CFRA

# Industry Surveys

## Automobile Manufacturers

NOVEMBER 2022

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## CHARTS & FIGURES



## NEW THEMES

***What's Changed:*** The chip shortages and supply chain issues have caused both new and used vehicle prices to jump dramatically in recent months. We expect the issues to persist for the rest of 2022 and into 2023. See page 13.

***What's Changed:*** China's National Development and Reform Commission had lifted all foreign ownership limits on automakers operating in China in 2022. This has led to several large-scale foreign direct investments taking place this year. Check out page 16.

***What's Changed:*** On August 16, President Biden signed the Inflation Reduction Act into law. In order for consumers to claim the full $7,500 federal EV tax credit, there are some requirements that changed and made the tax credit more restrictive. Read more on pages 20-21.

# EXECUTIVE SUMMARY

From China to Mexico and South Carolina to Italy, automobile manufacturers churn out passenger cars, heavy-duty trucks, and everything in between to consumers around the world. Global supply chains help distribute the workload, and while newer entrants attempt to gain a foothold, the more established names are working feverishly to adapt. CFRA has a neutral outlook on the Automobile Manufacturers industry, reflecting a view that prices will remain near record highs, but volumes and costs will continue to be pressured by weak consumer discretionary spending, chip shortages, and inflationary impacts. We see global auto sales declining roughly 6% in 2022 before rising 3% in 2023 (after a 5.0% increase in 2021), with growth driven by China, the world's largest consumer, where we expect sales growth of 1.8% this year and 4.0% next year. Here are the key themes and our outlook for the remainder of 2022 and 2023.

### *Signing of Inflation Reduction Act Creates Electric Vehicle Winners and Losers*

On August 16, 2022, President Joe Biden signed the Inflation Reduction Act into law, and with the stroke of a pen, 70% of the 72 electric vehicle (EV) models currently available for purchase in the U.S. (which include all battery, plug-in hybrid, and fuel cell EVs) became instantly ineligible for the $7,500 federal tax credit on EV purchases. In order for consumers to claim the EV tax credit, there are several requirements that changed and made the tax credit more restrictive. These requirements are: (1) final assembly of the vehicle must take place in North America; (2) the vehicle's MSRP needs to be below $55,000 for cars and below $80,000 for trucks and SUVs; and (3) EV battery materials must be sourced from the U.S. or free-trade partners, with phase-in starting in 2024. The bill also includes a new federal tax credit of $4,000 for used EVs and income caps for consumers to claim the tax credits (a buyer's adjusted gross income cannot exceed $150,000 for individuals or $300,000 for joint filers). Relatively speaking, we view Tesla as the biggest winner from the legislation, followed by General Motors and Ford, while most EV upstarts and major European and Asian automakers stand to lose from the bill. For Tesla, most versions of their Model Y and Model 3 (by far the industry's two bestselling EVs) become eligible for the $7,500 tax credit effective January 1, 2023. Previously, all Tesla vehicles had phased out of tax credit eligibility. EVs accounted for only 3.1% of new vehicle sales in the U.S. and 8.3% worldwide in 2021.

### *New Vehicle Inventory Shortages Easing*

Over the last few months, new vehicle inventory shortages, which have plagued the market over the past year, have started to ease. While domestic and global auto production remains weak due to ongoing shortages of semiconductors and other parts, sales have fallen by an even greater degree as prices hit record highs and consumers pull back on big ticket purchases. Inventory levels are beginning to recover from the record low levels of 2021. In the first eight months of 2022, monthly U.S. new vehicle sales averaged only about 1.1 million units, down from 1.4 million in the first eight months of 2019, the last full year prior to the pandemic. At the end of August, U.S. new vehicle inventories stood at more than 29 days of supply, a 14-month high but well below the historical average of 59 days. Importantly, automakers book their sales when the vehicle leaves the factory, so we think an upcoming dealer re-stocking cycle has positive implications for automakers' near-term sales and earnings.

### *New Vehicle Prices Continue to Hit Record Highs*

Driven by the inventory shortages over the past year and cost-push inflation, the average U.S. new vehicle sales price hit a record high of $48,301 in August (up 11% Y/Y and 22% from two years ago). The combination of record-high new vehicle prices, rising interest rates and the impact of inflation on household budgets is stretching the limits of consumer affordability, particularly for lower-income consumers. Experian recently reported that the average monthly new vehicle loan payment hit $667 in Q2 2022, up nearly 15% from $582 one year earlier. Despite the price run-up, we don't expect a surge in auto loan defaults unless there is a significant deterioration in unemployment/household income levels.

# AUTOMOBILES MANUFACTURERS

*Outlook: Neutral*

## MARKET SHARE BREAKDOWN

*(vehicles sold by company in 2021)*

| RANK NO. | COMPANY NAME | MARKET SHARE |
|---|---|---|
| 1 | Toyota | 14.3% |
| 2 | Volkswagen | 13.9% |
| 3 | Hyundai-Kia | 10.5% |
| 4 | GM | 9.9% |
| 5 | Stellantis* | 9.6% |
| 6 | Honda | 7.0% |
| 7 | Nissan | 6.4% |
| 8 | Ford | 6.2% |
| 9 | Renault | 4.2% |
| 10 | BMW | 4.0% |

*FCA and PSA completed a merger to form Stellantis on January 18, 2021.
Source: Factorywarrantylist.com.

## ETF FOCUS

| | | | |
|---|---|---|---|
| DRIV<br>Global X Autonomous & Electric Vehicles | AUM ($M)<br>861.01 | Expense Ratio<br>0.68 |
| IDRV<br>Ishares Self-Driving Ev and Tech | AUM ($M)<br>416.73 | Expense Ratio<br>0.47 |
| FTXR<br>First Trust NASDAQ Transportation | AUM ($M)<br>72.19 | Expense Ratio<br>0.6 |
| HAIL<br>SPDR S&P Kensho Smart Mobility | AUM ($M)<br>71.08 | Expense Ratio<br>0.45 |
| CARZ<br>First Trust NASDAQ Global Auto Index | AUM ($M)<br>42.67 | Expense Ratio<br>0.70 |

## BY THE NUMBERS

**$48,301**
The average U.S. new vehicle sales price as of March 2022 (+10.8% Y/Y)

**29**
Days' supply of U.S. new vehicle inventories in August 2022 (highest level in 16 months)

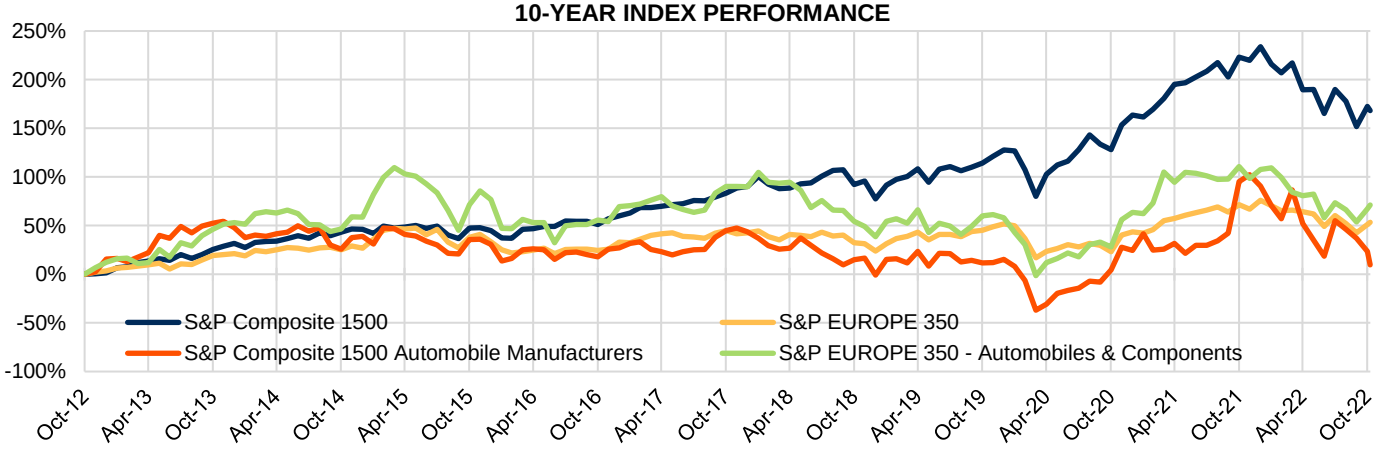
**12.2 years**
The average age of vehicles on the road in the U.S., in years (a record high)

**50**
Number of new electric vehicles of various models expected to debut in the U.S. by 2024

**3.1%**
EV's share of U.S. new vehicle sales in 2021 (up from 2% in 2020)

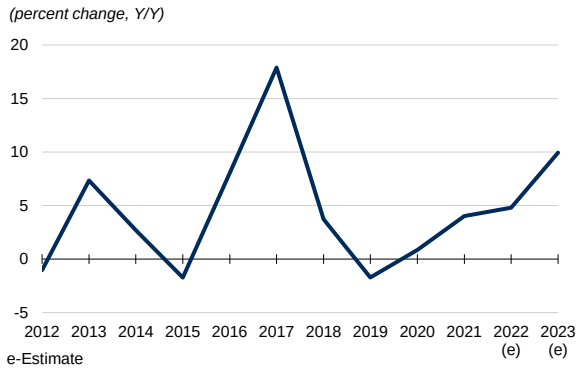
**8.3%**
EV's share of global new vehicle sales in 2021 (up from 4.2% in 2020)

## 10-YEAR INDEX PERFORMANCE



# FINANCIAL METRICS

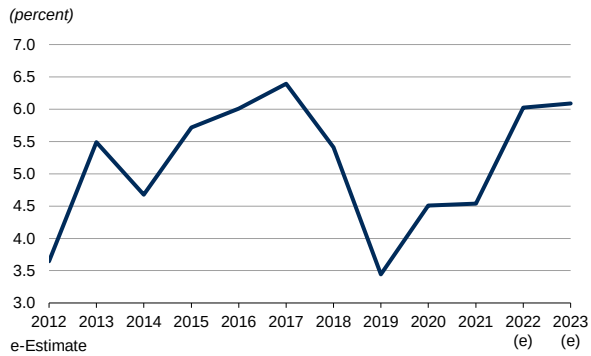
## Median Revenue Growth




e-Estimate
Source: CFRA, S&P Global Market Intelligence.

- We expect industry revenues to grow 4.8% in 2022 and 9.9% in 2023. We think revenue growth will remain essentially flat in 2022 as costs and volumes continue to be pressured by weak consumer discretionary spending and inflationary impact. The significant growth in 2023 will be driven by China, in our view.
- Revenue growth for the industry is expected to continue to gain momentum despite growing headwinds from the surging inflation rate and interest rate hikes.

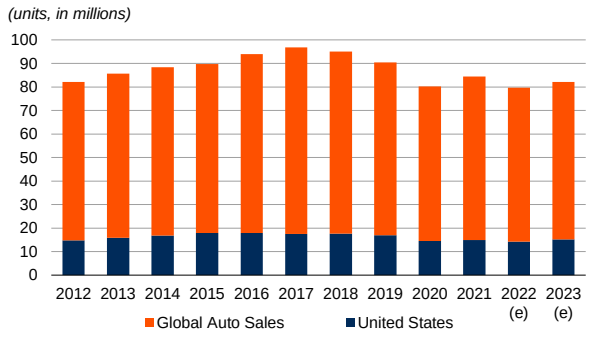
## Median EBIT Margin




e-Estimate
Source: CFRA, S&P Global Market Intelligence.

- Industry median operating margin is estimated to grow by 80 basis points (bps) in 2022 and will remain flat in 2023, after stagnating in 2021 due to improved capacity utilization rates, higher price realizations from vehicle mix, and benefits from cost cuts.
- While the Covid-19-led recession did not do much to deteriorate the already-battered margin, the same could not be said for the industry's downline in 2020. EPS recovered by 185% in 2021 after taking a 52.2% hit in 2020, and is expected to further grow by around 24%% in 2022 before decline slightly in 2023.

## Global Automobile Sales

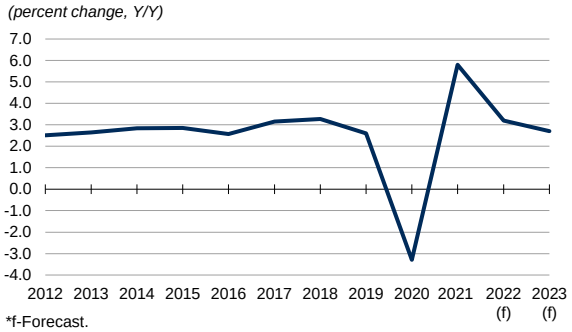



Source: CFRA, International Organization of Motor Vehicle Manufacturers.

- We project global automobile sales will decline by 6.0% in 2022 before increasing by 3.0% in 2023 after a 5.0% increase in 2021, but production and sales growth have been hampered by semiconductor shortages and supply chain issues, which are likely to persist for some time.
- We see rebounding global vehicle sales volume in 2023, driven by the world's largest auto market of China.

# KEY INDUSTRY DRIVERS

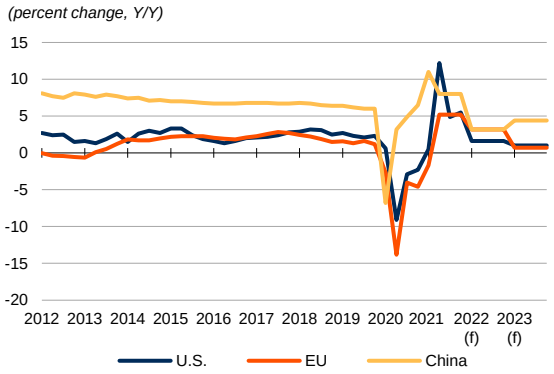
## Global GDP Growth




*f-Forecast.
Source: The World Bank.

- The World Bank currently forecasts a slowdown in global GDP recovery to 3.2% in 2022 and 2.7% in 2023 after a significant rebound of 5.8% in 2021.
- The deceleration in growth is expected as the twin perils of high inflation and slowing economic growth, or stagflation, hit the global economy.

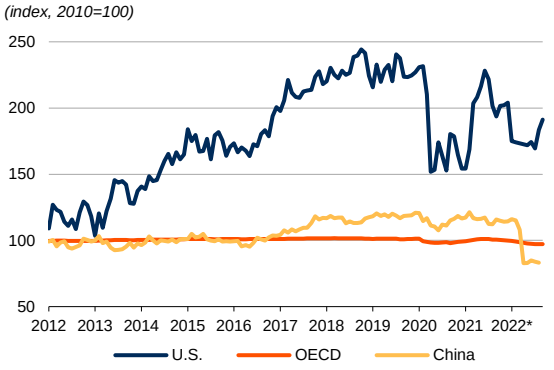
## Real GDP Growth




f-Forecast.
Source: Bureau of Economic Analysis, CEIC, The World Bank.

- Looking at the world's three largest auto markets, the World Bank currently projects the following GDP growth:
  - China: 3.2% in 2022; 4.4% in 2023.
  - E.U.: 3.2% in 2022; 0.7% in 2023.
  - U.S.: 1.6% in 2022; 1.0% in 2023.
- We expect global GDP growth to remain pressured in 2022 and 2023, with the weakest growth since the global financial crisis. This is due to several ongoing headwinds (inflation, the Ukraine-Russia war, and weakening consumer discretionary spending).

## Consumer Confidence Index




*Data for U.S. and OECD countries through September, China through August.
Source: The Conference Board, CEIC.

- The Consumer Confidence Index for all three economic regions has been on the rise after a steep drop due to the global pandemic that hit the world in 2020, which caused considerable damage to consumer sentiment and discretionary spending.
- In 2022, the index gradually dropped for China and OECD member countries amid tightening zero-Covid-19 policy for the former and the Ukraine-Russia war and soaring inflation for the latter. The index for the U.S. gradually improved amid a strong labor market.

# INDUSTRY TRENDS

**Industry Outlook and Profitability Overview**

We have a neutral fundamental outlook for the Automobile Manufacturers sub-industry for the next 12 months. Our outlook reflects expectations that auto prices will remain near record-high levels and demand will continue to recover in most major markets. However, in our view, growth will be tempered by a combination of semiconductor shortages, supply chain disruptions, cost inflation, and rising interest rates. Overall demand is growing but balanced by chip shortages and supply chain issues, pressuring inventory levels and hurting sales volumes and unit costs.

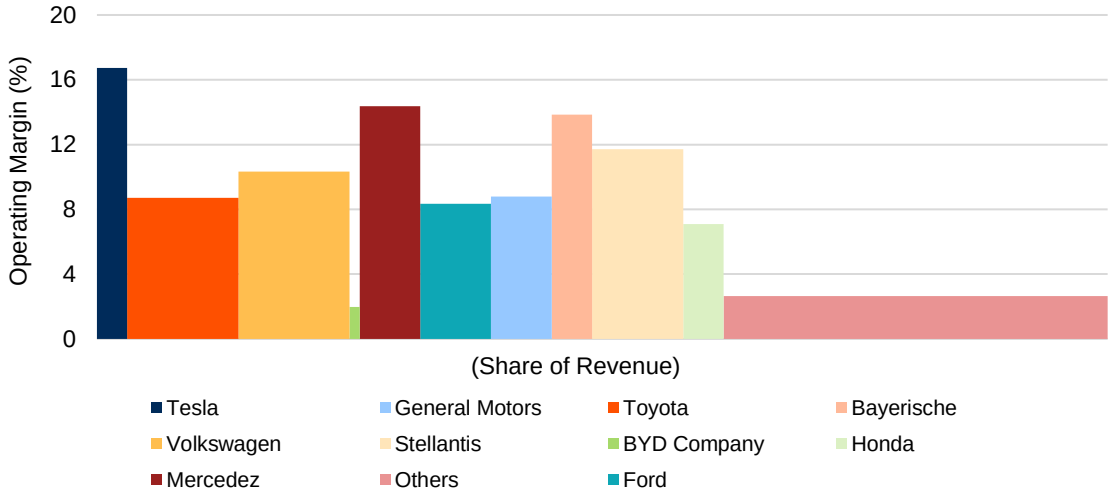
We estimate U.S. light vehicle sales will decline by 13.2% to 13.0 million units in 2022 from the 2021 total of 14.95 million (+3.3% Y/Y). By comparison, the pre-pandemic light vehicle sales level in the U.S. was just under 17.0 million units in 2019. Prior to 2019, U.S. auto sales had posted an unprecedented streak of strength with four consecutive years above 17.0 million units.

On the positive side, GDP growth, low unemployment rates, and relatively low (but rising) interest rates should help support sales volumes. Currency swings will also likely impact companies' profitability, possibly benefiting companies with significant non-U.S. manufacturing exposure if the U.S. dollar depreciates against other major currencies. We think margins will benefit from draconian cost cuts (opex and capex) implemented during the pandemic and increasing production will likely help with fixed cost absorption, but rising labor and raw materials costs are growing concerns.

We think margins will benefit from a combination of record-high new vehicle price realizations (now over $48,000 in the U.S.) and cost cuts implemented during the course of the Covid-19 pandemic. However, chip shortages, supply chain disruptions, rising labor and raw materials costs, higher gasoline prices, and expected interest rate increases are major concerns. We expect investments in electric and autonomous vehicle programs to remain a drag on bottom line results for most companies. One major secular trend over the last several years has been the increasing popularity of light duty vehicles – a category that includes pickup trucks, SUVs, and crossovers – and the waning popularity of passenger cars such as sedans and compact vehicles. Light duty vehicles accounted for 77.6% of total new vehicles sold in the U.S. in 2021, a percentage that was up from only 52.2% in 2011, according to National Automobile Dealers Association data. The average vehicle on the road in the U.S. was 12.2 years old in 2022, according to IHS Markit, an industry record that will likely help support retail and parts demand. Many companies resumed dividend payments and/or share repurchases after a Covid-19-related pause in 2020.

These are innovative times for the industry; increasing vehicle electrification combined with the rise of ride-sharing and ride-hailing services are dramatically changing how the industry and consumers operate, and how they will perform in the future. Both traditional and non-traditional automobile makers have announced plans to bring fully autonomous vehicles to market in the next decade.

**REVENUE SHARE MAP OF GLOBAL AUTOMOBILE MANUFACTURING INDUSTRY***




* For the last 12 months ended third quarter of 2022.
Source: CFRA, S&P Global Market Intelligence.

Despite having one of the lowest profit margins, automobile manufacturers contributed a reasonably large amount of revenue – a combined $2.04 trillion in the last 12 months for the 63 largest automakers covered in this survey – to their respective nation's GDP.

**The Major Players**

The automotive industry is a significant contributor to the world's economy and highly dominated by companies in the U.S., EU, and various parts of Asia, such as Japan and China. The following is a summary of the major original equipment manufacturers (OEMs) in the world.

**MAJOR AUTOMAKERS BY REGION**

| COMPANY | 2021 SALES *(in million units)* | BUSINESS DESCRIPTION |
|---|---|---|
| **European Union** | | |
| 1) Volkswagen (Germany) | 8.9 | Volkswagen AG (VW) was founded in 1937 and is headquartered in Wolfsburg, Germany. It operates as a subsidiary of Porsche Automobile Holding SE. VW's passenger cars segment develops vehicles and engines while producing and selling passenger cars and related parts. Its commercial vehicles segment develops, produces, and sells light commercial vehicles, trucks, and buses. VW offers parts and associated services, while its power engineering segment develops, produces, and sells large-bore diesel engines, turbo compressors, industrial turbines, and chemical reactor systems, as well as gear units, propulsion components, and testing systems. |
| 2) Stellantis N. V.* (Netherlands) | 6.1 | The merger between FCA and Peugeot S.A. (PSA), officially agreed upon in December 2019, was to create the world's fourth-largest carmaker. On December 21, 2020, the European Commission announced its approval of the merger. The merger was approved on January 4, 2021 by the shareholders of both FCA and PSA, and the deal was completed on January 16, 2021. PSA merged with and into Fiat Chrysler Automobiles N.V., with Fiat Chrysler as the surviving company of the merger. The combined company, renamed as Stellantis N.V., is headquartered in Amsterdam. |
| 3) Renault (France) | 2.7 | Renault was founded in 1898 and is based in Boulogne-Billancourt, France. The company designs, manufactures, sells, and distributes vehicles. It offers passenger and light commercial, and electric vehicles primarily under the Renault, Dacia, Renault Samsung Motors, Alpine, and LADA, as well as under the Nissan, Datsun, and Infiniti brands. The company also sells powertrains and used vehicles, as well as spare parts, and provides various services. |
| 4) Daimler AG (Germany) | 2.1 | The Mercedes-Benz Group AG (previously named Daimler-Benz, DaimlerChrysler, and Daimler) is a German multinational automotive corporation headquartered in Stuttgart, Baden-Württemberg, Germany. In February 2022, Daimler was renamed Mercedes-Benz Group following the demerger and the successful stock market debut of Daimler Truck. The Mercedes-Benz Group's marques are Mercedes-Benz for cars and vans (including Mercedes-AMG and Mercedes-Maybach) and Smart. |

*FCA and PSA completed a merger to form Stellantis on January 16, 2021.
Source: CFRA, S&P Global Market Intelligence, OICA, Factorywarrantylist.com.

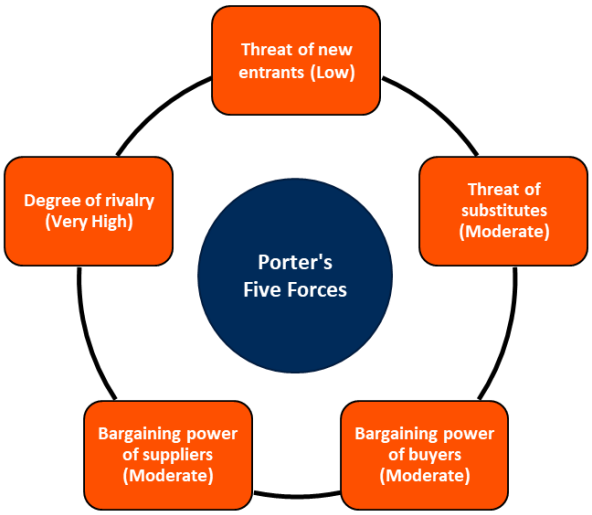
**MAJOR AUTOMAKERS BY REGION (CONTINUED)**

| | COMPANY | 2021 SALES *(in million units)* | BUSINESS DESCRIPTION |
|---|---|---|---|
| **North America** | | | |
| 1) | General Motors | 6.3 | General Motors Company designs, builds, and sells cars, trucks, crossovers, and automobile parts worldwide. The company also sells trucks, crossovers, and cars to dealers for consumer retail sales, as well as to fleet customers. Additionally, it offers safety and security services for retail and fleet customers. Further, the company provides automotive financing services. It also operates an online new vehicle store. |
| 2) | Ford | 3.9 | Ford Motor Company was founded in 1903 and is based in Dearborn, Michigan. The company designs, manufactures, markets, and services a range of Ford cars, trucks, sport utility vehicles, and electrified vehicles worldwide. The Automotive segment sells Ford and Lincoln vehicles, service parts, and accessories. The Mobility segment designs and builds mobility services as well as provides self-driving systems development and vehicle integration, autonomous vehicle research and engineering, and autonomous vehicle transportation-as-a-service network development services. |
| **Asia** | | | |
| 1) | Toyota (Japan) | 9.6 | Toyota Motor Corporation was founded in 1933 and is headquartered in Toyota, Japan. It designs, manufactures, assembles, and sells passenger vehicles, minivans and commercial vehicles, and related parts and accessories. The company offers hybrid cars, fuel cell vehicles, and conventional engine vehicles. Further, the company engages in the IT-related businesses comprising operation of a web portal for automobile information known as GAZOO.com. |
| 2) | Hyundai-Kia (S. Korea) | 6.7 | Hyundai Motor Company was founded in 1967 and is headquartered in Seoul, South Korea. It manufactures and distributes motor vehicles and parts worldwide. In addition, the company offers trucks, buses, vans, special-CVs, and engines; vehicle financing, credit card processing, marketing, engineering, and insurance services. It also manufactures trains and operates a football club. Further, the company is involved in real estate development, research and development, as well as investment activities. Hyundai Motor Company has a strategic partnership with Rimac Automobili to develop electric vehicles. |
| 3) | Honda (Japan) | 4.5 | Honda Motor Co., Ltd. was founded in 1946 and is headquartered in Tokyo, Japan. It develops, manufactures, and distributes motorcycles, automobiles, power products, and other products worldwide. The company's automobile business segment offers passenger cars, light trucks, and mini vehicles as well as vehicles powered with alternative fuel, such as ethanol, battery electric, and fuel cell vehicles. Its power product and other businesses segment manufactures and sells power products for various purposes, which also includes the HondaJet aircraft. |

Source: CFRA, S&P Global Market Intelligence, OICA, Factorywarrantylist.com.

## Competitive Environment

Below, we used Porter's Five Forces framework as a tool to analyze the competitive environment of the Automobiles industry.




**1) Threat of new entrants or new entry (Low)**
The high initial capital, high cost of doing business, and tremendous brand development cost may deter most competitors from entering the industry. Large automakers had also long associated their brands to patriotism, and that would be something hard for new entrants to replicate.

**2) Threat of substitutes (Moderate)**
The industry experiences increasing effects from substitutes that may include public transportation or other modes of transportation. The proliferation of e-hailing services, rising environmental awareness, and increasing connectivity of public transportation may also pose threats to car ownership. Switching costs, however, may be high for most people as owning a car is still the easiest way to travel; buyers are also less inclined to use other modes of transportation, while still paying down their car loans.

**3) Bargaining power of buyers (Moderate)**
The moderate bargaining power of buyers stems mainly from a few factors. First, they face low switching costs to another automaker. Next, the moderate size of individual purchases means that a small change in purchasing trends would have a significant effect on revenue. Lastly, the wide range of substitutes means that rapid development of other modes of transportation and proliferation of the Internet of Things (IoT) could disrupt firms' profitability.

**4) Bargaining power of suppliers (Moderate)**
Suppliers support this industry with the availability of raw materials and assembled parts needed for business operations. Given the moderate overall supply and population of suppliers, they do have considerable but limited bargaining power over big automakers. However, a low degree of vertical integration means many suppliers do not have control of sales of their product to automakers.

**5) Degree of rivalry/competition (Very High)**
The degree of rivalry and competition has been known to be exceptionally high. Industry players tend to offer very similar products. Furthermore, switching costs are low to none for the buyers as they can easily switch from one automaker to another. Players would have to continually innovate to ensure they have products with the latest technologies to offer. The industry's high exit barriers mean firms would rather compete than shut their businesses.

# Operating Environment

**'Chip & Ship' Issues Likely to Linger a While Longer**

Recently, it has become clear that the primary headwinds that plagued the global auto industry in 2021 – semiconductor shortages (chips) and supply chain issues (ships) – appear likely to persist well for the balance of 2022 and into 2023. Automakers are doing several things to navigate the semiconductor shortages and supply chain issues. As it relates to chips, auto manufacturers are operating fewer shifts or temporarily idling certain factories, partially assembling vehicles minus the parts that require semiconductors as they await the delivery of additional supplies, and prioritizing the production of their more profitable vehicle models over others. Regarding the supply chain issues, companies are entering into agreements with additional suppliers, taking steps to vertically integrate their supply chains, and resorting to more expensive and unconventional transportation means to help maintain production levels.

The chip shortages and supply chain issues have caused both new and used vehicle prices to jump dramatically in recent months. In fact, the average U.S. new vehicle sales price stood at $48,301 in August (+11% Y/Y and +22% in the last two years), according to Kelly Blue Book. Surging prices and lack of availability are having a significant negative impact on sales volume. The tight supply situation has created an environment where buyers have very little negotiating power with dealers. In fact, in each of the last nine months, the average price paid by consumers for a new vehicle purchase was above MSRP. Another trend driving prices higher is mix, *i.e.,* the increasing popularity of higher-priced trucks and SUVs.

Despite the steep drop in new vehicle sales volume so far in 2022, U.S. new vehicle inventories remain near record-low levels, as production has been sluggish as well. In fact, U.S. dealer inventories stood at 29 days' supply in August, well below the monthly average of 59 days since the beginning of 2015 and only modestly above the record low of 24 days from July 2021. Looking at absolute stockpiles, U.S. dealership volumes stood at 1.27 million units, above the record low of 0.97 million units reached in September 2021 but significantly below monthly average inventory levels of 3.17million units since January 2015.

The jump in used vehicle prices over the last several months has been even more dramatic than in the new car market. The Manheim Index, a widely used index of wholesale used vehicle prices, has jumped by 29% in the past two years as of August. According to industry sources, rental car companies for the first time have become major buyers of used cars at auction instead of sellers, because they can't get enough new vehicles and are desperate to fill their fleets. Additionally, dealers have been buying used cars to fill their lots. It's a seller's market and it doesn't appear that the situation will change anytime soon. The only silver linings are that interest rates remain low and trade-in values are very favorable, helping bring down the cost for buyers who have a trade-in, but concerns about potential rate hikes are growing.

The origin of the chip shortages and supply chain issues dates back to the onset of the Covid-19 pandemic in early 2020, which led to the temporary idling of auto manufacturing plants around the world. When the factories shut down, wafer and chip suppliers diverted shipments to other end-markets, such as consumer electronics, where demand was boosted by stay-at-home trends and the purchase of products for home office use. While auto production collapsed, demand surged as ridesharing and public transportation usage plummeted. The pandemic also created many first-time car buyers, and a significant population shift from cities to more suburban and rural areas occurred, where people needed their own mode of transportation. Several supply-related issues have exacerbated the problems, catching the industry off-guard.

Interestingly, the surge in global electric vehicle (EV) production is also partly to blame for the severity of the chip shortages. According to AlixPartners, the average vehicle today contains 1,400 semiconductors,

but the number of chips per vehicle can vary widely. For example, a smaller, non-luxury vehicle, such as the Ford Focus, uses roughly 300 chips, while the Ford Mustang Mach-E EV contains about 3,000 chips. Semiconductor content in automobiles has also grown dramatically over the last several years, and chips are used across a variety of parts categories spanning connectivity, autonomy, powertrain/vehicle dynamics, body/comfort, and infotainment systems. Ford Europe chairman Gunnar Herrmann said the company is facing a “new crisis” in raw materials, adding that “it’s not only semiconductors,” as lithium, plastics, and steel are also in relatively short supply.

Going forward, we expect auto manufacturers to take steps toward greater vertical integration. Automakers are already attempting to exercise greater control over their supply chains, spurred by their experiences over the past several months. Examples of this include Tesla’s and Rivian’s plans to produce their own battery cells, GM producing the motors for their new Ultium EVs in-house and entering into a long-term supply agreement with rare earth miner MP Materials (December 9, 2021), and Ford insourcing software and entering into joint-venture agreements to design chips and batteries. At an investor conference in December 2021, Ford North America COO Lisa Drake said, “We haven’t used ‘vertical integration’ in this industry in a long time, but you’re going to hear it a lot more” as Ford and other automakers transition from internal combustion engines to EVs.

For the past few years leading up to this downturn (despite already dwindling sales prior to Covid-19), automakers had been exercising little restraint when it comes to investing in vehicle technologies and electric transportation. As a result, many manufacturers, such as Toyota and BMW, saw their credit ratings downgraded, while others, such as GM, were reviewed due to balance sheet vulnerabilities in 2020. However, most of the companies mentioned above have seen their credit ratings stabilize following the rebound in vehicle sales as economies reopened in 2021.

**Growth Potential in Developing Markets**

The global automobiles industry is increasingly shifting its focus toward emerging markets with Asia-Pacific leading the pack in the share of world vehicle sales. In developing countries, social changes, such as urbanization and the change in lifestyles, are crucial to the industry because they can lead to an increase in per-capita consumption of automobiles. GDP, disposable income, and population in various developing regions are outpacing those of the U.S. and Western Europe.

**TOTAL VEHICLE SALES BY REGION**

*(for the year ended, in millions of vehicles)*

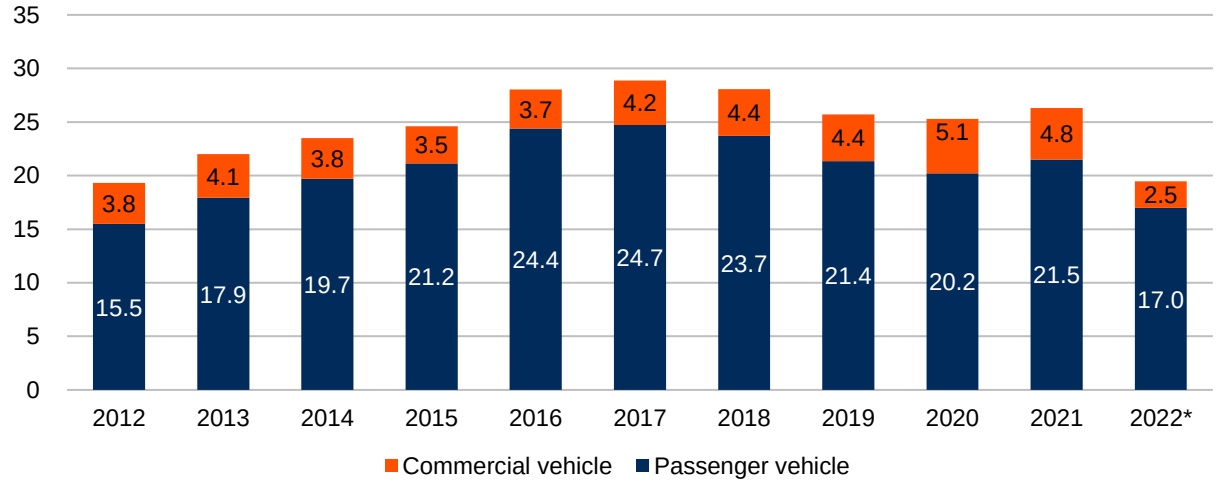
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|
| U.S. | 17.408 | 17.477 | 17.150 | 17.225 | 16.961 | 14.472 | 14.947 | 12.974 | 13.311 |
| **North America** | **21.175** | **21.497** | **21.120** | **21.207** | **20.825** | **17.445** | **18.160** | **15.727** | **16.136** |
| **South America** | **4.514** | **4.052** | **4.334** | **4.753** | **4.560** | **3.369** | **3.841** | **3.687** | **3.754** |
| **Europe** | **19.036** | **20.135** | **20.755** | **20.813** | **20.931** | **16.713** | **16.875** | **14.006** | **14.244** |
| China | 24.662 | 28.028 | 28.879 | 28.081 | 25.797 | 26.323 | 27.010 | 27.496 | 28.596 |
| Japan | 5.047 | 4.970 | 5.234 | 5.272 | 5.195 | 4.599 | 4.448 | 3.870 | 3.978 |
| **Asia, Oceania & Middle East** | **43.411** | **46.858** | **48.547** | **47.647** | **43.714** | **40.323** | **42.664** | **43.176** | **44.773** |
| **Africa** | **1.550** | **1.314** | **1.137** | **1.229** | **1.198** | **0.924** | **1.145** | **1.124** | **1.147** |
| **Total** | **89.685** | **93.856** | **95.893** | **95.650** | **91.227** | **78.774** | **82.685** | **77.720** | **80.054** |
| ***% Change*** | | | | | | | | | |
| *U.S.* | *3.4%* | *0.4%* | *-1.9%* | *0.4%* | *-1.5%* | *-14.7%* | *3.3%* | *-13.2%* | *2.6%* |
| ***North America*** | ***6.4%*** | ***1.5%*** | ***-1.8%*** | ***0.4%*** | ***-1.8%*** | ***-15.5%*** | ***3.3%*** | ***-13.4%*** | ***2.6%*** |
| ***South America*** | ***-18.9%*** | ***-10.2%*** | ***6.9%*** | ***9.7%*** | ***-4.1%*** | ***-26.1%*** | ***14.0%*** | ***-4.0%*** | ***1.8%*** |
| ***Europe*** | ***2.4%*** | ***5.8%*** | ***3.1%*** | ***0.3%*** | ***0.6%*** | ***-20.2%*** | ***1.0%*** | ***-17.0%*** | ***1.7%*** |
| *China* | *4.9%* | *13.7%* | *3.0%* | *-2.8%* | *-8.1%* | *2.0%* | *2.6%* | *1.8%* | *4.0%* |
| *Japan* | *-9.3%* | *-1.5%* | *5.3%* | *0.7%* | *-1.5%* | *-11.5%* | *-3.3%* | *-13.0%* | *2.8%* |
| ***Asia, Oceania & Middle East*** | ***2.0%*** | ***7.9%*** | ***3.6%*** | ***-1.9%*** | ***-8.3%*** | ***-7.8%*** | ***5.8%*** | ***1.2%*** | ***3.7%*** |
| ***Africa*** | ***-9.8%*** | ***-15.2%*** | ***-13.5%*** | ***8.0%*** | ***-2.5%*** | ***-22.9%*** | ***23.9%*** | ***-1.8%*** | ***2.0%*** |
| ***Total*** | ***1.5%*** | ***4.7%*** | ***2.2%*** | ***-0.3%*** | ***-4.6%*** | ***-13.7%*** | ***5.0%*** | ***-6.0%*** | ***3.0%*** |
| ***Global Market Share %*** | | | | | | | | | |
| *U.S.* | *19.4%* | *18.6%* | *17.9%* | *18.0%* | *18.6%* | *18.4%* | *18.1%* | *16.7%* | *16.6%* |
| ***North America*** | ***23.6%*** | ***22.9%*** | ***22.0%*** | ***22.2%*** | ***22.8%*** | ***22.1%*** | ***22.0%*** | ***20.2%*** | ***20.2%*** |
| ***South America*** | ***5.0%*** | ***4.3%*** | ***4.5%*** | ***5.0%*** | ***5.0%*** | ***4.3%*** | ***4.6%*** | ***4.7%*** | ***4.7%*** |
| ***Europe*** | ***21.2%*** | ***21.5%*** | ***21.6%*** | ***21.8%*** | ***22.9%*** | ***21.2%*** | ***20.4%*** | ***18.0%*** | ***17.8%*** |
| *China* | *27.5%* | *29.9%* | *30.1%* | *29.4%* | *28.3%* | *33.4%* | *32.7%* | *35.4%* | *35.7%* |
| *Japan* | *5.6%* | *5.3%* | *5.5%* | *5.5%* | *5.7%* | *5.8%* | *5.4%* | *5.0%* | *5.0%* |
| ***Asia, Oceania & Middle East*** | ***48.4%*** | ***49.9%*** | ***50.6%*** | ***49.8%*** | ***47.9%*** | ***51.2%*** | ***51.6%*** | ***55.6%*** | ***55.9%*** |
| ***Africa*** | ***1.7%*** | ***1.4%*** | ***1.2%*** | ***1.3%*** | ***1.3%*** | ***1.2%*** | ***1.4%*** | ***1.4%*** | ***1.4%*** |
| ***Total*** | ***100.0%*** | ***100.0%*** | ***100.0%*** | ***100.0%*** | ***100.0%*** | ***100.0%*** | ***100.0%*** | ***100.0%*** | ***100.0%*** |

Sources: International Organization of Motor Vehicle Manufacturers; CFRA estimates for 2022-2023

*Brookings Institute*, a non-profit research firm, stated in a 2018 report that just over 50% of the world's population, or about 3.8 billion people, now have enough discretionary spending to be considered "middle class." The report goes on to state that the rapid expansion of the middle class stemmed mostly from Asia, with India and China accounting for more than two-thirds of the next billion entrants to the global middle class. With the growth of the middle class predominately in Asia, we expect real GDP in emerging markets to grow at a faster rate than real GDP in advanced economies.

China, one of the developing countries and the world's largest vehicle market, sold 26.3 million units in 2021 (accounting for approximately 32% of global sales), an increase of 2.6% from 2020. This was China's second straight annual auto sales increase after a 2.0% increase in 2020. China was the only major country whose sales increased in 2020, when global auto sales were devastated by Covid-19.

**VEHICLE SALES IN CHINA**
*(units, in millions)*




*Year-to-date through September.
Source: China Association of Automobile Manufacturers.

CFRA projects global vehicle sales will decline by 6.0% to 77.7 million units in 2022 from the 2021 total of 82.7 million (+5.0% from 2020), before increasing by 3.0% in 2023. Still, these forecasts have major risks, as semiconductor shortages and supply chain issues continue to weigh on global output; global auto sales peaked at 95.9 million units in 2017. In 2021, sales were particularly resilient in China, the world's largest consumer (32% of global auto sales), increasing 3.8%, while the second and third largest markets of Europe (20% global market share) and the U.S. (18%) increased by 1.0% and 3.3%, respectively. We expect China to again post the strongest growth rate of the three major markets in 2022.

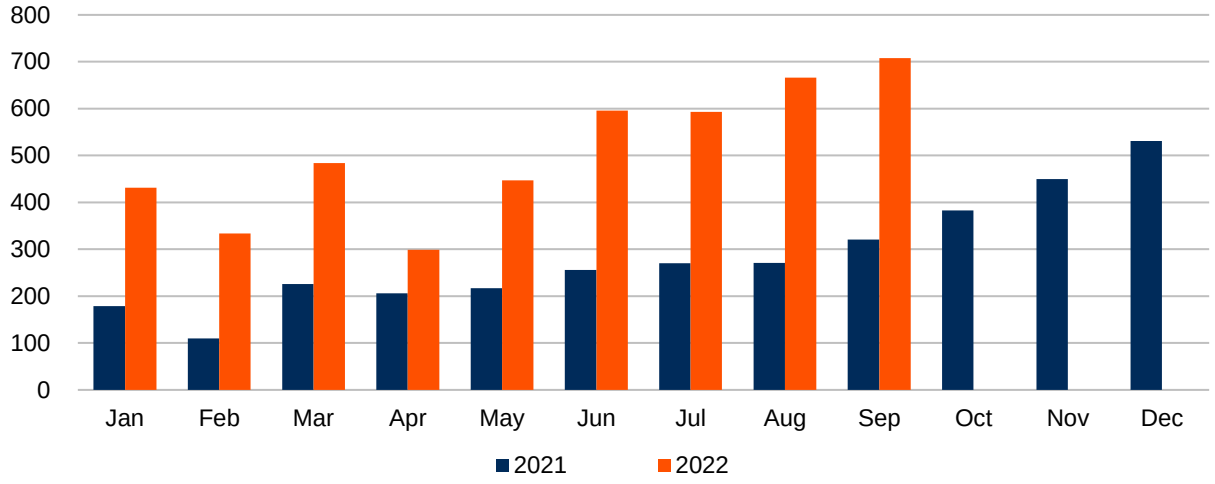
**Potential Investment in China Amid Foreign Ownership Restriction Removal**

China's National Development and Reform Commission lifted all foreign ownership limits on automakers operating in China in 2022. Prior to the relaxation, all foreign automakers were required to establish local JVs with Chinese companies (with no more than 50% of foreign ownership and no more than two JVs for any single type of vehicle) to operate in China.

Against the backdrop of the relaxation, several large-scale foreign direct investments took place in 2022. These include German automaker BMW raising stake in its Chinese JV, BMW Brilliance, to 75% from 50% (the additional stake is worth $4.4 billion), Japanese automaker Honda announcing plans to build two EV production plants with two separate JV partners in China, namely Dongfeng Honda (at a cost of $629 million) and GAC-Honda (at a cost of $410 million), and German automaker Audi commencing the construction of its EV factory in China (at a cost of $3.3 billion).

In order to compete better in China's EV market, these localization investments by foreign automakers eventually aim to lower EV production costs. The table below demonstrates how China's sales of EV have increased gradually over the last two years. This, in our opinion, was made possible by cheaper EV production costs, supply chain benefits, and advantageous government policies (such as the availability of EV subsidies for vehicles costing less than $42,000, which is the price range in which the majority of EVs with Chinese brands are sold).

**EV SALES IN CHINA**
*(units, in thousands)*




*Data through September 2022.
Source: China Association of Automobile Manufacturers.

As robust demand for EVs in China keeps growth momentum intact, we see the government's move to stimulate more foreign investments into its auto industry a measure to introduce more competition at the supply end as the sector progresses to the next phase of growth.

The Chinese government's decision to reduce EV subsidies serves as another catalyst to speed up cost-cutting efforts among EV makers on top of the push for the next growth phase. Initially, the subsidies, which gave EV customers an average $3,500 reimbursement per vehicle, were scaled back by 10% in 2020, 20% in 2021, and 30% in 2022. Then, in 2023, the subsidies will no longer exist. Due to these and rising underlying battery material costs, we anticipate difficulties with EV affordability in China.

We anticipate a decline in the difference in selling prices between EVs with Chinese and foreign brands. All things considered, we see the easier entry to China's EV market as a chance for international manufacturers to gain a larger market share and challenge Chinese-branded EVs' dominance in the next three to five years.

**Electric Vehicles**

The advancement in technology has allowed automakers to add more features to vehicles. Current technological endeavors in the Automobiles industry include electric vehicles (EVs), which encompass electric/plug-in vehicles (including hybrids) and autonomous vehicles (AVs). CFRA thinks that despite their relatively minuscule market share, EVs and autonomous vehicle sales should rise rapidly. Accelerated mass-market EV growth is generally expected, whereas fully autonomous vehicles are in the testing stage and adoption may be years away.

Despite the 6% drop in global vehicle sales in 2020 due to the worldwide pandemic, the number of EVs on the road globally continued to increase from roughly 17,000 units in 2010 to 16 million units in 2021. Once again, global EV sales reached new highs in 2021, reaching 6.75 million units, up 108% Y/Y compared to the same period in the prior year. The global share of EVs rose from 4.2% in 2020 to 8.3% in 2021. Global EV sales in 2019 and 2020 were derailed below the long-term trajectory, but 2021 sales brought it back on track. China led the world in EV sales in 2021, as sales accounted around 50% of total EV sales in that year, followed by Europe and North America. We expect volumes to continue to grow rapidly, aided by the introduction of numerous new models. These statistics include both battery

electric vehicles (BEVs) and plugin hybrid vehicles (PHEVs). The 2021 breakdown of EVs on the road was approximately 71% BEVs and 29% PHEVs.

Industry researcher LMC Automotive forecasts that by 2031, more than 17 million BEVs will be sold around the world and that hybrids and EVs to represent around 49% of all car sales. Although relatively small today, EV and AV sales will likely rise steadily and rapidly, in CFRA's view. Despite successful participation in the transitioning to EV/AV, some suppliers may still face pressure on their legacy businesses as demands dwindle, especially if and when some countries ultimately ban the production of internal combustion engine (ICE) vehicles. CFRA does not expect any bans to take effect prior to the 2030s.

Looking at the market share of EVs as a percentage of each country's total vehicle sales, Norway is by far the largest country in terms of EV adoption, at 86.2% of overall vehicle sales in 2021, followed by Iceland (69%), Sweden (45%), Denmark (35%), and Finland (31%). The U.S. ranked 21st in terms of EV market share (4.0%). Sales have been boosted by generous government subsidies in many countries. For example, Norway has a significant CO2 tax on gas-powered vehicles in addition to making EVs exempt from a 25% value-added tax (VAT), a weight tax, and a NOx tax, in addition to other incentives.

In the next 10 years, CFRA expects a multifold increase in EV sales volumes. Automobile manufacturers have noted this trend and have responded with plans to bring more EVs to market. LMC Automotive forecasts that in 2030, 18.2 million units of EVs will be sold, a sharp increase from the estimated 3.24 million EVs sold worldwide in 2020. While the Covid-19 pandemic has wrought significant disruption to vehicle production, various European countries (*e.g.,* France and Germany) have looked to support their automotive manufacturing sectors via stimulus subsidies tilted toward EVs, which should also incentivize the transition away from ICE to EVs.

The top factor holding consumers back from purchasing an EV is not enough public charging stations. In a 2022 EY Mobility Consumer Index study with more than third of survey respondents said not enough public charging stations (34%), driving range anxiety (33%), and purchase price (27%) were the three most important factors holding them back from purchasing or leasing a plug-in EV for their next vehicle. The other leading factors cited by consumers were inadequate home/work charging infrastructure (26%), and concern about electricity cost. We believe that the top two factors still hold true in 2022, and we see ongoing pressure on purchase prices as battery costs continue to increase and competition increases. The number of EVs coming to market is increasing rapidly, yet the infrastructure for EV mass adoption (mainly the public charging stations) is still a concern.

In the U.S., we expect no fewer than 50 new electric cars, trucks, vans, and SUVs to debut by 2024. We think the most anticipated new EVs are Tesla's Cybertruck, Ford's F-150 Lightning, and GM's Hummer EV. The tri-motor AWD Tesla Cybertruck is slated to start at $69,900 and features an 800hp engine, which would launch the vehicle from 0 to 60 mph in 2.9 seconds. The Cybertruck could possibly hit the market in early 2023. Shipments of Ford's F-150 Lightning began in the spring of 2022 at a base price of $39,970, up to 300 miles of range, and a 0 to 60 mph time in the mid-4 second range. The Hummer EV Edition 1, which starts at $112,595, features three motors totaling 1,000 hp, capable of catapulting the massive vehicle from 0-60 mph in three seconds. Hummer released the EV Edition 1 in December 2021.

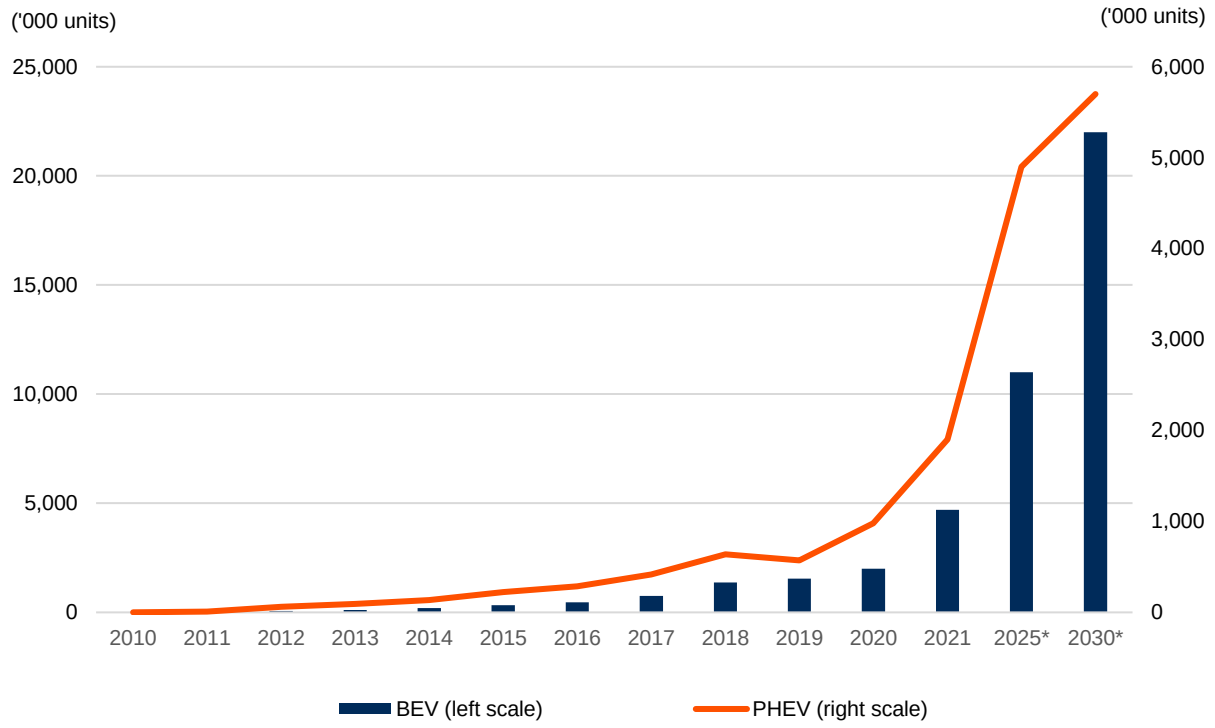
Given the surge in EV supply, we think many of the new models will be unsuccessful from a sales perspective, particularly those with a less favorable combination of price and range. Interestingly, many companies are betting there will be a market for plug-in hybrids with a lower range, as several of the new EV models expected to be introduced in the U.S. are plug-in hybrids with an ell-electric range of 40 miles or less. Companies are betting there is a market for these urban/suburban commuter vehicles, capable of driving to work or the store on battery power alone, before switching to fuel. But with surveys showing that consumers rank vehicle range as a close second behind price in terms of most important

characteristic when considering an EV purchase, we think many carmakers could be setting themselves up for disappointment from a sales perspective.

Automakers have been quick to pull the plug on certain EV models. In fact, dozens of EV models have been discontinued in the U.S. since the first EVs of the modern era debuted in the late-1990s (GM's Chevy S-10 electric pickup and EV1 coupe) – including more than a dozen since 2018. In 2020, the production of six EV models were discontinued: BMW i8, Fiat 500e, Honda Clarity, Hyundai Sonata (PHEV), Smart fortwo, and the Volkswagen e-Golf. Additionally, at least a dozen EV-focused start-ups have failed, including Fisker, Coda, Spyker Cars, Detroit Electric, HumanCar, LeEco, Bright Automotive, AMP, Aptera, Corbin, Better Place, and Li-ion Motors.

We think EV sales will benefit from a continued drop in battery costs and, as charging times improve, that will help the economics of EVs move closer to parity with gas-powered vehicles. Alix Partners estimates that $225 billion will be spent to develop more than 200 new EVs through 2023 (a figure that does not include hybrids). Looking at the estimated 2030 EV sales in the U.S., Tesla, and Volvo (owned by Geely) are expected to have the greatest EV exposure as a percentage of their total vehicle sales (100% and 50% of total sales, respectively). "The Big Three" German automakers are also expected to have significant EV exposure, with EVs accounting for 25% of U.S. vehicle sales volumes for Volkswagen and Mercedes Benz (Daimler) and 20% for BMW. Nissan will likely rank as the second-largest EV seller in the U.S. on a volume basis, and EVs are expected to account for 20% of the company's U.S. vehicle sales. Japanese competitor Honda is projected to rank third in terms of U.S. EV market share, although EVs are only expected to account for 15% of Honda's U.S. vehicle sales.

**GLOBAL ELECTRIC VEHICLES(EV) SALES OUTLOOK**




*forecast
Source: International Energy Agency (IEA)
Notes: Electric Vehicles include BEVs are battery electric vehicles. PHEVs are plug-in hybrid electric vehicles. EVs refers to all electric vehicles (BEVs + PHEVs).

We think the rise of EVs could have profound long-term financial implications on large segments of the auto industry, such as aftermarket retailers, parts and equipment manufacturers, gas stations, and repair and service shops. Much of this is due to the fact that EVs use no gasoline, and on average, EV repair and maintenance costs are about half those of gas-powered vehicles over the life of a vehicle. EVs also don't require oil changes, fuel and oil additives, oil filters, grease and lubricants, or transmission fluid. In fact, an October 2020 Consumer Reports study showed that the average lifetime maintenance and repair costs of owning a gas-powered vehicle ($9,200) are double that of either a BEV or PHEV ($4,600). We think this will particularly impact companies that produce or sell engine maintenance-related products or perform services such as oil changes or exhaust-related repairs. The transition to EVs could also significantly impact publicly traded auto dealerships, as their parts and service operations are both their most profitable segments and account for a higher percentage of overall gross profit than any other segment.

**Expected Impact of Inflation Reduction Act on Electric Vehicle Sales**

On August 16, 2022, President Biden signed the Inflation Reduction Act (IRA) into law after the bill passed by a 220-207 vote strictly along party lines in the U.S. House of Representatives. In order for consumers to claim the full $7,500 federal EV tax credit, there are a handful of requirements that changed and made the tax credit more restrictive. These requirements are: (1) final assembly of the vehicle must take place in North America; (2) the vehicle's MSRP needs to be below $55,000 for cars and below $80,000 for trucks and SUVs; and (3) EV battery materials must be sourced from the U.S. or free-trade partners, with phase-in starting in 2024. The bill also included a new federal tax credit of $4,000 for used EVs and income caps for consumers to claim the tax credits (a buyer's adjusted gross income cannot exceed $150,000 for individuals or $300,000 for joint filers).

Auto industry trade groups, such as the Alliance For Automotive Innovation, which represents automakers that account for 98% of domestic auto production, sounded the alarm about perceived flaws in the bill in the weeks before it was signed into law. In short, of the 72 EV models currently available for purchase in the U.S. (which includes all battery, plug-in hybrid, and fuel cell EVs), approximately 70% became immediately ineligible for the $7,500 federal tax credit. Starting in 2024, under the requirement that at least 50% of the components in an electric car battery should come from the U.S., Canada, or Mexico (a percentage that rises to 100% by 2028), not a single EV model would qualify for the tax credit. Additionally, the share of the minerals in batteries that have to come from the U.S. or a free trade partner will climb to 80% in 2026. In short, if no changes are made, we think the bill could jeopardize the industry's collective goal of having EVs comprise 40%-50% of all new vehicle sales in the U.S. by 2030. We think the bill will also pressure automakers to produce more affordable EV models from factories located in North America.

Relatively speaking, we view Tesla as the biggest winner from the legislation, followed by General Motors (GM) and Ford, which have been taking steps toward building out their domestic EV supply chains and production infrastructure. Tesla and GM had previously phased out of the current EV tax credit program after both hitting 200,000 cumulative EVs sold in the U.S. in the 2018-2019 timeframe, and Toyota, Nissan, and Ford are all poised to hit the threshold over the next few quarters. Lower-priced versions of the two bestselling EVs in the U.S. – Tesla's Model 3 and Model Y – will qualify for the tax credit starting on January 1, 2023, as would GM's Chevy Bolt, Ford's Mustang Mach-E, and Stellantis' Jeep Wrangler 4xE hybrid. Looking at Tesla, both the long-range and performance versions of the Model Y SUV would qualify, as both have MSRPs below $70,000, but only the Model 3 Rear Wheel Drive would qualify for the tax credit given its current MSRP of $46,990. Tesla's solar and energy storage businesses will also benefit from various clean energy tax credits and subsidies in the bill. GM and Ford are in the process of building a half dozen battery plants in the U.S. over the next several years, positioning them favorably relative to competitors in this scope of the bill. The primary impediment for most domestic EVs to qualify for the tax credit is the MSRP requirement at a time when EV prices are

skyrocketing from raw material cost increases. According to Kelley Blue Book, the average EV sales price was $66,524 in August (+16% Y/Y), well above the $55,000 maximum MSRP requirement for a sedan or compact car to qualify for the credit, and we expect prices to continue to rise as automakers attempt to pass through higher costs to consumers. Notably, the 16% jump in EV prices over the past year has outpaced the average increase for all new vehicles (+11% to $48,301 in August), which we think reflects the surge in battery raw materials, as an EV battery can account for as much as one-third of the total cost of an EV.

Most of the major European and Japanese/Korean automakers (BMW, Mercedes-Benz, Toyota, Nissan, Subaru, Mazda, Hyundai/Kia) stand to lose from the bill, as most do not currently have EV production facilities in the U.S. or vehicles that meet the pricing requirement. Several of these manufacturers issued statements of criticism and concern related to the bill in recent days. Most of the newer U.S. EV manufacturers, such as Lucid, Rivian, and Fisker, are poised to lose as well given either the MSRP or country of assembly requirements, particularly after recent price hikes. The luxury Lucid Air is priced well above the $55,000 maximum threshold for passenger car EVs, as are Rivian's R1T pickup and R1S SUV following price increases announced earlier this year. Fisker's forthcoming Ocean will also become ineligible, as it will be imported from Austria. Polestar's Polestar 2 EV will lose the tax credit as will Volkswagen's Audi e-tron (both due to country of assembly) and Porsche Taycan (country of origin and price). Both the Hyundai IONIQ5 and Kia EV6, which have sold relatively well in the U.S., became ineligible for the tax credit, as both vehicles are assembled in South Korea.

Looking out to 2024, when the battery sourcing requirement takes effect, the tax credit becomes significantly more restrictive because a high percentage of key EV battery raw materials (lithium, cobalt, nickel, manganese, etc.) are mined and processed outside the footprint of the U.S. and free trade partner countries. Longer-term, we think significant investments will need to be made by metals and mining companies (and likely automakers themselves) to grow production of these commodities in the U.S. and free-trade partner countries or follow-on legislation will need to be passed that ease the restrictions of the bill if the tax credit is to be viable. Auto industry trade groups have said they plan to continue pushing for reform to the tax credit provisions even after the bill was signed into law.

**Autonomous Vehicles**

The list of car makers hopping on the autonomous-driving bandwagon had increased substantially. While most automakers normally outsource their component production to suppliers, they prefer to control autonomous vehicle (AV) technology through in-house expertise. Companies like Daimler, Renault-Nissan, VW, BMW, and Toyota, just to name a few, are also directly or indirectly engaging in the integration and implementation of autonomous driving into their vehicles.

Experts vary widely in terms of their forecasts, but LMC Automotive forecasts global sales of Level 5 AVs totaling one million in 2025, growing to four million in 2030, 32 million in 2040, and 68 million in 2050. While we believe Level 5 AVs will one day be commonplace, we think these forecasts are overly optimistic and we are reluctant to provide our own projections at this juncture given various uncertainties that remain. While Level 5 capabilities remain elusive and are likely years away, Level 4 vehicles are already being tested in the market and will likely be rolled out (without the need for safety drivers) over the next three to five years, albeit across very limited geographic regions. The rollout of robotaxis, beginning at Level 4, is likely to start in certain geographic regions over the next few years, by CFRA analysis. Cities across the states of Arizona and California will be among the first to roll out fleets with driverless cars, according to CFRA forecasts. However, our base case is for autonomous vehicles to be deployed gradually over the next two to three decades within the ridesharing ecosystem, while human drivers continue to serve most consumer demand.

**SAE INTERNATIONAL VEHICLE AUTONOMY LEVELS**

| LEVEL | DESCRIPTION | HUMAN ROLE | VEHICLE ROLE |
|---|---|---|---|
| 0 | None | All driver control | No autonomous functions |
| 1 | Limited + Safety | Almost all driver control | ABS, traction control |
| 2 | Limited, Active Safety, Convenience | Mostly driver control | Lane keeping, emergency braking, adaptive cruise control, parking assist |
| 3 | Significant Autonomy | Driver can disengage completely at times | Advanced controls in simple conditions (highway, slow-moving congestion, good weather) |
| 4 | High Autonomy | Driver not needed in some locations/conditions | Full conditional autonomous capabilities, more difficult conditions/locations not autonomous |
| 5 | High/Complete Autonomy | No driver needed | Autonomous driving in all locations/conditions possible, driver controls (brakes, steering wheel) not necessary |

Source: LMC Automotive.

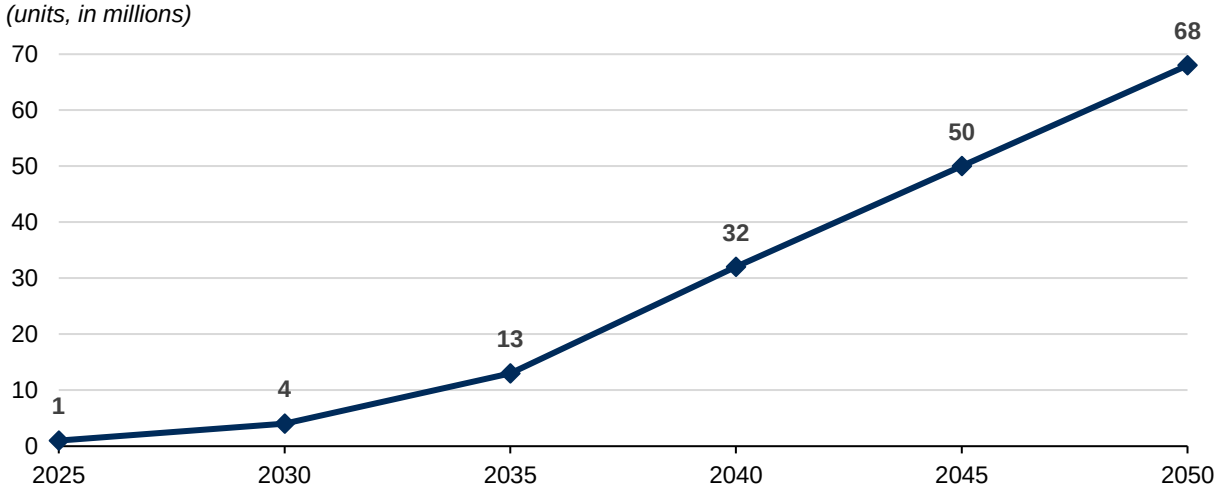
We think one of the biggest hurdles facing the widespread adoption of autonomous driving technology is that, statistically speaking, humans are already extremely safe drivers. National Highway Transportation Safety Administration (NHTSA) data shows that the number of U.S. motor vehicle fatalities totaled only 1.33 per 100 million miles traveled in 2021 (latest available), down from the peak of 24.09 in 1921 (the first-year statistics were recorded), but up slightly from the record low of 1.08 in 2014, which we attribute to an increase in texting while driving. On an absolute basis, total U.S. motor vehicle fatalities of 42,915 in 2021 were the highest number since 2005 but also down significantly from the peak of 54,589 in 1972, which we attribute to new safety technologies, such as anti-lock braking systems and airbags. Furthermore, human error is to blame for an estimated 94% of these casualties. The current U.S. motor vehicle fatality rate of just over one per 100 million miles traveled implies a safety rate of about 99.999999%. We think Level 5 AVs will not be broadly accepted by the public until they are as safe as human drivers.

Despite tremendous technological strides, it has become clear that Level 5 full autonomy is still many years – possibly decades – away. One of the main shortcomings of current AV technology is perception, or a vehicle's ability to identify objects and understand how to move around them. The second issue is that AV technology is extremely expensive and still far from commercial viability for major automakers, as evidenced by the recent pronouncements of various industry leaders.

We think AV technology needs to improve by several orders of magnitude before it is safer than a human driver. This has been echoed by many industry leaders. This more grounded recent view of autonomous technology contrasts with the euphoric predictions of many industry executives in past years.

Despite the technological hurdles, automakers are pouring billions of dollars into autonomous driving technology. If global auto demand does not improve, we think autonomous programs such as these are highly susceptible to job cuts and reduced investment, as automakers will likely seek ways to cut costs.

**FORECASTED GLOBAL SALES OF LEVEL 5 AUTONOMOUS VEHICLES**
*(units, in millions)*




Source: LMC Automotive.

Companies developing AV technology that may compete in the future include Alphabet (Waymo), Amazon, Apple, and Baidu, as well as many other technology companies and automobile manufacturers and suppliers. CFRA, however, cautions that despite the great initiatives and competitive pressures that exist, the shift to AV ridesharing services will likely take place very slowly, with some of the most ambitious targets likely needing to be ratcheted down/postponed.

An uncertain regulatory environment stands in the way of AVs being on the road and could delay the path to long-term profitability. While more states in the U.S. appear to be getting more comfortable with the idea of supporting advancement of AVs, companies themselves are likely to be very slow with rolling out Level 4 self-driving vehicles given the backlash that is faced when public casualties occur. Although we believe guidance at the state level is better than nothing, many in the field believe federal legislation is crucial to avoid varied regulation from state to state. As technology grows and improves, different sets of rules could become a major inconvenience and burden for car manufacturers as well as ride-sharing providers.

Along with vehicle manufacturers, auto part suppliers will also benefit from the proliferation of self-driving vehicles, in CFRA's view. A number of tech companies, such as Intel, Samsung, and Qualcomm, are acquiring or joining ventures with auto part suppliers in a bid to catch up in the autonomous parts market. With wireless technology proliferating in cars, cybersecurity in vehicles is becoming an area of increased focus and opportunity, mostly since the hacking experiment with FCA. Hackers have demonstrated how they can control the brakes, transmission, and other safety-critical systems in the internal network of Jeep Cherokees using a wireless communication system. Safety concerns are also becoming an issue and are raising questions as to how automakers plan to ensure that their autonomous or semi-autonomous cars meet safety procedures.

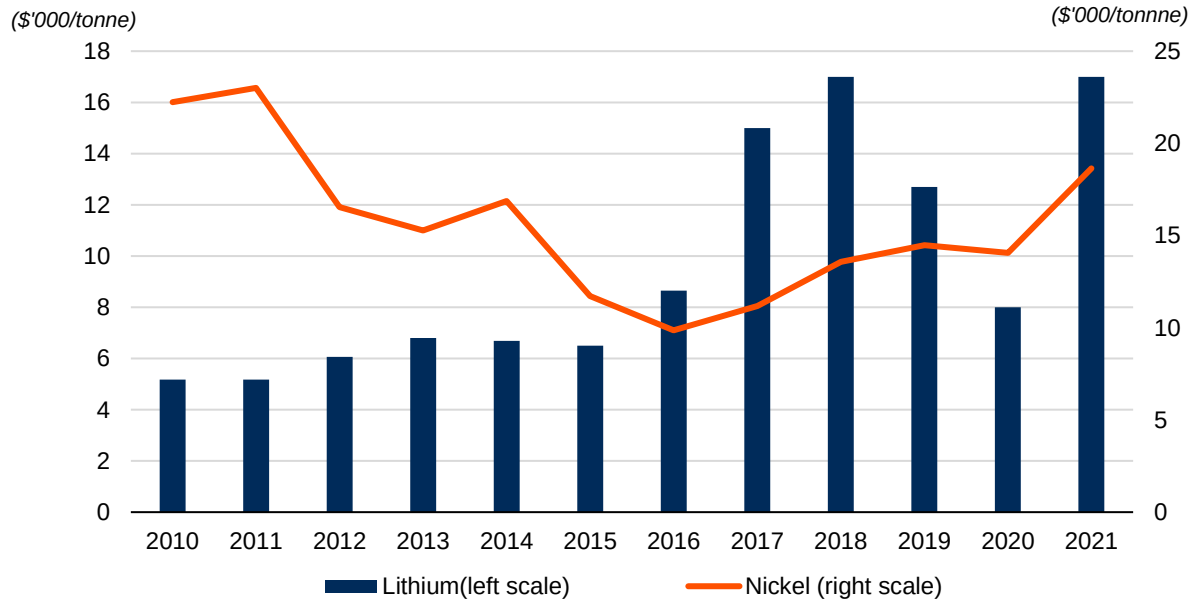
**Battery Supply Shortages May Charge Up Prices**

Global EV sales are growing rapidly, reaching a new high with 6.75 million units sold in 2021, doubling the number in 2020. The global share of EVs rose from 4.2% in 2020 to 8.3% in 2021. Many car manufacturers are stepping up investments in EV technology, trying to take advantage of the ever-increasing demand. The unquenchable demand for EVs, piqued further by surging oil prices, is accelerating the search for components and raw materials. Despite battery prices declining consistently over the past few years, other essential raw materials are rising in prices, most notably lithium and

nickel. On top of the global transition to low-carbon emissions, Russia's invasion of Ukraine further exacerbates the rise in prices.

According to *Financial Times*, car manufacturers and their suppliers have learned from the global chip shortage in the past two years. As manufacturers go all-in on EVs, the race for battery supplies is driving prices for raw materials ever higher. One of the most essential raw materials for almost all current batteries is lithium, and EVs accounted for about 60% of lithium usage in 2021 and the percentage is expected to increase to 80% by 2025. The average price for lithium carbonate hit $71,315/ton in mid-September 2022, up 220% versus a year ago and eclipsing the price boom in 2016-2017. For now, manufacturers can easily pass that on to customers. But a battery supply crunch looms. In fact, the International Energy Agency (IEA) recently warned that the world could face lithium shortages by 2025. Lithium supply faces challenges not only from surging demand, but also because resources are concentrated to a handful of countries and over half of current production is sourced from areas with high water stress.

**AVERAGE LITHIUM CARBONATE PRICES AND NICKEL (LME) PRICES**




Source: Refinitiv.

Nickel, on the other hand, is used for a number of purposes, notably for making stainless steel and for its use in many EV batteries, which are one of the largest costs in producing an EV. Nickel prices peaked at $48,200/tonne in March, doubling the number in early 2022 before declining considerably from its peak, holding at around $22,000/tonne but remained higher than 2021 prices. The average nickel prices for year-to-date through October 2022 rose 36% to $25,333/tonne compared to the whole year of 2021. We note that the significant surge in nickel prices was much attributed to Russia's invasion of Ukraine.

Higher EV prices are already materializing; Tesla raised prices across its entire line-up of EVs in mid-March. Prices have increased by between 5%-10%, with the cheapest car the company sells, the Model 3 Rear-Wheel Drive, now starting at $46,990, while its top-end Model X Tri motor saw a price increase of $12,500, from $126,490 to $138,990. Tata Motors' battery cost have also risen by 20%.

We see that the uptrend in raw material prices will persist for at least two years. One of the solutions currently taken by Tesla was to leverage LFP or lithium-ion phosphate batteries instead, because those

batteries don't use nickel. The only downside is that these batteries are generally less efficient (meaning lower range) than nickel variants and are hard to source.

**Proliferation of E-Commerce**

The way consumers purchase cars is changing. There is no dearth of research material and few reviews available on the internet, which help consumers select the best option to match their need at the best possible price from a wide range of alternatives. According to MediaPost, 91% of vehicle shoppers use the internet in some form in the vehicle purchase process. In fact, a typical used car buyer spends approximately 10 hours researching his or her prospective car purchase online, according to "The 2018 Car Buyer Journey" report from Auto Trader. This a significant change from the way consumers purchased vehicles historically, learning of vehicle availability through local print and broadcast media, and word of mouth, before going to dealerships to view vehicles in person and attempting to negotiate the best possible deal on a purchase. We think e-commerce is likely to play a much greater role in the auto industry in the coming decade, creating opportunity for auto manufacturers and dealers focused on online growth.

Auto retail is the largest segment of the U.S. consumer retail market and one of the last markets to be significantly transformed or disrupted by e-commerce. The industry generated approximately $1.37 trillion in sales in 2021, according to U.S. Census Bureau data (latest available), comprising roughly 18% of the U.S. retail economy. Of the $1.37 trillion in sales, the revenue breakdown was $1.10 trillion for new car dealers (80%); $162 billion for used car dealers (12%); and $112 billion for auto parts, accessories, and tire stores (8%).

As e-commerce continues to take share of overall U.S. retail sales, consumers have become more comfortable buying larger, big-ticket items online, such as furniture, electronics, and automobiles. According to the U.S. Census Bureau, e-commerce sales accounted for 14.5% of total U.S. retail sales in the second quarter of 2022, down from a peak of 15.7% in the same period in 2020 when the worldwide lockdown first started amid the pandemic outbreak, and 7.5% at the end of 2015. In the second quarter of 2022, e-commerce sales rose by 6.8% from the second quarter of 2021, considered high as it exceeds the all-time high reached in the second quarter of 2020 when the stay-at-home order was implemented due to Covid-19.

The U.S. auto retail market is highly fragmented and ripe for disruption, in our view. Dealerships are costly, operationally challenging, and difficult to scale, and data shows that consumers are highly dissatisfied with the car buying process. The number of new-car dealerships in the U.S. has declined by nearly one-third over the past few decades, from 25,025 in 1988 to 16,676 at the end of 2021. As for the used-vehicle industry, despite the considerably larger number of dealers, its annual revenue is much smaller in size, and the market is highly fragmented as the top 100 dealerships hold less than 10% of the total market share, according to various sources.

Perhaps most importantly, surveys have shown that consumers are highly dissatisfied with the car buying process. According to the DealerSocket Independent Dealership Action Report, 81% of North American consumers do not enjoy the car buying process, and car salespeople are among the least trusted professionals, according to a 2016 Gallup poll. The process of buying a car is also notoriously time consuming. According to Autolist, the average time spend in a dealership making a new car purchase was 3.6 hours in 2017, but in some cases the process can take up to 6.0 hours. For all of the reasons above, we are bullish on e-commerce growth in the auto industry going forward.

**Mobility Startups Could Disrupt the Industry**

Many new options for passenger transportation, collectively called innovative mobility services (IMS), have emerged in the past two decades and some have seen significant growth, driven by advancement in technologies and changing consumer preferences around vehicle ownership, according to a May 2018

feature story by the Center for Automotive Research (CAR). IMS includes car-sharing, ride-hailing, bike-sharing, ridesharing, micro-transit, and scooter sharing programs, and together these are aggressively expanding in cities worldwide. Ride-hailing services provided by companies such as Uber and Lyft have grown rapidly.

In the short to medium term, CAR thinks the growth of IMS will likely cause only a small decrease in vehicle sales, associated with falling vehicle ownership. Nevertheless, the researcher believes that IMS will have a profound effect on how people think about mobility, the way people relate to vehicles, and how transportation services are organized and paid for. Globally, mobility providers have captured the interest of consumers and venture capitalists alike. These start-ups are disrupting automakers and threatening vehicle manufacturers' share of auto industry profits. Beyond presenting a challenge to the vehicle ownership model, CAR thinks the expansion of IMS could influence other aspects of the automotive industry and related sectors, such as the automotive value chain, supply chain, logistics, automotive insurance, and vehicle maintenance and repair.

Investors see innovative mobility and driving automation as the future of transportation, and for that reason, some automakers have multiplied their efforts in the mobility space as a way to signal the markets that they are forward-looking and ultimately to increase their share value. Automakers had started investing in, partnering with, and acquiring mobility and tech companies, as well as creating mobility subsidiaries. Lyft president John Zimmer even predicted that private car ownership will nearly disappear in major U.S. cities by 2025. Mobility services are also attractive for automakers because they seem to be a non-recessionary business not affected by vehicle sales cycles. CAR thinks that providing in-house mobility services could make automakers less vulnerable to sales cycles and, for that reason, also boost their standing in financial markets.

# Regulatory Environment

### Emission Controls and Fuel Efficiency Requirements

Emission standards define the acceptable limits for exhaust emissions of new vehicles sold in the region. The following are developments in emission control and fuel efficiency in the U.S. and European Union.

#### UNITED STATES

On March 31, 2020, President Trump announced a final ruling to freeze the mile-per-gallon standards through 2026, set previously by the Obama administration to combat global warming. His reason for such rollback is to make vehicles substantially safer as he claims that car manufacturers would compromise on material strength to boost efficiency. The relaxation to achieve 54.5 mpg by 2025 would likely send a ripple effect across the world as a number of countries modeled their emission control rules on the U.S.'s, according to *The New York Times.* The new rule calls for corporate average fuel economy (CAFE) and CO2 emissions standards to increase by 1.5% each year through model year 2026. This is in contrast to the 5% increase set in 2012 by the Obama administration and would allow American vehicles to emit nearly a billion tons more CO2 during the period.

The enactment of the Clean Air Act in 1963, while allowing the U.S. Environmental Protection Agency (EPA) to determine air pollution standards, also forbids states from doing the same. This Act, however, exempted the State of California as they had already started addressing air pollution issues in the early 1960s. The California Air Resources Board (CARB), which set standards stricter than the EPA and followed by 12 other U.S. states, had opposed Trump's decision to roll back changes since he first proposed the plan. In May 2020, CARB and 22 other states formally challenged the Trump administration in court for its plan to roll back vehicle emission standards citing air pollution and public health concerns. At the same time, in August, CARB and several major automakers, including

Volkswagen, Honda, Ford, and BMW, seemingly defied Trump's initiative by coming into agreement to cut down on emissions voluntarily.

**EUROPEAN UNION**

Starting September 1, 2018, all new passenger cars sold in Europe had to comply with the Worldwide Harmonised Light Vehicle Test Procedure (WLTP) and Real Driving Emission (RDE), which replaced the New European Driving Cycle test used since the 1980s.

The two tests complement each other; the WLTP measures the car model's pollutant emissions and the RDE confirms WLTP results in real-life driving or on-the-road performance. However, the European Automobile Manufacturers Association (ACEA) said that the WLTP standard would affect vehicle taxation, because this more rigorous test would likely result in higher CO2 values. Nineteen European Union (EU) members currently apply car taxes based on CO2 values in emission tests; therefore, the ACEA urges national governments to ensure that taxations will remain fair, to prevent an increase in the financial burden on customers.

After a steady drop in CO2/km from 2010 to 2016, the European Environment Agency reported that average passenger car fleet emissions in the EU for 2017 and 2018 increased by 0.4g CO2/km and 2.0g CO2/km, respectively. Despite having met its 130 g CO2/km target two years ahead of the intended schedule of 2015, manufacturers will have to reduce fleet emissions meaningfully to meet the upcoming 2021 target of 95g CO2/km.

The industry has spent billions of dollars to reach its carbon emission targets and CFRA foresees further investment to meet the requirements of the EU. According to projections by *Transport & Environment*, an advocate for green policy, one in 10 cars sold across the EU will either be plug-in hybrids or fully electric thanks to the regulation. Furthermore, the group forecast that EVs would make up 15% of all vehicles in the Euro Area as manufacturers race to adhere to regulations, while avoiding financial penalties for non-compliance.

# M&A Environment

**Global Auto Deals**

The Covid-19 pandemic brought the global automotive industry (including automakers and parts & components manufacturers) merger and acquisitions (M&A) to their lowest level since the 2008 financial crisis. Total deal value plunged 41% to only $42 billion in 2020 from the prior year. The effects of the pandemic were most apparent in the second quarter as deal count declined 35%, while deal value dropped almost 50% compared to second-quarter 2019.

Although macroeconomic headwinds plagued the industry in 2021 with increasing commodity costs and a semiconductor supply-chain disruption causing production shortages, global M&A managed to reach new highs in 2021, with a total deal value of $136.6 billion (up 111% over 2020). M&A activity recovered rapidly with deal volume up 19% to 971 deals. Out of the $136.6 billion of deal value, vehicle manufacturers held the largest share at 45% ($61.3 billion), primarily due to special purpose acquisition company (SPAC) deals and other investments in new electric vehicles (NEV). Six out of 10 deals announced were SPAC deals ranging from EV manufacturers (design and testing phase) to EV charging solutions.

According to PricewaterhouseCoopers (PwC), M&A activity for automotive manufacturers recovered in 2021 and exceeded expectations as investments in new technology accelerated. PwC expects deal activity in 2022 to continue to grow with greater access to emerging sources of capital (notably SPACs), investment in NEV, and technology across all automotive subsectors. Traditional trends in supplier and

retail consolidation will likely continue, yet likely with emphasis on investments in technologies centering on the future of driving and new ways of engaging with customers whose buying habits have changed from traditional sources.

The current M&A situation for the industry is expected to persist for the next 12 to 18 months, according to PwC, due to the increasing commodity cost and shortages of chip supply. PwC expects automakers to transform their business model by seeking M&A opportunities to enhance their CASE technologies, thus helping them bolster their competitive position and meet ever stricter emissions standards, particularly within Europe.

**M&A ACTIVITIES IN THE GLOBAL AUTOMOTIVE MANUFACTURING INDUSTRY***
*(arranged by year and transaction size, in $, millions)*

| COMPLETION DATE | ACQUIRER | ACQUIRER COUNTRY | TARGET | TARGET COUNTRY | SIZE ($ MILLION) |
|---|---|---|---|---|---|
| *Pending* | Beijing Benz Automotive | China | Certain Assets of Beijing Branch of BAIC Motor | - | 922 |
| *Pending* | Porsche | Germany | Porsche AG | Germany | NA |
| **2022** | | | | | |
| 11/2/22 | BMW Holding | Netherlands | BMW Brilliance Automotive | China | 4,209 |
| **2021** | | | | | |
| 1/16/21 | Peugeot | France | Fiat Chrysler | Netherlands | 45,043 |
| 11/26/21 | Volkswagen | Germany | Europcar | France | 3,400 |
| **2020** | | | | | |
| 9/18/20 | Amazon | U.S. | Zoox | U.S. | 1,300 |
| 4/10/20 | Chongqing Sokon | China | Dongfeng Xiaokang Motor Company | China | 607 |
| 1/15/20 | - | - | Hyundai | S. Korea | 571 |

*With transaction size over $500 million.
Source: CFRA, S&P Global Market Intelligence.

# HOW THE INDUSTRY OPERATES

The Automobiles industry is engaged in the design, production, marketing, sale, provision of spares, and service of motor vehicles. The largest market for these products is the individual consumer. Success of the industry relies heavily on various macro- and micro-economic factors in the global scale as well as regulations in areas where they operate. The industry is characterized with long development and production cycles.

Replacement demand for automobiles is driven by product wear and tear, as well as changes in consumer preferences, technological advancements, and changes to regulatory requirements related to environmental factors and vehicle safety. Model lifecycles also affect sales: during the end of a model lifecycle, sales tend to decline, prices are cut, and larger incentives are offered. Consumers often will hold off on purchasing a model if they are aware that an updated version will soon become available.

## AUTOMAKER REVENUE

Automakers generate revenues from sales of vehicles to dealers and through financing operations. Revenues from vehicle sales depend on the automakers' market share, product mix, and pricing. In addition to the general macro-situation and consumer confidence, which drives overall volume, this volatile and cyclical business can be vulnerable to shifting consumer tastes and gyrating fuel prices. Given the industry's high fixed costs, volume is necessary to ensure profitability. This leaves the industry prone to bouts of price competition, exacerbated by significant industry overcapacity. This, in CFRA's view, has been the case in Europe with external players, such as Japanese and Korean original equipment manufacturers (OEMs), targeting rising sales in Europe at the same time as incumbents sought to cut. Market share movements tend to follow country and segment exposure as well as new model activity.

The growth of financial services businesses over the past decade and the age of cheap credit also improved sales and mix in the industry. The possible longer-term reversal of the era of cheap credit could be a risk to mature market volume and mix growth in the future, in CFRA's view.

### Automotive Pricing

Several factors can force retail auto prices to rise. Over time, consumers come to value, as standard equipment, features once offered as optional. New safety or emissions-control items may be required to comply with government regulations. Prices may also rise as new models are launched that are perceived as higher value-add or improved quality, or consumer demand for a model increases.

Competitive pressures can result in lower prices. Lower automobile prices, however, can be supported through higher unit production volume, cost savings on parts and labor, and manufacturing efficiencies. When costs are reduced through innovation, savings can be shared between manufacturer, supplier, and consumer; therefore, profits can still rise. However, when prices are reduced solely to stimulate demand and there are no offsetting cost savings, profitability often declines.

### Demand Factors

The economic environment naturally affects demand for automobiles. Principal end purchasers include private individuals, corporations, and short-term rental companies. Cars are a major purchase for most families, and consumers need to feel comfortable before they spend so much of their hard-earned money. During periods of sustained economic growth and plentiful employment, sales typically rise as customers feel flush and confident enough to buy new vehicles. Conversely, when the economy weakens, and jobs are hard to come by, consumers are more likely to delay the purchase of new vehicles.

Other factors affecting new-car sales include cost of ownership, changes in style, engineering, safety, and quality (which hasten the obsolescence of existing models), and the cost and availability of fuel and insurance. Safety has captured vehicle buyers' attention in recent years and has become a pervasive theme in automakers' ad campaigns. In response to consumer demand for safer vehicles, automakers have made wide use of components such as airbags and antilock brake systems (ABS). ABS has now been superseded by electronic stability control (ESC) systems in many countries. Other new driving aids include automated parking assist and the current introduction of advanced driver assistance systems, which may eventually lead to fully automated driving.

**Automaker Costs**

Auto parts, materials, and labor are the chief components of automaker operating costs. These costs are determined by the location of automaker plants, fluctuations in the price of key materials, and the terms of contracts between the automaker and parts/materials providers. Research and development (R&D) is another significant expense.

Operating leverage is generally very high in the industry given generally low operating margins and high fixed investment in plant, machinery, and capitalized development costs. Operating leverage remains lower at the premium makers (given superior operating margins) than the mass makers, which are more heavily geared into volume, with lower revenue per unit and already thin margins. Pricing and mix also affect automaker profitability to a large extent.

◆ **Auto parts.** Auto parts and components, along with raw materials, constitute purchased materials, the biggest cost category for automakers. Auto parts prices may include indirect costs, if suppliers are called upon to subsidize the automaker through R&D expenditures and investment in capital equipment.

◆ **Raw materials.** The key raw materials used in automobiles are steel, plastics and composites, iron, and aluminum, with metals comprising over 75% of a vehicle's total content. Spot prices for steel are easily accessible, but automakers typically sign undisclosed long-term contracts with steel suppliers to lock in prices, often on a volume-based level, which adds a higher degree of fixed costs to their structure, in our view. In contrast, parts suppliers and tire makers often buy on shorter contracts, and are thus more exposed to the risks of rapid price changes, with typically a six-month delay between the changes in spot prices and the impact on the profit and loss statement. CFRA thinks that mechanisms to pass on variations in raw materials have increasingly become a feature in component supply contracts.

◆ **Labor.** Labor is one of automakers' key operating costs. Factors weighing on labor expenses include hourly wages; the skill and productivity levels of the workforce; flexibility to learn new production techniques; and the presence of strong labor unions. Employee costs may be fixed or variable, depending on labor contracts that affect the employer's ability to adjust staffing levels and schedules according to demand. In Europe, labor costs have become increasingly variable through the implementation of time bank agreements, increased reliance on temporary labor, and government-backed, short-time working schemes.

◆ **Research and development.** The research & development (R&D) demands on the automobiles industry are unrelenting given the highly competitive structure and increased consumer and government-led demands for improved fuel efficiency, safety, performance, and comfort. Increasingly stringent emissions controls and safety regulations have meant that European companies have had to increase spending on R&D.

In the process of automotive manufacturing, fewer parts mean lower production costs and a reduced likelihood of assembly errors. Manufacturers are also lowering costs by minimizing industrial waste and pollution, as well as reducing the number of labor hours. The increase in subassemblies, a unit

assembled separately, but designed to fit with other units within a manufactured product, may also reduce the number of individual parts.

Reducing the number of labor hours required for the final assembly stage has been a high priority for automakers. Greater proportions of components are being made at parts facilities and delivered to the assembly plants on a just-in-time basis. Automakers send daily or even hourly orders for specific seats, which are then produced and delivered.

In recent years, there has been a trend toward the formation of alliances (*e.g.*, Renault/Nissan/AvtoVAZ or Peugeot/GM), which allow economies of scale through the joint development of new platforms/models/engines and joint purchasing. This has the effect of spreading costs over a significantly larger number of cars. It is not unusual to see one company assembling a vehicle that will be badged, marketed, and sold under its partner's brand. Contract manufacturers may be used to outsource capacity for successful models or for smaller manufacturing runs.

**Currency Risk/Reward Another Factor**

With auto OEMs as one of the world's largest exporters, foreign exchange (forex) can be a significant challenge as European OEMs have relatively high naturally unhedged positions. U.S. dollar weakness can seriously hurt profitability, most notably for the German OEMs.

Currency affects in three ways: translation, transaction, and competitiveness:

◆ **Translation:** The translation of revenue and profits into a reported currency.

◆ **Transaction:** Vehicles produced in Europe and sold in non-euro countries suffer from revenue deterioration, while the euro-based cost structure remains intact, causing a structural margin impact.

◆ **Competitiveness:** Manufacturers from regions with relative currency weakness have increased flexibility in terms of pricing in export regions. Historically, this has particularly supported the Japanese OEMs in the U.S. and in Europe to a much lesser degree.

Currency risks can be mitigated by hedging strategies, mainly futures and options, which can essentially lock in set exchange rates, but this remains a relatively short-term strategy. Going forward, OEMs are seeking to increase their natural hedging through greater local production and local content. Given the duration of the investment cycle, however, this will not be a quick solution to currency volatility impacts on profitability.

**Financial Services Operations: An Important Source of Earnings**

Over the past decade, automakers' financial services operations have offered growing support to volume and earnings developments. Given the longer-term nature of financing contracts (typically three years), these divisions have also offered a relatively stable source of earnings versus the more cyclical industrial business.

Financial services profitability is basically derived from the interest rate spread on receivables, with other influences being credit losses as well as general administrative costs. Leasing is predominantly U.S.-based, as VAT issues make leasing in Europe a much more expensive option; the U.K. has the highest leasing exposure in Europe. The prospects for a financial services division can be affected by the following:

◆ **Higher cost of capital**: This squeezes interest rate and thus financial services margins, although it depends on the ability to pass the higher cost on to the end consumer.

◆ **Higher delinquencies and defaults**: Difficulty in meeting payments pushes up credit losses. Cyclical highs of credit losses have historically been more than 2%.

◆ **Lower residual values**: For a vehicle coming off lease, a lower value versus expectations affects profits. Write-downs may also be taken to adjust for overly optimistic assumptions on financial services assets. In Europe, this affects the premium names—BMW and Mercedes-Benz—both of which took substantial residual value charges through 2008 on lower U.S. and U.K. used-vehicle prices.

◆ **Credit availability**: Access to financing markets has been a concern for the automakers' financial services arms needing to roll over debt to fund their businesses during the credit crunch. However, national and central bank schemes supported funding through 2008–2009 and conditions have greatly improved, with the average return on equity (ROE) on the assets across the European OEMs back well more than 10% again.

## SUPPLIERS

The automotive supply component comprises manufacturers of factory-installed automotive components, replacement (aftermarket) parts manufacturers, rubber fabricators, and distributors. The aftermarket segment of the industry includes manufacturers that sell replacement parts to repair facilities, individual consumers, service providers, and distributors. The automobiles industry is the primary source of revenues for parts suppliers.

### Mature, Capital-intensive Business

The auto parts segment is a mature and capital-intensive business, with high operating leverage amid volatility in end-market demand and raw material price inputs. Auto suppliers have a highly concentrated OEM customer base. Price pressure is intense given the challenges facing the OEM themselves, and real annual price deterioration is the norm, with flexibility, quality, and innovation expectations high. This follows down through the entire supply chain.

### Added Value, Growth Product Segments Key

Growth rates generally follow automotive production levels, which in mature markets can mean only 1%–2% annual growth. Above-average growth rates can result from market share gains, but more often from increased content per vehicle. This is particularly the case in the specialized areas of safety, comfort, electronics, fuel efficiency, and emissions-related technology. This can be prompted by tighter government legislation or proactively by the OEMs themselves as a competitive advantage, which increasingly becomes an industry standard. Parts suppliers with solid market shares in these growth areas typically have greater pricing resilience versus the more commoditized companies within the industry.

It is important to an OEM that its auto supplier base adds value to its product by investing heavily in research to provide innovative products, while improving manufacturing flexibility and good reliability, and allowing productivity improvement opportunities. The stronger European suppliers generally enjoy premium operating margins, returns, and free cash flow versus U.S. suppliers and even versus the OEMs themselves.

### Focus on Emerging Markets Offers Revenue and Cost Benefits

As the OEMs increase their production footprint in new emerging markets, auto suppliers follow suit. This shift to low-cost countries can generate higher revenue streams and accelerate growth and can help reduce suppliers' production costs. Emerging economies tend to have lower levels of unionized plants than Western markets do, and suppliers do not face the same type of political pressure as OEMs regarding lowering labor costs.

Auto suppliers may also gain access to markedly lower-priced component sources when using overseas production bases, such as Russia. The rise in raw materials prices can be a major challenge for the entire supply chain as well as the OEMs, with little opportunity to pass on any price increases to end customers. An obvious exception would be the tire segment, which has greater potential for price rises given the high degree of replacement sales making up their total demand, the oligopoly structure of the industry, and the increasingly disciplined nature of this segment. Some suppliers have agreements that allow changes in raw material prices (up and down) to be passed on to OEMs, usually with a lag of three to six months.

Other means for suppliers to reduce their cost structure include consolidation and attaining economies of scale, although leading European players already enjoy relatively high market shares, in our view. Consolidation in the industry is sometimes driven by OEMs reducing their number of suppliers by awarding larger contracts in exchange for lower pricing. Improved efficiency gains remain ongoing targets for the industry and areas include increased use of automation and reduction in parts complexity. The outsourcing of non-critical activities and higher collaboration down the supply chain can also reduce the capital intensity of the suppliers' business profile.

**Tough Pricing Environment, but Close OEM Relationship**

Supplier contracts are frequently written for the life of a vehicle model (currently as few as three to five years, from the previous norm of eight); contract terms typically include goals for cost, quality, performance, timing, and product features. The relationship between an auto supplier and an OEM is increasingly close. While price reductions remain part of the business, it makes no sense for OEMs to threaten the financial viability of their supply base by demanding excessive pricing cuts, given the greater disruption to production (and thus earnings) that a financial collapse could cause, and the ongoing need for suppliers to invest heavily in R&D, innovation, and quality.

Some OEMs and Tier 1 suppliers were forced to absorb costs to prop up their supply base after the sharp and pronounced nature of the production cuts from late 2008 (output fell by as much as 40%–50% in one quarter, year on year). This hurt suppliers, given the pressure on working capital.

In CFRA's view, European automotive suppliers typically have a more stable risk profile than U.S. suppliers. This relates to a more diversified customer base, platform and segment coverage, and geographical spread. U.S. suppliers that historically had close relationships with the U.S. OEMs offering significant North America–based volume had suffered disproportionately from the decline of the U.S. Big Three's U.S. volumes over an extended period, the rise of the Japanese transplants, and the relatively limited geographic expansion of the U.S. players versus the European names.

# HOW TO ANALYZE A COMPANY IN THIS INDUSTRY

## QUALITATIVE MEASURES

At CFRA, we recommend a top-down approach to valuation. An examination of the industry drivers outlined on page 7—economic growth and consumer confidence—is a good starting point.

### Industry Drivers

◆ **Economic growth.** The automobiles industry is highly cyclical, so changes in volume tend to correlate with economic conditions. Even if pricing is used to support volume, automakers' earnings and share prices will follow the macro picture. There is typically a close correlation between automotive share-price performances and the key lead indicators such as the German IFO Business Climate Index, the U.S. ISM Manufacturing Index, and consumer confidence data, giving an indication of the possible future direction of the macro environment. In terms of the share-price performance, the industry tends to be early cycle.

◆ **Currency exchange rates.** The industry remains one of the most currency-sensitive industries. Despite increasing local production outside Europe (in the U.S., China, and Brazil) and apparent rising local content ratios, much of the value-added componentry may still be sourced in Europe and, as such, the German automakers remain large net exporters from Europe, with large U.S. dollar and U.K. sterling exposures.

◆ **Commodity prices.** Raw materials have a significant impact on automakers' earnings, both directly through input costs, but can also affect volume and mix through cost of ownership. Manufacturers typically cannot pass higher input costs on to consumers.

### Company Analysis

A number of qualitative and quantitative factors should be considered when evaluating an auto company. A plethora of statistics is available to help track the state of the industry and its participants.

#### Seasons and Cycles

The automobiles industry is a highly cyclical and seasonal one, with the second and fourth quarters typically the strongest volume periods of the year. The industry's profitability also typically follows pronounced macro-related cycles.

#### Geographic Diversity

A company's current geographic spread, as well as its plans for global expansion to emerging markets, is important. On a short-term basis, each country typically produces monthly sales statistics (including data down to the manufacturer level) that can help gauge country sales performance. In Europe, the European Automobile Manufacturers Association (ACEA), a trade group, produces a monthly pan-European summary. Data are also available on most other key global markets, including the U.S., Brazil, and China.

Obviously, an OEM's relative exposure to certain markets is an indication of overall sales prospects. The relative contribution from emerging and mature markets is a key indication of longer-term future growth prospects. However, pricing, and thus, margins, tend to be better in-home markets, particularly at the early stages of development.

**Market Share Evolution and Product Mix**
Market share evolution is important when analyzing an automaker and can typically be highly correlated with model cycles. However, pricing also remains key, as automakers can "buy" share in various ways—by high sales to low-value rental fleets, for example, or by highly incentivized sales, both of which hurt earnings. Model line data can also provide valuable insight when analyzing product mix developments. Pricing and margins tend to be better in the larger segments, with content in general increasing across all segments, but the ability to "price" that in is much more restricted in more compact segments.

A number of factors influence product mix, including changes in regulations, customer preferences, commodity prices, and demographics. Product mix can also be influenced by government-backed scrappage incentives, as was witnessed in 2009, when monetary incentives encouraged a temporary sales shift to small cars, which favored the small carmakers.

**Model Changeovers**
There has typically been a tight inverse correlation between the average age of an automakers' product range and its earnings before interest and tax (EBIT) margin. This effectively means that when an automaker has a young, fresh product range, it is often rewarded with higher production volume, with the obvious operating leverage benefits, as well as improving market share. New models also help improve pricing, as older models increasingly need higher incentives, and increase showroom traffic in general. Production costs also typically fall from one generation model to the next, with greater commonality, lower complexity, and use of modular designs, all helping to reduce costs.

**Pricing: New and Used**
Pricing is a key earnings contributor for autos companies, but is much more difficult to track on an ongoing monthly basis given the lack of consistent data, not least because of variations in the levels of standard equipment. In North America, incentives per vehicle can be monitored using monthly estimates from Autodata; in Europe, however, data are less consistent, so qualitative manufacturer offers/discounts (which are often not specification-adjusted) can be viewed as a gauge. Pricing is highly linked to branding and customer perceptions of quality; customer loyalty offers higher profitability. Typically, higher specification vehicles fitted with more optional extras offer higher profitability than entry-level vehicles.

Used-vehicle pricing is highly important, not just for the implications that it has on the general health of the new-car market and pricing, but more directly for the impact it has on the leasing business and the potential residual value impact. Typically, consumers may require higher discounts on cars that see their value fall away the quickest. When an automaker offers a lease, it includes a value it believes the vehicle will be worth at the end of that lease. Should used vehicle pricing fall notably, the automaker will have to take a provision for that change in asset value. Monthly data in the U.S. is provided by the Manheim Index, which tracks used prices, and by ADESA—North America's premier vehicle auction operator, which provides segment detail.

**Management**
CFRA looks favorably on seasoned management teams that have performed well, compared with their peers, in both good times and bad. However, some executives may be particularly good at containing costs, while others are better at creating new products or managing expansion. In evaluating a company, it is a good idea to look at top management's track record—either at that company or at other firms—and to assess whether the skills demonstrated in the past match up well with the company's current needs or goals. It is worth highlighting, however, that due to the ownership structure of European autos companies—many have high family or government ownership—the ability to carry out what is believed to be the necessary restructuring can often be limited, even for managers with strong track records.

## QUANTITATIVE MEASURES

When assessing any company, it is important to analyze income statement, cash flow, and balance sheet data. The measures of particular importance to autos companies are described below.

**Analyzing the Financial Statements**
Looking at financial statements is important. Sources of information include quarterly and annual reports to shareholders, filings with relevant bodies and reports put out by advisory firms (such as CFRA and ValueLine), and brokerage companies. Investors are increasingly able to hear corporate managements talk about their businesses, via conference calls or company-provided webcasts, often around the time that they release their quarterly earnings. Discussed later in this section are various significant financial considerations one should be aware of when analyzing an automobile company.

**Sustainability of Revenues and Earnings**
When looking at both revenues and profits, one must determine whether contributions to the current results are likely to recur in future periods. If one-time factors have either inflated or depressed results in a prior period, these should be examined as well. Furthermore, some ongoing costs of doing business can change significantly due to macroeconomic and industry factors, or world events.

**Accounting Items to Review**
There are various corporate accounting issues to consider. For example, an analyst should consider if the company has significant pension or employee benefit plans, and if it is accounting for them in a realistic and conservative manner.

## The Income Statement

Among the major items to examine on an automaker's income statement are revenues, gross margins and marketing costs. Automakers typically include them in two different statements. In accordance with financial accounting standards, automakers since 1988 have presented consolidated statements of income. These statements separate and detail the income from, and expenses for, automotive manufacturing and financial services. Automakers can present a second set of financial statements, in which their finance subsidiaries' results are reported on an equity basis. This means that the company's income statement gives only the net operating income for financial services, rather than a detailed breakdown of income and expenses.

**Revenues**
Automakers derive the bulk of their revenues from the sale and financing of light vehicles, which are defined as cars and light trucks weighing less than 10,000 pounds. The key revenue drivers for the automobiles industry are vehicle production and sales volume. For manufacturers, revenues are recognized when vehicles are shipped to dealers. In the short term, they may not match sales; however, over time, sales should act as a leading indicator of production needs. Revenue is based on volume, mix, and pricing. The automobiles industry is highly concentrated and global in nature.

◆ **Sales revenues.** Automobile companies listed on U.S. stock exchanges report their revenues on a quarterly basis. Most revenues are derived from wholesale (or factory) vehicle shipments; these are recorded when automakers ship vehicles to dealerships.

Monthly vehicle sales reports record the retail volume of motor vehicle sales by dealerships. These numbers are disclosed to the public and followed closely by economists, analysts and the media. In the long term, factory shipments and retail sales should balance out. As a practical matter, however, differences usually arise due to the timing of shipments and retail sales, and the impact of imports and exports.

Average revenue per vehicle sold can be tracked by dividing an automaker's revenues from vehicle sales by the number of vehicles shipped during the same period. Generally, the trend should be upward; if an automaker has flat or declining revenues per vehicle, it may have discounted heavily to sustain unit shipments, or it may be selling more of its cheaper models. A sharp rise in revenues per vehicle could indicate that an automaker has seen a shift in production volume to models that are more expensive.

◆ **Financing revenues.** Automakers receive revenues from the dealer inventories and retail customer sales that they finance. In addition to generating revenues, financing is an important sales tool: automakers use their financing divisions to support various marketing initiatives. These include encouraging dealers to keep larger inventories on hand (by offering a favorable interest rate on inventory purchases) and subsidizing customers' vehicle purchases (via rebates, below-market interest rates and the like). U.S. automakers also generate revenues by offering a variety of services, including insurance and extended service contracts.

An automaker's financing revenues may rise or fall with the general level of interest rates without dramatically affecting income from financing operations. This is because the automaker earns a markup on the interest it pays to borrow funds. Auto loans are usually made for a period of 24 to 60 months. Automakers attempt to match their borrowings with loan maturities to minimize their exposure to interest rate fluctuations.

***Watch Out!*** *Companies rely upon estimates to calculate the appropriate provision and allowance related to potentially uncollectible receivables. The estimates are generally based on factors such as an aging of receivables and the financial condition of customers. Because credit loss provisions for financing and trade receivables are based on estimates and because there is not a quantifiable "correct" level for the allowance, such provisions can easily be manipulated to benefit earnings.*

**Gross Margins**

Gross margins in the automobiles industry fluctuate greatly with production volume because many of the costs related to vehicle production are fixed. Even labor costs had become largely fixed because of union contracts, which restricted layoffs or required automakers to pay certain laid-off workers benefits worth up to 95% of their take-home pay. This policy has changed, largely due to the industry's latest financial crisis and government intervention.

Therefore, automakers must sustain relatively high production levels to break even. Once the break-even point has been passed and fixed costs are spread over more units, however, the automaker can earn substantial profits. For each additional unit of production beyond the break-even point, variable profit for high-end vehicles can exceed $10,000 per unit.

Even so, it is rare for an automaker's gross margin to exceed 25% of its revenues. By the time the company has deducted marketing, selling, general and administrative (SG&A) costs, its average return on sales (i.e., net income from operations as a percentage of revenues) may be as little as 5% over the automotive cycle, which may run more than four years. Over the past two decades, U.S. automakers' return on sales has often been even lower due to strenuous competition.

***Watch Out!*** *Companies in the Automobiles 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.*

***Watch Out!*** *Automobile companies generally incur substantial costs related to R&D. Under U.S. GAAP, R&D costs must be expensed as incurred. A sharp decline in R&D costs relative to sales raises concern that a company may be delaying or cutting back on R&D costs in the current period to boost earnings.*

**Marketing Costs**

Marketing costs tend to rise and fall with the underlying level of demand for motor vehicles. Normally, automakers devote about 10% of sales revenue to marketing costs (which may include financial incentives). When attempting to stimulate demand, however, they may spend 14% or more. Nevertheless, when it is clear that demand is declining severely due to recession, automakers may have to face reality and curtail advertising and marketing expenditures.

## The Balance Sheets

As with their income statements, automakers produce two sets of balance sheets. One set uses the full consolidation method, and one accounts for financial operations on an equity basis. An equity balance sheet separates the automaker's financial services operation (which customarily operates with high debt leverage ratios) from its manufacturing operation. Auto investors usually focus on the equity-method balance sheets because these make it easier to determine the financial strength of a company's manufacturing operations.

When studying an automaker's balance sheets, it is easy to be impressed with the strong cash position the company may have accumulated during a favorable economic period. However, when business slows, an automaker's cash position can quickly erode for several reasons. First, the company receives less revenue. Second, the float created by timing differences between the purchase of supplies and materials and payment of accounts payable diminishes, as fewer materials are purchased, and more bills are paid. Third, the automaker must continue to pay its fixed costs even as its business volume decreases. Thus, an automaker can see wide swings in liquidity in a short time.

***Watch Out!*** *Inventory represents one of the most substantial assets on the balance sheets of Automobiles companies and can be a leading indicator of financial condition. Therefore, a company's choices with respect to inventory accounting can have a significant impact on a company's results. Rising inventories are a sign of a business slowdown.*

## Valuation Measures

Valuation measures are used to determine how much a company or its stock is worth. A common measurement is a multiple of projected earnings. Keep in mind that valuations depend on various factors, including overall investor sentiment, industry conditions, the level of interest rates and the extent to which future earnings seem predictable. As is the case with other measures, valuations of a particular company should be compared with those of similar companies in the same industry.

◆ **P/E ratio.** When valuing a company's stock, a good place to start is the basic investment ratio of stock price-to-earnings (P/E) per share, or P/E ratio. This ratio (or multiple) is useful in judging a company's performance relative to firms in the same industry, as well as in other industries.

Historically, automotive P/E expanded during recessions or times of economic weakness that lead to lower profits. During flusher times, P/E ratios will often contract. The reason for this counterintuitive action reflects the cyclical nature of the industry: when profits rise, the multiple contracts in anticipation of the inevitable decrease in profits; when profits fall, the multiple increases.

◆ **P/S ratio.** At times, companies may not have forward earnings to apply P/E multiples to. In such cases, other metrics might come into play, such as price-to-cash flow or enterprise value-to- earnings before interest, taxes, depreciation and amortization (EV/EBITDA) ratios. However, in extreme circumstances (as seen in 2009, for example), these numbers may not be meaningful, and the investor has to rely on price-to-sales (P/S) ratios or discounting to future years' expected profits.

# GLOSSARY

**Aftermarket**—Replacement or add-on purchases for a product after its original sale. The automotive aftermarket includes replacement parts, accessories, lubricants, fuel, appearance products, and repairs.

**Autonomous vehicles (AVs)**—Self-driving cars capable of fully operating without input.

**Diesel engine**—An internal combustion engine that uses diesel oil for fuel. Rather than using a traditional ignition system, it functions by injecting diesel oil into the cylinders when the piston has compressed the air to make it hot enough to ignite the diesel fuel without a spark.

**Electric vehicles (EVs)**—Electric/plug-in vehicles (including hybrids) that use one of more electric motors for propulsion.

**Hybrid**—A vehicle utilizing two distinct but interdependent forms of propulsion, usually a gasoline engine coupled with an electric motor.

**Innovative mobility services (IMS)**—Alternative options for passenger transportation that include car-sharing, ride-hailing, bike-sharing, ridesharing, micro-transit, and scooter sharing programs.

**Internal combustion engine (ICE)**—An engine that generates motive power by the burning of petrol, oil, or other fuel with air inside the engine, the hot gases produced being used to drive a piston or do other work as they expand

**Platform**—Mechanical underpinnings of a vehicle.

**Special purpose acquisition company (SPAC)**—Also known as a “blank check company”, it is a shell corporation listed on a stock exchange with the purpose of acquiring a private company, thus making it public without going through the traditional initial public offering process.

**Tier 1 (T1) suppliers**—Automotive parts manufacturers that supply final equipment directly to automakers (OEMs or original equipment manufacturers). Increasingly, Tier 1 suppliers are becoming “systems integrators” or producers of major subassemblies and modular components that can be installed into a vehicle as a unit, such as a complete chassis.

**Tier 2 (T2) suppliers**—Manufacturers that produce components for Tier 1 suppliers.

**Tier 3 (T3) suppliers**—Manufacturers that supply raw materials used in the production of components.

**Transplant**—A production facility operated by an automaker outside its native country. The term often refers to cars or trucks with a foreign nameplate made within a country where it will be distributed.

**Original equipment manufacturer (OEM)**—A company whose goods are used as components in the products of another company, which then sells the finished item to users.

# INDUSTRY REFERENCES

## TRADE ASSOCIATIONS

***China Association of Automobile Manufacturers (CAAM)***
www.caam.org.cn/
A non-profit social organization that represents firms engaged in the production and management of automobiles, auto parts, and vehicle-related industries within China.

***European Automobile Manufacturers Association (ACEA)***
www.acea.be
Representing 13 of Europe's biggest auto, bus, and truck manufacturers, ACEA issues monthly and annual registration figures for Western Europe.

***International Organization of Motor Vehicle Manufacturers (OICA)***
www.oica.net/
An international trade association founded in 1919 in Paris whose members are 39 national automotive industry trade associations.

***National Automobile Dealers Association (NADA)***
www.nada.org/
Represents all franchised new-car dealers (domestic and import) before Congress, federal agencies, the media, and the general public, and provides education and guidance on regulatory matters.

## RESEARCH FIRMS

***Borrell Associates***
borrellassociates.com/
Tracks local advertising throughout North America and the U.K. and provides detailed reports and forecasts for local media companies.

***Brookings Institute***
www.brookings.edu/
A non-profit firm that conducts research and education in the social sciences, primarily in economics, metropolitan policy, governance, foreign policy, and global economy and development.

***Center for Automotive Research (CAR)***
www.cargroup.org/
An independent, non-profit organization producing industry-driven automotive research and fostering dialogue on issues facing the automotive industry.

***CEIC Data***
www.ceicdata.com/en
Provides data and insights into both developed and developing economies around the world.

***Consumer Reports***
www.consumereports.org
An American non-profit consumer organization dedicated to independent product testing, investigative journalism, consumer-oriented research, public education, and consumer advocacy.

***EV-volumes.com***
www.ev-volumes.com
Publishes reports and data on the electric vehicle market.

***Experian***
www.experian.com/
A consumer credit reporting company that collects and aggregates information on over one billion people and businesses around the world.

***J.D. Power***
www.jdpower.com
An international marketing and information firm that studies consumer opinion and customer satisfaction, and supplies statistics and survey information on the auto industry. (J.D. Power is a unit of McGraw Hill Financial.)

***LMC Automotive Ltd.***
www.lmc-auto.com
Provides global and national automotive production, sales, and powertrain forecasts, and automotive market intelligence.

***PricewaterhouseCoopers (PwC)***
www.pwc.com
A consulting firm that provides industry information, trends, and forecasts.

***The Conference Board, Inc.***
www.conference-board.org
Publishes monthly consumer confidence surveys, which measure consumer sentiment.

## GOVERNMENT AGENCIES

***Bureau of Economic Analysis (BEA)***
www.bea.gov
Produces and disseminates statistics that provide a comprehensive, up-to-date picture of U.S. economic activity.

***Environmental Protection Agency (EPA)***
www.epa.gov/
An independent agency, specifically an independent executive agency, of the U.S. federal government for environmental protection.

***International Energy Agency (IEA)***
www.iea.org
An autonomous organization that works to ensure reliable, affordable, and clean energy for its 30 member countries and beyond.

***The World Bank***
www.worldbank.org/
A vital source of financial and technical assistance to developing countries around the world, comprising five institutions managed by their member countries.

**ONLINE RESOURCES**

***Autolist***
www.autolist.com/
An automotive classified advertising business that specializes in new and second-hand automotive sales.

***Auto Trader***
www.autotrader.co.uk/
An automotive classified advertising business that specializes in new and second-hand automotive sales.

***DealerSocket***
www.dealersocket.com/
A solution provider for automotive CRM, websites, inventory management, and DMS for independent car dealers.

***Factorywarrantylist.com***
www.factorywarrantylist.com
An automotive resource for dealers and consumers alike, modified by suggestions from new car customers and dealerships nationwide.

***Financial Times***
www.ft.com
A British daily news organization that focuses on business and economic current affairs.

***MediaPost***
www.mediapost.com/
An online publishing resource providing news, articles, and commentary.

# COMPARATIVE COMPANY ANALYSIS

**Operating Revenues**

| | | | Million $ | | | | | | | CAGR(%) | | | Index Basis (2011=100) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ticker | Company | Yr. End | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 10-Yr. | 5-Yr. | 1-Yr. | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 |
| TSLA | TESLA, INC. | DEC | 53,823.0 | 31,536.0 | 24,578.0 | 21,461.0 | 11,759.0 | 7,000.1 | 4,046.0 | 74.6 | 50.4 | 70.7 | 1330 | 779 | 607 | 530 | 291 | 173 |
| 7203 | TOYOTA MOTOR CORPORATION | MAR | 258,407.9 | 246,065.5 | 277,565.0 | 272,770.3 | 276,630.2 | 247,508.5 | 252,786.7 | 3.7 | (0.9) | (8.9) | 102 | 97 | 110 | 108 | 109 | 98 |
| VOW3 | VOLKSWAGEN AG | DEC | 284,544.5 | 272,641.0 | 283,505.8 | 270,035.5 | 275,636.4 | 229,354.0 | 231,650.3 | 4.6 | 2.9 | 12.3 | 123 | 118 | 122 | 117 | 119 | 99 |
| STLA | STELLANTIS N.V. | DEC | 169,929.5 | 58,294.8 | 66,202.4 | 84,757.3 | 74,755.0 | 57,035.8 | 59,382.0 | 9.8 | 22.6 | 213.5 | 286 | 98 | 111 | 143 | 126 | 96 |
| BMW | BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT | DEC | 126,508.6 | 121,088.7 | 116,945.3 | 116,945.3 | 111,816.0 | 99,413.1 | 100,108.6 | 4.9 | 3.4 | 12.4 | 126 | 121 | 117 | 117 | 112 | 99 |
| 1211 | BYD COMPANY LIMITED | DEC | 34,024.2 | 23,986.4 | 18,345.6 | 18,909.6 | 16,277.8 | 14,901.9 | 12,323.3 | 16.0 | 15.9 | 38.0 | 276 | 195 | 149 | 153 | 132 | 121 |
| GM | GENERAL MOTORS COMPANY | DEC | 127,004.0 | 122,485.0 | 137,237.0 | 147,049.0 | 145,588.0 | 149,184.0 | 135,725.0 | (1.7) | (3.2) | 3.7 | 94 | 90 | 101 | 108 | 107 | 110 |
| 7267 | HONDA MOTOR CO., LTD. | MAR | 119,840.4 | 119,083.5 | 138,761.5 | 143,386.1 | 144,636.8 | 125,553.4 | 129,949.7 | 4.0 | (2.0) | (11.8) | 92 | 92 | 107 | 110 | 111 | 97 |
| RACE | FERRARI N.V. | DEC | 4,857.2 | 4,232.2 | 4,226.9 | 3,916.1 | 4,102.9 | 3,277.8 | 3,100.0 | NA | 6.6 | 23.4 | 157 | 137 | 136 | 126 | 132 | 106 |
| 600104 | SAIC MOTOR CORPORATION LIMITED | DEC | 122,760.1 | 113,674.1 | 121,116.8 | 131,176.7 | 133,806.6 | 108,940.0 | 103,265.0 | 6.0 | 0.6 | 5.1 | 119 | 110 | 117 | 127 | 130 | 105 |
| A005380 | HYUNDAI MOTOR COMPANY | DEC | 98,736.2 | 95,562.4 | 91,595.8 | 86,964.0 | 90,217.8 | 77,788.7 | 78,146.3 | 4.2 | 4.7 | 13.1 | 126 | 122 | 117 | 111 | 115 | 100 |
| NIO | NIO INC. | DEC | 5,688.4 | 2,490.3 | 1,123.8 | 719.9 | 0.0 | 0.0 | 0.0 | NA | NA | 122.3 | NA | NA | NA | NA | NA | NA |
| MARUTI | MARUTI SUZUKI INDIA LIMITED | MAR | 11,639.2 | 9,618.9 | 10,047.8 | 12,422.4 | 12,264.2 | 10,507.8 | 8,689.4 | 6.7 | 4.1 | (7.0) | 134 | 111 | 116 | 143 | 141 | 121 |
| F | FORD MOTOR COMPANY | DEC | 136,341.0 | 127,144.0 | 155,900.0 | 160,338.0 | 156,776.0 | 151,800.0 | 149,558.0 | 0.1 | (2.1) | 7.2 | 91 | 85 | 104 | 107 | 105 | 101 |
| 2333 | GREAT WALL MOTOR COMPANY LIMITED | DEC | 21,472.3 | 15,823.9 | 13,817.6 | 14,427.8 | 15,548.5 | 14,202.8 | 11,710.9 | 16.3 | 6.7 | 32.0 | 183 | 135 | 118 | 123 | 133 | 121 |
| 7269 | SUZUKI MOTOR CORPORATION | MAR | 29,385.3 | 28,736.3 | 32,419.8 | 34,938.1 | 35,377.0 | 28,426.4 | 28,307.8 | 2.0 | (0.0) | (8.9) | 104 | 102 | 115 | 123 | 125 | 100 |
| 175 | GEELY AUTOMOBILE HOLDINGS LIMITED | DEC | 15,995.2 | 14,109.3 | 13,988.6 | 15,498.7 | 14,256.2 | 7,737.1 | 4,642.0 | 17.1 | 13.6 | 10.3 | 345 | 304 | 301 | 334 | 307 | 167 |
| PAH3 | PORSCHE AUTOMOBIL HOLDING SE | DEC | 0.0 | 0.0 | 131.3 | 119.1 | 40.8 | 1.1 | 0.0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Note: Data as originally reported. CAGR-Compound annual growth rate. #Of the following calendar year.
Souce: S&P Capital IQ.

## Net Income

| | | | Million $ | | | | | | | CAGR(%) | | | Index Basis (2011=100) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ticker | Company | Yr. End | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 10-Yr. | 5-Yr. | 1-Yr. | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 |
| TSLA | TESLA, INC. | DEC | 5,519.0 | 721.0 | (862.0) | (976.0) | (1,962.0) | (674.9) | (888.7) | NA | NM | 665.5 | (621) | (81) | 97 | 110 | 221 | 76 |
| 7203 | TOYOTA MOTOR CORPORATION | MAR | 23,470.4 | 20,300.9 | 18,922.9 | 16,991.9 | 23,482.7 | 16,422.5 | 20,582.9 | 18.6 | (0.6) | 10.3 | 114 | 99 | 92 | 83 | 114 | 80 |
| VOW3 | VOLKSWAGEN AG | DEC | 17,493.5 | 10,846.5 | 15,583.0 | 13,895.1 | 13,752.4 | 5,667.7 | (1,487.9) | (0.0) | 23.4 | 73.5 | NM | (729) | NM | (934) | (924) | (381) |
| STLA | STELLANTIS N.V. | DEC | 16,149.2 | 2,658.1 | 3,592.2 | 3,236.8 | 2,310.3 | 1,826.2 | 976.4 | 37.5 | 52.4 | 553.5 | 1,654 | 272 | 368 | 332 | 237 | 187 |
| BMW | BAYERISCHE MOTOREN WERKE AKTIENGESELLS( | DEC | 14,081.7 | 4,617.7 | 5,515.7 | 5,515.7 | 8,051.3 | 7,244.8 | 6,917.2 | 9.8 | 12.5 | 228.0 | 204 | 67 | 80 | 80 | 116 | 105 |
| 1211 | BYD COMPANY LIMITED | DEC | 479.4 | 648.6 | 231.9 | 404.2 | 625.0 | 727.6 | 434.9 | 8.2 | (9.6) | (28.1) | 110 | 149 | 53 | 93 | 144 | 167 |
| GM | GENERAL MOTORS COMPANY | DEC | 10,019.0 | 6,427.0 | 6,732.0 | 8,014.0 | (3,864.0) | 9,427.0 | 9,687.0 | 0.9 | 1.2 | 55.9 | 103 | 66 | 69 | 83 | (40) | 97 |
| 7267 | HONDA MOTOR CO., LTD. | MAR | 5,822.6 | 5,944.2 | 4,235.5 | 5,507.8 | 9,974.5 | 5,529.8 | 3,066.3 | 2.1 | 13.8 | 44.3 | 190 | 194 | 138 | 180 | 325 | 180 |
| RACE | FERRARI N.V. | DEC | 944.8 | 743.5 | 780.9 | 898.4 | 642.9 | 420.9 | 312.6 | NA | 15.8 | 36.7 | 302 | 238 | 250 | 287 | 206 | 135 |
| 600104 | SAIC MOTOR CORPORATION LIMITED | DEC | 3,861.9 | 3,129.5 | 3,677.1 | 5,235.6 | 5,288.4 | 4,609.5 | 4,589.0 | 2.0 | (5.2) | 20.1 | 84 | 68 | 80 | 114 | 115 | 100 |
| A005380 | HYUNDAI MOTOR COMPANY | DEC | 4,149.2 | 1,308.9 | 2,581.3 | 1,354.7 | 3,775.1 | 4,490.8 | 5,453.4 | (4.3) | (1.8) | 247.0 | 76 | 24 | 47 | 25 | 69 | 82 |
| NIO | NIO INC. | DEC | (1,664.2) | (859.4) | (1,639.1) | (3,391.8) | (1,162.1) | (506.6) | (506.6) | NA | 24.6 | 88.4 | 329 | 170 | 324 | 670 | 229 | 100 |
| MARUTI | MARUTI SUZUKI INDIA LIMITED | MAR | 511.2 | 599.9 | 753.8 | 1,104.0 | 1,210.9 | 1,159.0 | 829.3 | 6.3 | (4.4) | (22.7) | 62 | 72 | 91 | 133 | 146 | 140 |
| F | FORD MOTOR COMPANY | DEC | 17,937.0 | (1,279.0) | 47.0 | 3,677.0 | 7,731.0 | 4,589.0 | 7,373.0 | (1.2) | 31.3 | NM | 243 | (17) | 1 | 50 | 105 | 62 |
| 2333 | GREAT WALL MOTOR COMPANY LIMITED | DEC | 1,058.8 | 821.4 | 645.8 | 757.1 | 772.6 | 1,519.6 | 1,241.3 | 7.0 | (8.6) | 25.4 | 85 | 66 | 52 | 61 | 62 | 122 |
| 7269 | SUZUKI MOTOR CORPORATION | MAR | 1,320.4 | 1,323.9 | 1,247.4 | 1,613.2 | 2,031.3 | 1,434.6 | 1,038.3 | 12.5 | 4.6 | 9.1 | 127 | 128 | 120 | 155 | 196 | 138 |
| 175 | GEELY AUTOMOBILE HOLDINGS LIMITED | DEC | 763.1 | 847.6 | 1,176.2 | 1,825.2 | 1,634.3 | 736.3 | 348.2 | 12.1 | (1.1) | (12.4) | 219 | 243 | 338 | 524 | 469 | 211 |
| PAH3 | PORSCHE AUTOMOBIL HOLDING SE | DEC | 5,192.8 | 3,208.6 | 4,945.6 | 3,997.0 | 3,936.1 | 1,450.4 | (334.5) | 61.9 | 27.1 | 74.1 | NM | (959) | NM | NM | NM | (434) |

Note: Data as originally reported. CAGR-Compound annual growth rate. #Of the following calendar year.
Souce: S&P Capital IQ.

| | | | Return on Revenues (%) | | | | | | Return on Assets (%) | | | | | | Return on Equity(%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ticker** | **Company** | **Yr. End** | **2021** | **2020** | **2019** | **2018** | **2017** | **2016** | **2021** | **2020** | **2019** | **2018** | **2017** | **2016** | **2021** | **2020** | **2019** | **2018** | **2017** | **2016** |
| TSLA | TESLA, INC. | DEC | 10.3 | 2.3 | NM | NM | NM | NM | 8.9 | 1.4 | NM | NM | NM | NM | 20.4 | 5.4 | NM | NM | NM | NM |
| 7203 | TOYOTA MOTOR CORPORATION | MAR | 9.1 | 8.3 | 6.8 | 6.2 | 8.5 | 6.6 | 4.2 | 3.6 | 3.8 | 3.6 | 5.0 | 3.8 | 11.2 | 10.0 | 10.2 | 10.1 | 13.8 | 10.8 |
| VOW3 | VOLKSWAGEN AG | DEC | 6.1 | 4.0 | 5.5 | 5.1 | 5.0 | 2.5 | 2.9 | 1.8 | 2.8 | 2.6 | 2.7 | 1.3 | 11.2 | 7.0 | 11.6 | 10.7 | 11.4 | 5.9 |
| STLA | STELLANTIS N.V. | DEC | 9.5 | 4.6 | 5.4 | 3.8 | 3.1 | 3.2 | 8.3 | 2.9 | 4.6 | 4.6 | 3.3 | 3.8 | 33.0 | 10.2 | 14.1 | 18.2 | 15.0 | 16.0 |
| BMW | BAYERISCHE MOTOREN WERKE AKTIENGESEL | DEC | 11.1 | 3.8 | 4.7 | 7.2 | 8.7 | 7.3 | 5.4 | 1.7 | 2.2 | 3.3 | 4.4 | 3.6 | 18.2 | 6.4 | 8.5 | 12.7 | 17.1 | 15.3 |
| 1211 | BYD COMPANY LIMITED | DEC | 1.4 | 2.7 | 1.3 | 2.1 | 3.8 | 4.9 | 1.0 | 2.1 | 0.8 | 1.4 | 2.3 | 3.5 | 4.7 | 9.5 | 3.4 | 5.9 | 8.5 | 12.0 |
| GM | GENERAL MOTORS COMPANY | DEC | 7.9 | 5.2 | 4.9 | 5.4 | NM | 6.3 | 4.1 | 2.7 | 3.0 | 3.5 | NM | 4.3 | 17.2 | 13.2 | 15.0 | 20.4 | 0.8 | 22.0 |
| 7267 | HONDA MOTOR CO., LTD. | MAR | 4.9 | 5.0 | 3.1 | 3.8 | 6.9 | 4.4 | 2.9 | 3.0 | 2.2 | 3.0 | 5.5 | 3.3 | 7.6 | 7.9 | 6.1 | 8.1 | 14.3 | 9.3 |
| RACE | FERRARI N.V. | DEC | 19.5 | 17.6 | 18.5 | 22.9 | 15.7 | 12.8 | 12.1 | 9.7 | 12.8 | 16.2 | 12.9 | 10.4 | 41.7 | 37.2 | 49.2 | 73.6 | 96.5 | 257.5 |
| 600104 | SAIC MOTOR CORPORATION LIMITED | DEC | 3.1 | 2.8 | 3.0 | 4.0 | 4.0 | 4.2 | 2.7 | 2.2 | 3.0 | 4.6 | 4.8 | 5.4 | 10.6 | 9.6 | 12.1 | 17.4 | 18.6 | 19.7 |
| A005380 | HYUNDAI MOTOR COMPANY | DEC | 4.2 | 1.4 | 2.8 | 1.6 | 4.2 | 5.8 | 2.1 | 0.7 | 1.5 | 0.8 | 2.3 | 3.0 | 7.2 | 2.5 | 4.2 | 2.2 | 6.2 | 8.2 |
| NIO | NIO INC. | DEC | NM | NM | NM | NM | 0.0 | 0.0 | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | 0.0 |
| MARUTI | MARUTI SUZUKI INDIA LIMITED | MAR | 4.4 | 6.2 | 7.5 | 8.9 | 9.9 | 11.0 | 5.2 | 6.2 | 8.9 | 12.0 | 13.1 | 14.5 | 7.2 | 8.6 | 11.8 | 17.1 | 19.8 | 22.2 |
| F | FORD MOTOR COMPANY | DEC | 13.2 | NM | 0.0 | 2.3 | 4.9 | 3.0 | 7.0 | NM | 0.0 | 1.4 | 3.0 | 1.9 | 45.1 | NM | 0.2 | 10.3 | 23.9 | 15.9 |
| 2333 | GREAT WALL MOTOR COMPANY LIMITED | DEC | 4.9 | 5.2 | 4.7 | 5.2 | 5.0 | 10.7 | 3.8 | 3.5 | 4.0 | 4.7 | 4.5 | 11.4 | 11.3 | 9.6 | 8.5 | 10.3 | 10.4 | 24.6 |
| 7269 | SUZUKI MOTOR CORPORATION | MAR | 4.5 | 4.6 | 3.8 | 4.6 | 5.7 | 5.0 | 3.9 | 3.6 | 4.0 | 5.3 | 6.5 | 5.1 | 9.3 | 8.9 | 9.3 | 14.3 | 18.5 | 15.4 |
| 175 | GEELY AUTOMOBILE HOLDINGS LIMITED | DEC | 4.8 | 6.0 | 8.4 | 11.8 | 11.5 | 9.5 | 3.6 | 5.0 | 7.6 | 13.7 | 12.5 | 7.6 | 6.5 | 9.4 | 16.5 | 31.6 | 36.1 | 23.3 |
| PAH3 | PORSCHE AUTOMOBIL HOLDING SE | DEC | 0.0 | 0.0 | 3766.7 | 3356.7 | 9641.2 | 137400.0 | 10.7 | 7.2 | 12.4 | 10.4 | 10.4 | 4.8 | 11.7 | 7.4 | 12.8 | 10.8 | 11.1 | 5.0 |

Note: Data as originally reported. CAGR-Compound annual growth rate. #Of the following calendar year.
Souce: S&P Capital IQ.

| | | | Current Ratio | | | | | | Debt/Capital Ratio(%) | | | | | | Debt as a % of Net Working Capital | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ticker** | **Company** | **Yr. End** | **2021** | **2019** | **2018** | **2017** | **2016** | **2015** | **2021** | **2019** | **2018** | **2017** | **2016** | **2015** | **2021** | **2019** | **2018** | **2017** | **2016** | **2015** |
| TSLA | TESLA, INC. | DEC | 1.4 | 1.1 | 0.8 | 0.9 | 1.1 | 1.0 | 11.9 | 56.1 | 57.3 | 62.7 | 50.6 | 65.1 | 57.9 | 722.5 | NM | NM | 1427.8 | NM |
| 7203 | TOYOTA MOTOR CORPORATION | MAR | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 62.4 | 51.2 | 4.8 | 4.1 | 4.9 | 4.9 | 1409.3 | 2046.9 | 152.8 | 229.5 | 180.0 | 42.6 |
| VOW3 | VOLKSWAGEN AG | DEC | 1.2 | 1.1 | 1.1 | 1.0 | 0.9 | 1.0 | 14.4 | 12.5 | 10.8 | 5.8 | 5.9 | 9.8 | 68.5 | 90.0 | 91.1 | NM | (27.0) | NM |
| STLA | STELLANTIS N.V. | DEC | 1.2 | 1.0 | 0.9 | 0.9 | 1.0 | 1.0 | 26.8 | 29.8 | 25.9 | 28.3 | 28.2 | 25.3 | 207.0 | NM | NM | NM | 678.1 | 2502.4 |
| BMW | BAYERISCHE MOTOREN WERKE AKTIENGESELLS | DEC | 1.1 | 1.1 | 1.2 | 1.0 | 1.0 | 0.9 | 43.8 | 53.7 | 53.1 | 51.9 | 55.4 | 56.6 | 592.5 | 831.0 | 486.6 | 3100.5 | NM | NM |
| 1211 | BYD COMPANY LIMITED | DEC | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.8 | 18.3 | 79.6 | 76.4 | 65.8 | 53.0 | 66.0 | NM | NM | NM | NM | NM | NM |
| GM | GENERAL MOTORS COMPANY | DEC | 1.1 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 20.1 | 24.2 | 24.3 | 27.5 | 19.7 | 18.2 | 214.0 | NM | NM | NM | NM | NM |
| 7267 | HONDA MOTOR CO., LTD. | MAR | 1.5 | 1.3 | 1.2 | 1.2 | 1.2 | 1.1 | 31.6 | 33.8 | 32.6 | 32.0 | 34.7 | 34.7 | 175.7 | 279.4 | 303.2 | 298.3 | 357.0 | 484.5 |
| RACE | FERRARI N.V. | DEC | 1.9 | 1.9 | 1.9 | 1.7 | 1.4 | 1.1 | 48.4 | 52.3 | 53.8 | 65.6 | 81.5 | 150.0 | 128.3 | 131.4 | 132.2 | 171.6 | 263.5 | 1354.5 |
| 600104 | SAIC MOTOR CORPORATION LIMITED | DEC | 1.1 | 1.1 | 1.1 | 1.0 | 1.1 | 1.0 | 34.9 | 33.1 | 32.0 | 22.7 | 21.5 | 17.2 | 202.7 | 229.8 | 259.9 | NM | 162.3 | 309.4 |
| A005380 | HYUNDAI MOTOR COMPANY | DEC | 0.8 | 1.4 | 1.5 | 1.7 | 1.1 | 1.6 | 55.6 | 50.7 | 49.0 | 47.6 | 48.0 | 48.5 | NM | 288.1 | 251.1 | 191.1 | 1485.5 | 205.7 |
| NIO | NIO INC. | DEC | 2.2 | 0.5 | 1.4 | 5.1 | 1.2 | 0.0 | 31.3 | 344.6 | 32.6 | 8.3 | 5.8 | NA | 43.5 | NM | 84.9 | 10.9 | 38.4 | NA |
| MARUTI | MARUTI SUZUKI INDIA LIMITED | MAR | 1.0 | 0.7 | 0.9 | 0.5 | 0.7 | 0.7 | 0.7 | 0.3 | 0.5 | 0.4 | 1.6 | 0.4 | NM | (4.8) | (13.8) | (2.3) | (13.0) | (4.4) |
| F | FORD MOTOR COMPANY | DEC | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 26.0 | 29.7 | 26.0 | 29.8 | 34.2 | 29.8 | 93.0 | 87.5 | 65.2 | 65.6 | 80.0 | 58.7 |
| 2333 | GREAT WALL MOTOR COMPANY LIMITED | DEC | 1.1 | 1.3 | 1.2 | 1.2 | 1.2 | 1.3 | 23.3 | 7.9 | 27.3 | 27.1 | 0.6 | 0.9 | 135.8 | 31.7 | 127.3 | 129.3 | 2.8 | 4.1 |
| 7269 | SUZUKI MOTOR CORPORATION | MAR | 1.6 | 1.3 | 1.2 | 1.6 | 1.6 | 1.4 | 21.1 | 16.3 | 16.1 | 24.5 | 28.7 | 32.0 | 72.8 | 104.0 | 110.2 | 69.4 | 67.7 | 95.4 |
| 175 | GEELY AUTOMOBILE HOLDINGS LIMITED | DEC | 1.1 | 1.0 | 1.0 | 1.1 | 1.2 | 1.2 | 2.6 | 7.0 | 7.2 | 3.7 | 8.4 | 8.9 | 38.4 | 278.9 | NM | 41.7 | 33.9 | 39.4 |
| PAH3 | PORSCHE AUTOMOBIL HOLDING SE | DEC | 6.4 | 6.7 | 6.9 | 7.6 | 4.1 | 13.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 1.9 | 1.5 | 1.4 | 0.0 | 16.1 |

Note: Data as originally reported. CAGR-Compound annual growth rate. #Of the following calendar year.
Souce: S&P Capital IQ.

| | | | Price/Earnings Ratio (High-Low) | | | | | | | | | | | | Dividend Payout Ratio(%) | | | | | | Dividend Yield(High-Low, %) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ticker | Company | Yr. End | 2021 | | 2020 | | 2019 | | 2018 | | 2017 | | 2016 | | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2021 | | 2020 | | 2019 | | 2018 | | 2017 | | 2016 | |
| TSLA | TESLA, INC. | DEC | 220 | 100 | 940 | 98 | NM | NM | NM | NM | NM | NM | NM | NM | 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 |
| 7203 | TOYOTA MOTOR CORPORATION | MAR | 11 | 8 | 11 | 8 | 12 | 9 | 9 | 7 | 12 | 8 | 12 | 8 | 0 | 28 | 30 | 34 | 25 | 35 | 2.8 | 2.0 | 3.7 | 2.6 | 3.5 | 2.8 | 3.6 | 2.8 | 3.7 | 2.7 | 4.2 | 2.9 |
| VOW3 | VOLKSWAGEN AG | DEC | 8 | 5 | 11 | 5 | 7 | 5 | 8 | 6 | 8 | 6 | 14 | 9 | 19 | 33 | 21 | 20 | 12 | 7 | 5.3 | 2.5 | 3.5 | 2.0 | 5.6 | 2.6 | 3.5 | 2.6 | 3.0 | 1.1 | 1.6 | 0.1 |
| STLA | STELLANTIS N.V. | DEC | 4 | 3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2 | 0 | 19 | 17 | 22 | 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 |
| BMW | BAYERISCHE MOTOREN WERKE AKTIENGESELLSCH | DEC | 5 | 4 | 13 | 7 | 10 | 8 | 9 | 7 | 7 | 6 | 9 | 6 | 10 | 44 | 47 | 38 | 27 | 31 | 7.7 | 1.9 | 3.7 | 2.0 | 8.7 | 3.3 | 6.0 | 4.5 | 5.5 | 3.6 | 4.5 | 3.5 |
| 1211 | BYD COMPANY LIMITED | DEC | 299 | 133 | 141 | 23 | 119 | 74 | 83 | 44 | 57 | 29 | 30 | 17 | 80 | 86 | 263 | 141 | 77 | 62 | 0.1 | 0.0 | 0.1 | 0.0 | 0.7 | 0.0 | 0.6 | 0.3 | 1.5 | 0.3 | 2.0 | 0.8 |
| GM | GENERAL MOTORS COMPANY | DEC | 10 | 6 | 11 | 4 | 9 | 7 | 8 | 5 | NM | NM | 6 | 4 | 0 | 10 | 35 | 28 | NM | 25 | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | 0.0 | 4.7 | 3.7 | 5.0 | 3.4 | 4.7 | 3.3 |
| 7267 | HONDA MOTOR CO., LTD. | MAR | 9 | 6 | 12 | 9 | 11 | 8 | 7 | 5 | 11 | 7 | 23 | 14 | 27 | 22 | 43 | 32 | 16 | 26 | 3.6 | 2.4 | 5.2 | 1.6 | 4.6 | 3.5 | 4.1 | 2.6 | 3.2 | 2.3 | 3.6 | 2.5 |
| RACE | FERRARI N.V. | DEC | 61 | 42 | 69 | 39 | 46 | 26 | 36 | 23 | 42 | 20 | 28 | 15 | 19 | 34 | 28 | 17 | 22 | 22 | 0.8 | 0.4 | 0.7 | 0.4 | 1.0 | 0.6 | 0.9 | 0.6 | 0.8 | 0.6 | 1.0 | 0.6 |
| 600104 | SAIC MOTOR CORPORATION LIMITED | DEC | 12 | 9 | 16 | 10 | 14 | 10 | 12 | 8 | 12 | 8 | 9 | 6 | 38 | 61 | 65 | 64 | 60 | 49 | 4.3 | 2.8 | 4.5 | 2.7 | 7.1 | 3.1 | 7.8 | 4.7 | 7.4 | 4.4 | 6.0 | 4.4 |
| A005380 | HYUNDAI MOTOR COMPANY | DEC | 14 | 10 | 36 | 12 | 13 | 10 | 29 | 16 | 11 | 9 | 8 | 6 | 24 | 63 | 38 | 75 | 28 | 20 | 3.1 | 0.9 | 2.2 | 0.9 | 6.1 | 2.1 | 3.7 | 2.8 | 4.3 | 2.4 | 3.0 | 2.4 |
| NIO | NIO INC. | DEC | NM | NM | NM | NM | NM | NM | 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 |
| MARUTI | MARUTI SUZUKI INDIA LIMITED | MAR | 57 | 28 | 41 | 22 | 39 | 26 | 38 | 23 | 25 | 14 | 26 | 18 | 35 | 41 | 43 | 32 | 29 | 14 | 0.9 | 0.5 | 2.0 | 0.7 | 1.5 | 1.0 | 1.2 | 0.8 | 1.2 | 0.5 | 0.9 | 0.6 |
| F | FORD MOTOR COMPANY | DEC | 5 | 2 | NM | NM | 888 | 647 | 14 | 8 | 7 | 5 | 12 | 10 | 2 | NM | 5083 | 74 | 31 | 52 | 3.2 | 1.6 | 2.6 | 0.0 | 6.7 | 0.0 | 7.9 | 5.7 | 8.3 | 5.5 | 6.2 | 4.9 |
| 2333 | GREAT WALL MOTOR COMPANY LIMITED | DEC | 52 | 24 | 38 | 7 | 15 | 9 | 18 | 7 | 21 | 13 | 8 | 4 | 87 | 47 | 63 | 39 | 67 | 16 | 6.6 | 2.3 | 2.6 | 0.9 | 8.2 | 1.8 | 6.8 | 2.8 | 5.9 | 2.6 | 5.0 | 0.0 |
| 7269 | SUZUKI MOTOR CORPORATION | MAR | 19 | 8 | 19 | 9 | 19 | 12 | 14 | 9 | 13 | 7 | 20 | 11 | 30 | 28 | 25 | 20 | 12 | 9 | 2.6 | 1.4 | 3.0 | 1.3 | 1.9 | 1.3 | 1.4 | 1.0 | 1.0 | 0.7 | 1.2 | 0.8 |
| 175 | GEELY AUTOMOBILE HOLDINGS LIMITED | DEC | 70 | 37 | 42 | 18 | 21 | 11 | 20 | 9 | 24 | 6 | 16 | 5 | 36 | 41 | 34 | 17 | 9 | 5 | 1.9 | 0.8 | 1.4 | 0.7 | 3.5 | 1.0 | 3.3 | 1.8 | 2.2 | 0.4 | 1.2 | 0.3 |
| PAH3 | PORSCHE AUTOMOBIL HOLDING SE | DEC | 7 | 4 | 8 | 4 | 5 | 3 | 7 | 4 | 7 | 4 | 12 | 8 | 15 | 26 | 15 | 15 | 9 | 22 | 3.6 | 2.3 | 4.1 | 2.2 | 7.3 | 3.2 | 4.0 | 2.9 | 3.5 | 1.3 | 2.2 | 1.4 |

Note: Data as originally reported. CAGR-Compound annual growth rate. #Of the following calendar year.
Souce: S&P Capital IQ.

| | | | Earnings per Share($) | | | | | | Tangible Book Value per Share($) | | | | | | Share Price (High-Low, Respective currencies) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ticker | Company | Yr. End | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2021 | | | 2020 | | | 2019 | | | 2018 | | | 2017 | | | 2016 | | | | | | | | |
| TSLA | TESLA, INC. | MAR | 4.90 | 0.64 | (0.98) | (1.14) | (2.37) | (0.94) | 28.78 | 22.61 | 6.72 | 5.30 | 4.52 | 5.42 | 1243.49 | - | 539.49 | 718.72 | - | 70.10 | 87.06 | - | 35.40 | 77.49 | - | 48.92 | 77.92 | - | 42.19 | 53.87 | - | 28.21 | | | | | |
| 7203 | TOYOTA MOTOR CORPORATION | MAR | 1.69 | 1.45 | 1.34 | 1.16 | 1.57 | 1.07 | 14.97 | 14.42 | 13.60 | 12.33 | 12.12 | 10.56 | 2188.00 | - | 1443.20 | 1609.00 | - | 1154.20 | 1589.80 | - | 1232.20 | 1561.20 | - | 1209.00 | 1462.40 | - | 1134.00 | 1499.00 | - | 983.40 | | | | | |
| VOW3 | VOLKSWAGEN AG | MAR | 33.67 | 20.34 | 29.88 | 27.01 | 26.78 | 10.83 | 151.46 | 144.17 | 124.39 | 119.92 | 108.82 | 63.36 | 252.20 | - | 141.76 | 186.84 | - | 79.38 | 187.74 | - | 134.08 | 192.46 | - | 131.44 | 179.30 | - | 124.75 | 140.00 | - | 92.70 | | | | | |
| STLA | STELLANTIS N.V. | DEC | 5.12 | 1.64 | 2.19 | 3.45 | 2.45 | 2.04 | 3.39 | 8.65 | 5.61 | 5.48 | 4.00 | 7.06 | 18.74 | - | 11.96 | 0.00 | - | 0.00 | 0.00 | - | 0.00 | 0.00 | - | 0.00 | 0.00 | - | 0.00 | 0.00 | - | 0.00 | | | | | |
| BMW | BAYERISCHE MOTOREN WERKE AKTIENGESELLSC | MAR | 21.35 | 7.01 | 8.38 | 8.38 | 12.24 | 11.03 | 105.55 | 90.02 | 81.16 | 81.16 | 81.21 | 62.57 | 96.39 | - | 68.21 | 77.31 | - | 36.60 | 78.30 | - | 58.04 | 97.50 | - | 69.12 | 91.76 | - | 77.07 | 94.71 | - | 63.38 | | | | | |
| 1211 | BYD COMPANY LIMITED | MAR | 0.17 | 0.23 | 0.07 | 0.14 | 0.22 | 0.27 | 4.21 | 2.53 | 2.32 | 2.34 | 2.53 | 2.23 | 324.60 | - | 138.40 | 212.00 | - | 33.50 | 60.10 | - | 36.20 | 77.75 | - | 39.90 | 83.70 | - | 40.70 | 57.25 | - | 32.05 | | | | | |
| GM | GENERAL MOTORS COMPANY | MAR | 6.70 | 4.33 | 4.57 | 5.53 | (2.60) | 6.00 | 36.44 | 28.43 | 26.04 | 23.77 | 20.82 | 25.12 | 65.18 | - | 40.04 | 46.71 | - | 14.33 | 41.90 | - | 32.20 | 45.52 | - | 30.56 | 46.76 | - | 31.92 | 37.74 | - | 26.69 | | | | | |
| 7267 | HONDA MOTOR CO., LTD. | MAR | 3.39 | 3.44 | 2.42 | 3.12 | 5.56 | 3.07 | 46.33 | 46.79 | 42.41 | 41.72 | 41.25 | 35.51 | 3677.00 | - | 2743.00 | 3167.00 | - | 2120.00 | 3290.00 | - | 2412.00 | 4151.00 | - | 2733.00 | 3936.00 | - | 3000.00 | 3846.00 | - | 2417.00 | | | | | |
| RACE | FERRARI N.V. | MAR | 5.12 | 4.01 | 4.16 | 4.74 | 3.39 | 2.23 | 8.60 | 6.35 | 3.99 | 3.22 | (0.25) | (2.75) | 278.78 | - | 183.82 | 233.66 | - | 127.73 | 172.89 | - | 96.62 | 149.85 | - | 93.85 | 121.14 | - | 57.56 | 58.86 | - | 31.66 | | | | | |
| 600104 | SAIC MOTOR CORPORATION LIMITED | MAR | 0.33 | 0.27 | 0.31 | 0.45 | 0.45 | 0.42 | 3.48 | 3.21 | 2.86 | 2.72 | 2.80 | 2.36 | 27.32 | - | 18.03 | 28.80 | - | 16.90 | 30.30 | - | 22.49 | 37.66 | - | 24.13 | 34.23 | - | 23.57 | 26.55 | - | 17.60 | | | | | |
| A005380 | HYUNDAI MOTOR COMPANY | MAR | 15.94 | 5.02 | 9.80 | 5.06 | 14.04 | 16.71 | 275.94 | 279.49 | 264.89 | 263.32 | 275.86 | 236.97 | 289000.00 | - | 189000.00 | 199000.00 | - | 65000.00 | 143500.00 | - | 113000.00 | 167500.00 | - | 92500.00 | 173000.00 | - | 133000.00 | 159500.00 | - | 126500.00 | | | | | |
| NIO | NIO INC. | DEC | (1.06) | (0.73) | (1.59) | (10.21) | (53.31) | (30.34) | 3.31 | 2.63 | (0.88) | 0.92 | (74.80) | (31.69) | 66.99 | - | 27.52 | 57.20 | - | 2.11 | 10.64 | - | 1.19 | 13.80 | - | 5.35 | 0.00 | - | 0.00 | 0.00 | - | 0.00 | | | | | |
| MARUTI | MARUTI SUZUKI INDIA LIMITED | MAR | 1.69 | 1.99 | 2.50 | 3.65 | 4.01 | 3.84 | 23.86 | 23.52 | 21.54 | 22.28 | 21.49 | 18.75 | 8368.00 | - | 6400.00 | 8013.15 | - | 4001.10 | 7758.70 | - | 5446.05 | 9929.00 | - | 6500.00 | 9996.40 | - | 5267.80 | 5974.00 | - | 3193.25 | | | | | |
| F | FORD MOTOR COMPANY | MAR | 4.45 | (0.32) | 0.01 | 0.92 | 1.93 | 1.15 | 12.12 | 7.61 | 8.25 | 8.72 | 8.70 | 7.15 | 21.49 | - | 8.43 | 9.50 | - | 3.96 | 10.56 | - | 7.48 | 13.48 | - | 7.41 | 13.27 | - | 10.47 | 14.22 | - | 11.02 | | | | | |
| 2333 | GREAT WALL MOTOR COMPANY LIMITED | MAR | 0.11 | 0.09 | 0.07 | 0.08 | 0.08 | 0.17 | 0.94 | 0.86 | 0.78 | 0.78 | 0.77 | 0.70 | 39.00 | - | 17.16 | 27.25 | - | 3.85 | 7.26 | - | 4.15 | 10.28 | - | 3.96 | 12.08 | - | 7.12 | 9.24 | - | 4.94 | | | | | |
| 7269 | SUZUKI MOTOR CORPORATION | MAR | 2.72 | 2.73 | 2.66 | 3.57 | 4.46 | 3.25 | 31.79 | 31.38 | 28.46 | 27.20 | 27.61 | 22.71 | 5520.00 | - | 4054.00 | 5816.00 | - | 2438.00 | 5986.00 | - | 3501.00 | 7680.00 | - | 5056.00 | 6627.00 | - | 4133.00 | 4227.00 | - | 2450.00 | | | | | |
| 175 | GEELY AUTOMOBILE HOLDINGS LIMITED | DEC | 0.08 | 0.09 | 0.13 | 0.20 | 0.18 | 0.08 | 1.08 | 0.99 | 0.85 | 0.73 | 0.59 | 0.40 | 36.45 | - | 17.34 | 26.90 | - | 10.00 | 19.14 | - | 10.08 | 28.75 | - | 12.84 | 29.80 | - | 7.39 | 9.20 | - | 2.76 | | | | | |
| PAH3 | PORSCHE AUTOMOBIL HOLDING SE | MAR | 16.96 | 10.48 | 16.15 | 13.05 | 12.85 | 4.74 | 156.70 | 142.67 | 128.41 | 123.97 | 121.38 | 96.15 | 102.00 | - | 54.06 | 70.66 | - | 28.28 | 70.18 | - | 49.89 | 80.28 | - | 50.10 | 72.09 | - | 47.28 | 54.04 | - | 35.94 | | | | | |

Note: Data as originally reported. CAGR-Compound annual growth rate. #Of the following calendar year.
Souce: S&P Capital IQ.

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