

Economic Outlook

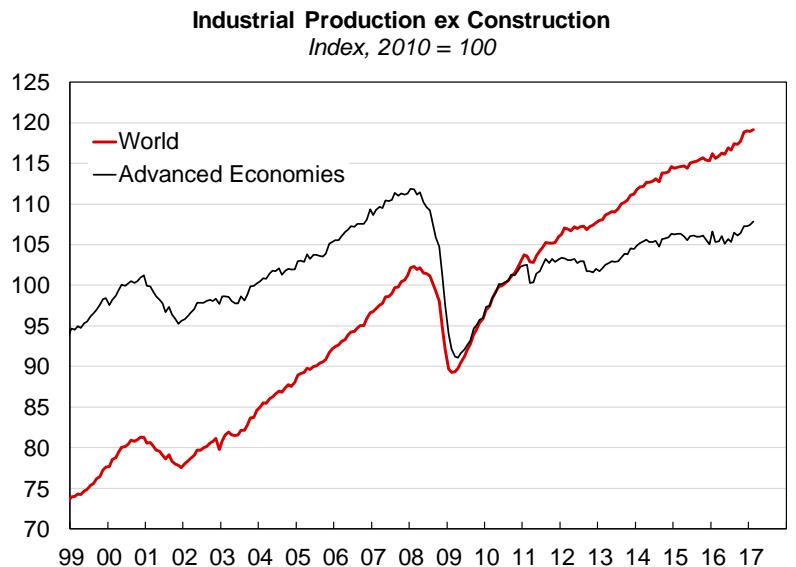
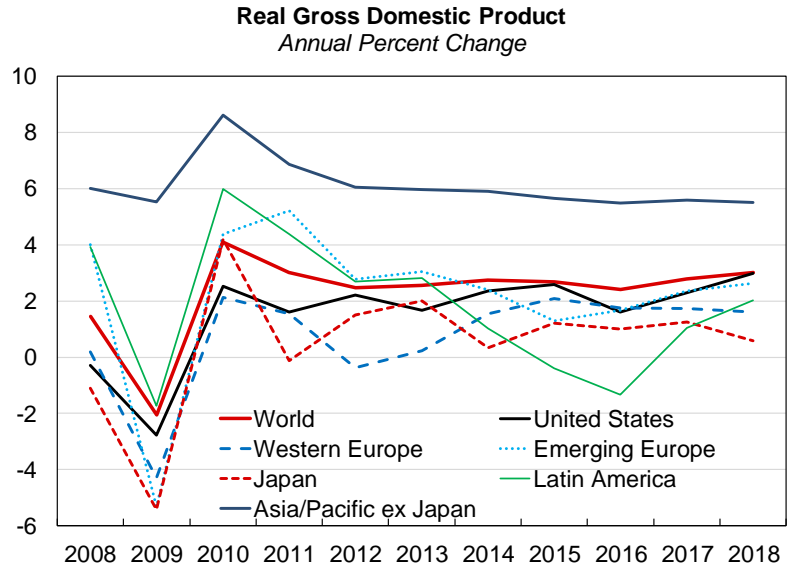
Robert C. Fry, Jr., Ph.D.

May 5, 2017

- Growth in global manufacturing has resumed after two years of stagnation. The acceleration began in China in early 2016 and quickly spread to Japan. Official data show industrial production in China up 7.6% year-over-year in March. That's the best growth since 2014. My own calculation shows slightly slower growth but a more pronounced acceleration. Industrial production in Japanese manufacturing hit a 37-month high in February and was up 3.3% year-over-year in March. Growth in U.S. manufacturing resumed in the second half of 2016. Industrial production in U.S. manufacturing rose 1.5% from August 2016 to February 2017 before a decline in March. Industrial production in European manufacturing has been trending upward for four years. It was up 1.6% year-over-year in February. Production may have even hit bottom in Brazil, the world's worst-performing major economy over the last four years.
- U.S. real Gross Domestic Product grew at a 0.7% annual rate in the first quarter after growing at a 2.1% rate in the fourth quarter of 2016. Year-over-year growth slowed from 2.0% to 1.9%. Weakness in the first quarter reflected a decline in motor vehicle sales, another decline in defense spending, a slowdown in the rate of inventory accumulation, and the negative impact of unseasonably warm weather on personal consumption expenditures on gas and electric utilities. Growth will rebound in the second quarter with inventory rebuilding and a return to normal weather. A pro-growth tax reform bill that includes immediate expensing of business investment and incentives to repatriate foreign earnings would boost growth in the long run.
- Real GDP for the European Union rose 0.4% (not annualized) in the first quarter and was up 1.7% year-over-year. The Eurozone economies grew faster (0.5%) than the UK economy (0.3%) for the first time in a year. While these top-line growth rates are disappointing by global and historical standards, per capita growth rates are not especially weak. Population growth is very slow in most European countries and even negative in some. Failure to take that into account leads to unrealistic growth expectations and makes European economic performance look worse than it really is. IHS Markit's Manufacturing Purchasing Managers' Index for the Eurozone rose to a six-year high in April. Real retail sales have surged since 2014.
- Japan's economy continues to grow slowly. Real GDP rose 0.2% quarter-to-quarter in the fourth quarter of 2016 and was up 1% for the year. Growth is weak by global and historical standards, but is slightly above Japan's long-run potential growth rate.
- Economic growth in China has accelerated significantly since early 2016. Official data don't show the full extent of the acceleration because they didn't show the full extent of the 2014-2015 downshift. China has boosted growth by returning to its old growth model, based on investment and exports, and postponing the needed transition to consumer-led growth. This is working in the short run, but is not sustainable. The combination of demographics (working age population has peaked), debt (used to fund excessive investment), and depreciation (could trigger capital outflow and invite U.S. retaliation) will cause growth to slow sharply in the next few years, most likely in 2018. Actual growth could downshift suddenly and fall far short of most forecasts, but reported growth will slow much more gradually.
- Global Gross Domestic Product is expected to grow 2.8% in 2017, up from 2.4% in 2016 and the best growth rate since 2011. The acceleration is due to the end of recessions in South America and slightly faster growth in North America. Growth is expected to accelerate further, to 3.0%, in 2018. Global industrial production is expected to grow 2.6% in 2017, up from 1.7% in each of the prior two years. Global industrial production is expected to grow 2.7% in 2018.

Global Macroeconomic Overview

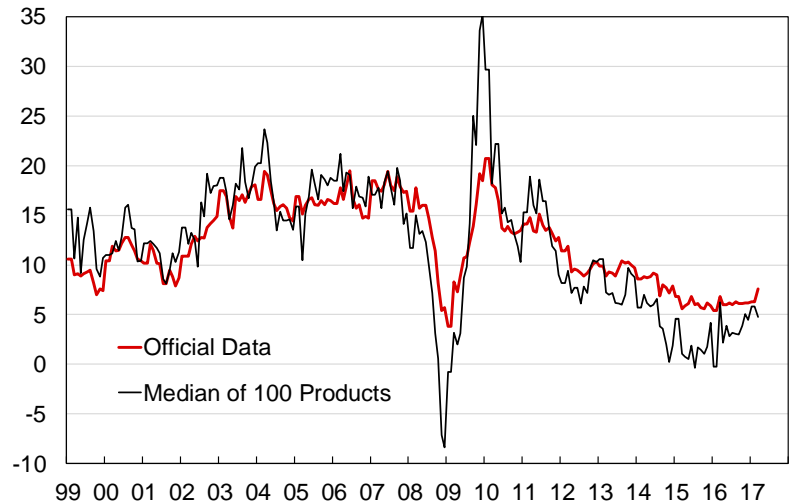
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- Growth remains strongest in the Asia/Pacific region, excluding Japan, but growth there has clearly downshifted since 2010.
- Growth in global industrial production accelerated in 2016.
- Industrial production in the Advanced Economies started growing again in the second half of 2016 after more than two years of stagnation.
- Most of the growth in global industrial production in 2014 and 2015 is due to the inclusion of Chinese data, which significantly overstated growth in China during that period.
- Year-over-year growth in global industrial production has risen significantly since the beginning of 2016.
- The acceleration has been most pronounced in the Advanced Economies.
- Because total industrial production includes mining, which was hit hard by falling oil and gas prices and declining commodity demand, it grew more slowly than industrial production in manufacturing from mid-2014 to mid-2016.



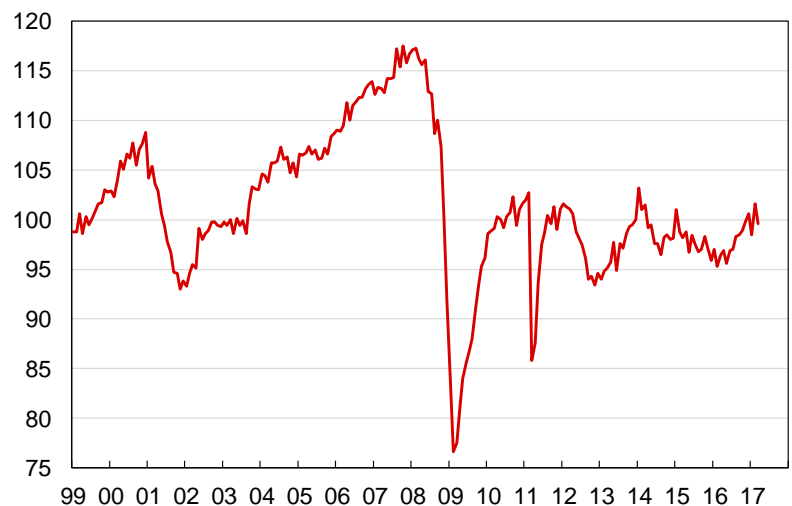
Asia

- Value Added of Industry, China's official measure of industrial production, was up 7.6% year-over-year in March. This was the best growth rate since 2014.
- My alternative index, based on production of 100 industrial products, was up 4.8%.
- Official data don't show the full extent of the acceleration since early 2016 because they didn't show the full extent of the slowdown in 2014 and 2015.
- Japan's economy continues to grow slowly. Real GDP rose 0.2% quarter-to-quarter in the fourth quarter of 2016 and was up 1% for the year. Growth is weak by global and historical standards, but is slightly above Japan's long-run potential growth rate.
- Industrial production in Japanese manufacturing rose to a 37-month high in February before declining in March. It was up 3.3% year-over-year in March. Except for the sharp drop after the earthquake and tsunami in 2011, industrial production has fluctuated within a narrow range since 2010. It is nearing the top of that range.
- Korean manufacturing seems to have broken out of its 2012-2016 stagnation. Despite a February decline from January's record high, industrial production was up 3.3% year-over-year in March.
- Korea and China are major trading partners. The acceleration of growth in China since early 2016 is largely responsible for the resumption of growth in Korean manufacturing.
- Real Gross Domestic Product rose a better-than-expected 0.9% quarter-to-quarter in the first quarter and was up 2.7% year-over-year.

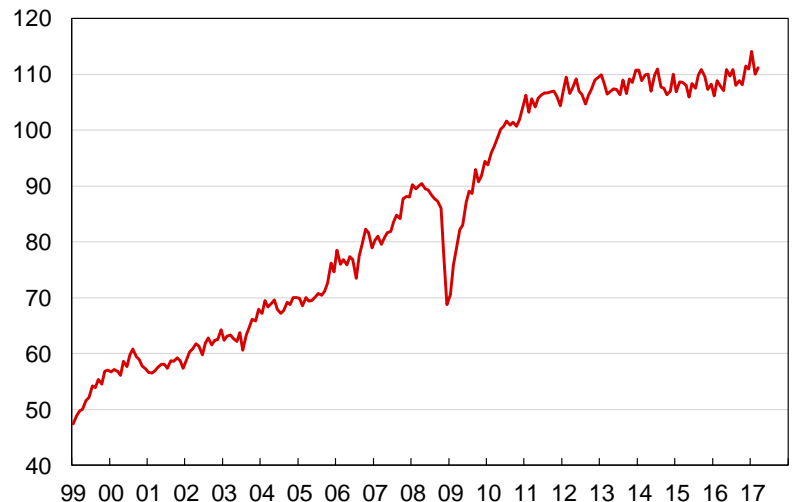
Value Added of Industry (Industrial Production): China
Percent Change from Year Ago



Industrial Production, Manufacturing: Japan
Index, 2010 = 100



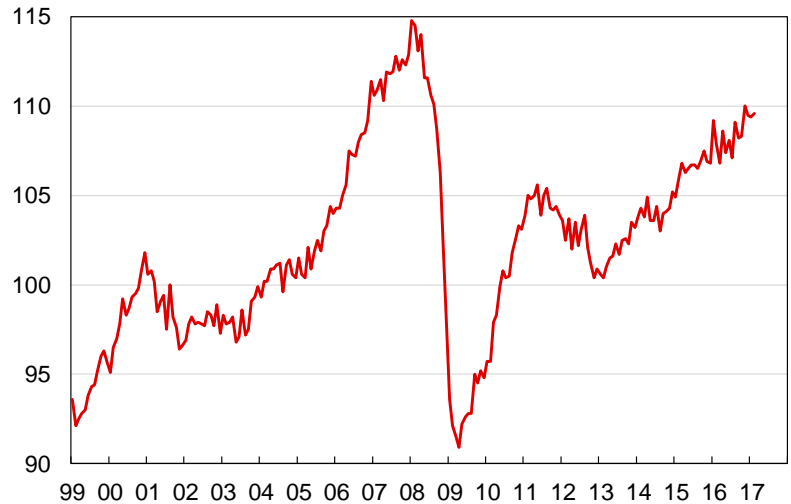
Industrial Production, Manufacturing: South Korea
Index, 2010 = 100



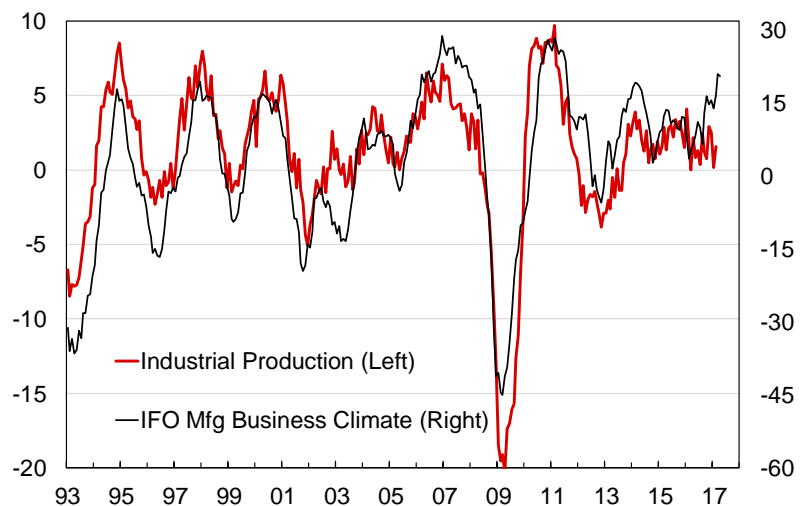
Europe

- Industrial production in European Union manufacturing has been trending upward for four years. Production was up 1.6% year-over-year in February.
- The European economy has been performing better than is commonly perceived. Negative depictions result from a) a failure to take slow population growth into account, b) excessive focus on price declines (until recently), rather than on volume **growth**, and c) an effort to bolster European exporters by talking down the value of the Euro versus the U.S. dollar.
- The 12-month change in the German IFO manufacturing business climate index has historically led year-over-year growth in European Union manufacturing production by three months and is reported in a timelier manner.
- The IFO index rose in March to its highest level since 2011 and remained close to that level in April. The index suggests that year-over-year growth in industrial production will rise significantly in coming months.
- Industrial production in manufacturing rose to record highs in Poland, Hungary, and the Czech Republic in February. From a manufacturing standpoint, these have been among the best-performing economies in the world over the last several years.
- Production was up 5.4% year-over-year in Poland, up 6.7% in Hungary, and up 6.5% in the Czech Republic.

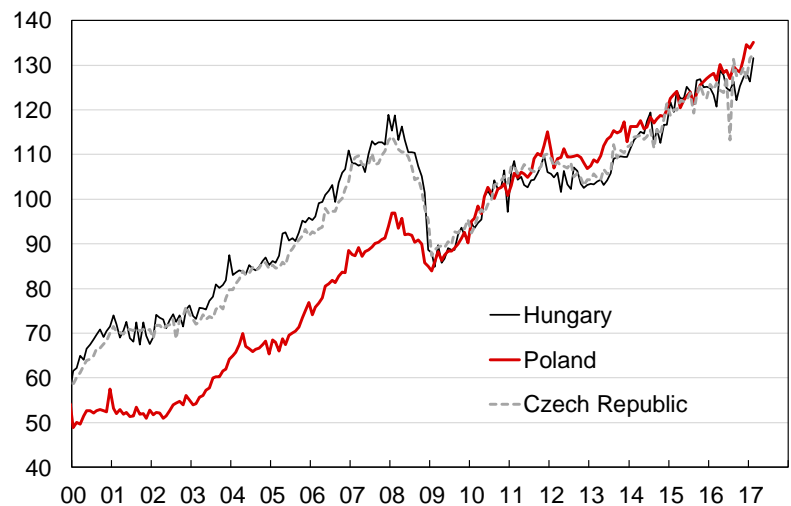
Industrial Production, Manufacturing: European Union
Index, 2010 = 100



Industrial Production, Manufacturing: European Union
Percent Change from Year Ago Balance of Opinion



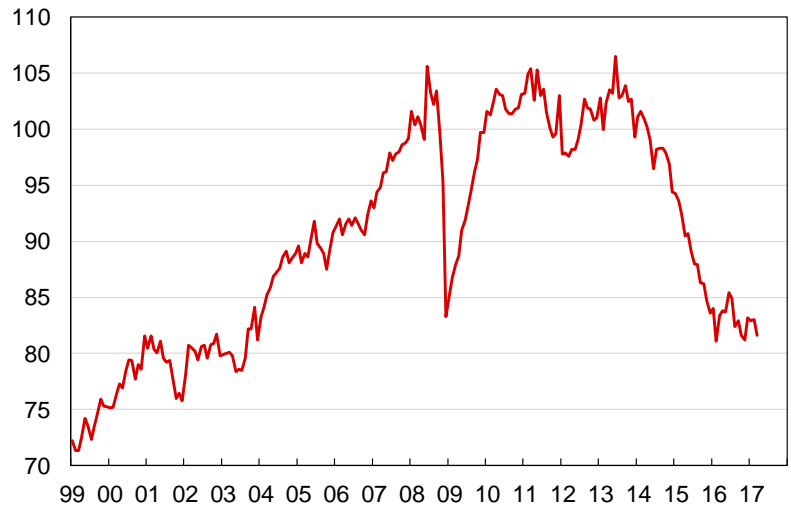
Industrial Production, Manufacturing: Central Europe
Index, 2010 = 100



Americas

- Brazil has been the worst-performing major economy in the world over the last four years. In 2015 and 2016, industrial production in Brazilian manufacturing fell below the lows hit in the global recession in 2008 and 2009.
- Production may have hit bottom in February 2016, but has not recovered significantly; it was down 2.2% year-over-year in March.
- Improving global growth helps commodity producers like Brazil, but Brazil will never realize its economic potential without better economic policies.
- Industrial production in Mexican manufacturing continues to trend slowly but persistently upward. Production hit an all-time high in January before slipping slightly in February. Despite the small decline, production was up 3.3% year-over-year.
- Although better economic policies have not boosted growth nearly as much as some had hoped, Mexico is doing far better than most Latin American economies.
- Industrial production in U.S. manufacturing rose 1.5% from August 2016 to February 2017 before falling 0.4% in March. Before the recent upturn, production was flat to slightly down for more than two years.
- The stagnation in production from 2014 to 2016 was due largely to declines in metals and machinery, which were hit hard by the decline in oil drilling activity triggered by the decline in oil prices that began in 2014. Production in those industries has rebounded with drilling activity.
- The March decline in production was due largely to a cut in motor vehicle production.

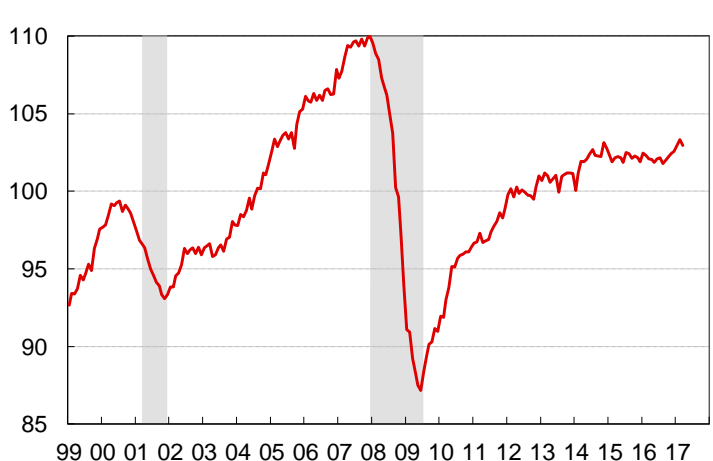
Industrial Production, Manufacturing: Brazil
Index, 2012 = 100



Industrial Production, Manufacturing: Mexico
Index, 2008 = 100



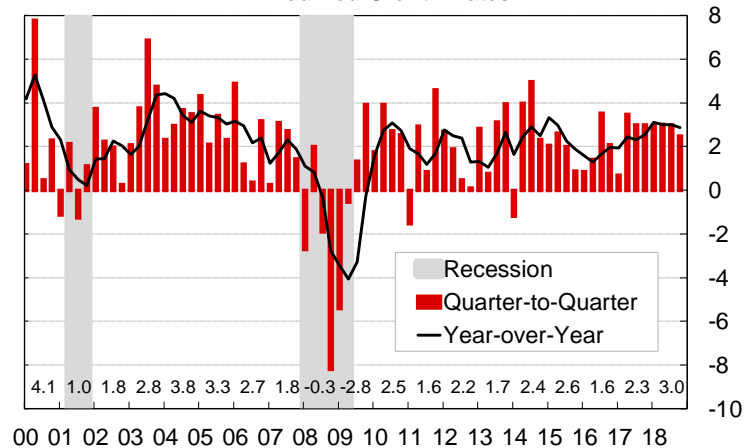
US Industrial Production: Manufacturing
Index, 2012=100



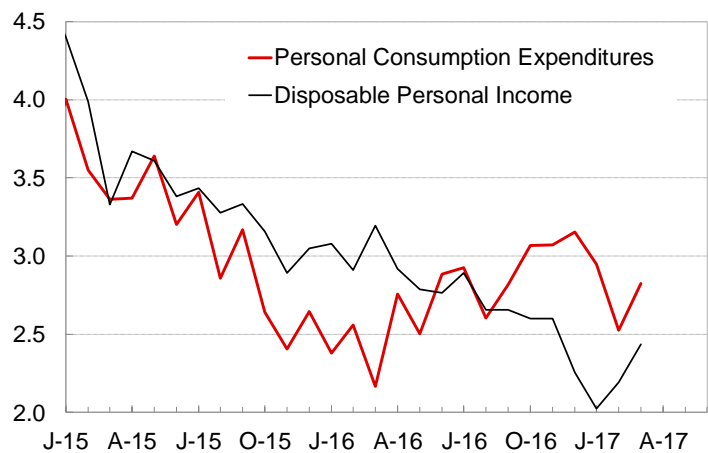
US Macroeconomic Overview

- Real Gross Domestic Product in the United States rose at just a 0.7% annual rate in the first quarter after rising at a 2.1% rate in the fourth quarter of 2016. Year-over-year growth edged down from 2.0% to 1.9%.
- Weakness in the first quarter reflected a decline in motor vehicle sales, another decline in defense spending, a slowdown in the rate of inventory accumulation, and the negative impact of unseasonably warm weather on personal consumption expenditures on gas and electric utilities. Growth will rebound with inventory rebuilding and a return to normal weather.
- Real personal consumption expenditures rose 0.3% in March after declining in both January and February. Year-over-year growth rebounded from 2.5% to 2.8%.
- Real disposable personal income rose 0.5% in March, the biggest monthly increase since 2015. Year-over-year growth is likely to rise going forward as wages and salaries accelerate in response to a tightening labor market.
- Headline (nominal) spending and income were weaker than real spending and income in March because of falling prices.
- Economic growth during the current economic expansion has been unusually slow by historical standards. This weakness is due largely to a sudden downshift in productivity growth since 2010.
- The downshift in productivity growth could be due in part to high government debt and the lasting impact of the financial crisis (Democratic argument) or the impact of taxes and excessive government regulation (Republican argument), but it's mostly due to the impact of high oil prices.
- Oil prices averaged over \$110/barrel from February 2011 through August 2014.

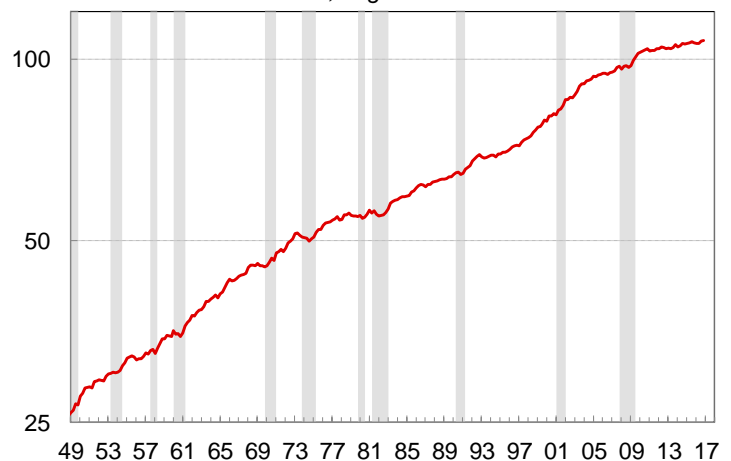
US Real Gross Domestic Product
Annualized Growth Rates



US Real Consumer Spending & Disposable Income
Percent Change from Year Ago, Chained 2009 Dollars

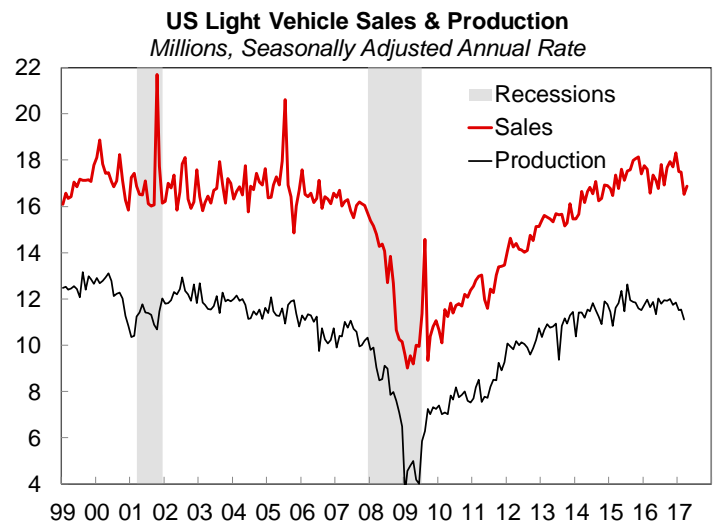
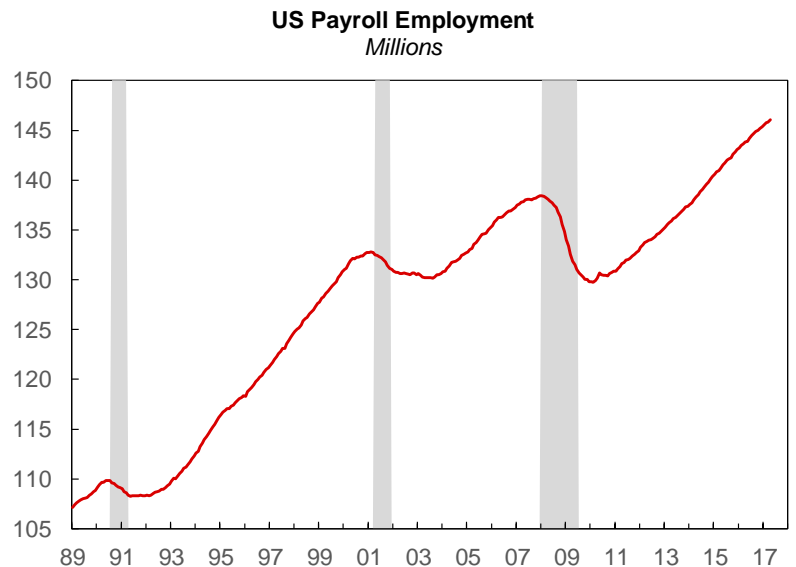


Real Output Per Hour: US Nonfarm Business Sector
2009 = 100, Logarithmic Scale



US Macroeconomic Overview

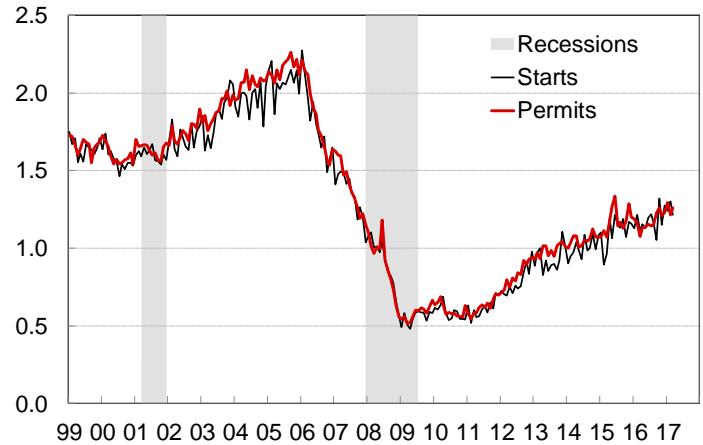
- The civilian unemployment rate fell to 4.4% in April, below the Congressional Budget Office's 4.7% estimate for the natural rate of unemployment.
- The U-6 measure of unemployment, which includes people who are working part-time but would prefer to work full-time and those who have stopped looking for a job because they are discouraged, fell to 8.6% in March, down from 9.4% in December 2016 and the lowest since 2007. U-6 is nearing the level consistent with full employment, suggesting there is little slack left in the labor market.
- Nonfarm payrolls grew by 211,000 in April, rebounding from a disappointing 79,000 gain in March. Job growth has decelerated slightly over the last year, but still exceeds what is required to absorb growth in the adult population.
- Barring the return of discouraged and retired workers to the labor force, growth in payroll employment will have to slow to less than 150,000 within the next year or so.
- Light vehicles sold at about a 16.7 million seasonally adjusted annual rate in March and April, well below the 17.5 million average selling rate of the prior two years.
- The weakness of the last two months makes it unlikely that annual sales will match 2016's record high of 17.5 million, but sales are still likely to exceed 17 million for a third straight year.
- Sales have risen more than U.S. production during this economic expansion as vehicle imports, particularly imports from Mexico, have risen.



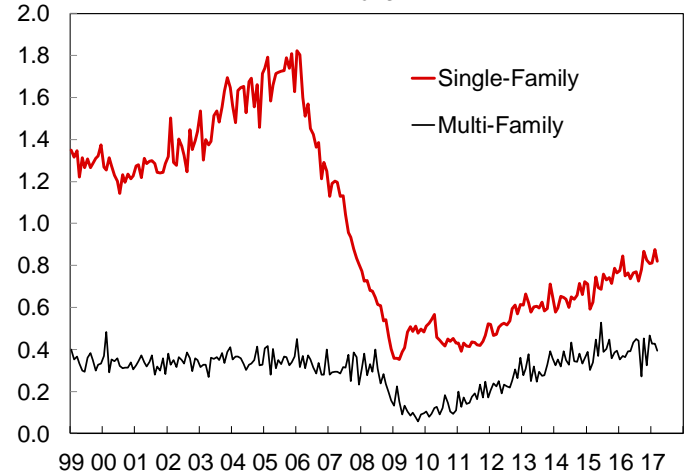
US Housing

- Housing starts and permits both fell in March, but for the first quarter as a whole were at their highest seasonally adjusted rates since 2007. Housing permits are a better indicator of housing market conditions because they are less sensitive to the weather.
- The need for more housing to satisfy growth in the adult population suggests that the recovery in housing starts will continue for several more years. Demographics favor a strong rebound, but supply constraints involving capital, labor, and materials are preventing that.
- Multi-family housing starts (apartments and condominiums) have risen to record highs since the recession. Single-family starts have recovered relatively little.
- The relative strength of multi-family starts is only partly attributable to difficulties in obtaining mortgages on single-family homes. It also reflects a generational shift in locational preferences and attitudes towards home ownership.
- Sales of both new and existing homes are being held back by a lack of houses on the market.
- Despite the supply constraints, existing home sales hit a post-recession high in March. New home sales came very close to the post-recession high hit last July.
- With inventories of unsold homes at record lows, further increases in home sales will require further growth in housing starts.

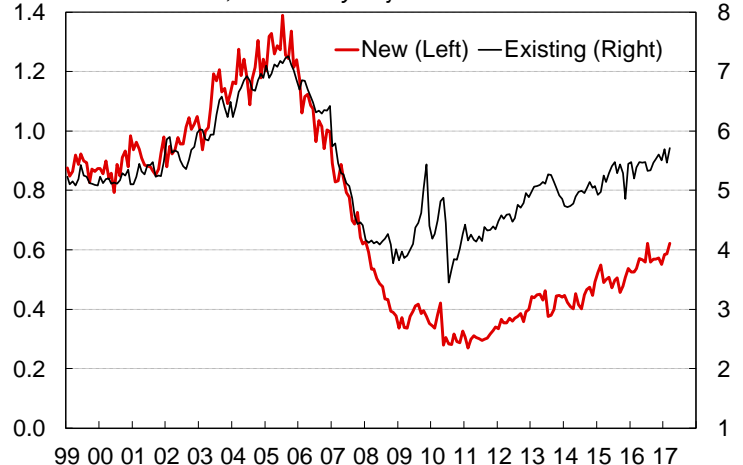
US Housing Starts & Building Permits
Millions, Seasonally Adjusted Annual Rate



US Housing Starts
Millions



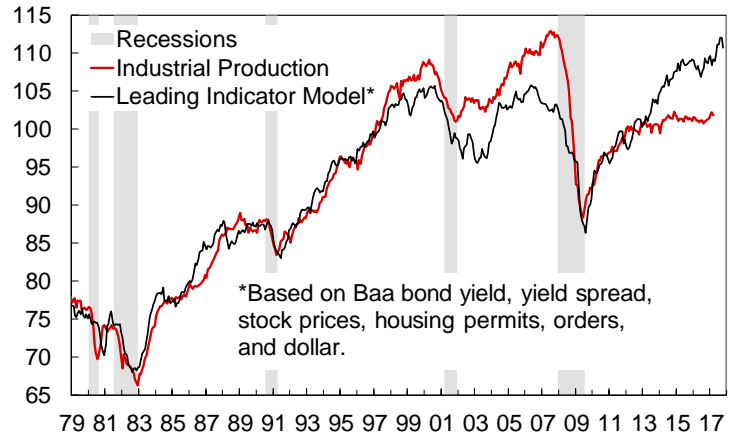
US Home Sales
Millions, Seasonally Adjusted Annual Rate



US Industrial Production

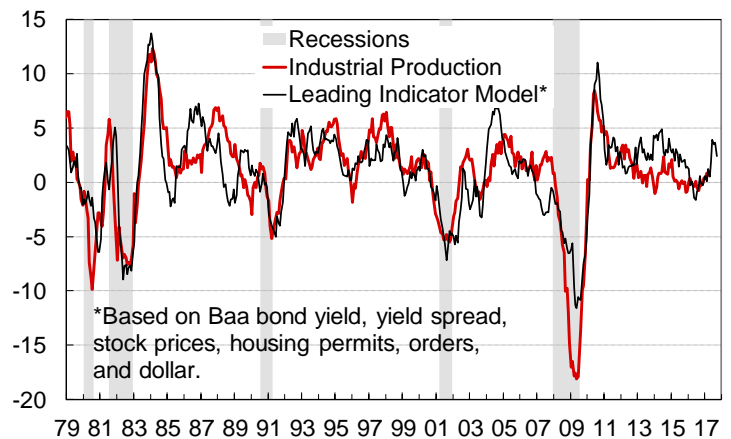
- Industrial production in U.S. manufacturing (excluding computers, communication equipment, and semiconductors) rose 1.5% from August 2016 to February 2017, but fell 0.4% in March.
- My own leading indicator for industrial production jumped sharply from October 2016 to February 2017. It fell in March and April, but still suggests that the March decline in industrial production was a one-off event and that growth in production will resume in coming months.

US Industrial Production: Manufacturing ex high-tech
Index 2012 = 100



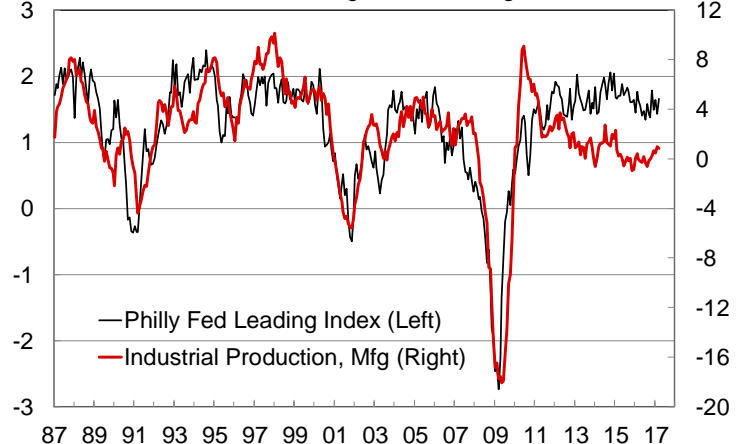
- Industrial production for manufacturing (excluding the high-tech sectors) was up 0.7% in March.
- Despite decline in March and April, my leading index for industrial production suggests that year-over-year growth will rise significantly over the next few months.

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



- Historically, the Federal Reserve Bank of Philadelphia's leading index has been highly correlated with industrial production in U.S. manufacturing.
- This correlation has broken down in recent years. This could be because low interest rates, faster money supply growth, and higher stock prices have not boosted growth as much as they have in the past.

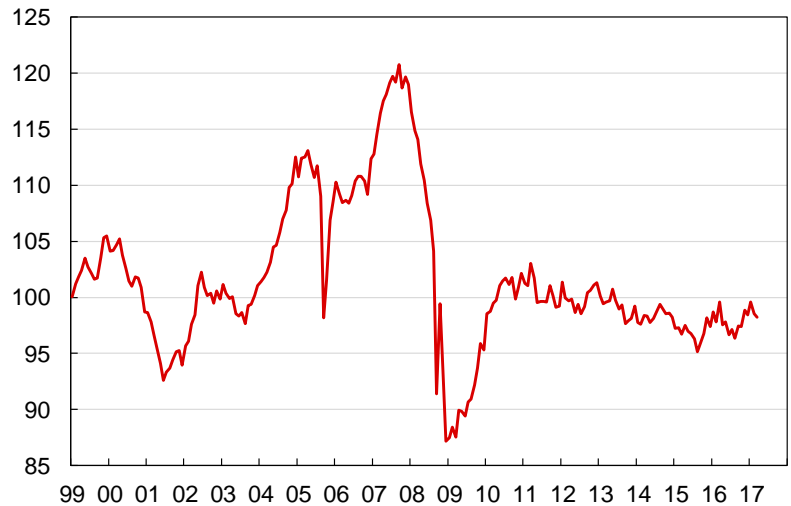
US Industrial Production vs Philly Fed Leading Index
Percent Change from Year Ago



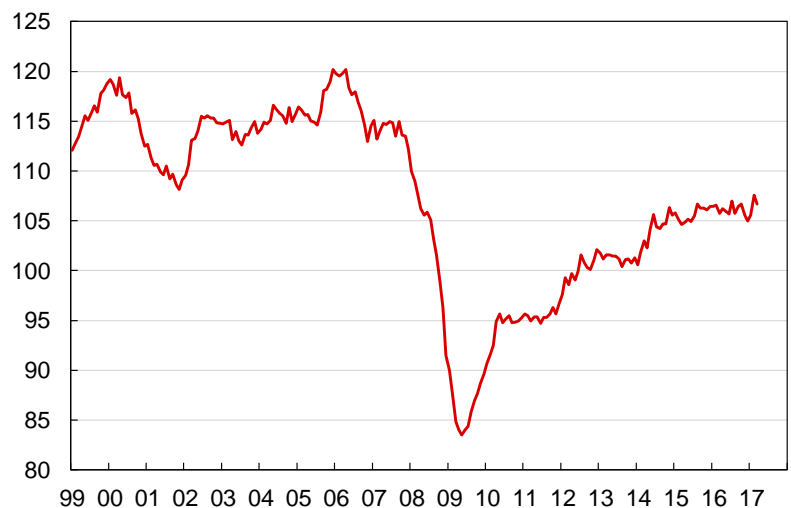
US Industrial Production

- Chemical industry capacity in the United States is expanding as new facilities are built to take advantage of the abundance of cheap natural gas liquids from shale formations. Strong growth in production is likely over the rest of the decade, but is hard to detect in the data so far.
- Industrial production of chemicals (excluding pharmaceuticals) was down 1.4% year-over-year in March (from a solid March 2016) and is below its January 2010 level. March's annual revision of industrial production data significantly lowered reported growth over the last three years.
- U.S. industrial production of plastic and rubber products was up 0.9% year-over-year in March.
- Plastic and rubber production was boosted by the strong recovery in motor vehicle sales and production from 2009 to 2015. Production has flattened as motor vehicle sales have plateaued. As in the case of chemicals, production is likely to be boosted in the future by the abundance of cheap natural gas liquids.
- 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.
- The Producer Price Index for industrial chemicals fell sharply following the collapse in oil prices that began in mid-2014, but stopped falling when oil prices hit bottom in early 2016.

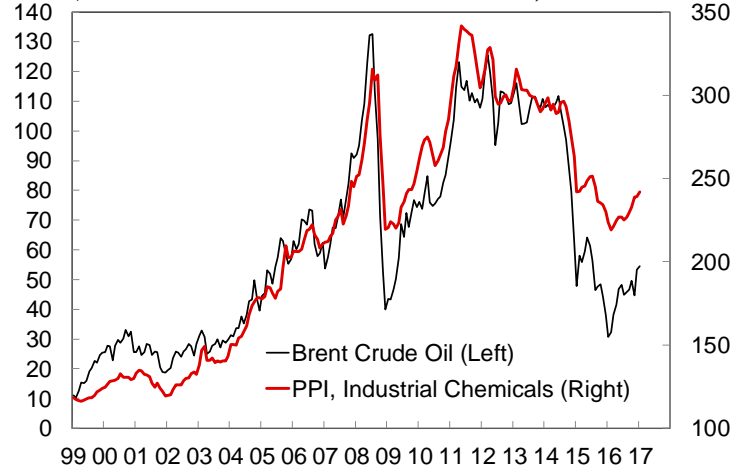
US Industrial Production: Chemicals ex pharmaceuticals
Index, 2012=100



US Industrial Production: Plastic & Rubber Products
Index, 2012=100

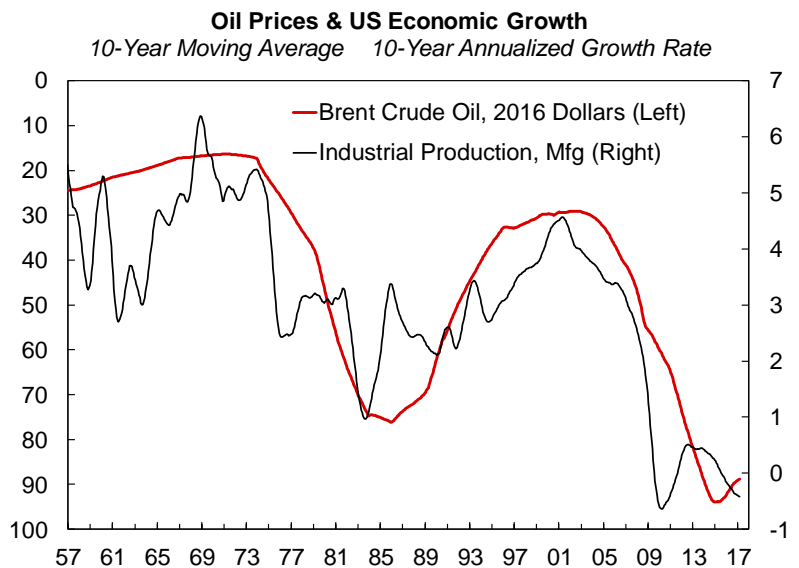
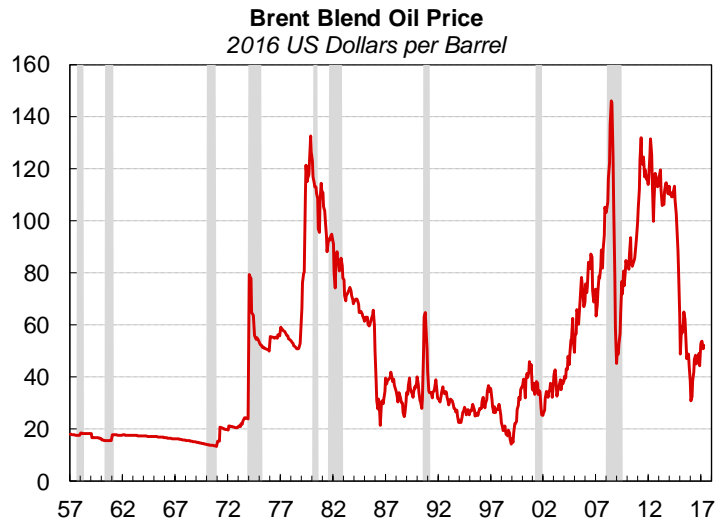
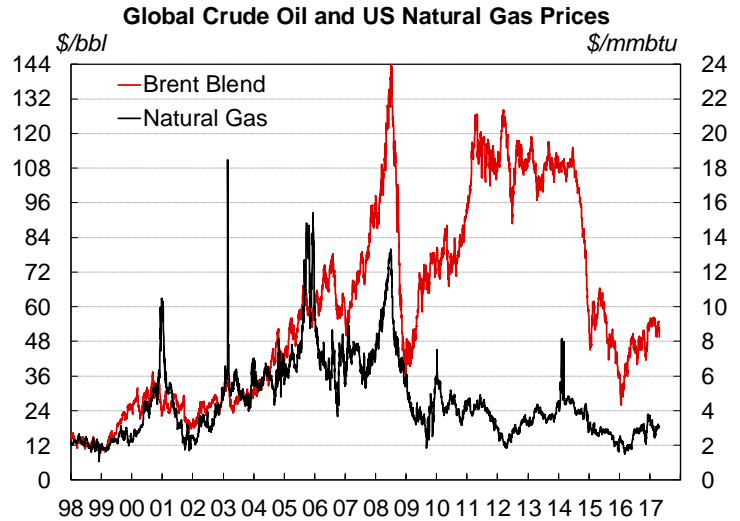


Brent Oil Price vs Industrial Chemical Prices
\$/Barrel (Left) Index, 1982 = 100 (Right)



Oil & Gas Prices

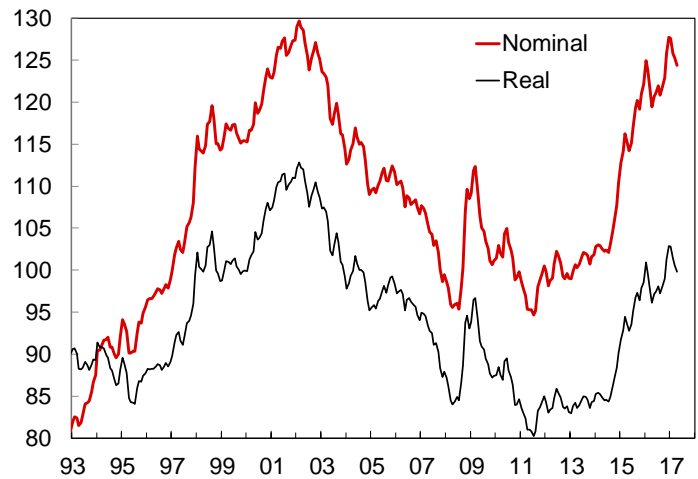
- Natural gas prices have recovered from the 17-year lows hit in early 2016. Low prices for natural gas and natural gas liquids boost the competitiveness of North American chemical producers, which tend to use natural gas liquids as a feedstock while most of their foreign competitors rely on naphtha, a crude oil derivative.
- The North American chemical industry still has a significant feedstock-cost advantage, but that advantage shrunk when oil prices collapsed in late 2014. This reduced costs for competitors abroad.
- Oil prices don't exhibit smooth cycles. Instead, they are marked by sudden regime shifts, shown by nearly-vertical lines on the chart.
- The real (inflation-adjusted) price of Brent Blend crude oil peaked in November 1979 and did not set another new high until May 2008. It remained above its November 1979 peak for only three months.
- Because of hydraulic fracturing and horizontal drilling in shale formations, real oil prices could remain below their 2008 highs for decades.
- Economic growth, particularly growth in U.S. industrial production in manufacturing, has been significantly stronger during periods of low real oil prices than during periods of high prices.
- Although real oil prices peaked in 2008 and have fallen sharply since mid-2014, the 10-year moving average of real oil prices did not begin to decline until 2015.
- Initially, the negative impact of lower oil prices on drilling activity and related industries dominated the positive impact on the rest of the economy. In the long run, the positive impact will dominate.



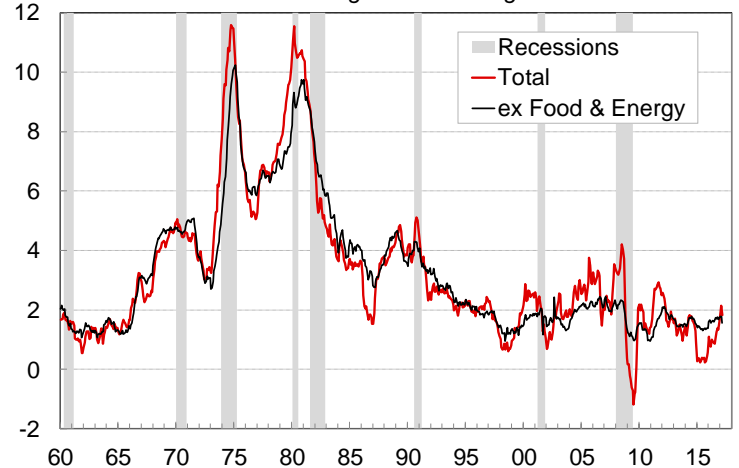
Exchange Rates, Inflation, and Interest Rates

- The U.S. dollar hit a 14-year high in January. It has weakened slightly since then but remains very strong by historical standards.
- A strong dollar reduces the competitiveness of U.S.-produced goods and services. The negative impact of the strong dollar on U.S. manufacturers has offset some of the positive impact of lower oil and natural gas prices.
- The U.S. Federal Reserve seeks to keep inflation, as measured by the year-over-year change in the Personal Consumption Expenditure Price Index, near 2%.
- The total PCE Price Index was up 1.8% year-over-year in March. The “core” (ex food and energy) index was up 1.6% in March. The core inflation rate has been between 1.3% and 1.8% for 57 straight months. Core inflation has been below 2.5% since NAFTA was enacted in 1994. Before then, it hadn't fallen below 2.5% for 27 years.
- The Federal Reserve raised its target federal funds rate by a quarter point at its December 2015, December 2016, and March 2017 meetings. I expect two more quarter-point hikes in 2017.
- I believe low interest rates have suppressed economic growth by reducing the interest income of the elderly and by forcing young people to save more to fund their future retirements.
- The yield on 10-year Treasury notes hit an all-time low in July 2016. Rates are likely to fluctuate around a rising trend over the next several years.

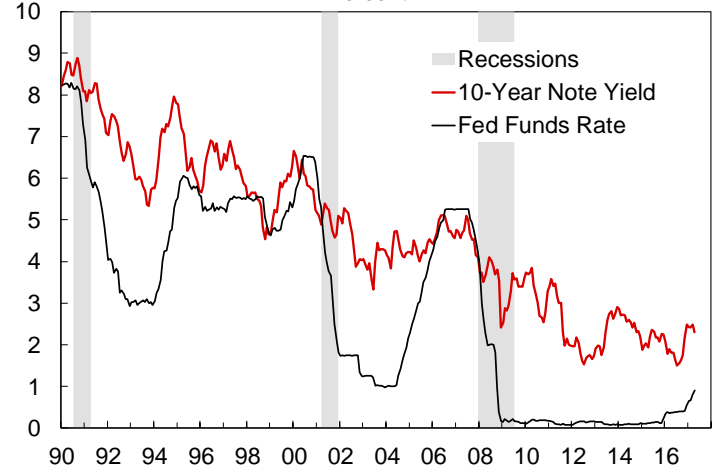
Federal Reserve Broad Dollar Index



US Personal Consumption Expenditures Price Index
Percent Change from Year Ago

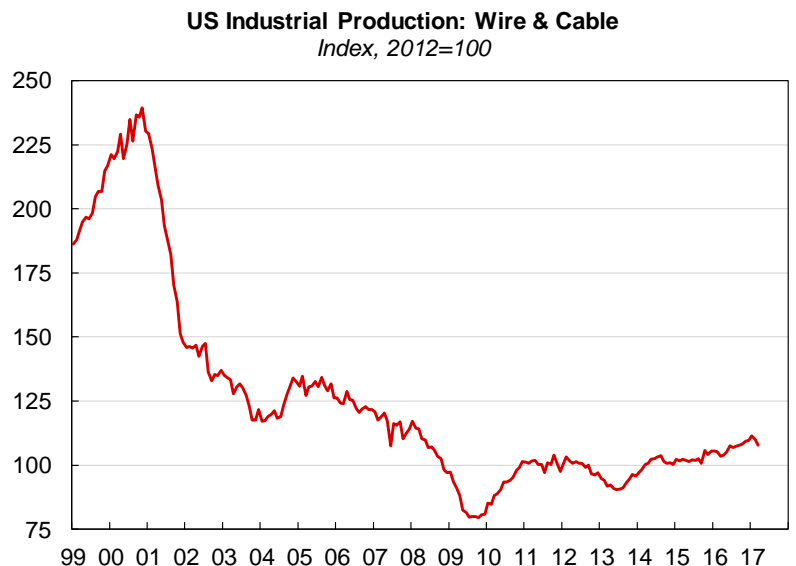
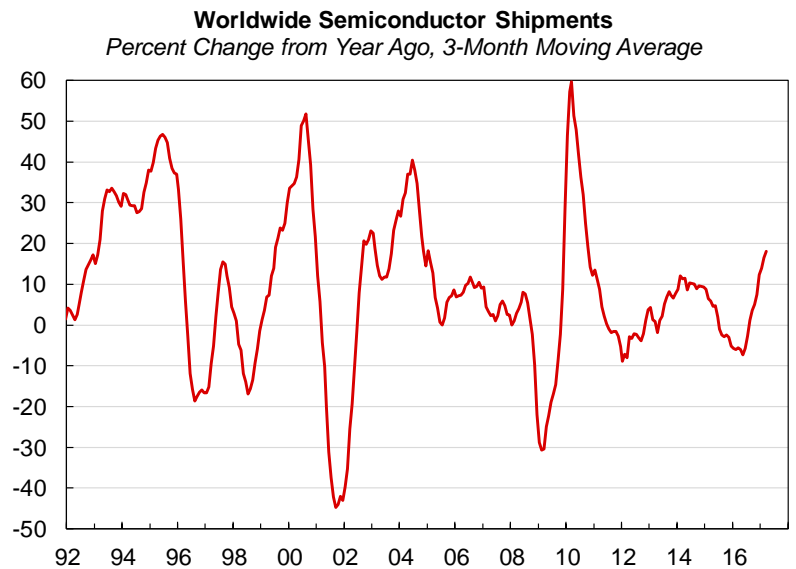
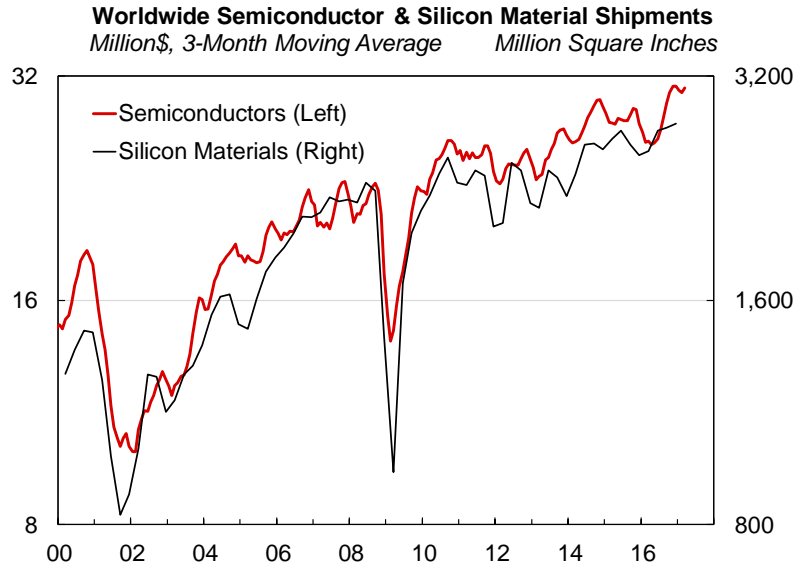


US Interest Rates
Percent



Electronics & Communication

- Shipments of silicon materials are a good indicator of global demand for products going into the electronics industry. Shipments rose to a new record high in the fourth quarter of 2016 and were up 10.4% from year-earlier levels.
- The data 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 semiconductor shipments reached a record high in the three months ending in November 2016. The small decline over the next three months was a normal seasonal fluctuation.
- Worldwide semiconductor shipments were up 18.1% year-over-year in the three months ending in March. That's the largest year-over-year increase since 2010.
- Industrial production of wire and cable used in communication and energy applications fell by two-thirds from its 2000 "bubble" peak to its 2009 trough. The recovery since then, while significant in percentage terms, has erased little of the decline.
- Wire and cable production was up 4.3% year-over-year in March despite declines in February and March.



Global GDP Growth

						Forecast			
	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>
World	2.7	2.7	2.4	2.8	3.0	2.8	2.8	2.7	2.7
North America	2.4	2.4	1.6	2.3	2.9	2.4	2.0	2.0	1.9
United States	2.4	2.6	1.6	2.3	3.0	2.5	2.0	2.0	2.0
Canada	2.6	0.9	1.4	2.3	2.0	1.8	1.8	1.8	1.8
Mexico	2.3	2.6	2.3	1.7	2.0	2.7	2.7	2.7	2.7
Western Europe	1.6	2.1	1.8	1.6	1.6	1.6	1.6	1.5	1.5
France	0.7	1.2	1.1	1.3	1.4	1.5	1.5	1.4	1.4
Germany	1.6	1.7	1.9	1.5	1.6	1.4	1.3	1.2	1.2
Italy	0.1	0.8	0.9	0.9	0.9	0.8	0.8	0.9	0.9
Spain	1.4	3.2	3.2	2.6	2.2	2.0	1.9	1.7	1.6
U.K.	3.1	2.2	1.8	1.7	1.3	1.6	1.9	1.9	1.9
C & E Europe	2.4	1.3	1.7	2.4	2.6	2.6	2.7	2.8	2.7
Middle East & Africa	3.0	2.6	2.6	2.2	3.3	3.1	3.2	3.2	3.4
Asia/Pacific	4.5	4.5	4.4	4.6	4.4	4.1	4.1	3.8	3.8
Japan	0.3	1.2	1.0	1.2	0.6	0.8	0.7	0.7	0.6
ex Japan	5.9	5.7	5.5	5.6	5.5	5.0	5.0	4.6	4.6
Australia	2.8	2.4	2.5	3.1	3.0	2.9	2.8	2.8	2.7
China	7.3	6.9	6.7	6.6	6.2	5.0	5.0	4.0	4.0
India	7.2	7.9	6.8	7.2	7.7	7.8	7.9	8.1	8.2
Indonesia	5.0	4.9	5.0	5.1	5.3	5.4	5.5	5.5	5.5
Korea (South)	3.3	2.8	2.8	2.7	2.8	3.0	3.0	3.1	3.1
Malaysia	6.0	5.0	4.2	4.5	4.7	4.9	4.9	4.8	4.8
Philippines	6.2	5.9	6.8	6.8	6.9	7.0	7.0	7.0	7.0
Singapore	3.6	1.9	2.0	2.2	2.6	2.6	2.6	2.6	2.6
Taiwan	4.0	0.7	1.4	1.7	1.9	2.0	2.3	2.5	2.5
Thailand	0.9	2.9	3.2	3.0	3.3	3.2	3.1	3.0	3.0
Vietnam	6.0	6.7	6.2	6.5	6.3	6.2	6.2	6.2	6.2
Latin America	0.7	-1.2	-2.3	0.9	2.0	2.4	2.5	2.5	2.5
Argentina	-2.5	2.6	-2.3	2.2	2.3	2.5	3.0	3.2	3.1
Brazil	0.5	-3.8	-3.6	0.2	1.7	2.0	2.0	2.0	2.0
Colombia	4.4	3.1	2.0	2.3	3.0	3.6	3.6	3.6	3.6
Venezuela	-3.9	-6.2	-18.0	-7.4	-4.1	-1.3	-1.4	-1.4	-1.3

Global Industrial Production Growth

						Forecast			
	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>
World	3.2	1.7	1.7	2.6	2.7	2.4	2.3	2.3	2.1
Advanced economies	2.2	0.4	0.1	1.8	2.0	1.7	1.6	1.5	1.3
United States	3.1	-0.7	-1.2	1.7	2.6	2.4	1.9	1.8	1.8
Japan	1.9	-1.3	-0.6	2.5	1.5	0.5	0.5	0.5	0.5
Euro Area	0.8	2.1	1.4	1.5	1.5	1.5	1.5	1.5	1.2
Other advanced	2.9	1.3	1.0	2.0	2.0	2.0	2.0	2.0	1.5
Emerging economies	4.2	3.0	3.2	3.9	3.9	3.5	3.5	3.5	3.4
Emerging Asia	6.4	4.7	4.9	5.5	5.0	4.5	4.5	4.5	4.0
C & E Europe	1.4	-1.6	1.0	4.0	3.0	3.0	3.0	3.0	2.5
Latin America	-0.6	-2.3	-3.7	2.0	3.0	2.0	2.0	2.0	2.5
Middle East & Africa	1.3	2.9	3.5	2.0	3.0	3.0	3.0	3.0	3.5

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