Special Feature: Commodity Market Developments and Forecasts

Commodity prices have increased since the release of the October 2017 World Economic Outlook (WEO). Supply outages, the extension of the production agreement by the Organization of the Petroleum Exporting Countries (OPEC), and stronger-than-expected global economic growth all pushed oil prices higher. Metal prices also increased following better-than-expected growth in all major economies and production cuts in China. Agricultural prices rose markedly less than those of other commodities, but they have been catching up following unfavorable weather, especially in the Western Hemisphere.

The IMF’s Primary Commodities Price Index rose 16.9 percent between August 2017 and February 2018, the reference periods for the October 2017 and current WEO (Figure 1.SF.1, panel 1). Energy prices and metal prices increased substantially, 26.9 percent and 8.3 percent, respectively, while agricultural prices increased markedly less, by 4.1 percent. Oil prices increased to above $65 a barrel (as of January), attaining their highest level since 2015, in response to unplanned outages and stronger global economic growth. Since then, prices have receded following stronger-than-expected US production. Natural gas prices increased sharply as a result of winter heating use and strong demand from China. Coal prices increased, but by less than other energy prices, because a shift from coal to gas is under way in many countries.

Oil Prices Highest since 2015

Among key influences on oil prices, on November 30, 2017, OPEC agreed to extend to the end of 2018 the production target in place since January 2017. This extension was the second (following the April 2017 agreement that had extended the November 2016 agreement). The agreement entails a cut of 1.2 million barrels a day (mbd) relative to October 2016 production. Russia and other non-OPEC countries agreed to stick to current production levels, implying additional cuts of about 0.6 mbd relative to the October 2016 level.

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Sources: Bloomberg Finance L.P.; IMF, Primary Commodity Price System; Thomson Reuters Datastream; and IMF
\(^1\)WEO futures prices are baseline assumptions for each WEO and are derived from futures prices. April 2018 WEO prices are based on February 22, 2018, closing.
\(^2\)Derived from prices of futures options on February 22, 2018.
mostly supply-driven oil price rally. The main reason is that a typical income elasticity of demand would imply at most a 0.2 percent increase in oil demand as a result of the 0.2 percentage point upward revision of global growth for 2018 in the current WEO. Based on a fixed supply curve, with price elasticity of supply between 0.03 and 0.1, the 0.2 percent increase in oil demand would imply a 2–6 percent increase in prices—that is, a $1 to $3 price increase over an initial level of $50 a barrel.

The biggest supply surprise is the faster-than-expected deterioration in Venezuelan output. Venezuela produced 2.38 mbd of crude oil in 2016 and 2.10 mbd in the third quarter of 2017. The latest production figure stands at 1.62 mbd in December 2017, and many expect that it will decline to close to 1.0 mbd by the end of 2018. An additional decline in production, some of which is probably already priced in, would push prices even higher.

To sum up, if the supply forecast for 2018 is revised down by 0.8 mbd, and the oil demand elasticity is identical to the oil supply elasticity, it implies that roughly 80 percent of the recent price increase was caused by a deterioration in supply conditions.

An alternative method to infer the role of demand and supply factors in driving price changes uses regression analysis. Figure 1.SF.2 plots a proxy for global demand; that is, economic and market conditions—a weighted index based on the purchasing managers’ index, industrial production, and equity prices against the detrended movement in oil prices (obtained by using the Hodrick-Prescott filter). The purchasing managers’ index and equity prices proxy for market sentiment and financial factors, respectively—the latter relates to speculative demand for oil. Figure 1.SF.1 shows that global demand fluctuations explain oil price movements well over the past couple of decades, especially earlier in the sample period, when demand from China and the financial crisis of 2008 and its recovery were key drivers of oil prices. More recently, however, fluctuations in global demand have been muted, compared with the large swings in prices, suggesting that demand shocks have lost much of their explanatory power. Specifically, the price collapse of 2014 and the notable subsequent swings seem only weakly related to movements in global demand. A regression-based calculation suggests that only 20 percent of oil price fluctuations since August 2017 can be attributed to changes in global demand.

In addition to the OPEC extension, unplanned outages, including on the US Gulf Coast, in Venezuela, and in other locations, cut supply unexpectedly. Although 2017 non-OPEC supply was slightly stronger than expected, the sharp decline in production in Venezuela—following further deterioration in its macroeconomic and financial conditions—more than offset the increase in non-OPEC production. While Libya’s production increased dramatically during 2017, a recent outage there together with one in the North Sea further reduced global oil supply. Hurricane damage to infrastructure slowed the US production response to rising oil prices. (The rig count returned to its August 2017 level only in February 2018, even though oil prices were rising from their trough below $50 a barrel since June 2017.) However, the stronger-than-expected increase in US oil production in early 2018 eventually helped pull oil prices down from the January high. These events were concentrated between late 2017 and early 2018, so spot prices moved much more than futures.

**Oil Price Rally: Largely Supply Driven**

Despite the increase in global aggregate demand, recent revisions to oil market expectations point to a
Oil Futures

Oil futures contracts point to a decline in prices to about $53.6 a barrel in 2023 (Figure 1.5.F.1, panel 2). Baseline assumptions for the IMF’s average petroleum spot prices, based on futures prices, suggest average annual prices of $62.3 a barrel in 2018—an increase of 18.0 percent from the 2017 average—and $58.2 a barrel in 2019 (Figure 1.5.F.1, panel 3). The decline is due to an expected increase of US supply and the eventual end of the OPEC deal.

Uncertainty remains around the baseline assumptions for oil prices, although risks are balanced. Upside risks include further declines in Venezuelan production and unplanned outages elsewhere. At the same time, stronger-than-expected US and Canadian production could push prices down sooner than predicted. However, the long end of the futures curve is expected to stay at about $55, given current technology trends.

Natural Gas and Coal

The natural gas price index—an average for Europe, Japan, and the United States—rose sharply, by 45.0 percent, between August 2017 and February 2018, reflecting seasonal factors, including an extremely cold winter in Europe. Strong demand for liquefied natural gas (LNG) in China, where the government has reduced the use of coal to mitigate air pollution, helped drive the spot LNG price to its highest level in three years. India’s LNG demand also grew strongly in the second half of 2017. Higher oil prices add extra upward pressure to natural gas prices in countries where oil-linked pricing is more common.

The coal price index—an average of Australian and South African prices—increased by 8.4 percent from August 2017 to February 2018. Following the introduction of coal import restrictions in July 2017, China’s coal imports declined in the second half of 2017 compared with the previous year, although total imports were higher than in 2016 as a result of increases in the first half of the year. More recently, however, Chinese import restrictions were temporarily lifted to accommodate strong winter heating demand.

Metal Prices Increasing

Metal prices increased by 8.3 percent between August 2017 and February 2018, in line with better-than-expected growth in all major economies. Purchasing managers’ indices for major economies have been well above the 50-point mark that separates growth from contraction, led by the United States and the euro area, and were about 60 as of February 2018. The World Bureau of Metal Statistics reported a wider demand-supply gap for all base metals, especially aluminum, as solid economic growth led to higher demand, while supply was limited, partially owing to China’s production cuts. Depreciation of the US dollar has also supported dollar-denominated metal commodities.

Iron ore returned to trading at about $78 a ton in February, rising 4.1 percent from its August price of $74.6 a ton. The force behind the recovery comes from higher steel prices and state-mandated curbs on steel mills in China, which have lowered output despite strong demand. Rising coal prices due to China’s import restrictions further amplified the effect during the traditional restocking season for iron ore, adding more demand to this raw material for steel production. However, markets are expecting a decline over the medium term, linked to expected lower steel production.

Aluminum and copper hit multiyear highs following production cuts in China (which contributes more than half of both global production and consumption of aluminum) to reduce air pollution during the winter. In turn, this has led to a larger global supply-demand deficit and pushed aluminum prices to close February 7.5 percent higher than August. Likewise, copper prices gained 8 percent during the same period, boosted by solid demand in China. Futures markets suggest further price increases of both metals over the medium term, in line with improved global macroeconomic prospects.

The price of nickel, a key ingredient in stainless steel and batteries in electric vehicles, reached multiyear highs in February, up 24.8 percent over August 2017. Owing to strong demand from China and tight supplies, nickel inventories at London Metal Exchange warehouses fell since October to a 14-month low in January. Cobalt, another raw material for batteries, has experienced sharp price increases since 2016, fueled by tight supply and rising demand from electric vehicle manufacturers. Hitting a nine-year high in late

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1 The US Energy Information Administration expects US crude oil production in 2018 to reach 10.3 mbd, exceeding the previous high of 9.6 mbd recorded in 1970, and to increase further in 2019. Canada’s oil production, which has been growing strongly, is expected to grow further.
January, cobalt prices were up 38.2 percent in February 2018 relative to their August 2017 average.\(^2\)

Uranium was hovering at about $20 since August, but rallied in early November following the announcement of production cuts by two of the world’s biggest producers. The price has receded since early December and fell 11.2 percent between August 2017 and February 2018.

**Adverse Weather Driving Food Prices Higher**

The IMF’s agricultural price index rose 4.1 percent from August 2017 to February 2018, given that unfavorable weather conditions in recent months are expected to reduce this year’s harvests of many grains and oilseeds. The subindices of food and agricultural raw materials rose by 4.1 and 6.0 percent, respectively, and the beverages index declined by 3.6 percent. The drop in beverage prices can be attributed to a substantial decline in the price of coffee (by 12.7 percent) while the gain in the index of raw agricultural materials follows a rally in the price of cotton.

Wheat prices increased by 23.9 percent between August 2017 and February 2018. Following the Northern Hemisphere harvests and continued stock building in most of the world, except China, wheat prices remained under significant pressure until November. Since then, prices have rallied—winter wheat crops in the key southern Plains region of the United States were likely significantly damaged by cold and dry winter weather.

Soybean prices trended up from August 2017 to February 2018, increasing by 7.5 percent, following concerns over weather in South America. A deterioration in the next Argentine soybean crop because of hot and dry conditions has stimulated early buying, providing price support for the soybean complex. The outlook is bullish as continued feed demand growth and supportive global biodiesel policies counter historically large global stocks.

Maize prices have also increased since August, rising by 10.1 percent, following the upward trend of soybean prices. While dry weather in Argentina has already reduced yields of the partially harvested corn crop, in Brazil, rainfall is hampering planting, potentially reducing future yields.

Palm oil prices rose by 3.4 percent from August 2017 to February 2018. Prices trended down throughout 2017 as production growth in Indonesia and Malaysia continued to outpace demand growth and stocks recovered. But prices increased in early 2018 as higher oil prices stimulated biodiesel demand in Indonesia. Another major support for palm oil prices is the reduction in supplies of rival oilseeds, such as soybeans, caused by bad weather.

Cotton prices increased by 11.3 percent between August 2017 and February 2018. The recent price increase follows worries over pest damage to India’s crop, resulting in lower stocks available for export, as well as setbacks to the latest US harvest during the hurricane season. Looking ahead, the recent increase in oil prices is likely to provide support for cotton prices, because it makes artificial fibers more expensive. Falling stocks in China are also likely to contribute upward pressure on prices.

Pork prices declined by 11.2 percent from August 2017 to February 2018 due to seasonal factors. While supplies are expected to increase in 2018, especially in the United States, strong demand from China, Japan, Mexico, and the United States implies that markets are again expected to clear at higher year-over-year prices. Beef prices rose by 3.1 percent because supply growth in the United States, a major producer and exporter, was offset by strong export demand. Moreover, drought in the United States reduced the number of cattle placed on feedlots.

Following dry weather in west Africa at the beginning of 2018, output of cocoa is expected to fall in all producer countries, including the top producer, Côte d’Ivoire, although the world is still projected to run a production surplus in 2017–18. The reduction in expected supply comes at a time of strong demand. These developments led to an increase in the price of cocoa of 6.8 percent between August 2017 and February 2018.

The price of Arabica coffee declined by 7.6 percent between August 2017 and February 2018, reflecting weaker-than-expected demand for exports at the beginning of the 2017–18 season.

The price of sugar decreased by 6.7 percent between August 2017 and February 2018, reflecting upward revisions to an expected 2017–18 surplus global production. In India, most notably, output may exceed that of the previous season by as much as 40 percent. Strong supplies from Brazil and Europe in 2018–19 are likely to lead to another surplus year.

\(^2\)Box 1.1 studies the role of cobalt and lithium as important raw materials in the production of electric vehicle batteries.
The prices of most major agricultural commodities have been revised up slightly, reflecting diminishing excess supply. Overall, food prices are projected to increase by 2.6 percent in 2018 and 1.8 percent in 2019, mostly on account of rising cereal and oilseed prices (compared with the previously projected decrease of 0.7 percent and increase of 2.6 percent, respectively) and are expected to decline again thereafter.

Weather disruptions and variability are an upside risk to the forecast for agricultural prices. The ongoing weak-to-moderate La Niña weather pattern has peaked and is expected to weaken further over the spring. It has proved to be a significant source of price volatility for several commodities. The recent worries over Argentina’s soybean crop, as well as the reported setback to winter wheat crops in the key southern Plains region of the United States—both caused by cold and dry winter weather—are consistent with historical patterns of the weather phenomenon. Changes in trade policies may be another upside risk factor, especially for agricultural importers. A depreciating US dollar helped stimulate exports in 2017, but a partial reversal in 2018 could put upward pressure on prices for importing countries. Uncertainty over global corn acreage, as production margins for farmers remain low, could put upward pressure on corn prices by the end of this year.
Box 1.SF.1. The Role of Metals in the Economics of Electric Vehicles

The emergence of electric vehicle markets is supported by the falling costs of lithium-ion batteries, the most common and industry-preferred battery for such vehicles. Conversely, the emergence of electric vehicles has helped reduce the production costs of these batteries through economies of scale. A lithium-ion battery consists of an anode, typically graphite carbon, and a cathode, separated by a liquid organic electrolyte. The cathode typically uses lithium and some combination of copper, nickel, manganese, aluminium, and cobalt.

Expenditures on metals for cathode construction make up a large share of total lithium-ion and electric vehicle costs. Substitution with other materials is difficult. Lithium is an important ingredient because it is an element that is easily ionized or “charged.” In addition, it allows for high energy density and, as such, yields batteries that dominate in the automotive area and in portable electronics. Cobalt is important for similar reasons but, at historically high prices, its cost share significantly exceeds that of lithium.

As supplies of lithium and cobalt have been unable to keep up with the surge in demand following the rapid growth of electric car sales in recent years, prices have been rising. The Chinese spot price of lithium carbonate increased by more than 30 percent in 2017. Even more noteworthy is the price path of cobalt: after more than doubling between September 2016 and April 2017, prices rose an additional 25 percent between November 2017 and January 2018. The question now is how production of these metals will change. To answer this question, this box analyzes global supply conditions.

Supply Conditions of Lithium and Cobalt

Australia and Chile are by far the biggest producers of lithium, together accounting for more than three-quarters of world production; Argentina is a distant third. According to the US Geological Survey, world reserves stood at 600 times global output in 2015. Production is thus not limited by physical resource scarcity. But, although recent production deficits and rising prices have encouraged new productive capacity, this new capacity has not so far kept prices in check.

Unlike lithium, cobalt supply is likely to remain relatively tight, at least over the next 5 to 10 years. In 2016 more than 50 percent of global supply originated in the Democratic Republic of the Congo, China (6.3 percent), Canada (5.9 percent), and Russia (5.0 percent) are other important, but much smaller, players. There is also an unofficial “artisanal” stream of production, some of it under the control of insurgent militias and relying on child labor. Geopolitical instability in the Democratic Republic of the Congo has the potential to disrupt supply, as it did at the end of the 1970s when political unrest led to a price boom (Figure 1.SF.1.1). Furthermore, the refining of cobalt is also geographically concentrated, with China by far being the biggest producer.

The specificities of the cobalt production process are perhaps the weakest link in the supply chain. Cobalt is mostly produced as a by-product of mining of other metals, nickel (50 percent), and copper (35 percent); only 6 percent of world production originates from primary production (see Olivetti and others 2017). For nickel-cobalt mines, most of the revenues come

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from nickel. This implies that the supply of cobalt from nickel-cobalt mines is inelastic with respect to the price of cobalt.

The situation is different, however, for copper: given last year’s prices, a copper-cobalt mine could have obtained more than half its revenue from cobalt. Most cobalt-copper ore and reserves are in the Democratic Republic of the Congo, which implies that the rising price of cobalt will generate new supplies primarily from that country, further concentrating cobalt production. Last year, mining companies from the West and China invested heavily in copper mines in the Democratic Republic of the Congo.

Since 1915 there have been four price boom episodes—defined as a sequence of years during which real prices are in the upper 10 percent of a normal distribution’s right tail. Those during 1978–81 and 1995–96 elicited sharp responses: world production grew by 54.1 and 36.1 percent in 1983 and 1995, respectively, significantly higher than the 50-year average of 4.8 percent. As of January 2018, prices of 15-month cobalt futures suggest that 2018 will be the first boom year since the 1995–96 episode.

Outlook

Future demand for cobalt and lithium will depend on the growth of their end-use products—including electronics and automobiles—which in turn depend on oil prices, economic growth, and battery technology, among other factors. Based on a forecast of global lithium-ion battery consumption, global lithium demand is expected to increase from 181 kilotons of lithium carbonate equivalent to 535 kilotons by 2025 (Deutsche Bank 2017). This demand could be matched by investments in productive capacity, but there could still be supply constraints: new mining projects have long lead times, and concerns about the local environmental impact of mining in Latin America and elsewhere could slow the issuance of permits.

When it comes to cobalt, the situation seems to be more pressing. Based on a modest forecast of 10 million electric vehicle sales in 2025, Olivetti and others (2017) suggest a demand for cobalt exceeding 330 kilotons by 2025—almost three times the current world production. Such demand would require average annual growth of more than 11 percent for the next decade, well beyond that of the past 50 years. Historical evidence from the 20th century suggests that most commodity price booms peak within two years of their onset (Jacks 2013) as they give way to permanent changes in productive capacity and new productivity-enhancing investment. But occasionally they last longer. The required growth in cobalt production—historically unprecedented—is a risk to the electrification of the transportation sector.

Several developments could limit price volatility. These include increased recycling of cobalt and new primary production mining techniques. Perhaps most important, progress in battery technology could bring the surge in cobalt prices to a halt. One of the leading alternatives to the lithium-ion battery concept—the solid-state battery—would mean smaller and more-energy-dense batteries that would not need cobalt as an input. Widescale adoption of a mature solid-state battery concept would reduce the demand for cobalt. Continued research in this area will prevent resource constraints from delaying or altogether halting progress in electric vehicles and portable electronics.