

READING THE METER

*A look inside a cleaner, safer,
smarter auto industry.*



ALLIANCE FOR AUTOMOTIVE INNOVATION

Contents – January 6, 2021

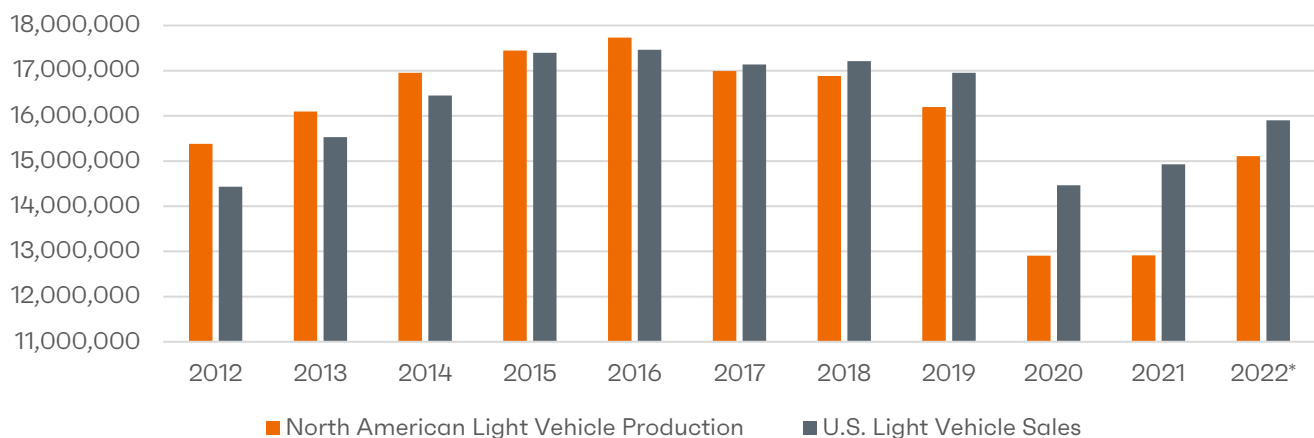
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Forecast Meter

Sales & Production Summary and Forecast (Updated 1/6/22)

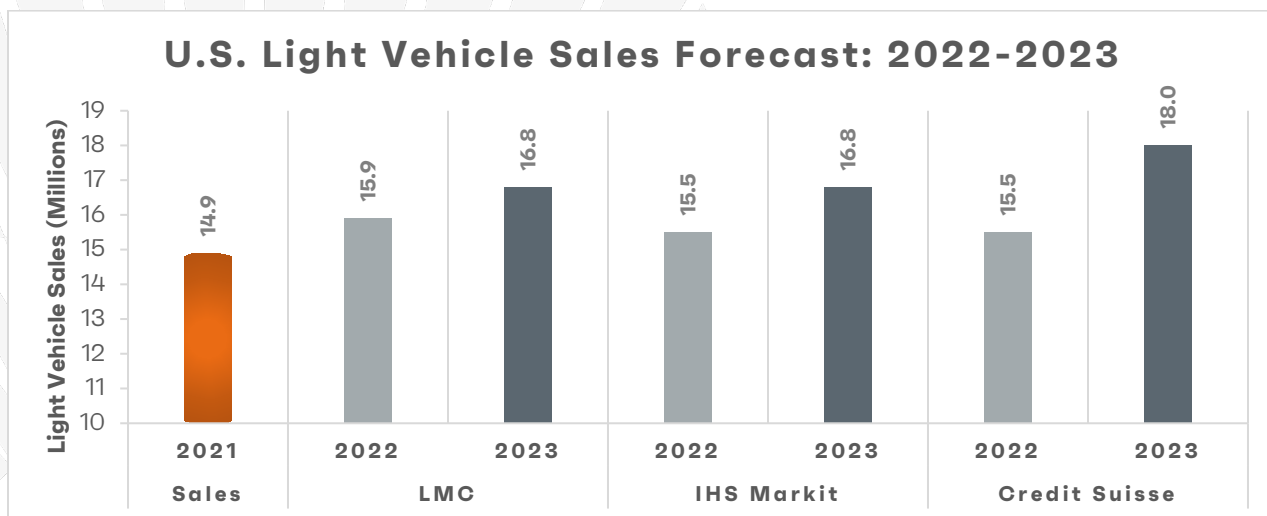
2021-2022 Sales, ¹ Extended Sales Forecast ² and Production Forecasts ³		
	U.S. Sales & Forecasts	North American Production
January '21	1,094,689 (-3.6% YoY)	1,175,940 (-14.0% YoY)
February '21	1,180,506 (-5.3% YoY)	1,120,200 (-22.9% YoY)
March '21	1,581,067 (+59.7% YoY)	1,376,904 (31% YoY)
April '21	1,512,186 (+111.4 YoY)	1,094,891 (-21% YoY)
May '21	1,577,941 (+41% YoY)	729,879 (+271% YoY)
June '21	1,296,517 (+17% YoY)	1,107,958 (-1.9% YoY)
July '21	1,288,494 (-7.9% YoY)	926,035 (3% YoY)
August '21	1,090,446 (-11% YoY)	1,113,327 (-19% YoY)
September '21	1,006,875 (-25% YoY)	907,470 (-33.4% YoY)
October '21	1,046,282 (-20% YoY)	1,140,383 (-22.1% YoY)
November '21	1,001,351, (-20% YoY)	1,168,245 (-9% YoY)
December '21	1,194,313 (-22.9% YoY)	1,008,6000 (-16% YoY) (forecast)
1st Quarter '21	3,869,872 (+11.3 YoY)	3,688,512 (-4.7% YoY)
2nd Quarter '21	4,153,855 (+20.2% YoY)	3,309,000 (132% YoY)
3rd Quarter '21	3,377,045 (-13% YoY)	2,930,000 (-26.7% YoY)
4th Quarter '21	3,249,377 (+139% YoY)	3,322,100 (-15.7% YoY) (forecast)
2021 Full Year	14,926,933 (+3.1% YoY)	13,361,400 (0.0004% YoY) (forecast)
2022 Full Year Estimate	15.9 million units (+7% YoY)	15,107,419 (+17% YoY)

North American Production And U.S. Light Vehicle Sales



U.S. Light Vehicle Sales Outlook (Updated 1/6)

Wards Intelligence Outlook (1/6)⁴: “The speed new-vehicle availability increases will determine how quickly sales resume consistent month-to-month growth and begin meeting the pent-up demand created over the past two years due directly to the pandemic in 2020 and its impact on the supply chain in 2021. U.S. light-vehicle inventory ended December at 1.12 million units, 7.4% above November’s 1.05 million units, and 59% below like-2020’s 2.75 million. It’s also the highest level since the same total in July and marks the third straight increase since September’s rock-bottom 973,000 units. Initial modeling indicates January U.S. light-vehicle sales will total close to 900,000 units for a seasonally adjusted annual rate of 13.2 million, which would be the first month-to-month increase since October, and best results since 14.7 million in July. Wards Intelligence/LMC Automotive forecasts 2022 sales to total 15.9 million units. Based on the sales outlook, including sequential volume gains in each quarter, and on forecast production for the U.S. market, inventory should continue growing through the end of the year. . . . Until inventory begins to greatly improve for more affordable vehicles, sales could stay relatively flat with Q4-2021.”



North American Production & Inventory Outlook (Updated 12/22)

Wards Intelligence December Production Outlook (12/22)⁵: “Total vehicle production in North America in Q1-2022 is projected to nearly match the same-period year-ago, likely a precursor to long-term growth. Combined production of light-vehicles and medium- and heavy-duty trucks is expected to total 3.70 million units in January-March 2022, a smidgeon below Q-2021’s 3.72 million units. Although improving, global supply-chain disruptions continue to create a high-risk environment for production planners, and the increase in cases of the Covid-19 Omicron variant, which some experts expect to accelerate after the December holiday season, poses the biggest potential headwind to

automakers in Q1-2022. Compared to most other regions, the production cuts in North America due to the disruptions – semiconductor shortages in particular – greatly improved over the past couple months. Production in November finished 10,000 units below expectations, a relatively miniscule amount compared with the shortfalls throughout most of 2021. Furthermore, the production outlook in December is tracking nearly even with month-ago’s expectations for the period, while revisions to some big-truck totals initially estimated for October increased that month’s final tally some 4,900 units. In total, Q4-2021 is tracking to production of 3.32 million units, 15.7% below year-ago’s total, and a slight paring of 6,800 units from last month’s outlook for the period. Light-vehicle output is pegged at 3.20 million in Q4, 16.1% below like-2020, and a cut from prior expectations of 14,300 units.

“Light-vehicle production in 2021 is tracking to 12.889 million units, 0.5% below the prior year’s 12.951 million. Light-vehicle production was last lower in 2010 – 11.910 million units.”

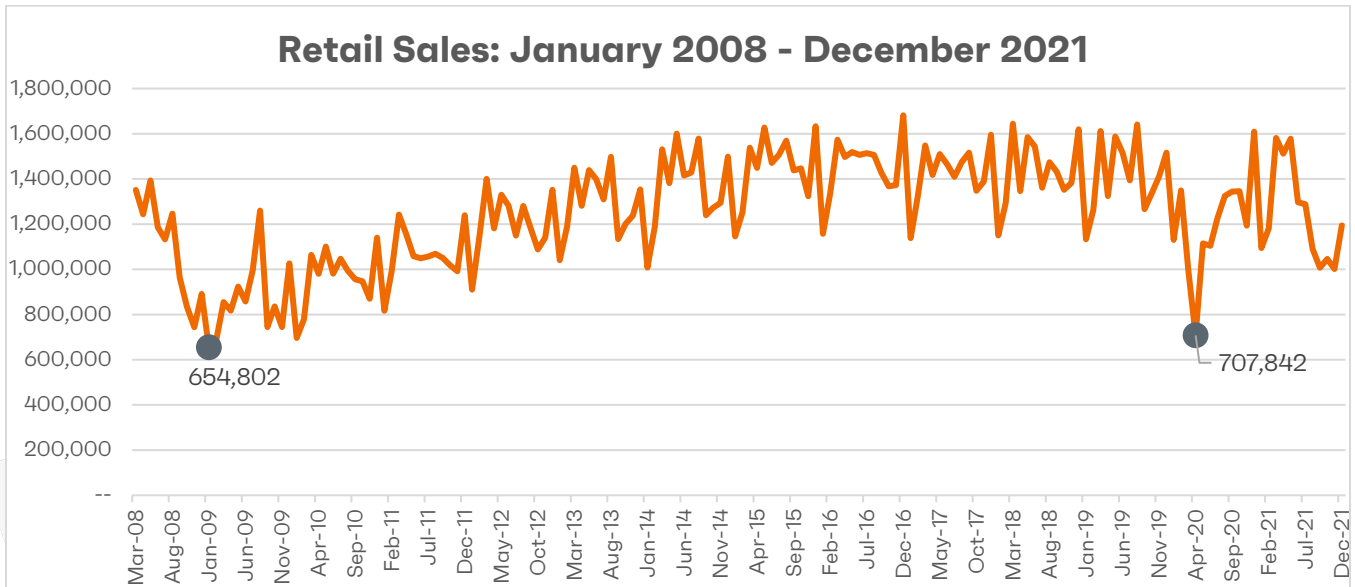
IHS Markit North American Outlook 2022 (12/15) ⁶: “The outlook for North America light vehicle production was reduced by 18,000 units for 2021 and was largely unchanged for 2022 (and was increased by 91,000 units for 2023). The forecast revisions for 2021 continue to be primarily driven by semiconductor challenges and other supply chain issues taking a greater toll on production in the region. On a positive note, mass downtime announcements have slowed dramatically with production in fourth quarter 2021 expected to mark an improvement over the second and third quarters, though remaining worse off than the first quarter. Despite improving momentum heading into 2022, the production outlook remains largely unchanged for 2022 at 15.2 million units. The December 2021 forecast continues to reflect weakness more heavily weighted in the first half as expectations are for the supply of semiconductors to improve throughout the year. While production is projected to improve relative to 2020 and 2021, output will remain constrained by not only the shortage of semiconductors and their long lead times, but other supply chain, logistics and worker related issues hampering a return to more normalized production levels. Additional support for 2022 production comes from 29 all-new or localized vehicles being added to the region. Of note, production in 2023 was revised higher by 0.5% or 91,000 units with the increase associated with a stronger outlook for Tesla.”

Market Meter

U.S. Light Vehicle Sales (Updated 1/6)

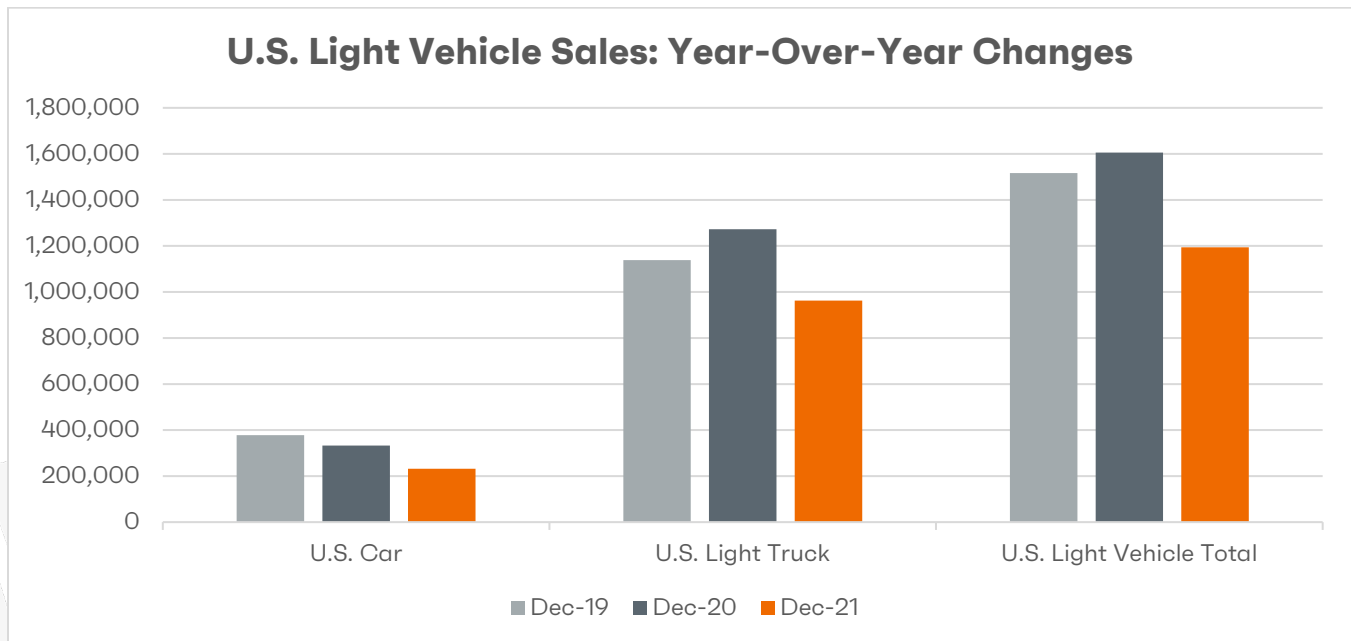
Monthly Sales (Updated 1/6)

This chart helps to put into context the monthly retail sales due to the COVID pandemic and showing the relative drop in sales compared to the 2008 financial crisis.



December Sales (Updated 12/2)

WardsIntelligence⁷: “For the second straight month, U.S. sales on a seasonally adjusted annual basis fell from the prior month, even finishing slightly below expectations again. December’s 12.4 million-unit seasonally adjusted annual rate was a decline from November’s 12.9 million and lower than October’s 13.1 million, which at the time was thought to be the beginning of a long line of sequential increases after September bottomed out at 12.3 million. The fourth-quarter SAAR ended at 12.8 million units, a decline from Q3’s 13.4 million, Q2’s 16.9 million and Q1’s 16.8 million – first-half totaled 16.9 million. Fourth-quarter 2020 totaled 16.2 million units. Calendar-year 2021 totaled sales of 14.93 million units, up 3.1% from 2020’s pandemic-impacted 8-year-low of 14.47 million, but well below the 17.2 million averaged in the five years through 2019. Per the usual seasonal trend, December’s raw volume increased from November, rising 19.0%, but it was a 25.6% drop from same-month 2020’s 1.605 million. The daily selling rate of 44,234 over the month’s 27 selling days was 22.9% decline from December 2020’s 57,339 – 28 selling days – and a 5.8% increase from November’s DSR of 41,790 over 24 selling days. A double-digit increase from November’s DSR is more typical.”



Fleet Sales (Updated 12/2)

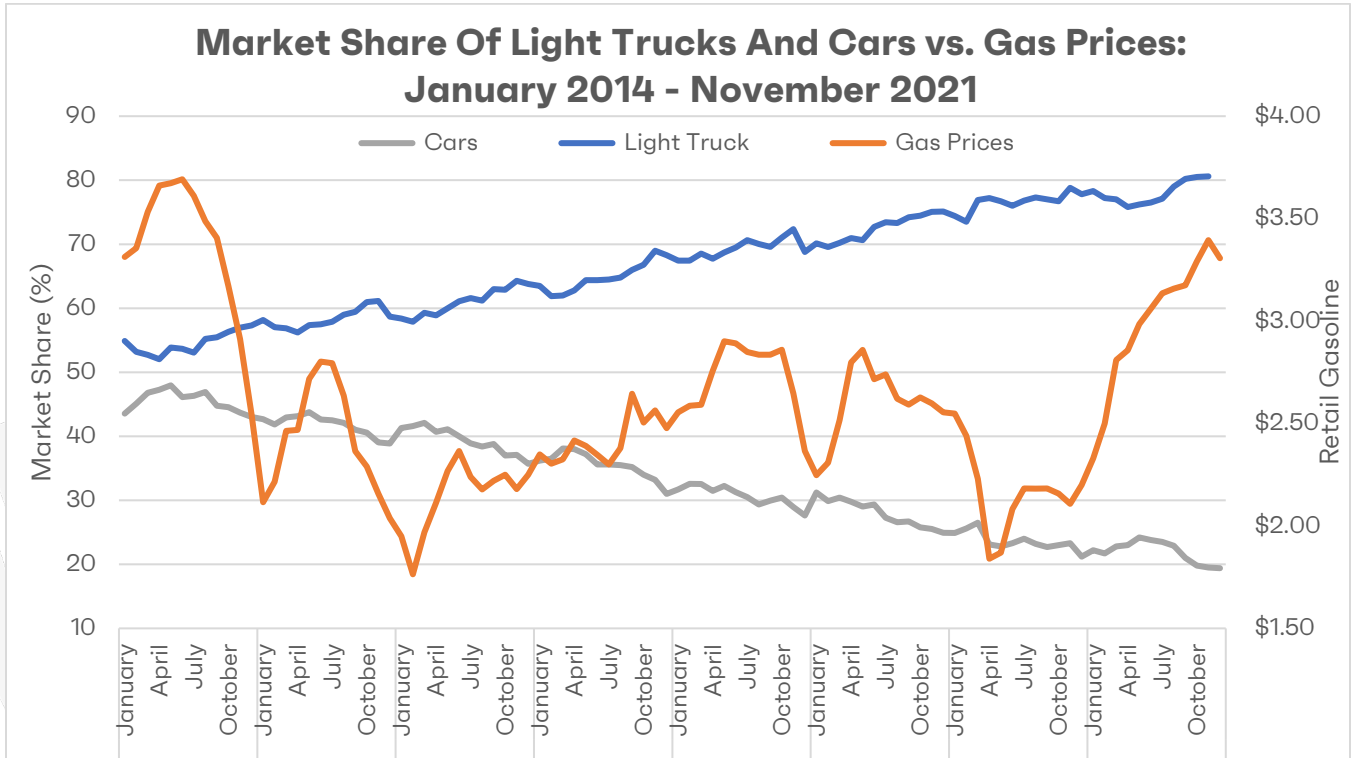
TrueCar⁸: “Fleet sales for December 2021 are expected to be down 29% from a year ago and down 3% from November 2021 when adjusted for the same number of selling days.”

J.D. Power⁹: “Fleet sales are expected to total 140,000 units in December, down 38.6% from December 2020 on a selling day adjusted basis. Fleet volume is expected to account for 11% of total light-vehicle sales, down from 15% a year ago.”

Segments vs. Gas Prices (Updated 1/6)

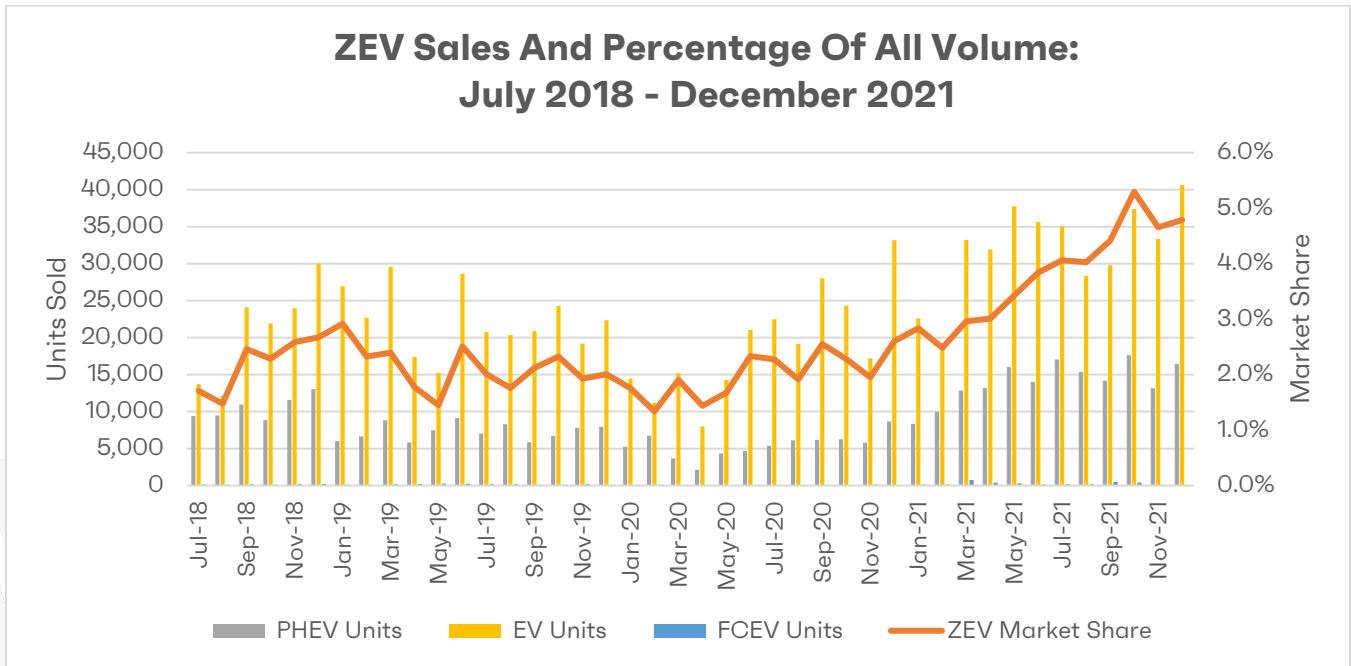
Monthly Sales For September: Light trucks accounted for 80.6% of sales in December, a 1.3 pp increase in market share from a year ago, and the highest level ever. Compared to the same period in 2020, sales of cars are down more than 100,000, and down nearly 150,000 from December 2019, when cars comprised 25% of the market as opposed to the 19.4% of the market passenger cars have now.

Historic Perspective: The upward trend in the popularity of light trucks over cars has been steady since 2013, when only 2% of annual market share separated the two segments¹⁰ and gas was over \$3.00¹¹ a gallon. As fuel prices dropped below the \$3.00 mark in mid-September 2014, light truck sales began to take off. Gas prices since have averaged only \$2.57 a gallon (through August 2021) and when combined with increased fuel economy for light trucks, an increase of 4 mpg since 2013, the perfect conditions existed to continue fueling light truck market growth.¹²



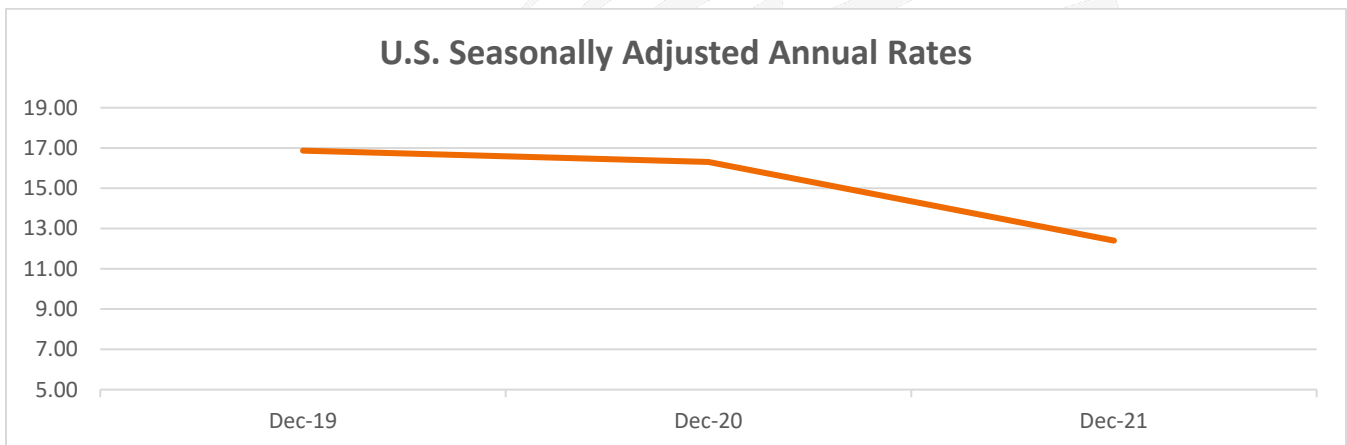
ZEV Powertrain Sales (Updated 1/6)

Sales of zero emission vehicles (BEV, PHEV, & Fuel Cell) accounted for 4.8% of total vehicle sales in December 2021, up 2.2 pp from a year ago and up .1 pp from November 2021. Sales of battery electric vehicles led the way for ZEVs, accounting for 3.4% of total sales, up 1.34 pp from December 2020. Plug-in hybrids accounted for 1.38%, nearly three times the amount from the same time last year.¹³



Seasonally Adjusted Annual Rates (Updated 1/6)

WardsIntelligence: “December’s 12.4 million-unit seasonally adjusted annual rate was a decline from November’s 12.9 million and lower than October’s 13.1 million, which at the time was thought to be the beginning of a long line of sequential increases after September bottomed out at 12.3 million. The fourth-quarter SAAR ended at 12.8 million units, a decline from Q3’s 13.4 million, Q2’s 16.9 million and Q1’s 16.8 million – first-half totaled 16.9 million. Fourth-quarter 2020 totaled 16.2 million units.”¹⁴

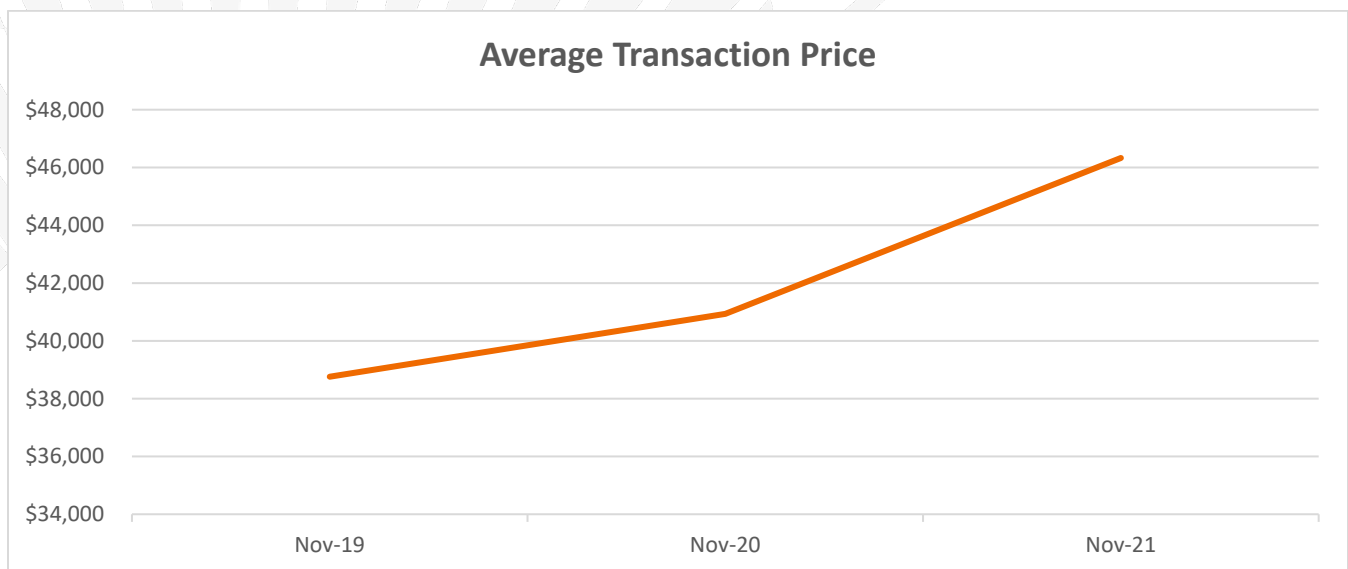


Average Transaction Price (Updated 12/15)

Kelley Blue Book (November): “New-vehicle prices increased further into record territory in November, including a modest increase from the month prior. According to new data released today by Kelley Blue Book, average transaction prices (ATPs) are sharply elevated from last year, up more than 13% from November 2020. New-vehicle inventory levels remain tight, and with sufficient consumer demand, dealers have been able to hold prices at or above the manufacturer's suggested retail price (MSRP). In recent research from Cox Automotive, nearly 70% of franchised dealers indicated their new-vehicle prices are higher than pre-pandemic levels.”¹⁵

Used Vehicle Prices Are Continuing To Increase, With Wholesale Vehicle Prices Increasing 43.5% Year-Over-Year. “Used car prices are still going up. Wholesale vehicle prices, or what dealers pay, rose 3.9% in November, putting the year-over-year increase at 43.5%.”¹⁶

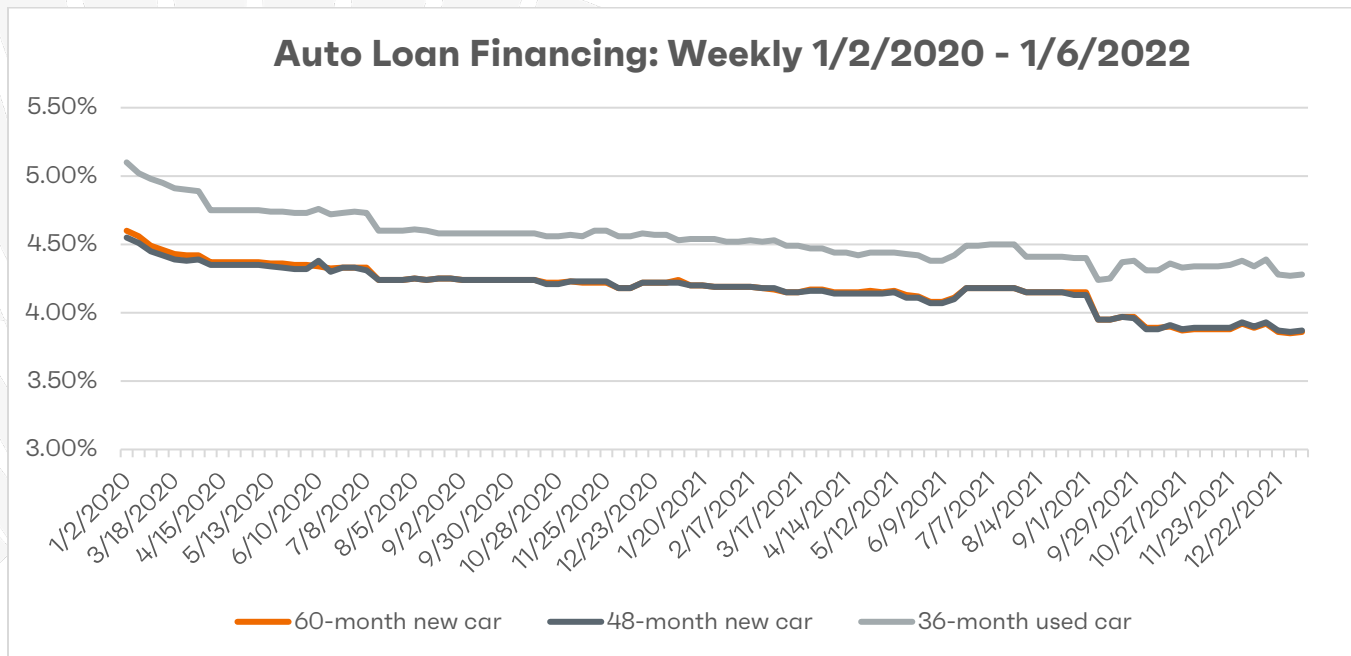
J.D. Power¹⁷: “Average transaction prices are expected to reach a November record of \$44,043, a sixth consecutive month above \$40,000, and 18.1% higher than November 2020 when prices hit \$37,284. This is partly due to record-low manufacturer incentives. The average manufacturer incentive per vehicle is on pace to be a November low of \$1,612, a decrease of \$2,089 from a year ago. Expressed as a percentage of the average vehicle MSRP, incentives for November 2021 are trending toward a record-tying low of 3.6%, down nearly five percentage points from a year ago and the second time on record below 4.0%.”



Auto Loan Financing (Updated 12/22)

Interest Rates Rise Slightly: Interest rates for new cars rose slightly (.01 pp) and now stand at 3.86%. Rates also rose .01 pp on the 36-month used car loan and now stand at 4.28%. Since the beginning of 2020, rates are down 0.74 pp, and down 0.38 pp since the same time a year ago.¹⁸

Dates	60-month new car	48-month new car	36-month used car
1/2/2020	4.60%	4.55%	5.10%
1/6/2021	4.24%	4.22%	4.53%
12/29/2021	3.85%	3.86%	4.27%
1/5/2022	3.86%	3.87%	4.28%
One Week Change	0.01%	0.01%	0.01%
Two Week Change	0.00%	0.00%	0.00%
Change since 1/3/20	-0.74%	-0.68%	-0.82%
One Year Change	-0.38%	-0.35%	-0.25%



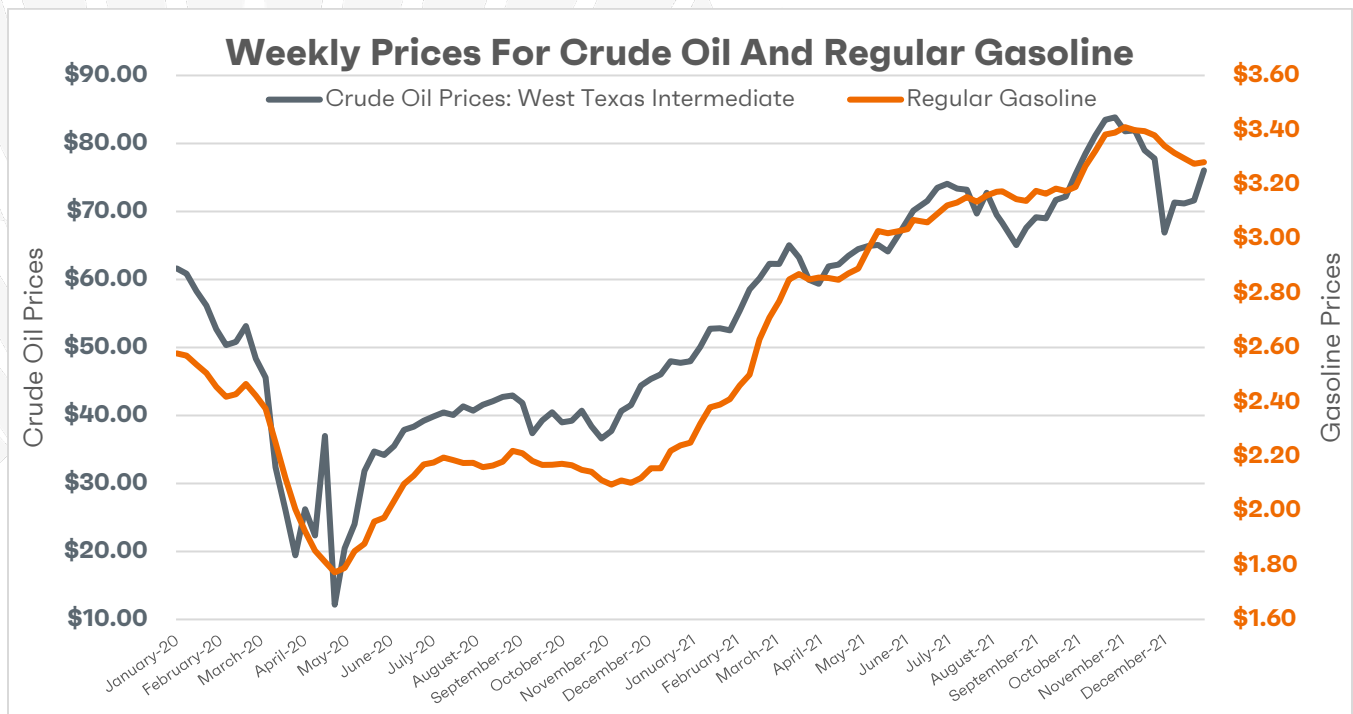
Crude Oil and Gas Prices (Updated 1/6)

EIA Outlook For Gasoline (12/8)¹⁹: “U.S. regular gasoline retail prices averaged \$3.39 per gallon (gal) in November, a 10 cents/gal increase from October and \$1.29/gal higher than in November 2020. The November monthly average was the highest since September 2014. We forecast that retail gasoline prices will average \$3.13/gal in December before falling to \$3.01/gal in January and \$2.88/gal on average in 2022.”

EIA Outlook For Oil (12/8)²⁰: “Brent crude oil spot prices averaged \$81 per barrel (b) in November, a \$3/b decrease from October 2021 but a \$38/b increase from November 2020. Crude oil prices have

risen over the past year as result of steady draws on global oil inventories, which averaged 1.4 million barrels per day (b/d) during the first three quarters of 2021. Crude oil prices fell significantly on November 26, and the Brent spot price began December below \$70/b. The drop in prices followed the identification of the new COVID-19 Omicron variant, which raised the possibility that petroleum demand could decline in the near term. We expect Brent prices will average \$71/b in December and \$73/b in the first quarter of 2022 (1Q22). For 2022 as a whole, we expect that growth in production from OPEC+, of U.S. tight oil, and from other non-OPEC countries will outpace slowing growth in global oil consumption, especially in light of renewed concerns about COVID-19 variants. We expect Brent prices will remain near current levels in 2022, averaging \$70/b.”

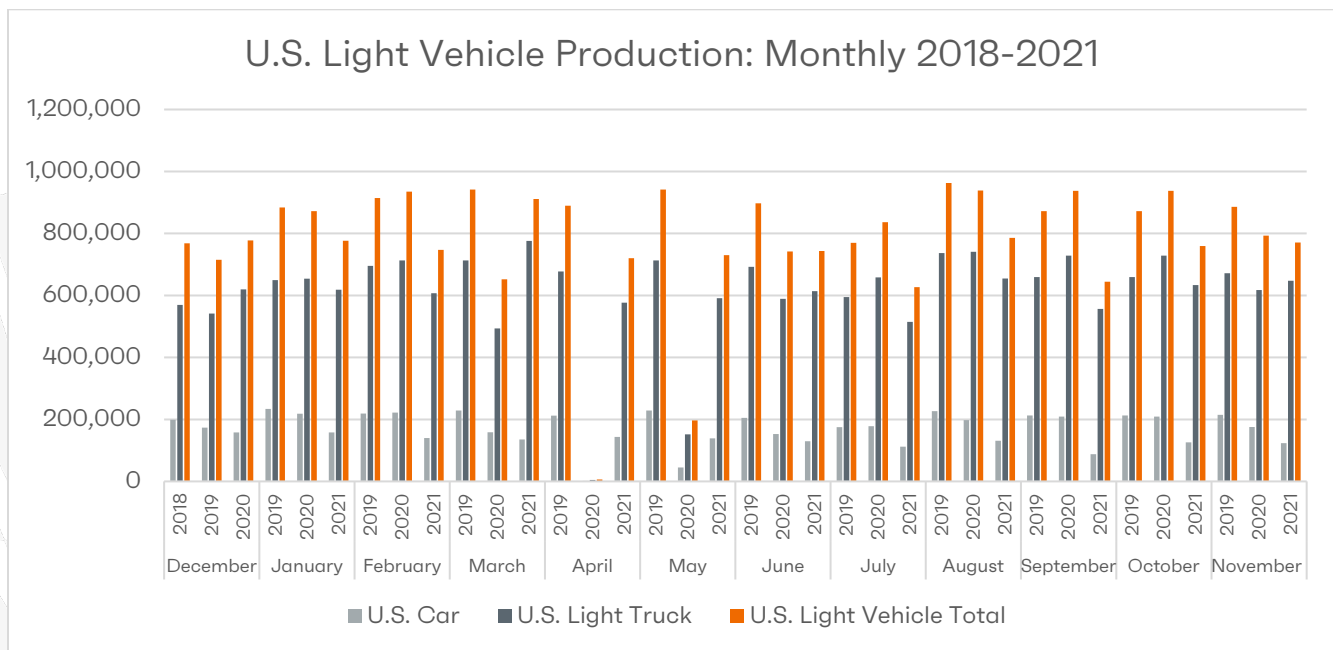
Oil Rebounds Slightly As Gas Steadily Declines From Multiyear Highs: Oil prices, as benchmarked at West Texas Intermediate, rose more than \$4 to \$76.05 a barrel. Since election day, oil prices have climbed more than \$38 a barrel. Gas prices remain unchanged at \$3.28, remaining near the highest level since October 2014. Gas is 28% higher than the beginning of 2020.²¹



Production Meter

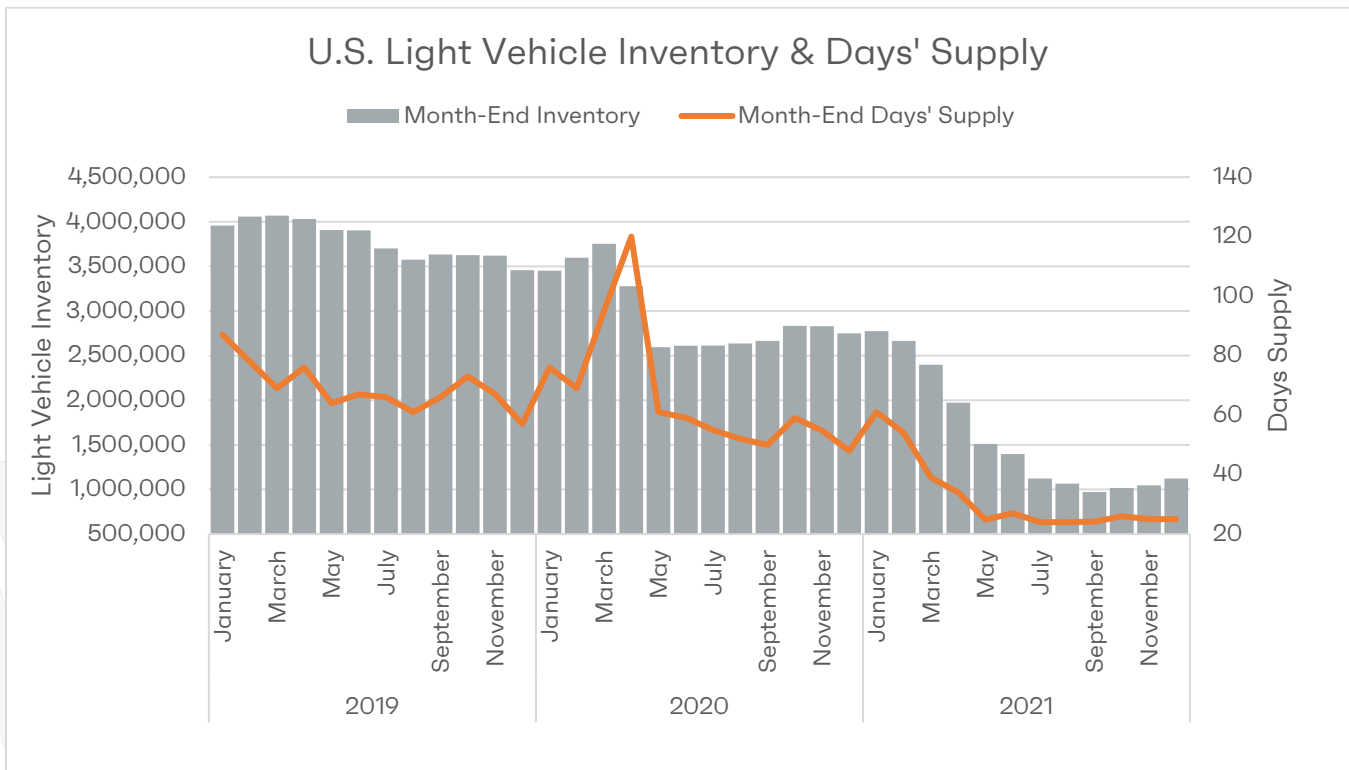
U.S. Light Vehicle Production (Updated 12/22)

U.S. Light vehicle production for November 2021 increased month-over-month by 1.6 percent, totaling 770,992 (123,528 cars, 647,464 light trucks), year-over-year, production is down 2.8% from 2020. ²²



U.S. Light Vehicle Inventory and Days' Supply (Updated 1/6)

WardsIntelligence Inventory Update (1/6)²³: “U.S. light-vehicle inventory – unexpectedly – increased from November to December, despite holiday-related plant shutdowns at the end of the month that limited production for U.S. dealers. Inventory normally declines from November to December, but the increase clearly shows that supply-chain blockages and bottlenecks are improving, and more parts are getting to vehicle assembly plants. . . . U.S. light-vehicle inventory ended December at 1.12 million units, 7.4% above November’s 1.05 million units, and 59% below like-2020’s 2.75 million. It’s also the highest level since the same total in July and marks the third straight increase since September’s rock-bottom 973,000 units. . . . Days’ supply ended December at 25, flat with the prior month but well below like-2020’s 48. A 60 days’ supply is normal for December.”



Global Meter

Global Light Vehicle Sales Outlook (Updated 1/6)

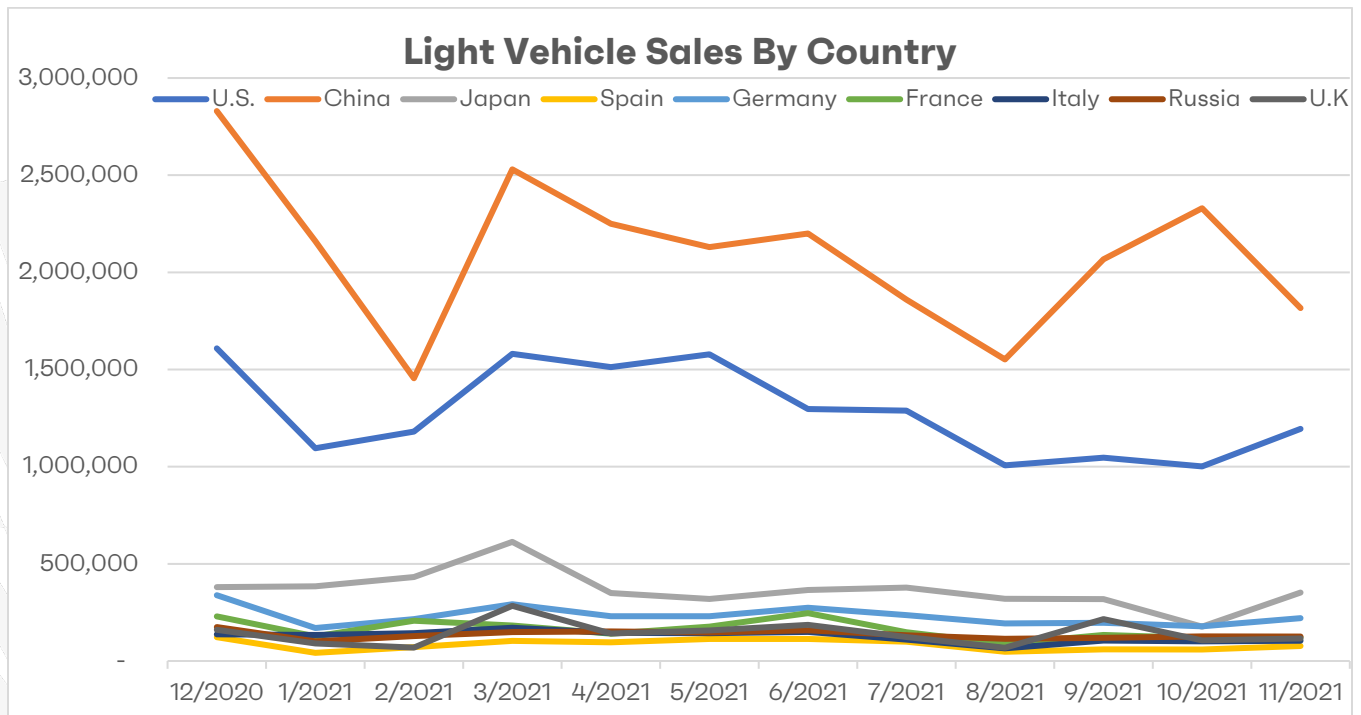
Wards Intelligence Outlook²⁴: “World vehicle sales in November declined 12.6% year-over-year to 6.86 million. November marked the fifth consecutive month of losses as the auto market has not recovered yet from the global semiconductor supply crisis.

All regions reported losses for the month, with Europe facing the biggest drop at 16.6% to 1.26 million, compared to 2020’s 1.51 million. The region’s market share slightly dropped to 18.3% from year-ago’s 19.2%. Russia (-17.6%), Spain (-15.7%) and France (-5.4%) saw declines in sales for November. The downturn was sharper for Germany (-30.6%) and Italy (-23.4%), while the U.K. (+2.9%) increased its tally. Year-to-date vehicle sales for Europe were up 3.2% to 15.32 million.

“The picture was similar in North America, where sales shrank 15.0% to 1.25 million for the month. All countries reported losses, with the U.S. facing the biggest decline at 16.1% to 1.04 million deliveries. Mexico fell 12.9% to 85,000, while Canada faced a modest loss of 5.4% to 126,000 deliveries. The

region’s 11-month total was up 7.2% to 16.7 million. In the Asia Pacific region, sales were down 11.4% to 3.76 million compared to last year’s 4.24 million.

“November marked the seventh consecutive month of losses for China, as vehicle sales fell 12.2% to 2.52 million compared to year-ago’s 2.87 million. Still, year-to-date deliveries improved 4.1% to 24.33 million. South Korea (-15.6%, estimated), Japan (-14.4%, estimated) and Thailand (-3.0%, estimated) experienced declines for the month, while Indonesia (+62.4%) reported gains with 87,000 deliveries.”



Global Light Vehicle Production Outlook (Updated 12/15)

IHS Markit Forecast: “As another year marked by disruption draws to a close, supply chain conditions remain a key factor in governing an elusive production recovery which is necessary to support sales activity. Production revisions in the near-term have stabilized (and even improved) somewhat; however, there remains an increasing focus on the intermediate-term and the trajectory of the recovery in many markets requiring the support of incremental semiconductor capacity gains. The combination of robust chip demand from non-automotive sectors coupled with increasing automotive semiconductor content levels and requirements will keep pressure on the semiconductor supply chain in the near-to-intermediate term. The December 2021 forecast update includes a mix of near-term upgrades for 2021 to reflect stronger production results for Q4-2021 and some stabilization in semiconductor supply offset by reductions for 2022 (particularly Q4-2022) due to adjusted expectations regarding increased

chip availability. The more noteworthy regional adjustments with the latest forecast update are detailed below:

“Europe: The outlook for Europe light vehicle production was increased modestly by 2,000 units for 2021 and reduced by 93,000 for 2022 (and reduced by 157,000 units for 2023). While recent production actuals in Europe have disappointed, there have been positive signals for November and December output, particularly from German automakers, and as a result, our forecast for 2021 is largely unchanged for the December 2021 update. Looking forward to 2022, the downward forecast revision was almost exclusively focused on Q4-2022 to reflect a somewhat longer duration of the core shortage of semiconductors. The cuts to Q4-2022 affect French automakers, in particular, as the seasonality of the previous forecast reflected further incremental improvement at the end of the year which was adjusted with the December 2021 update. The expectation for extended supply constraints drags into 2023, although a fair part of the downgrade applied to 2023 is the result of removing the Tesla Model 3 from the European production forecast (partially offset by higher volumes for the Model Y).

“Greater China: The outlook for Greater China light vehicle production was increased by 366,000 units and reduced by 211,000 units for 2021 and 2022, respectively (and increased by 279,000 units for 2023). After a challenging summer, semiconductor deliveries have improved, supporting recent outperformance for production in October. Given the stronger recent performance, we have upgraded our expectations for both November and December. While inventories remain at very low levels, potential electric power shortages in the winter introduce more uncertainties before as we approach 2022. Light vehicle production for mainland China in 2021 is expected to total 23.7 million units, reflecting a year-on-year increase of 1.4%, an improvement relative to our November forecast. Due to the fragile semiconductor supply chain and a potential pay-back effect from a strong Q4-2021, light vehicle production remains vulnerable to disruption in 2022. As a result, the production outlook was reduced for next year to reflect those uncertainties leading to more modest regional growth of 1.6%, with more meaningful growth deferred to 2023 and 2024.

Japan/Korea: Full-year 2021 Japan production volume was increased by 87,000 units relative to the November forecast as October production results and activity in November and December are shaping up better than expected. Nevertheless, while semiconductor shortage issues have been easing somewhat, we continue to expect chip supply to remain challenged into 2022. Japan production volumes in the intermediate-term were largely unchanged with factors such as re-shoring of Lexus ES production being offset by export challenges with select legacy internal combustion engine vehicles given the accelerated spread of battery electric vehicles in Europe and the United States. Full-year 2021 South Korea production was reduced by 20,000 units relative to the previous forecast as recent production results reflected somewhat weaker performance. Due to ongoing concerns around available semiconductor capacity in the near-term, production for 2022 was reduced by 16,000 units relative to the November forecast. South Korea production in the intermediate-to-long term reflects volume adjustments associated with Hyundai Motor Group’s evolving electrification strategy. Vehicles such as the Kia K3 and Pride are expected to shift to overseas plants and upcoming EVs based on the

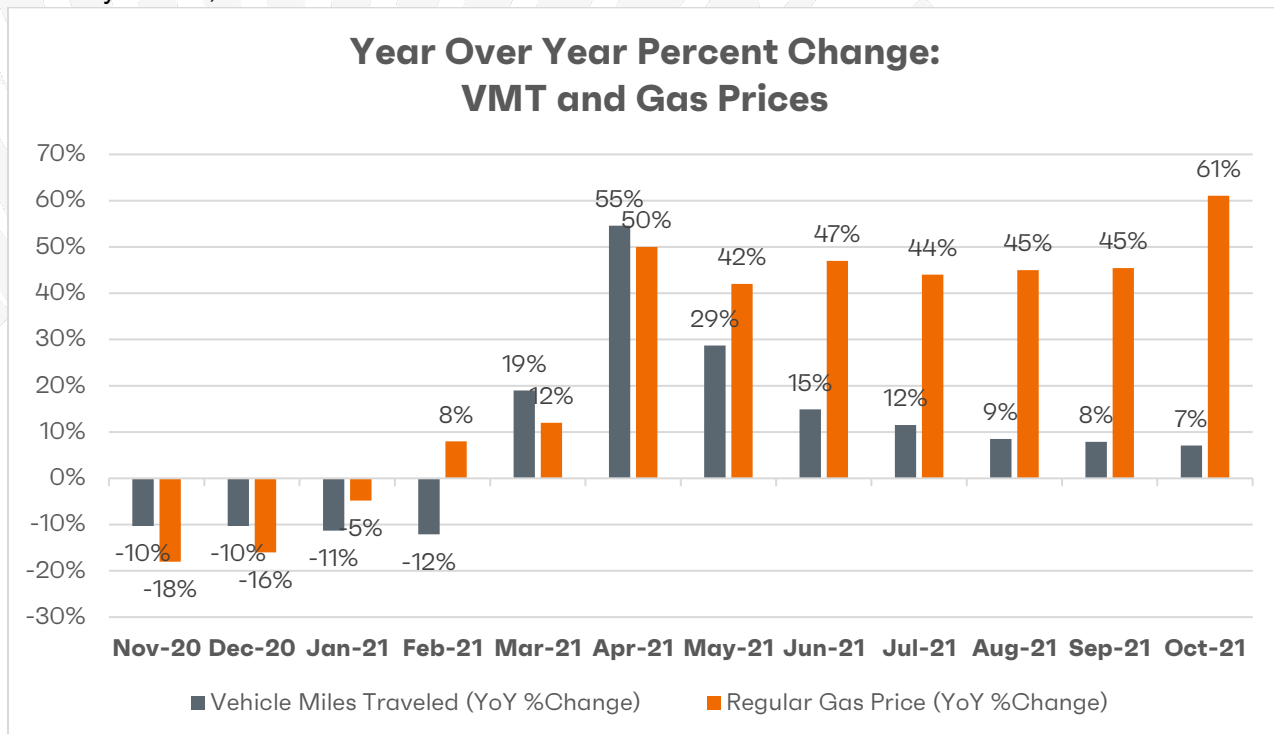
E-GMP K platform are expected to assume product positioning from vehicles like the Kia Soul and Stonic. As a result, long-term South Korea output was reduced accordingly through the forecast horizon.”²⁵

Recovery Meter

Roadway Travel (Updated 12/22)

According to the U.S. Department of Transportation, seasonally-adjusted vehicle miles traveled in October rose 7.1% from the same time a year ago. The cumulative travel estimate for 2021 is 262.5 billion vehicle miles.²⁶

- Travel on all roads and streets changed by 7.1% (18.4 billion vehicle miles) for October 2021 as compared with October 2020. Travel for the month is estimated to be 277.5 billion vehicle miles.
- The seasonally adjusted vehicle miles traveled for October 2021 is 266.8 billion miles, a 7.9% (19.6 billion vehicle miles) increase over October 2020. It also represents 0.5% increase (1.3 billion vehicle miles) compared with September 2021.
- Cumulative Travel for 2021 changed by 11.2% (262.5 billion vehicle miles). The cumulative estimate for the year is 2,613.1 billion vehicle miles of travel.



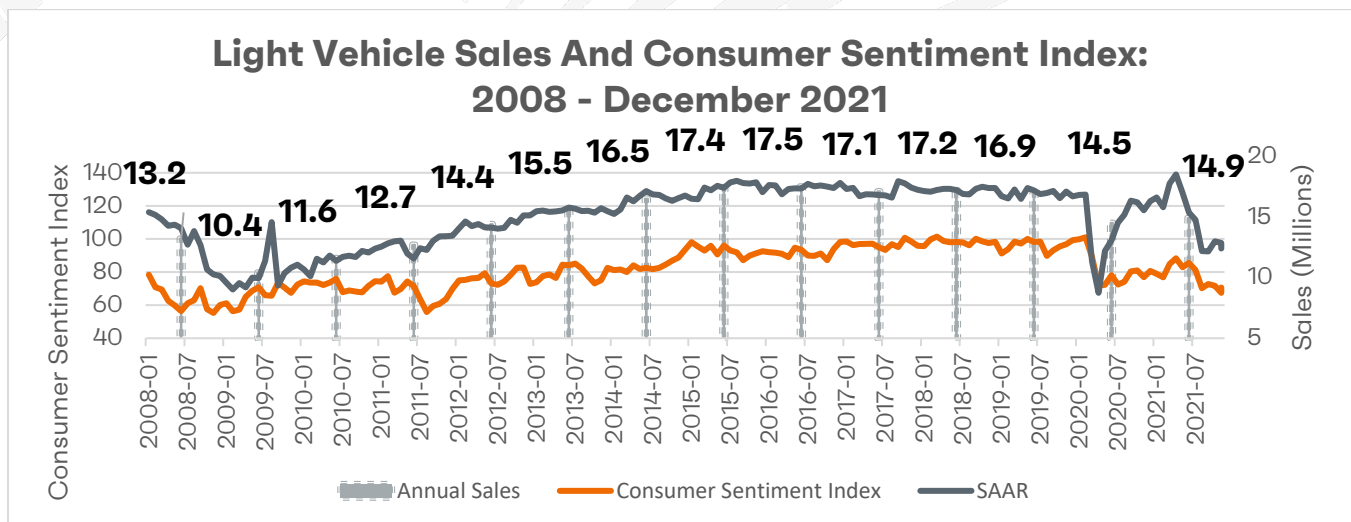
Economic News (Updated 12/8)

While Manufacturing Gained 31,000 Jobs In November, The Gains Were Hampered By A Loss Of 10,000 By Motor Vehicles And Parts. “Manufacturing increased employment by 31,000 jobs last month, split almost evenly between non-durable and durable goods industries. Non-durable goods added 16,000 jobs with durable goods boosting employment by 15,000, according to a breakdown by industry issued today by the U.S. Bureau of Labor Statistics. . . Industries that lost jobs included motorized vehicles and parts, down 10,100 jobs.”²⁷

For November, The ISM Rose To 61.1%, Up From 60.8% In October. “Manufacturing sped up in November on improvements in new orders, production and employment, the Institute for Supply Management said today. The Tempe, Ariz.-based group’s manufacturing index, known as the PMI, rose to 61.1 percent last month, up from 60.8 percent in October.”²⁸

Consumer Confidence and Sales (Updated 1/6)

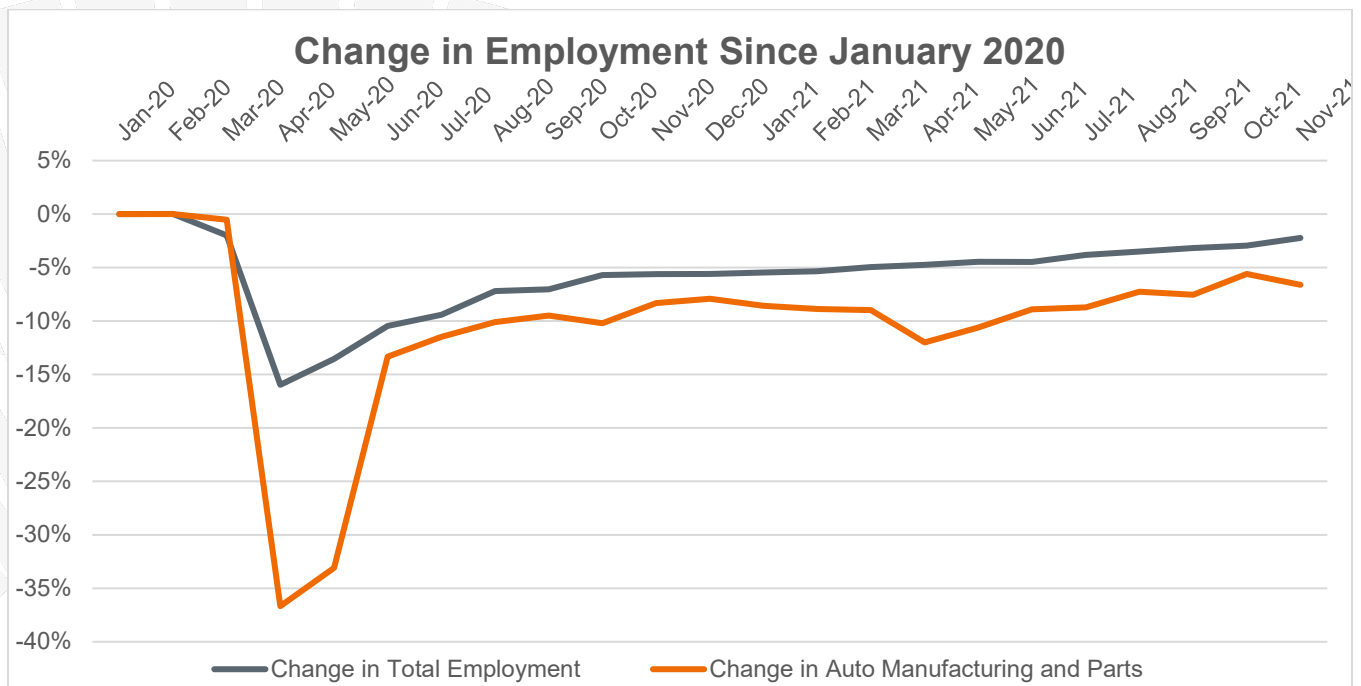
“The Sentiment Index improved in December. The uptick was primarily due to significant gains among households with incomes in the bottom third of the distribution. Indeed, the bottom third expected their incomes to rise during the year ahead by 2.8%, up from 1.8% last December, and the highest level since 2.9% was recorded in 1999. There have only been five times in the past half century that income expectations among low income households have exceeded the December 2021 level. The announced increase in Social Security payments of 5.9% in 2022 was partly responsible for the gain, and 5.0% increases in expected wage among the youngest workers. Importantly, too few interviews were conducted to capture the impact of the rapid spread of the Omicron variant in the U.S. Confidence and spending are likely to be depressed in January, but it is too early to know the eventual impact of Omicron on the economy.”²⁹



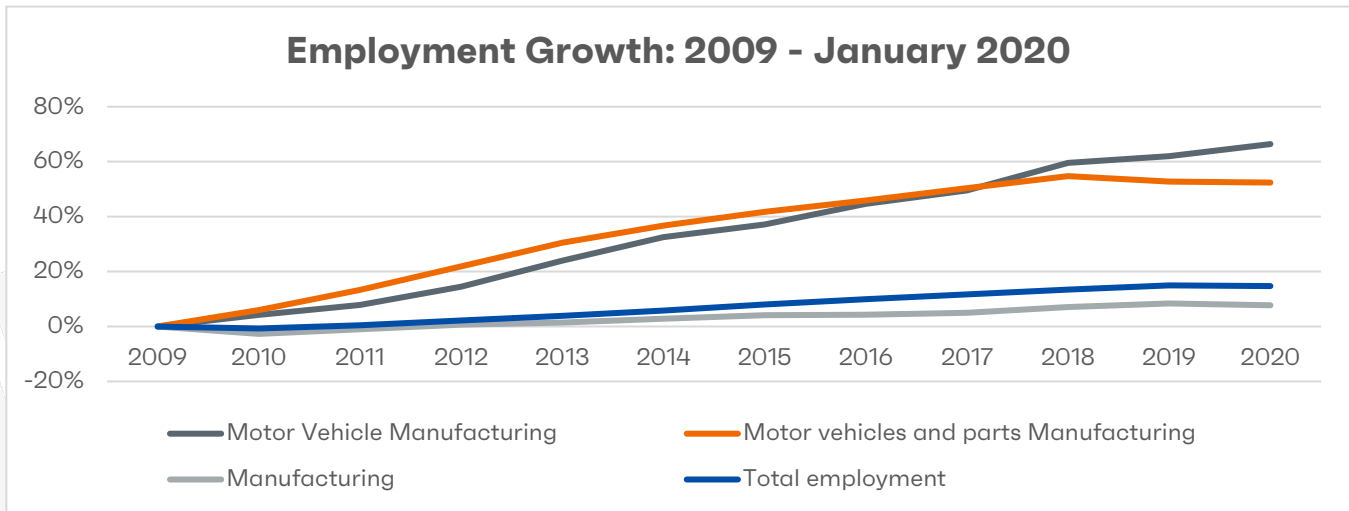
Employment (Updated 12/8)

After a loss of nearly 350,000 employees (about 35% of the workforce) in the height of the pandemic, employment in the Automobile Manufacturing and Parts sectors raced back but is now fighting losses due to supply chain disruptions with semiconductors. Employment in motor vehicles and parts is down 52,300 jobs since January 2020.³⁰

- **Motor Vehicle And Parts Manufacturing Lost 10,100 Jobs In November.**³¹



After the recession in 2009, the auto industry was credited with being on the leading edge of the recovery, which began a ripple effect through other parts of the country.³² Additionally, the chart below shows how the recovery of jobs in motor vehicle manufacturing alone and motor vehicle and parts manufacturing far outpaced the recovery of manufacturing and total jobs.



Sources

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