ALLIANCE FOR AUTOMOTIVE INNOVATION

*Cleaner. Safer. Smarter.*

# READING THE METER

*A Look Inside A Cleaner, Safer, Smarter Auto Industry.*

August 25, 2021

## Contents,

ALLIANCE FOR AUTOMOTIVE INNOVATION

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# Forecast Meter

## Forecast Summary (Updated 8/25)

| 2020-2021 Sales,[1] Extended Sales Forecast[2] and Production Forecasts[3] | | |
|---|---|---|
| | **U.S. Sales & Forecasts** | **North American Production** |
| **June '20** | 1,103,791 (-24% YoY) | 1,135,807 (-19.7% YoY) |
| **July '20** | 1,227,091 (-12.1% YoY) | 1,261,884 (+2.2% YoY) |
| **August '20** | 1,325,144 (-19.1% YoY) | 951,983 (-1.1% YoY) |
| **September '20** | 1,344,310 (6.4% YoY) | 1,395,830 (+2.1% YoY) |
| **October '20** | 1,345,401 (0.9% YoY) | 1.413.207 (+3.7% YoY) |
| **November '20** | 1,193,180 (-15.4% YoY) | 1,260,763 (-6.4% YoY) |
| **December '20** | 1.608.875 (5.9% YoY) | 1,115,542 (+2.8% YoY) |
| **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) | 1,300,000 (forecast) |
| **1st Quarter '20** | 3,476,512 (-12.7% YoY) | 3,754,533 (-11.7% YoY) |
| **2nd Quarter '20** | 2,948,410 (-33.3% YoY) | 1,371,420 (-67.6% YoY) |
| **3rd Quarter'20** | 3,904,539 (-9.2% YoY) | 3,989,982 (-.5% YoY) |
| **4th Quarter'20** | 4,159,622 (-2.1% YoY) | 3,789,512 (-2.5% YoY) |
| **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** | | 3,808,000 (-7.5% YoY) |
| **2020 Calendar Year** | 14,463,935 (-14.7% YoY) | 12,905,447 (-23.1%) |
| **2021 Full Year Estimate** | 16 million units (11% YoY) | 14,611,185 (13% YoY) |

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# U.S. Light Vehicle Sales Outlook (Updated 8/25)

**Wards Intelligence Outlook[4]:** "As has been the pattern throughout this year, the microchip shortage refuses to improve as fast as hoped, and along with other supply chain disruptions related to increased Covid-19 restrictions, clogged ports and other shipping delays, automakers again are forced to cut back on production plans and can't seriously start building up inventory to meet underlying demand.

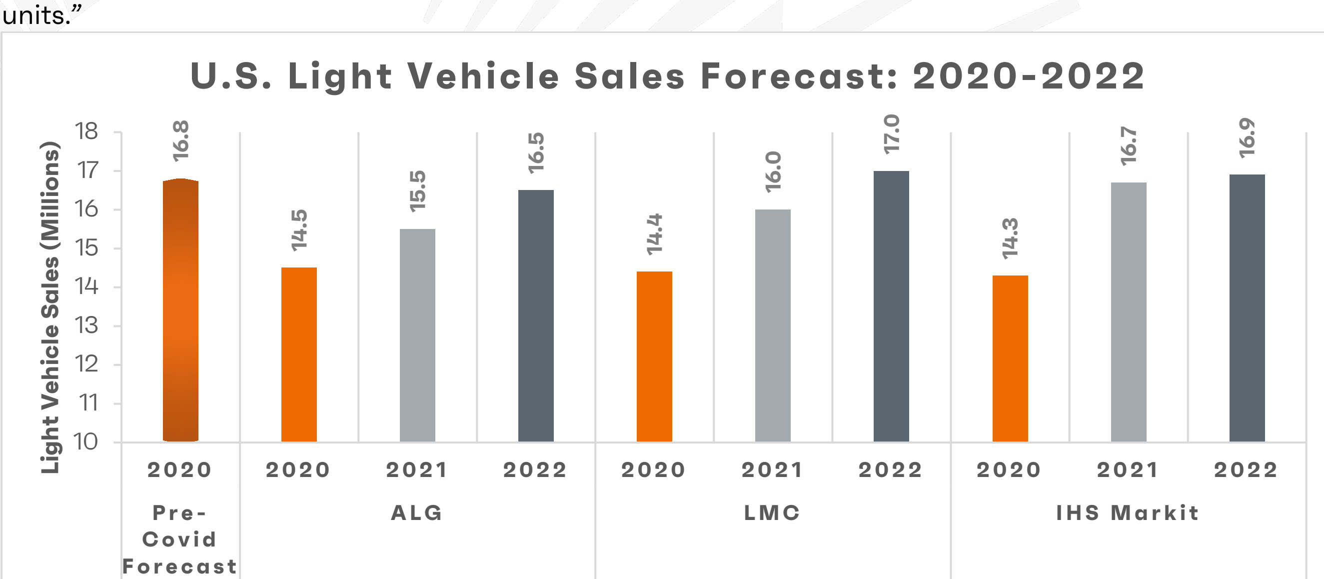
"Because of the dearth of product, U.S. light-vehicle sales in August are forecast to decline for the fourth straight month on a sequential basis to 14.1 million-unit seasonally adjusted annual rate. Pent-up demand in both retail and fleet is building up, but at what point some of that excess can start to be satisfied still depends on when automakers can get production close to capacity.

"Since peaking at an18.3 million-unit SAAR in April, sales on an annualized basis have fallen steadily as the impact from drastically declining inventory finally began pulling down retail volume. Deliveries to fleet customers, which are being delayed in favor of meeting typically more profitable retail volume, has been running below demand since the beginning of the year.

"Although there remains a strong probability that they stay flat or even decline again, the July-to-August inventory increase means sales could start to rebound in September, and, if production for the U.S. market can continue to rise, improve significantly in the fourth quarter.

"However, with inventory expected for less of a bounce-back, Wards Intelligence/LMC Automotive has lowered its outlook for 2021 to 16.0 million units from 16.6 million. Sales in the final four months of 2021 will only need to record a tepid 15.5-million-unit annualized rate to meet the calendar-year forecast. The forecast for 2022 also has been reduced to 17.0 million units from 17.3 million.

"August sales volume is pegged at 1.18 million units for a daily selling rate over the month's 25 selling days of 47,240, 6.8% below like-2020's 50,695 – 26 selling days. August 2020's SAAR was 15.2 million units."



## North American Production & Inventory Outlook (Updated 8/25)

**Wards August Production Outlook (8/25)[5]:** "Although still greatly limited from the parts shortages, North America production is expected to pick up strongly in August from last month and inventory is forecast to rise 9.4% from July for the first month-to-month increase since January. That calculation includes estimated import shipments in August to the U.S., which could be lower than expected due depending on how much disruption there is from recent increases in plant closures in Asia and Europe caused by the microchip shortage.

"Despite the month-to-month increase, August inventory is projected to total a paltry 1.23 million units, 52% below the same period in 2020, and lowest for the month in several decades. Days' supply is pegged at 26, compared with the year-ago month's 51 and prior-month's 24.

"After averaging 3.8 million per month in the five years through 2019 when annual sales averaged over 17 million – a level that could be reached in 2021 if enough inventory was on hand – inventory is not likely to even reach 2 million units by the end of this year.

**Wards Intelligence Third Quarter Outlook (8/25)[6]:** "Third-quarter North America production is tracking to 3.808 million units, a 7.5% year-over-year decline. Year-to-date production through September is tracking to 10.8 million units, up 14.7% from 9-month 2020's 9.4 million. Light-vehicle production in the third quarter is pegged at 3.69 million units, 7.8% below same-period 2020's total of 4.00 million. The Q3 projection is a 9-year low for the period."

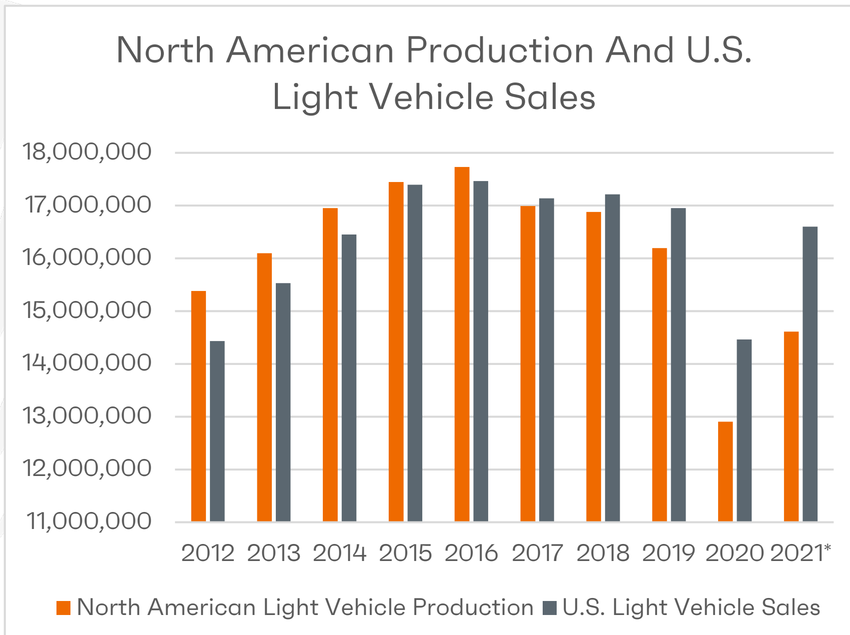
**Wards Intelligence Global Production Outlook (8/18)[7]:** "Global light-vehicle production is forecast to end 2021 about 3.75 million units lower because of the shortage of microchips to the automotive industry, which has caused major cutbacks in vehicle output in all regions. Wards Intelligence partner LMC Automotive expects production to end 2021 at 83.2 million units but output could have totaled close to 87 million if not for the chip shortage. The estimated cuts exclude losses due to other unusual disruptions to the supply chain, meaning production ultimately could have topped 87 million in 2021. Forecast 2021 output still represents a big gain of 11.6% from 2020's pandemic-slammed total of 74.6 million units, which was 15.9% below 2019's 88.7 million and 21.5% below the record year of 2017 when production totaled 95.1 million.

"By region, North America is forecast to lose the most output – 1.46 million units – from the chip shortage, followed by 938,000 in Europe. Combined, the two regions account for 64% of the estimated global losses. China, geographically the biggest volume manufacturer of light vehicles, is expected to account for 16% - 615,000 units - of the 2021 chip-related losses."

**IHS Global Production Outlook (8/25)[8]:** "The global forecast for light vehicle production in 2021 now stands at 80.78 million units with our latest August release. This represents an 8.3% increase over 2020 levels.

'Output lost to disruption to the semiconductor supply chain is estimated to have reached 1.44 million units in Q1 and 2.60 million units in Q2. Visible downtime in Q3 now stands at 1.60 million units underlining the assessment that Q3 will continue to see disruption, and this is becoming more significant. While we do not expect to see levels of disruption like those in Q2, it now seems highly likely that the impact will be in the range of 1.8 to 2.1 million units for the quarter if the rate of downtime that we currently see was to continue through September. We expect Q4 will be exposed to ongoing disruption and this disruption is now expected to spill over into Q1 2022. Q2 2022 may be the point at which we look for the stabilization of supply, with recovery efforts now starting only from H2 2022.

'Across the full year, taking the estimates for Q3 and Q4, in addition to the losses already identified in the first half of the year, this would put the full-year risk associated with semiconductor shortages between 6.3 million to 7.1 million units globally, according to IHS Markit estimates.' - Mark Fulthorpe, Executive Director, global light vehicle forecasting, IHS Markit"

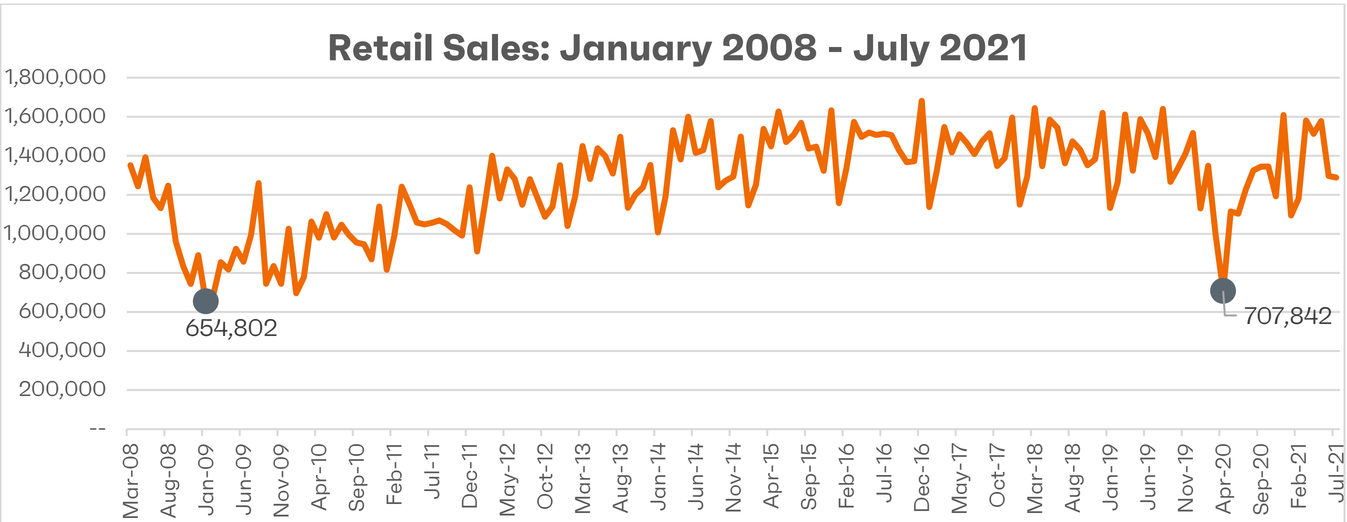



**IHS Markit Outlook (8/18)[9]:** "The outlook for North America light vehicle production was sharply reduced by 775,000 units for 2021 and increased by 192,000 units for 2022 (and increased by 406,000 units for 2023). The production outlook for 2021 was meaningfully reduced in the near-term as the semiconductor supply chain is not improving at the pace that was expected with renewed COVID-19 restrictions adding further weight to an already hamstrung global supply chain. Production in Q3-2021 was revised down 11.8% or 433,000 units on continuing and expected incremental downtime. Production in the third quarter was expected to begin a marked improvement in the supply of semiconductors with the August 2021 forecast release essentially erasing any increases compared to the benchmark December 2020 forecast. Production in the Q4-2021 was revised down 8.3% or 333,000 units amid expectations for disruptions to continue for a more protracted period that extends through Q2-2022. Production in 2022 was revised higher by 192,000 units with production more heavily weighted in the second half amid expectations that the semiconductor industry will be able to support levels that allow automakers to finally begin recovering lost volume. Significant production recovery is limited due to expectations of a tougher first half along with many high-volume plants unable to produce beyond their already strong work patterns with this phenomenon decidedly weighting on full-size pickup production."

# U.S. Light Vehicle Sales (Updated 8/4)

## Monthly Sales (Updated 8/4)

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.



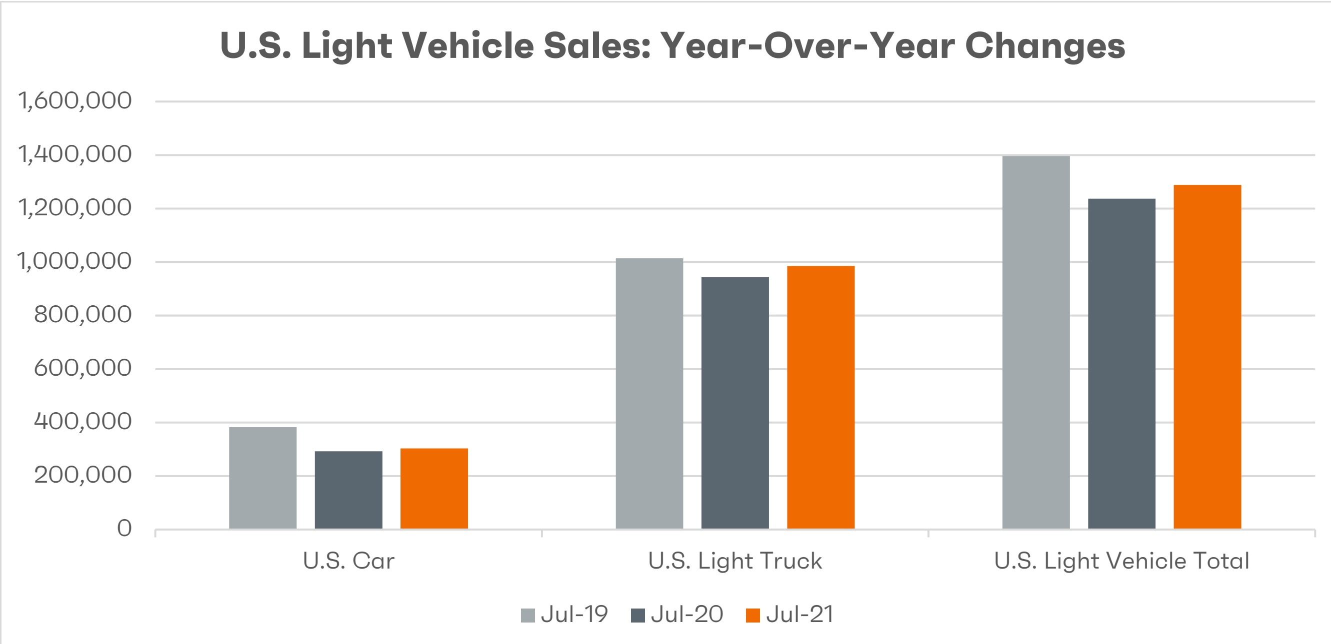

## July Sales (Updated 8/4)

**WardsIntelligence:** “Ever-worsening product availability further capped U.S. light-vehicle sales in July, as deliveries on an annualized basis fell sequentially a third straight month to the lowest level outside of pandemic-ridden 2020 in over eight years.

“July sales totaled a seasonally adjusted annual rate of 14.8 million units, nearly the same as like-2020’s 14.7 million, but the third in a string of declines that began in May when sales fell to 17.0 million from April’s 18.3 million, followed by another huge drop to 15.4 million in June. Prior to 2020, the last time a monthly SAAR was lower than July’s total was 14.5 million units in October 2012.

“July’s raw volume totaled 1.289 million units, 4.2% above like-2020’s 1.237 million units, which was an 8-year low for the period due to lockdown measures taken last year to battle the Covid-19 pandemic. The daily selling rate over the month’s 27 selling days was 47,722, 0.3% above July 2020’s 47,563 – 26 selling days.

Calendar year-to-date volume through July totals 9.57 million units, 25.1% above 7-month 2020’s 7.65 million. The year-to-date SAAR totals 16.5 million units vs. January-July 2020’s 13.2 million.”[10]



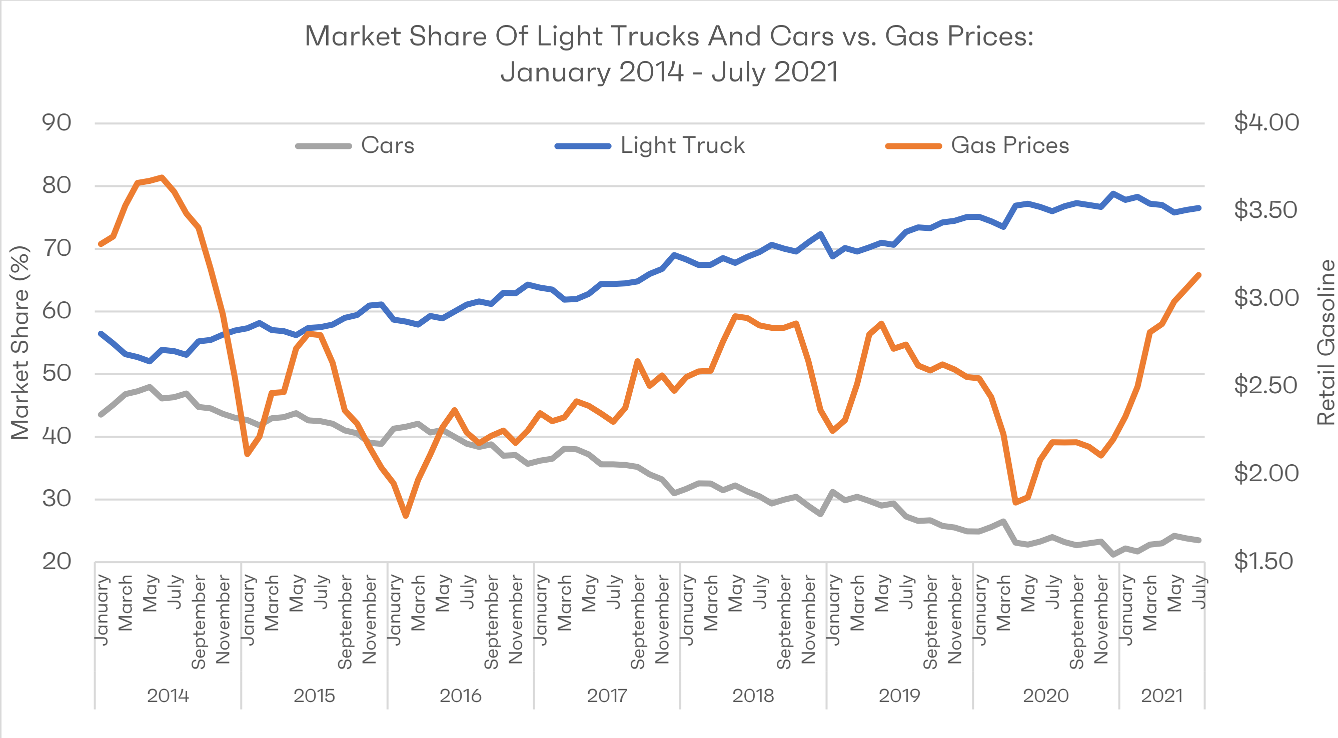

**Fleet Sales (Updated 6/3)**

**Wards Intelligence:** "Estimated fleet volume in May, although up 95% from year-ago's pandemic downward-skewed total, accounted for just 10% of the month's volume after averaging 16% in the first four months of 2021 and well below its pre-pandemic mark of close to 20%."[11]

## Segments vs. Gas Prices (Updated 8/4)

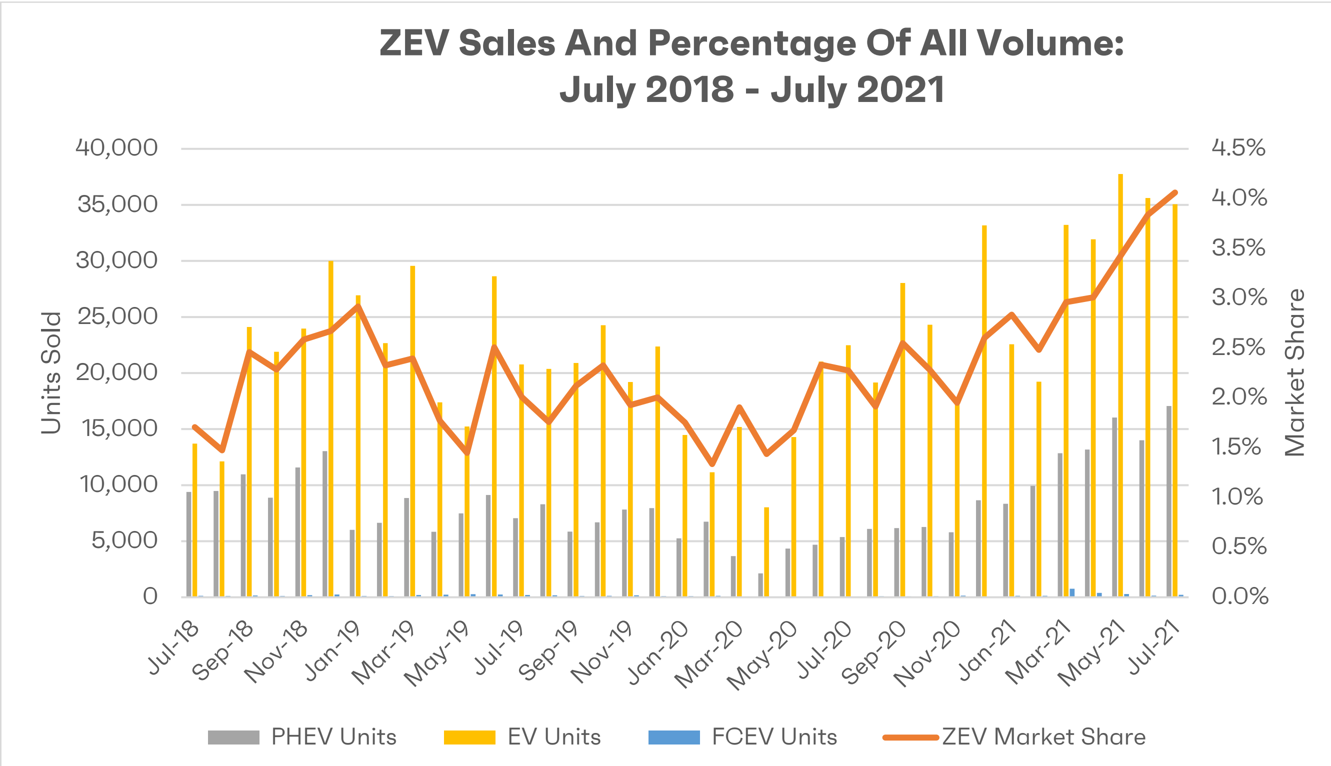
**Monthly Sales For June:** Light trucks accounted for 76.5% of sales in June, a .2% increase in market share from a year ago. Compared to 2020, sales of cars are up more than 10,000, but down nearly 80,000 from June 2019.

**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 segments[12] and gas was over $3.00[13] 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 $2.67 a gallon (through June 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.[14]



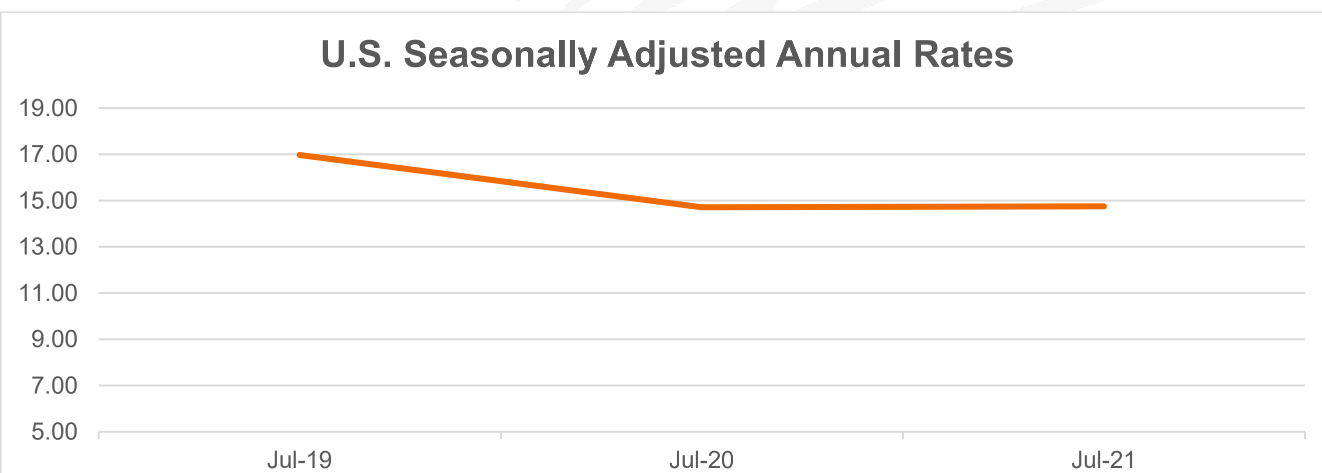

## ZEV Powertrain Sales (Updated 8/4)

Sales of zero emission vehicles (BEV, PHEV, & Fuel Cell) accounted for 4.1% of total vehicle sales in June 2021, up 1.8% from a year ago and up .3% from June 2021. Sales of battery electric vehicles led the way for ZEVs, accounting for 2.72% of total sales, up .89% from July 2020. Plug-in hybrids accounted for 1.32%, three times the amount from the same time last year.[15]




## Seasonally Adjusted Annual Rates (Updated 8/4)

**WardsIntelligence:** “July sales totaled a seasonally adjusted annual rate of 14.8 million units, nearly the same as like-2020’s 14.7 million, but the third in a string of declines that began in May when sales fell to 17.0 million from April’s 18.3 million, followed by another huge drop to 15.4 million in June. Prior to 2020, the last time a monthly SAAR was lower than July’s total was 14.5 million units in October 2012.”[16]

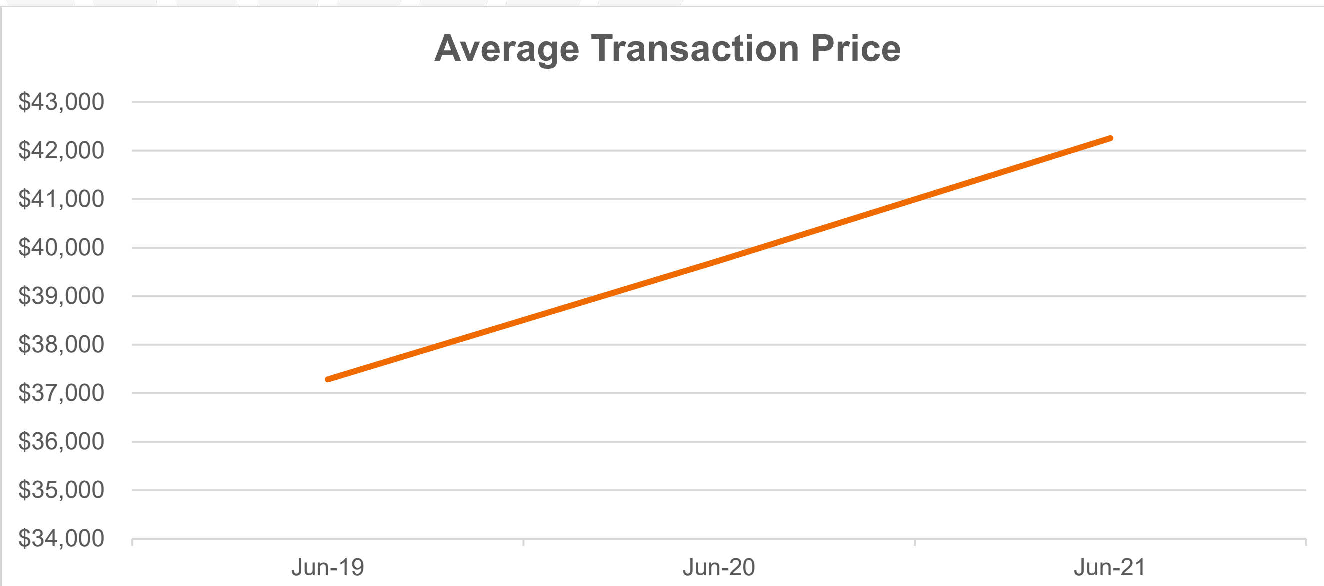


## Average Transaction Price (Updated 8/4)

**J.D. Power[17]:** "For July 2021, average transaction prices are expected reach an all-time high of $41,044. For context, average transaction prices are trending to be nearly 17% higher in July 2021 than they were in July 2020. This is partially due to the continued retraction in manufacturer incentives. The average manufacturer incentive per vehicle is on pace to be $2,065, a decrease of $2,170 from a year ago and the lowest amount on record for the month of July. Expressed as a percentage of the average vehicle MSRP, incentives for July 2021 are trending toward a record low of 4.8%, down nearly 5.5 percentage points from a year ago, and the first time on record below 5%.

"The combination of strong retail volumes and higher prices means that consumers are on track to spend $48.7 billion on new vehicles this month, the highest on record for the month of July."

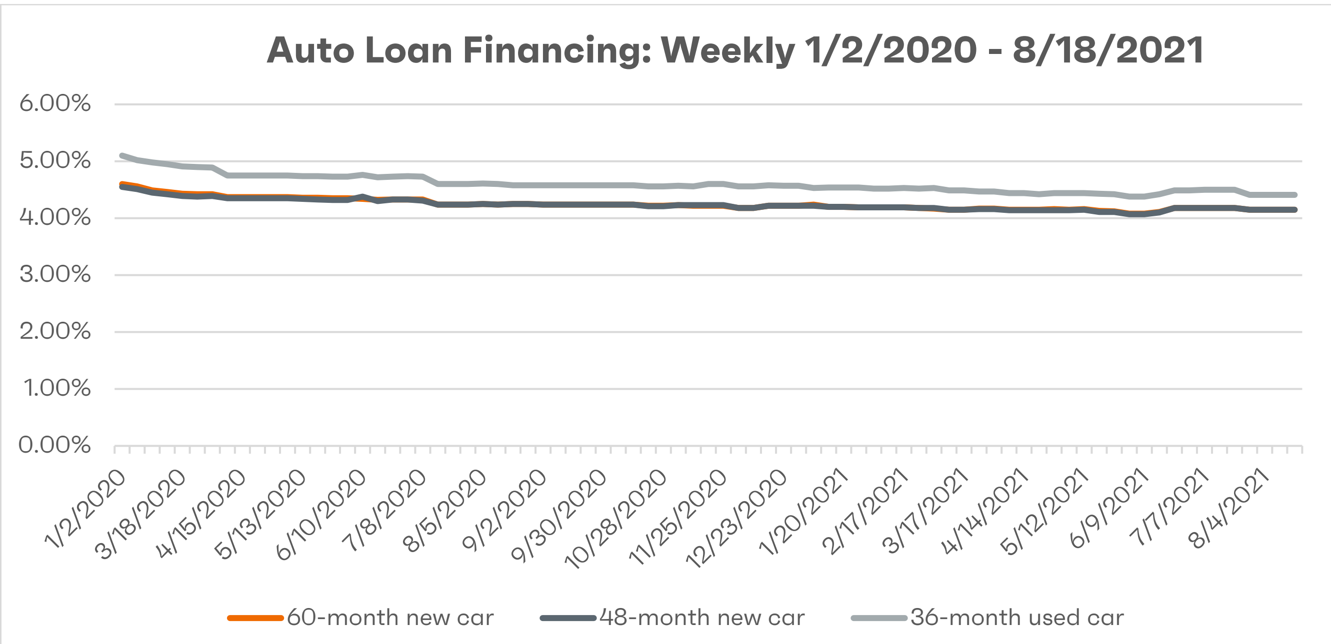
**Kelley Blue Book:** "The estimated average transaction price for a light vehicle in the United States was $41,263 in May 2021, according to the analysts at Kelley Blue Book. New-vehicle prices increased $2,125 (up 5.4%) from May 2020, while increasing $493 (up 1.2%) from April 2021."[18]




## Auto Loan Financing (Updated 8/25)

**Financing Steady:** Interest rates for new cars and used cars held steady for the fourth week in a row. The interest rate for 60 months currently stands at 4.15%. Rates also remained the same for a 36-month used car loan at 4.41%. Since the beginning of last year, rates are down 0.45%, and down 0.10% since the same time a year ago[19]

| Dates | 60-month new car | 48-month new car | 36-month used car |
|---|---|---|---|
| 8/19/2020 | 4.25% | 4.25% | 4.58% |
| 1/2/2020 | 4.60% | 4.55% | 5.10% |
| 8/11/2021 | 4.15% | 4.15% | 4.41% |
| 8/18/2021 | 4.15% | 4.15% | 4.41% |
| One Week Change | 0.00% | 0.00% | 0.00% |
| Two Week Change | 0.00% | 0.00% | 0.00% |
| Change since 1/3/20 | -0.45% | -0.40% | -0.69% |
| One Year Change | -0.10% | -0.09% | -0.19% |

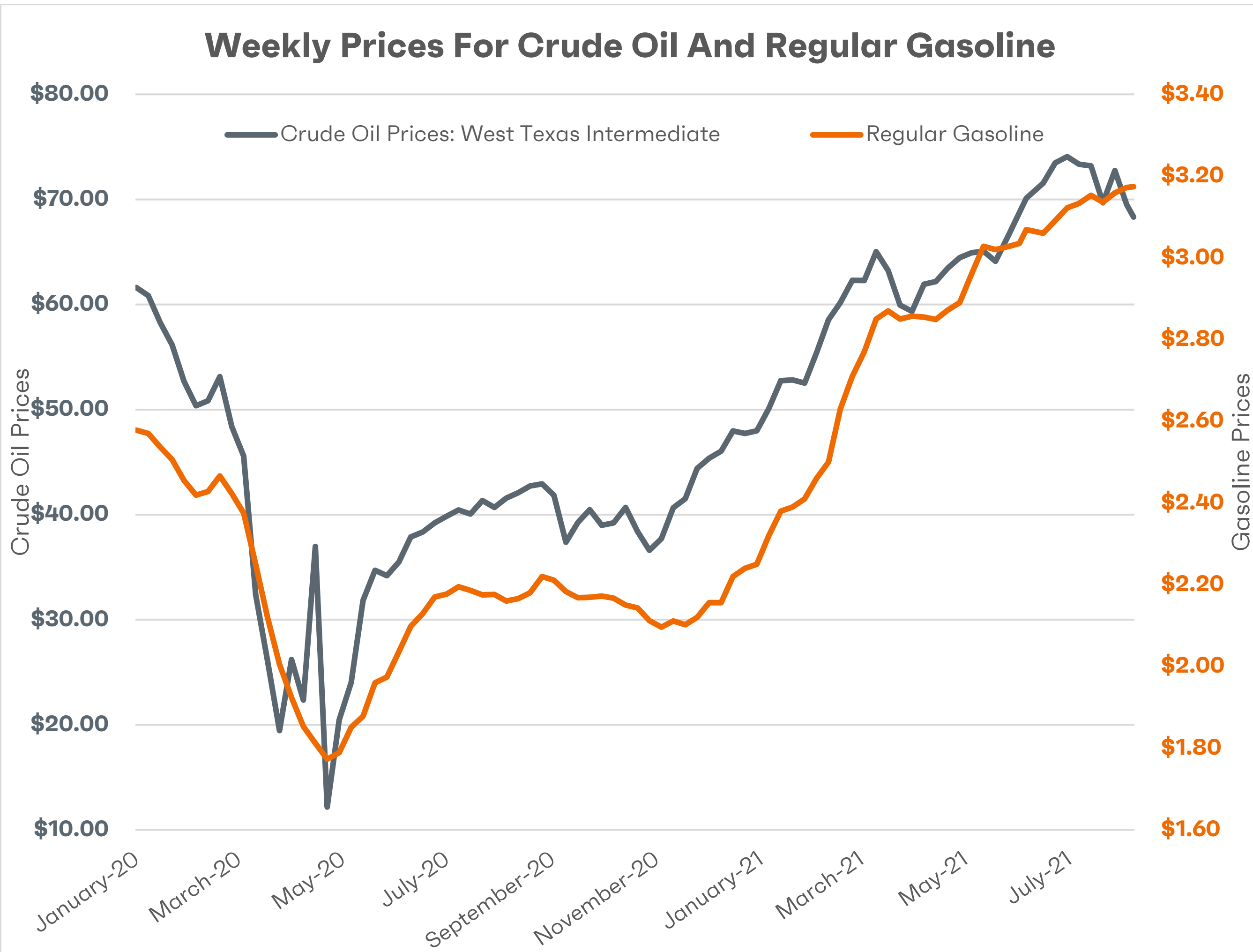



## Crude Oil and Gas Prices (Updated 8/18)

**EIA Outlook For Gasoline**[20]**:** "U.S. regular gasoline retail prices averaged $3.14 per gallon (gal) in July, the highest monthly average price since October 2014. Recent gasoline price increases reflect rising crude oil prices and rising wholesale gasoline margins, amid relatively low gasoline inventories. We expect that prices will average $3.12/gal in August before falling to $2.82/gal, on average, in 4Q21. The expected drop in retail gasoline prices reflects our forecast that gasoline margins will decline from elevated levels, as is typical in the United States during the second half of the year."

**EIA Outlook For Oil**[21]**:** "Brent crude oil spot prices averaged $75 per barrel (b) in July, up $2/b from June and up $25/b from the end of 2020. Brent prices have been rising this year as result of steady draws on global oil inventories, which averaged 1.8 million barrels per day (b/d) during the first half of 2021 (1H21) and remained at almost 1.4 million b/d in July. We expect Brent prices will remain near current levels for the remainder of 2021, averaging $72/b from August through November. However, in 2022, we expect that continuing growth in production from OPEC+ and accelerating growth in U.S. tight oil production—along with other supply growth—will outpace decelerating growth in global oil consumption and contribute to Brent prices declining to an average of $66/b in 2022."

**Gas Prices Holding Above $3 A Gallon:** Oil prices, as benchmarked at West Texas Intermediate, fell slightly in mid-August to just over $65 a barrel, remaining near three year highs. Since election day, oil prices have climbed more than $27 a barrel. Gas prices dipped slightly this week to $3.15, remaining near the highest mark since October 2014. Gas is 22% higher than the beginning of 2020.[22]

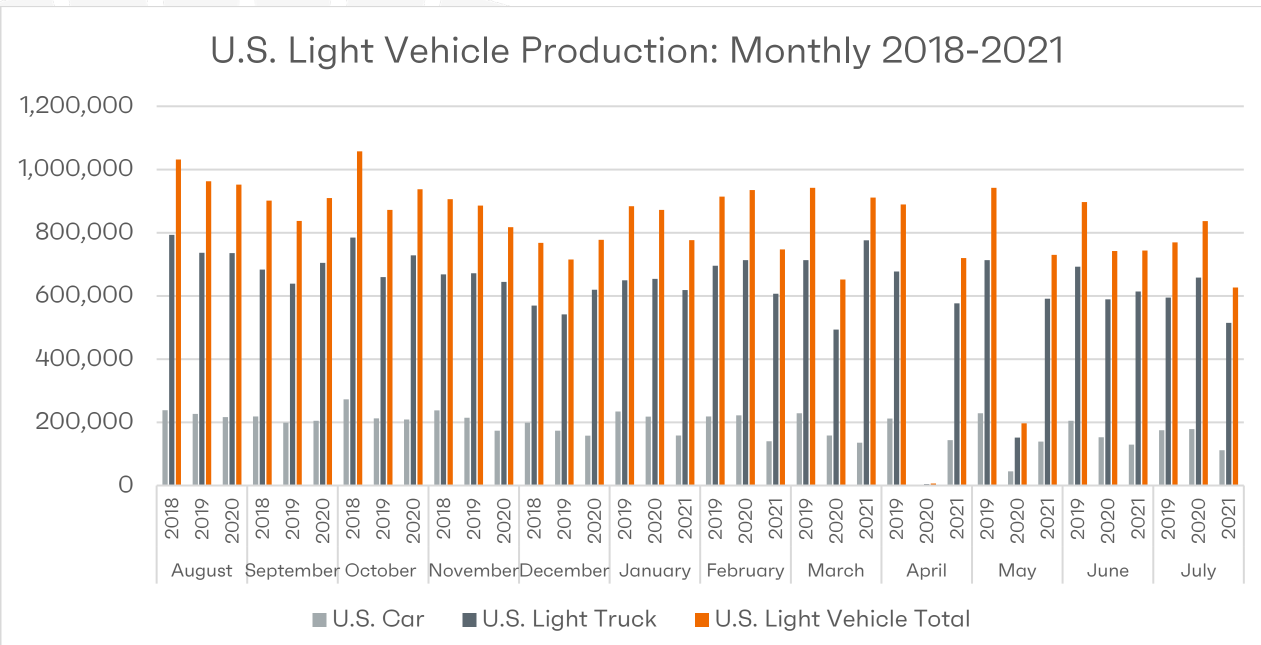



## Production Meter

### U.S. Light Vehicle Production (Updated 8/25)

**Wards Intelligence Analysis[23]:** "Total production in July – including light vehicles and medium-/heavy-duty trucks – fell 186,100 units short of expectations due to previously unplanned plant shutdowns and slowdowns that were added by automakers during the month. Furthermore, including input from Wards Intelligence partner LMC Automotive, the production outlook has been lowered for both August and September from month-ago's projections. Including July's shortfall, the tracking for Q3 production has been cut 382,700 units from month-ago's expectations. Looking beyond Q3, LMC Automotive reports there already are planned shutdowns related to the chip shortage in Q4. . . . July production totaled 965,100 units, 25.4% below like-2020's 1.293 million – a total negatively impacted from production losses related to Covid-19 restrictions last year. Total light-vehicle output in July was 926,051, 26.4% below like-2020 and lowest for the month since 831,740 in 2011.

**U.S. Light vehicle production for July 2021 totaled 626,718, down 25% from 2020:**

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## U.S. Light Vehicle Inventory and Days' Supply (Updated 8/4)

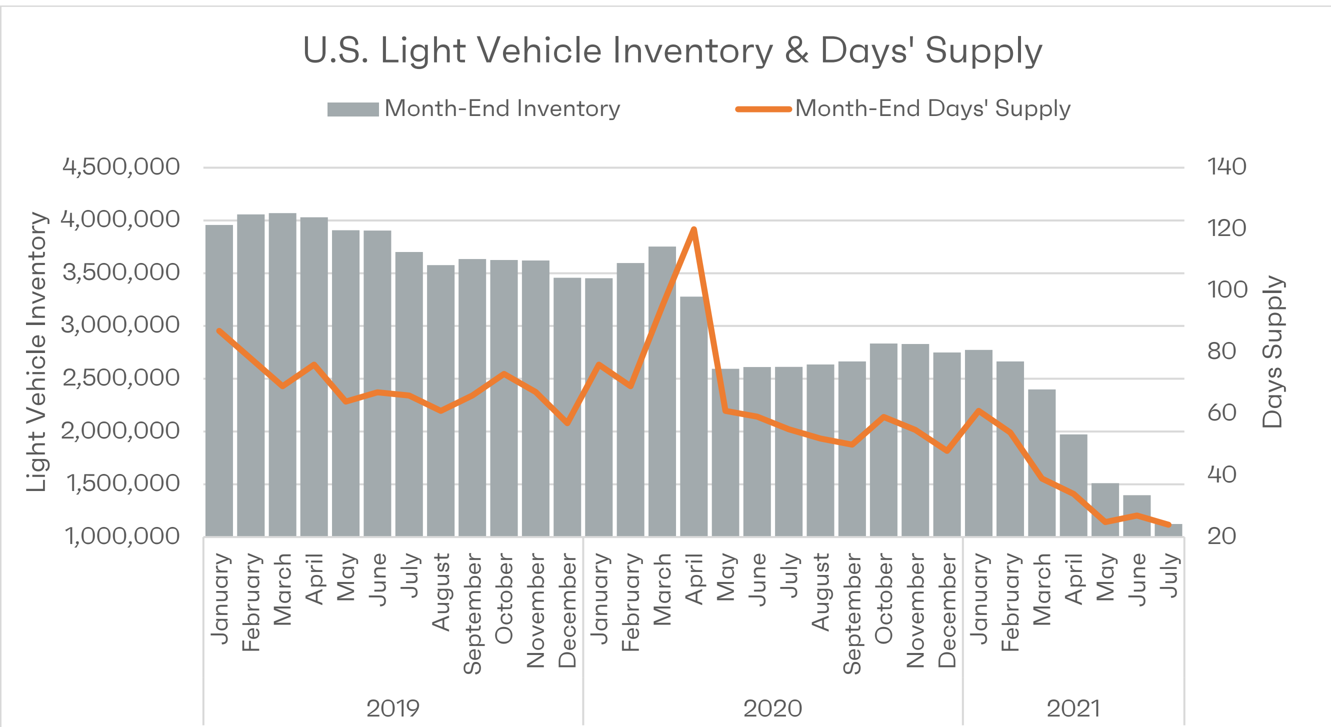
**WardsIntelligence Inventory Update[25]:** "U.S. light-vehicle inventory fell 19.4% from June, finishing July at 1.12 million units, 56% below the same year-ago period.

"The decline continues a trend of sharply falling inventory due to supply disruptions caused mostly by the global microchip shortage that have sharply curtailed production for the U.S. market in North America and overseas plants. The downward slide has been ongoing since January, with declines accelerating in Q2.

"July 31 days' supply totaled 24, down from like-2020's 54 and well below the 60-65 range normal for the month.

"Inventory of domestically made vehicles totaled 829,889 units, down 58% from like-2020, and equal to a 23 days' supply. Import inventory totaled 293,252 units, down 51% year-over-year, and equal to a 24 days' supply.

"Despite the current gloom, irrespective of whether sales strengthen or weaken in August from July, inventory should rise month-to-month for the first time since January, setting the stage for robust results in Q4."




## Global Meter

## Global Light Vehicle Sales Outlook (Updated 8/25)

**Wards Intelligence Outlook:** "World vehicle sales improved 9% in June to 7.41 million, compared to year-ago's 6.80 million. Despite the growth, the month still fell 6% short of June 2019's 7.90 million total as the pandemic and global chip shortage continue to restrain the industry's recovery.

Increased vehicle sales were seen in most regions but at a slower pace than in May as the market slowly approaches 2019's levels. South America recorded the highest increase (+45.1%), while Asia Pacific saw a 1.7% decline to 3.36 million units compared to year-ago's 3.41 million.

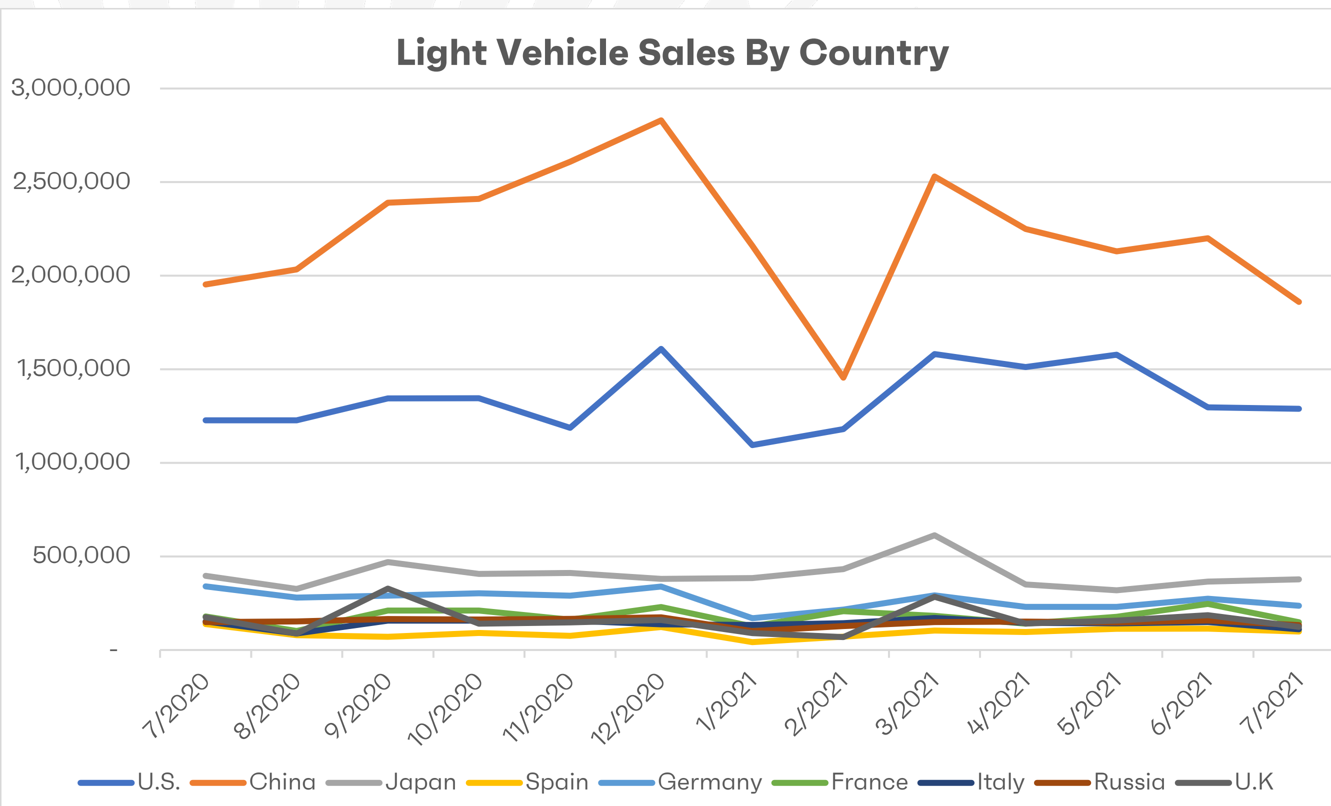
"Global market share in APAC decreased from 50.2% in same-period 2020 to 45.3% in 2021. Due to the fourth wave of COVID-19, many countries across the region recorded losses in vehicle sales when compared to last year. Malaysia saw a significant decline in sales since the country imposed a national lockdown in June. Vehicle sales in China saw a year-on-year decrease, down more than 12% to 2.09 million, while year-to-date sales were up 25.1% with 13.37 million deliveries.

"North America sales increased 19.4% year-on-year to 1.61 million vehicles in June. However, vehicle sales across the region were down 14% compared to May. Sales in the U.S. improved 18.1% to 1.34 million, while sales in Canada and Mexico increased 21.4% and 38.3%, respectively.

Demand in Europe rose 14.3% to 1.77 million units for the month. Most countries reported gains in June, with Ireland experiencing the biggest growth in sales (+136.4%). Declines were seen in Belgium (-15.9%), France (-13.6%), Luxembourg (-5.2%), Romania (-15.5%) and Slovenia (-17.1%) for the month. Year-to-date light-vehicle sales in Europe jumped 31.2% to 8.84 million deliveries from year-ago's 6.74 million.

"Total world light vehicle sales rose 9% to 7.07 million for June, compared to year-ago's 6.48 million."[26]

**Sales in select countries around the globe, raw volume by month:**

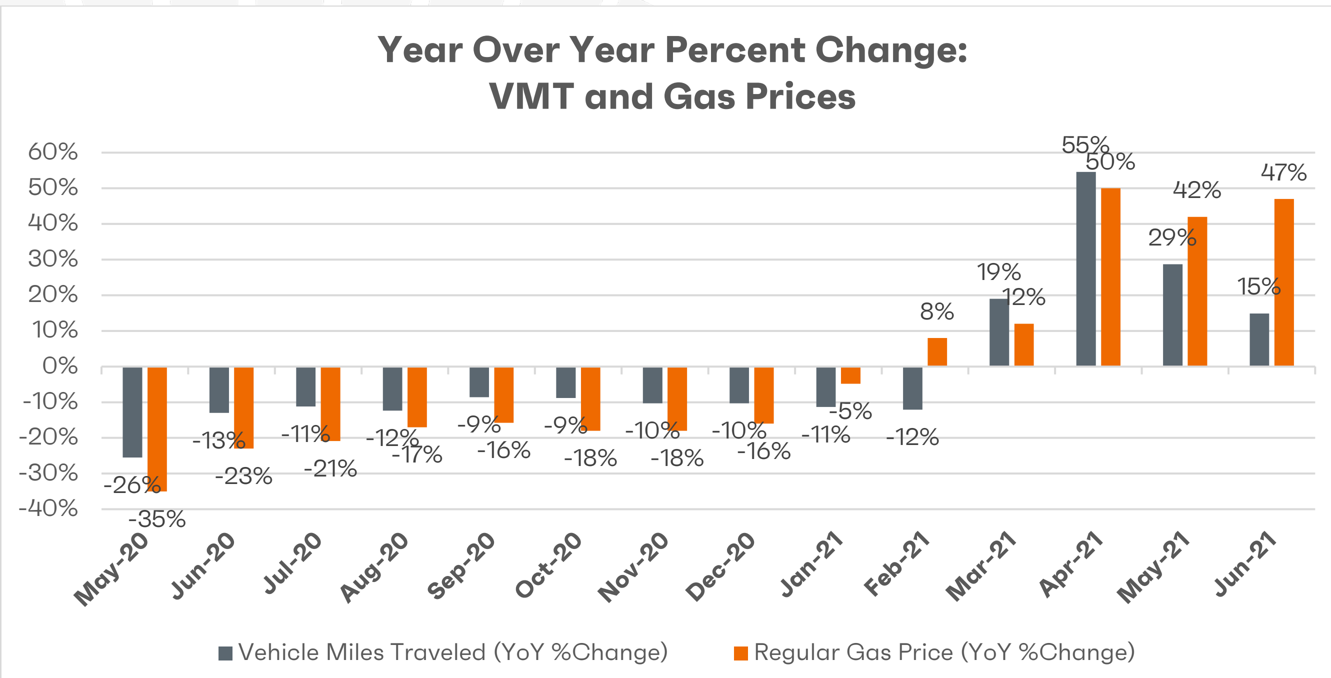


# Recovery Meter

## Roadway Travel (Updated 8/12)

According to the U.S. Department of Transportation, seasonally-adjusted vehicle miles traveled in June rose 14.9% from the same time a year ago. The cumulative travel estimate for 2021 is 1,504.6 billion vehicle miles.[27]

- Travel on all roads and streets changed by 14.5% (35.7 billion vehicle miles) for June 2021 as compared with June 2020. Travel for the month is estimated to be 282.5 billion vehicle miles.
- The seasonally adjusted vehicle miles traveled for June 2021 is 267 billion miles, a 14.9% (34.7 billion vehicle miles) increase over June 2020. It also represents 1.7% increase (4.5 billion vehicle miles) compared with May 2021.
- The cumulative estimate for the year is 1,504.6 billion vehicle miles of travel.




## Economic News (Updated 8/12)

**Manufacturing Added 27,000 Jobs In July.** "Manufacturing boosted employment by 27,000 jobs in July, with durable goods doing the heavy lifting. Durable goods accounted for 20,000 jobs of last month's gain, according to a breakdown by industry issued today by the U.S. Bureau of Labor Statistics. . . . Manufacturing totaled 12.366 million jobs on a seasonally adjusted basis in July. That was up from an adjusted 12.339 million the month before and 12.037 million in July 2020. In 2020, manufacturing felt the impact of the COVID-19 pandemic. Some industries shut plants to implement new safety procures to deal with the virus. Manufacturing employment still lags pre-pandemic levels. The manufacturing job total is 433,000 below February 2020, the last month before COVID-19 began to hit the U.S. economy."[28]

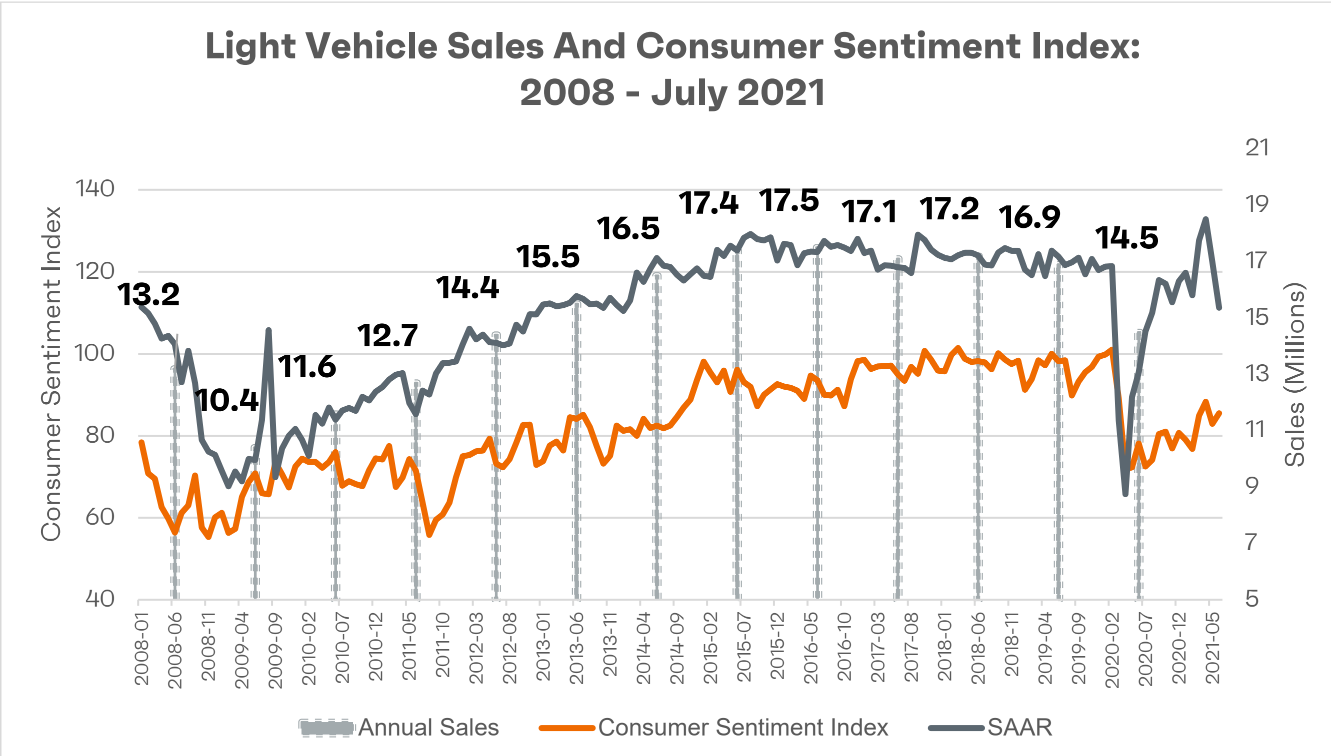
**Motor Vehicles And Parts Were Up 800 (Seasonally Adjusted).** "Transportation equipment, a major category, was down 1,500 jobs, although the motor vehicles and parts category was up 800."[29]

**For July, The ISM Ticked Down To 59.5 From 60.6 In June.** "U.S. manufacturing continued to grow in July, though the pace slowed for the second straight month as spending rotates back to services from goods and shortages of raw materials persist. The Institute for Supply Management (ISM) said on Monday its index of national factory activity fell to 59.5 last month, the lowest reading since January, from 60.6 in June. A reading above 50 indicates expansion in manufacturing, which accounts for 11.9% of the U.S. economy. Economists polled by Reuters had forecast the index little changed at 60.9."[30]

**The Index Of Prices For Raw Materials Fell To 85.7, The Largest Drop Since March 2020.** "The ISM survey's measure of prices paid by manufacturers fell to a reading of 85.7 last month from a record 92.1 in June, reflecting an easing in commodity prices. The drop - the largest pullback in the index since March 2020 - supports Federal Reserve Chair Jerome Powell's contention that inflation will moderate as supply constraints abate."[31]

## Consumer Confidence and Sales (Updated 8/4)

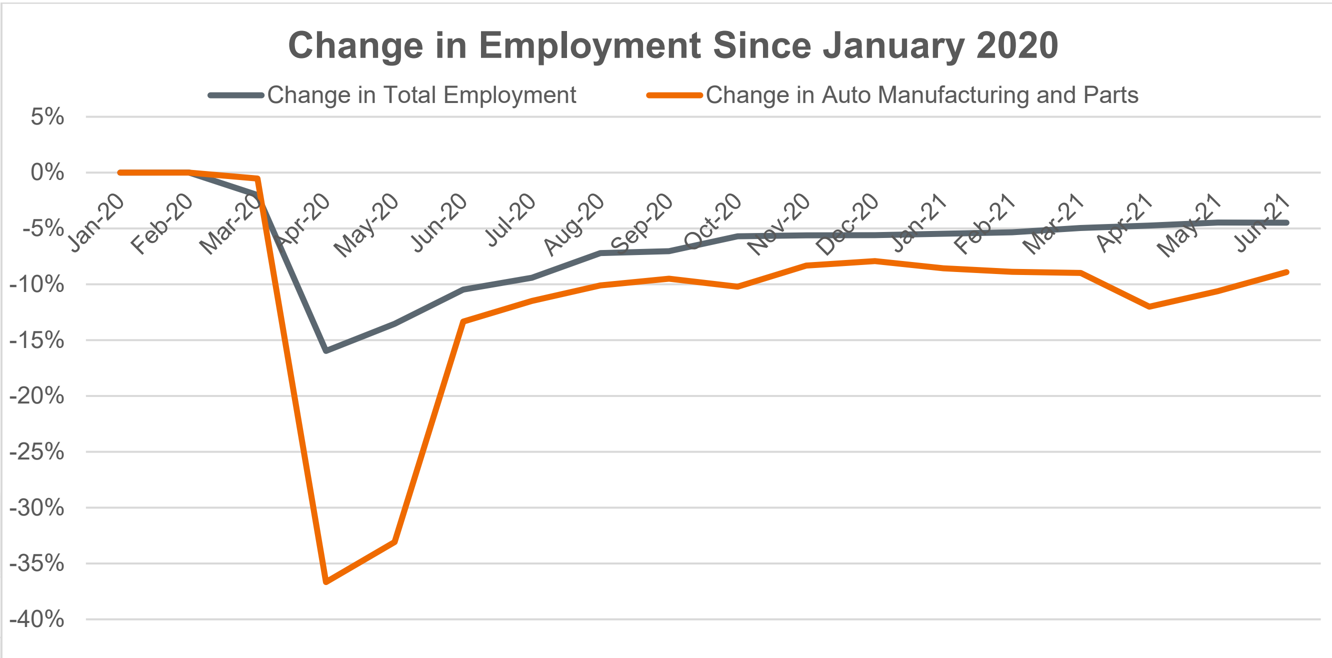
"Consumer sentiment edged upward at the end of July, although it still posted a monthly decline of 5.0%. The largest monthly declines remained concentrated in the outlook for the national economy and complaints about high prices for homes, vehicles, and household durables. While most consumers still expect inflation to be transitory, there is growing evidence that an inflation storm is likely to develop on the not too distant horizon. The improved finances of consumers have greatly reduced consumers' resistance to price increases."[32]



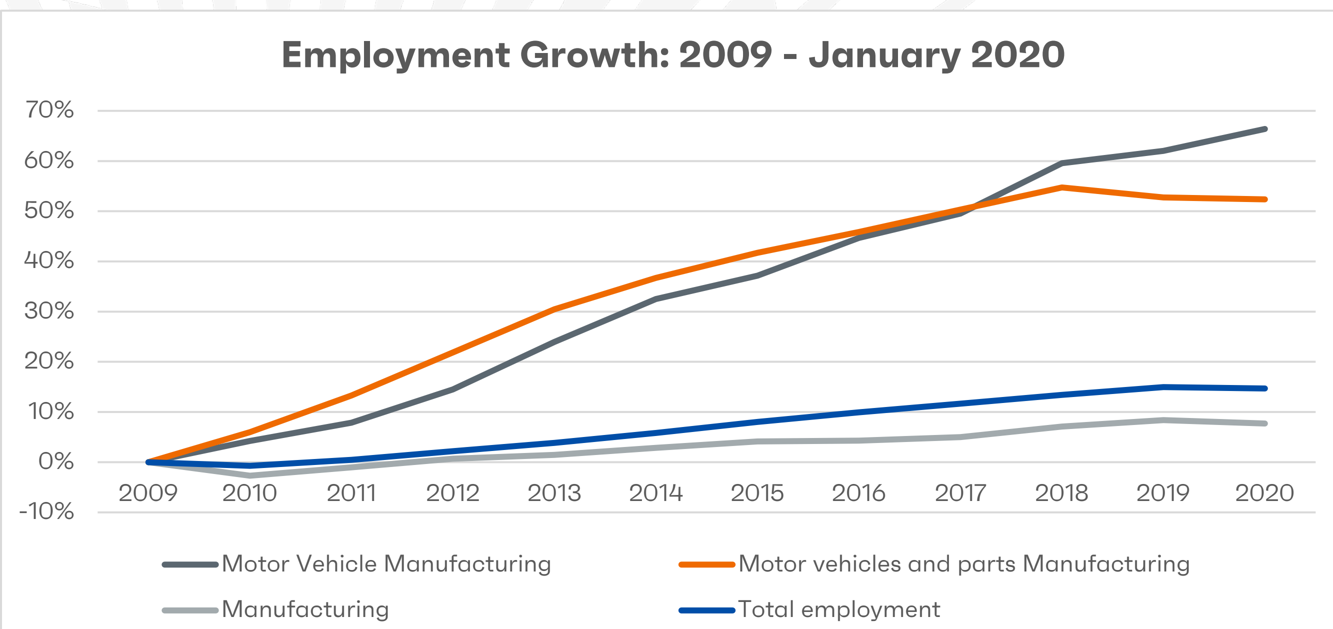

## Employment (Updated 8/12)

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 96,000 jobs since January 2020.[33]

- **Motor Vehicle And Parts Manufacturing Added 800 Jobs In July.**[34]




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.[35] 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

[1] WardsIntelligence, "U.S. Light Vehicle Sales, April," 5/1/20; WardsIntelligence, "U.S. Light Vehicle Sales, May 2020," 6/2/20; WardsIntelligence, "U.S. Light Vehicle Sales, June 2020," 7/1/20; WardsIntelligence, "U.S. Light Vehicle Sales, July 2020," 8/3/20; WardsIntelligence, "U.S. Light Vehicle Sales, August 2020," 9/1/20; WardsIntelligence, "U.S. Light Vehicle Sales, September 2020," 10/1/20; WardsIntelligence, "U.S. Light Vehicle Sales, October 2020," 11/3/2020; WardsIntelligence, "U.S. Light Vehicle Sales, November 2020," 12/1/2020; "U.S. Light Vehicle Sales, December 2020," 1/5/2021

[2] Haig Stoddard, "COVID-19 Impact Will Tank March, Second-Quarter U.S. Light-Vehicle Sales," *WardsIntelligence*, 3/25/20; Haig Stoddard, "March 25 COVID-19 Update: 2020 North America Production, U.S. Sales Forecasts," *WardsIntelligence*, 3/30/20; Haig Stoddard, "U.S. Light-Vehicle Sales Start on the Road Back in May," *WardsIntelligence*, 5/21/20

[3] Haig Stoddard, "COVID-19's Toll on North America Vehicle Production in March, Q2," *WardsIntelligence*, 3/30/20; Haig Stoddard, "North America Platform by Plant Production Forecast - 2020-2022," *WardsIntelligence*, 1/8/21

4 Haig Stoddard, "August U.S. Light-Vehicle Sales to Continue Downward Spiral," *WardsIntelligence*, 8/24/21

[5] Haig Stoddard, "August U.S. Light-Vehicle Sales to Continue Downward Spiral," *WardsIntelligence*, 8/24/21

[6] Haig Stoddard, "North America Vehicle Production Takes Another Chip-Related Hit in Q3," *Wards Intelligence*, 8/20/21

[7] Haig Stoddard, "Microchip Shortage to Shave 3.75 Million Units from 2021 Global Light-Vehicle Output," *WardsIntelligence*, 8/10/21

[8] IHS Markit, "Global Light Vehicle Production Impacts Now Expected Well Into 2022," 8/19/21

[9] IHS Markit, email, "IHS Markit Monthly Automotive Update - August 2021," 8/16/21

[10] Haig Stoddard, "U.S. Light-Vehicle Sales Continue Downward Slide in July," *WardsIntelligence*, 8/4/21

[11] Haig Stoddard, "U.S. Light-Vehicle Sales Still Solid, But Dried-Up Inventory Dents May's Results," *WardsIntelligence*, 6/2/21

[12] WardsIntelligence, U.S. Light Vehicle Sales, January 2013 – June 2021

[13] U.S. Energy Information Administration, Weekly Retail Gasoline and Diesel Prices, Regular price per gallon, including taxes

[14] WardsIntelligence, Fuel Economy Index, December 2013 & 2019

[15] WardsIntelligence, U.S. Light Vehicle Sales, June 2020; U.S. Light Vehicle Sales, June, 2021

[16] Haig Stoddard, "U.S. Light-Vehicle Sales Continue Downward Slide in July," *WardsIntelligence*, 8/4/21

[17] J.D. Power, Press Release, "Inventory Shortages Cause July Sales Pace to Weaken but Demand Drives Average Transaction Price Above $41,000 for First Time," 7/28/21

[18] Kelley Blue Book, Press Release, "Average New-Car Prices Up Nearly 4 Percent Year-Over-Year for May 2019, According to Kelley Blue Book," 6/3/19; Kelley Blue Book, Press Release, "Average New-Vehicle Prices Rise More Than $2,000 from Last Year, Hitting All-Time Record High for May, According to Kelley Blue Book," 6/22/2021

[19] Bankrate, "Current Car Loan Interest Rates," Accessed 7/14/21; Internet Archive, Bankrate, "Current Car Loan Interest Rates, cached image from 12/4/19

[20] EIA, "Short-Term Energy Outlook," 7/7/21

[21] EIA, "Short-Term Energy Outlook," 7/7/21

[22] U.S. Energy Information Administration, Regular Gasoline, www.eia.gov, Accessed 6/30/21; U.S. Energy Information Administration, Weekly Cushing, OK WTI Spot Price, www.eia.gov, Accessed 6/30/2021; YCharts, ycharts.com, Accessed 11/4/20

[23] Haig Stoddard, "North America Vehicle Production Takes Another Chip-Related Hit in Q3," *Wards Intelligence*, 8/20/21

[24] WardsIntelligence, "North America Production, November 2019," 12/18/19; WardsIntelligence, "North America Production, November 2020," 12/17/20

[25] Haig Stoddard, "July U.S. Light-Vehicle Inventory Falls 19%; 2021 Sales Outlook Chopped," *WardsIntelligence*, 8/4/21

[26] Olympia Fotiadi Mouzala, "World Sales Rose 9% in June," *WardsIntelligence*, 8/2/21

[27] U.S Department of Transportation, https://www.fhwa.dot.gov/policyinformation/travel_monitoring/20novtvt/, Accessed 5/19/2021

[28] Bill Koenig, "Manufacturing Adds 27,000 Jobs, Paced by Durable Goods," SME, 8/6/21

[29] Bill Koenig, "Manufacturing Adds 27,000 Jobs, Paced by Durable Goods," SME, 8/6/21

[30] "U.S. Manufacturing Sector Growth Slowing-ISM," *Reuters*, 8/2/21

[31] "U.S. Manufacturing Sector Growth Slowing-ISM," *Reuters*, 8/2/21

[32] Surveys of Consumers, University of Michigan, http://www.sca.isr.umich.edu/, 7/14/21

[33] Bureau of Labor Statistics, Current Employment Statistics, Accessed 3/17/2021

[34] Bureau of Labor Statistics, Table B-1. Employees on nonfarm payrolls by industry sector and selected industry detail, June 2021

[35] Jerry Hirsch, "Auto Industry Has Soared Since 2010, Leading Economic Recovery," *Los Angeles Times*, 1/3/14