BUILD ELECTRONICS BETTER

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ECONOMIC OUTLOOK

As we set to close 2020, we look forward to 2021 with trepidation but also with a degree of optimism. We're closing out one of the worst years in history, and when the dust settles, global real GDP growth will be down 3.7 percent. The United States economy will have fallen by 3.5 percent during the year, the worst annual decline since the demobilization following World War II in 1946, and before that, the Great Depression. 2020 is one of the 10 worst years in the 200+ years of U.S. history.

In some ways it could have been worse. In many ways it could have been better.

The decline in the second quarter left a crater like none the U.S. has experienced. The speed and depth of the decline was unheralded. This same narrative played out in most countries across the globe. But early fiscal and monetary response helped mitigate some of the potential fallout. The partial recovery in the third quarter was the strongest quarter of growth in history in the U.S., Europe and elsewhere.

At the same time, a resurgence of COVID-19 cases in recent months has brought renewed restrictions in the U.S. and Europe and incoming data suggests economic activity is slowing. While the damage has not been as pronounced as early in the pandemic cycle, it has curtailed growth and will prolong the recovery. In Europe, it has likely exacerbated a second decline in headline economic growth. While a double dip recession is not the base-case scenario in the U.S., the risk of a double dip recession has increased.

Nowhere is this slowdown more pronounced than with the U.S. labor market. Job growth is slowing and at the current rate, it will take until 2024 to recover all of the jobs lost to the pandemic. Temporary layoffs dropped to 2.8 million in November, but the slowdown could mean employers are turning back to furloughs as the outlook weakens. Permanent layoffs increased to 3.7 million in November and the percent of those workers who are long-term unemployed (over 27 weeks) continues to rise, leading to concerns of structural dislocations in the labor market. The COVID-19 recession is unlike previous recessions in many ways. Typically, during a recession, consumers delay spending on durable goods while spending on services is more resilient. But in this recession, travel restrictions and mandated closures crippled the service industry. Conversely, the manufacturing industry has recovered more quickly than it might have historically as consumers reallocated spending towards the goods economy. In the U.S., spending on services is still seven percent below pre-pandemic levels, while spending on goods is now above its pre-recession peak.

We enter 2021 at a crossroads. The early months will be dictated by the trajectory of the virus. Expect slower growth in both the U.S. and Europe. But vaccines are now being administered to millions of people. It would take more than four years to reach herd immunity without vaccines. While the exact timing is uncertain, it appears likely that the U.S. and much of Europe can reach herd immunity with the help of vaccines by the back half of 2021.

In the second half of next year prospects should brighten. Increased immunization should instill confidence and push economies closer to pre-pandemic normalcy. Pent-up demand should help drive economic activity. The U.S. economy should regain it's pre-pandemic levels by mid-2021, although the labor market will likely lag behind. European economies are not likely to regain their pre-pandemic levels until the end of 2022 or into 2023. This will be especially true in Southern Europe where countries are more reliant on tourism.

China continues to weather the global recession better than many. November data reveal that both the consumer and the industrial sides of the economy continue to recover. Retail sales were up five percent in November 2020 when compared with last year. Industrial production is up seven percent over the same period. Both retail sales and industrial production are stronger year-over-year growth rates than in the prior month as investments accelerate.

While the recession will likely end up being less severe than initially feared, the recovery will be long and uneven. There are also a myriad of risks that could derail the recovery like the news of a more highly contagious COVID-19 mutation. This could mean more restrictive measures in 2021 that will further hamper economic recovery. While this isn't, as of now, the base-case scenario, it is a risk with outsized negative consequences.

The global manufacturing sector continues to recover. Many sectors have recovered from seemingly impossible collapse in the immediate aftermath of the pandemic. The auto industry in both the U.S. and Europe has recovered surprisingly well. In the U.S., the auto industry has brought back nearly 80 percent of the jobs lost this year, far better than most other sectors of the economy. Production and sales both recovered sharply, quickly making up lost ground. The auto production in the EU is now off just 2.5 percent from a year-ago.

Additional fiscal support in both the U.S. and Europe will further help mitigate some of the negative effects of the pandemic, but we aren't out of the woods yet. The next few months will be especially vulnerable. With rapid dissemination of vaccines, growth should begin to pick-up in the back half of 2021. Credit card balances are at three-year lows and savings rates are at record highs. Strong government support early in the pandemic pushed personal income up. At the same time spending was limited by the lockdown. These excess savings are now sitting on the sidelines waiting to be spent.

0.8%

The manufacturing component of industrial production increased 0.8 percent in November. The manufacturing component has now recouped more than 81 percent of the pandemic-induced loss

1.7%

China's economy is set to expand 1.7 percent in 2020, one of few countries to grow in 2020.

8.8%

The motor vehicle manufacturing production index for the EU increased 8.8 percent in October, after increasing 12.1 percent in September. Auto production in the EU is now off just 2.5 percent from a year ago.

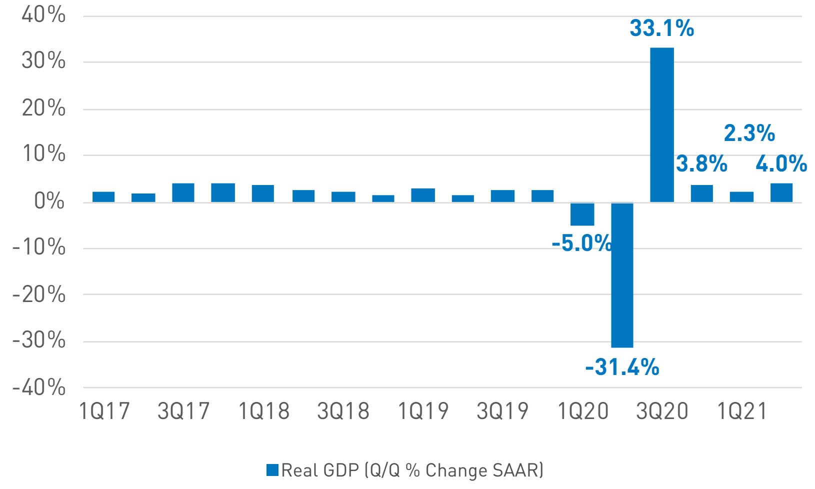
-3.7%

The global economy declined 3.7 percent in 2020, one of the worst years on record.

U.S. OUTLOOK

ECONOMIC GROWTH

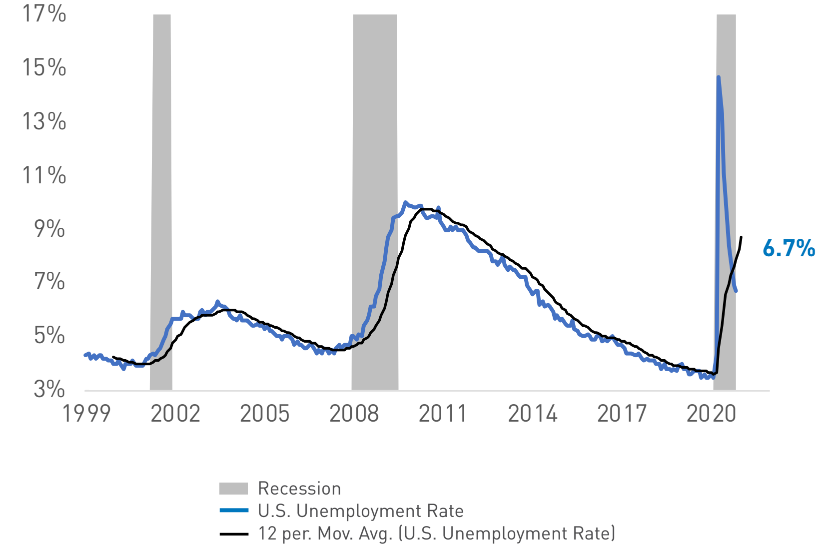
As expected, the economy grew strongly in the third quarter, rising a slightly revised 33.4 percent (annualized). This is record growth on the back of a record decline in the fourth quarter (down 31.4 percent annualized). The economy is on track to grow roughly four percent in the final quarter of the year. The pace of growth in 2021 will depend on the rate of further COVID infections, the rate at which vaccines can be administered, and the extent of fiscal stimulus. The first half of the year will see weaker growth, giving way to a more stable economy and more solid growth in the second half of the year.



	2020 ECONOMIC GROWTH (GDP % Change)	2021 ECONOMIC GROWTH (GDP % Change)	2020 EXCHANGE RATE (v. USD)	2021 EXCHANGE RATE (v. USD)
UNITED STATES	-3.5%	4%	N/A	N/A
CANADA	-5.6%	4.7%	1.31	1.30
MEXICO	-9.0%	3.0%	20.68	20.67
EURO AREA	-7.3%	4.7%	1.19	1.22
CHINA	2.0%	8.0%	6.63	6.60

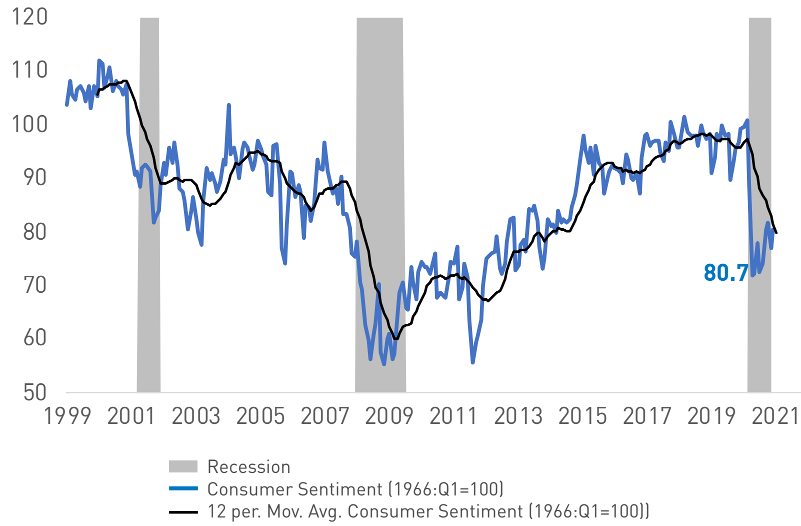
EMPLOYMENT

The economy added jobs again in November, but the rate of growth slipped further. During the month, 245,000 jobs were added, down from 610,000 jobs in October. While the economy has added back roughly 56 percent of all jobs lost this year, at this rate it would take the economy another 40 months to regain the remaining 44 percent of jobs. The unemployment rate declined to 6.7 percent, but this was largely due to workers leaving the labor force.Transportation and warehousing gained 145,000 jobs while retail trade payrolls dropped by 34,700 jobs on a seasonally-adjusted basis, as holiday spending shifts towards e-commerce.



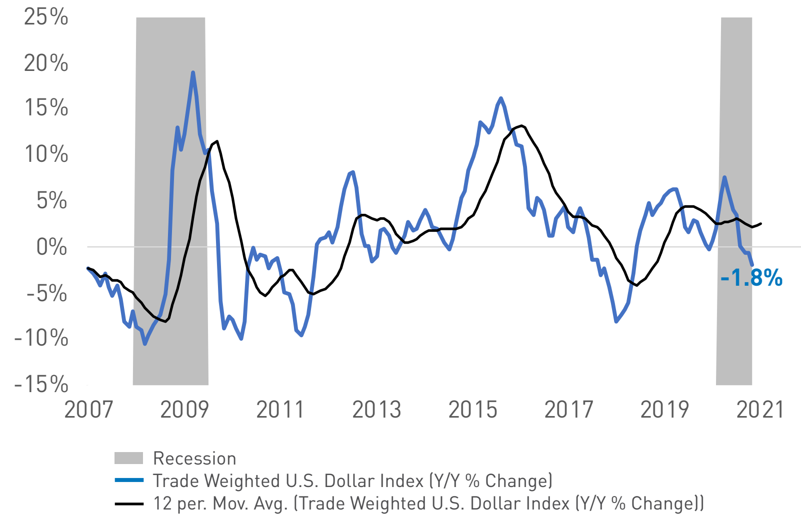
SENTIMENT

The Consumer Sentiment Index moved lower in November, before regaining some ground in December. The index fell to 76.9 in November as the number of COVID cases raged across the country. In December, the index recovered to 80.7. Much of the decline in November was attributable to declines in the Expectations Index as consumers continue to try to assess the future course for the economy. The pandemic has opened up a wide gap between how consumers are assessing the overall economy relative to their individual finances. Historically, these measures moved in tandem. Household finances have remained positive for those who are still employed and working from home.



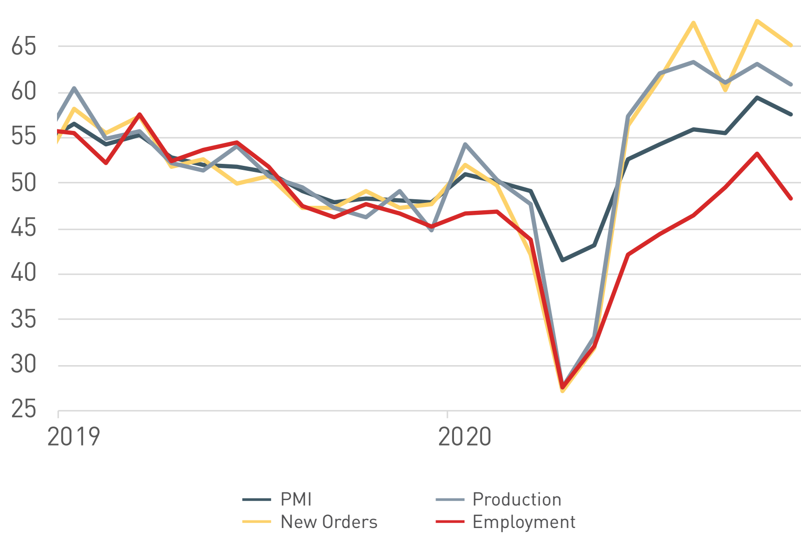
TRADE-WEIGHTED U.S. DOLLAR INDEX

The trade-weighted dollar index fell 1.5 percent during November and is down 1.8 percent from a year-ago. The dollar is on track for it's weakest year since 2017. Low interest rates and massive stimulus have put downward pressure on the dollar throughout the year. The Federal Reserve has nearly doubled the size of its assets from under $4.2 trillion in February to $7.4 trillion today. Rising risk appetites are also putting further pressure on the dollar as investors seek higher yielding assets in emerging markets. The dollar is facing headwinds as the economy heads into 2021. In turn, this could be a positive tailwind for U.S. equities and exports.



MANUFACTURERS' SENTIMENT (PMI)

The manufacturing sector continues to expand and the outlook remains positive despite a slight decline in manufacturer sentiment over the last month. The PMI decreased to 57.5, but this is coming down from the highest levels recorded in the last two years. COVID-19 protocols continue to exert some strain on manufacturers. These strains are materializing in the form of new operating procedures that are less efficient at times, absenteeism and short-term shutdowns to clean facilities. Customers' Inventory Index is at its lowest levels since June 2010, suggesting growth in demand should drive orders.

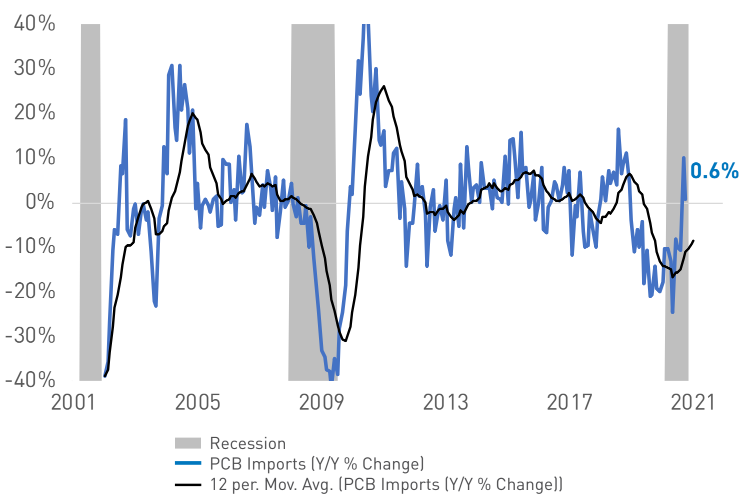


U.S. PCB DEMAND & INDUSTRY EMPLOYMENT

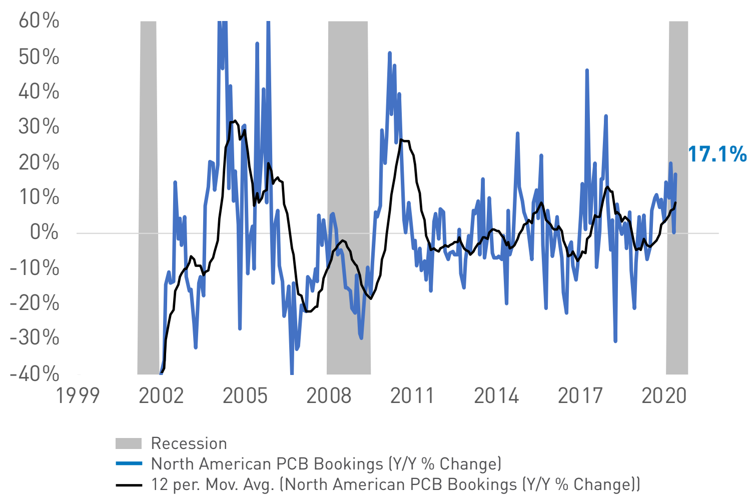
PCB INDUSTRY

PCB shipments and orders continue to be somewhat volatile but remain in line with recent trends. While November shipments slipped slightly below the recent average, November orders rose above their respective average and are 17 percent higher than a year-ago. The year-to-date trend is also instructive in understanding the broader trends for the year. Year-to-date PCB orders are up 23.2 percent, and bookings are up 26.1 percent. So while both orders and bookings have been slowing in recent months, the year-to-date trend has been strong. PCB imports were flat in October and are up 0.6 percent over the last year. PCB imports year-to-date are up 1.2 percent.

PCB Imports (Y/Y % Change)



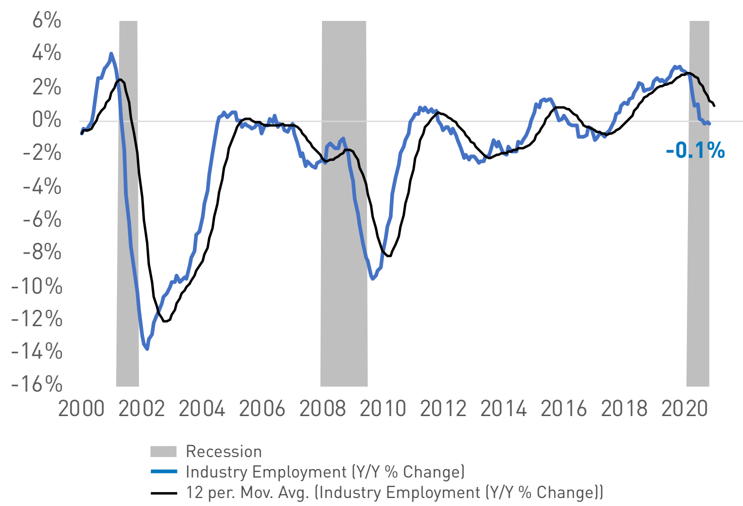
North American PCB Bookings (Y/Y % Change)



INDUSTRY EMPLOYMENT

The electronics industry added 3,100 jobs in November (down 1,500 on a seasonally-adjusted basis). This follows a downward revised addition of 2,100 jobs in October (flat on a seasonally-adjusted basis). Industry employment remains down 10,000 jobs (36,300 on a seasonal basis). Monthly job growth has been slowing in manufacturing and the overall economy, and that trend is expected to continue into 2021. Likewise, job growth will likely remain muted for the electronics industry. While the industry lost a smaller percentage of jobs than the overall manufacturing sector did during the early months of the pandemic, it will likely take some time for the industry to fully recover jobs.

Industry Employment (Y/Y % Change)



U.S. END MARKETS FOR ELECTRONICS

Industrial production rose 0.4 percent in November, and has now recovered about 71 percent of the output lost to the pandemic. The manufacturing component increased 0.8 percent during the month and has regained 81 percent of the ground lost to the pandemic. Motor vehicle production and transit equipment were especially strong during the month.

AUTOMOTIVE PRODUCTS

Auto production was up 5.2 percent during the month. Auto production is up 2.7 percent over the last year and up 43.6 percent from March 2020.

TRANSIT EQUIPMENT

Transit equipment production increased seven percent last month. The sector remains down 19.1 percent from last year but is now just 2.7 percent from pre-pandemic levels.

INFORMATION PROCESSING & RELATED EQUIPMENT

Production in the information processing and related equipment sector increased 1.5 percent during the month.The sector is up 0.8 percent over the last year.

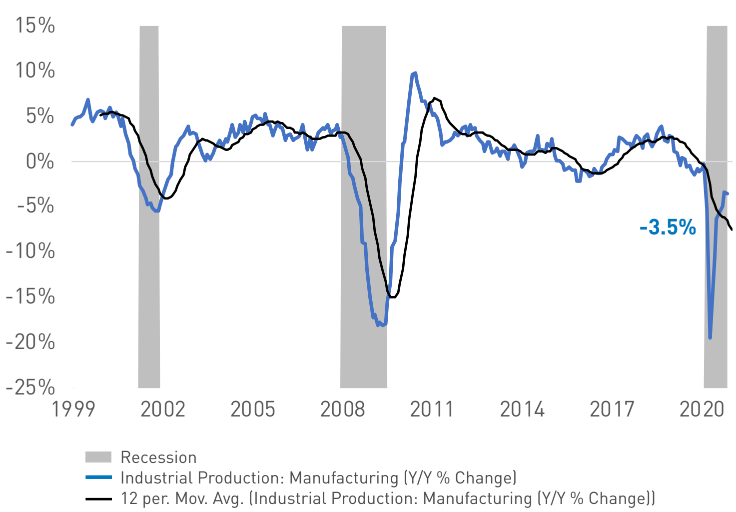
INDUSTRIAL & OTHER EQUIPMENT

The industrial segment grew 0.3 percent. The sector is down eight percent over the last year and 7.1 percent from the start of the pandemic.

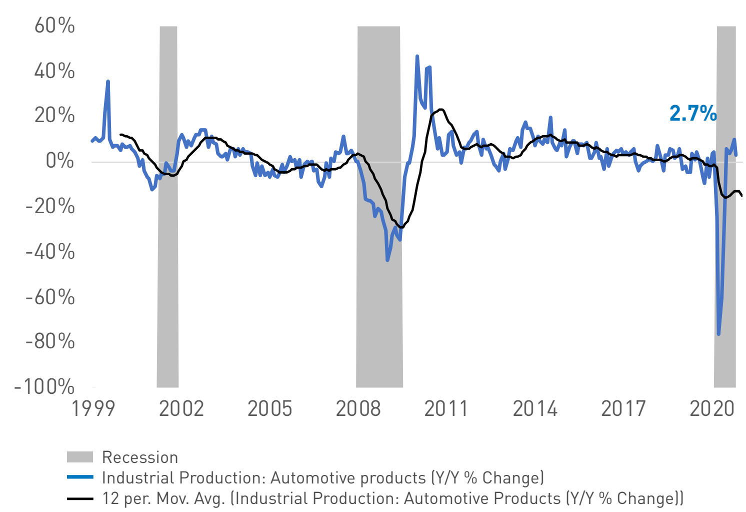
DEFENSE & SPACE EQUIPMENT

The defense and space equipment segment increased 0.9 percent in November after an upwardly revised 1.8 percent gain in October. The sector is now up 0.3 percent over the last year.

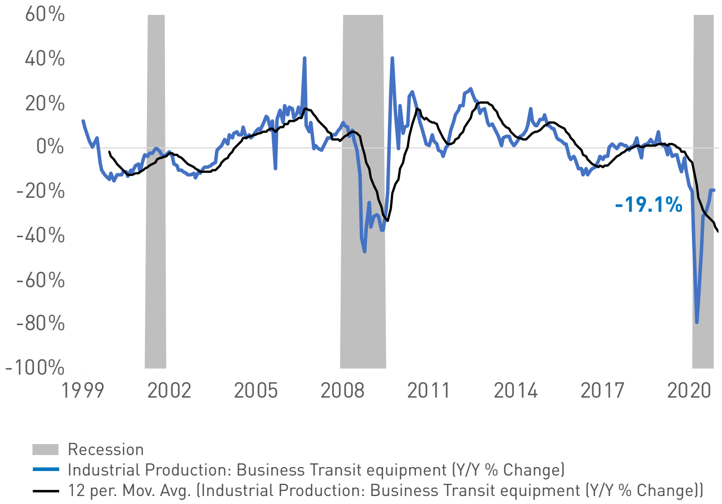
Manufacturing



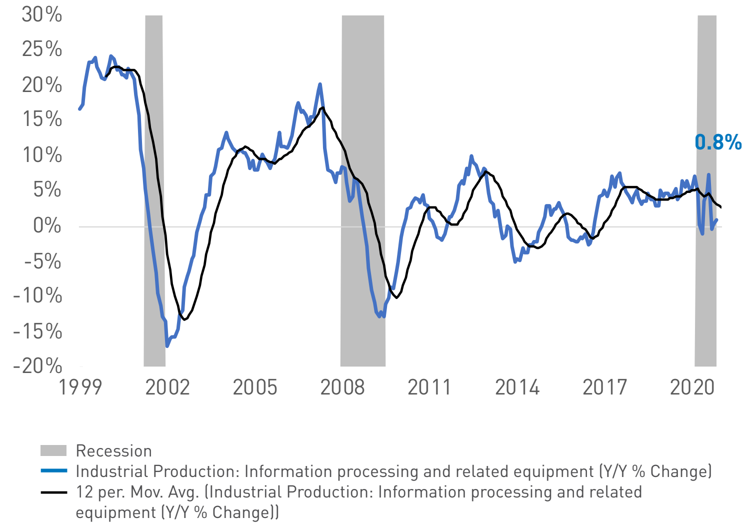
Automotive Products



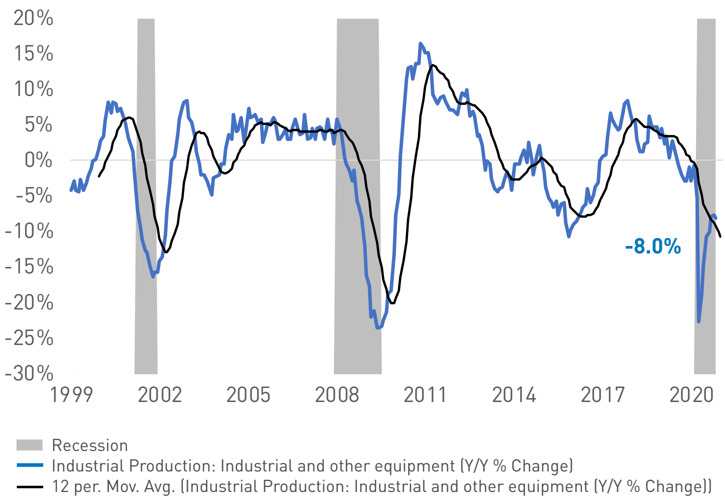
Business Transit Equipment (Y/Y % Change)



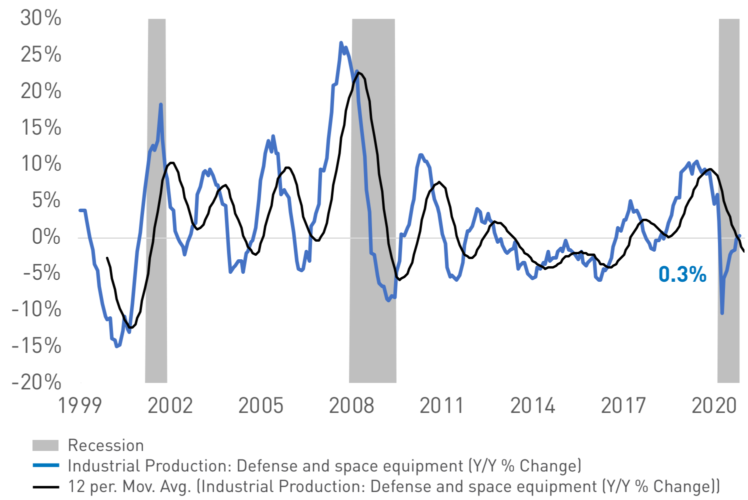
Information Processing & Related Equipment (Y/Y % Change)



Industrial & Other Equipment (Y/Y % Change)



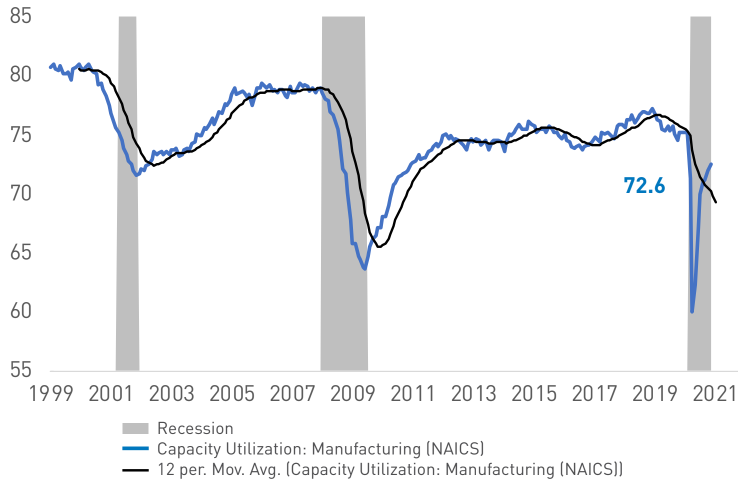
Defense & Space Equipment (Y/Y % Change)



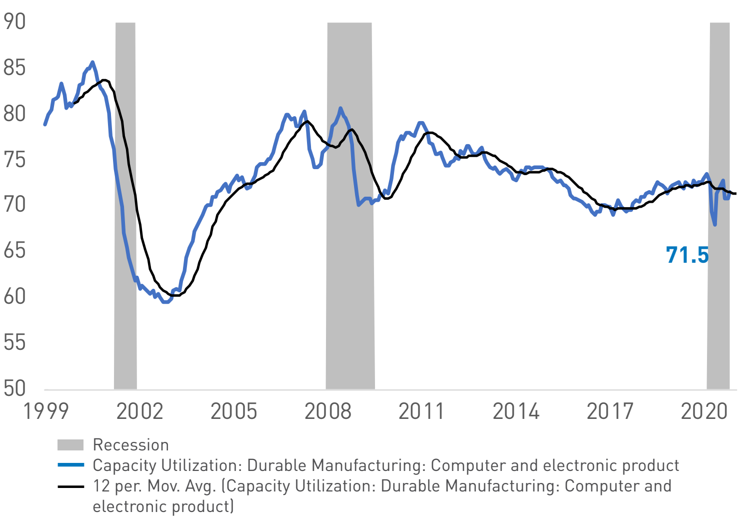
MANUFACTURING CAPACITY UTILIZATION

Recovery in the industrial and manufacturing sectors continue. Overall, capacity utilization increased to 73.3 percent in November from 73 percent in October. Manufacturing capacity rose to 72.6 percent, from 72 percent during the month. Utilization in the Computer and Electronic Product sector increased to 71.5. Capacity utilization in Aerospace and Miscellaneous Transportation Equipment increased to 6.79 percent. Utilization in the Motor Vehicles and Parts sector jumped during the month, rising to 77.8 percent. Of the sectors tracked, only Electrical Equipment, Appliance, and Components saw capacity utilization decrease.

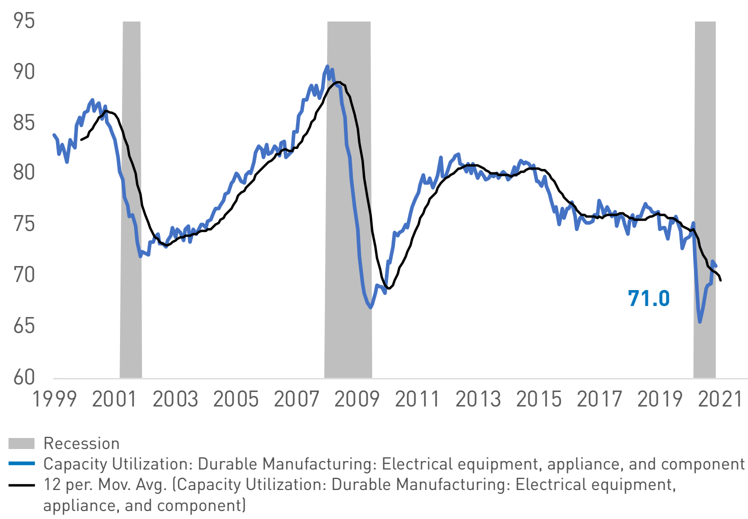
Manufacturing (NAICS)



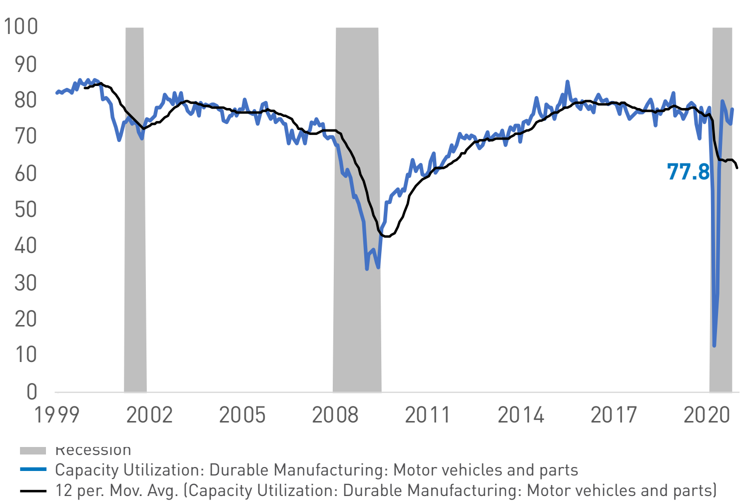
Computer & Electronic Product



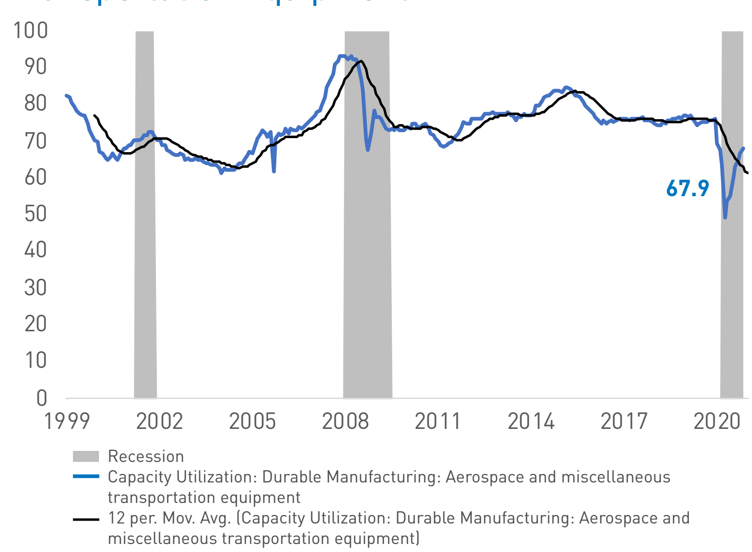
Electrical Equipment, Appliance, & Component



Motor Vehicles & Parts



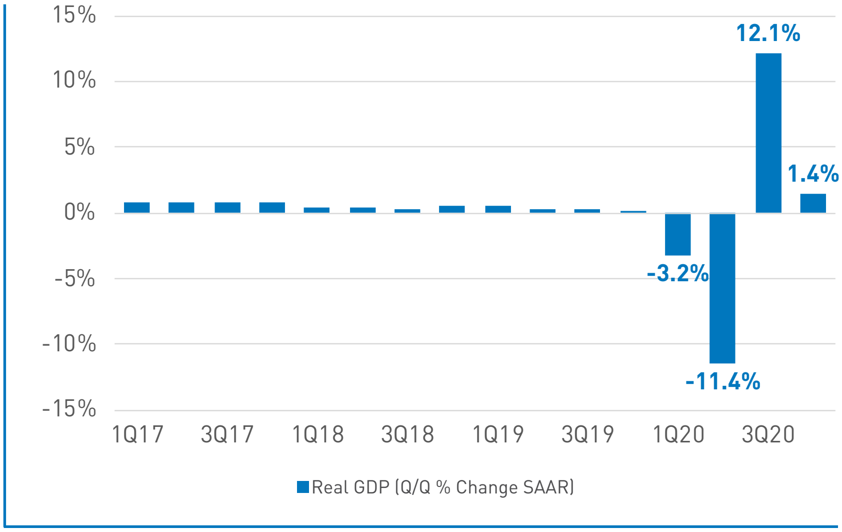
Aerospace & Miscellaneous Transportation Equipment



EUROPEAN OUTLOOK

ECONOMIC GROWTH

GDP for the third quarter was revised down slightly. Euro area GDP increased 12.5 percent in the third quarter (11.5 percent in the EU), the strongest quarterly growth since records began in 1995. GDP is still down 4.3 percent from 2019 (4.2 percent in the EU). France saw the strongest jump in the third quarter, rising 18.7 percent. Spain (16.7 percent increase) and Italy (15.9 percent increase) also experienced solid growth. Germany was up 8.5 percent during the quarter.



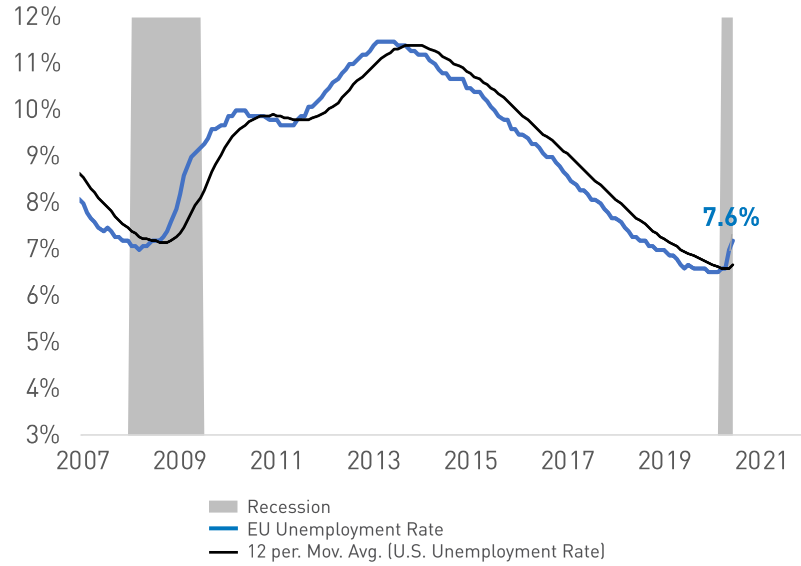
Over the last month, rising COVID-19 cases have led many countries to implement lockdowns. While not as severe as earlier in the year, the lockdowns have diminished economic activity. The lockdowns will drive GDP to contract in the final quarter of the year and lead to subdued economic activity in the first half of 2021. Further fiscal policy support, coupled with vaccine dissemination and pent-up demand, should drive growth in the back half of t2021. The economy is on track to decline just under two percent in the fourth quarter, before eeking out a small gain in the first quarter.

	Q/Q PERCENTAGE CHANGE				Y/Y PERCENTAGE CHANGE			
	2019Q4	2020Q1	2020Q2	2020Q3	2019Q4	2020Q1	2020Q2	2020Q3
EURO AREA	0.1%	-3.7%	-11.7%	-12.5%	1%	-3.2%	-14.7%	-4.3%
EU (27)	0.2%	-3.3%	-11.2%	11.5%	1.3%	-2.6%	-13.9%	-4.2%
GERMANY	0%	-1.9%	-9.8%	8.5%	0.4%	-2.1%	-11.2%	-4%
FRANCE	-0.2%	-5.9%	-13.8%	18.7%	0.8%	-5.7%	-18.9%	-3.9%
ITALY	-0.3%	-5.5%	-13%	15.9%	0.1%	-5.6%	-18%	-5%
SPAIN	0.4%	-5.2%	-17.8%	16.7%	1.7%	-4.2%	-21.5%	-8.7%

	2020 ECONOMIC GROWTH (GDP % CHANGE)	2021 ECONOMIC GROWTH (GDP % CHANGE)
EURO AREA	-7.3%	4.7%
GERMANY	-5.5%	4.1%
FRANCE	-9.1%	6.1%

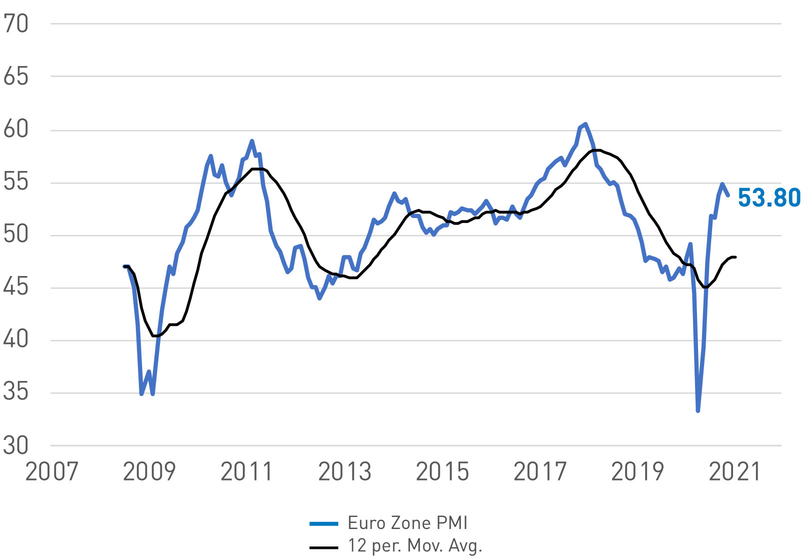
EMPLOYMENT

The unemployment rate in the EU was steady at 7.6 percent in October. In the Eurozone, the unemployment fell from 8.5 percent to 8.4 percent in October. Unemployment was 7.4 percent in the same month last year. Revisions in the last month reveal a worse unemployment rate in the aftermath of the pandemic that has slowly improved in recent months. Short-time work programs have helped to mitigate the impact of the pandemic on employment. While October brought increased COVID-related restrictions, initial data suggests these measures haven't yet materialized in higher unemployment.



MANUFACTURERS' SENTIMENT (PMI)

The Eurozone's manufacturing PMI decreased slightly in November, falling from 54.8 to 53.8, likely driven by new lockdown measures and curtailed economic activity. Despite these new restrictions, the manufacturing sector continued to expand in November and early indicators suggest the same for December. Unlike normal recessions, the manufacturing sector continues to expand following the initial punch of the pandemic while the service sector continues to languish. Europe manufacturing is being buoyed in particular by strong growth from German producers.



E.U. END MARKETS FOR ELECTRONICS

While renewed restrictions have reduced mobility and curtailed some spending, the industrial sector in Europe continues to recover. The manufacturing output index for the EU rose in October, increasing 1.8 percent. Output remains down 3.3 percent from last year.

COMPUTER, ELECTRONIC & OPTICAL PRODUCTS

The electronics industry, which includes categories such as components, loaded boards, computers, communications equipment and consumer electronics, increased three percent in October. The sector is off 12.9 percent from last year.

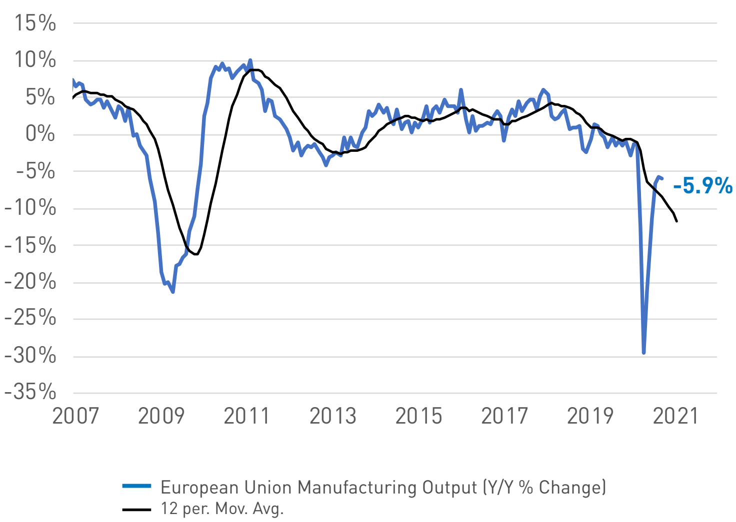
MOTOR VEHICLES

The Motor vehicle manufacturing production index increased 8.8 percent in October, after increasing 12.1 percent in September. Auto production in the EU is now off just 2.5 percent from a year-ago.

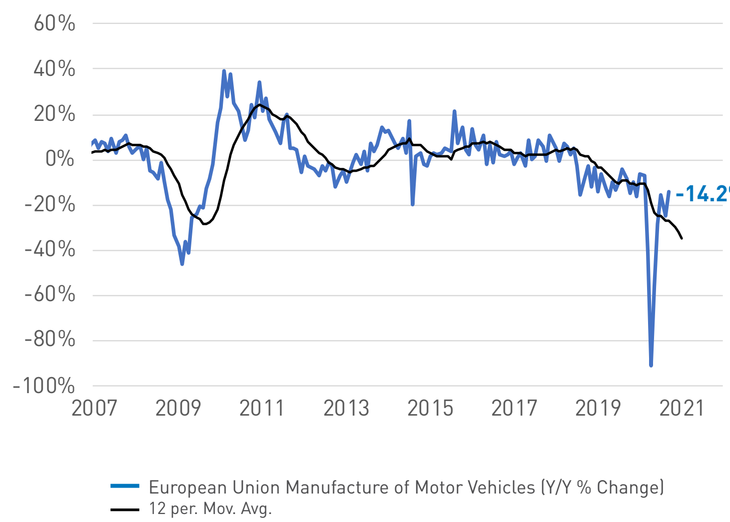
AIR & SPACECRAFT & RELATED MACHINERY

The air and spacecraft manufacturing sector continues to struggle. The production index declined 4.7 percent in October after increasing 7.2 percent in September. The sector remains down significantly, off 23.5 percent from last year.

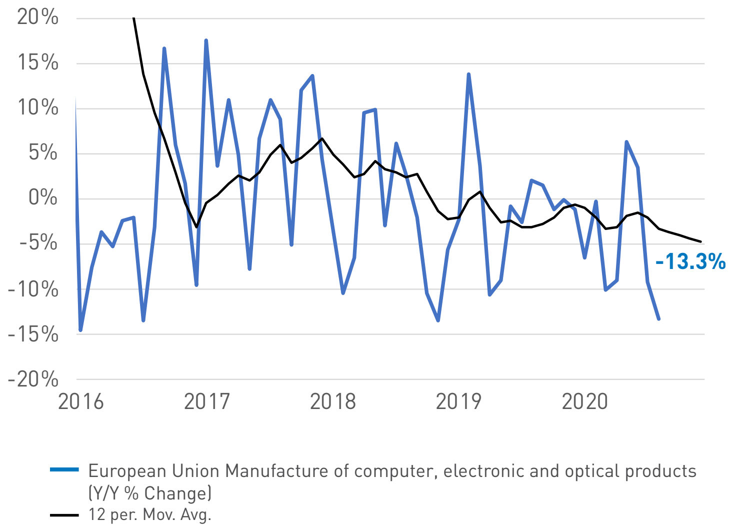
E.U. Manufacturing Output



E.U. Manufacture of Motor Vehicles



E.U. Manufacture of Computer, Electronic & Optical Products (Y/Y % Change)



E.U. Manufacture of Air & Spacecraft & Related Machinery (Y/Y % Change)