Economic Outlook

Robert C. Fry, Jr., Ph.D. **November 4, 2022**

- The global economy recovered surprisingly rapidly from the 2020 recession caused by the COVID-19 pandemic, but most major economies are likely to fall back into recessions in late 2022 or 2023. While the large increases in food and energy prices caused by Russia's invasion of Ukraine are a contributing factor – especially in Europe, the Middle East, and Africa – the main cause of the coming recessions is the large increase in interest rates needed to bring inflation back down to acceptable levels.

- U.S. Real Gross Domestic Product, which declined at a 1.6% annual rate in the first quarter and a 0.6% annual rate in the second quarter, rose at a 2.6% annual rate in the third quarter. (The declines in the first half are inconsistent with other economic data and could be revised away in a future data revision.) I expect growth to decelerate in the fourth quarter and to turn negative in the first quarter of 2023 as a recession begins. Industrial production in U.S. manufacturing rose to a 14-year high in September and was up 4.7% from September 2021. Production is likely to peak and turn down in coming months, beginning with industries that are tied to residential construction and existing home sales

- Economic growth in China has slowed sharply due to a declining population, a zero-COVID policy that shuts down cities and ports in response to a few cases of COVID-19, and bad economic policies in general. Value Added of Industry, China's official measure of industrial production, was up 6.3% year-over-year in September. That's the highest year-over-year growth rate since January/February but comes off a weak prior-year comparison. My preferred measure of growth in industrial production, the median year-over-year growth rate of 100 industrial products, rose to 5.8% in September, but it had been **negative** in the prior six months.

- Real GDP in the European Union rose 0.2% (not annualized) in the third quarter after rising 0.8% in the second quarter. GDP was up 2.4% year-over-year. Despite the increase in energy prices caused by Russia's invasion of Ukraine, industrial production in EU manufacturing hit a record high in June and remained near that level in August. Production was up 4.0% year-over-year in August.

- Industrial production in Japanese manufacturing had nearly recovered from the 2020 recession (but not from the 2018-19 decline) by June 2021 but didn't rise above that level until August 2022. Production was up 9.6% year-over-year in September, albeit from depressed prior-year levels.

- Global real Gross Domestic Product (based on market exchange rates, not purchasing power parity) fell 3.5% in 2020, the biggest decline since the Great Depression. It rebounded strongly in 2021, rising 5.9%. The current forecast, which is based in part on the International Monetary Fund's October World Economic Outlook, is for growth to slow to 2.8% in 2022 and 1.6% in 2023, reflecting recessions in many major economies.

- The U.S. Federal Reserve and other central banks around the world have raised interest rates sharply this year in an effort to reverse the big increase in inflation unleashed by bad fiscal and monetary policies in 2021. The Fed waited a year too long to begin tightening policy, in part because they target price indexes that reflect real-world inflation with a considerable lag. That lag will also cause the Fed to wait too long to stop raising interest rates, making the coming recession longer and deeper than is necessary to bring inflation down to the Fed's 2% target. That said, a mild-to-moderate recession is necessary to bring inflation down to 2%. That recession ultimately reflects policy errors made in 2021, not errors that will be made in 2023.

US Macroeconomic Overview

- U.S. Real Gross Domestic Product, which declined at a 1.6% annual rate in the first quarter and a 0.6% rate in the second quarter, rose at a 2.6% rate in the third quarter.

- A bigger trade deficit and slower inventory accumulation more than accounted for the declines in the first half; final demand continued to grow. A smaller trade deficit contributed to growth in the third quarter.

- I expect growth to decelerate in the fourth quarter and to turn negative in the first quarter of 2023.

- Real personal consumption expenditures rose 0.3% in September, leaving them up 1.9% year-over-year.

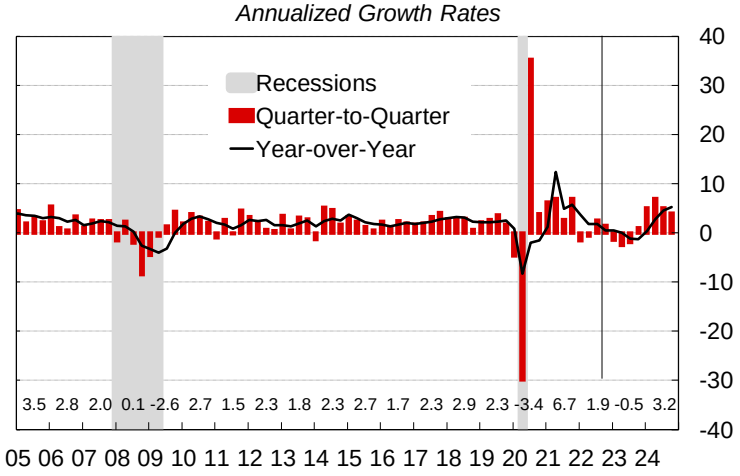
- Real disposable personal income was flat in September. It was down 2.9% year-over-year. Spending has grown faster than income in eight of the last nine months.

- Consumers are using the savings accumulated from March 2020 through March 2021 to support consumer spending even though disposable income is down. That is unsustainable.

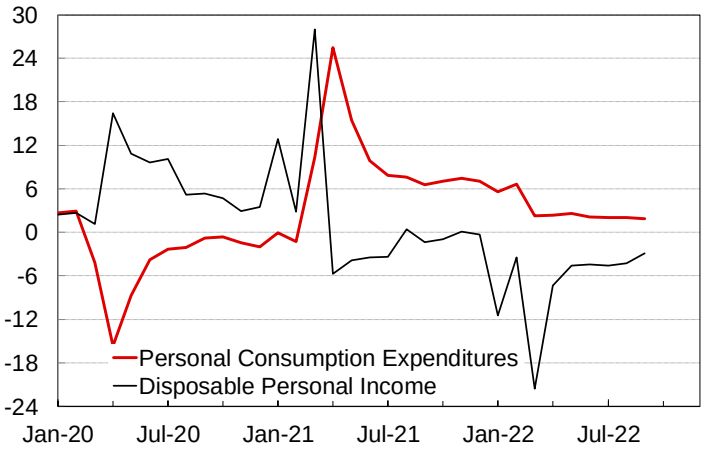
- Motor vehicle production, which was constrained in 2021 and early 2022 by the failure of manufacturers to obtain enough semiconductors, surged in March and April. It is near pre-pandemic levels but still well below the highs of the last decade.

- The increase in production has begun to ease supply constraints. That allowed light vehicle sales to rise to a 14.9 million seasonally adjusted annual rate in October, the highest sales rate since January and second highest since June 2021. Because sales have been at "recession levels" this year because of supply constraints, they won't fall as much as in most recessions.

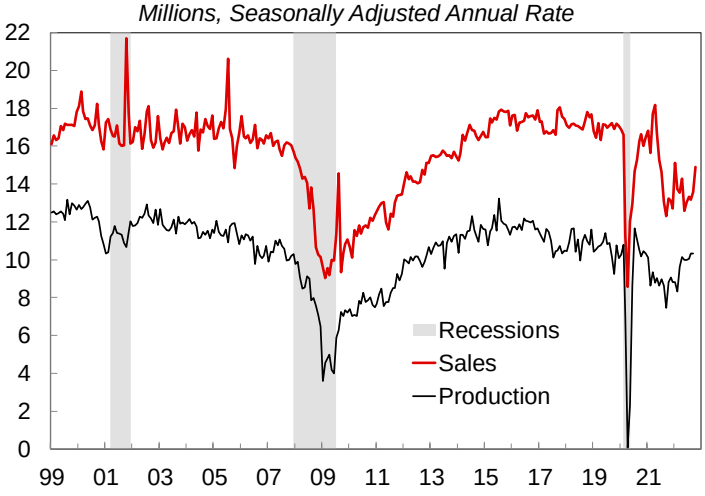
US Real Gross Domestic Product
Annualized Growth Rates



US Real Consumer Spending & Disposable Income
Percent Change from Year Ago, Chained 2012 Dollars



US Light Vehicle Sales & Production
Millions, Seasonally Adjusted Annual Rate



US Labor Market

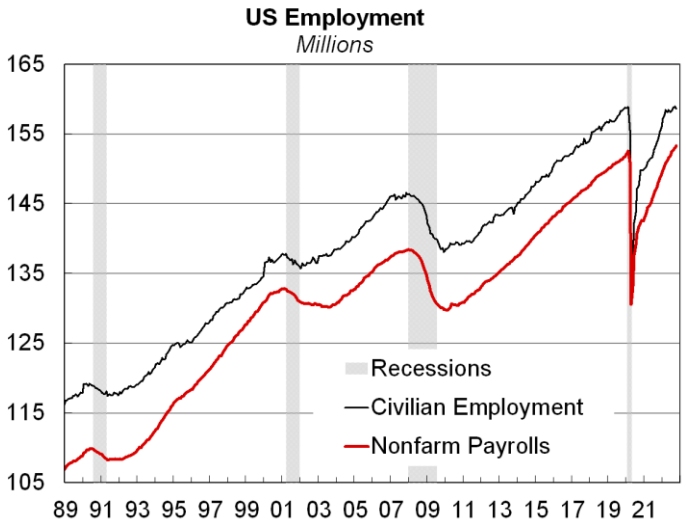
- Nonfarm payrolls, from a survey of employers, rose by 261,000 in October. It was the smallest increase in employment since December 2020 but still much more than what is needed to absorb growth in the adult population. September employment was revised up by 29,000.

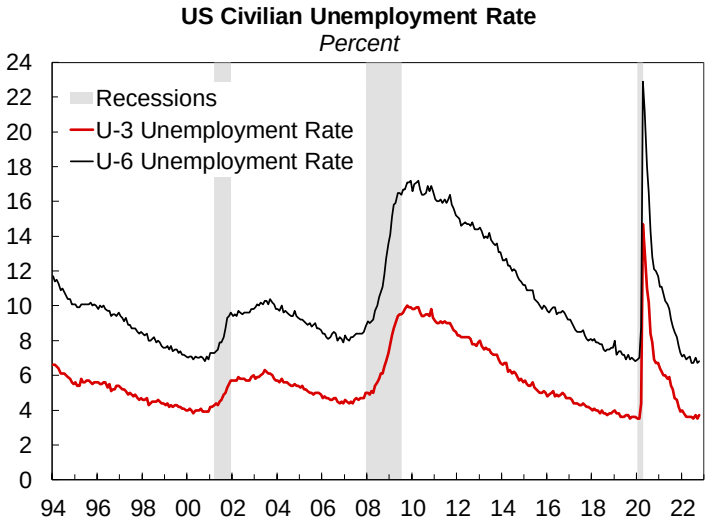
- Manufacturing added 32,000 jobs.

- Civilian employment, from the survey of households used to calculate the unemployment rate, fell by 328,000 in October. Civilian employment sometimes leads payroll employment at turning points.

- The civilian unemployment rate rose to 3.7% in October. It was at 3.5% in September, equaling a 53-year low.

- The unemployment rate has never risen by more than 0.4 percentage points from its cyclical low without the economy falling into a recession.

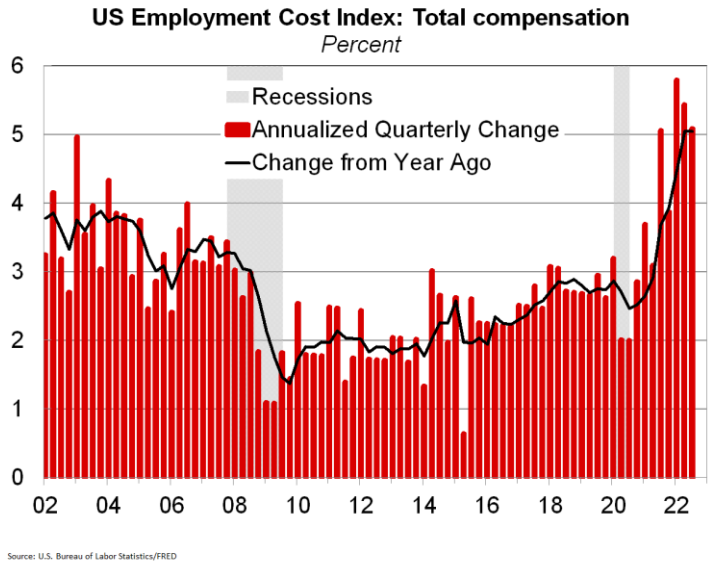




- According to the Job Openings and Labor Turnover Survey (JOLTS), there were 10.7 million job openings in the United States at the end of September, down from 11.9 million in March but still nearly twice the number of unemployed. This means that labor markets are even tighter than the unemployment rate suggests.

- Tight labor markets have put upward pressure on wages and salaries.

- The Employment Cost Index, the best measure of U.S. labor costs, rose 1.2% in the third quarter. The four biggest increases since the data series began have occurred in the last five quarters.



US Housing & Business Investment

- U.S. housing starts hit a 16-year high in April but fell 23.7% over the next three months in response to a doubling in mortgage rates. There is still pent-up demand for housing, but it will remain pent-up until mortgage rates fall significantly.

- The seasonally adjusted annual rate of building permits for single-family homes, the most important number in the monthly housing report, declined 27.6% from February to September. (Permits are a better indicator of housing market activity than starts because they are less sensitive to weather.)

- New home sales (seasonally adjusted) fell 47.6% from their cyclical peak in August 2020 to their recent low in July. Sales bounced in August but turned down again in September. Further declines are likely.

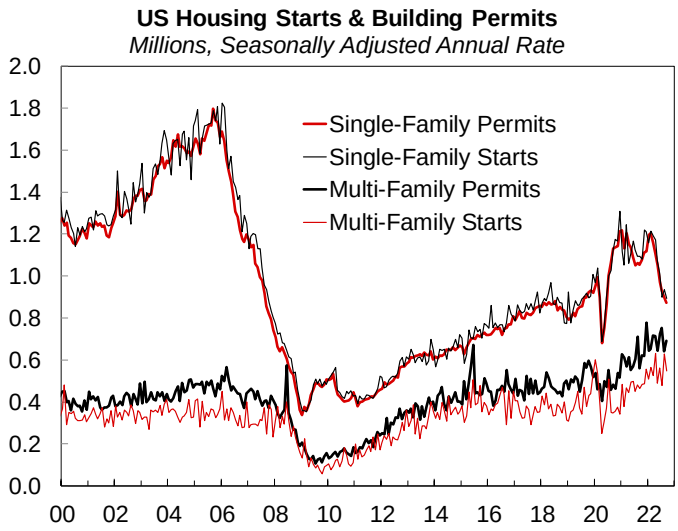
- Declines in 2021 reflected supply constraints. Declines in 2022 reflect mortgage rates at 20-year highs.

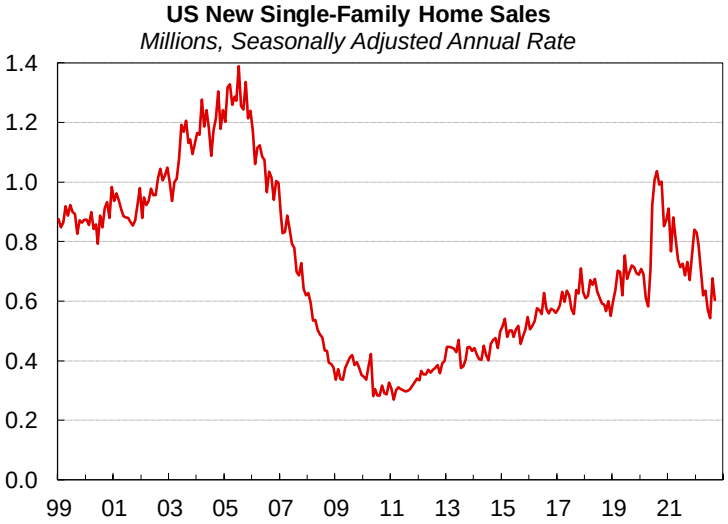
- Existing-home sales (not shown) declined for an eighth straight month in September, leaving them down 27.4% from January's cyclical high.

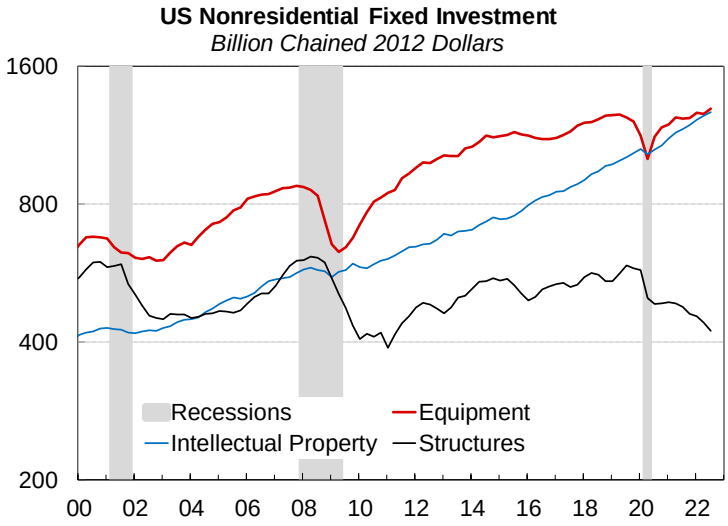
- Investment in business equipment rose at a 10.8% annual rate in the third quarter, to a record high. Businesses need new equipment and software to boost the productivity of (or replace) scarce workers.

- Investment in intellectual property products, which includes software, rose strongly for a ninth consecutive quarter. It has been the most consistent contributor to GDP growth since the 2020 recession.

- Investment in business structures, which includes oil and gas wells as well as commercial and industrial structures, continued to decline in the third quarter.





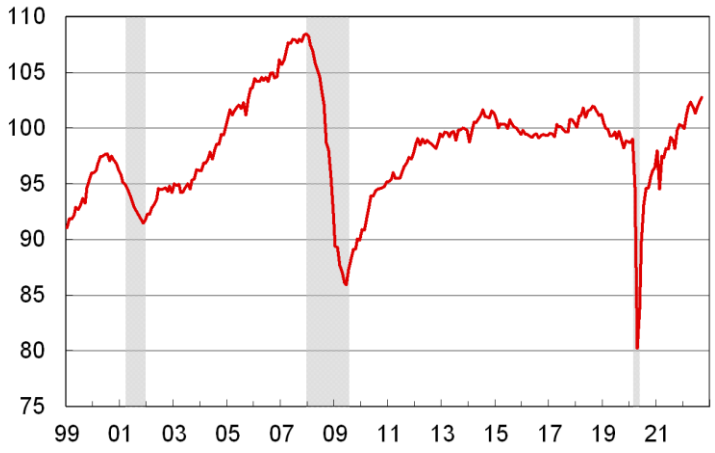


Industrial Production & Leading Indicators

- Industrial production in U.S. manufacturing rose to a 14-year high in September and was up 4.7% from September 2021.

- Most major industries are at or near cyclical highs, but production is likely to peak and turn down in coming months, beginning with industries that are tied to residential construction and existing home sales (e.g., building materials, paints, floor coverings, appliances, furniture and furnishings).

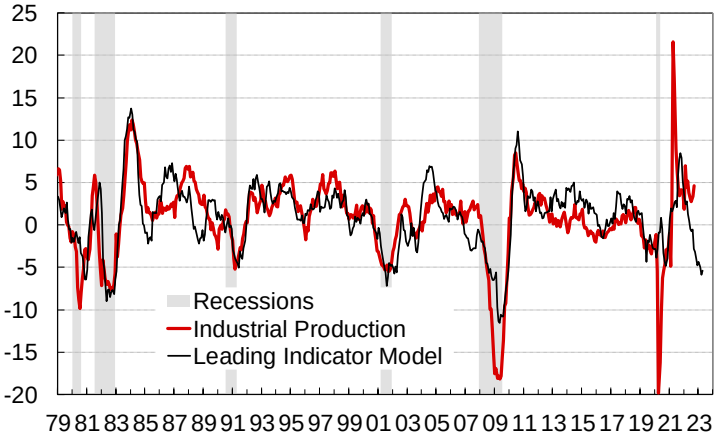
US Industrial Production: Manufacturing
Index, 2017=100



- Industrial production for manufacturing (excluding computers, communication equipment, and semiconductors) was up 4.6% year-over-year in September.

- My leading indicator model suggests that year-over-year growth will turn negative over the next six months. This is consistent with my forecast, which calls for declines in industrial production in the first three quarters of 2023.

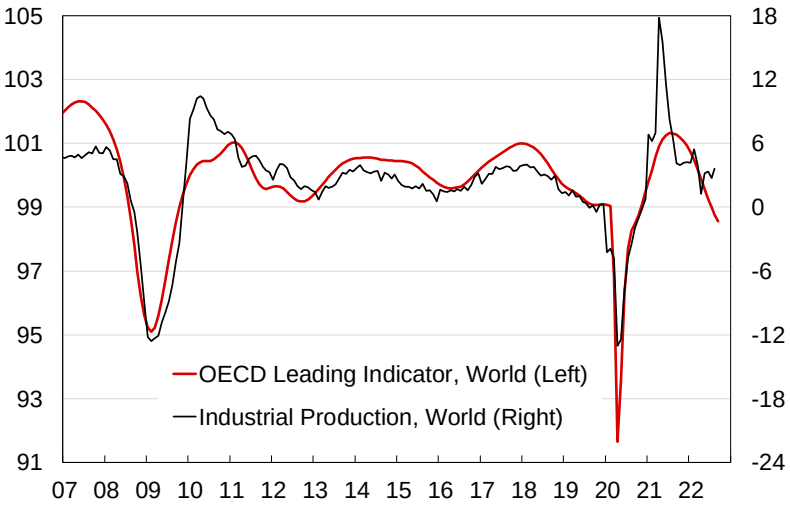
US Industrial Production: Manufacturing ex high-tech
Percent Change from Year Ago



- The Organization for Economic Cooperation and Development (OECD) publishes leading indicators for OECD members and five non-member developing countries. (Data for Russia are currently unavailable.) Their broad leading indicators are highly correlated with year-over-year growth in global industrial production.

- The OECD "leading" indicator doesn't lead by much, if at all, but because it doesn't change direction often, it can confirm whether an apparent turning point in growth in industrial production is a true turning point or just statistical "noise". The indicator suggests growth will soon turn negative.

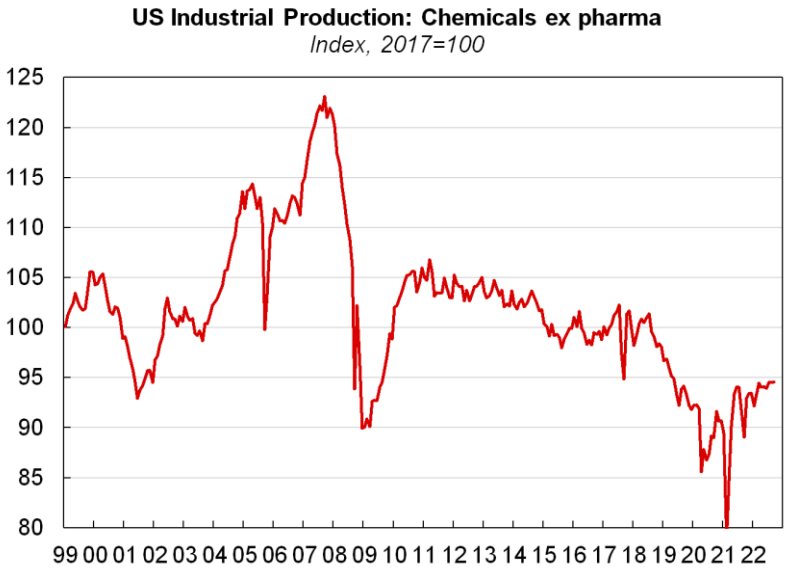
OECD Leading Indicator & Global Industrial Production
Trend = 100 *Percent Change from Year Ago*



US Industrial Production

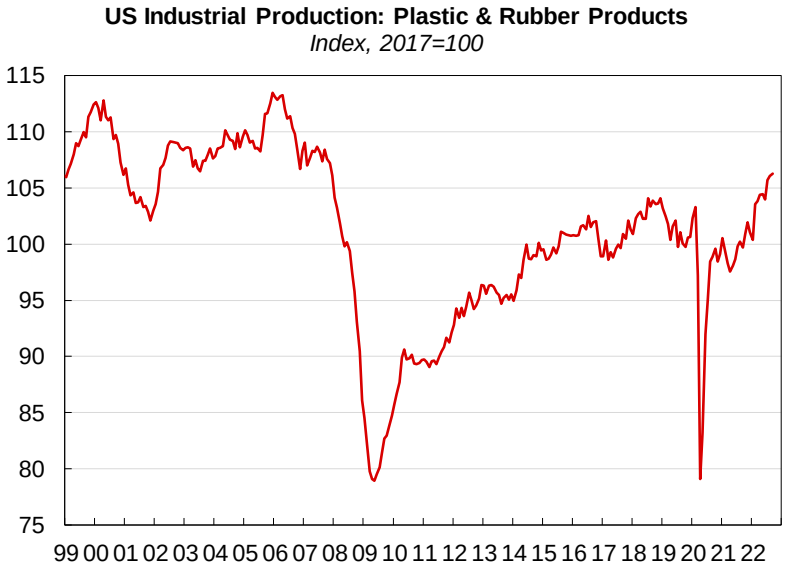
- Industrial production of chemicals (excluding pharmaceuticals) hit a cyclical high in September and was up 6.2% year-over-year, but production has been essentially flat since March.

- Many industrial production indexes are based on hours worked rather than on actual physical production. Over the last decade, data on actual production, where available, paint a much less negative picture of chemical production than the index shown in the chart.



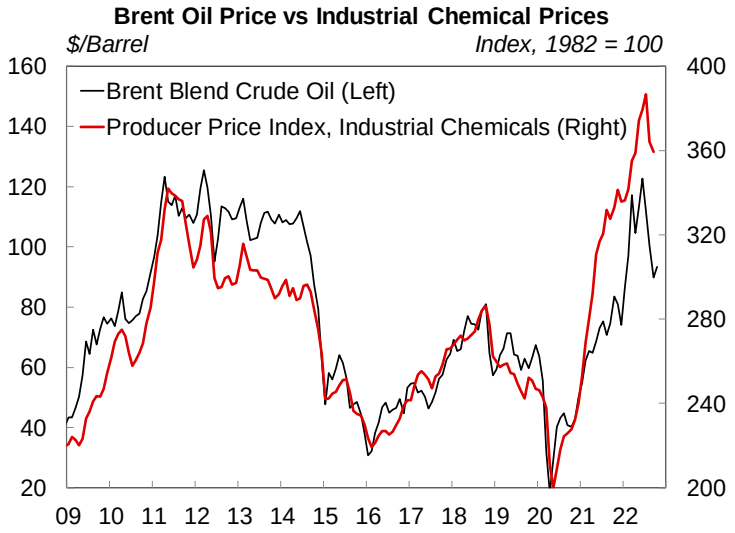
- U.S. industrial production of plastic and rubber products rose in September to its highest level since 2007. It was up 6.6% year-over-year.

- Much of the production of plastic and (especially) rubber products goes into motor vehicles. The recovery in motor vehicle production accounts for much of the growth in production of plastic and rubber products this year.



- Even though natural gas liquids are the primary feedstock for the North American chemical industry, industrial chemical prices are more highly correlated with global oil prices than with natural gas prices because oil-based imports are the marginal source of supply. That correlation broke down after the February 2021 freeze.

- The Producer Price Index for industrial chemicals rose 93.3% from May 2020 to July 2022 but declined in August and September.



Oil & Gas Prices

- The price of Brent Blend crude oil rose to its highest level since 2008 in March, after Russia invaded Ukraine. (Brent is tied to what U.S. consumers pay for petroleum products.) It has declined since but is currently trading near $95/barrel, well above where it was before the pandemic.

- Natural gas prices also rose to their highest sustained levels since 2008 as the war in Ukraine boosted European demand for liquified natural gas. Prices have fallen back in response to mild weather but will be extremely weather-dependent this winter as the market remains tight.

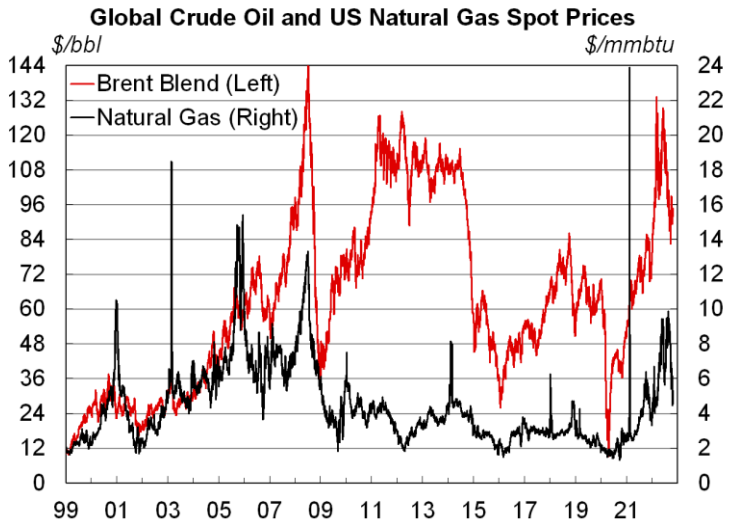
- Higher prices for natural gas and natural gas liquids, relative to oil prices, reduce the competitive advantage of North American chemical producers, which use natural gas liquids as their primary feedstock, vis-à-vis foreign competitors, which rely on naphtha, a crude oil derivative.

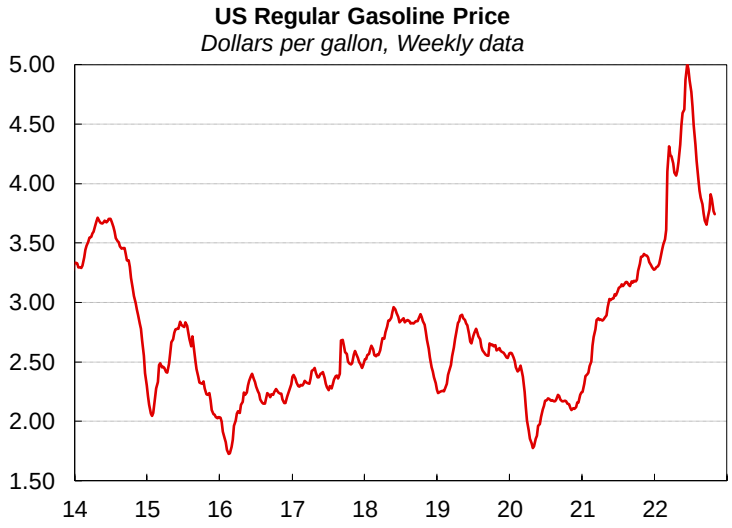
- Oil prices affect most consumers through the price of gasoline, which is one of the most important determinants of consumer confidence. While crude oil prices remained below their 2008 highs, gasoline prices rose to record highs this year. That drove the University of Michigan's Consumer Sentiment index to record lows.

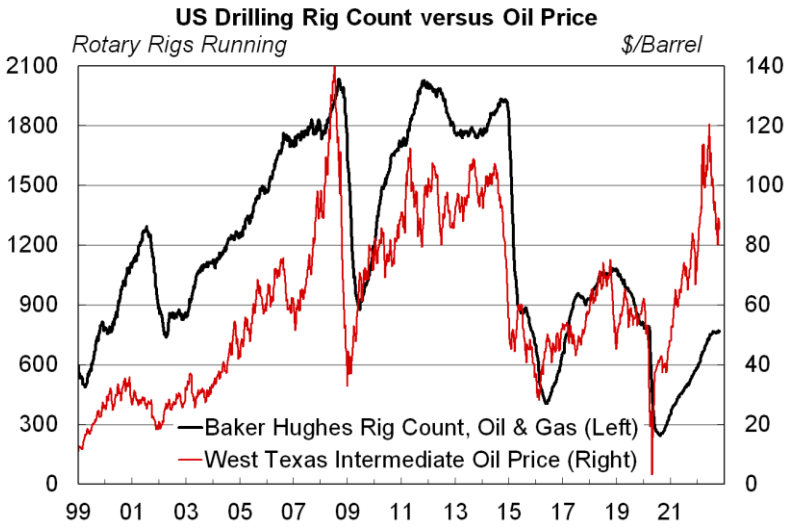
- The price of West Texas Intermediate crude oil, which is tied to what U.S. oil producers are paid for their oil, rose above $100/barrel earlier this year.

- Oil and gas drilling rose in response to higher prices but remained well below where it has been for most of the last two decades and has leveled off recently.

- U.S. production of crude oil, natural gas, and natural gas liquids fell sharply in 2020. Production has gradually recovered. Gas production has risen above its pre-recession peak. Oil production will soon.



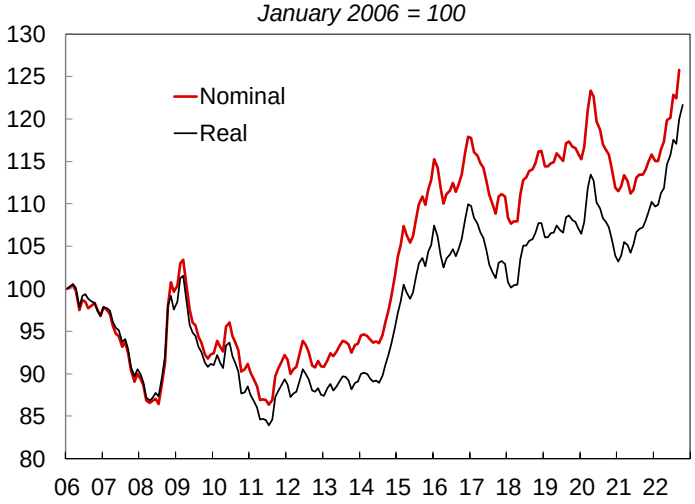




Exchange Rates, Inflation, and Interest Rates

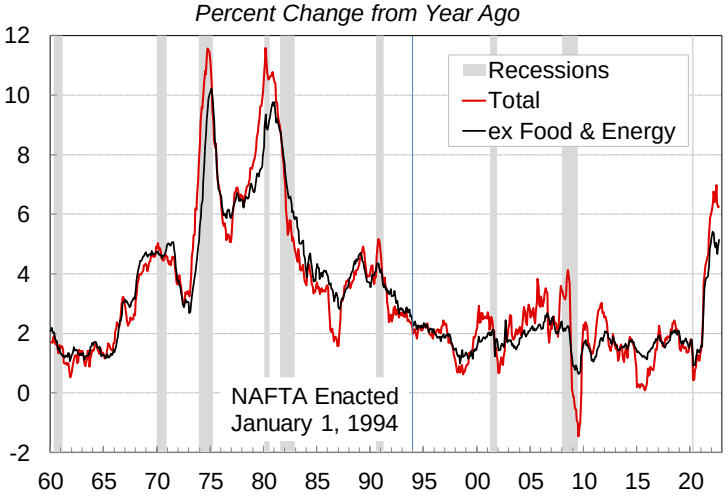
- The trade-weighted foreign exchange value of the U.S. dollar, which has been rising since mid-2021, is at the highest level in the history of the Federal Reserve's current dollar index.
- A "strong" dollar reduces the global competitiveness of U.S.-produced goods, especially in agriculture, manufacturing, and mining but helps in the fight against inflation.

Federal Reserve Broad Dollar Index
January 2006 = 100

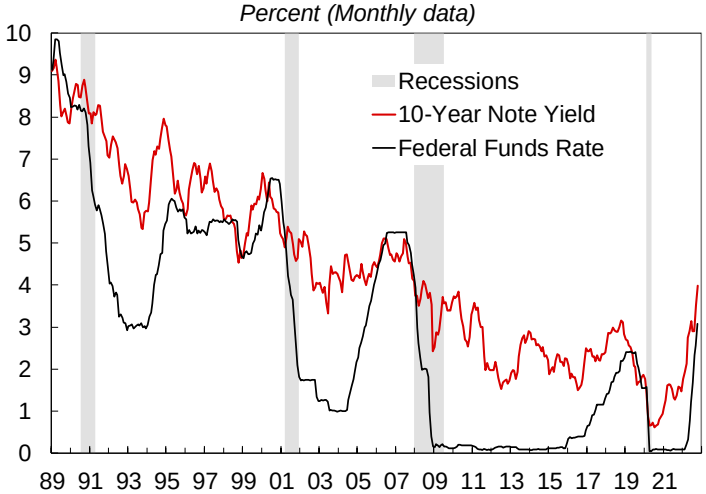


- The U.S. Federal Reserve seeks to keep inflation, as measured by the year-over-year change in the Personal Consumption Expenditure Price Index averaged over a period of years, near 2%.
- The total PCE Price Index was up 6.2% year-over-year in September, down from the 6.8% year-over-year increase hit in June. The "core" (excluding food and energy) index was up 5.1% year-over-year.
- If history is any indication, a recession is required to get inflation down to the Fed's 2% target.
- The Fed has raised its federal funds rate target by 3.75 percentage points since March. I expect a half-point hike next month and two quarter-point hikes in 2023.
- The closing yield on 10-year Treasury notes rose from 1.35% on December 3, 2021 to a high of 4.25% on October 24, 2022. In response, mortgage rates have risen above 7% for the first time since 2002.
- A December rate hike would put the federal funds rate about the 10-year Treasury yield. The 3-month Treasury bill has already been above the 10-year. Such an inverted yield curve signals an impending recession.

US Personal Consumption Expenditures Price Index
Percent Change from Year Ago



US Interest Rates
Percent (Monthly data)



Electronics & Communication

- Shipments of silicon materials are a good indicator of global demand for products going into the electronics industry.

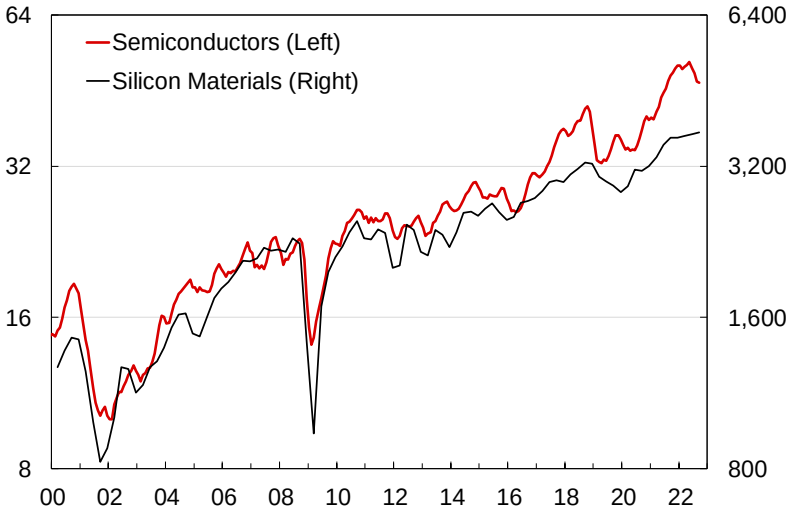
- Data on silicon material shipments (from SEMI®) are only reported quarterly back to 2000, but silicon wafer area (in square inches) has been strongly correlated with semiconductor shipments (in dollars), which are reported monthly back to 1976.

- Worldwide silicon material shipments rose to a record high in the third quarter. Semiconductor shipments, which are in dollar terms and reflect prices as well as volumes, peaked in the fourth quarter of 2021. The global semiconductor "shortage" has been due to strong demand, **not** to a reduction in supply.

- Semiconductor shipments, which grew in 2020 despite the pandemic and recession and in 2021 as the economy recovered, were **down** 3% year-over-year in the third quarter. Silicon material shipments were **up** 2.5%. The discrepancy points to falling semiconductor prices.

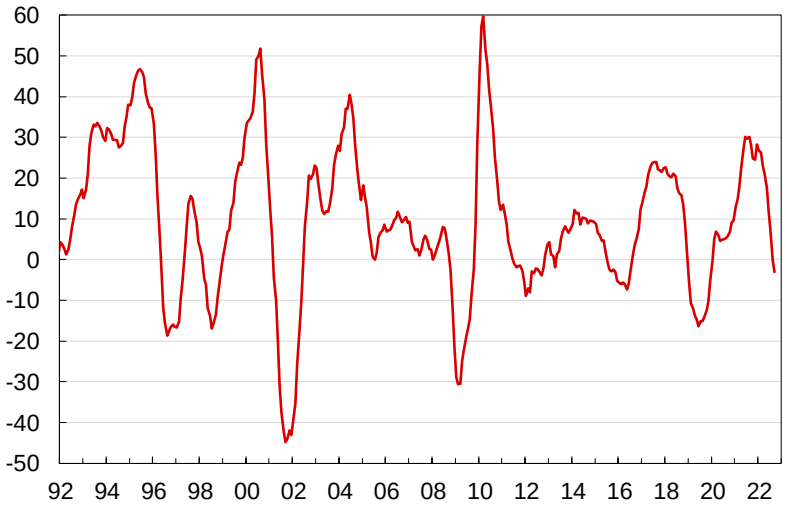
Worldwide Semiconductor & Silicon Material Shipments

Million$, 3-Month Moving Average *Million Square Inches*



Worldwide Semiconductor Shipments

Percent Change from Year Ago, 3-Month Moving Average

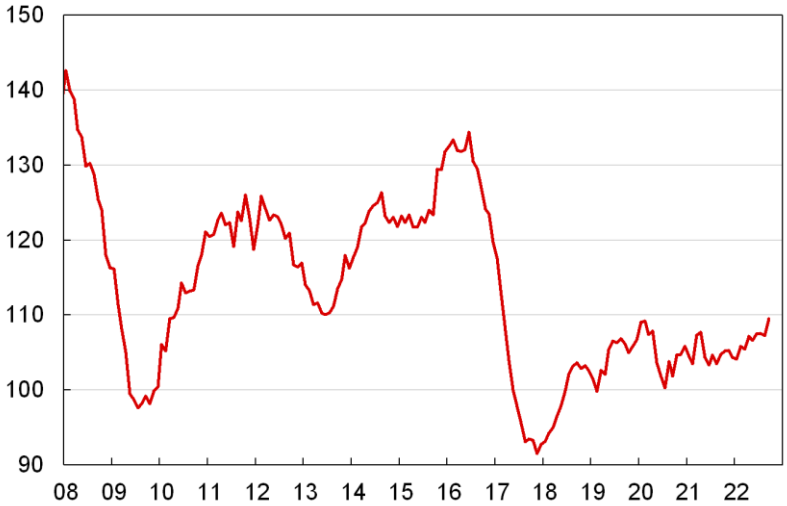


- Industrial production of wire and cable used in communication and energy applications fell by two-thirds from its 2000 peak to its 2009 trough. The recovery from 2009 to 2016, while significant in percentage terms, erased little of the 2001-2009 decline.

- Production fell again, by 31.9%, from June 2016 to November 2017. It then rose until the 2020 recession, when it declined 8.2% from February to July. It finally exceeded its 2020 peak in September 2022.

US Industrial Production: Wire & Cable

Index, 2017=100



Global Macroeconomic Overview

- Global real Gross Domestic Product (based on market exchange rates, not purchasing power parity) fell 3.5% in 2020, the biggest decline since the Great Depression.

- GDP rose 5.9% in 2021. The current forecast, based on the IMF's April World Economic Outlook, is for 2.8% growth in 2022 and 1.6% growth in 2023, reflecting recessions in many major economies.

- The war in Ukraine, through its effects on the price and availability of oil and gas, grains, and fertilizer, is having a bigger impact on Europe, the Middle East, and Africa than on the Americas and Australia.

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- Global industrial production, as measured by the CPB Netherlands Bureau for Economic Policy Analysis, declined 12.8% from December 2019 to April 2020.

- By December 2020, production had risen above its pre-recession peak. After stagnating through most of 2021, it has risen to record highs in 2022. (The apparent peak in February 2022 is due to questionable data from China.)

- Industrial production in the Advanced Economies has also risen to record highs this year.

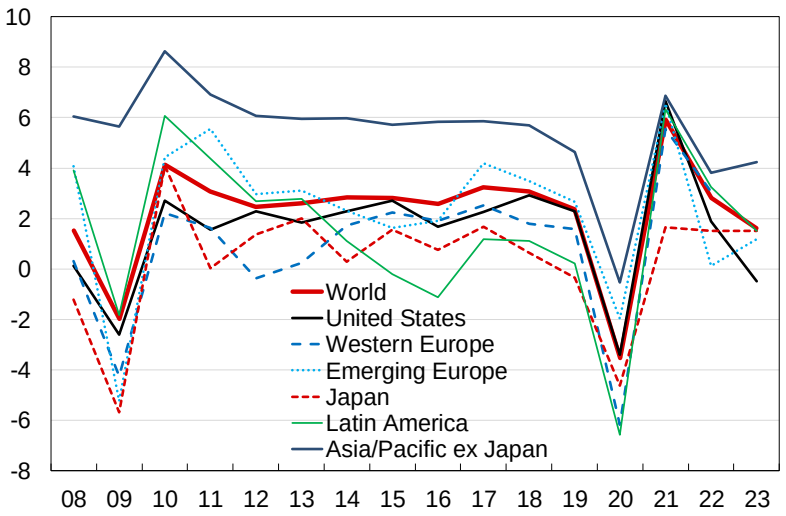
- Global industrial production was up 3.6% year-over-year in August. It had been down as much as 13.0% year-over-year in April 2020 and up as much as 17.8% year-over-year in April 2021.

- Industrial production in Emerging Economies was up 4.2% year-over-year in August.

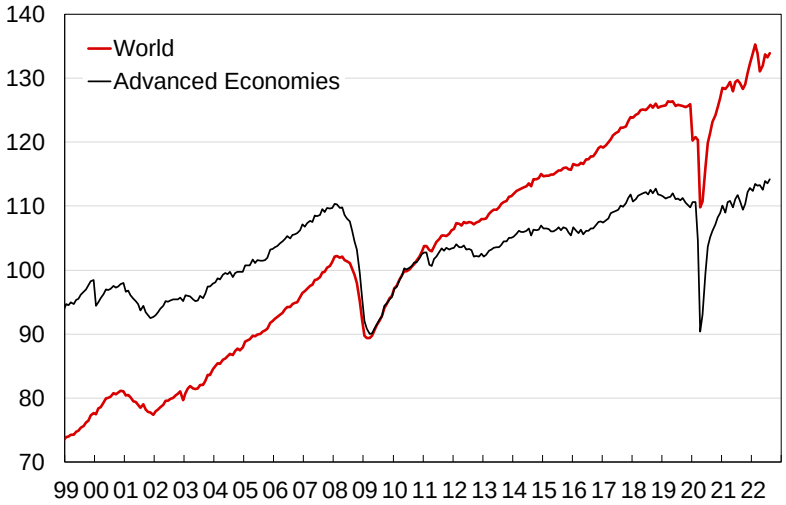
- Industrial production in Advanced Economies was up 3.0%.

- Growth is likely to turn negative in 2023.

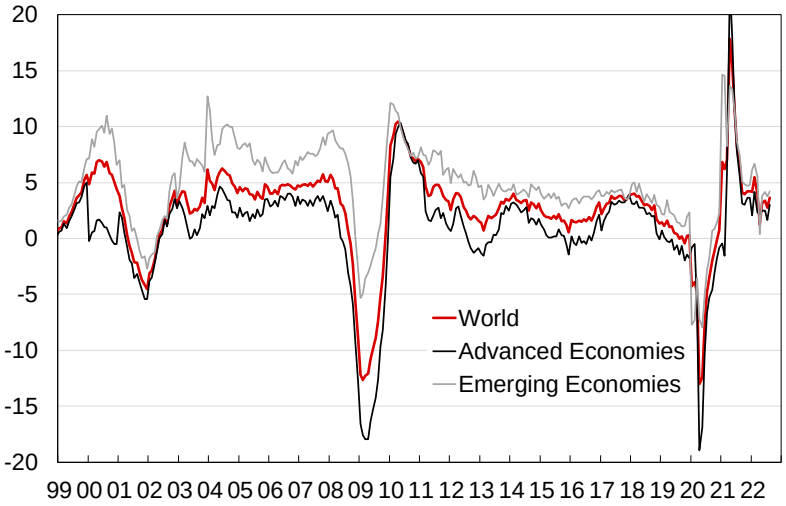
Real Gross Domestic Product
Annual Percent Change



Industrial Production ex Construction
Index, 2010 = 100



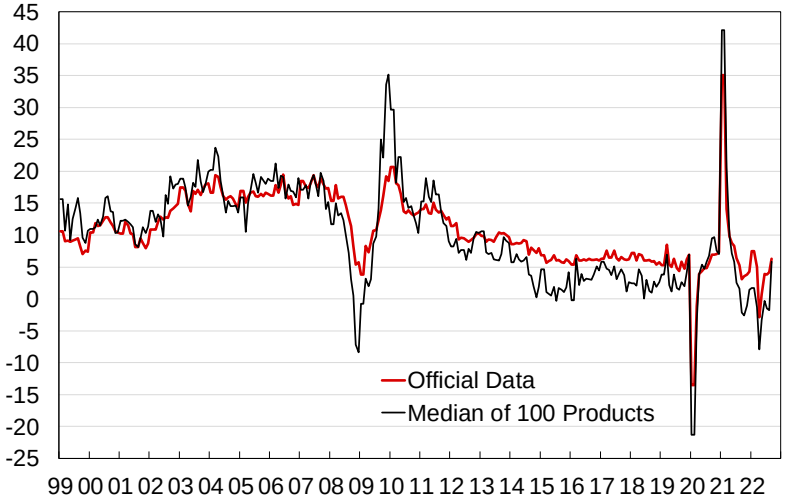
Industrial Production ex Construction
Percent Change from Year Ago



Asia

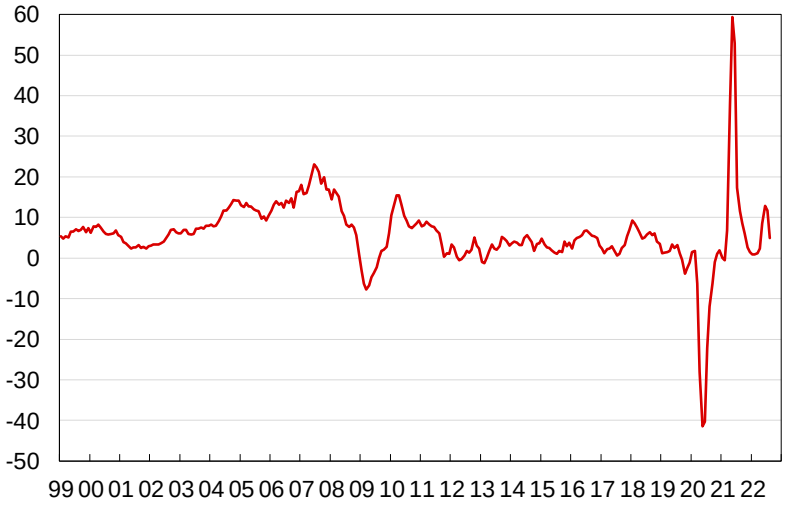
- China's economy is struggling due to bad economic policies, including zero-COVID.
- Value Added of Industry, China's official measure of industrial production, was up 6.3% year-over-year in September. That's the highest year-over-year growth rate since January/February but comes off a weak prior-year comparison.
- My preferred measure of growth in industrial production, the median year-over-year growth rate of 100 industrial products, rose to 5.8% in September, but it had been **negative** in the prior six months.
- Industrial production in Japanese manufacturing had fully recovered from the 2020 recession (but not from the 2018-19 decline) by June 2021 but didn't rise above that level until August 2022.
- Production was up 9.6% year-over-year in September, albeit from depressed prior-year levels.
- Until recently, Japanese manufacturing, which is heavily dependent on exports, particularly of motor vehicles, was hurt by shortages of ships and shipping containers and by the global semiconductor shortage.
- India's population is expected to surpass China's in 2023, four years earlier than prior estimates. Going forward, India's economy is likely to grow faster than China's.
- India's manufacturing sector could benefit from efforts to diversify supply chains away from China. Industrial production in manufacturing was down 0.7% year-over-year in August, but the less-volatile three-month moving average was up 4.9%.
- The International Monetary Fund forecasts GDP growth of 6.8% in 2022 and 6.1% in 2023 after an 8.7% increase in 2021. GDP fell 6.6% in 2020.

Value Added of Industry (Industrial Production): China
Percent Change from Year Ago



Industrial Production, Manufacturing: Japan
Index, 2015 = 100

Industrial Production, Manufacturing: India
Percent Change from Year Ago, Smoothed



Europe

- Real GDP in the European Union, which no longer includes the United Kingdom, rose 0.2% (not annualized) in the third quarter after rising 0.8% in the second quarter. GDP was up 2.4% year-over-year.

- Industrial production in EU manufacturing hit a record high in June and remained near that level in August. Production was up 4.0% year-over-year in August. Manufacturers may have built inventories in anticipation of shutting down this winter to free up natural gas for home heating. With gas inventories up recently, the risk of such shutdowns has diminished.

- The 12-month change in the German IFO manufacturing business climate index has historically led year-over-year growth in EU manufacturing production by three months and is reported in a timelier manner.

- The IFO index plummeted in March in response to Russia's invasion of Ukraine. It had another big decline in September. In recent months, its 12-month change has been at its lowest level since May 2020. The index suggests that year-over-year growth in industrial production will turn negative in coming months.

- Industrial production in manufacturing has surged to new record highs in Poland and Hungary this year but is slightly below its 2021 peak in the Czech Republic.

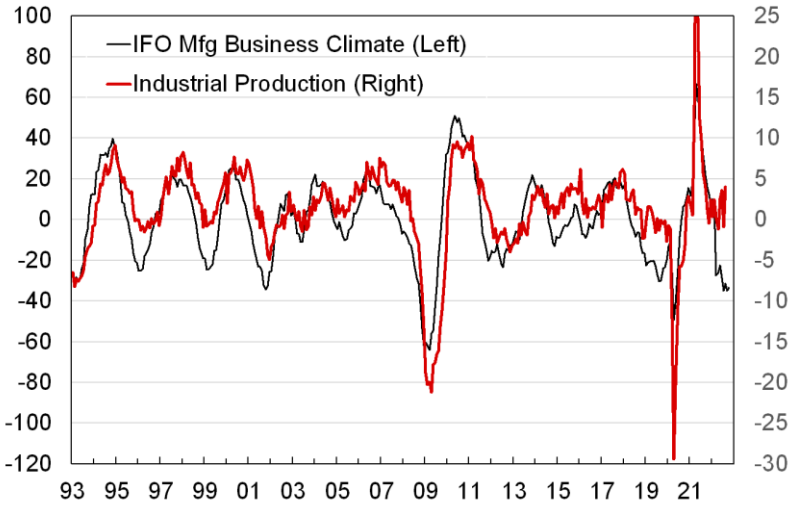
- Industrial production in Polish manufacturing hit a record high in September and was up 11.2% year-over-year.

- Production hit a record high in Hungary in August. It was up 9.5% year-over-year.

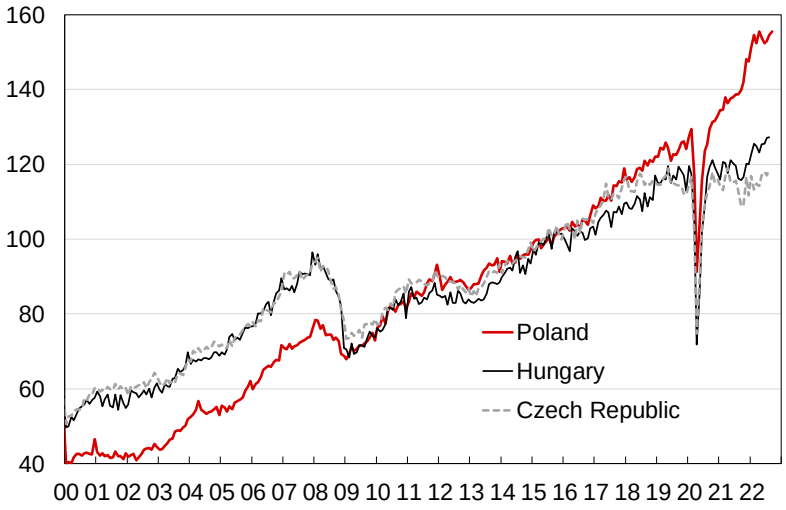
- Production was up 5.3% year-over-year in the Czech Republic in August.

Industrial Production, Manufacturing: European Union
Index, 2015 = 100

Industrial Production, Manufacturing: European Union
Change/Percent Change from Year Ago



Industrial Production, Manufacturing: Central Europe
Index, 2015 = 100

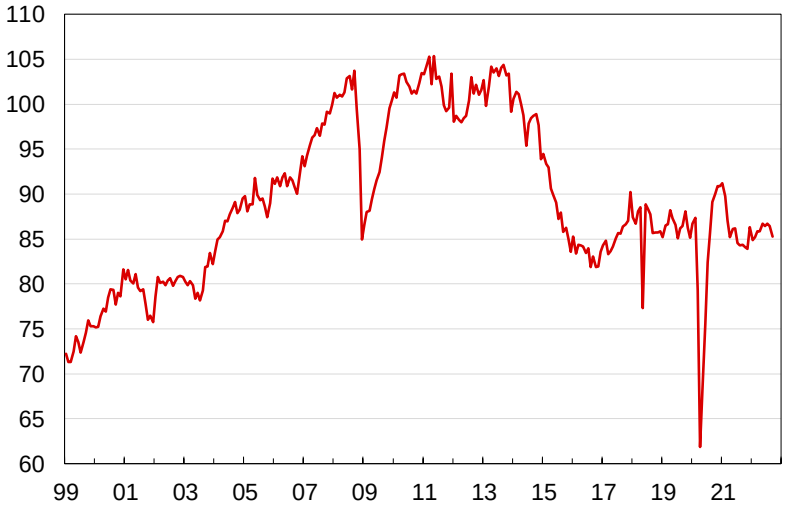


Americas

- By September 2020, industrial production in Brazilian manufacturing had more than fully recovered from the 29.4% decline from February 2020 to April 2020. But production peaked in January 2021 and declined over the rest of the year. It rose in early 2022 but has turned down again, leaving it 20% below 2011's record high.

- Production was up just 1.1% year-over-year in September.

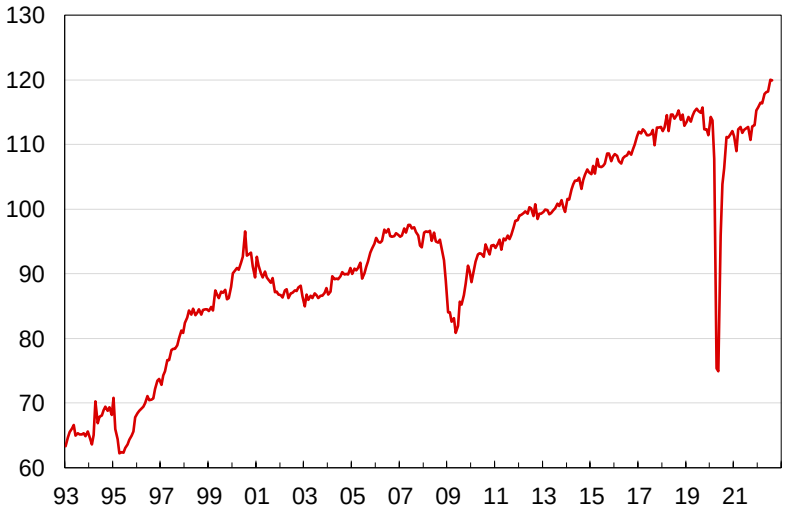
Industrial Production, Manufacturing: Brazil
Index, 2012 = 100



- Industrial production in Mexican manufacturing hit a record high in July and remained near that level in August.

- Production was up 6.4% year-over-year in August.

Industrial Production, Manufacturing: Mexico
Index, 2013 = 100

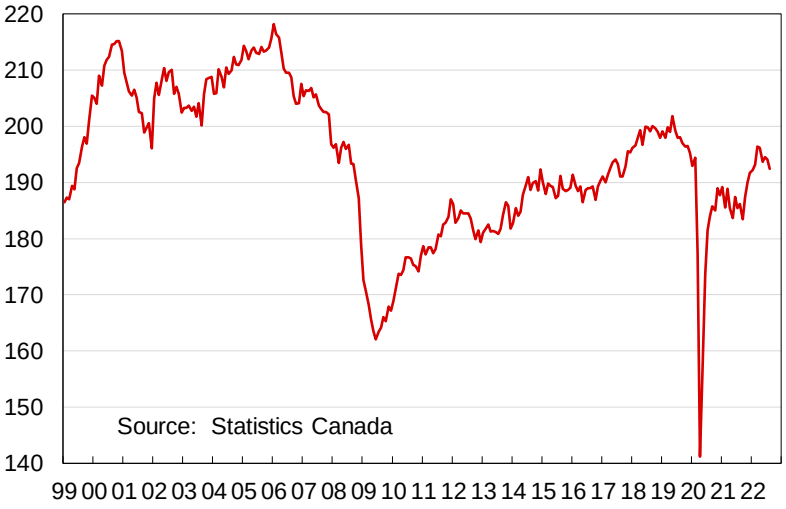


- Unlike most countries, Canada reports Gross Domestic Product monthly rather than quarterly and for various sectors of the economy.

- Real GDP in manufacturing, which is comparable to industrial production in other countries, fell 28.3% in March and April 2020. By March 2022, it had recouped all of that decline, but not its 2019 decline. It declined 2.0% from March to August.

- Despite the recent decline, real GDP in manufacturing was up 3.3% year-over-year in August.

Real GDP at Basic Prices, Manufacturing: Canada
Billion 2012 Chained Canadian Dollars



Global GDP Growth

	2017	2018	2019	2020	2021	2022	2023	2024	2025
World	**3.2**	**3.1**	**2.4**	**-3.5**	**5.9**	**2.8**	**1.6**	**3.0**	**3.2**
North America	**2.3**	**2.9**	**2.2**	**-3.6**	**6.5**	**2.0**	**-0.4**	**3.1**	**3.6**
United States	2.3	2.9	2.3	-3.4	6.7	1.9	-0.5	3.2	3.7
Canada	3.0	2.8	1.9	-5.2	4.5	3.2	0.6	1.6	2.3
Mexico	2.1	2.2	-0.2	-8.1	4.8	2.1	1.2	1.8	2.1
Western Europe	**2.5**	**1.8**	**1.6**	**-6.2**	**5.6**	**3.1**	**0.2**	**1.6**	**2.0**
France	2.4	1.8	1.9	-7.9	6.8	2.5	0.3	1.6	1.8
Germany	2.7	1.0	1.1	-3.7	2.6	1.4	-0.9	1.5	2.2
Italy	1.7	0.9	0.5	-9.0	6.7	3.2	-0.2	1.3	1.1
Spain	3.0	2.3	2.1	-10.8	5.1	4.3	1.2	2.6	2.7
U.K.	2.1	1.7	1.7	-9.3	7.4	3.6	-0.3	0.6	2.3
C & E Europe	**4.2**	**3.5**	**2.7**	**-2.0**	**6.6**	**0.1**	**1.2**	**2.9**	**2.7**
Middle East & Africa	**1.8**	**2.2**	**1.6**	**-3.4**	**4.5**	**4.3**	**3.3**	**3.2**	**3.4**
Asia/Pacific	**4.9**	**4.6**	**3.6**	**-1.4**	**5.8**	**3.4**	**3.7**	**3.9**	**3.9**
Japan	1.7	0.6	-0.4	-4.6	1.7	1.5	1.5	1.3	0.9
ex Japan	5.9	5.7	4.6	-0.5	6.9	3.8	4.2	4.5	4.6
Australia	2.4	2.8	2.0	-2.1	4.9	3.8	1.9	1.8	2.0
China	6.9	6.8	6.0	2.2	8.1	3.2	4.4	4.5	4.6
India	6.8	6.5	3.7	-6.6	8.7	6.8	6.1	6.8	6.8
Indonesia	5.1	5.2	5.0	-2.1	3.7	5.3	5.0	5.4	5.3
Korea (South)	3.2	2.9	2.2	-0.7	4.1	2.6	1.6	2.7	2.6
Malaysia	5.8	4.8	4.4	-5.5	3.1	5.4	4.4	4.9	4.4
Philippines	6.9	6.3	6.1	-9.5	5.7	6.5	5.0	6.0	6.0
Singapore	4.7	3.7	1.1	-4.1	7.6	3.0	2.3	2.6	2.5
Taiwan	3.3	2.8	3.1	3.4	6.6	3.1	2.2	2.1	2.0
Thailand	4.2	4.2	2.2	-6.2	1.5	2.8	3.7	3.6	3.3
Vietnam	6.9	7.2	7.2	2.9	2.6	7.0	6.2	6.6	6.7
Latin America	**0.9**	**0.8**	**0.3**	**-6.2**	**6.7**	**3.6**	**1.6**	**2.2**	**2.4**
Argentina	2.8	-2.6	-2.0	-9.9	10.4	4.0	2.0	2.0	2.0
Brazil	1.3	1.8	1.2	-3.9	4.6	2.8	1.0	1.9	2.0

Global Industrial Production Growth

	2019	2020	2021	2022	2023	2024	2025
World	**0.5**	**-4.8**	**7.9**	**2.8**	**-0.6**	**3.5**	**3.0**
Advanced economies	**-0.9**	**-6.5**	**6.6**	**1.9**	**-2.4**	**2.7**	**2.4**
United States	-0.8	-7.0	4.9	4.4	-2.4	2.8	3.1
Japan	-2.6	-10.1	5.4	-1.5	-2.0	3.0	3.0
Euro Area	-1.3	-8.3	7.4	-1.0	-3.0	3.0	2.0
Emerging economies	**2.0**	**-3.2**	**9.1**	**4.0**	**1.6**	**4.6**	**3.7**
China	5.8	2.1	10.6	3.5	4.0	5.0	4.0
Emerging Asia ex China	0.7	-12.1	12.1	3.0	2.0	6.0	6.0
E Europe & CIS	3.1	-2.0	4.6	3.0	0.0	3.0	3.0
Latin America	-5.0	-8.7	8.0	2.0	-1.0	4.0	3.0
Middle East & Africa	-3.8	-9.4	3.8	8.0	0.0	4.0	2.5