

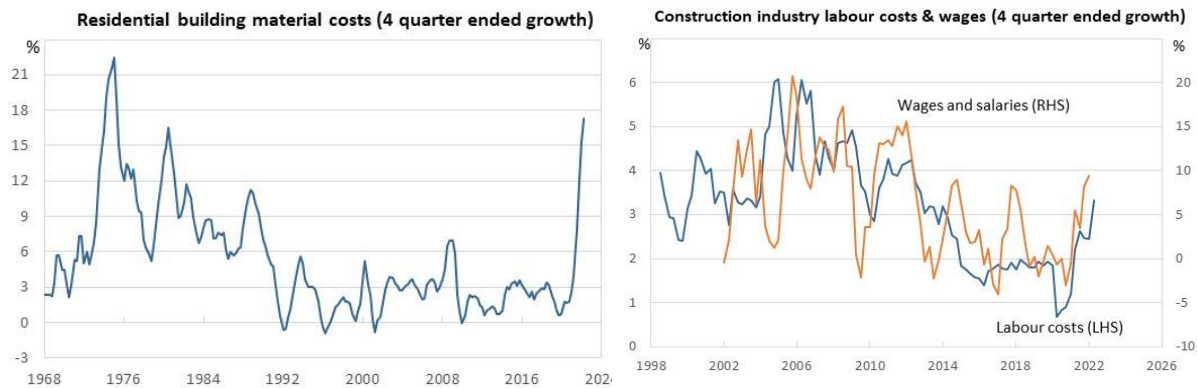
## How supply and demand are affecting building cost inflation

The construction industry has seen strong demand on the back of fiscal and monetary stimulus during the early stages of the pandemic. Fiscal stimulus began being withdrawn at various stages during 2021 and this year monetary policy began unwinding. The pandemic has also seen disruptions to global supply chains which have impacted the supply of building materials to the Australian construction industry.

The result of strong demand and limited supply of building materials has been strong growth in building material costs, which are seeing their fastest pace of growth since the 1970s (Figure 1 – LHS). The cost of labour has increased as well, but at a slower pace (Figure 1 – RHS).

This paper unpacks the demand and supply-driven components of building material cost inflation to help assess how construction cost inflation may evolve as higher interest rates slow demand.

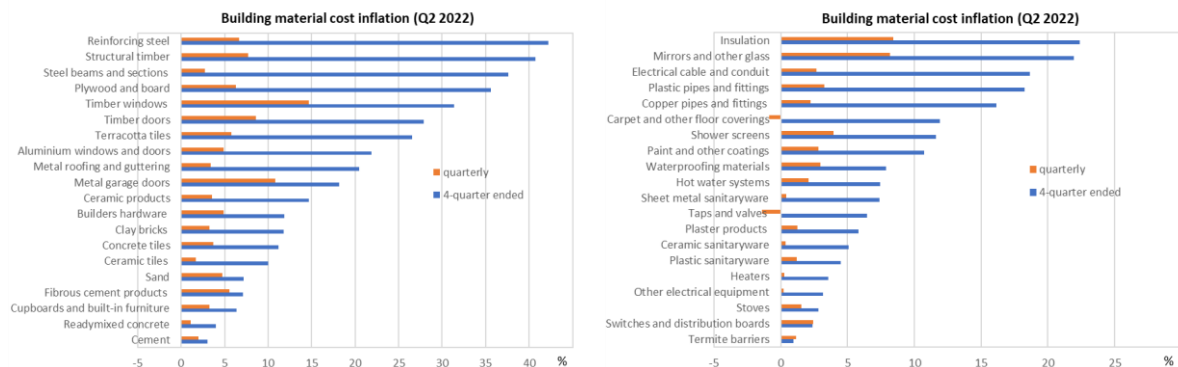
**Figure 1: Building material and labour cost inflation**



Source: ABS. Labour costs are measured as total hourly rate of pay excluding bonuses

Structural timber, plywood, steel reinforcement and structural steel costs have all increased by more than 25% over the past year (Figure 2). It's too early to tell whether cost pressures have peaked, given the strong increase in products such as metal garage doors, timber doors and windows, insulation, structural timber, plywood and mirrors in the June quarter.

**Figure 2: Building material cost inflation**



Source: ABS.

Timber, metal and ceramic products are the main materials used in residential construction and the cost of each of these items rose strongly over the past year (Figure 3). Steel recorded the greatest price increase (42%) but it is used less intensively.

**Figure 3: Materials used in house building weights and inflation in Q2 2022**

Material	% Contribution	4-qtr ended inflation (%)	Quarterly inflation (%)
Timber, board and joinery	27.4	24.2	7.0
Other materials	17.6	12.0	2.8
Other metal products	16.5	18.4	3.9
Ceramic products	12.7	14.7	3.5
Plumbing products	6.6	10.8	2.1
Concrete, cement, and sand	6.3	4.3	1.4
Steel products	5.8	39.1	4.0
Electrical equipment	2.9	11.7	2.4
Cement products	2.6	9.5	4.5
Installed gas and electric appliances	1.8	4.2	1.3

Source: ABS. See appendix for more detail.

### Estimating the supply-driven and demand-driven components of material cost inflation

An Economic Letter by Adam Hale Shapiro of the San Francisco Federal Reserve Bank quantifies and tracks Personal Consumption Expenditure (PCE) inflation by spending category.<sup>1</sup> The categories in the PCE basket (approximately 100 items) are grouped into:

- **Demand-driven categories** – where an unexpected change in price moves in the same direction as the unexpected change in quantity.
- **Supply-driven categories** – where an unexpected change in price and an unexpected change in quantity move in the opposite direction.

In Shapiro's methodology, it's important to isolate the *unexpected* components of the changes in prices and quantities.

Prices and quantities generally increase around a longer-term trend, which doesn't represent a short-term shift in demand or supply. Furthermore, price and quantity growth in line with an existing trend reflects longer-run factors such as technological change, the relationship between the cost-of-living adjustments and wages, or even demographic factors.

### Applying the methodology to Australian building material cost inflation

The following procedure is used to estimate the demand and supply-driven components of building material cost inflation:

- Calculate the quarterly growth of the components of the ABS building material cost index shown in Figure 2.
- Calculate the quarterly growth in the ABS real residential construction work done. This is a proxy for the change in all quantities, which implicitly assumes that the weights of each component of the cost index are consistently applied to the materials used in the quarterly growth in work done. One shortcoming is that the ABS weights are fixed weights last

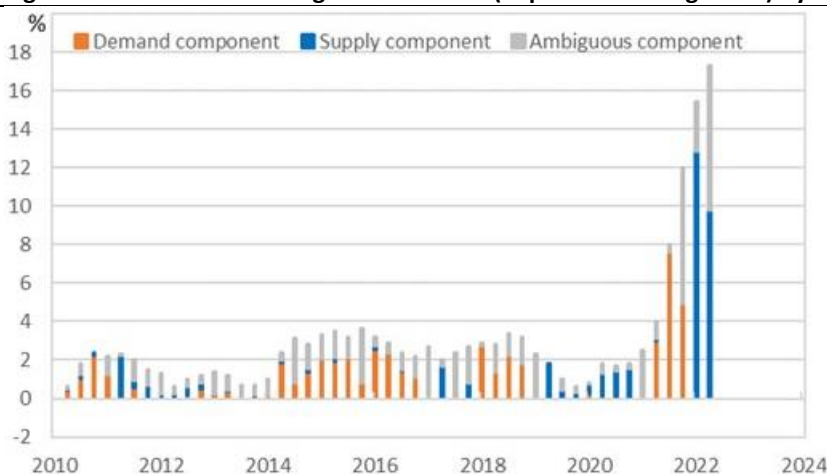
<sup>1</sup> <https://www.frbsf.org/economic-research/publications/economic-letter/2022/june/how-much-do-supply-and-demand-drive-inflation/#:~:text=Inflation%20drivers%20over%20the%20pandemic%20period&text=During%20the%20pre%2Dpandemic%20period,April%202022%20rate%20of%206.3%25.>

updated in 2003. The composition of materials used in residential construction industry may change over time and this may affect the quantities estimated. For example, if significantly more apartments are being built, then the proportion of materials such as structural timber may be less.

- Calculate price and quantity growth expectations using ARIMA modelling on the growth of each component. A +or – 10% error threshold is applied to the expectations and observations within this range of expectation are considered ambivalent and neither driven by supply nor demand. An ARIMA (3,3) model was used to calculate price and quantity expectations, optimised using least squares and the maximum likelihood function.
- Calculate the difference between the growth in both price and quantity and their respective expectations (within the error band). Growth in price and quantity outside the expectations error band is significant. Where price growth or quantity growth is within the band of expectations, the price growth is neither demand nor supply driven and classified as ambiguous.
- If price and quantity growth are significant and both positive or both negative, then price growth is defined as being demand driven. If price and quantity growth are significant but one is positive and the other negative, then price growth is defined as being supply driven.

The results of the analysis are shown in Figure 4. Around 83% of the material cost inflation during the 2022 fiscal year was driven by supply constraints, so cost pressures may persist even as higher interest rates slow demand. In contrast, during the early stages of the pandemic, demand was the major driver of cost inflation, accounting for 75% of cost inflation in the 2021 fiscal year.

**Figure 4: Residential building material costs (4 quarter ended growth) by cause**



Source: ABS, NHFIC.

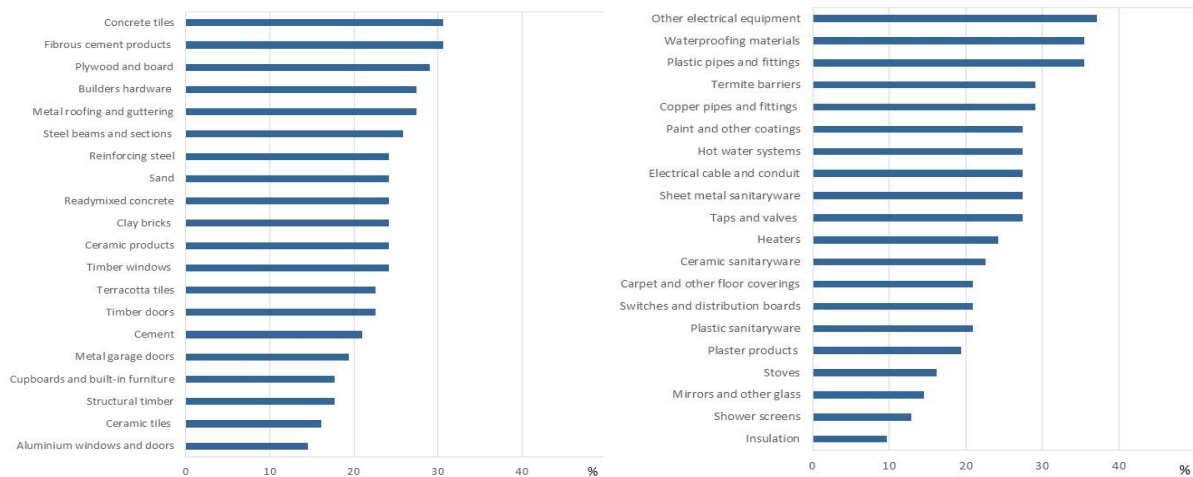
Over the longer-term demand has impact price increases more than supply. During the period of the analysis, 4-quarter ended material cost growth averaged 2.7%, with 0.6ppts driven by supply issues and 1.0ppts due to demand. The remaining 1.1ppts were ambiguous and in line with expectations.

Australian industry structure is dominated by duopolies and oligopolies, which may increase the proportion of price movements due to supply. For example, in Hardware, Bunnings is the major

player. In plasterboard, the industry consists of BGC, CSR Gyprock, Etex (Siniat), Knauf and Winstone Wallboards. Similarly, only BlueScope Steel supplies rolled steel sheet, and only Liberty One Steel supplies structural steel and reinforcing steel for reinforced concrete. Hanson, Holcim, Boral, CSR Barro group and Hy-tech are the main redi-mix concrete suppliers in different geographic markets.

At least 30% of price movements in Other electrical equipment, waterproofing materials, plastic pipes, concrete tiles and fibre cement products are driven by supply (Figure 5). While only 15% of price movements in insulation, shower screens, mirrors and other glass, ceramic tiles, aluminium windows and structural timber are supply driven.

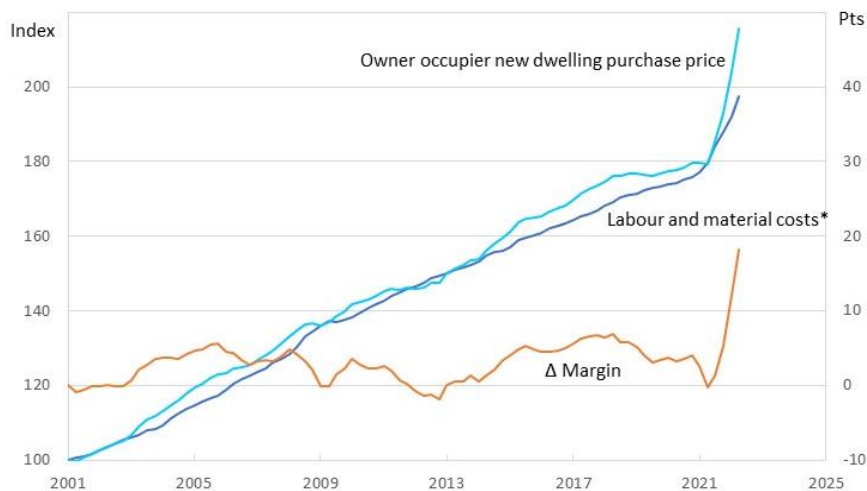
**Figure 5: Percentage of cost growth driven by supply: 1997: 2022**



Source: ABS, NHFIC.

Changes in the margin charged by builders and developers can be estimated using ABS data on construction industry labour and building material costs. The margin has increased sharply since mid-2021 on the back of strong demand and increasing costs after a period between 2018 and 2021 when there was downward pressure on margins (Figure 6).

**Figure 6: Residential construction costs and the homeowner purchase price (Q1 2001 = 100)**



Source: ABS, NHFIC. \* assumes 40% contribution from labour and 60% from materials. Doesn't include design and development costs such as the cost of development application, architectural design, engineering design.

## Appendix

**Figure 3: Materials used in house building weights**

Material	% Contribution	Material	% Contribution
<b>Timber, board and joinery</b>	27.4	<b>Plumbing products</b>	6.6
Structural timber	11.2	Plastic sanitaryware	0.9
Timber windows	2.8	Sheet metal sanitaryware	0.9
Plywood and board	2.2	Plastic pipes and fittings	0.9
Timber doors	4.3	Ceramic sanitaryware	1.5
Cupboard and fittings	6.9	Shower screens	2.4
<b>Other materials</b>	17.6	<b>Concrete, cement and sand</b>	6.3
Mirrors and other glass	3.5	Cement	0.5
Termite barriers	0.4	Pre-mixed concrete	5.5
Carpet and other floor coverings	3.1	Sand	0.3
Waterproofing materials	0.2	<b>Steel products</b>	5.8
Paint and other coatings	3.6	Steel beams and sections	3.7
Plaster products	3.8	Steel doors frames	0.0
Insulation	3.1	Steel house frames	0.0
<b>Other metal products</b>	16.5	Reinforcing steel	2.1
Metal garage doors	0.9	<b>Electrical equipment</b>	2.9
Aluminium windows and doors	6.5	Switchboards and distribution boards	1.8
Taps and valves	1.3	Electrical cable and conduit	0.5
Metal roofing and guttering	3.5	Other electrical equipment	0.7
Builders hardware	3.6	<b>Cement products</b>	2.6
Copper pipes and fittings	0.7	Concrete bricks	0.0
<b>Ceramic products</b>	12.7	Concrete tiles	1.5
Clay bricks	10.3	Fibrous cement products	1.1
Terracotta tiles	1.2	<b>Installed gas and electric appliances</b>	1.8
Ceramic tiles	1.2	Stoves	0.9
		Heaters	0.2
		Hot water services	0.7

Source: ABS.