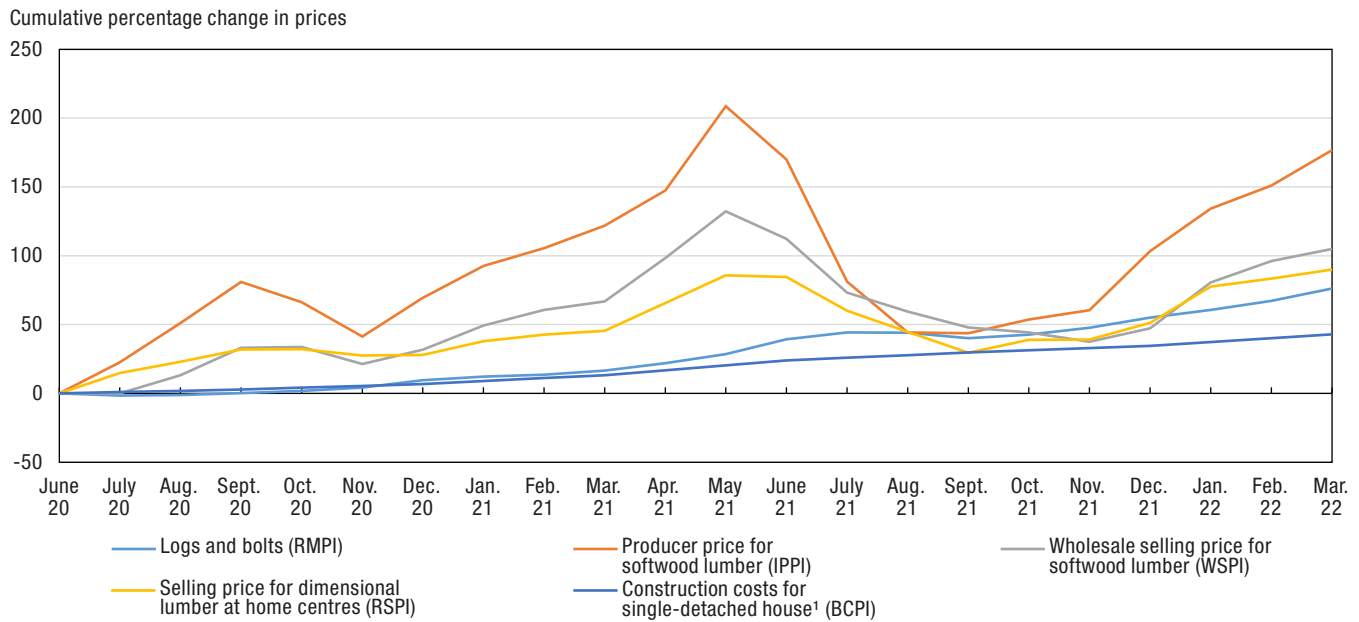
Prices across the supply chain for lumber are interconnected. For example, the producer price for softwood lumber is influenced by upstream developments such as higher prices of logs. Rising input costs can cause lumber producers to increase their output price to remain profitable, an example of cost-push inflation. At the same time, the producer price for softwood lumber is also influenced by downstream developments. A growing number of building permits, signalling an expansion in future construction, will eventually translate into higher demand for building materials including lumber. As these building intentions materialize into supply agreements, lumber producers may increase output prices to maximize their potential earnings, an example of demand-pull inflation. Other factors such as innovations in home construction can also influence producers prices. Ultimately, prices at every stage of the supply-chain will be influenced by a unique combination of factors outlined above. However, this section focuses on describing price movements across the supply chain instead of quantifying their determinants.

8. Lance Lambert, "Lumber's epic boom and bust, explained in 8 charts," Fortune, September 15, 2021.

Chart 2 illustrates the price changes in lumber across the supply chain since June 2020. It is interesting to note that price increases did not transmit evenly across the supply chain. For example, wholesale selling prices for lumber peaked at 132% above June 2020 levels, while retail selling prices for dimensional lumber surpassed June 2020 levels by 86%. This incomplete transfer reflects the fact that wholesalers and retailers reduced their markups.⁹ In other words, wholesalers did not pass on the entire cost increase from producers to retailers, nor did retailers pass on the entire cost increase from wholesalers on to consumers.

In addition, price increases did not always appear simultaneously. For example, it took five months for prices of logs and bolts to increase 5% above June 2020 levels. The remainder of this section discusses movements across the supply chain in greater detail.

Chart 2
Price movements across the supply chain for lumber



1. Quarterly series converted to monthly series through linear interpolation.
Source: Statistics Canada. Table 18-10-0268-01 Raw materials price index, monthly; Statistics Canada. Table 18-10-0266-01 Industrial product price index, by product, monthly; Internal calculation of indexes by NAPCS from Statistics Canada's Wholesale Price Report (survey number 5106); Internal calculation of indexes by NAICS from Statistics Canada's Retail Price Report (survey number 5135); Statistics Canada. Table 18-10-0135-01 Building construction price indexes, by type of building.

Raw materials

While prices for logs and bolts eventually rose, the transfer from producer prices for lumber was imperfect. Between June 2020 and March 2022, price movements for logs and bolts appeared to lag movements in producer prices. At the same time, the price increase for logs and bolts was more moderate compared to softwood lumber, with prices for the raw material peaking 44% above June 2020 levels in July 2021. Since then, log prices have continued to increase, reaching 76% above June 2020 levels by March 2022.

Manufacturing

As highlighted earlier, the unprecedented increase in lumber prices originated in manufacturing. Producer prices for lumber grew substantially amidst an imbalance between supply and demand for lumber that was spurred by various pandemic-related developments. Between June 2020 and May 2021, producer prices for softwood lumber increased by an average of 12% per month.

9. In this report, margin is defined as the gross difference between average selling price over average purchase price. In turn, the markup is defined as the ratio of the margin to the selling price. Margins and markups do not necessarily move in tandem. For example, a wholesaler may purchase a product from a supplier for \$20 today and resell this product to a retailer for \$25. The margin would be \$5, while the markup would be 20%. Tomorrow that same wholesaler may purchase the identical product from the same supplier for \$40 and resell it to a retailer for \$48. The margin would have increased to \$8, however, the markup would have declined to 17%. To maintain their initial markup of 20%, the wholesaler would have had to resell their product for \$50.

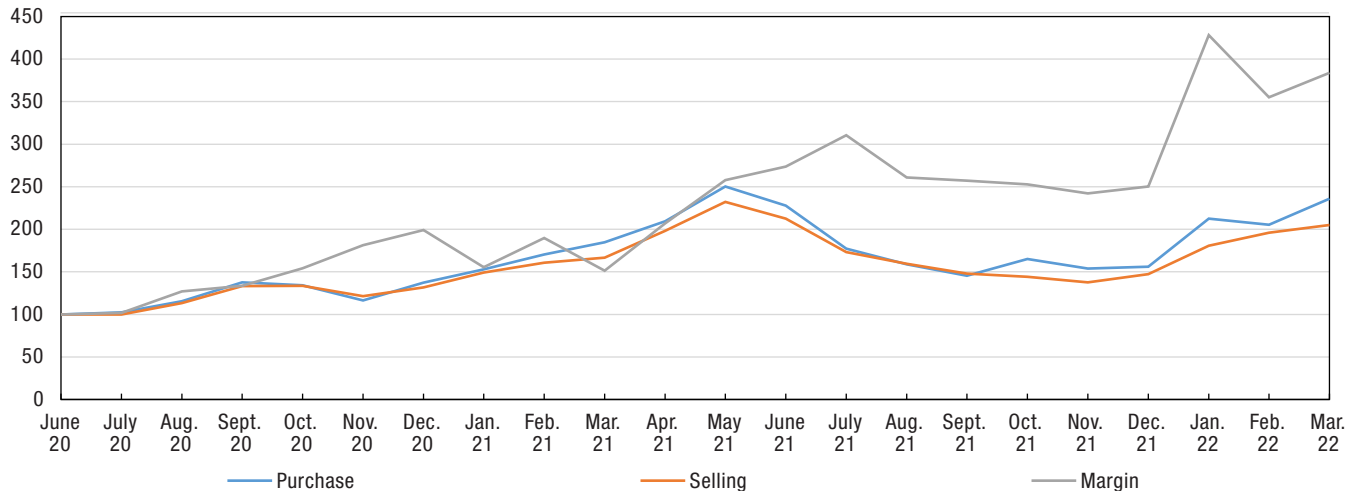
Wholesale

Between June 2020 and March 2022, wholesale selling price movements for lumber largely coincided with movements in producer prices for lumber. What is more, producer and wholesale prices peaked simultaneously, in May 2021, before moderating in unison thereafter.

Chart 3 illustrates how the prices paid by wholesalers to producers of lumber grew faster than the prices they charged retailers for it. In other words, wholesalers were not passing along the entire increase in lumber prices from their suppliers on to their customers, opting to reduce markups somewhat to stay competitive. Nonetheless, the wholesale margin price, which represents the dollar value spread between the average selling price and the average purchase price, increased. This reflects the fact that at higher prices, wholesalers pocketed a larger gross difference between the price they paid for lumber and the price at which they sold it for. A lower wholesale markup, or margin measured as a percent of the selling price, did not prevent wholesalers from earning three times as much profit per unit of lumber sold in May 2021, compared to June 2020. Chart 4 depicts a hypothetical example showing how margins can increase even as markups decline.

Chart 3
Wholesalers earned higher margins on sales of lumber

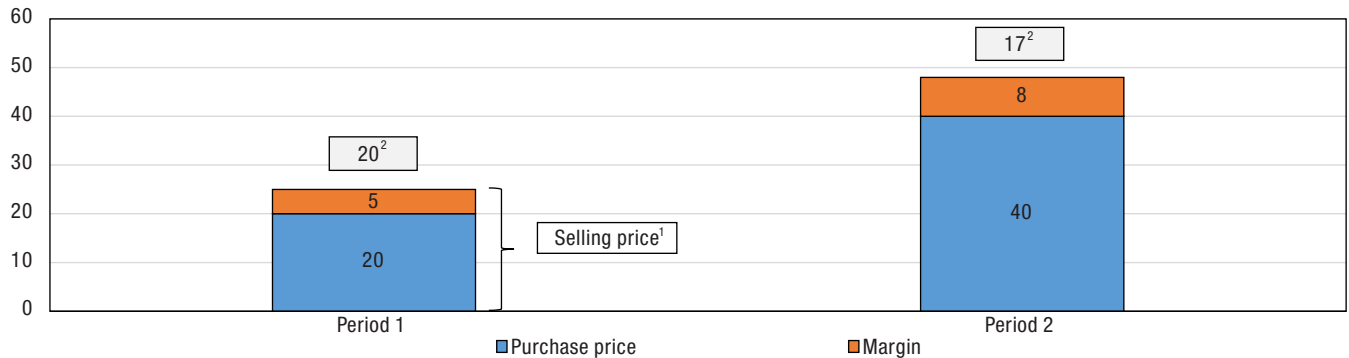
Wholesale price index for softwood lumber, June 2020=100



Source: Internal calculation of indexes under the North American Product Classification System from Statistics Canada’s Wholesale Price Report (survey number 5106).

Chart 4
Illustrating the possibility for higher profits at lower markups

Hypothetical selling prices, in dollars



1. Selling price = Purchase price + Margin
2. Markup percentage = Margin / Selling price

Retail

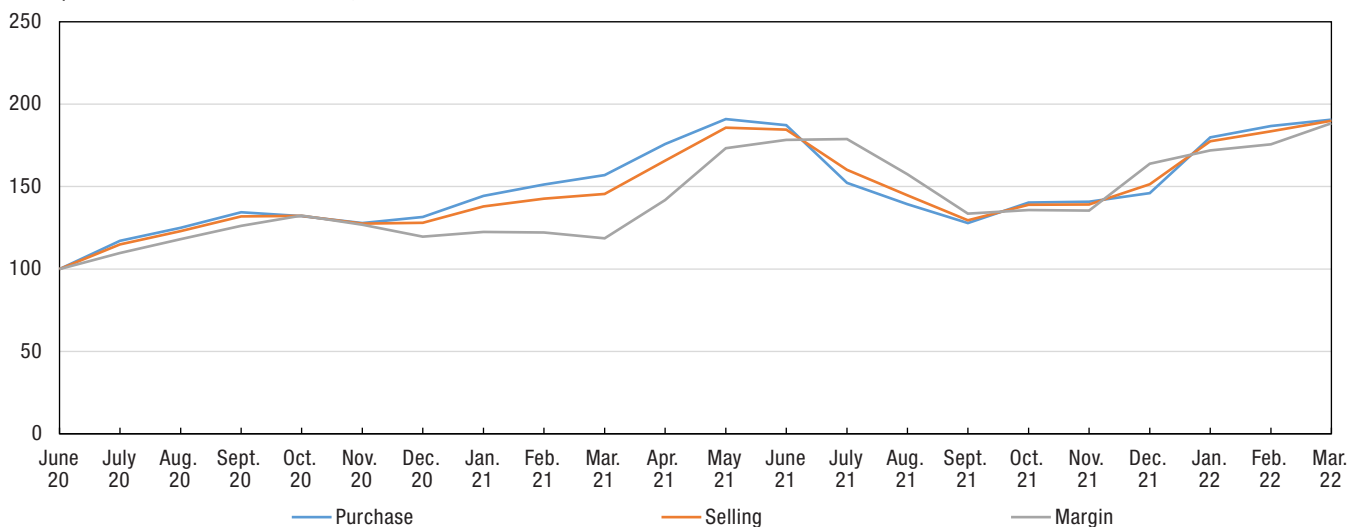
At home centres, one of two important end-markets for lumber that are examined in this analysis, movements in selling prices for lumber resembled movements in wholesale selling prices over the period between June 2020 and March 2022.¹⁰ Moreover, retail prices for lumber also peaked in May 2021, before moderating thereafter.

However, in retail trade, margin increases were lower than in wholesale trade. Like wholesalers, the prices that retailers paid their suppliers for lumber grew faster than the prices they charged consumers for it. As a result, the percentage markup on each piece of lumber sold shrank. In fact, markups on dimensional lumber at home centres declined between November 2020 and March 2021, reaching their lowest levels over the history of available data, which began in 2012. Despite lowering markups, retailers still earned higher profits on each unit of lumber sold, due to higher prices. Between July 2020 and May 2021, retailers earned an average of 28% more profit per unit of lumber, compared to June 2020. (See Chart 5.)

It is interesting to note that the margin increases for retailers were noticeably lower than those for wholesalers. One reason retailers are often more limited in their ability to transfer upstream price increases to their customers is the competitive nature of their markets, in which failing to match competitor prices can result in the loss of market share.

Chart 5
Retail margins grow despite shrinking markups

Retail price index for dimensional lumber, June 2020=100



Source: Internal calculation of indexes under the North American Industry Classification System from Statistics Canada's Retail PriceReport (survey number 5135).

Home construction

The pattern for inflation in single-detached home construction does not resemble the pattern for upstream inflation in lumber prices. This may partly reflect a transmission lag due to fixed purchase agreements by contractors. Furthermore, prices to construct homes encompass more than only lumber. Unlike the first four elements of the supply chain that all represent one individual product, home construction is much more complex, involving many materials as well as labour. As such, changes to the costs to construct single-detached homes reflect more than simply changes to lumber prices.

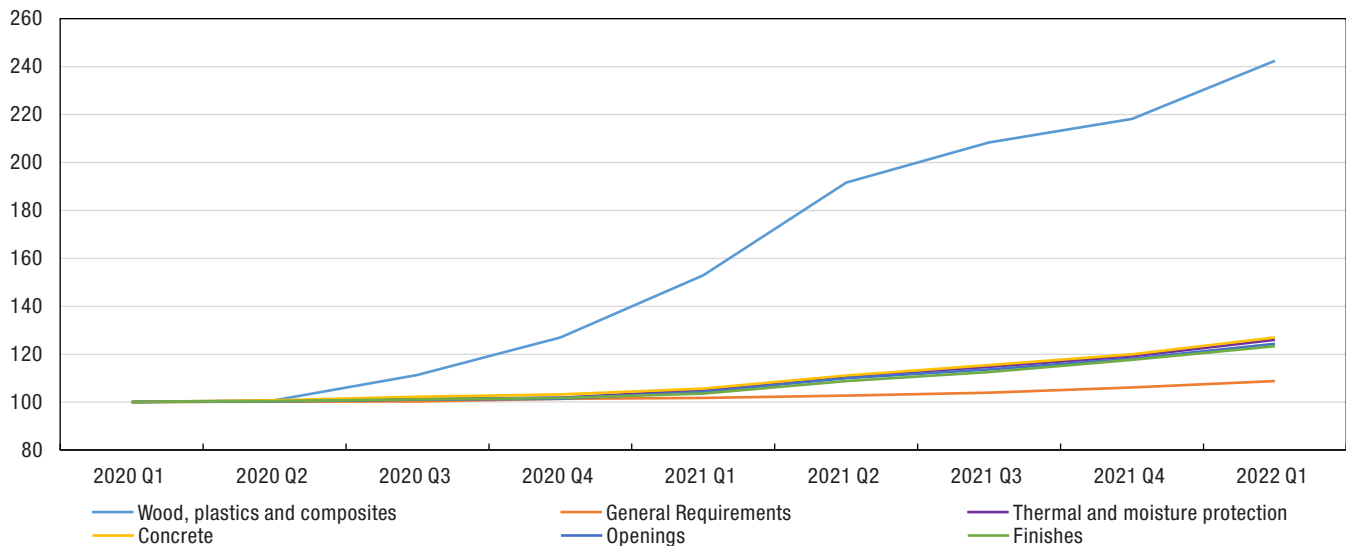
10. Based on results from a vector autoregression model (VAR) focusing on the period between January 2019 and December 2021, a one percentage point increase in wholesale prices for softwood lumber would increase retail prices for dimensional lumber by 0.46 percentage points in the following month. By 24 months, the cumulative increase in retail prices as a result of the one percentage point increase in wholesale lumber prices would be 0.7 percentage points.

Chart 6 shows price movements between the first quarter of 2020 and the first quarter of 2022 for the six largest cost divisions in single-detached home construction. Together these six divisions account for 77% of the cost to construct a single-family home.

Price trends for these divisions can be separated into two orders of magnitude. In the first, which includes five divisions, prices increased from a low of 9% over the reference period, for general requirements (e.g., building permit costs and general contractors fee), to a high of 27% for concrete. In the second, there is only one division - wood, plastics, and composites - where prices increased by an unparalleled 142% over the reference period. Price increases in this division were specifically driven by wood products, with contractors reporting 100% price increases for most wood products and increases as high as 186% for wood truss framing.

Chart 6
Exceptional price growth for wood, plastics, and composites

Price index of key cost divisions in single-detached home construction, 2020 Q1=100



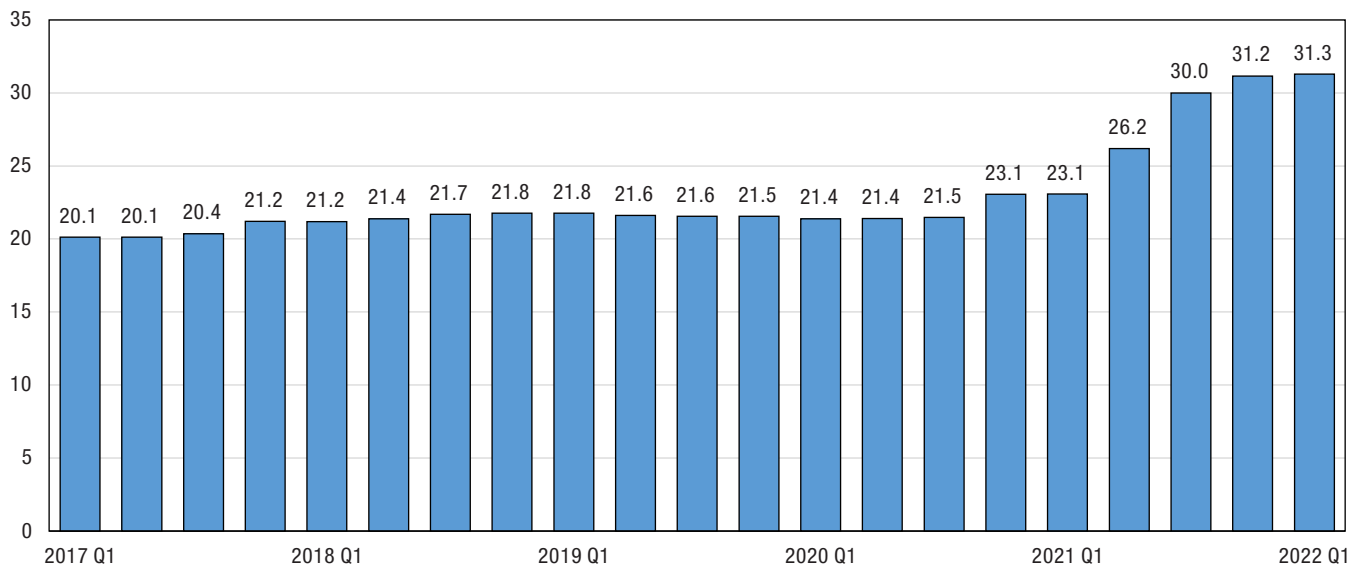
Source: Internal calculation of indexes from Statistics Canada's Building Construction Price Index (survey number 2317).

Based on product level data collected through the Building Construction Price Index, wood, plastics, and composites accounted for 65% of the increase in the cost to construct a single-detached home between the first quarter of 2020 and the first quarter of 2022. Put differently, the share of costs in single-detached home construction¹¹ attributed to wood, plastics, and composites rose from an average of 21.6% in 2019 to 31.3% by the first quarter of 2022. (See Chart 7.)

11. Share of costs in single-detached home construction measured across a composite of 11 Census Metropolitan Areas (CMAs), including St. John's, Moncton, Halifax, Montréal, Ottawa-Gatineau (Ontario part), Toronto, Winnipeg, Saskatoon, Calgary, Edmonton and Vancouver.

Chart 7 Higher prices for wood, plastics and composites driving costlier single-detached home construction

Wood, plastics, and composites percent share of single-detached home construction costs



Source: Internal calculation of indexes from Statistics Canada's Building Construction Price Index (survey number 2317).

Conclusion

There are various takeaways from this analysis. Firstly, strong increases in demand for softwood lumber coupled with domestic supply constraints contributed to record lumber prices, which peaked in May 2021. Secondly, the transmission of prices throughout the supply chain for lumber was imperfect. Notably, wholesalers and retailers reduced their markups, likely to remain competitive. Consequently, the increase in producer prices was not passed along proportionately to consumers. Finally, higher prices for softwood lumber drove the unprecedented increase in construction costs for single-detached homes in 2021. In fact, two thirds of the increase in the cost to produce a single-detached home since the start of 2020 can be attributed to only one division—wood, plastics, and composites. Detailed product data within this division points towards wood products as the dominant driver behind this inflation.