Monthly Labor Review

March 2017

Producer prices, 2016: goods inflation returns and price increases for services move higher

Using data from the Producer Price Index program, this article describes changes in producer prices in 2016. Prices in the goods-producing sector saw substantial gains, reversing 2015 declines, and prices in the service-providing sector advanced faster than they did in 2015.

The Producer Price Index (PPI) measures the average change over time in selling prices received by domestic producers for their output. The Final Demand–Intermediate Demand (FD–ID) aggregation system, the main structure used to analyze the behavior of producer prices, measures final-demand inflation (price changes for goods, services, and construction sold for personal consumption, as capital investment, to government, and for export) and intermediate-demand inflation (price changes for goods, services, and construction sold to businesses as inputs to production). Using the FD–ID system, this article describes PPI price movements in 2016.[1]

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Overview

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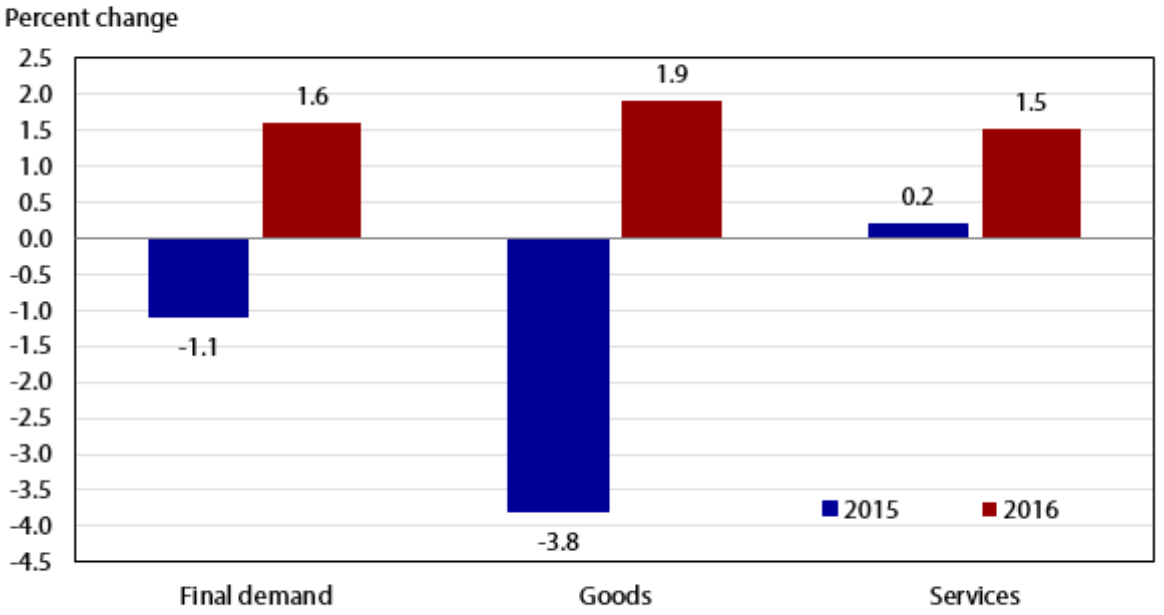
Figure 1. Producer price indexes for total final demand, goods, and services, 12-month percent change, 2015 and 2016



Source: U.S. Bureau of Labor Statistics.

Producer inflation returned in 2016, as the PPI for final demand advanced 1.6 percent after declining 1.1 percent in 2015. Over two-thirds of this upturn can be traced to prices for final-demand goods, which rose 1.9 percent after decreasing 3.8 percent a year earlier. Within the goods-producing sector, a 5.9-percent increase in prices for final-demand energy, following a 16.4-percent drop in 2015, accounted for more than 60 percent of the upturn in the index for final-demand goods. In addition, the index for final-demand goods other than foods and energy moved up 1.7 percent in 2016, after inching down 0.1 percent in 2015, and price declines for final-demand foods slowed to 1.1 percent, down from 5.2 percent a year earlier.[2] (See figure 1 and table 1.)

Table 1. Selected producer price indexes for final demand and intermediate demand, 12-month percent change, 2015 and 2016

Index	2015	2016
Final demand		
Total final demand	-1.1	1.6
Goods for final demand	-3.8	1.9
Foods	-5.2	-1.1
Energy goods	-16.4	5.9
Goods less foods and energy	-.1	1.7
Services for final demand	.2	1.5

See footnotes at end of table.

Table 1. Selected producer price indexes for final demand and intermediate demand, 12-month percent change, 2015 and 2016

Index	2015	2016
Trade services	.0	1.0
Transportation and warehousing services	-3.5	.0
Services less trade, transportation, and warehousing	.8	2.0
Construction for final demand	2.1	.6
Intermediate demand, by type of commodity		
Processed goods for intermediate demand	-6.6	1.8
Processed foods and feeds	-9.2	-.3
Processed energy goods	-17.0	4.6
Processed materials less foods and energy	-3.8	1.5
Unprocessed goods for intermediate demand	-25.3	13.2
Unprocessed foodstuffs and feedstuffs	-18.2	-3.1
Unprocessed energy materials	-37.7	37.3
Unprocessed nonfood materials less energy	-18.5	13.6
Services for intermediate demand	.5	2.5
Trade services for intermediate demand	-.7	.7
Transportation and warehousing services for intermediate demand	-.8	.3
Services less trade, transportation, and warehousing for intermediate demand	.9	3.5
Construction for intermediate demand	1.7	1.9
Intermediate demand, by production flow		
Stage-4 intermediate demand	-1.5	1.7
Total goods inputs to stage-4 intermediate demand	-3.4	1.2
Total services inputs to stage-4 intermediate demand	.6	2.2
Stage-3 intermediate demand	-6.7	1.9
Total goods inputs to stage-3 intermediate demand	-12.7	1.2
Total services inputs to stage-3 intermediate demand	.6	2.5
Stage-2 intermediate demand	-8.3	6.5
Total goods inputs to stage-2 intermediate demand	-19.3	11.5
Total services inputs to stage-2 intermediate demand	.8	3.0
Stage-1 intermediate demand	-8.6	4.1
Total goods inputs to stage-1 intermediate demand	-13.9	6.1
Total services inputs to stage-1 intermediate demand	-1.1	1.8

Source: U.S. Bureau of Labor Statistics.

In the service-providing sector, a larger rise in the index for final-demand services less trade, transportation, and warehousing—a rise of 2.0 percent in 2016, compared with 0.8 percent in 2015—accounted for over half of the acceleration in prices for final-demand services, which climbed 1.5 percent in 2016, after inching up 0.2 percent in the preceding year. Also contributing to the faster rate of increase were margins for final-demand trade services, which moved up 1.0 percent after no change in 2015, and the index for final-demand transportation and warehousing services, which remained unchanged after a 3.5-percent decrease in 2015. (Trade indexes measure changes in margins received by wholesalers and retailers.[3])

The index for final demand less foods, energy, and trade services rose 1.7 percent in 2016, after advancing 0.3 percent in 2015. Historically, the indexes for food, energy, and trade services have exhibited greater short-term

volatility than other components of the FD–ID system. As a result, PPI calculates a number of indexes that exclude these potentially volatile components.[4]

Similarly to final demand prices, prices for intermediate-demand goods turned up in 2016, after falling a year earlier, and prices for intermediate-demand services rose more than they did in 2015. The index for processed goods for intermediate demand advanced 1.8 percent, reversing a 6.6-percent decline in the preceding year, because of upturns in prices for processed energy goods and processed core goods. The index for processed foods and feeds was little changed in 2016, after seeing a large drop in 2015. Similar shifts in prices for unprocessed energy materials, unprocessed core goods, and unprocessed foodstuffs and feedstuffs caused prices for unprocessed goods for intermediate demand to increase after falling a year earlier. Within intermediate-demand services, the inflation rate rose to 2.5 percent in 2016, up from 0.5 percent in 2015. Leading this faster rate of advance, the index for services other than trade, transportation, and warehousing moved up more than it did in 2015. Margins for trade services and the index for transportation and warehousing services increased in 2016, after decreasing a year earlier.

Economic background

Energy

Prices for crude petroleum surged 51.2 percent in 2016, reversing a 44.8-percent decrease in 2015. Mirroring the movements in the PPI for crude petroleum, contract prices for Cushing, OK, crude oil futures trended lower in 2015, settled to less than $30 per barrel in late January and early February of 2016, and then increased throughout the remainder of 2016. The U.S. Energy Information Administration reported that, after ranging between 9.2 and 9.6 million barrels per day in 2015, U.S. crude oil production retreated to a low of 8.5 million barrels per day by late 2016.[5] Offsetting this decline in U.S. production, crude petroleum imports rose, leaving overall inputs to refineries roughly equivalent to 2015 levels. In May 2016, U.S. crude oil stocks peaked at roughly 510 million barrels, and then fell more than 8 percent by October, to 469 million barrels. For the first 9 months of 2016, world crude oil production averaged 79.9 million barrels per day, compared with 80.3 million barrels per day in 2015. Furthermore, in late November 2016, the member nations of the Organization of the Petroleum Exporting Countries (OPEC) and Russia agreed to cut production by 1.2 million and 0.6 million barrels per day, respectively, effective January 1, 2017.[6] In December 2016, the PPI for crude petroleum responded to these cuts, surging 18.9 percent.

In terms of demand for refined petroleum products, *weekly product supplied* to the market (a proxy for U.S. petroleum product consumption) grew about 1.4 percent in 2016.[7] Consumption of finished motor gasoline rose 1.9 percent; consumption of distillate fuels, such as diesel fuel and heating oil, fell 2.8 percent; and consumption of jet fuel climbed 4.4 percent. Trending similarly to the PPI for crude petroleum, the PPI for refined petroleum products—an index including gasoline, diesel fuel, heating oil, and jet fuel—climbed 12.0 percent in 2016, after declining 32.1 percent in the preceding year.

In the natural gas sector, the index for wellhead natural gas rose 61.2 percent in 2016, after decreasing 49.9 percent in 2015. However, the December-to-December 12-month increase in natural gas prices reflects a modest recovery in calendar-year price levels from near-term historic lows. During the first 10 months of 2016, U.S. natural gas marketed production averaged 2.36 million MMcf (million cubic feet) per month, a modest decline of 1.3 percent from 2015 levels. Total consumption inched higher over the first 10 months of 2016. The share of natural

gas in electric power generation (34 percent) surpassed that of coal (30 percent).[8] At the close of the 2016 refilling season (October), working gas in underground storage was little changed from a year earlier.[9] Paralleling the rise in wellhead natural gas prices, the index for utility natural gas moved higher in 2016, reversing a steep decline in 2015.

Core goods

The return of inflation for goods other than foods and energy also contributed to the upturn in the indexes for intermediate-demand goods and final-demand goods. In the metals market, rising prices for iron and steel scrap, nonferrous metal ores, and nonferrous scrap reversed 2015 declines, leading to advances in the indexes for steel mill products, fabricated structural metal products, and nonferrous mill shapes. These gains have been attributed to a decline in scrap supplies in early 2016—a decline due to weak industrial production in 2015—and a stabilizing worldwide economic outlook.[10] In response to price movements for crude oil and natural gas, the index for basic organic chemicals moved higher in 2016, after falling a year earlier, and prices for plastic resins and materials and plastic products were little changed, after decreasing in 2015.[11]

Food

The rate of decline in prices for slaughter cattle slowed to 8.1 percent in 2016, after dropping 27.2 percent a year earlier, and the index for slaughter hogs also fell less than it did in 2015. Similarly, the PPI for meats moved down at a slower rate in 2016, 1.1 percent, compared with 17.2 percent in the previous year. The U.S. Department of Agriculture reported that total domestic beef production advanced 6.1 percent in 2016, to 25.1 billion pounds, while pork production grew by 1.7 percent, to 24.9 billion pounds. Over the same period, net exports of beef and pork rose by about 750 million pounds. The increase in net exports, combined with a stronger U.S. dollar, helped stabilize meat prices despite rising production.[12] In the poultry sector, prices for slaughter chickens advanced 6.3 percent in 2016, compared with a 22.9-percent decrease in the previous year. The index for processed young chickens also turned up in 2016. Similarly to meat production, poultry production increased, but its downward pressure on prices was more than offset by increases in exports.[13] In terms of input costs, prices for soybeans spiked in 2016, leading to upturns in prices for soybean cake and meal and prepared animal feeds. For the 2015–16 growing season, U.S. soybean production was little changed from the previous year, at 106.86 metric tons; however, over the same period, foreign production fell 2.92 percent, to 206.68 metric tons.[14] Higher feed prices affected production costs in the meat, processed young chicken, raw milk, and dairy product sectors.

Services

Interest-rate hikes by the U.S. Federal Reserve in December 2015 and December 2016 resulted in increases in the PPI for securities brokerage, dealing, and related services in late 2015, early 2016, and December 2016. These advances were leading contributors to the acceleration in prices for intermediate-demand and final-demand services. Higher interest rates also contributed to the upturn in prices for business loans, which affected the PPI for intermediate-demand services in 2016. Helped by stock market gains in 2016, the PPIs for portfolio management and investment banking increased faster than they did in 2015. Health care services made up about one-fourth of the PPI for final-demand services in 2016, and prices for health care services increased 1.6 percent, after moving up 0.9 percent a year earlier. Within final-demand trade services, higher margins for machinery and equipment wholesaling accounted for most of the year-over-year rise. In response to higher prices for refined petroleum products, many PPIs for transportation and warehousing services—including rail transportation of freight, long-

distance motor carrying, deep-sea water transportation of freight, and airline passenger services—moved up in 2016, after seeing declines a year earlier.[15]

Final demand

Final-demand goods

In 2016, the upturn in the index for final demand was led by prices for final-demand goods, which advanced 1.9 percent after declining 3.8 percent in 2015. The index for final-demand energy accounted for more than 60 percent of the upturn, increasing 5.9 percent in 2016, after a 16.4-percent drop a year earlier. Prices for final-demand goods less foods and energy also turned up, rising 1.7 percent, compared with a 0.1-percent decrease the previous year. The index for final-demand foods declined 1.1 percent in 2016, after a 5.2-percent decrease in 2015.

Over a quarter of the upturn in prices for final-demand goods can be attributed to the index for gasoline, which increased 11.8 percent in 2016, after dropping 28.7 percent in the preceding year. The indexes for utility natural gas, diesel fuel, iron and steel scrap, and basic organic chemicals also rose after declining in the previous year. Prices for meats declined at a slower rate than in 2015. Conversely, the index for fresh and dry vegetables dropped 28.2 percent in 2016, compared with a 16.5-percent advance a year earlier. Prices for passenger cars and butter also turned down subsequent to rising in the preceding year. The index for corn decreased more than in 2015.

Final-demand services

The index for final-demand services advanced 1.5 percent in 2016, after rising 0.2 percent in 2015. Over half of the faster rate of increase can be traced to prices for final-demand services less trade, transportation, and warehousing services, which climbed 2.0 percent after moving up 0.8 percent in the previous year. Margins for final-demand trade services rose 1.0 percent in 2016, compared with no change a year earlier. Prices for final-demand transportation and warehousing services were unchanged after a 3.5-percent decline in 2015.

Nearly a quarter of the acceleration in the index for final-demand services can be traced to prices for securities brokerage, dealing, investment advice, and related services, which jumped 21.5 percent in 2016, after moving up 3.2 percent in the preceding year. The index for machinery and equipment wholesaling also rose more than in 2015. Prices for airline passenger services turned up after falling a year earlier. The index for outpatient care (partial) increased in 2016, after seeing no change in the preceding year, and margins for fuels and lubricants retailing declined less than in 2015. Conversely, margins for food retailing turned down 2.2 percent in 2016, compared with a 6.7-percent increase in the previous year. The indexes for residential real estate loans (partial) and computer hardware, software, and supplies retailing also fell after rising in 2015. Margins for chemicals and allied products wholesaling fell at a faster rate than they did a year earlier.

Intermediate demand by commodity type

Processed goods for intermediate demand

The index for processed goods for intermediate demand rose 1.8 percent in 2016, after seeing a 6.6-percent decline in 2015. Nearly half of the upturn in prices for processed goods for intermediate demand can be attributed to the index for processed materials less foods and energy, which advanced 1.5 percent after falling 3.8 percent in 2015. Prices for processed energy goods increased 4.6 percent in 2016, after dropping 17.0 percent in the previous year. The decrease in the index for processed foods and feeds slowed to 0.3 percent in 2016, down from 9.2 percent in 2015.

Within the index for processed goods for intermediate demand, prices for basic organic chemicals increased 6.1 percent in 2016, subsequent to a 14.7-percent decrease a year earlier. The indexes for diesel fuel, steel mill products, gasoline, utility natural gas, and prepared animal feeds also rose in 2016, after declining in the previous 12-month period. Conversely, prices for processed eggs dropped 60.0 percent after rising 3.4 percent in 2015. The indexes for agricultural chemicals and chemical products and potassium salts and boron fell more than they did a year earlier.

Unprocessed goods for intermediate demand

The index for unprocessed goods for intermediate demand advanced 13.2 percent in 2016, after falling 25.3 percent in 2015. Almost 60 percent of the upturn in 2016 can be traced to prices for unprocessed energy materials, which jumped 37.3 percent after falling 37.7 percent a year earlier. The index for unprocessed nonfood materials less energy rose 13.6 percent subsequent to an 18.5-percent decrease in 2015. Price declines for unprocessed foodstuffs and feedstuffs slowed to 3.1 percent, down from 18.2 percent in 2015.

Thirty percent of the upturn in the index for unprocessed goods for intermediate demand can be attributed to prices for crude petroleum, which advanced 51.2 percent in 2016, after decreasing 44.8 percent in 2015. The indexes for natural gas, iron and steel scrap, slaughter chickens, and hay, hayseeds, and oilseeds also turned up in 2016. Prices for slaughter steers and heifers fell less than they did in 2015. Conversely, the index for fresh vegetables, except potatoes turned down 35.8 percent in 2016, after increasing 24.0 percent a year earlier. Prices for corn fell more in 2016 than in the preceding year, while the index for construction sand, gravel, and crushed stone rose less than in 2015.

Services for intermediate demand

In 2016, the rise in the index for services for intermediate demand accelerated to 2.5 percent, up from 0.5 percent in 2015. The index for services less trade, transportation, and warehousing for intermediate demand advanced 3.5 percent in 2016, compared with a 0.9-percent increase in the previous 12-month period. Margins for trade services for intermediate demand turned up 0.7 percent, compared with a 0.7-percent decline in 2015. Prices for transportation and warehousing services for intermediate demand rose 0.3 percent in 2016, following a 0.8-percent decrease in the previous year.

Within the index for services for intermediate demand, prices for loan services (partial) moved up 0.6 percent in 2016, after falling 2.8 percent in the previous year. Prices for securities brokerage, dealing, investment advice, and related services rose more than in 2015. The indexes for paper and plastics products wholesaling, television advertising time sales, and airline passenger services also turned up after declining in the previous year. In contrast, margins for chemicals and allied products wholesaling fell 13.1 percent in 2016, following a 1.6-percent

decline a year earlier. The indexes for deposit services (partial) and U.S. postal services turned down in 2016, while prices for ground courier and messenger services rose less than in 2015.

Intermediate demand by production flow

The production-flow treatment of intermediate demand is a stage-based system of price indexes. The stage-based indexes can be used to study price-transmission relationships between sequential intermediate-demand stages, and between the last stage of intermediate demand and final demand. The production-flow system contains four main indexes, each corresponding to one of four stages of intermediate demand (stages 1 through 4). Indexes for the four stages were developed by assigning each industry in the economy to a stage, whereby industries assigned to the fourth stage produce output primarily consumed for final demand, industries in the third stage produce output primarily consumed by stage-4 industries, industries assigned to the second stage produce output primarily consumed by stage-3 industries, and industries assigned to the first stage produce output primarily consumed by stage-2 industries. The four stage-based, intermediate-demand indexes track price change for the net inputs consumed by industries assigned to each of the four stages. The stage-4 intermediate-demand index, for example, tracks price change for inputs consumed, not produced, by industries included in the fourth stage. Hence, this index measures price change in the inputs to production for industries that primarily produce final-demand goods, services, and construction.

In 2016, price movements for the four stages of intermediate demand by production flow were consistent with the upturn in the index for final demand—each stage also moved up after falling in 2015. (See data for intermediate-demand stage 4, stage 3, stage 2, and stage 1.) From a timing standpoint, across all of the stages, prices for services inputs to intermediate demand rose more during the first half of 2016 than in the second half of the year.[16] Leading this trend were prices for financial services such as portfolio management and securities brokerage, dealing, investment advice, and related services. Margins for intermediate-demand trade services—including building materials, paint, and hardware wholesaling; metals, minerals, and ores wholesaling; and paper and plastics products wholesaling—also advanced primarily during the first half of 2016. In contrast, the indexes for goods inputs to intermediate demand increased moderately during the early part of 2016, before accelerating during the second half of the year.[17] At the earlier stages of production, prices for crude petroleum, iron and steel scrap, and steel mill products spiked in the first half of 2016, while prices for nonferrous ore and scrap, as well as wellhead natural gas, surged during the second half of the year. At the later production stages, the advances in the indexes for utility natural gas, refined petroleum products, industrial chemicals, nonferrous mill shapes, and fabricated metal products accelerated during the second half of 2016.

Stage-4 intermediate demand

The index for stage-4 intermediate demand moved up 1.7 percent in 2016, after falling 1.5 percent in the previous 12-month period. Prices for total goods inputs to stage-4 intermediate demand rose 1.2 percent after declining 3.4 percent in 2015. The increase in the index for total services inputs to stage-4 intermediate demand accelerated to 2.2 percent, up from 0.6 percent in the previous year. In 2016, prices for diesel fuel jumped 20.3 percent after dropping 43.1 percent a year earlier. The indexes for gasoline, steel mill products, basic organic chemicals, and paper and plastic products wholesaling also increased after moving lower in 2015. Prices for securities brokerage, dealing, investment advice, and related services rose more than in the preceding year. Conversely, margins for

chemicals and allied products wholesaling dropped 13.1 percent in 2016, following a 1.6-percent decrease in 2015. The indexes for deposit services (partial) and food wholesaling turned down after rising in 2015.

Stage-3 intermediate demand

The index for stage-3 intermediate demand increased 1.9 percent in 2016, after falling 6.7 percent in the previous year. Prices for total goods inputs to stage-3 intermediate demand rose 1.2 percent after declining 12.7 percent in 2015. The advance in the index for total services inputs to stage-3 intermediate demand accelerated to 2.5 percent, up from 0.6 percent a year earlier. Prices for gasoline moved up 11.8 percent in 2016, following a 28.7-percent drop in the previous year. The indexes for jet fuel, primary basic organic chemicals, raw milk, and steel mill products also rose in 2016, after moving down in the preceding 12-month period. Prices for slaughter steers and heifers fell less than in 2015. In contrast, the index for chemicals and allied products wholesaling dropped 13.1 percent in 2016, following a 1.6-percent decrease a year earlier. Prices for slaughter vealers and slaughter turkeys turned down after advancing in 2015.

Stage-2 intermediate demand

The index for stage-2 intermediate demand increased 6.5 percent in 2016, following an 8.3-percent decrease in 2015. Prices for total goods inputs to stage-2 intermediate demand rose 11.5 percent after moving down 19.3 percent in the previous year. The index for total services inputs to stage-2 intermediate demand climbed 3.0 percent in 2016, compared with a 0.8-percent increase in the preceding year. Prices for crude petroleum jumped 51.2 percent after declining 44.8 percent in 2015. The indexes for gas fuels, steel mill products, and prepared animal feeds also turned up after dropping in 2015. Prices for securities brokerage, dealing, investment advice, and related services rose more than in 2015, while the index for plastic resins and materials declined less than in 2015. Conversely, the index for U.S. postal services turned down 2.2 percent after increasing 2.1 percent in the previous year. Prices for ground courier and messenger services rose less than in 2015, while the index for corn fell more than in 2015.

Stage-1 intermediate demand

The index for stage-1 intermediate demand advanced 4.1 percent in 2016, following an 8.6-percent decrease a year earlier. Prices for total goods inputs to stage-1 intermediate demand rose 6.1 percent after moving down 13.9 percent in 2015. The index for total services inputs to stage-1 intermediate demand advanced 1.8 percent, subsequent to a 1.1-percent decrease in the previous year. Prices for iron and steel scrap jumped 61.7 percent in 2016, after falling 50.8 percent in the preceding 12-month period. The indexes for basic organic chemicals, diesel fuel, nonferrous scrap, and crude petroleum also increased after dropping in the previous year. Prices for securities brokerage, dealing, investment advice, and related services rose more than in 2015. In contrast, the index for chemical and allied products wholesaling dropped 13.1 percent after declining 1.6 percent in 2015. Prices for deposit services (partial) turned down in 2016, and the index for corn fell more than in 2015.

SUGGESTED CITATION

Joseph Kowal, Lana Conforti, Brian Hergt, and Christopher Marquardt, "Producer prices, 2016: goods inflation returns and price increases for services move higher," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, March 2017, https://doi.org/10.21916/mlr.2017.8.

NOTES

1 The 12-month percent changes reported in this article cover the period from December 2015 to December 2016. Revised PPI data for December 2016 will be posted with the release of first-issued data for April 2017 on May 11, 2017. All PPI data are recalculated 4 months after original publication, to reflect late reporting by survey respondents.

2 The Final Demand–Intermediate Demand (FD–ID) system was first introduced in January 2011 as a set of experimental indexes. With the release of data for January 2014, the FD–ID system replaced the Stage of Processing (SOP) system. Nearly all new FD–ID goods, services, and construction indexes provide historical data back to either November 2009 or April 2010, while the indexes for goods that correspond to the historical SOP indexes go back to the 1970s or earlier. For more information about the FD–ID system, see "A new, experimental system of indexes from the PPI program," *Monthly Labor Review*, February 2011, https://www.bls.gov/opub/mlr/2011/02/art1full.pdf, or visit the PPI FD–ID system webpage at https://www.bls.gov/ppi/fdidaggregation.htm.

3 PPIs for trade services measure changes in margins received by wholesalers and retailers. For more information on these PPIs, see "Wholesale and retail producer price indexes: margin prices," *Beyond the Numbers: Prices and Spending*, vol. 1, no. 8 (U.S. Bureau of Labor Statistics, August 2012), https://www.bls.gov/opub/btn/volume-1/pdf/wholesale-and-retail-producer-price-indexes-margin-prices.pdf.

4 Historically, the PPIs for food and energy goods have exhibited greater short-term volatility than the PPIs for goods other than food and energy. As a result, the PPI program long ago introduced a number of goods indexes that exclude one or both of these potentially volatile components. With the transition from the SOP to the FD–ID system, PPI continues to produce these indexes. In addition, with the FD–ID expansion to include prices for many services, it has been observed that the indexes for wholesale and retail trade, which measure changes in margins, also are subject to potentially large short-term volatility. Consequently, PPI calculates a number of indexes that exclude prices for trade services. These indexes include final-demand services less trade services and final demand less trade services. In addition, PPI calculates an index for final demand less foods, energy, and trade services, removing all three potentially volatile components.

5 "Hydrocarbon gas liquids becoming a key factor in overall liquid fuel balance changes," *This Week in Petroleum* (U.S. Energy Information Administration, January 19, 2017), http://www.eia.gov/petroleum/weekly/. Crude petroleum statistics for prices, reserves, production, refining, processing, and imports/exports are available online at http://www.eia.gov/petroleum/weekly/crude.cfm.

6 Data for world crude petroleum production are available at http://www.eia.gov/totalenergy/data/monthly/pdf/sec11_5.pdf. The text of the OPEC agreement to cut crude petroleum production is available at http://www.opec.org/opec_web/static_files_project/media/downloads/press_room/OPEC%20agreement.pdf. For an analysis of this development, see Nayla Razzouk, Angelina Rascouet, and Golnar Motevalli, "OPEC confounds skeptics, agrees to first oil cuts in 8 years," *Bloomberg News*, November 30, 2016, https://www.bloomberg.com/news/articles/2016-11-30/opec-said-to-agree-oil-production-cuts-as-saudis-soften-on-iran. See also Grant Smith, "OPEC sees Russia delivering cuts while its own output declines," *Bloomberg News*, January 18, 2017, https://www.bloomberg.com/news/articles/2017-01-18/opec-sees-russia-delivering-cuts-while-its-own-output-declines-iy2w5qjw.

7 According to the U.S. Energy Information Administration, petroleum product supplied "approximately represents consumption of petroleum products because it measures the disappearance of these products from primary sources, i.e., refineries, natural gas processing plants, blending plants, pipelines, and bulk terminals. In general, product supplied of each product in any given period is computed as follows: field production, plus refinery production, plus imports, plus unaccounted for crude oil, (plus net receipts when calculated on a PAD District basis), minus stock change, minus crude oil losses, minus refinery inputs, minus exports." The data for petroleum product supplied cited in this article are available at http://www.eia.gov/dnav/pet/pet_cons_wpsup_k_w.htm.

8 Ibid.

9 *Natural Gas Monthly* (U.S. Energy Information Administration), http://www.eia.gov/naturalgas/monthly/. For data specific to natural gas marketed production, select table 7. For data specific to natural gas inventory, select table 9. For data specific to natural gas consumption, select table 2. For more information about natural gas markets, visit http://www.eia.gov/naturalgas/.

10 Narae Kim, "Don't get too excited about China's commodity reflation, with supply set to rise," *Bloomberg News*, January 16, 2017, https://www.bloomberg.com/news/articles/2017-01-17/don-t-get-too-excited-about-china-s-commodity-reflation-with-supply-set-to-rise. See also "World economic outlook update: a shifting global economic landscape" (Washington, DC: International Monetary Fund, January 16, 2017), http://www.imf.org/external/pubs/ft/weo/2017/update/01/pdf/0117.pdf; and *World economic outlook: subdued demand, symptoms and remedies* (Washington, DC: International Monetary Fund, October 2016), http://www.imf.org/external/pubs/ft/weo/2016/02/pdf/text.pdf.

11 For a detailed discussion of price transmission across stages of processing, see Jonathan Weinhagen, "An empirical analysis of price transmission by stage of processing," *Monthly Labor Review*, November 2002, https://www.bls.gov/opub/mlr/2002/11/art1full.pdf; and Weinhagen, "Price transmission within the PPI for intermediate goods," *Monthly Labor Review*, May 2005, https://www.bls.gov/opub/mlr/2005/05/art4full.pdf. More highly processed intermediate and finished goods commonly exhibit price movements that are somewhat different from those of less processed goods, because basic material costs tend to be a smaller portion of total costs for producers of more highly processed goods than for manufacturers of less processed goods. Contracts and escalation agreements also can delay or mitigate the pass-through effect of early stage price volatility on successive stages of processing.

12 Mildred Haley and Keithly Jones, "Livestock, dairy, and poultry outlook," LDP-M-270 (U.S. Department of Agriculture, December 15, 2016), p. 17.

13 Ibid.

14 "World agricultural production," Circular Series WAP-01-17 (U.S. Department of Agriculture, January 2017), p. 22, https://apps.fas.usda.gov/psdonline/circulars/production.pdf.

15 For a discussion of fuel surcharges and their effect on transportation prices, see "Current price topics: the impact of fuel surcharges on the PPI," *Focus on Prices and Spending*, vol. 2, no. 6 (U.S. Bureau of Labor Statistics, August 2011), https://www.bls.gov/opub/btn/archive/producer-price-indexes-the-impact-of-fuel-surcharges-on-the-ppi.pdf.

16 See data for total stage-4 services inputs, total stage-3 services inputs, total stage-2 services inputs, and total stage-1 services inputs.

17 See data for total stage-4 goods inputs, total stage-3 goods inputs, total stage-2 goods inputs, and total stage-1 goods inputs.

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