



CFRA

Industry Surveys

Paper & Paper Packaging

APRIL 2023

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NEW THEMES



What's Changed: Amazon has transitioned toward using lightweight packaging and less paper, reducing its use of corrugated boxes in North America and Europe by 35% over the past five years. Read more on page 18.



What's Changed: We expect pulp prices to soften as a new wave of investment in capacity expansion is set to enter the market in 2023. See page 19.

EXECUTIVE SUMMARY

CFRA has a neutral outlook on the Paper & Forest Products industry and the Paper Packaging sub-industry. Here are some key themes to watch for in 2023.

Housing Market Weakness Amid Higher Mortgage Rates

Affordability has been a major risk to the health of the housing market. The surge in mortgage rates has eliminated many American families (that were potential buyers) from the market. Although real estate prices have fallen some, prices remain high historically, and significantly higher mortgage rates have resulted in an affordability crisis. According to the NAHB/Wells Fargo Housing Opportunity Index (HOI), only 38% of new and existing homes sold in the fourth quarter of 2022 were affordable to families earning the U.S. median income of \$90,000. This is a sharp decline from the 57% of homes sold in the first quarter of 2022 and the lowest affordability level since the beginning of the revised series in the first quarter of 2012.

Despite the recent slowdown in mortgage applications, CFRA thinks there is significant pent-up demand for new household formations as the millennial generation continues to transition to home ownership, which could drive a multiyear boom for home building, once the economy emerges from the current rate-tightening cycle. The health of the U.S. housing market is crucial to paper and forest product companies, and investors need to keep an eye on leading indicators, such as starts and permits.

Following a spike in the average lumber price during 2021 and 2022, prices have fallen significantly, amid the cooling down of the housing market. Lumber prices have returned to the pre-pandemic normal and we expect to see lumber prices back to a more normal range of \$300-\$600 (per thousand board feet) in 2023.

An Evolving Consumer Is a Boon for Paper Packaging

Major consumer trends (such as sustainability, convenience, and e-commerce) create new growth opportunities for the Paper Packaging sub-industry. CFRA expects the strong growth in e-commerce to be a long-term tailwind for box demand (and other paper packaging products). E-commerce is changing the packaging landscape, as companies must focus on the unboxing experience, counterfeiting measures, optimizing last-mile delivery, and product safety.

Paper is generally the preferred packaging material in e-commerce deliveries, and paperboard packaging is making inroads with sustainability, given that these products are mostly recyclable and compostable, as they utilize a significant amount of renewable wood fiber. Consumer disdain towards plastic packaging appears to be gaining momentum, and this will likely benefit paper packaging demand.

As demand increases for ready-to-eat food items, the packaging market must continue to innovate and provide better packaging material. CFRA expects this trend to provide modest growth opportunities in corrugated board packaging markets.

Transition of Capacity to New Growth Opportunities

Although graphic papers (such as newsprint) continue to face secular declines due to digitalization, the industry overall continues to grow, albeit at a slower pace than in previous decades. The industry has been proactive with machine conversions from uncoated freesheet to packaging and specialty papers. We expect consumer packaging and tissue demand to grow in line with global GDP. Industrial packaging and transportation end markets should continue to experience significant growth, driven mostly by demand from e-commerce. Cartonboard packaging, containerboard packaging, and tissue have been offsetting the loss in graphic paper during the last decade and are still expected to grow at CAGRs of 1.9%, 2.2%, and 2.4%, respectively, between 2022 and 2030.

PAPER & PAPER PACKAGING

Outlook: Neutral

BY THE NUMBERS

MARKET CAP BREAKDOWN

RANK NO.	COMPANY NAME	MARKET CAP (\$ billion)
1	Weyerhaeuser	22.4
2	Amcor	16.0
3	Avery Dennison	14.5
4	Packaging Corporation	12.9
5	International Paper	12.7
	Others*	37.3

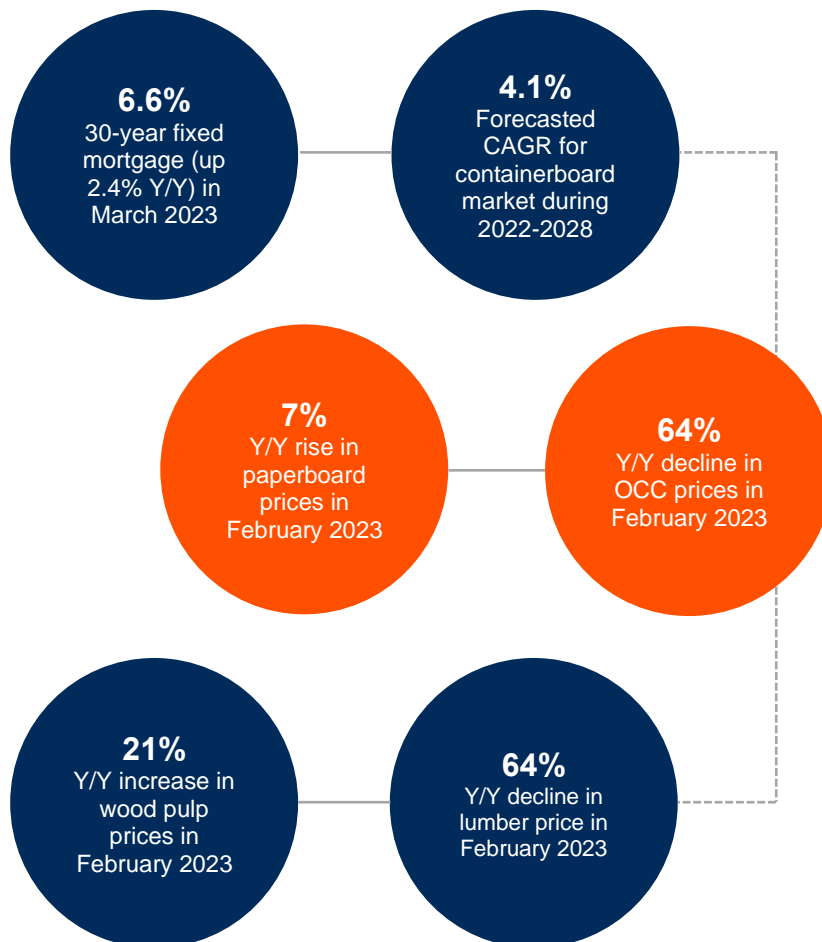
Market cap as of April 25, 2023.

Source: CFRA, S&P Global Market Intelligence.

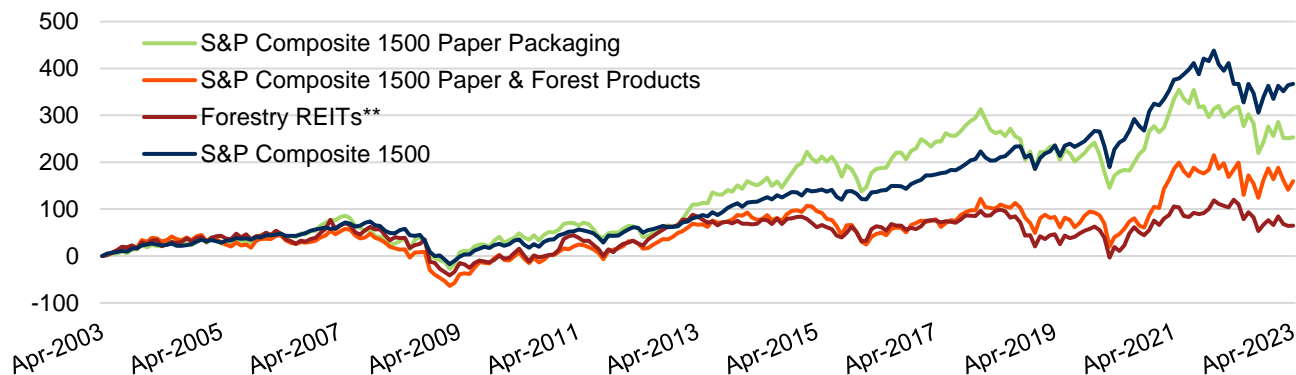
*Refer to the Comparative Company Analysis section of this survey for other companies in the industry.

ETF FOCUS

XLB Materials Select Sector SPDR	AUM (\$M) 5,303.7	Expense Ratio 0.10
WOOD iShares Global Timber & Forestry	AUM (\$M) 199.1	Expense Ratio 0.40
CUT Invesco MSCI Global Timber	AUM (\$M) 58.8	Expense Ratio 0.60



20 YEAR PRICE PERFORMANCE

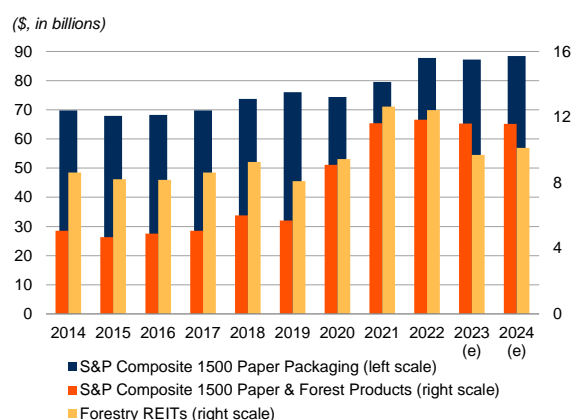


**Refer to Comparative Company Analysis table for the constituents of Forestry REITs

Source: CFRA, S&P Global Market Intelligence.

FINANCIAL METRICS

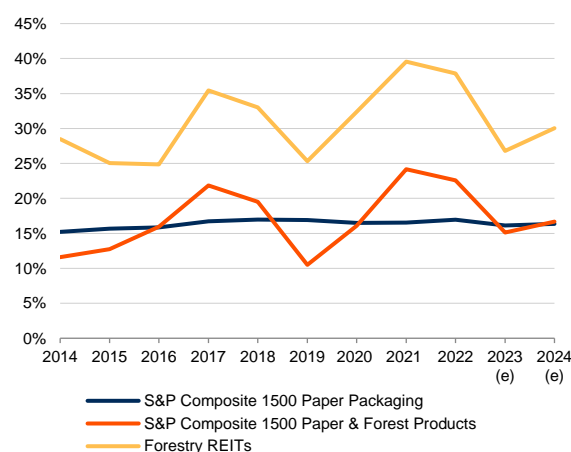
Revenue



Source: CFRA, S&P Global Market Intelligence.

- ◆ Revenue for Paper & Forest Products stabilized in 2022 after surging 28.0% in 2021 following a rebound in economic activity and an increase in pulp prices. We expect growth to come under pressure in 2023 and 2024 due to weaker volume and pricing for oriented strand board (OSB) as housing demand grows weaker amid rising interest rates.
- ◆ Paper Packaging revenue grew 10.4% in 2022 following a 6.9% growth in 2021. Demand for uncoated freesheet paper has mostly recovered due to increased demand from businesses and schools following high vaccination rates worldwide. Strong demand for cardboard boxes should remain a tailwind in 2023 and 2024, in our view.
- ◆ Revenue for Forestry REITs remained flat in 2022 after growing 34.1% in 2021 due to a decline in lumber prices, coupled with soaring interest rates and fear of recession further exacerbating the housing market. We expect this trend to continue in 2023, with revenue falling 22% before growing 4.8% in 2024.

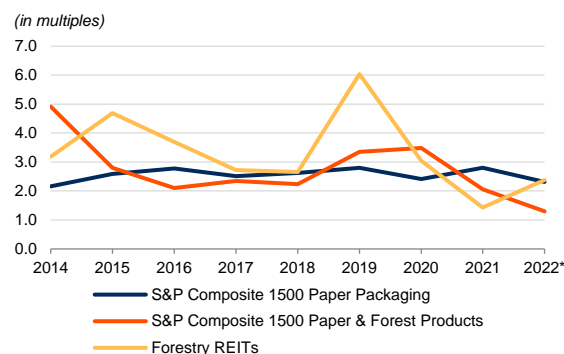
EBITDA Margin



Source: CFRA, S&P Global Market Intelligence.

- ◆ EBITDA margin for Paper & Forest Products increased to 24.2% in 2021 before falling to 22.6% in 2022 due to higher material costs, wage inflation, and lower OSB prices as the housing market softened. We expect this trend to continue this year, further contracting EBITDA margin by around 750 bps in 2023 before increasing by 160 bps in 2024.
- ◆ Paper Packaging's EBITDA margin expanded by 70 bps in 2022 after remaining flat in 2021 at 16.5%. We project EBITDA margin to contract by 80 bps in 2023 (from lower pricing and volume) before expanding by 30 bps in 2024.
- ◆ EBITDA margin for Forestry REITs declined to 37.9% in 2022 from 39.6% in 2021 due to lower lumber prices and slower demand for housing amid blistering inflation, coupled with fear of a possible recession. We expect margin to further decrease to 26.8% as the trend continues in 2023 before recovering to 30.0% in 2024.

Net Debt-to-EBITDA



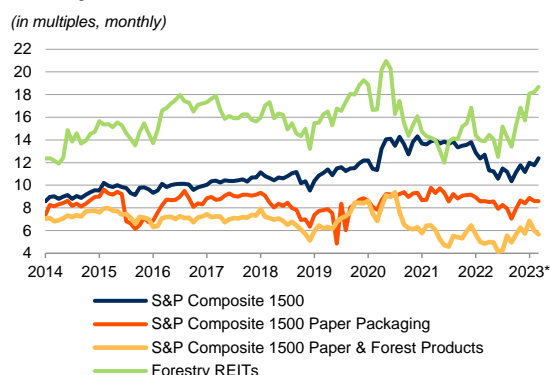
*Data through Q4.
Source: CFRA, S&P Global Market Intelligence.

- ◆ The financial leverage ratios of the relative sub-industries of the S&P Composite 1500 are as follows:

	2022	10-year average
Paper & Forest Products	1.7x	2.7x
Paper Packaging	2.3x	2.5x
Forestry REITs	2.4x	3.4x

- ◆ CFRA expects balance sheets to remain strong in 2023 despite risks of a global recession, as most companies in these industries benefit from strong and stable cash flow.

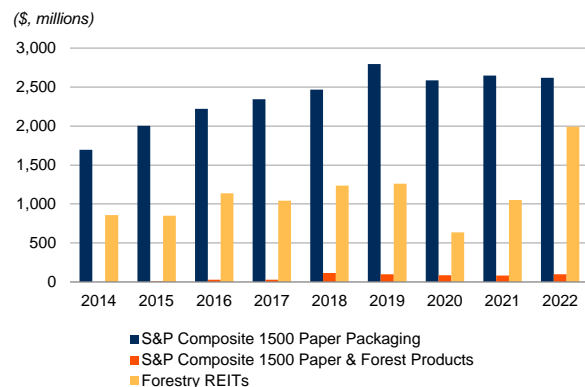
Enterprise Value-to-Forward EBITDA Ratio



*Data through March.
Source: CFRA, S&P Global Market Intelligence.

- ◆ The EV/EBITDA multiple for the Paper Packaging sub-industry has recovered from a slump in 2019. However, this sub-industry continues to trade at around 20%-30% discount to the S&P Composite 1500. Despite a strong growth outlook, this sub-industry has a high level of fixed costs and is generally very cyclical and relies on commodity prices, which helps explain its lower valuation.
- ◆ As of the first quarter of 2023, Paper & Forest Products companies traded at a steep 52.7% discount to the S&P Composite 1500, as these companies' valuations have yet to recover from the Covid-19 pandemic affecting markets with highly cyclical earnings streams.
- ◆ Forestry REITs are valued at a 48.2% premium to the S&P Composite 1500. This sub-industry historically has traded at a large premium given its robust free cash flow generation and relative stability.

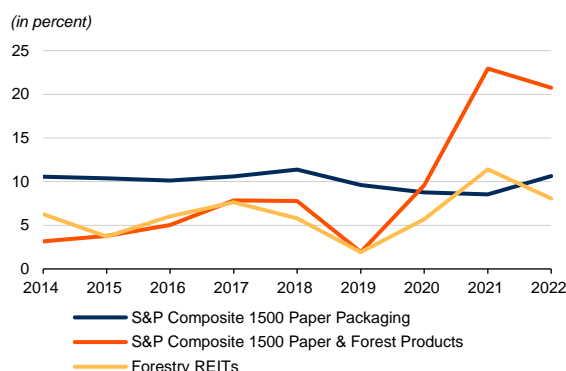
Total Dividends Paid



Source: CFRA, S&P Global Market Intelligence.

- ◆ Dividends per share for all three peer groups increased at a strong pace from 2010 through 2019 but were met with an unexpected economic downturn due to Covid-19, resulting in lower dividends paid in 2020 for both Paper Packaging and Forestry REITs, and lower dividends in 2021 for Paper & Forest Products.
- ◆ The 10-year compound annual growth rates (CAGR) for the sub-industries are: Paper & Forest Products at 44.8%; Paper Packaging at 11.0%; and Forestry REITs at 8.0%.
- ◆ Dividend growth has regained momentum due to the economic rebound driven by the growing vaccine coverage in 2021 through 2022. However, we expect dividend growth to remain flat in 2023 amid ongoing inflation and risks of a recession.

Return on Capital (ROC)



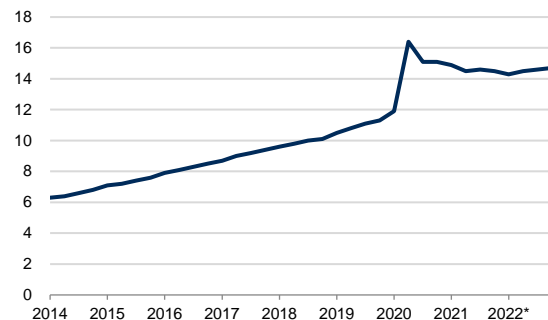
Source: CFRA, S&P Global Market Intelligence.

- ◆ The 10-year average ROC is highest in the Paper Packaging Index at 10.0%, followed by Paper & Forest Products (8.6%) and Forestry REITs (6.3%). In 2022, most of the sub-industries posted a decline in ROC, except for Paper Packaging, due to a strong e-commerce market.
- ◆ Within the Paper & Forest Products sub-industry, Louisiana-Pacific Corporation saw the highest ROC (but it was volatile), contributing to the overall industry ROC. However, Louisiana-Pacific's ROC declined to 44.4% in 2022 from 66.6% in 2021, mostly due to the slow housing market and a significant decline in OSB pricing.
- ◆ Forestry REITs saw a decline in ROC to 8.1% in 2022 from 11.4% in 2021, mostly due to the strong decline in lumber prices.

KEY INDUSTRY DRIVERS

E-commerce Retail Sales as a Percent of Total Sales

(in percent, seasonally adjusted, quarterly)

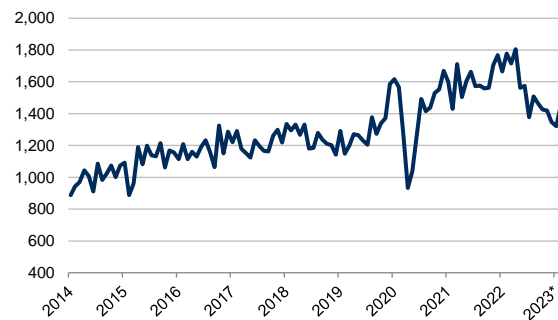


*Data through Q4.
Source: U.S. Census Bureau.

- ◆ E-commerce retail sales growth continues to outpace total retail sales growth, a trend we see as sustainable for at least the next five years. Growth in e-commerce retail sales will have a direct impact on industry sales, for the Paper Packaging sub-industry in particular, as online sales have relied heavily on paper as their product packaging. Sales in paper packaging generally grow in tandem with surging online retail sales.
- ◆ In the fourth quarter of 2022, the share of retail sales for e-commerce remained strong and significantly higher compared to pre-pandemic levels despite the economy having fully reopened. This shows that online shopping remains the preferred shopping method for many consumers.
- ◆ We see this trend continuing to drive growth in the containerboard and paper packaging market.

Housing Starts

(seasonally adjusted annual rate, in thousands)

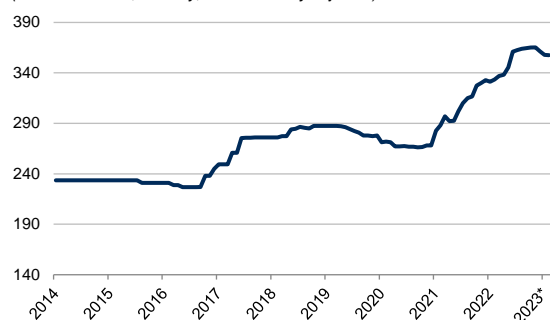


*Data through February.
Source: U.S. Census Bureau.

- ◆ The housing market is an important source of demand for the forest products business.
- ◆ U.S. residential starts declined in February 2023 compared to the prior year period, while building permits, a proxy for future construction, also declined 17.9% year-over-year to 1.52 million, according to the Census Bureau.
- ◆ With mortgage rates soaring and house affordability worsening, we think the underlying demand for new household formation will slowly lose support. On top of that, fear of recession exacerbates the housing market condition.

Containerboard Producer Price Index (PPI)

(Index 1982=100, monthly, not seasonally adjusted)

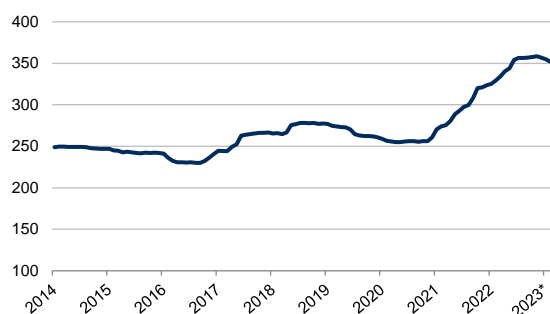


*Data through February.
Source: Bureau of Labor Statistics.

- ◆ Containerboard prices have surged since the pandemic. In February 2023, containerboard prices rose 7% compared to the same period in 2022. We forecast the containerboard market to grow at a CAGR of 4.1% during the 2022-2028 period to around \$198 billion.
- ◆ A key driver is the booming e-commerce market, leading to increased product shipments. Another key driver is the strong growth in demand for ready-to-eat and packaged foods.

Paperboard PPI

(Index 1982=100, monthly, not seasonally adjusted)



*Data through February.
Source: Bureau of Labor Statistics.

- ◆ In February 2023, paperboard prices rose by 6.8% year-over-year, as the price of pulp, a key raw material, surged 20.8% during the same period, also reaching a new record high in January 2023.
- ◆ The wood pulp inventories have gradually declined since 2021. On top of that, the Ukraine-Russia war has disrupted the supply of pulp, increasing the severity of supply shortages and propelling pulp prices up even more as demand remains strong.

Old Corrugated Containers (OCC) PPI

(Index June 2006=100, monthly, not seasonally adjusted)

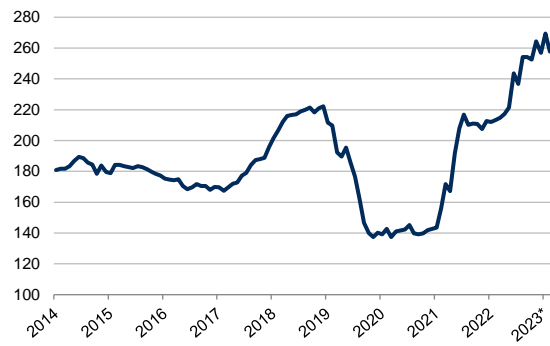


*Data through February.
Source: Bureau of Labor Statistics.

- ◆ China, the largest importer of U.S. OCC exports, implemented strict import policies on recovered paper in 2018, which caused domestic and export prices for OCC to fall.
- ◆ After surging 138.9% year-over-year in October 2021, the OCC pricing has gradually declined and has taken a major dive in recent months. In February 2023, OCC pricing was down 63.5% year-over-year. The deterioration was mainly attributable to weakening demand and oversupply.

Wood Pulp PPI

(Index 1982=100, monthly, not seasonally adjusted)



*Data through February.
Source: Bureau of Labor Statistics.

- ◆ Wood pulp prices surged 20.8% year-over-year in February 2023, also reaching an all-time high in January 2023, mostly due to supply disruptions, logistical bottlenecks, project delays, and restrictions on wood imports from Russia.
- ◆ During the first half of 2021, monthly price increases in pulp were significant and historic, as raw-material shortages coincided with higher demand for toilet paper and other tissue products.
- ◆ Chinese tariffs on U.S. pulp were cut in half from 10% to 5% in February 2020 as part of Phase One of the U.S.-China trade deal. China further cut tariffs on wood products in January 2023. This has supported the price of pulp, especially during the economic recovery following lockdowns in China in 2022. Furthermore, China's reopening of its economy in 2023 will provide further support for pulp prices, in our view.

INDUSTRY TRENDS

Competitive Environment

PROFIT-POOL MAP OF PAPER & PACKAGING INDUSTRY GROUP

(for the full year of 2022)



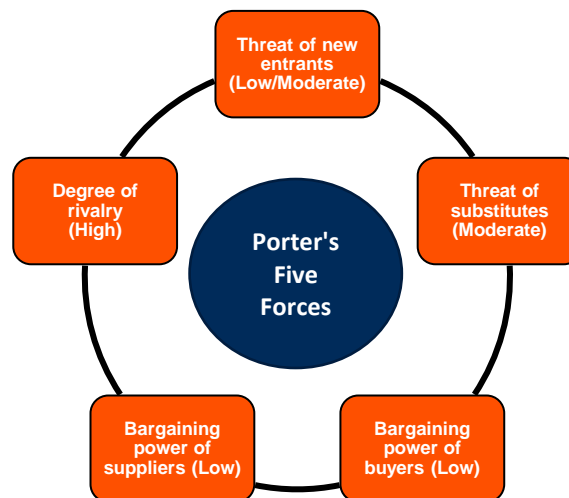
Source: CFRA, S&P Global Market Intelligence.

Forest products companies have the smallest share of revenue in the combined paper and paper packing value chain, accounting for only 3.4% of industry revenue; despite that, the sub-industry enjoys the healthiest operating margin of 31.9%. Coming in second with the lowest market share is paper products at 7.1% and operating margin of 12.7%. The lower margin is due to the commoditized nature of paper products, competing mainly on price.

Forest REITs fared better in 2022, as lumber prices spiked to a record high in April 2021 and remained mostly higher than the pre-pandemic levels in 2022; it has 11.1% share of industry revenue and the second healthiest operating margin among the sub-industries at 26.5%.

Paper packaging companies have the largest share of revenue at 78.3%, with a healthy operating margin of 12.2%. The rise of e-commerce, growing consumer awareness regarding sustainable packaging, and strict regulations imposed by environmental protection agencies to reduce the usage of plastics have driven the market for paper packaging.

PORTER'S FIVE FORCES



Below, we used the Porter's Five Forces framework as a tool to analyze the competitive environment of the Paper & Paper Packaging industries.

1) Degree of Rivalry/Competition (High)

In addition to competing against each other, U.S. paper producers also compete with global producers, which may have lower production costs. As most paper products are commodities, they are widely available from many producers and have few distinguishing qualities from producer to producer. As a result, competition for these products is based primarily on price. Therefore, paper companies' ability to maintain their margins depends largely on their ability to control costs.

2) Bargaining Power of Buyers (Low)

Buyers do not have significant bargaining power over paper producers. Instead, pricing influences the amount of inventory held by customers.

3) Bargaining Power of Suppliers (Low)

The main raw material used to make paper is wood fiber. Wood fiber is a commodity, and prices historically have been impacted by a variety of factors, rather than the power of suppliers. With many fiber producers, paper producers can easily switch to another supplier if the current supplier tries to unfairly raise prices.

4) Threat of Substitutes (Moderate)

Paper as a medium to store information has been sharply diminished by the introduction of digital technologies. The proliferation of digital newspaper and magazine articles has resulted in a sharp decline in demand for newsprint and printing paper. Nevertheless, although the adoption of e-books has gained traction in the past decade, many readers still prefer traditional books. In addition, tissue and other hygienic paper products are not particularly susceptible to substitutions.

For paper packaging, plastic packaging can act as a substitute. However, there is growing awareness and concern regarding the negative impact of plastic packaging on the environment. Plastic and paper are the two most widely used packaging materials.

5) Threat of New Entrants (Low/Moderate)

Paper mills tend to be highly capital intensive, given their typically large size and the high costs of paper machines, fiber preparation equipment, and converting equipment. Outlays for sophisticated safety and environmental protection equipment also boost capital expenditures, as do extensive industry efforts to modernize and expand plant capacity. These costs create high barriers to entry in the paper segment, making it unlikely that new paper companies will emerge. Wood products mills tend to be smaller and less costly to construct than paper mills. Thus, barriers to entry are not significant in the wood product market.

The paper business is one of the most heavily regulated markets in the U.S, and it spends several billion dollars every year to comply with federal regulations to reduce pollution. This is a major deterrent for new entrants into the segment.

Overview of the Paper & Forest Products Industry

According to the American Forest & Paper Association's (AF&PA) 2022 preliminary report (latest available), overall paper and paperboard capacity in the U.S. declined by 0.4% in 2021, compared to the average decline of 1.0% per year since 2012, and remained essentially flat in 2022. However, some segments rose, such as boxboard and containerboard. For the 12th year running, containerboard capacity increased and reached a record high of 47.3 million tons. Especially noteworthy is that containerboard capacity increased at the highest rate in 26 years. Due to strong growth in containerboard and changes in other grades, containerboard as a percentage of the total capacity of all paper and paperboard exceeded 50% for the first time in 2021. Boxboard capacity increased 5.9% after a 1.9% increase in 2021, reversing its long-term trend of average annual declines of 0.4%, and should continue increasing in 2023. Most domestic paper & forest products firms derive the majority of their revenues from U.S. sales, with only a small portion from the export market and international operations. However, there are some exceptions, such as International Paper Co., which has a large and growing presence in overseas markets.

Most larger companies with a printing paper business have decreased paper capacity, converted some capacity to other products, or divested their paper business. International Paper, for example, completed a spin-off of its global printing paper business (now operating as Sylvamo Corporation) in October 2021. The market remains moderately fragmented, although consolidation has reduced the number of competitors in several product categories. The forest products sub-industry remains highly fragmented, and there are only a few large publicly traded companies in this sub-industry; the most notable one is Louisiana-Pacific Corporation.

LARGEST NORTH AMERICAN PAPER & FOREST PRODUCTS AND PAPER PACKAGING COMPANIES

(ranked by 2022 estimated revenue, in \$, millions)

RANK	COMPANY	FISCAL YEAR END	REVENUES*			PERCENT CHANGE 2021-2022
			2020	2021	2022	
1	WestRock Company	Dec	17,557	19,296	21,227	10.0%
2	International Paper Company	Sep	20,580	19,363	21,161	9.3%
3	Amcor plc	Jun	12,484	13,588	14,971	10.2%
4	Weyerhaeuser Company	Dec	7,532	10,201	10,184	-0.2%
5	Avery Dennison Corporation	Dec	6,972	8,408	9,039	7.5%
6	Packaging Corporation of America	Dec	6,658	7,730	8,478	9.7%
7	Boise Cascade Company	Dec	5,475	7,926	8,387	5.8%
8	Sonoco Products Company	Dec	5,237	5,590	7,251	29.7%
9	Sealed Air Corporation	Dec	4,903	5,534	5,642	2.0%
10	Louisiana-Pacific Corporation	Dec	2,788	4,553	3,854	-15.4%

*Includes revenues from operations other than paper and forest products in certain cases.

Source: Company reports.

The paper & forest products industry has closed many paper mills over the years, and this has helped the supply-and-demand balance. However, the accelerating decline in demand for newspaper inserts, directories, magazines, and paperback books could adversely impact paper demand and operating rates in 2023 and beyond. With demand expected to continue to decline, CFRA foresees further capacity closures in the years ahead.

Competitive Advantage

E-commerce to Drive Containerboard and Paper Packaging Market Growth

With the increasing penetration of e-commerce, the demand for retail e-commerce packaging has increased considerably. The containerboard market was valued at around \$155.9 billion in 2022 and is expected to reach \$198.4 billion by 2028, with a CAGR of 4.1% over the forecast period of 2022 to 2028, according to a market research report by Valuates Reports. Additionally, another market research report by Fortune Business Insights forecasts the value for e-commerce packaging to reach \$140.86 billion by 2028, from \$48.81 billion in 2021, growing at a 16.3% CAGR over the 2022-2028 period, driven by the emerging significance of e-commerce packaging as a key asset in communicating brand values and sustainability. In combination with the growing usage of containerboard by e-commerce giants such as Amazon.com and eBay, the demand for corrugated cardboard and other sustainable packaging materials has significantly increased.

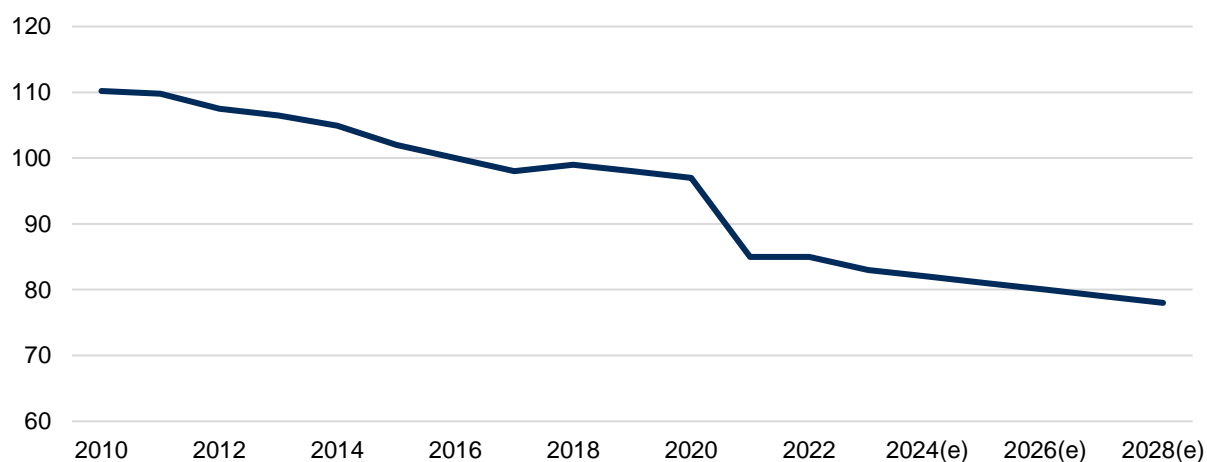
Decline in Print Offset by Growth in Packaging and Tissue

The paper & forest products industry is among the oldest yet most vital industries in the U.S. In recent years, it has been hit hard by expanding technology and electronic devices. The demand for graphic papers has been in decline for several years with only moderate signs of growth in the developing world. The graphic paper market has declined over the last decade. The global paper market fell by a CAGR of roughly 6.1% during the five-year period ending 2022. The newsprint market fell at a 7.0% CAGR from 2018 to 2022, while the graphic paper market declined at a 1.5% CAGR over the same period, according to RISI (latest available). While the market as a whole is declining, it is worth noting that some segments of the market are growing, such as the specialties and digital print markets. Moreover, the global printing and writing paper market size is estimated to grow by \$7.9 billion with a CAGR of over 1.76% during the 2022-2026 forecast period, according to a press release by MarketWatch.

According to the February 2023 Printing-Writing Monthly report from the American Forest & Paper Association, total printing-writing paper shipments declined 15% in February 2023 compared to February 2022 and total purchases of printing and writing papers in the U.S. decreased 6% compared to the same period in the prior year. Moreover, total printing-writing papers inventory levels remained essentially flat compared to January 2023. U.S. shipments declined in all three major printing-writing grades compared to the same period last year, with uncoated free sheet (UFS) papers posting the smallest decline of 9%. In January 2023, net imports increased in coated and UFS papers while net imports of mechanical papers decreased by 2%.

GLOBAL DEMAND FOR PRINTING AND WRITING PAPER

(million tons)



Source: Suzano, AFRY.

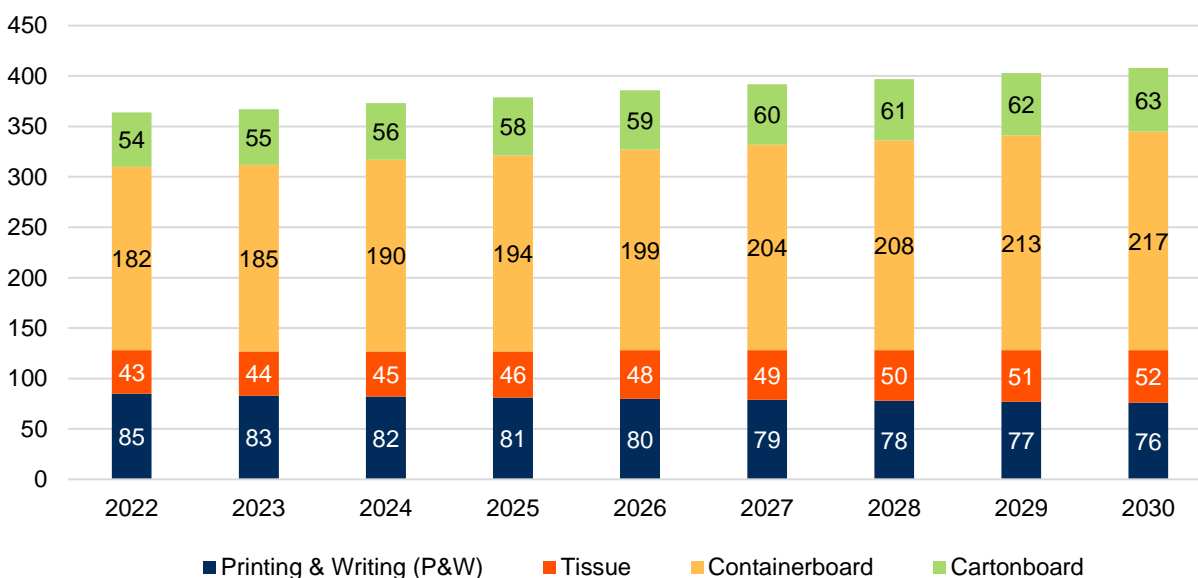
CFRA expects graphic paper demand to decline in almost all regions of the world. We see the rates of decline abating in the developed regions of North America and Western Europe, as these markets have already experienced a big hit from the initial adoption of new technologies. However, we think that other developing regions will not see as huge a hit as they never really saw print media develop to the extent that it did in the western world. We think a sustainable level of demand will eventually be reached and the secular decline will end, but we do not see this happening in the distant future.

Interestingly, the paper & forest products industry as a whole is actually growing, albeit at a slower pace than before, as other products are filling the gap left by the shrinking graphic paper market. Cartonboard packaging, containerboard packaging, and tissue have been offsetting the loss in graphic paper during the last decade and are still expected to grow at CAGRs of 1.9%, 2.2%, and 2.4%, respectively, between 2022 and 2030. Diminishing demand for printing and writing paper is further exacerbated by the shortages and price hikes of its raw material, wood pulp.

Despite the secular decline in printing and writing paper demand, paper is still predominantly used to archive knowledge, while tissue, napkins, and non-woven products are essential to personal hygiene and medical care. Fiber-based packaging materials, which are low-cost and recyclable, are used to prevent damage to products that are being transported. Finally, chemicals and materials derived from wood pulp are adopted for a wide range of products in various markets – from consumer electronics to pharmaceuticals.

PAPER END USE CONSUMPTION

(million tons)



Source: AFRY.

Operating Environment

OCC Pricing Crumbles Amid Supply and Demand Disparity

Even as the economy and shopping malls reopened after the global pandemic, the increased usage of online shopping has been inevitable for many customers and sellers. The trend, in our opinion, is here to stay. Corrugated box shipments are expected to grow at a CAGR of 5.0% during the forecast period of 2022 to 2032. However, we note that old corrugated container (OCC) prices have gradually declined in value and weakened considerably in recent months. OCC pricing plunged 63% in February 2023 compared to the same period in the prior year and down 71% compared to its peak back in October 2021. The deterioration was attributed to weaker demand and oversupply, which could be a forward indicator of slower demand for corrugated boxes.

Excess inventories and underwhelming consumer purchasing contributed to the lukewarm demand for OCC. On top of that, several new projects are coming online in 2023, widening the supply and demand gap even further. Interest rate hikes by the Federal Reserve and inflation also weaken OCC demand as higher interest rates and goods prices affect consumer spending and, consequently, the amount of packaging needed for retail and e-commerce are negatively impacted.

Several companies in the industry have reported a decline in its corrugated box sales. International Paper, an American pulp & paper company and one of the largest paper companies in the world, posted a decline in its industrial packaging sales segment of 2% in the fourth quarter of 2022 compared to the same period in 2021 and 6% in its entire 2022 corrugated box sales as consumers shifted their purchases of goods to services to entertainment instead. Packaging Corporation of America also reported having faced similar headwinds; despite the increase in overall sales for full-year 2022, its sales in the packaging segment dropped 8% Y/Y in the fourth quarter of 2022 while corrugated box sales were down 10.2% compared to the prior year's fourth quarter.

We also note that more and more companies are transitioning toward lightweight packaging as opposed to heavy packaging (corrugated boxes). Lowering materials' weight and altering the packing format to lighter configurations are an ongoing effort for almost every business in support of cost reduction, reduction of climate impact, and progressing towards sustainability. Much legislation is in place around the world to support this as well as significant pressure from consumers and retailers. E-commerce juggernaut Amazon has already transitioned toward lightweight packaging, using less paper and more flexible packaging such as plastic, lightweight paper, or a combination of both. According to Amazon, its efforts have reduced its use of corrugated boxes in North America and Europe by 35% over the past five years, and its overall packaging optimization efforts have saved about 60,000 tons of cardboard annually. We expect this trend to continue gaining traction and further dampen the demand for OCC in the future.

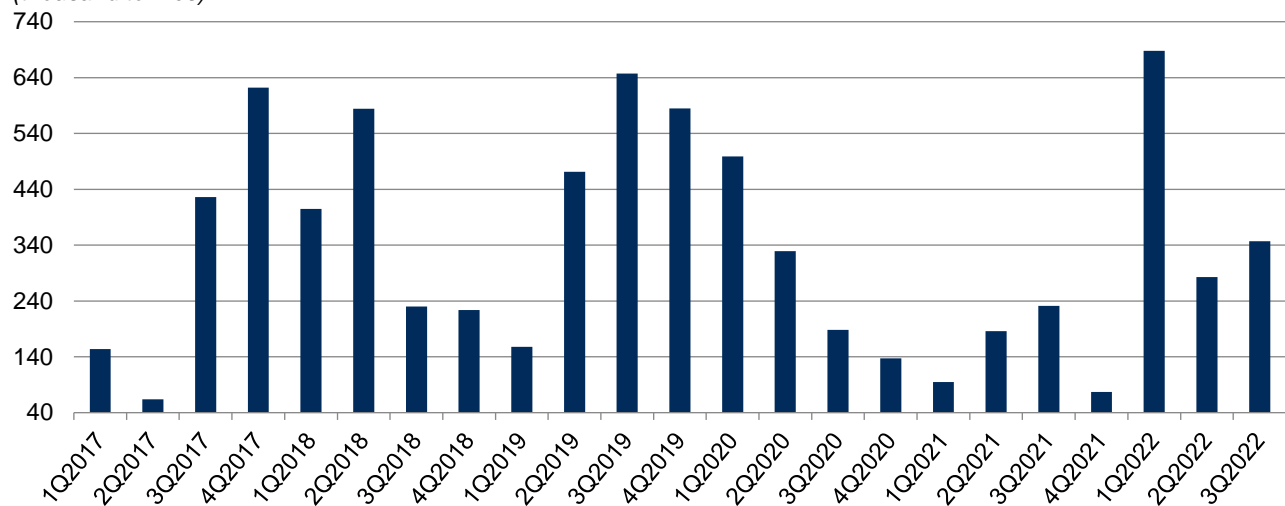
Furthermore, with the continuing uncertainty of economic conditions, including risk of recession and ever-changing consumer appetite, we do not expect OCC prices to see a reasonable rebound in the first half of 2023.

Pulp Prices Spike as Supply Falls Short

In early 2021, paper stockpiles had depleted to historically low inventory levels as demand began to rebound, drying up the mill inventories to an all-time low and driving price appreciation in paper and pulp prices. The rally in wood pulp prices continued through 2021 as China, the biggest buyer of pulp, recovered from Covid-19, coupled with disruption in the supply chain. To meet the demand, paper mill operating rates reached over-capacity as some mills had been idle or closed; some shifted to hygiene products amid the Covid-19 outbreak, making it harder for them to meet the demand. Following the law of supply and demand, the mills had the upper hand in pricing leverage.

PULP PRODUCTION DOWNTIME

(thousand tonnes)

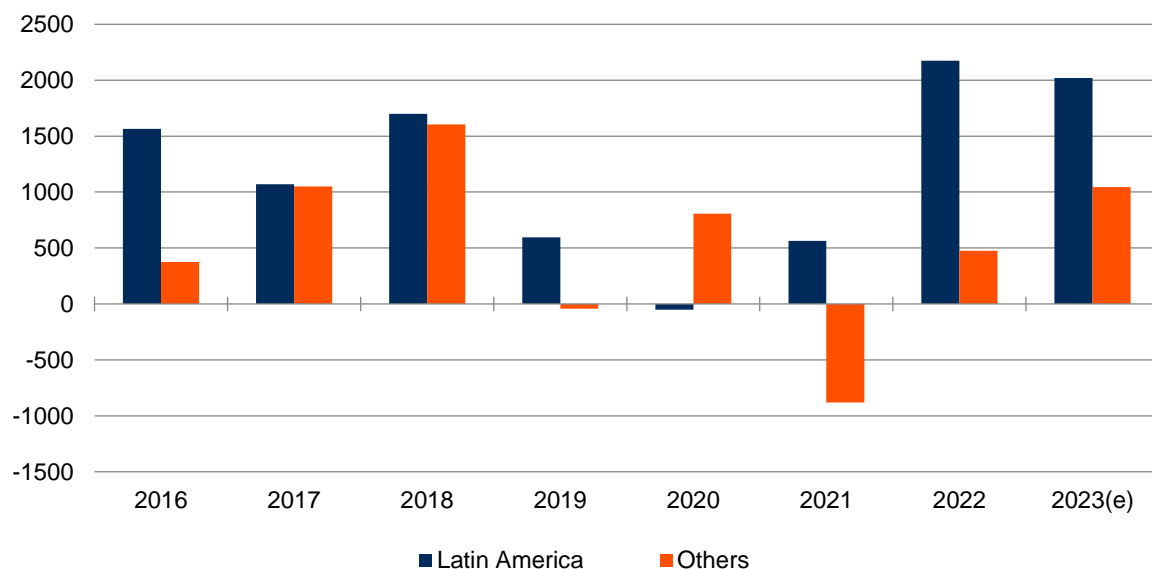


Source: Fastmarkets.

In 2022, the combined effect of the pandemic, supply chain disruptions, and rising energy costs exacerbated the already severe supply shortages as demand continued to rise amid economic comebacks. Publication printing companies (books, newspapers, magazines, and advertising) are particularly susceptible to the alarming shortages and price increases of wood pulp. The PPI surged 20.8% year-over-year in February 2023 to 257.8, a record high. The index has continued to increase, driven by the disruption in the supply side, with over 1.5 million tonnes of pulp production cut from supplies amid unexpected production downtime in the first nine months of 2022 alone.

ADDITIONAL PULP CAPACITY

(thousand tonnes)



*Source: Fastmarkets.

We expect pulp prices to soften as a new wave of investment in capacity expansion worth 2.5 million tonnes is set to enter the market in 2023 after limited gains in 2019 through 2021. Majority of the projects are focused in Latin America.

PRODUCER PRICE INDEX: WOOD PULP

(Index 1982=100, monthly, not seasonally adjusted)



*Data through February.

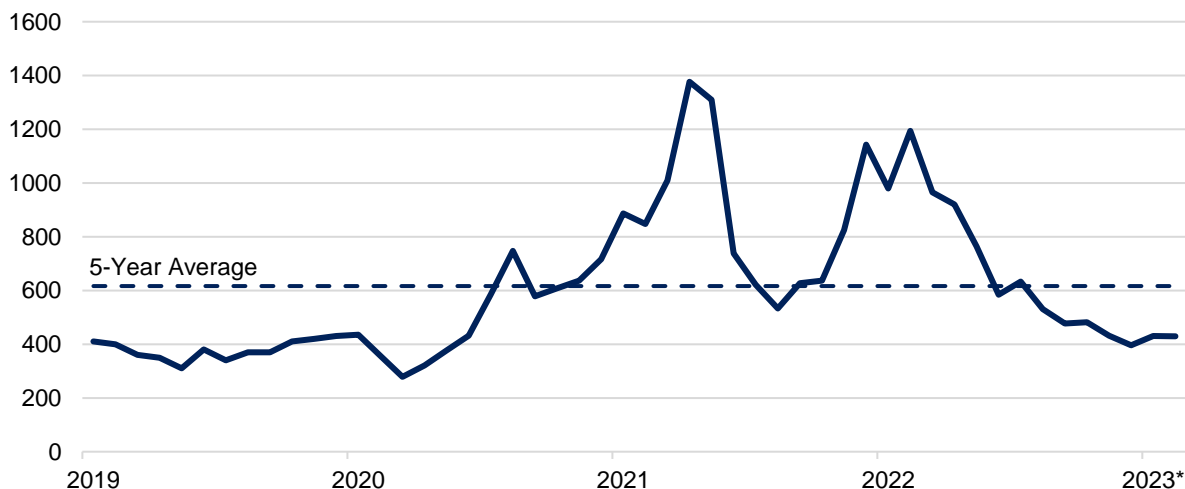
Source: Bureau of Labor Statistics.

Lumber Prices Soften Amid Weakening Housing Market

Lumber prices had surged by almost 200% in May 2021 compared to when the Covid-19 pandemic first began, before plunging by more than 40% in June 2021 alone, suffering their worst month since records began in 1978. After a quick recovery in the second half of 2021, the downward trend took place yet again and continued through February 2023, where the price sank to \$429, a peak-to-trough decline of 64%. The quick reversal of lumber prices resulted from a number of factors, including a slowdown of the housing market, soaring mortgage rates amid interest rates hikes by the Fed, and prolonged inflation that weakened consumers' purchasing power, which in turn led to a decline in home demand. We see the decline in lumber prices as a simple cooling down of the housing market and going back to pre-pandemic normal rather than a crash, and we expect to see lumber prices back to normal range of \$300-\$600 in 2023.

LUMBER PRICE (IOM:^LB)

(\$ per thousand board feet)



*Data through February.

Source: S&P Global Market Intelligence.

Forest Products: Housing Starts and Permits Are Declining

The housing market is the largest end market for lumber and other wood products. When assessing the state of the housing segment, it is important to understand the sales trends for existing homes, housing starts, and housing permits. In general, existing-home sales represent the majority of total housing sales. The National Association of Realtors (NAR) reported that sales of existing homes – a category that includes single-family, townhomes, condominiums, and co-ops – totaled 4.58 million (seasonally adjusted annual rate) in February 2023, a 14.5% month-over-month increase and the largest monthly percentage rise since July 2020, but a decline of 22.6% from 5.92 million compared to the prior year period.

Total housing inventory at the end of February 2023 remained flat from the previous month at 0.98 million and up 15.3% from the prior year period. Unsold inventory sat at a 2.6-month supply at the current sales pace, a 10.3% decline month-over-month but an increase from 1.7 months in February 2022, according to the NAR.

Meanwhile, housing starts in February rose 9.8% at a seasonally adjusted annual rate of 1.45 million from 1.32 million in January 2023, but was down 18.4% from the February 2022 rate of 1.77 million, according to data from the U.S. Census Bureau. Residential building permits, which indicate how much construction is in the pipeline, decreased by 18.4% to 1.45 million compared to the same period in the prior year (1.77 million). The significant growth slowdown in recent months was due to several factors, such as rising mortgage rates, the Fed's aggressive interest rate hikes, and prolonged inflation, which have exacerbated the affordability issue, along with the looming risk of recession leading to a cautious consumer buying behavior. However, this may be partly offset by the Biden administration's announcement on incentives and a tax credit of \$15,000 for first-time homebuyers. As of February 2023, however, this bill has yet to become law.

Household Formations Losing Steam

According to Federal Economic Data, the U.S. had added 4.9 million households (relative to the prior-year period) in June 2020, substantially higher than the two-year average of 1.81 million in 2018-2019. The year-over-year growth rate decelerated through March 2021, before year-over-year declines occurred for five months in 2021 (April through August). As of December 2022, the number has gradually recovered to 129.6 million from its April 2021 low of 125.9 million, up by 3.7 million compared to the prior-year period. This suggests that demographics were favorable for the housing market in the second half of 2021 through the second half of 2022, propelled by a strong labor market.

U.S. HOUSEHOLD FORMATIONS (Y/Y)

(in thousands)

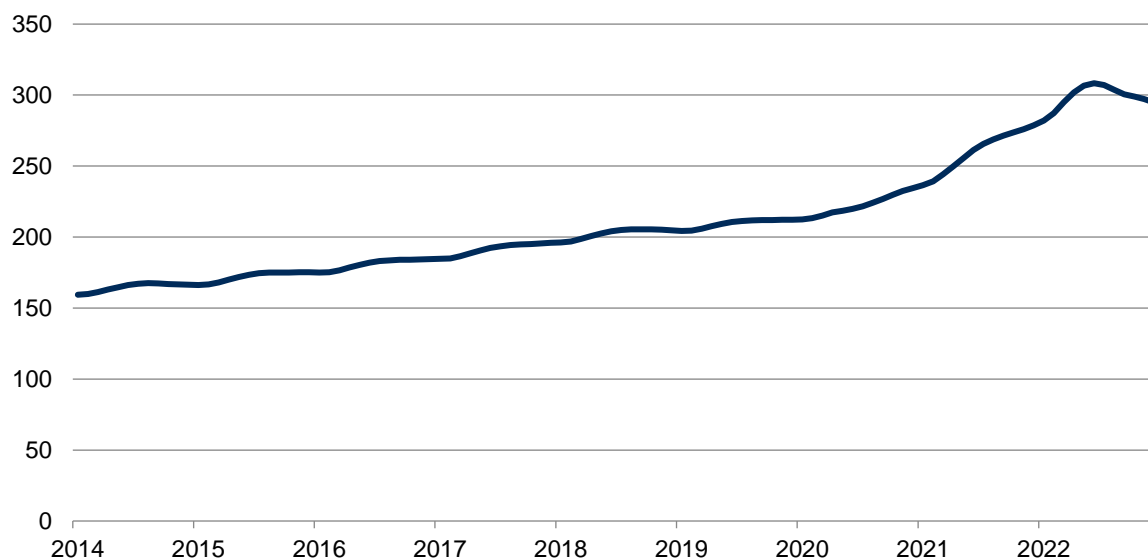


Source: Federal Economic Data.

However, we expect the housing market to start losing steam in 2023 with the deterioration of consumers' buying power due to higher mortgage rates and multi-decade high inflation rates, coupled with soaring interest rates. Housing prices have continued to move solidly higher and were 28.1% higher in October 2022 compared to when the pandemic first started, according to Fortunes. However, prices started declining in November 2022. In December 2022, prices were down 4.4% from its peak in June 2022.

CASE-SHILLER U.S. NATIONAL HOME PRICE INDEX

(Index Jan 2000=100, Monthly, not seasonally adjusted)



Source: Federal Economic Data.

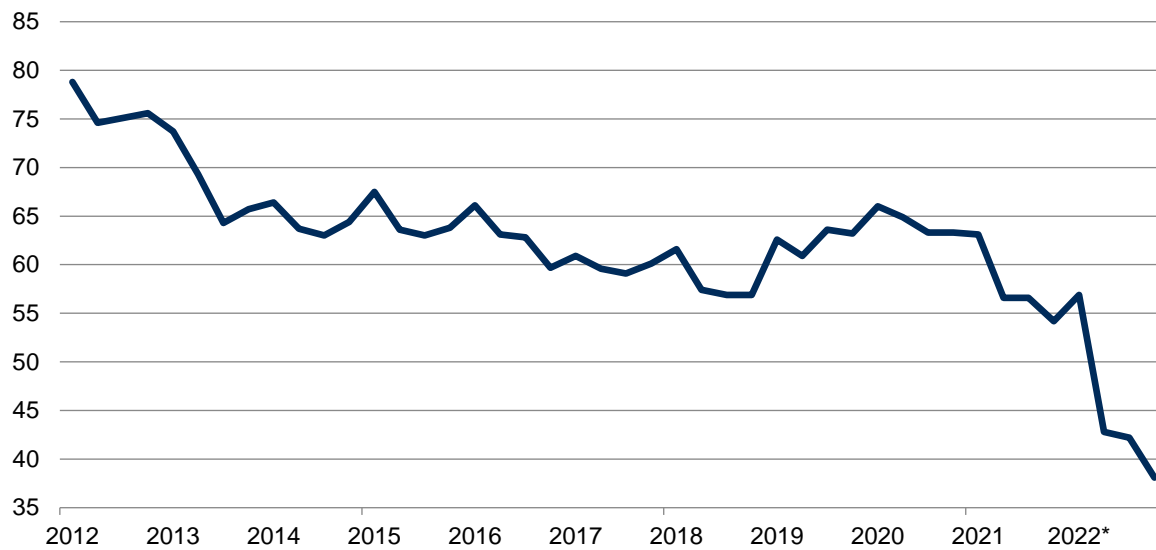
U.S. Home Prices Soften

In the second quarter of 2022, strong demand, low inventory, and soaring interest rates by the Fed resulted in increased mortgage rates and plunged housing affordability to its lowest level in a decade. According to the NAHB/Wells Fargo Housing Opportunity Index (HOI), 38.1% of new and existing homes sold in the fourth quarter of 2022 were affordable to families earning the U.S. median income of \$90,000. This is a sharp decline from the 56.9% of homes sold in the first quarter of 2022 and the lowest affordability level since the beginning of the revised series in the first quarter of 2012.

However, the Housing Affordability Index shows that the national median home price has started slowly falling down to \$370,000 in the fourth quarter of 2022, down \$10,000 and \$20,000 from the third quarter of 2022 and the second quarter of 2022, respectively. Meanwhile, the average mortgage rates surged by an alarming 302 basis points in the fourth quarter to 6.88%, from the rate of 3.86% in the first quarter of 2022, reaching a level not seen in more than a decade.

In May 2022, the Biden administration announced new actions to tackle housing costs' burden by releasing the Housing Supply Action Plan. Starting with the building and preservation of hundreds of thousands of affordable housing units over the next three years, this plan calls for legislative and administrative measures that will assist in closing America's housing supply gap within five years. Closing the gap will result in more cheap rents and more attainable homeownership for Americans. Aligned with other policies, the plan will help to bring down housing costs and ensure affordability, such as rental aid and downpayment support.

NAHB/WELLS FARGO HOUSING OPPORTUNITY INDEX
(percent)



*Data through Q4.

Source: National Association of Home Builders.

HOW THE INDUSTRY OPERATES

The Paper & Forest Products industry is involved in the manufacture of paper, paperboard, and wood products. What these products have in common is their use of timber, or some form of timber resource, as a raw material. In the paper and paperboard area, timber or recycled material is converted into printing and writing papers, newsprint, tissue, containerboard, and specialty fibers. In the wood products area, logs are converted into lumber and structural panels. Structural panels consist primarily of plywood and oriented strand board (OSB).

Raw Materials

To manufacture paper and forest products, a company must first develop sources for its raw materials. A firm's method of procurement depends on its degree of vertical integration and its operating strategy. The principal means of fulfilling timber needs include owning timberlands, signing cutting contracts to harvest timber (on land that is either government-owned or privately held), and purchasing already-harvested logs from contractors or landowners. Makers of structural panels and other engineered wood products may produce or purchase wood chips or fiber. Paper makers that are not vertically integrated may rely on purchases of recovered paper or market pulp.

The fulfillment of raw material needs has taken on greater complexity in recent years, as the timber supply from federal lands has been increasingly curtailed by environmental regulations. The main federal regulatory action in this area was the June 1990 ruling by the U.S. Fish and Wildlife Service that listed the northern spotted owl as a threatened species. This decision prohibited timber harvesting from about nine million acres of land in the Pacific Northwest, where the owls reside. Since this ruling eliminated a substantial supply of logs, particularly from old-growth trees, the industry has had to develop alternative raw materials sources.

The Roadless Area Conservation Rule, enacted by the Clinton administration in January 2001, further attempted to restrict the use of raw timber materials. In May 2001, the Bush administration announced that it would uphold the federal regulation, which banned road building, timber harvest, and road reconstruction within the inventoried roadless area (roughly 60 million acres) of the national forest system.

However, in May 2005, the federal government repealed the law and replaced it with regulations governed by each individual state. Under the new policy, roadless areas may receive protection only if the governors of the states in which those roadless areas lie complete a petition process that is filed with the U.S. Department of Agriculture (USDA). The petitions are nonbinding, and the federal government has the choice to accept, modify, or reject them. Existing forest plans restrict road building on 40% of the roadless acres managed by the Forest Service.

To ensure that companies in the U.S. Paper & Forest Products industry procure their wood and other plant-derived materials by legal means, the Lacey Act was implemented in 1900, which originally limited trafficking bans to wildlife, before it was amended in 2008 to include plant and plant products such as timber and paper. The amendment included the prohibition of illegally harvesting plants, and required traders to declare the scientific name, value, quantity, and country of harvest origin. The Trans-Pacific Partnership (TPP) also aims to prevent illegal logging by requiring its members to fulfill their obligations under the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which includes responsible trading of flora and fauna, promoting the long-term conservation of species at risk, protecting natural habitats such as wetlands, and implementing strong anti-corruption protection against bribery. Members of the TPP reached a final agreement in October 2015. The TPP initially involved 12 countries, including the U.S. However, an executive order from President Trump in January 2017 formally ended participation from the U.S. in TPP.

Recycled Supply

In the paper area, the alternative to virgin wood fiber is recycled fiber, which can come from a variety of sources, including used corrugated containers and wastepaper. Prompted by the U.S. government's environmental protection efforts and the reduced availability of virgin wood fiber, the U.S. pulp, and paper industry has dramatically increased its use of recycled fiber.

Rather than consuming only virgin wood fiber (fiber that has never been part of a production process), many producers reuse wood-based products several times to produce paper and containerboard products. This has relieved some of the pressure caused by the restricted availability of timber resources. The recycling rate in 2020 was 65.7%, down from 66.2% in 2019. The decline was mostly the result of a sharp drop in recovered paper exports (12.6%) following China's import restrictions. Expect a further decline in the recycling rate as China moves from import restrictions to ban imported recycled paper altogether. Since 2009, the recycling rate has either met or exceeded 63% each year. AF&PA member companies are working towards a goal to increase the recovery rate to more than 70% in the near future and in 2021, the recovery rate was at 68%.

Recycling of newspapers and cardboard boxes has been common for some time, with growing amounts of magazines and office paper now being reused. Old corrugated containers (OCC) are widely recycled; the recycling rate was 92% in 2019 and dipped to 88% in 2020 before increasing to 91.4% in 2021. Despite the declining recycling rate, U.S. mill consumption of OCC reached a record level in 2021 of 24.3 million tons. Furthermore, the volatility was largely due to trade flows, according to the AF&PA. For decades, corrugated cardboard has been recycled by collecting cardboard boxes from commercial firms, such as the grocery market, though households and small businesses are now included in corrugated recycling efforts.

Companies that use recycled paper and paperboard for production fiber can obtain it in different ways. Some firms satisfy their wastepaper requirements by making recoveries through their own recycling system: they set up centers at various outside locations to collect fiber for the mills. Other firms purchase wastepaper from suppliers located near their recycling plants. In those instances, the suppliers collect, sort, and bale the material before passing it along to their customers. In many cases, the goods are sold under long-term contracts, with prices and quantities fluctuating according to market conditions. Some firms also use recovered waste materials, such as residual wood chips, sawdust from sawmills, and forest waste.

Managing Timberland Supplies

For companies in the Paper & Forest Products industry, having alternative fiber sources – such as supply contracts for wood from another timberland owner – is important to their long-term survival. Nonetheless, a firm that has extensive timberland holdings often has a competitive advantage. For a company that has control over a large timber base, decisions on proper harvesting levels in a given period are an important factor in maximizing the long-term use of its holdings.

A firm typically makes its harvesting decisions based on the price and supply of timber for sale on the open market; often, it will harvest less of its own holdings if it can purchase timber at a low price. The company also considers what is best for the sound long-term management of its timberlands, including methods to increase the volume of wood fiber available from its forests, as well as the sale of land for other uses. To improve site preparation and planting, fertilizing, thinning, and logging techniques, a company may engage in natural reforestation practices, genetic research, computerization, or other advanced techniques.

Timber: Hardwood and Softwood

Timber is divided into two classes: hardwood and softwood. These names do not necessarily reflect the wood's physical properties; some hardwood timber is actually softer than some softwood timber. Rather, the terms indicate a tree's genetic classification: softwood comes from coniferous trees, while hardwood comes from deciduous trees.

Different woods are suitable for different purposes. In homebuilding, Douglas fir and pine (which are classified as softwood) are frequently used for framing lumber. Oak and maple (both hardwoods) are used for flooring, while redwood and cedar (both softwoods) are used for siding and roofing. In papermaking, pulp made from hardwood fibers promotes smoothness in fine papers and softness in tissue, while softwood pulp has fibers that promote cohesion and strength in heavier papers.

Production

Once a firm has its necessary supply of timber and/or wastepaper, it brings the fiber into its mills to be processed into the various paper, paperboard, and wood products that it has chosen to manufacture.

Paper mills tend to be highly capital intensive, given their typically large size and the high costs of paper machines, fiber preparation equipment, and converting equipment. Outlays for sophisticated safety and environmental protection equipment also boost capital expenditures, as do extensive industry efforts to modernize and expand plant capacity. These costs create high barriers to entry in the paper segment, making it unlikely that new paper companies will emerge.

Wood products mills tend to be smaller and less costly to construct than paper mills. Thus, barriers to entry are not as significant in the wood product market.

Making Pulp for Paper and Paperboard

Plants that produce paper and paperboard use virgin wood fiber and/or recovered paper and board products in a variety of processes to manufacture pulp – the essential ingredient in paper and paperboard products. It is important to note that certain mills may use either recycled or virgin products only, while some mills are engineered to allow operators to shift between using recycled and virgin materials. The latter allows firms to take advantage of fluctuations in market prices and to use the material that has the most competitive price.

Pulp is made by separating wood fibers from a substance called lignin, which acts as a glue holding the fibers together. Two commonly used methods are dissolving the fibers chemically or tearing them apart mechanically. One mechanical method involves grinding wood chips, then mixing the fibers with water. Pulp is often bleached to prepare it for its end use. In most cases, a mixture of different kinds of pulp is prepared to create the specific characteristics of the paper or paperboard into which it will be processed.

Once the pulp has been prepared, it may be sent immediately to one of the firm's paper machines, dried and inventoried, or sold to another company. The water, spent chemicals, and other waste from the pulping process must undergo biological and other waste elimination treatments to meet stringent federal (and sometimes state) environmental regulations.

Making Wood Products

In the wood products area, large-diameter logs are taken to mills equipped with converting capacity. These mills transform the logs into solid wood products, predominantly lumber and structural panels. The processing of lumber products begins with the debarking of the logs. The logs are then sawed, seasoned (dried), and planed.

Plywood is made by gluing one or more veneers (thin sheets of wood peeled from logs) to another veneer or to a solid wood core to form a laminated wood panel. The grains of alternate layers are placed at right angles to add strength.

Engineered wood products, which can be manufactured from smaller-diameter logs, have gained market share in recent years. OSB, the most prominent engineered wood product, is made by combining discrete strands of wood with resin, then shaping the mixture into panel form using resins and high pressure.

Cost Structures Differ

The paper segment is highly capital intensive and is characterized by large fixed costs; according to the USDA, it is the most capital-intensive manufacturing sector in the U.S. economy. A large paper machine can cost between \$300 million and \$500 million to construct, and building a large integrated pulp and paper facility can require more than \$1 billion. These heavy capital requirements create a high barrier to entry. The large fixed-cost base also encourages producers to run their facilities at high operating rates to reduce their capital cost per ton and generate cash. This creates pricing and earnings pressures for all industry players during periods of excess industry capacity.

Regarding variable costs, the largest expenditures for paper companies are usually fibrous raw materials (e.g., wood and pulp), followed by non-fibrous raw materials, which typically consist of chemicals and paper additives. Other variable costs include fuel and energy, consumables (e.g., fabric and felts), maintenance, materials, water and effluent, and solid waste disposal.

The forest products segment is less capital intensive than paper products. Building a sawmill generally costs between \$50 million and \$70 million, according to the USDA. For engineered wood product plants, the USDA estimates that an integrated OSB plant costs between \$100 million and \$150 million. An I-joist plant costs \$10 million to \$20 million, and a laminated veneer lumber (LVL) plant costs slightly more than that.

As with paper companies, forest products companies' primary variable cost is wood. It accounts for a larger portion of variable costs for makers of sawn lumber and plywood than for makers of engineered wood. The USDA estimates the percentages at 50%-70% of variable costs for plywood, and 30%-35% for OSB. Although the fixed costs for I-joists and LVL are lower than traditional sawn lumber, these engineered wood products typically have higher production costs. The unique adhesives and resins, additional processing, and specialized manufacturing skills make engineered wood products more costly to produce than sawn lumber.

Paper & Forest Products Categories

Companies in the Paper & Forest Products industry produce a large number of paperboards, paper, and wood product grades.

Paperboard

In the paperboard area, products are divided between containerboard and boxboard. In recent years, these products have accounted for slightly more than half of the industry's total production of paper and paperboard.

◆ **Containerboard.** Containerboard is the material used to make corrugated containers, which are used primarily for packaging applications. Containerboard is made of two kinds of paperboard: linerboard and corrugating medium.

- *Linerboard* is the material used on the inside and outside of corrugated boxes. It is made in a variety of basis weights, from both virgin and recycled fibers. Production of linerboard that is based on 100% wastepaper has been growing rapidly in the U.S.
- *Corrugating medium* is the fluting material comprising the middle portion of containerboard. It is made in a variety of basis weights, from both semi-chemical pulp and recycled fiber.

◆ **Boxboard.** The boxboard category of paperboard is a paper grade used to make folding packaging for food, toiletries, cosmetics, pharmaceuticals, milk, and other products. Boxboard includes solid bleached sulfate (SBS) board (the premium grade used in folding cartons), unbleached kraft boxboard, and

recycled boxboard. The most significant trend in this category is SBS's loss of market share over the past decade to plastic products and to the more environmentally friendly recycled grades of boxboard.

Paper

Printing and writing papers, newsprint, tissue, and others are among the various classified grades of paper.

◆ **Printing and writing papers.** The printing and writing paper market consists of uncoated and coated paper.

- *Uncoated paper* includes free sheet (defined as paper made from cooked wood fibers mixed with chemicals and washed free of impurities) and groundwood (containing at least 10% mechanical pulp) grades. Uncoated free sheet is used for publishing (mostly textbooks and trade books), writing, and business applications such as photocopying, computer printing, and envelopes. Uncoated ground wood paper, meanwhile, is used for preprinted newspaper inserts, lower-cost business forms, paperback books, and telephone directories.
- *Coated paper* production includes about equal quantities of free sheet and ground wood grades. Coated paper is used principally for magazines, catalogs, and other publications that require colored inks. These papers are covered with a thin, transparent clay coating that provides a smooth surface, allowing for superior color reproduction. Most coated paper has a glossy finish on both sides.

◆ **Newsprint.** Newsprint is the thin paper used in newspaper printing. The grade is generally made mostly with mechanical pulp, and it may include some chemical pulp.

◆ **Tissue paper.** Tissue paper is used in sanitary products such as bath tissue, paper towels, facial tissue, and napkins. About two-thirds of domestic tissue paper sales go to the consumer market and the remaining one-third goes to the commercial/industrial (C&I) market. Products are sold mainly through supermarkets and drugstores. C&I products are sold for use in hotels, offices, factories, restaurants, schools, hospitals, and other institutions.

◆ **Other products.** Other products are composed of non-paperboard packaging products and converted products. Included in this category are papers used for grocery bags, multiwall sacks, folders, cups, labels, tapes, playing cards, and other specialty items.

Converting

Most paper-producing plants are very large, and the papers they make are stored on rolls weighing several tons. For that paper to be used by printers, businesses, and industrial customers, it must first be converted. Major paper makers usually have numerous converting plants located around the country. These plants primarily cut large rolls of paper into smaller sheets or rolls that can then be used to make a variety of products, such as office paper, envelopes, cardboard boxes, cup stock, folders, cereal boxes, tubes, and other similar products.

Wood Products

The wood products side of forestry manufacturing has lumber and structural panels as its two main categories.

◆ **Lumber.** The principal consumers of lumber are the homebuilding and repair/remodeling markets, which now account for a combined total of more than two-thirds of domestic lumber usage. Lumber can be used for almost all elements in building a home, including structural framing, flooring, siding, and roofing.

◆ **Structural panels.** The two predominant types of structural panels are plywood (layers of solid wood) and OSB (engineered wood). Structural panels are used mainly to build walls, roofs, and floors before the finished materials, such as plasterboard and shingles, are put in place.

Selling and Distribution

Most major paper companies maintain direct sales forces to sell their paper and paperboard products. The sales staff markets the products to distributors, industrial customers, and integrated and independent converters and manufacturers. They sell directly to paper-intensive markets, including printers, publishers, direct mail firms, retail and corporate copy centers, and office supply retailers. Paper companies typically have sales offices located throughout the U.S.; a few own large distribution businesses with customer service and retail store locations in addition to distribution centers. Some paper companies also use paper merchants or brokers to sell their products.

Like paper companies, most forest products companies employ a sales force to market their wood products. The sales efforts of most wood products firms target independent wholesalers, distributors, and industrial customers (e.g., cabinet and furniture manufacturers). More attention is now being paid to home centers, such as Home Depot Inc. and Lowe's Cos. Inc., which have become a major retail category for building materials. Some forest products firms also operate their own building materials distribution centers, which sell to retail lumber dealers, home centers specializing in the do-it-yourself market, and industrial clients. A few companies with large distribution businesses also purchase wood products from third parties to sell through their distribution channels.

Business Cycles, Strategies, and R&D

The performance of the Paper & Forest Products industry is driven mainly by the interaction of supply and demand. Because of dependence on factors such as global economic health and the capacity of the industry, supply and demand are frequently out of balance. Although the industry cannot control the global economic situation, it can try to keep supply from greatly exceeding demand. One way to do this is to limit capacity expansion. In addition, producers on occasion take downtime, halting production to allow supply and demand to balance out, or to conduct scheduled or unscheduled maintenance.

Companies in the Paper & Forest Products industry typically maintain research and development (R&D) divisions. The R&D activity of a paper company may focus on identifying innovations and improvements to the pulping, papermaking, bleaching, and chemical recovery processes; discovering improvements to paper coatings and barriers, stiffeners, and inks; perfecting packaging designs; and reducing environmental discharges. For a forest products company, R&D may focus on tree nutrition, regeneration, and propagation; sustainable forestry methods; and improved applications of computer controls to sawmills and engineered wood production facilities.

Government and Industry Regulations

The Paper & Forest Products industry falls under the jurisdiction of the U.S. Department of Justice when issues concerning fairness of trade arise. The industry is also subject to a variety of federal, state, and local environmental and pollution control laws and regulations. Federal environmental regulations – primarily the Endangered Species Act and the Clean Air and Clean Water Acts – have a substantial impact on forestry companies. The Environmental Protection Agency (EPA) enforces these laws.

◆ **The Clean Air Act.** This federal law regulates air emissions from area, stationary, and mobile sources. Passed in 1970 and amended in 1977 and 1990, the law permits the EPA to establish National Ambient Air Quality Standards, which set limits on how much of a given pollutant may be in the air in the U.S. In 1990, the law was amended to address problems related to acid rain, ground-level ozone, stratospheric

ozone depletion, and air toxins. In 1993, the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for the pulp and paper production sources was originally proposed, and it was promulgated in 1998. Under NESHAP, the EPA identified large quantities of methanol, acetaldehyde, formaldehyde, and other hazardous air pollutants from pulp and paper production sources. As a result, this subpart regulates “total HAP” emissions.

◆ **The Clean Water Act.** This is a 1977 amendment to the Federal Water Pollution Control Act of 1972. This law, which focuses on toxic pollutants, made it illegal to release a pollutant from a point source into navigable waters unless a permit is obtained according to the provisions of the Act. In 1987, the Act was again amended to include the State Revolving Funds program for sewage-treatment-plant construction, wherein states and localities will be responsible for financing, constructing, and managing municipal wastewater facilities.

◆ **The Endangered Species Act.** This legislation focuses on the conservation of threatened and endangered animals and plants, as well as their habitats. The regulations regarding air and water quality standards for pulp and paper companies grew more stringent under the Cluster Rule, which the EPA published in the Federal Register in April 1998.

The Cluster Rule regulations affecting air emissions are entitled MACT I, MACT II, and MACT III. (MACT stands for maximum achievable control technology.) Each level covers a specific type of mill operation and its pollutants. The Cluster Rule set new limits for the level of toxins and nonconventional pollutants that can be released into the air and water. The EPA originally proposed the Cluster Rule in December 1993; however, the AF&PA put forth considerable argument, leading the EPA to agree to less rigorous wastewater controls than originally proposed.

Compliance deadlines for this multiphase rule are staggered; the paper sector achieved compliance with Phase I of the Cluster Rule (which applied to MACT I and MACT III) in April 2001. The date for compliance with the second phase of MACT I was April 2006. MACT II regulations were promulgated in February 2001, and firms were to be in compliance by March 2004. In late February 2004, the EPA announced two new MACT standards for plywood and composite panel facilities, as well as for boilers at wood products and pulp and paper facilities. Compliance with the standards was required by mid-2007. In June 2010, the EPA proposed MACT standards for commercial and industrial boilers; a final rule was issued in February 2011. EPA promulgated changes in January 2013, which included new rules and resetting the clock for compliance, giving firms more time to install their control equipment.

Industry Guidelines

In addition to the federal environmental regulations, companies in the Paper & Forest Products industry also operate in accordance with industry guidelines. For example, the environmental, health, and safety guidelines of the AF&PA govern most domestic forest industry companies. Specifically, the AF&PA’s Sustainable Forestry Initiative Program (SFIP) oversees the industry’s most exacting and broadly applied standards of forest management. Participants in the SFIP program, all members of the AF&PA, must comply with the program’s guidelines and performance measures in such areas as sustainable forestry, forest and health productivity, legal compliance, protecting special sites, and continual improvement.

HOW TO ANALYZE A COMPANY IN THIS INDUSTRY

At CFRA, we recommend a top-down approach to valuation. An examination of the industry drivers outlined on pages 9 to 11 – e-commerce retail sales, housing starts, and containerboard, paperboard, old corrugated containers, and pulp prices – is a good starting point.

Industry Drivers

◆ **E-commerce retail sales.** E-commerce has been growing at a rapid rate, proving to have a significant impact on the demand for corrugated packaging. The increasing adoption of online shopping is a huge growth driver for the global retail e-commerce market. The growing demand for packaged food and the presence of online stores ranging from specialty packaged foods to non-perishable groceries can be purchased online and delivered to the consumer's doorstep, thus driving the paper packaging market.

◆ **Housing starts.** The housing market is the largest end market for lumber and other wood products. As a result, housing starts – the number of residences on which construction has begun during a given period – are a key indicator of the direction and health of the Paper & Forest Products industry. The U.S. Department of Commerce reports monthly on the seasonally adjusted annualized rate of housing starts.

◆ **Gross domestic product.** Compiled quarterly by the U.S. Department of Commerce, gross domestic product (GDP) is a measure of the total value of goods and services produced by labor and property in the U.S. GDP is reported quarterly; calendar-year totals are reported annually.

The growth of GDP is an important indicator of the economy's general health, which tends to have a significant effect on conditions in the Paper & Forest Products industry. Much of the industry shadows GDP growth because staple items that people use in daily living, such as tissues and paper towels, come from this industry. Strong economic growth is not always a positive factor, however, as it can be a precursor to inflation. GDP is watched closely by the Federal Reserve Board (the Fed), which currently tends to favor real growth (that is, growth with inflation factored out) in the range of 3% to 4%. The Fed is apt to raise interest rates if the economy grows too quickly.

◆ **Operating rates.** The operating rate – the proportion of total manufacturing capacity being utilized – is a key indicator of the current health of a given plant or the overall industry. Paper, paperboard, and wood products facilities have significant fixed costs – especially the first two segments. They therefore benefit from a high operating rate, which allows these plants to spread their costs over a greater number of units, typically boosting operating profits. Of course, this is true only if prices being received for a grade exceed the operating costs to make that product.

The AF&PA calculates operating rates for paper and paperboard monthly. For wood products, operating rates are compiled by the AF&PA and APA – The Engineered Wood Association, another industry trade group.

◆ **International trade.** International trade can play an important part in the performance of the Paper & Forest Products industry. A solid level of exports can help the industry to thrive during periods of strength in domestic markets and can keep the industry afloat during difficult times. Imports can also play a positive role when domestic supply is tight. At times, however, heavy imports can depress pricing in the U.S. market, as in the case of Canadian lumber imports at times in the past.

Product Mix

An important factor to examine when reviewing a company in the Paper & Forest Products industry is the product mix, which has a significant influence on a company's financial results and outlook. Although they are influenced by some of the same factors, prices for paper products and wood products are not closely correlated.

In general, a firm that produces more value-added products and relies less on commodity-oriented items will be valued more highly by investors. Most of the industry's products are commodities – goods produced in large volumes with little differentiation among manufacturers. Pricing for commodity products depends on the supply/demand balance and tends to be volatile. To succeed in these markets, companies should have strong sales and financing capabilities, as well as low-cost manufacturing, in order to survive the periods of weak demand or excess supply when manufacturers have little control over selling prices.

Value-added wood products generally target smaller markets, and thus are often impractical for larger manufacturers to produce. Such products frequently consist of certain species of softwood and hardwood lumber, as well as engineered wood products. On the paper side, some smaller firms focus on specialty products, which include premium coated paper, some recycled grades, premium grades of bleached board and Bristol, technical papers, and specialty fibers.

Smaller firms may lack the financial strength to thrive as major players in commodity markets. Manufacturing specialty products can help them to perform steadily despite periods of economic sluggishness. At the same time, a narrow focus may deliver less exceptional earnings during periods of market strength.

It is important to understand the composition of a company's product line within each of the broad categories, along with the market drivers and conditions for each grade. An investor should examine the company's level of product differentiation, its market share, and its cost profile relative to the competition.

Influences on Supply and Demand

The balance (or imbalance) between supply and demand has a major impact on the industry's health. To assess this condition, an investor should consider the following factors: general domestic and international economic prospects; the business outlook for the company's principal customers; the inventory situation in each of a company's product categories; and the production capacity and planned additions in each grade, which affect a company's operating rate.

The relationship between supply and demand in a given commodity grade almost exclusively determines the level and direction of prices. Pricing is exceptionally important for companies in the Paper & Forest Products industry, since it largely determines their net income. Commodity prices are sensitive to economic cycles and capacity additions, and they can also be highly volatile in response to seasonal and economically driven demand shifts and adjustments to inventory levels.

Demand Drivers Vary by Product

For the Paper & Forest Products industry, a key determinant of product demand is the strength of markets served by major customers.

In the paper segment, demand can take on distinct characteristics for different grades. For example, because containerboard is used to make cardboard boxes, demand tends to track the economic cycle. When the economy is strong, more products are shipped, and thus more boxes are needed. For the same reason, containerboard is normally one of the first paper grades to revive when the economy

recovers from recession. Other grades that generally track the economy are coated paper (used in magazines and catalogs), and various printing grades (used for business purposes).

If the economic outlook is uncertain, or if a slowdown appears imminent, companies that produce tissue or bleached board may benefit. These grades are used in consumer staples markets, which are less cyclical than other sectors. The trade-off is that these less-cyclical firms also do not see the dramatic earnings gains that commodity paper and packaging firms can experience during strong economic times.

When forecasting future demand for a grade of paper, specific trends are key indicators. For newsprint and coated paper, these have historically included projections for advertising spending. For containerboard and corrugated containers, the growth rates for nondurable manufactured goods should be considered. Secular trends are also important to consider as the increasing use of electronic forms of communication has had a significant negative impact on the demand for paper, especially newsprint, and, to a lesser degree, printing papers.

In the wood products area, the major determinants of demand are residential homebuilding and remodeling activity, which accounts for about three-fourths of total usage. Factors affecting homebuilding include interest rates, credit availability, employment levels, housing affordability, consumer confidence, and the level of household formations.

Taking Stock of Inventory

Inventory levels and pricing have significant effects on demand. Pricing influences the amount of inventory held by customers, who tend to order extra stock when producers announce price hikes during an industry uptrend. This pattern eventually leads to an inventory buildup. Indeed, when demand far exceeds supply, customers may frantically double- or triple-order as they try to fill their needs. Often, they receive shipments on these orders after economic and industry conditions have begun to slow.

When customer inventory levels grow, manufacturers' price hikes usually near an end, as customers will have no need to place orders for a while. This scenario leads to the down cycle: as paper and wood product makers find that they are suddenly lacking orders, they are forced to reduce prices as an incentive to encourage customers to buy.

Therefore, inventories at both the customer and manufacturer levels should be considered when analyzing a paper and forest product company. These statistics are available through groups such as the AF&PA. In addition, when companies in the Paper & Forest Products industry release earnings, most indicate the inventory situation of their predominant grades.

Capacity Levels

Our discussion of inventory relates to the next topic of importance: changes in industry capacity. Because building a mill is an extremely capital-intensive proposition – particularly in the paper area – operators make every effort to keep their mills running continuously. Companies must take downtime periodically, however, to correct pricing and inventory situations, perform scheduled maintenance, and make repairs.

Most capacity expansions are planned during boom periods, but because construction takes a considerable amount of time, new machines are often not started up until after a down cycle has begun. Increased capacity in a given product area raises the level of supply, which in turn intensifies price competition. Thus, capacity additions tend to increase the severity of industry downturns. Both overcapacity and undercapacity can have a significant impact on a particular grade of paper. Excess capacity will put downward pressure on prices, while undercapacity can lead to price increases when demand rises. Thus, one should pay considerable attention to a company's capacity to produce major grades.

Capacity in the U.S. paper and board segment is reported annually by the AF&PA, and the international situation is surveyed by certain industry research organizations. The capacity data for wood product can be obtained through sources such as RISI and The Engineered Wood Association.

Operating Rates

For the Paper & Forest Products industry as a whole, the operating rate is the percentage of manufacturing capacity used industry-wide in a given period for a particular paper grade. Typically, when utilization rates approach the mid-90% range, they signal a favorable near-term pricing and profit outlook. An examination of an individual company's operating rate will likely provide a clear picture of its profitability. The paper segment's high fixed-cost structure means that a drop in its operating rate will likely lead to a significant decline in its net income, while a rising rate will magnify net income.

Cost Position

The business of manufacturing paper and forest products is cyclical, with pricing largely outside of manufacturers' control; therefore, it is crucial for companies to manage their cost structures to remain competitive. Investors should scrutinize a company's cost structure and examine key cost drivers, such as fiber, energy, transportation, and labor, as well as the age and efficiency of equipment, operating rates, relative cost of capital, environmental compliance costs, and mill locations.

Companies with a greater degree of vertical integration typically have lower-cost positions relative to their less integrated peers, which generally translates into higher profitability. A company in the Paper & Forest Products industry is vertically integrated if it owns timberlands (providing a readily available supply of pulp for paper companies), has energy cogeneration capabilities, adds value through additional processing (e.g., converting containerboard into corrugated boxes), and/or controls its distribution channels.

Analyzing Financial Statements

Income Statement

Sales and operating margins are important factors to analyze on an income statement of a company in the Paper & Forest Products industry.

◆ **Sales.** Of all items on the income statement, sales performance usually reveals the most about the present business situation of a company in the Paper & Forest Products industry. Quarterly changes in sales volume and pricing indicate the recent supply-and-demand levels for a company's product lines and are the principal factors to watch.

Long-term growth trends are important, but it is also useful to look at sequential changes in sales, which offer a better picture of the current industry environment than do year-to-year comparisons. For instance, if selling prices are down on a year-over-year basis, one might think the company is in a bad position. However, in examining sequential trends, one might discover that, after a dramatic nine-month downtrend, prices had turned upward in the most recent quarter, indicating a positive turn in the company's prospects.

When conducting a sequential analysis, the investor should pay attention to whether the company has any seasonal operating patterns. Although most paper companies' operations are not highly seasonal, firms that make cardboard boxes may have somewhat stronger demand after agricultural harvests or before the Christmas holiday season. Those that make notebook paper may have slow growth after September, when demand for school supplies typically declines. Wood product companies, on the other hand, tend to have slower sales in the winter, when cold weather interrupts homebuilding.



Watch Out! Management can boost earnings in the current period by selling off timber and timberlands at its discretion for a gain. Look out for income statement or footnote disclosure of gains on the sale of timberland.

◆ **Operating margins.** Pricing has a significant impact on gross margins (revenues minus the cost of goods sold, expressed as a percentage of sales). Although lower sales prices for paper or wood products are typically accompanied by a downturn in raw materials costs, costs for those materials almost never fall enough to leave a producer's gross margins intact.

Gross margins tend to move in the same direction as major pricing upturns or downturns. Although pricing patterns are very difficult to offset in the gross margin equation, most top companies put considerable effort into establishing operating efficiencies. Such efforts become noticeable when a firm's gross margins remain more stable than those of its peers during difficult industry times.

Costs for selling, marketing, and administrative functions also figure into a company's operating margins. A firm has much greater control over these factors than its raw materials costs. The most successful firms usually make major efforts to control these cost levels.



Watch Out! Companies can use inventory accounting to manipulate margins. Rising inventories can be a sign of a business slowdown. Look out for rising inventory levels relative to cost of sales and changes in inventory accounting policies.

Cash Flow and Balance Sheet Data

In a paper company analysis, an examination of cash flow trends is essential. Cash flow is equal to the firm's net income plus non-cash items such as depreciation and amortization (D&A). Because the overall Paper & Forest Products industry is so cyclical in nature, a large number of industry participants are likely to experience losses during portions of a down cycle. Since most paper companies (and some wood products companies) typically have high debt levels, it is essential to determine whether a company's cash flow levels during hard times will cover interest charges.



Watch Out! Companies in the Paper & Forest Products industry are fixed asset intensive, making depreciation a significant expense for most of these companies. Since depreciation is based on estimates of asset lives, management can manipulate these estimates to manage earnings. Specifically, extending the depreciable life of an asset will boost a company's earnings while shortening depreciable lives will decrease earnings. Look out for declines in depreciation expense relative to gross property plant and equipment (PP&E), longer depreciable lives for PP&E than competitors, and footnote disclosures of change in depreciable lives of PP&E.

The investor should note a firm's traditional level of non-cash charges in order to determine how much loss it can sustain before turning cash flow negative. The firm's traditional or expected level of capital spending should also be observed to determine if recent or expected cash flow will support its programs.

If a firm's cash flow seems unlikely to cover its desired level of capital spending or, in another instance, to finance a sizable acquisition, the firm's long-term debt-to-capitalization ratio must be examined. Most paper product firms have long-term debt in the range of 40% to 60% of capitalization; companies that have made large acquisitions may have higher ratios. Those with lower ratios have greater financial flexibility and more room to borrow in the future.



Watch Out! Some companies engage in supplier financing, arrangements whereby the retailer arranges a financial institution to pay its suppliers and the retailer repays the financial institution later. This effectively lengthens the supplier payment terms and thus improves working capital. However, operating cash flows can be overstated if the cash payment to the financial institution is presented as financing outflows rather than operating cash flows, which would be the case if the company pays the supplier directly. Look out for disclosure of a company's arrangement to finance its payables, substantial increases in accounts payable without a similar increase in inventory and increases in interest expenses and/or disclosure of related interest costs within footnotes.

Acquisitions and divestitures can have a major influence on a firm's balance sheet and operating results; they also provide clues about a company's business strategy. If an operation is purchased or sold, it is important to determine which grades have been added or eliminated, as well as the reasons behind this shift. Sometimes companies sell operations to raise funds to pay down debt or because they lack enthusiasm for a grade's prospects. Conversely, a firm might add operations if it is optimistic about the outlook for a certain grade or believes that the grade has characteristics well suited to its business plan. Companies may also pursue acquisitions in order to add modern, low-cost production facilities.

Equity Valuation

Several different methods can be used to evaluate the attractiveness of an individual paper & forest product company. Because of the cyclical nature of the industry, it may be necessary to use different methods at different times or more than one method at any given time, to get a true picture of the proper value of a stock.

P/E Ratio

The P/E ratio divides the price of a stock at any point in time by the earnings over a one-year period, typically the fiscal year of the company being analyzed. Historical P/E ratios utilize actual earnings for a given year as the denominator and the average stock price for that year as the numerator. Looking at this measure over several years gives an investor a good idea of where the stock has traded historically on average as well as the range over which the stock has fluctuated.

Stocks of companies that have exhibited, and are expected to continue to show, strong earnings growth usually trade at relatively high P/E ratios, while shares of stocks that exhibit highly variable earnings tend to trade at relatively low P/E ratios. Other factors that can affect P/E ratios include debt levels, the track record of management, the level or lack of dividend payouts, and the industry in which the company operates.

Forward-looking P/E ratios use at least a partial estimate of future earnings compared with the current stock price. This P/E is then compared with the historical ratio to determine if the stock appears to be overvalued, undervalued, or in line with its historical levels. Sometimes, a stock's P/E is compared with the average of an appropriate peer group of similar companies to determine if that stock is trading above or below its peers. Stocks with P/Es below their peers or lower than historical averages are frequently viewed as attractive investments, although there can be reasons for stocks to trade at a discount, such as poor financial condition.

Cyclical stocks (such as those in the Paper & Forest Products industry) usually trade at lower P/E levels than the broad market averages because of their cyclical earnings pattern and relatively high debt levels. At certain times, such as when a company has very low earnings or losses, P/E ratios can be of limited value in evaluating stock prices.

Discounted Cash Flow

Because of the limitations of P/E ratios, other methods for valuing paper & forest product stocks are often used. One such method is the discounted cash flow (DCF) model. Compared with the P/E ratio, this

metric is much more complicated, as it involves making estimates for a variety of factors well into the future. However, many investors feel that this gives a true long-term intrinsic value of the stock, since it is based on the fundamental expectations of the business rather than on public market factors or historical precedents.

In DCF analysis, the net present value of projected cash flows for a company, minus the investment needed to generate future cash flows, is calculated. While DCF analysis provides an inherent value of the company based on its ability to generate future cash flows, it is highly dependent on the accuracy of the many assumptions regarding free cash flows, terminal value, and the discount rate.

Sum of the Parts

Another method used by investors in the Paper & Forest Products industry in evaluating their companies is the sum-of-the-parts (SOTP) model. This model has historically been especially appropriate for this sector because many companies in the industry have several different and distinct businesses, and because some of the companies have major land holdings that do not produce significant earnings. However, consolidation in the sector in recent years has made this method less useful.

SOTP, sometimes known as the “break-up” analysis, involves adding up the value of a company’s individual businesses to arrive at a total enterprise value (TEV). Equity value is then determined by subtracting net debt and other non-operating adjustments. The first step in SOTP analysis is to determine a value for each segment. After the value of each segment is determined, they are totaled; then, the amount of debt and other non-operating adjustments are subtracted. This figure is divided by the number of shares outstanding to determine a current value for the stock. If that value is significantly more than the current market value of the stock, an investment opportunity may exist.

Investors can also look at a company’s enterprise value to EBITDA (EV/EBITDA) ratio. EV is the market value of a company’s equity shares and debt financing, less cash. EBITDA is indicative of a firm’s earning power, regardless of capital structure, tax planning, or non-cash charges, and can be compared with those of other companies on an apples-to-apples basis. For this reason, EV/EBITDA is the preferred method to valuing merger & acquisition (M&A) multiples.

GLOSSARY

Bristol—A heavy paper (either coated or uncoated) that is used for folders, tags, posters, tickets, and similar products.

Containerboard—Material used in the manufacture of shipping containers and related products can be either solid fiberboard or corrugated and combined board. In its most common combined board form, two sheets of linerboard sandwich a fluted layer of corrugated medium.

Engineered wood products—Composite wood products that use glued fiber, lumber, and/or veneer to meet specific criteria. Examples include laminated veneer lumber (LVL), parallel strand board, I-beams, oriented strand board (OSB), and glue-laminated timber (glu-lams).

Fiber—The principal raw material for making paper; usually wood reduced to fine pieces.

Fine paper—High-grade paper used for copying, tablets, computer forms, envelopes, and printing.

Forestry—The management, protection, and utilization of forest resources. (*See Silviculture.*)

Free sheet—Paper made from chemical pulp that may contain up to 10% mechanical pulp (groundwood), or paper made from pulps having a high degree of “freeness” (the rate at which water drains from a stock suspension through a wire mesh screen or perforated plate).

Grade—A particular type or weight of paper.

Groundwood—Paper and newsprint made from woodchips that have been mechanically ground rather than chemically refined.

Hardwood—Wood from a deciduous tree; generally used for interior construction, making furniture, and some pulp.

Kraft—Heavy paper or paperboard made from unbleached kraft pulp, which is made by boiling wood chips in a sodium and sulfate solution.

Laminate—The act of bonding together two or more pieces of wood to make a single piece, using adhesives and pressure.

Lignin—A substance that combines with cellulose to form the woody cell walls of plants; it is extracted during pulping.

Market pulp—Pulp that is sold (by the company that produced it) on the open market rather than used by the company in the production of its paper grades.

Mechanical pulp—Pulp made by grinding fiber mechanically, as opposed to breaking it down chemically; also called groundwood pulp.

Oriented strand board (OSB)—An engineered wood product manufactured from waterproof heat-cured adhesives and rectangular-shaped wood strands that are arranged in cross-oriented layers, similar to plywood.

Plywood—An engineered wood product manufactured from thin sheets of cross-laminated veneer and bonded under heat and pressure with strong adhesives.

Recovery—The percentage of a log that is processed into salable lumber products by a sawmill.

Recycled fiber—Any fiber resource that is reused to manufacture a new product.

Silviculture—The theory and practice of establishing and maintaining groups of trees (known as stands) for particular management objectives.

Softwood—Wood cut from coniferous trees, such as spruce, fir, and pine, among others; the principal wood used in the construction of houses. It is also used for pulp production.

Sustainable forestry—A forestry method based on meeting present-day supply requirements while keeping future generations in mind. This land stewardship ethic combines the growing and harvesting of trees for useful products with reforestation; the conservation of soil, air, and water quality, biological diversity, and wildlife and aquatic habitat; recreation; and aesthetics.

Ton—A unit of mass of 2,000 pounds; also called a short ton.

Tonne—A metric ton, a unit of mass of 2,240 pounds; also called a long ton.

Veneer—A thin sheet of wood peeled or sawed from a log. Layers of this material are glued together to produce plywood.

INDUSTRY REFERENCES

PERIODICALS

Fortune Business Insights

fortunebusinessinsights.com

Delivers market research reports and custom services with keen focus on accuracy of data.

MarketingCharts

Marketingcharts.com

A hub of marketing data, graphics, and analyses.

MarketWatch

marketwatch.com

A website that provides financial information, business news, analysis, and stock market data.

Paper360

Paper360.tappi.org

A bi-monthly publication dedicated to exploring the links within the pulp and paper industry around the world.

Paper, Paperboard & Wood Pulp Statistical Reports

afandpa.org

Publishes monthly, quarterly, and annually; detailed roundup of pulp, paper, and paperboard statistics.

Pulp & Paper Week

risiinfo.com

Weekly publication providing current news, market analysis (including monthly prices for pulp, paper, and wastepaper markets, as well as inventory and shipment data), and information on regulations, mergers, management changes, and financial results.

Valuates Reports

reports.valuates.com

Provides premium market research reports customized for specific needs with deep focus on the current market trends with precision.

TRADE ASSOCIATIONS

American Forest & Paper Association

afandpa.org

National trade organization of the forest, paper, and wood products industries.

APA – The Engineered Wood Association

apawood.org

National trade association representing manufacturers of plywood, oriented strand board, structural composite panels, glued laminated timber, and wood I-joists.

Association of American Publishers

publishers.org

National trade association of the American book publishing industry.

Audio Publisher Association

audiopub.org

The first and only not-for-profit trade organization of the audiobook industry in the U.S.

National Association of Home Builders

nahb.org

One of the largest trade associations in the U.S. representing the housing industry.

RESEARCH FIRMS

eMarketer

emarketer.com

Provides insights and trends related to digital marketing, media, and commerce.

Pew Research Center

pewresearch.org

Nonpartisan fact tank that informs the public about the issues, attitudes, and trends shaping the globe. It conducts public opinion polling, demographic research, media content analysis, and other empirical social science research.

RISI, Inc.

risiinfo.com

Private economic forecasting firm for the international forest products industry; formerly called Resource Information Systems Inc.

GOVERNMENT AGENCIES

U.S. Department of Commerce

commerce.gov

Government department tasked with promoting economic growth, gathering economic and demographic data for business and government decision-making, and helping to set industrial standards.

U.S. Department of the Treasury

treasury.gov

The treasury of the U.S. federal government.

U.S. Environmental Protection Agency

epa.gov

Governmental agency charged with protecting public health and safeguarding and improving the natural environment; enforces governmental regulations regarding air, water, and land resources.

COMPARATIVE COMPANY ANALYSIS

		Operating Revenues																	
Ticker	Company	Yr. End	Million \$							CAGR (%)			Index Basis (2012=100)						
			2022	2021	2020	2019	2018	2017	2016	10-Yr.	5-Yr.	1-Yr.	2022	2021	2020	2019	2018	2017	
PAPER PRODUCTS																			
CLW	§ CLEARWATER PAPER CORPORATION	DEC	2,080.1	1,772.6	1,868.6	1,761.5	1,724.2	1,730.4	1,734.8	1.0	3.7	17.3	120	102	108	102	99	100	
UFS	DOMTAR CORPORATION	DEC	4,577.0	3,668.0	3,415.0	4,119.0	4,565.0	5,148.0	5,090.0	-1.8	-2.3	24.8	90	72	67	81	90	101	
MERC	§ MERCER INTERNATIONAL INC.	DEC	2,280.9	1,803.3	1,423.1	1,624.4	1,457.7	1,169.1	931.6	7.8	14.3	26.5	245	194	153	174	156	125	
NP	NOVELPLUS TECHNOLOGY BERHAD	DEC	1.1	1.2	1.2	1.4	1.4	0.0	0.0	NA	NA	-2.8	NA	NA	NA	NA	NA	NA	
GLT	§ GLATFELTER CORPORATION	DEC	1,491.3	1,084.7	916.5	927.7	866.3	800.4	761.2	-0.6	13.3	37.5	196	142	120	122	114	105	
SWM	SEVEN WEST MEDIA LIMITED	JUN	1,069.3	964.8	840.9	999.1	1,198.7	1,268.0	1,282.6	-2.3	-1.7	21.2	83	75	66	78	93	99	
FOREST PRODUCTS																			
BCC	§ BOISE CASCADE COMPANY	DEC	8,387.3	7,926.1	5,474.8	4,643.4	4,995.3	4,432.0	3,911.2	11.7	13.6	5.8	214	203	140	119	128	113	
LPX	† LOUISIANA-PACIFIC CORPORATION	DEC	3,854.0	3,915.0	2,399.0	2,310.0	2,828.0	2,734.0	2,233.4	8.6	7.1	-1.6	173	175	107	103	127	122	
PAPER PACKAGING																			
AMCR	□ AMCOR PLC	JUN	14,544.0	12,861.0	12,468.0	9,458.0	9,319.1	9,101.0	9,421.3	1.8	9.8	13.1	154	137	132	100	99	97	
AVY	□ AVERY DENNISON CORPORATION	DEC	NA	9,039.3	8,408.3	7,070.1	7,159.0	6,613.8	6,086.5	4.4	6.4	7.5	NA	149	138	116	118	109	
IP	□ INTERNATIONAL PAPER COMPANY	DEC	21,161.0	19,363.0	17,565.0	18,317.0	23,306.0	21,743.0	19,495.0	-0.3	-0.5	9.3	109	99	90	94	120	112	
PKG	□ PACKAGING CORPORATION OF AMERICA	DEC	8,478.0	7,730.3	6,658.2	6,964.3	7,014.6	6,444.9	5,779.0	11.5	5.6	9.7	147	134	115	121	121	112	
SEE	□ SEALED AIR CORPORATION	DEC	5,641.9	5,533.8	4,903.2	4,791.1	4,732.7	4,461.6	4,211.3	-2.9	4.8	2.0	134	131	116	114	112	106	
SON	† SONOCO PRODUCTS COMPANY	DEC	7,250.6	5,590.4	5,237.4	5,374.2	5,390.9	5,036.7	4,782.9	4.2	7.6	29.7	152	117	110	112	113	105	
WRK	□ WESTROCK COMPANY	SEP	21,256.5	18,746.1	17,578.8	18,289.0	16,285.1	14,859.7	14,171.8	8.7	7.4	13.4	150	132	124	129	115	105	
FORESTRY REITS																			
WY	□ WEYERHAEUSER COMPANY	DEC	10,184.0	10,201.0	7,532.0	6,554.0	7,476.0	7,196.0	6,365.0	5.5	7.2	-0.2	160	160	118	103	117	113	
RYN	† RAYONIER INC.	DEC	909.1	1,109.6	859.2	711.6	816.1	819.6	815.9	9.1	2.1	-18.1	111	136	105	87	100	100	
PCH	† POTLATCHDELTIC CORPORATION	DEC	1,330.8	1,337.4	1,040.9	827.1	974.6	678.6	599.1	9.7	14.4	-0.5	222	223	174	138	163	113	

Note: Data as originally reported. CAGR-Compound annual growth rate.

□Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600. #Of the following calendar year.

Source: S&P Capital IQ.

Net Income

			Million \$							CAGR (%)			Index Basis (2012=100)					
Ticker	Company	Yr. End	2022	2021	2020	2019	2018	2017	2016	10-Yr.	5-Yr.	1-Yr.	2022	2021	2020	2019	2018	2017
PAPER PRODUCTS																		
CLW	§ CLEARWATER PAPER CORPORATION	DEC	46.0	-28.1	77.1	-5.6	-143.8	97.3	49.6	-3.3	-13.9	NM	93	-57	156	-11	-290	196
UFS	DOMTAR CORPORATION	DEC	339.0	-27.0	-127.0	84.0	283.0	-258.0	128.0	7.0	NM	NM	265	-21	-99	66	221	-202
MERC	§ MERCER INTERNATIONAL INC.	DEC	247.0	171.0	-17.2	-9.6	128.6	70.5	34.9	NA	28.5	44.5	707	489	-49	-28	368	202
NP	NOVELPLUS TECHNOLOGY BERHAD	DEC	-0.3	-0.5	0.8	1.6	1.6	0.0	0.0	NA	NA	-44.7	NA	NA	NA	NA	NA	NA
GLT	§ GLATFELTER CORPORATION	DEC	-194.2	6.9	21.3	-21.5	-177.6	7.9	21.6	NA	NM	NM	-901	32	99	-100	-824	37
SWM	SEVEN WEST MEDIA LIMITED	JUN	211.1	318.1	-163.3	-324.3	132.8	-745.0	184.3	-0.7	NM	-33.6	115	173	-89	-176	72	-404
FOREST PRODUCTS																		
BCC	§ BOISE CASCADE COMPANY	DEC	857.7	712.5	175.0	80.9	20.5	83.0	38.3	35.4	59.5	20.4	2242	1863	457	212	54	217
LPX	† LOUISIANA-PACIFIC CORPORATION	DEC	1,086.0	1,377.0	499.0	-5.0	395.0	390.0	149.8	43.8	22.7	-21.1	725	919	333	-3	264	260
PAPER PACKAGING																		
AMCR	▯ AMCOR PLC	JUN	805.0	939.0	612.0	430.0	575.2	564.0	244.1	6.9	7.4	-14.3	330	385	251	176	236	231
AVY	▯ AVERY DENNISON CORPORATION	DEC	NA	757.1	740.1	303.6	467.4	281.8	320.7	13.4	21.9	2.3	NA	236	231	95	146	88
IP	▯ INTERNATIONAL PAPER COMPANY	DEC	1,504.0	1,752.0	482.0	1,225.0	2,012.0	2,144.0	904.0	6.6	-6.8	-14.2	166	194	53	136	223	237
PKG	▯ PACKAGING CORPORATION OF AMERICA	DEC	1,029.8	841.1	461.0	696.4	738.0	668.6	449.6	20.5	9.0	22.4	229	187	103	155	164	149
SEE	▯ SEALED AIR CORPORATION	DEC	491.6	506.8	502.9	263.0	193.1	814.9	486.4	NA	-9.6	-3.0	101	104	103	54	40	168
SON	† SONOCO PRODUCTS COMPANY	DEC	466.4	-85.5	207.5	291.8	313.6	175.3	286.4	9.1	21.6	NM	163	-30	72	102	109	61
WRK	▯ WESTROCK COMPANY	SEP	944.6	838.3	-690.9	862.9	1,906.1	708.2	-396.3	14.3	5.9	12.7	-238	-212	174	-218	-481	-179
FORESTRY REITS																		
WY	▯ WEYERHAEUSER COMPANY	DEC	1,880.0	2,607.0	797.0	-76.0	748.0	582.0	1,027.0	17.2	26.4	-27.9	183	254	78	-7	73	57
RYN	† RAYONIER INC.	DEC	107.1	152.6	37.1	59.1	102.2	151.7	212.0	-9.1	-6.7	-29.8	51	72	17	28	48	72
PCH	† POTLATCHDELTIC CORPORATION	DEC	333.9	423.9	166.8	55.7	122.9	86.5	10.9	22.9	31.0	-21.2	3053	3875	1525	509	1123	790

Note: Data as originally reported. CAGR-Compound annual growth rate.

□ Company included in the S&P 500. † Company included in the S&P MidCap 400. § Company included in the S&P SmallCap 600. # Of the following calendar year.

Source: S&P Capital IQ.

Ticker	Company	Yr. End	Return on Revenues (%)						Return on Assets (%)						Return on Equity (%)					
			2022	2021	2020	2019	2018	2017	2022	2021	2020	2019	2018	2017	2022	2021	2020	2019	2018	2017
PAPER PRODUCTS																				
CLW	§ CLEARWATER PAPER CORPORATION	DEC	2.2	NM	4.1	NM	NM	5.6	2.7	NM	4.3	NM	NM	5.4	8.5	NM	16.2	NM	NM	18.6
UFS	DOMTAR CORPORATION	DEC	7.4	NM	NM	2.0	6.2	NM	7.2	NM	NM	1.7	5.7	NM	19.3	NM	NM	2.7	11.2	NM
MERC	§ MERCER INTERNATIONAL INC.	DEC	10.8	9.5	NM	NM	8.8	6.0	9.1	7.3	NM	NM	6.5	4.1	32.2	26.4	NM	NM	22.7	15.2
NP	NOVELPLUS TECHNOLOGY BERHAD	DEC	NM	NM	15.9	26.9	0.0	0.0	NM	NM	18.0	38.6	NA	NA	NM	NM	23.2	0.0	0.0	0.0
GLT	§ GLATFELTER CORPORATION	DEC	NM	0.6	2.3	NM	NM	1.0	NM	0.4	1.7	NM	NM	0.5	NM	1.2	3.7	NM	NM	NM
SWM	SEVEN WEST MEDIA LIMITED	JUN	13.7	25.1	NM	NM	8.2	NM	15.2	20.9	NM	NM	7.0	NM	121.3	NM	NM	NM	27.9	NM
FOREST PRODUCTS																				
BCC	§ BOISE CASCADE COMPANY	DEC	10.2	9.0	3.2	1.7	0.4	1.9	26.5	27.7	8.9	4.8	1.3	5.2	50.3	64.7	22.5	11.8	3.0	13.2
LPX	† LOUISIANA-PACIFIC CORPORATION	DEC	28.2	35.2	20.8	NM	14.0	14.3	46.2	62.8	23.9	NM	15.7	15.9	66.2	104.9	43.2	NM	24.1	27.9
PAPER PACKAGING																				
AMCR	▯ AMCOR PLC	JUN	5.5	7.3	4.9	4.5	6.2	6.2	4.6	5.5	3.7	2.5	6.4	6.2	18.2	20.0	12.0	13.7	75.0	67.7
AVY	▯ AVERY DENNISON CORPORATION	DEC	NA	8.8	8.0	4.3	6.5	4.3	9.5	9.3	9.1	5.5	9.0	5.5	38.3	43.4	41.3	28.1	46.7	28.6
IP	▯ INTERNATIONAL PAPER COMPANY	DEC	7.1	9.0	2.7	6.7	8.6	9.9	6.3	6.9	1.5	3.7	6.0	6.3	19.8	9.6	2.3	9.2	24.0	38.7
PKG	▯ PACKAGING CORPORATION OF AMERICA	DEC	12.1	10.9	6.9	10.0	10.5	10.4	12.9	10.7	6.2	9.6	11.2	10.8	28.3	24.5	14.6	24.3	30.4	33.9
SEE	▯ SEALED AIR CORPORATION	DEC	8.7	9.2	10.3	5.5	4.1	18.3	7.9	8.1	8.3	4.6	3.8	15.4	165.8	233.2	NM	NM	NM	16.5
SON	† SONOCO PRODUCTS COMPANY	DEC	6.4	NM	4.0	5.4	5.8	3.5	6.6	NM	3.9	5.7	6.8	3.8	23.8	NM	11.1	16.3	18.0	10.8
WRK	▯ WESTROCK COMPANY	SEP	4.4	4.5	NM	4.7	11.7	4.8	3.3	2.9	NM	2.9	7.5	2.8	8.2	7.5	NM	7.5	17.5	6.9
FORESTRY REITS																				
WY	▯ WEYERHAEUSER COMPANY	DEC	18.5	25.6	10.6	NM	10.0	8.1	10.8	14.8	4.9	NM	4.3	3.2	17.5	26.7	9.4	NM	8.3	6.4
RYN	† RAYONIER INC.	DEC	11.8	13.7	4.3	8.3	12.5	18.5	2.8	4.2	1.0	2.1	3.7	5.3	6.2	10.7	1.7	3.8	6.4	10.3
PCH	† POTLATCHDELTIC CORPORATION	DEC	25.1	31.7	16.0	6.7	12.6	12.7	9.4	16.7	7.0	2.5	5.3	9.1	17.6	29.9	13.2	4.4	16.2	48.5

Note: Data as originally reported. CAGR-Compound annual growth rate.

□ Company included in the S&P 500. † Company included in the S&P MidCap 400. § Company included in the S&P SmallCap 600. # Of the following calendar year.

Source: S&P Capital IQ.

Ticker	Company	Yr. End	Current Ratio						Debt/Capital Ratio (%)						Debt as a % of Net Working Capital					
			2022	2021	2020	2019	2018	2017	2022	2021	2020	2019	2018	2017	2022	2021	2020	2019	2018	2017
PAPER PRODUCTS																				
CLW	§ CLEARWATER PAPER CORPORATION	DEC	1.9	1.9	1.9	1.7	1.0	1.1	48.6	54.8	57.2	66.7	61.1	63.3	197.4	266.0	303.0	466.0	NM	2,163.4
UFS	DOMTAR CORPORATION	DEC	2.2	2.0	3.0	2.0	2.0	2.2	46.2	51.6	32.2	28.4	24.9	31.0	166.5	180.8	62.6	124.7	104.5	121.7
MERC	§ MERCER INTERNATIONAL INC.	DEC	3.1	3.8	4.1	3.3	4.1	2.0	60.8	63.0	65.6	66.4	64.2	54.6	162.8	151.3	172.7	184.9	169.2	157.2
NP	NOVELPLUS TECHNOLOGY BERHAD	DEC	22.8	25.3	5.8	3.2	0.0	0.0	0.0	0.0	0.0	27.3	NA	NA	0.0	0.0	0.0	37.8	NA	NA
GLT	§ GLATFELTER CORPORATION	DEC	1.9	1.7	1.9	2.1	2.0	1.7	72.4	59.4	33.3	37.7	42.7	39.9	252.2	286.7	131.4	136.5	169.6	197.7
SWM	SEVEN WEST MEDIA LIMITED	JUN	1.0	1.3	1.6	1.4	1.6	1.3	52.8	85.4	147.7	115.6	59.2	65.7	1,602.8	334.0	290.0	443.5	292.5	574.6
FOREST PRODUCTS																				
BCC	§ BOISE CASCADE COMPANY	DEC	3.8	2.9	2.5	2.7	2.7	2.4	17.8	24.7	34.3	38.6	39.5	39.4	29.3	35.7	56.6	69.1	71.3	79.5
LPX	† LOUISIANA-PACIFIC CORPORATION	DEC	2.5	2.5	3.5	2.5	4.9	5.0	19.4	21.8	21.9	25.7	16.9	17.9	66.8	64.2	49.2	92.5	33.8	32.1
PAPER PACKAGING																				
AMCR	▯ AMCOR PLC	JUN	1.1	1.2	1.1	1.1	0.7	0.8	61.8	57.0	58.0	55.5	114.2	97.9	865.7	679.0	1,103.7	911.8	NM	NM
AVY	▯ AVERY DENNISON CORPORATION	DEC	NA	1.1	1.3	1.0	1.2	1.1	68.2	65.8	59.8	61.4	72.1	66.6	NM	1,659.2	433.5	1,896.3	646.8	585.0
IP	▯ INTERNATIONAL PAPER COMPANY	DEC	1.4	1.7	1.4	0.8	1.5	1.6	35.9	37.0	50.4	55.4	60.1	62.4	269.3	180.5	270.4	NM	452.5	341.6
PKG	▯ PACKAGING CORPORATION OF AMERICA	DEC	2.9	3.1	3.5	3.4	3.0	2.3	40.3	40.7	43.3	44.6	48.2	53.2	151.5	133.7	126.0	141.2	174.7	229.2
SEE	▯ SEALED AIR CORPORATION	DEC	1.0	1.0	1.4	1.1	1.0	1.4	90.5	92.8	95.7	108.5	120.1	96.2	9,224.0	5,139.2	722.6	2,949.0	5,240.6	666.9
SON	† SONOCO PRODUCTS COMPANY	DEC	1.4	1.1	1.2	1.1	1.4	1.6	64.5	49.9	38.8	47.6	44.2	46.8	491.6	1,124.6	379.8	1,217.5	300.2	250.5
WRK	▯ WESTROCK COMPANY	SEP	1.5	1.6	1.7	1.4	1.4	1.5	39.0	39.9	45.6	44.8	33.1	35.7	350.6	385.5	443.6	611.1	390.9	389.9
FORESTRY REITS																				
WY	▯ WEYERHAEUSER COMPANY	DEC	1.6	3.3	1.7	1.6	0.8	1.5	27.5	32.1	37.9	44.5	40.4	41.2	404.7	233.8	808.0	1,054.0	NM	1,133.1
RYN	† RAYONIER INC.	DEC	2.1	1.9	1.9	0.8	3.4	2.7	43.3	39.2	41.7	39.0	24.7	37.7	1,415.0	572.8	1,794.2	NM	441.3	890.6
PCH	† POTLATCHDELTIC CORPORATION	DEC	3.4	3.3	2.6	1.6	1.9	2.6	30.5	32.6	36.9	37.4	35.3	73.6	299.2	250.6	350.9	1,044.2	570.5	471.7

Note: Data as originally reported. CAGR-Compound annual growth rate.

□Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600. #Of the following calendar year.

Source: S&P Capital IQ.

Ticker	Company	Yr. End	Price/Earnings Ratio (High-Low)						Dividend Payout Ratio (%)						Dividend Yield (High-Low, %)					
			2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016
PAPER PRODUCTS																				
CLW	§ CLEARWATER PAPER CORPORATION	DEC	NM - NM	9 - 3	NM - NM	NM - NM	11 - 7	24 - 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
UFS	DOMTAR CORPORATION	DEC		NA - NA	NA - NA	NA - NA	NA - NA	NA - NA	0.0	NM	131.0	38.2	NM	79.7	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
MERC	§ MERCER INTERNATIONAL INC.	DEC	7 - 4	NM - NM	NM - NM	10 - 5	14 - 10	20 - 11	10.0	NM	NM	31.7	42.4	85.1	2.6 - 1.7	3.2 - 1.5	8.1 - 2.5	5.2 - 3.1	4.2 - 2.6	4.8 - 3.2
NP	NOVELPLUS TECHNOLOGY BERHAD	DEC	NM - NM	NA - NA	NA - NA				0.0	0.0	0.0	0.0	0.0	0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
GLT	§ GLATFELTER CORPORATION	DEC	122 - 87	38 - 21	NM - NM	NM - NM	138 - 92	50 - 29	352.6	110.3	NM	NM	284.1	100.2	26.9 - 0.0	4.1 - 2.8	5.2 - 2.7	5.4 - 2.8	4.2 - 2.2	3.1 - 2.0
SWM	SEVEN WEST MEDIA LIMITED	JUN	3 - 0	NM - NM	NM - NM	10 - 5	NM - NM	10 - 5	0.0	0.0	0.0	22.7	NM	65.6	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	8.3 - 0.0	11.9 - 5.1
FOREST PRODUCTS																				
BCC	§ BOISE CASCADE COMPANY	DEC	4 - 3	11 - 5	19 - 11	93 - 42	19 - 10	28 - 14	12.9	43.1	18.5	57.2	3.3	0.0	10.8 - 5.5	10.0 - 2.8	6.8 - 2.9	4.0 - 1.0	1.4 - 0.6	0.8 - 0.7
LPX	† LOUISIANA-PACIFIC CORPORATION	DEC	6 - 3	9 - 3	NM - NM	11 - 7	11 - 7	20 - 13	4.8	13.0	NM	18.7	0.0	0.0	1.8 - 0.9	1.7 - 0.9	4.2 - 1.6	2.5 - 1.8	2.5 - 1.6	0.0 - 0.0
PAPER PACKAGING																				
AMCR	¶ AMCOR PLC	JUN	21 - 16	31 - 16	32 - 29	NA - NA	NA - NA	NA - NA	77.5	122.2	154.9	89.6	85.2	191.2	4.4 - 3.6	5.0 - 3.8	7.7 - 4.1	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
AVY	¶ AVERY DENNISON CORPORATION	JAN	18 - 9	20 - 15	34 - 23	23 - 14	25 - 19	18 - 14	NA	29.8	35.4	62.5	37.4	55.2	1.7 - 1.2	2.9 - 1.6	2.4 - 1.7	2.5 - 1.5	2.3 - 1.5	2.5 - 2.0
IP	¶ INTERNATIONAL PAPER COMPANY	DEC	14 - 10	42 - 22	15 - 12	13 - 8	11 - 10	25 - 15	44.5	167.2	65.0	39.2	35.9	81.1	5.9 - 3.7	4.5 - 3.2	7.7 - 4.0	5.4 - 4.2	5.0 - 2.9	3.7 - 3.2
PKG	¶ PACKAGING CORPORATION OF AMERICA	DEC	17 - 14	28 - 16	15 - 11	17 - 10	17 - 12	18 - 9	45.2	65.0	42.9	36.3	35.5	48.1	4.5 - 2.4	3.1 - 2.3	4.1 - 2.3	4.1 - 2.8	3.8 - 1.9	3.0 - 2.1
SEE	¶ SEALED AIR CORPORATION	DEC	20 - 12	14 - 5	28 - 20	41 - 25	12 - 10	21 - 15	22.8	20.0	37.7	53.9	14.7	25.0	1.9 - 1.1	1.5 - 1.1	3.6 - 1.4	2.0 - 1.4	2.1 - 1.3	1.5 - 1.3
SON	† SONOCO PRODUCTS COMPANY	DEC	NM - NM	30 - 18	23 - 18	19 - 15	32 - 27	19 - 13	NM	83.2	58.3	51.5	87.3	51.1	3.8 - 2.7	3.1 - 2.6	4.5 - 2.8	3.3 - 2.6	3.3 - 2.8	3.3 - 2.7
WRK	¶ WESTROCK COMPANY	SEP	20 - 11	NM - NM	16 - 10	9 - 7	21 - 16	NM - NM	27.9	NM	54.2	23.1	56.9	NM	2.6 - 1.8	2.5 - 1.4	8.4 - 2.4	5.6 - 3.0	3.1 - 2.4	3.6 - 2.7
FORESTRY REITS																				
WY	¶ WEYERHAEUSER COMPANY	DEC	12 - 9	32 - 13	NM - NM	39 - 21	47 - 39	24 - 16	19.5	47.8	NM	133.0	161.7	92.9	2.6 - 1.6	2.4 - 1.7	4.8 - 0.0	6.4 - 4.5	5.2 - 3.3	4.1 - 3.4
RYN	† RAYONIER INC.	DEC	38 - 27	118 - 68	72 - 57	50 - 34	27 - 22	16 - 11	100.6	394.6	238.7	133.8	27.0	58.0	3.8 - 2.4	3.8 - 2.6	5.8 - 3.3	4.1 - 3.3	3.6 - 2.6	3.8 - 3.1
PCH	† POTLATCHDELTIC CORPORATION	DEC	10 - 8	21 - 9	54 - 37	27 - 14	25 - 19	162 - 92	91.6	64.6	193.5	83.3	71.6	556.2	4.5 - 2.9	3.6 - 2.6	6.8 - 3.4	5.5 - 3.6	4.7 - 2.9	3.8 - 2.8

Note: Data as originally reported. CAGR-Compound annual growth rate.

¶ Company included in the S&P 500. † Company included in the S&P MidCap 400. § Company included in the S&P SmallCap 600. # Of the following calendar year.

Source: S&P Capital IQ.

Ticker	Company	Yr. End	Earnings per Share (\$)						Tangible Book Value per Share (\$)						Share Price (High-Low, \$)					
			2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016
PAPER PRODUCTS																				
CLW	§ CLEARWATER PAPER CORPORATION	DEC	-1.7	4.6	-0.3	-8.7	5.9	2.9	30.7	31.4	23.0	22.3	18.2	11.2	45.8 - 27.3	42.5 - 11.9	35.3 - 13.9	50.6 - 21.6	67.5 - 42.2	69.8 - 32.0
UFS	DOMTAR CORPORATION	DEC	0.0	-2.3	1.4	4.5	-4.1	2.0	0.0	40.4	41.2	30.9	29.5	24.3	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
MERC	§ MERCER INTERNATIONAL INC.	DEC	2.6	-0.3	-0.2	2.0	1.1	0.5	9.8	8.4	7.6	8.1	8.1	5.7	18.1 - 9.5	13.4 - 5.8	17.7 - 10.1	19.1 - 9.4	15.0 - 10.4	10.8 - 5.9
NP	NOVELPLUS TECHNOLOGY BERHAD	DEC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3 - 0.2	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
GLT	§ GLATFELTER CORPORATION	DEC	0.2	0.5	-0.5	-4.1	0.2	0.5	3.4	7.5	7.3	6.6	13.0	12.0	19.5 - 13.3	18.4 - 9.4	19.0 - 9.3	23.9 - 9.4	25.6 - 16.5	25.5 - 14.1
SWM	SEVEN WEST MEDIA LIMITED	JUN	0.2	-0.1	-0.2	0.1	-0.5	0.1	-0.4	-0.5	-0.4	-0.3	-0.4	-0.2	0.7 - 0.3	0.3 - 0.1	0.6 - 0.3	1.1 - 0.5	0.9 - 0.6	1.2 - 0.7
FOREST PRODUCTS																				
BCC	§ BOISE CASCADE COMPANY	DEC	18.0	4.4	2.1	0.5	2.1	1.0	32.3	19.6	15.9	15.3	15.5	13.1	78.4 - 45.8	50.4 - 20.1	40.1 - 22.1	49.3 - 22.0	41.0 - 22.6	30.0 - 13.8
LPX	† LOUISIANA-PACIFIC CORPORATION	DEC	14.1	4.5	0.0	2.7	2.7	1.0	14.0	11.2	8.4	12.2	10.9	8.2	79.7 - 36.7	40.8 - 13.0	30.3 - 20.7	32.2 - 20.4	29.4 - 18.7	21.2 - 13.3
PAPER PACKAGING																				
AMCR	▯ AMCOR PLC	JUN	0.6	0.4	0.4	0.5	0.5	0.2	-1.6	-1.7	-1.1	-1.5	-1.4	-1.1	12.9 - 10.3	12.4 - 5.8	11.8 - 9.2	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
AVY	▯ AVERY DENNISON CORPORATION	JAN	NA	8.8	6.6	3.6	5.3	3.1	NA	-12.0	-0.2	-0.1	-3.1	-2.6	229.2 - 147.4	156.8 - 77.0	134.6 - 86.9	123.7 - 82.9	117.9 - 69.5	79.3 - 57.1
IP	▯ INTERNATIONAL PAPER COMPANY	DEC	4.5	1.2	3.1	4.9	5.1	2.2	15.0	12.1	11.1	10.0	7.5	2.4	65.3 - 43.9	52.0 - 26.4	48.2 - 36.5	66.9 - 37.6	59.0 - 49.6	54.7 - 32.5
PKG	▯ PACKAGING CORPORATION OF AMERICA	DEC	8.8	4.8	7.3	7.8	7.1	4.8	25.5	22.1	19.3	14.7	9.5	7.0	156.5 - 124.8	139.0 - 71.1	114.8 - 81.9	131.1 - 77.9	121.4 - 84.0	88.4 - 44.3
SEE	▯ SEALED AIR CORPORATION	DEC	3.3	3.2	1.7	1.2	4.3	2.5	-14.1	-14.3	-16.8	-15.4	-11.1	-6.8	68.0 - 41.8	46.4 - 17.1	47.1 - 34.3	49.9 - 30.2	50.6 - 41.2	52.8 - 38.0
SON	† SONOCO PRODUCTS COMPANY	DEC	-0.9	2.1	2.9	3.1	1.7	2.8	2.4	1.9	-0.1	1.0	1.3	2.2	69.8 - 54.8	62.5 - 37.3	66.6 - 51.3	58.7 - 46.6	55.8 - 47.1	55.5 - 36.6
WRK	▯ WESTROCK COMPANY	SEP	3.1	-2.7	3.3	7.3	2.8	-1.5	9.0	3.8	1.3	10.9	5.8	9.4	62.0 - 40.0	45.6 - 21.5	43.4 - 31.9	71.6 - 35.2	64.9 - 49.2	53.6 - 29.7
FORESTRY REITS																				
WY	▯ WEYERHAEUSER COMPANY	DEC	3.5	1.1	-0.1	1.0	0.8	1.4	14.4	11.7	11.0	12.1	11.8	12.2	41.7 - 30.9	34.7 - 13.1	30.3 - 20.9	38.4 - 20.5	36.9 - 29.9	33.3 - 22.1
RYN	† RAYONIER INC.	DEC	1.1	0.3	0.5	0.8	1.2	1.7	12.1	10.6	11.1	14.5	12.3	11.4	41.1 - 28.9	33.1 - 16.0	33.1 - 25.8	39.7 - 26.3	31.9 - 26.5	28.5 - 17.9
PCH	† POTLATCHDELTIC CORPORATION	DEC	6.3	2.5	0.8	2.0	2.1	0.3	21.9	19.3	18.0	19.2	4.9	3.9	65.7 - 46.9	51.7 - 22.4	44.7 - 29.8	55.8 - 28.1	56.4 - 39.1	44.0 - 24.0

Note: Data as originally reported. CAGR-Compound annual growth rate.

□ Company included in the S&P 500. † Company included in the S&P MidCap 400. § Company included in the S&P SmallCap 600. # Of the following calendar year.

Source: S&P Capital IQ.

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