

Inflation & Commodity Trends

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September 2023

What's in this Report

This report contains information on twelve primary commodities. Information provided for these commodities includes forecast growth rates, the impact of these primary commodities on secondary commodities, substitutes for primary commodities, as well as upstream and downstream supply chain analysis for each primary commodity.

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Executive Summary

- Continued strength in labor markets has been prompting the Federal Reserve to continue raising interest rates in 2023. Rate projections by the Federal Reserve Board of Governors anticipate two more quarter-point rate hikes by the end of the year as the Federal Reserve looks to tame inflation in core services.
 - The Federal Reserve is unlikely to cut rates in 2023 as long as the US economy remains resilient. As the economy slows down further in the long term, rates will drift downwards.
- Prices of metals are projected to continue declining in 2023, and into the forecast period, primarily from weakening global demand. Demand from large global consumers, such as China, remain low as the country continues to consume metals at lower rates than normal. At the same time, supply growth for metals over the forecast period is anticipated to grow stronger, thus contributing to price declines.
 - Risks to the upside for metals lie in China's economic recovery being more heavily tilted towards commodity-intensive products than services. A strengthening of China's real estate sector would also significantly increase demand for steel, pressuring prices upwards.
- Food prices in the US are expected to increase as inflation continues to negatively impact food and agricultural products. Food price growth is expected to be mitigated in the long-term however, as favorable harvests and increased planting both domestically and globally indicate more stable conditions in the market in the future.
 - Brazil is anticipated to have a record grain harvest in 2023 due to favorable weather, joining Australia, Canada, Kazakhstan, and Russia, which saw better-than-expected harvests in 2022, leading to higher stock-to-use ratios.
 - Concurrently, US surveys suggest increased maize and wheat planting, which will continue to lower prices in 2023.
- Energy markets are expected to remain highly volatile; however, declines from record highs are expected to continue.
- High interest rates and inflation will have mixed impacts on secondary commodities.
 - For example, rising input costs are prompting suppliers to increase their prices to maintain profitability. However, higher interest rates and inflation are negatively impacting the demand for primary and secondary commodities, subsequently exerting downward pressure on prices.
 - While the availability of secondary commodities is on the rise, the current economic volatility continues to create disruptions and uncertainties in the market, making future price trajectories unpredictable.



Commodity Analysis

1. Aluminum

Forecast CAGRs:

- 6 Month: -6.8%
- 1 Year: -4.7%
- 2 Year: -1.1%
- 3 Year: 1.8%

Analysis: The rise in energy prices fueled much of the price growth for aluminum in 2022, along with a restricted supply of aluminum from factory shutdowns in China and export restrictions of Russian aluminum. However, prices are expected to begin to reverse course and decline over the following three-year period. Over the next three years, demand for aluminum is expected to increase as global economic growth recovers; however, supply is expected to lag as production remains low globally. Decreases in supply are expected due to ongoing demographic concerns in China and new regulations intended to constrain debt-financed property development within the nation. Nonetheless, the volatility in aluminum prices is mainly dependent on energy prices and supply estimates from China, both of which are difficult to anticipate, contributing to frequently fluctuations in forecast data for aluminum.

Secondary Commodities:

- Cameras/Cell Phones/Computers/Copiers
 - Aluminum is used in printed circuit boards, computer chips, and other structural or body technology components, such as cameras, cell phones, and computers. As aluminum prices stabilize, so may product prices.
- Canned Goods
 - Canned goods and beverage manufacturers will see input costs increase marginally over the next three years as aluminum prices slowly climb due to greater demand and rising overhead costs.
- Vehicle/Vehicle Parts
 - Vehicle and auto part manufacturers expect increased manufacturing capabilities due to greater aluminum production. New and used car availability is likely to improve in the final months of 2023 and into 2024.

Substitute Commodities:

- Magnesium Alloys

Upstream Supply Chain:

- Alumina Producers & Processors
 - Bauxite Miners
- Mining Equipment Manufacturers

Analysis: The upstream supply chain for aluminum consists of raw material suppliers that mine bauxite, process it into alumina, and deliver it to aluminum manufacturers. As China has eased restrictions on industrial users and factories, smelting activity has increased significantly, increasing the overall supply of aluminum and placing downward pressure on prices.



1. Aluminum

Downstream Supply Chain:

- Car & Automobile Manufacturers
- Metal Can & Container Manufacturers

Analysis: The downstream supply chain for aluminum comprises final products and solutions engineered and built from aluminum. Major downstream players include aircraft and automobile part and equipment manufacturers and canned goods and beverage suppliers. Aluminum demand is anticipated to remain relatively flat, as interest and inflation rates are unlikely to change significantly throughout the final months of 2023.

2. Chlorine

Forecast CAGRS:

- 6 Month: 22.6%
- 1 Year: 14.7%
- 2 Year: 7.8%
- 3 Year: 4.7%

Analysis: The price of chlorine is expected to remain elevated over the next three years as shortages persist throughout the market. High demand and fires at large chlorine and chemical-producing plants in Louisiana in mid-2021 and New Jersey in early 2022 have continued to hamper the supply of chlorine. These events have been particularly limiting the supply of chlorine tablets. The recent reopening of a BioLab chlorine plant in November 2022 will bring some price relief. Still, many suppliers have continued posting price increases for 2023, with some of these increases running as high as 30.0%. As more consumers switch to lower-cost chlorine types, this will put greater strain on the overall chlorine supply, which has yet to fully recover from the high demand and supply shortages, which began in 2020. These trends and rising overhead costs will continue to place upward pressure on prices over the next three years.

Secondary Commodities:

- Pharmaceutical Products
 - As chlorine shortages linger and prices continue to rise, pharmaceutical products and medicines that use chlorine as components are also expected to increase in price. Prices are anticipated to face further upward pressure as demand from water treatment facilities prompts suppliers to raise chlorine prices further.

Substitute Commodities:

- Bromine

Upstream Supply Chain:

- Chemical Product Manufacturers
 - Inorganic Chemical Manufacturers
- Mineral & Phosphate Miners
 - Mining Equipment Manufacturers

Analysis: The primary upstream supply chain risk for chlorine stems mainly from the ability to meet demand. A significant disruption in the supply chain occurred from the fire at a Louisiana chlorine plant



2. Chlorine

in 2021, which has continued to affect the supply of chlorine into 2023. The long-term effect of this incident and how long negative impacts may last are unclear.

Downstream Supply Chain:

- Pharmaceutical Manufacturers
- Chemical Product Wholesalers
- Facility Maintenance Providers

Analysis: Demand from downstream suppliers is steady on average, as most buyers in the market require the product at a regular, predictable pace for operations to continue.

3. Food Products

Forecast CAGRS:

- 6 Month: 5.6%
- 1 Year: 2.8%
- 2 Year: 1.7%
- 3 Year: 1.5%

Analysis: The price of food products are expected to increase quickly in the next 6-months, and remain elevated throughout the forecast period as inflationary pressures push prices higher. Storms, demand and preference changes and other events have significantly impacted food products and the supply and availability of different products incorporated in the category, which has prompted recent price growth.

Secondary Commodities:

- Animal Feed/Products
 - Food products and grain are major components of the typical animal feed used by farmers. As animal feed prices rise, farmers raise the prices of these animal products to cover rising costs, thereby contributing to upward pressure on various food prices, including beef and dairy. The projected increase in food prices in the forecast period are expected to contribute to increases in animal feed and other related products.

Substitute Commodities:

- Barley & Other Grains
- Rice

Upstream Supply Chain:

- Fertilizer Manufacturers
 - Chemical Product Manufacturers
- Farm Product Storage & Warehousing Providers
- Tractors & Agricultural Machinery Manufacturers
 - Steel Manufacturers
- Water Supply & Irrigation Providers
 - Pipe & Tube Manufacturers



3. Food Products

Analysis: Major supply chain disruptions can result from fluctuations in the price or availability of fertilizer. Stabilization in fertilizer prices over the next three years will increase production for crops, increasing the overall supply of food prices, which will help to mitigate other demand forces pushing prices upwards.

Downstream Supply Chain:

- Animal Feed Producers
- Food & Grocery Stores
- Fruit & Vegetable Markets

Analysis: Downstream demand is steady; however, many substitutes are available to consumers and farmers alike, reducing the impact of demand shocks in the market.

4. Crude Oil

Forecast CAGRS:

- 6 Month: 5.1%
- 1 Year: 4.3%
- 2 Year: -3.1%
- 3 Year: -2.6%

Analysis: The price of crude oil is currently experiencing high volatility. Price forecasts have a high level of uncertainty from many conflicting factors unevenly impacting supply and demand. For instance, interest rate hikes of central banks worldwide and economic stagnation in China have lowered demand prospects. Meanwhile, continued sanctions against Russia oil, the world's second-largest producer, have elevated uncertainty about supply. In March 2023, oil prices declined due to the banking crisis, sparking speculations of a global recession. However, uncertainty eased when several major central banks pledged to boost liquidity. At the same time, the Union Bank of Switzerland completed its takeover of Credit Suisse, effectively preventing a total collapse that would have devastated the global banking system. After a decline in prices over the last few months, crude oil prices are projected to increase over the next year from current prices as demand increases in the summer months. An increased supply later in the forecast period is expected to translate into lower demand in 2026, resulting in future price declines for the price of crude oil.

Secondary Commodities:

- Diesel/Gasoline
 - In September, gasoline and diesel prices currently stand at \$3.803 and \$4.459 per gallon, respectively, increasing from previous data listed from July.
- Grounds Maintenance Equipment/Heavy Equipment
 - Many types of equipment rely on lubricating oils to ensure machines' longevity. Because these products are refined from crude oil, owners of these machines can expect significant volatility in future costs associated with maintaining their equipment.



4. Crude Oil

- Tires/Auto Parts
 - Oil is a primary component in tires and in manufacturing additional auto parts. Both manufacturers and buyers of tires can expect increased prices alongside the rising crude oil costs.
- Asphalt
 - As asphalt is produced from petroleum, crude oil prices and supply depend nearly entirely on the current conditions in the global oil market. As a result, asphalt prices are projected to increase in line with oil prices over the next six months.
- Industrial Consumables:
 - Industrial consumables, including motor and lubricating oils, paint, and plastic products, depend heavily on the market for crude oil, as many of these products are oil derivatives. As volatile conditions persist in the crude oil market, the supply and prices of these products are expected to shift quickly.

Substitute Commodities: N/A

Upstream Supply Chain:

- Mining, Oil & Gas Machinery Manufacturing
 - Steel Manufacturers
- Industrial Supplies Wholesalers
 - Power Tools & Other General Purpose Machinery Manufacturers
 - Pump & Compressor Manufacturers
- Metal Pipe & Tube Manufacturers
 - Steel Manufacturers
 - Iron Manufacturers

Analysis: Significant supply chain risk exists in the market for crude oil, as the market depends heavily on other risky commodities. While international sanctions on Russia have contributed to instability in the supply chain, tariffs on global steel producers can also cause disturbances, as steel and iron are critical components of most machinery used in the oil-extracting process. For example, Section 232 implemented a 25.0% tariff on steel which contributed to significant negative impacts since most steel pipes utilized in the domestic oil and gas industries are imported. As oil and gas suppliers have been facing higher prices and lower levels of availability for upstream supply chain components in recent years, overall market prices have faced an increased level of volatility as a result.

Downstream Supply Chain:

- Petroleum Refineries
- Gasoline & Petroleum Stations
- Petrochemical Manufacturers
- Rubber Product Manufacturers
- Plastics & Related Products Manufacturers

Analysis: Downstream demand shocks in the market can contribute to further strain on already low supply levels. Oil executives anticipate that recessionary fears may compromise demand from critical downstream buyers.



5. Lumber

Forecast CAGRS:

- 6 Month: 2.7%
- 1 Year: 1.5%
- 2 Year: 2.8%
- 3 Year: 2.4%

Analysis: The price of lumber is expected to increase over the forecast period, aided by a recovering US homebuilding market. Over the forecast period, prices are expected to grow at a moderate and stable rate, however, with little volatility currently expected to impact the lumber markets. According to the National Association of Home Builders (NAHB) Housing Market Index (HMI), home sales increased from a 2-year low of 31.0 in December 2022 to 44.0 in March 2023 and then expanded to an even higher 55.0 in June 2023. The HMI grew further in July 2023 to 56, and has since declined for the first time since November 2022, with an index of 50.0 registered in August 2023, indicating that conditions may begin deteriorating in the housing market slowly should this trend continue. Meanwhile, China's return to full-capacity production will also contribute to greater demand for lumber prices. Volatility in this market is expected to ease over the forecast period after almost three years of substantial monthly price fluctuations.

Secondary Commodities:

- Toilet Paper
 - As lumber prices steadily increase, personal paper products that depend on wood pulp, such as toilet paper, are forecast to grow through the forecast period.

Substitute Commodities:

- Metals/Steel
- Concrete/Asphalt
- Plastics

Upstream Supply Chain:

- Tools & Hardware Wholesalers
 - Tools & Hardware Manufacturers

Analysis: Upstream supply chain risk primarily stems from the availability of wood and lumber to be cut and sold. Weather events or wildfires can reduce the overall stock of lumber and contribute to higher prices.

Downstream Supply Chain:

- Hardware Stores
- Commercial Building Construction
- Residential Building Construction
- Municipal Building Construction
- Lumber & Building Material Stores

Analysis: The easing of extreme interest rate hikes and the return of construction activity will elevate demand for lumber, placing upward pressure on prices throughout the forecast period. With less inflation, homeowners will be greater incentivized to spend on home repair and remodeling, increasing demand for lumber and contributing to higher prices.



6. Natural Gas

Forecast CAGRS:

- 6 Month: 21.8%
- 1 Year: 10.8%
- 2 Year: -7.7
- 3 Year: -10.1

Analysis: Natural gas prices are highly volatile and difficult to predict. Prices are anticipated to increase considerably throughout the remainder of 2023 and into 2024 as slowed production growth and high usage in the summer months push prices upward. While prices are expected to grow over the forecast period, the EIA predicts high inventory levels will help keep price growth well below surges seen throughout early 2023 and 2022. In June, the EIA adjusted average Henry Hub gas prices for 2024 to 3.40/MMBtu, about 30.0% higher than their original 2023 forecast.

Secondary Commodities:

- Equipment
 - Equipment, like generators, depends on natural gas to operate and generate electricity. As a result, generator owners, including extensive facilities, universities, and other buildings, can expect operating cost increases throughout the forecast period, with natural gas prices unlikely to remain at current levels.

Substitute Commodities:

- Propane
- Biofuel
- Coal

Upstream Supply Chain:

- Mining, Oil & Gas Machinery Manufacturing
 - Steel Manufacturers
- Industrial Supplies Wholesalers
 - Power Tools & Other General Purpose Machinery Manufacturers
 - Pump & Compressor Manufacturers
- Metal Pipe & Tube Manufacturers
 - Steel Manufacturers
 - Iron Manufacturers

Analysis: Supply chain disruptions stem from low gas yields at drilling sites and fluctuations in markets for steel and iron, as these metals make up a significant portion of the machinery required to drill for natural gas. Furthermore, the war in Ukraine has compromised natural gas transportation via pipeline. As a result, European countries have turned to transporting US natural gas via tanker ships. However, infrastructure concerns and labor intensity are associated with liquefying the gas to prepare it for marine shipping. Suppliers must chill, liquify and pour the gas into specialized tankers suitable for transportation, a process that, if done incorrectly, can result in significant losses.

Downstream Supply Chain:

- Coal & Natural Gas Power Providers
- Fuel Dealers
- Fertilizer Manufacturers



6. Natural Gas

Analysis: Downstream demand for natural gas is steady. However, shifts toward green energy and the ongoing energy crisis in Europe have made demand shocks more likely in the forecast period, which is expected to limit price growth later in the forecast period.

7. Plastic

Forecast CAGRS:

- 6 Month: 2.1%
- 1 Year: 1.4%
- 2 Year: 1.8%
- 3 Year: 2.0%

Analysis: Propane, a derivative of crude oil, is used to make ethylene and propylene, which are the foundational building blocks of plastic manufacturing. Therefore, plastic prices will increase alongside rising crude oil prices in the short term. Demand for plastic will likely remain stagnant in 2023 as high interest rates and a slowdown in major economies worldwide restrict end-use markets for this commodity, such as construction and packaging. However, rising oil prices will ultimately push prices higher in this market over the next year – as oil prices decline later in the forecast period, input costs for plastics manufacturers will decline, pressuring prices downward.

Secondary Commodities:

- Medical Equipment
 - Plastic is a key input for medical equipment used in vials, beakers, implants and medical instruments. Input costs for plastic medical equipment are projected to increase in the short term, while plastic materials offer a more cost-effective solution to alternatives such as metals, glass, and ceramics.
- Disposables and Polystyrene Foam
 - Disposable bottles and bags rely on plastic, so increases in plastic prices directly impact prices for these goods. Polystyrene foam is also a plastic-based product used in packaging, as well as in automobile parts.
- PVC Pipes
 - PVC pipes are plastic-based products often used for sewage pipes and water mains for irrigation.
- Consumer Electronics
 - Smartphones and other consumer electronics use a wide variety of plastic products, including Polycarbonate (PC), Acrylonitrile Butadiene Styrene (ABS), and Polymethyl Methacrylate (PMMA). These plastics are used for display frames, haptic feedback cushioning, and mounting frames, among other purposes.

Substitute Commodities:

- Paper & Paperboard
- Bioplastics
- Glass



7. Plastic

- Platinum Silicone
- Ceramics

Upstream Supply Chain:

- Petrochemical Manufacturers
 - Petroleum Refiners
- Industrial Machinery & Equipment Wholesalers
 - Steel Manufacturers
 - Iron Manufacturers
- Inorganic & Organic Chemical Manufacturers
 - Steel Manufacturers
- Resin Producers
 - Coal Miners

Analysis: Petrochemicals, such as ethylene and propylene, are key inputs for plastic manufacturing and are produced from propane and butane, both of which derive from crude oil refining. Thus, increases in oil prices will pressure plastics prices upwards.

Downstream Supply Chain:

- Plastic Bottle Manufacturers
- Plastic Film, Sheet & Bag Manufacturers
- Plastic Pipe & Part Manufacturers
- Urethane Foam Manufacturers
- Plastic Product Wholesalers
- Plastic Toys
- Adhesive Manufacturers

Analysis: Increasing costs in resin and oil, thus plastic, will push prices higher for plastic-based products, including plastic containers, bags, and bottles. The price of polyolefins, used in e used in various products, including clothing, carpet, and roofing materials, is also rising.

8. Semiconductors

Forecast CAGRS:

- 6 Month: -0.4%
- 1 Year: -3.3%
- 2 Year: -3.2%
- 3 Year: -2.9%

Analysis: Rising logistics prices, pandemic-induced shortages, and high demand have pressured prices of semiconductors upwards from 2020 to 2021. However, with reduced demand for electronic products, increased capital costs and decreased earnings, prices are projected to decrease over the next six months. In response, numerous chip companies have been initiating cost-saving measures, including downsizing staff and deferring expenditure on additional capacity. However, due to the high level of product specialization for semiconductors, not all secondary commodities are impacted equally – while



8. Semiconductors

some industries have an oversupply of semiconductors, others are still experiencing shortages. While semiconductor prices are projected to bottom out in 2023 and into 2024, demand is expected to rebound throughout 2024 as the market recovers and demand once again exceeds supply.

Secondary Commodities:

- Cell Phones
 - Samsung Electronics, the largest producer of chips and smartphones, reported a 96% plunge in second-quarter operating profit due to an ongoing chip glut that began in Q4 of 2022. The oversupply of semiconductors amid reduced consumer demand has reduced the costs of smartphones, while an oversupply of cellphones has reduced enterprise demand for semiconductors – placing downward pressure on prices.
- Computers, Copiers, Web Cameras and Smartboards
 - With more consumers and businesses looking to save money amid rising costs, demand for electronic products has fallen, placing downward pressure on prices in this market. As semiconductor chips used in cell phones, PCs and other devices make up half the semiconductor industry, the oversupply of these chips has pressured forecasts to the downside over the next six months.
- Vehicles
 - Unlike the other secondary commodities, semiconductors used in vehicles will continue to remain in short supply through the end of 2023. As newer vehicles require more semiconductors than before, demand for vehicle semiconductors continues to exceed supply, especially as automotive manufacturers ramp up production in 2023 to meet pent-up demand for new vehicles.

Substitute Commodities: N/A

Upstream Supply Chain:

- Semiconductor Machinery manufacturers
 - Steel Manufacturers
 - Iron Manufacturers
 - Aluminum Manufacturers
- Copper Rolling, Drawing & Extruding Suppliers
 - Copper Miners
- Chemical Product Manufacturers
 - Silicon Suppliers

Analysis: Silicon production slowed down during the past three-year period, despite increasing demand for digital products from employers and consumers alike during the pandemic. To switch to cleaner energy, China, the world's leading supplier of silicon, has aimed to reduce its coal consumption by rationing the electricity use of industrial suppliers, including silicon suppliers.

Downstream Supply Chain:

- Consumer Electronics Stores
- Computer Manufacturers
- Wireless Telecommunication Manufacturers



8. Semiconductors

- Automobile Electronics Manufacturers

Analysis: The oversupply of chips is currently pressuring prices downwards for products downstream in the supply chain. Despite the increased supply of products, more complex and advanced semiconductors may not be as readily available.

9. Steel

Forecast CAGRS:

- 6 Month: -16.3%
- 1 Year: -14.6%
- 2 Year: -11.3%
- 3 Year: -7.3%

Analysis: The world price of steel is anticipated to fall over the next three years, with US manufacturers set to increase steel production to satisfy downstream demand. Rising production should alleviate upward pressure on prices caused by the shortage of steel over the last three-year period, which caused the price of steel to rise 200.0% in 2021 alone. In the United States, demand for steel will be limited in 2023 and into early 2024 as many large infrastructure and construction projects have been tabled until interest rate hikes cool off. Slowing manufacturing and construction activity in China, which accounts for roughly half of global steel consumption, will continue to limit steel demand and pressure prices downwards.

Secondary Commodities:

- Grounds Maintenance Equipment
 - Grounds maintenance equipment, such as shears, is made of hardened carbon or chromium steel.
- Heavy Equipment
 - Steel is the backbone for scaffolding, cranes, bulldozers and other heavy equipment.
- Industrial MRO Supplies
 - Declining steel prices have placed downward pressure on prices for repair tools and safety equipment.
- Medical Equipment
 - Medical equipment includes a wide range of steel products, such as medical carts, wheelchairs, hospital beds, IV stands, surgical tools, medical syringes and needles, surgical screws, and plates, among a host of other steel-based products.
- Vehicle & Vehicle Parts
 - Steel is a key component in vehicles and vehicle parts. As the supply of steel increases, the production and supply of vehicles and vehicle parts will increase as well.

Substitute Commodities:

- Aluminum
- Wood
- Stone
- Concrete



9. Steel

- Plastic

Upstream Supply Chain:

- Iron Ore Miners
- Copper, Nickel, Lead & Zinc Miners
- Industrial Machinery & Equipment Manufacturers
 - Steel Manufacturers
- Utilities & Energy Providers
 - Coal Miners

Analysis: Lower energy prices throughout the forecast period and reduced demand from machinery manufacturers and construction will continue to pressure prices downwards for steel. As inflation and interest rates remain high, prices are anticipated to continue falling rapidly in the short term.

Downstream Supply Chain:

- Constructors
- Metal Pipe & Tube Manufacturers
- Car & Automobile Manufacturers
- Steel Rolling & Drawers
- Ferrous Metal Foundry Products

Analysis: Downstream demand for steel includes products and services that rely on steel and steel-based products as a key input. This includes industrial and construction markets that use steel in heavy equipment and structures, such as shipbuilding, oil and gas refining, and vehicle production.

10. Consumer Paper Products

Forecast CAGRS:

- 6 Month: 3.6%
- 1 Year: 2.8%
- 2 Year: 2.7%
- 3 Year: 2.6%

Analysis: Consumer paper products are expected to move in line with lumber prices over the forecast period, which shows steady growth over the next three years. Paper products are expected to continue increasing in price as wood pulp remains highly sought after and in low supply; however, supply levels of lumber and pulp have recovered from peak levels that occurred in early 2023 and 2022 due to the Russia-Ukraine crisis.

Secondary Commodities: N/A

Substitute Commodities:

- Paper alternatives (Recycled materials, bamboo, etc.)

Upstream Supply Chain:

- Paper Mills



10. Consumer Paper Products

- Wood Pulp Mills

Analysis: Upstream supply chain risk depends entirely on the stability of the lumber and wood pulp markets, as all consumer paper products will be produced directly from these.

Downstream Supply Chain:

- Office Stationery Wholesalers
- Printing Suppliers
- Paper and Paper Product Wholesalers

Analysis: Consumer paper products typically go to printing providers, office supply wholesalers, and other paper and paper wholesalers who supply products to office buildings, hotels, and other large commercial spaces.

11. XaaS

Forecast CAGRS:

- 6 Month: 3.9%
- 1 Year: 2.3%
- 2 Year: 1.3%
- 3 Year: 1.1%

Analysis: Software-as-a-Service and Infrastructure-as-a-Service prices are projected to increase in the short term, as several major companies have already announced inflation-based price increases to their service offerings, including IBM, Microsoft, SAP, and Oracle. Soaring energy costs have also fueled price increases from software publishers. Over the next three-year period, a competitive labor market will continue to prompt suppliers to raise wages to attract new workers, while an increasing commitment for top suppliers to meet environmental sustainability objectives will also increase costs, which will be passed on to buyers.

Substitute Commodities:

- On-Premises Software
- In-House IT
- Open-Source Software

Upstream Supply Chain:

- Software Engineers & Developers
- Internet Service Providers
- Energy Suppliers
- Third-Party Software Suppliers
- IT Hardware Manufacturers

Analysis: As the costs of servers, storage, and networking hardware rise due to inflation, supply-chain disruptions, and higher manufacturing costs, service providers must shoulder these costs and pass them on to clients. The tight labor market, specifically in the tech sector, will continue to push XaaS prices higher.



11. XaaS

Downstream Supply Chain:

- Businesses & Corporate Entities
- Government Agencies
- Tech Start-Ups
- Healthcare Institutions
- Education Institutions
- Retailers
- E-Commerce Platforms

Analysis: Demand for XaaS will increase due to its scalability and cost-effectiveness, ultimately supporting price increases in this market.

12. Vehicles

Passenger Vehicles

Forecast CAGRS:

- 6 Month: 4.3%
- 1 Year: 2.7%
- 2 Year: 3.3%
- 3 Year: 4.1%

Analysis: Passenger vehicles are expected to continue increasing in price over the following three years; however, price growth is expected to slow temporarily as many manufacturers deal with oversupply; however, luxury vehicles are expected to be unaffected by these declines, keeping the overall price growth positive. Electric vehicle manufacturers are expected to face the most significant price disruptions as high levels of supply combined with weakening demand for these vehicles due to rising and highly volatile energy costs are expected to push consumers away from electric alternatives soon. Additionally, as interest rates remain elevated, consumers may be deterred from financing car purchases.

Fleet Vehicles

Forecast CAGRS:

- 6 Month: 6.6%
- 1 Year: 5.9%
- 2 Year: 5.5%
- 3 Year: 3.4%

Analysis: Fleet vehicles are expected to continue increasing in price over the following three years, moving in line with expectations from passenger vehicles. Fleet vehicles are expected to be impacted less by oversupply as demand remains elevated and continues to meet the supply set by suppliers.



12. Vehicles

Secondary Commodities:

- Gasoline/Diesel:
 - In September, gasoline and diesel prices currently stand at \$3.803 and \$4.459 per gallon, respectively, increasing from previous data listed from July.
- Tires
 - Tires and tire sales depend significantly on passenger vehicle and car sales. As car prices continue to decline, tire prices are expected to align with these changes.

Substitute Commodities:

- Public transportation
- Air transportation

Upstream Supply Chain:

- Auto Parts Manufacturers
 - Iron & Steel Manufacturers
- Car Battery Manufacturers
 - Copper, Nickel, Lead and Zinc Mining

Analysis: Supply chain risk is significant as the market depends on both iron and steel manufacturing and mining for metals such as lead and zinc, both of which experience high levels of volatility. Supply chain disruptions can lead to long-term shortages of specific parts in the vehicle manufacturing process, leading to temporary price spikes to particular types of cars that depend more heavily on a product.

Downstream Supply Chain:

- Automobile Wholesalers
- Car Rental Dealers
- Fleet Vehicle Suppliers

Analysis: New passenger vehicles are typically sold directly to a consumer from an automobile wholesaler or dealer to a car rental agency to rent to customers or to fleet vehicle suppliers to be provided to large corporations as a part of their fleet. As vehicles are a crucial aspect of day-to-day life for many customers and businesses, downstream demand is relatively stable and only impacted significantly by large-scale events.



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