A World Bank Report

APRIL 2022

Commodity Markets Outlook

The Impact of the War in Ukraine on Commodity Markets

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The World Bank's *Commodity Markets Outlook* is published twice a year, in April and October. The report provides detailed market analysis for major commodity groups, including energy, agriculture, fertilizers, metals, and precious metals. Price forecasts for 46 commodities are presented. Commodity price data updates are published separately at the beginning of each month.

The report and data can be accessed at:
www.worldbank.org/commodities

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Executive Summary

The war in Ukraine has caused major supply disruptions and led to historically higher prices for a number of commodities. For most commodities, prices are expected to be significantly higher in 2022 than in 2021 and to remain high in the medium term. The price of Brent crude oil is projected to average $100/bbl in 2022, a 42 percent increase from 2021 and its highest level since 2013. Non-energy prices are expected to rise by about 20 percent in 2022, with the largest increases in commodities where Russia or Ukraine are key exporters. Wheat prices, in particular, are forecast to increase by more than 40 percent this year, reaching an all-time high in nominal terms. While prices generally are expected to peak in 2022, they are to remain much higher than previously forecast. The outlook for commodity markets depends heavily on the duration of the war in Ukraine and the severity of disruptions to commodity flows, with a key risk that commodity prices could be higher for longer. A Special Focus section investigates the impact of the war on commodity markets and compares the current episode with previous price hikes. It finds that previous oil price hikes led to the emergence of new sources of supply and reduced demand through efficiency improvements and substitution of other commodities. In the case of food price hikes, additional land came into use for production. For policymakers, a short-term priority is to provide targeted support to poorer households facing higher food and energy prices. Over the longer term, they can encourage energy efficiency improvements, facilitate investment in new sources of zero-carbon energy, and promote more efficient food production. Recently, however, policy responses have tended to favor trade restrictions, price controls, and subsidies, which are likely to exacerbate shortages.

Recent trends

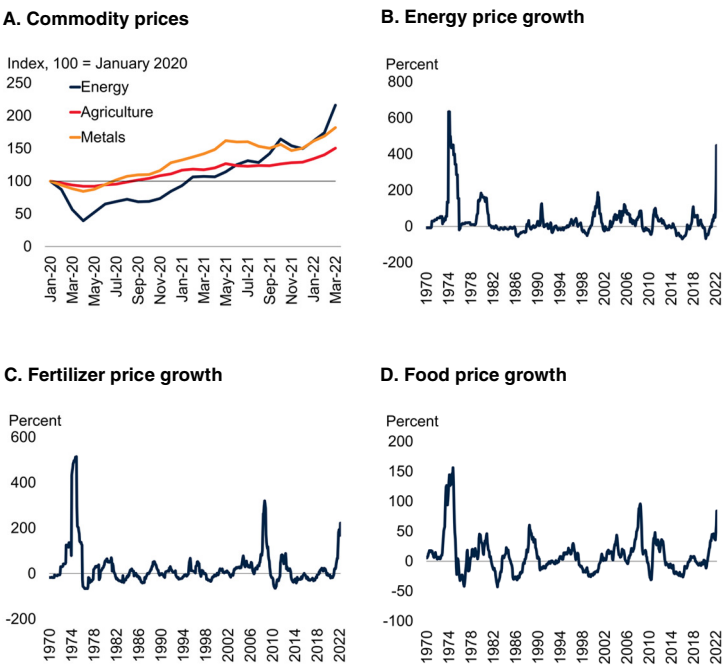
Commodity prices surged during the first quarter of 2022, reflecting the effects of the war in Ukraine as well as continued growth in demand and various constraints on supply (figure 1.A). Amid concerns about the war's disruptive effects on commodity supply, the increases in prices were particularly pronounced for commodities where Russia and Ukraine are large exporters, particularly energy, fertilizers, and some grains and metals. These developments have added to a broad-based rise in commodity prices that began in mid-2020 with a surge in demand driven by receding concerns about the COVID-19 pandemic. Demand for commodities rebounded as the global economy recovered, while commodity production increased more slowly, weighed down by several years of weak investment in new production capacity as well as various supply disruptions.

As a result, energy prices (in U.S. dollar terms) were more than four times higher in March 2022 than their April 2020 lows—the largest 23-month increase in energy prices since the 1973 oil price hike (figure 1.B). Fertilizer prices rose by 220 percent between April 2020 and March 2022, their largest 23-month increase since 2008 (figure 1.C). Similarly, food prices rose by 84 percent, their largest increase in a comparable period since 2008 (figure 1.D). These increases in prices are having major humanitarian and economic impacts and exacerbating food insecurity and inflation in many countries.

Energy prices have increased sharply since the start of the year, with broad-based increases across all fuels; some coal and natural gas benchmarks reached all-time highs in March. Several countries, including Canada, the United Kingdom, and the United States announced sanctions on imports of Russian energy; some energy-producing companies announced they would cease operations in Russia; and many traders chose to discontinue trades in Russian oil, partly because of difficulties in obtaining insurance on cargoes or making transactions. *Brent crude oil* averaged $116/bbl in March 2022, an increase of 55 percent compared with December 2021. After rising to a 10-year high in early March, it eased in April following announcements of significant releases of oil from strategic inventories by the United States and other International Energy Agency (IEA) members, as well as expectations of weaker demand due to COVID-19-related lockdowns in several cities in China. *Natural gas* prices in Europe reached an all-time high in

FIGURE 1 Commodity price developments

Commodity prices rose sharply following the start of the war in Ukraine, adding to the broader post-COVID-19 rally. Price increases during April 2020 to March 2022 were the largest for any equivalent 23-month period since 1973 for energy, and since 2008 for fertilizers and food.



Source: World Bank.
Note: All prices in U.S. dollar terms.
A. Monthly data. Last observation is March 2022.
B.-D. Charts show the percent change in monthly price indices over a 23-month period. This facilitates comparison of the April 2020 trough with the most recent data (March 2022). Due to data limitations, prior to 1979 the energy price change is proxied using the crude oil price change.

March, reflecting fears of disruption to imports from Russia. U.S. natural gas prices rose by almost a third in March relative to December 2021, in part reflecting increased demand for U.S. exports of liquefied natural gas. *Coal prices* also reached an all-time high in March due to increased demand for it as a substitute for natural gas in electricity generation.

Most *non-energy prices* have risen since the start of 2022, with particularly large increases for fertilizers, nickel, oilseeds, and wheat. Among *agricultural commodities*, wheat prices saw a very steep increase, and were almost 30 percent higher in March compared to December 2021. Most edible oil prices have increased sharply this year, partly owing to production shortfalls in South America as well as disruptions to Ukraine's sunflower seed oil exports. In contrast, rice prices saw only a modest increase, reflecting ample supplies in China and India. Fertilizer prices also increased sharply during 2022Q1, partly reflecting the surge in natural gas and coal prices, as both are key inputs into fertilizer production.

The *metals and minerals index* rose 13 percent in 2022Q1 (q/q) and is now 24 percent higher than a year ago. Nickel prices rose 35 percent in the quarter, chiefly due to a short squeeze that led the London Metal Exchange to halt trading in the metal for several days in mid-March. Aluminum and iron ore prices also saw large increases, reflecting Russia's importance in supply.

Outlook and risks

Commodity markets are facing an unprecedented array of pressures, lifting some prices to all-time highs, particularly for commodities where Russia or Ukraine is a key exporter (figure 2.A). These conditions may persist for three reasons. First, increased prices for one commodity typically induce substitution in demand toward other commodities, thereby alleviating the original price pressures. There is less scope for substitution today, however, because the increases in prices over the past year have been large and broad-based. For example, in the case of energy, crude oil is now one of the cheapest fuels per unit of energy, a notable difference from earlier energy price hikes when coal and natural gas were much cheaper.

Second, the increases in prices of some commodities have pushed up the production costs of other commodities. For example, rising energy prices increase the cost of inputs to agriculture production, such as fuel and fertilizers. Similarly, increasing energy prices drive up the cost of extracting and refining metal ores, particularly for aluminum, iron ore, and steel. In turn, higher metal prices increase the cost of renewable energy technologies.

The broader increase in inflation, globally, is also raising the costs of production of commodities, including through higher wages, higher transportation and storage costs, and, as interest rates increase, higher costs of borrowing.

Third, many governments have responded to high fuel prices with tax cuts and subsidies. While these policies may somewhat alleviate the immediate impact of price hikes, they do not provide large benefits to vulnerable groups and may actually exacerbate the underlying issue by increasing energy demand.

Most commodity prices are expected to be sharply higher in 2022 than in 2021 and to remain elevated in 2023-24 compared to their levels over the past five years (figure 2.B). Energy and non-energy prices are forecast to rise by 50 and 20 percent in 2022, respectively, before pulling back somewhat in 2023 and settling at much higher levels than in the previous forecast.

While the outlook for commodity markets depends heavily on the duration of the war in Ukraine and the extent of sanctions, it is assumed that the channels through which commodity markets have been affected are likely to persist. Changes in commodity trade patterns are expected to continue even after the war ends. The possibility of further outbreaks of COVID-19 in China, alongside a broader slowdown in global growth, present downside risks for prices.

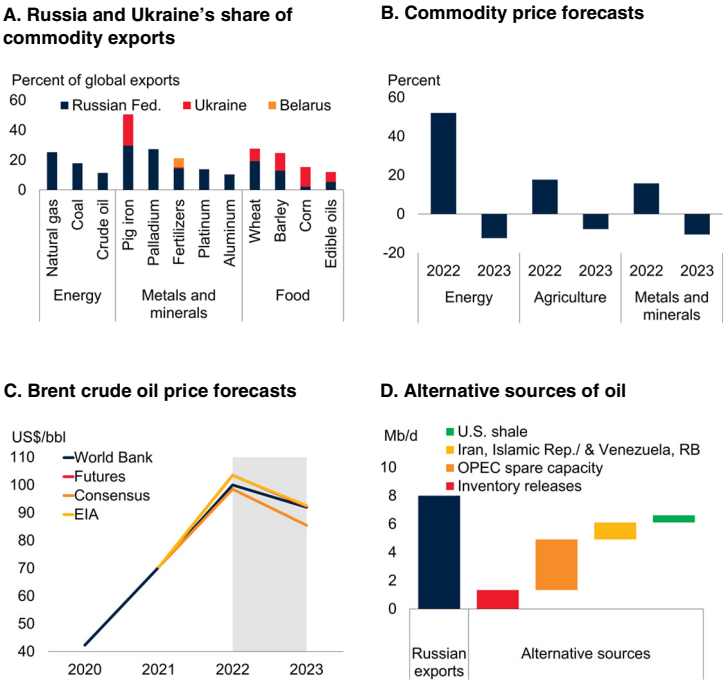
Among energy commodities, Brent crude oil prices are expected to average $100/bbl in 2022, an increase of 42 percent compared to 2021 (figure 2.C). Russia's energy exports are expected to be severely disrupted as many countries seek alternative suppliers. Declining supply from Russia, however, is being partially offset by inventory releases and diversion of exports to other countries. Prices are expected to average $92/bbl in 2023 as supply disruptions ease and production rises outside Russia, while demand is likely to grow more slowly than previously expected. The disruptions resulting from the war are likely to have a lasting impact on Russia's oil production due to the exit of foreign oil companies, weaker investment, and reduced access to foreign technology.

Natural gas and coal prices are also expected to be significantly higher in 2022, with natural gas prices in Europe projected to be more than double their 2021 levels. Coal prices are forecast to average just over 80 percent higher in 2022 relative to 2021. As with crude oil, natural gas prices are expected to ease in 2023 as new supplies come on stream, including additional terminals for liquefied natural gas. Lower natural gas demand, and increased investment in renewable energy sources will also dampen prices.

There is a material risk that energy prices could increase much more than forecast, especially if EU sanctions on Russian energy are broadened. This could lead to significant market disruptions.

FIGURE 2 Commodity markets outlook

Most commodity prices are expected to see big increases in 2022 and remain high in the medium term, with price increases particularly large for commodities where Russia and Ukraine are key exporters, including energy and some grains. Brent crude oil prices are expected to average $100/bbl in 2022, an increase of 42 percent compared to 2021. There are some alternatives to Russian oil supply, including inventories, and additional production by other producers.



Sources: Bloomberg; BP Statistical Review; Energy Information Administration; International Energy Agency; UN Comtrade; U.S. Department of Agriculture; World Bank.

A. Data for energy and food are trade volumes while metals and minerals are trade values. Fertilizers are phosphate rock and potash minerals, and ammonia-based non-minerals. Data are for 2020.

B. Data show commodity price forecasts shown in table 1.

C. Shaded areas indicate forecasts. "Consensus" refers to the March 2022 consensus survey. "Futures" refers to the March 22, 2022 futures price. "EIA" refers to the EIA's Brent crude oil forecast (April 2022 STEO report).

D. Figure shows Russian exports of oil and oil products prior to the war in Ukraine and alternative sources of supply. Inventory releases refer to the current announced release of oil by IEA members including the United States. Estimates for production are author calculations based on the IEA's "Oil Market Report—April 2022." OPEC spare capacity refers to Iraq, Saudi Arabia, and UAE only.

While there is scope for some diversion of Russia's energy exports to countries that are not imposing sanctions, these will be limited by the availability of infrastructure and involve higher transport costs. This is particularly the case for Russian natural gas, which is chiefly exported via pipelines to Europe. In the case of oil, there are some alternatives to Russian exports, including inventories and additional production by other producers (figure 2.D). However, there are concerns that OPEC spare capacity may be less than currently estimated, as evidenced by recently limited supply responses to increased prices. In addition, the U.S. shale industry faces constraints to significantly increasing output further, including shortages of labor and other inputs.

Agricultural prices are forecast to rise by 18 percent this year, reflecting war-related supply disruptions in Ukraine and Russia and higher costs of inputs, including fuel, chemicals, and fertilizers. The war has already disrupted exports from Ukraine and will severely interrupt agricultural production in 2022, including production of maize, barley, and sunflower seed oil, which are typically planted in the spring. Also, in Russia, the lack of access to agricultural inputs, such as seeds and farm machinery, could reduce agricultural production.

Accordingly, the projected 2022 increase in the agriculture price index reflects surges in wheat and maize prices. Agricultural prices are expected to fall back in 2023, reflecting increased supplies from the rest of the world, particularly wheat from Argentina, Brazil, and the United States. Nonetheless, agricultural prices in 2023-24 will remain well above previous forecasts, and could be subject to further upward pressures if input costs rise further. In particular, the sharp rise in fertilizer prices could lead to a reduction in their use, particularly in EMDEs, which could lower agricultural yields.

Metal prices are projected to increase by about 16 percent in 2022 relative to 2021 and ease somewhat in 2023, while remaining at historically elevated levels. Nickel and aluminum prices are expected to increase by 52 and 38 percent, respectively, reflecting Russia's outsize role as a supplier in these markets as well as the energy-intensive nature of aluminum production. Upside risks to the price forecast relate to the possibility of worsening geopolitical tensions. On the downside, a prolonged period of lockdowns in China could reduce metal demand and hence prices.

Special Focus: The impact of the war in Ukraine on commodity markets

The war in Ukraine has been a major shock to global commodity markets. The supply of several commodities has been disrupted, leading to sharply higher prices, particularly for energy, fertilizers, and some grains. This *Special Focus* compares the current rise in prices with earlier oil and food price hikes in the 1970s and in 2008-09. Previous price hikes resulted in the emergence of new sources of supply for both oil and food. In the case of oil, price hikes also led to sustained reductions in demand as a result of substitution to other fuels and improvements in energy efficiency, facilitated by government policies.

These episodes offer lessons for the current price hike. In the short term, supply disruptions and higher food and energy prices will raise inflation and policymakers will need to mitigate their impact on poorer households. The long-term effects of the war on commodity markets will depend on how extensively commodity trade is diverted, how much demand is reduced, and whether new supplies emerge.

Policymakers can take action to accelerate structural changes that alleviate upward pressure on energy prices, including promoting energy efficiency and incentivizing new low-carbon sources of energy production. These policies would also protect economies from future energy price volatility and accelerate the transition away from fossil fuels, helping to achieve climate change goals. At present, however, many governments have focused on trade restrictions, price controls, and subsidies, which can be expensive and often exacerbate supply shortfalls and price pressures.

TABLE 1 World Bank Commodities Price Forecast (nominal U.S. dollars)

							Percent change from previous year		Differences in levels from October 2021 projections	
Commodity	Unit	2020	2021	2022f	2023f	2024f	2022f	2023f	2022f	2023f
Price indices in nominal U.S. dollars (2010=100)										
Energy a/		52.7	95.4	143.6	125.8	110.8	50.5	-12.4	91.7	30.6
Non-Energy Commodities		84.4	112.0	133.5	121.7	117.8	19.2	-8.8	49.4	11.5
Agriculture		87.5	108.7	127.9	118.0	117.8	17.6	-7.7	40.8	11.7
Beverages		80.4	93.5	103.5	99.7	100.2	10.8	-3.7	23.1	8.7
Food		93.1	121.8	149.7	134.2	133.5	22.9	-10.4	57.2	15.7
Oils and Meals		89.8	127.1	164.9	141.9	140.6	29.8	-14.0	75.1	16.2
Grains		95.3	123.8	149.0	133.6	132.6	20.4	-10.4	55.9	19.0
Other food		95.5	113.1	130.3	124.8	125.1	15.2	-4.3	34.8	12.2
Raw Materials		77.6	84.5	87.2	87.8	88.4	3.2	0.7	9.6	3.6
Timber		86.4	90.4	86.4	89.5	90.8	-4.5	3.7	0.0	-1.7
Other raw materials		67.9	78.0	88.1	85.9	85.9	12.9	-2.5	20.2	9.2
Fertilizers		73.2	132.2	223.7	198.3	168.5	69.3	-11.4	150.5	82.2
Metals and Minerals b/		79.1	116.4	134.8	120.6	112.1	15.8	-10.5	55.7	3.1
Base Metals c/		80.2	117.7	143.9	131.9	123.8	22.2	-8.3	63.7	13.3
Precious Metals		133.5	140.2	144.4	131.5	127.0	3.0	-8.9	10.9	-8.7
Price data in nominal U.S. dollars										
Energy										
Coal, Australia	$/mt	60.8	138.1	250.0	170.0	154.7	81.1	-32.0	130.0	80.0
Crude oil, Brent	$/bbl	42.3	70.4	100.0	92.0	80.0	42.0	-8.0	26.0	27.0
Natural gas, Europe	$/mmbtu	3.2	16.1	34.0	25.0	22.3	111.0	-26.5	21.4	15.8
Natural gas, U.S.	$/mmbtu	2.0	3.9	5.2	4.8	4.7	35.0	-7.7	1.2	0.9
Liquefied natural gas, Japan	$/mmbtu	8.3	10.8	19.0	14.0	13.3	76.6	-26.3	7.6	4.0
Non-Energy Commodities										
Agriculture										
Beverages										
Cocoa	$/kg	2.37	2.43	2.45	2.50	2.53	1.0	2.0	0.00	0.00
Coffee, Arabica	$/kg	3.32	4.51	5.50	5.25	5.23	21.9	-4.5	1.30	1.10
Coffee, Robusta	$/kg	1.52	1.98	2.30	2.00	2.02	16.1	-13.0	0.30	0.10
Tea, average	$/kg	2.70	2.69	2.65	2.55	2.58	-1.4	-3.8	0.05	0.00
Food										
Oils and Meals										
Coconut oil	$/mt	1,010	1,636	2,200	1,900	1,882	34.4	-13.6	640	330
Groundnut oil	$/mt	1,672	...	2,300	1,900	1,908	...	-17.4	350	-100
Palm oil	$/mt	752	1,131	1,650	1,400	1,372	45.9	-15.2	575	350
Soybean meal	$/mt	394	481	590	550	548	22.7	-6.8	100	75
Soybean oil	$/mt	838	1,385	1,800	1,400	1,400	29.9	-22.2	375	50
Soybeans	$/mt	407	583	700	600	596	20.0	-14.3	115	50
Grains										
Barley	$/mt	98	...	165	150	149	...	-9.1	47	35
Maize	$/mt	165	260	310	280	278	19.4	-9.7	85	45
Rice, Thailand, 5%	$/mt	497	458	425	415	423	-7.3	-2.4	25	5
Wheat, U.S., HRW	$/mt	232	315	450	380	370	42.7	-15.6	200	135
Other Food										
Bananas, U.S.	$/kg	1.22	1.21	1.28	1.25	1.25	6.2	-2.3	0.04	0.00
Meat, beef	$/kg	4.67	5.39	6.20	5.80	5.82	15.1	-6.5	0.75	0.45
Meat, chicken	$/kg	1.63	2.26	3.20	3.00	2.98	41.8	-6.3	0.95	0.80
Oranges	$/kg	0.60	0.65	0.75	0.75	0.75	14.9	0.0	0.07	0.05
Shrimp	$/kg	12.67	13.70	14.50	14.80	15.04	5.8	2.1	-0.50	0.30
Sugar, World	$/kg	0.28	0.39	0.39	0.38	0.38	0.1	-2.6	0.02	0.00

TABLE 1 World Bank Commodities Price Forecast (nominal U.S. dollars) (*continued*)

							Percent change from previous year		Differences in levels from October 2021 projections	
Commodity	**Unit**	**2020**	**2021**	**2022f**	**2023f**	**2024f**	**2022f**	**2023f**	**2022f**	**2023f**
Price data in nominal U.S. dollars										
Non-Energy Commodities										
Raw Materials										
Timber										
Logs, Africa	$/cum	399	414	390	420	422	-5.8	7.7	-30	0
Logs, S.E. Asia	$/cum	279	271	255	260	265	-6.0	2.0	-25	-25
Sawnwood, S.E. Asia	$/cum	700	750	720	750	760	-4.0	4.2	-40	-15
Other Raw Materials										
Cotton A Index	$/kg	1.59	2.23	3.10	2.90	2.86	39.0	-6.5	0.90	0.75
Rubber, RSS3	$/kg	1.73	2.07	2.10	2.15	2.17	1.4	2.4	0.25	0.25
Tobacco	$/mt	4,336	4,155	4,200	4,100	4,116	1.1	-2.4	-25	-175
Fertilizers										
DAP	$/mt	312	601	900	800	650	49.8	-11.1	300	350
Phosphate rock	$/mt	76	123	175	160	150	42.0	-8.6	45	50
Potassium chloride	$/mt	218	210	520	470	453	147.4	-9.6	195	195
TSP	$/mt	265	538	750	650	550	39.4	-13.3	230	250
Urea, E. Europe	$/mt	229	483	850	750	600	75.9	-11.8	475	450
Metals and Minerals										
Aluminum	$/mt	1,704	2,473	3,400	3,100	3,000	37.5	-8.8	700	600
Copper	$/mt	6,174	9,317	10,100	9,700	9,000	8.4	-4.0	1300	1500
Iron ore	$/dmt	108.9	161.7	140.0	105.0	90.0	-13.4	-25.0	10.0	-15.0
Lead	$/mt	1,825	2,200	2,300	2,100	1,900	4.5	-8.7	200	100
Nickel	$/mt	13,787	18,465	28,000	22,000	21,000	51.6	-21.4	10250	5000
Tin	$/mt	17,125	32,384	41,000	35,000	30,000	26.6	-14.6	10000	5500
Zinc	$/mt	2,266	3,003	3,700	3,200	2,800	23.2	-13.5	878	800
Precious Metals										
Gold	$/toz	1,770	1,800	1,880	1,700	1,650	4.5	-9.6	130	-30
Silver	$/toz	20.5	25.2	24.2	22.5	21.0	-3.8	-7.0	-0.6	-1.9
Platinum	$/toz	883	1,091	1,110	1,180	1,200	1.7	6.3	110	165

Source: World Bank.
Note:
a/ Energy price index includes coal (Australia), crude oil (Brent), and natural gas (Europe, Japan, U.S.).
b/ Base metals plus iron ore.
c/ Includes aluminum, copper, lead, nickel, tin, and zinc.
f = forecast.

SPECIAL FOCUS

The Impact of the War in Ukraine on Commodity Markets

The Impact of the War in Ukraine on Commodity Markets

The Russian invasion of Ukraine has been a major shock to commodity markets. The war has led to significant disruptions to the production and trade of commodities for which Russia and Ukraine are key exporters. Prices have risen sharply for all energy commodities and some food commodities, including wheat and oilseeds. This, in turn, has raised energy and food security concerns, especially for the poorest households. In response to price hikes, policymakers have often sought to provide relief to consumers via subsidies or lower taxes; however, these are generally ineffective remedies and may exacerbate supply shortages. Policymakers can better mitigate the impact of higher prices on low-income households through targeted measures, including cash transfers. Past commodity price shocks induced policy and market responses that led to increased sources of supply and, for oil price shocks, greater consumption efficiency and substitution away from oil. Over time, the recent spike in prices will likely once again spur more efficient energy consumption and a faster transition away from fossil fuels, particularly if supported by appropriate policy responses. Food production, at the global level, will also respond to changes in relative prices. However, the uncertainties for food supply availability stemming from the war are high, and low-income countries may have urgent needs for international assistance for a prolonged period.

Introduction

The Russian invasion of Ukraine has caused major disruptions to the supply of commodities. Both countries are key exporters of energy and agricultural products. The disruptions have exacerbated existing stresses in commodity markets following the recovery from the COVID-19 pandemic, which saw rebounding global demand and constrained supplies after 2020. As a result, commodity price volatility has surged, with food prices reaching levels not seen since the 2007-08 price spikes. Beyond their broader impact on inflation, supply disruptions of key commodities could severely affect a wide range of industries, including food, construction, petrochemicals, and transport. Concerns about energy and food security have already prompted ad hoc policy responses to bolster national self-sufficiency and reduce energy prices for consumers; however, these policies often fall short of effectively solving the underlying problems.

Against this background, this Special Focus addresses the following questions:

- What has been the near-term impact of the war on commodity markets?
- What are the main lessons of past commodity price shocks?
- What are the key policy implications?

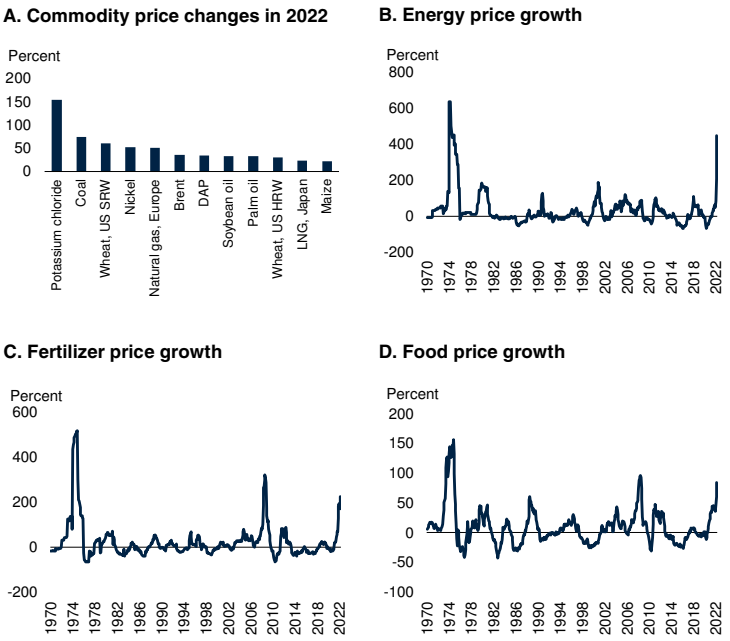
Near-term impact of the war on commodity markets

Commodity prices surged in the immediate aftermath of the war in Ukraine, particularly for commodities for which Russia and Ukraine are key exporters (figure SF.1). Commodity prices have been extremely volatile, with volatility for some commodities (e.g., coal, nickel, and wheat) reaching record highs in February and March 2022. The recent rise in prices reflects supply disruptions, higher input costs, and geopolitical risk premia. It comes on top of already tight commodity markets driven by a strong demand recovery from the pandemic, and numerous pandemic-related supply constraints. Reflecting these developments, between January 2020 and December 2021, the World Bank's energy and non-energy price indexes increased by 50 and 40 percent, respectively, while between January and March 2022 the two indexes rose an additional 34 and 13 percent.

Together, the total changes in nominal prices during the 23-month period (April 2020-March 2022) resulted in the largest increase in energy prices since the 1973 oil price spike. The recent price spike for food and fertilizers was the third-largest (after 1974 and 2008). Some commodities reached all-time highs in nominal terms (e.g., coal, European natural gas, and nickel), although only

FIGURE SF.1 Commodity price developments

Commodity prices (in nominal terms) rose sharply following the start of the war in Ukraine, particularly for commodities for which Russia and Ukraine are key exporters. Price increases from April 2020-March 2022 were the largest for any equivalent 23-month period since 1973 for energy, and since 2008 for fertilizers and food.



Sources: Bloomberg; World Bank.
A. Three-month change in commodity prices through end March 2022.
B.-D. Charts show the percent change in monthly price indexes over a 23-month period. This facilitates a comparison of the April 2020 with the most recent data (March 2022). Prior to 1979 the energy price percent change is proxied by the oil price due to data limitations.

European natural gas prices are at a record high when adjusted for inflation (figure SF.2).

The heightened volatility in commodity prices after February 2022 reflects concerns about the current and potential impact of the war on the production and trade of commodities, especially those for which Russia and Ukraine play a key role (figure SF.3). Russia is the world's largest exporter of wheat, pig iron, enriched uranium, natural gas, palladium, and nickel. It accounts for a significant share of coal, platinum, crude oil, and refined aluminum exports. Russia and Belarus are important suppliers of fertilizers, including nitrogen and potash.[1] Ukraine is a key exporter of wheat, pig iron, maize, and barley and is the world's largest exporter of sunflower seed oil.[2] Ukraine is also the largest exporter of neon gas, which is a critical input used to manufacture electronic chips.

Many countries rely on commodities from Russia and Ukraine. Europe imports a substantial share of its energy from Russia, including natural gas (35 percent), crude oil (20 percent), and coal (40 percent). In turn, Russia is similarly dependent on the European Union (EU) for its exports, with around 40 percent of its crude oil and natural gas being exported to the EU. With respect to food supplies, advanced economies (e.g., Australia, Canada, EU, the United States) are not reliant on Russia and Ukraine, being themselves major suppliers of grains and oilseeds. Large emerging market economies are also major agricultural commodity producers (e.g., Argentina, Brazil, China, India). However, many smaller emerging market and developing economies (EMDEs) depend heavily on supplies from Russia and Ukraine. More than half of wheat imports in numerous countries in Africa, developing Europe, and the Middle East, come from Russia and Ukraine.

Channels of disruption

The potential impact of the war in Ukraine on commodity markets comes through two main channels: the *physical impact* of blockades and the destruction of productive capacity, and the *impact on trade and production* following sanctions.

Physical impact. The war has significantly disrupted the transport of commodities. Almost all of Ukraine's grain exports flowed through Black Sea ports that are no longer operational (as of April 2022). Ukraine was expected to export as much as 20 million tons of wheat during the current season (ending in July 2022), corresponding to about 10 percent of global wheat exports. While some wheat may be transported through road and railway corridors to Hungary, Poland, Romania, and Slovakia, the capacity of

[1] The EU has imposed sanctions on imports of fertilizer from Belarus.

[2] Although Ukraine accounts for 46 percent of global sunflower seed oil exports, when all edible oils are considered (most of which are highly substitutable), its share is a little more than 6 percent (the shares are based on 2020-21 and 2021-22 season averages).

these facilities is limited, especially in view of the damage to infrastructure, and safety concerns. Elevated insurance rates reflecting the risks posed by the war have also increased the cost of shipping outside of blockades.

The war is also likely to disrupt agricultural production in Ukraine in the upcoming season. Spring planting for crops such as maize, barley, and sunflowers typically occurs from April to May, while winter wheat is planted from September to mid-November. Shortages of labor and inputs (such as fuel and fertilizers), destruction of farming equipment, and safety concerns of growers will have a severe impact on Ukraine's 2022-23 agricultural (and especially wheat) production. Estimates on how much Ukraine's agricultural production will decline in the upcoming season vary from 25 to 50 percent (FEWS NET 2022).

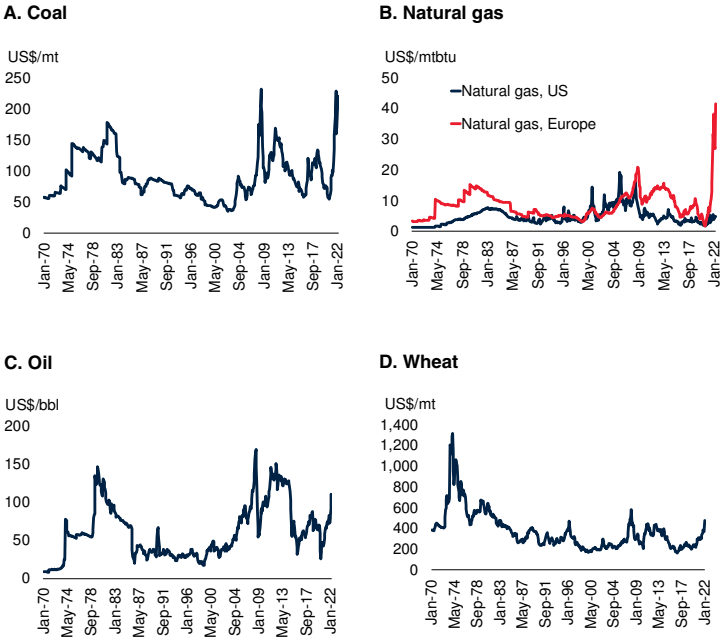
Impact on Trade. In response to the invasion of Ukraine, a wide range of sanctions have been imposed on Russia. While initial rounds of sanctions did not include energy, some countries subsequently banned or announced a phasing out of imports of Russian energy products. The European Union has announced a ban on imports of coal from Russia (starting in August 2022) and a two-thirds reduction of Russian gas imports by the end of 2022. The EU is also considering extending these measures to oil with an eventual phasing out of Russian fossil fuel imports by 2027.[3] The United States has banned imports of Russian oil, gas, and coal, though these only make up a small fraction of Russian energy exports. The United Kingdom has announced plans to phase out Russian oil imports by the end of 2022. Several large oil companies announced they would cease operations in Russia, while many traders chose to boycott Russian oil, in part reflecting difficulties and risks in making transactions or obtaining insurance on cargoes. As a result, the price of Urals (the Russian oil price benchmark) fell to more than $30/bbl below Brent oil prices in following the start of the invasion.

Russian exports of commodities by sea may also be facing disruptions as numerous shipping lines have announced they will suspend Russian bookings, and this has been exacerbated by difficulties in obtaining insurance. The reciprocal ban on Russian and European air space has disrupted trade through air cargo, pushing up transport costs as re-routing results in longer journeys, thus increasing the cost of transport for some commodities which are normally transported by air, such as palladium.

Russian production of commodities could also be affected, as the country will be less able to import machinery and equipment, including repair and

FIGURE SF.2 Real commodity prices

Coal, natural gas, and wheat prices have all reached historic highs in nominal terms. However, in real terms, only the European natural gas price has reached an all-time high, and it is substantially above its previous peak in 2008. Coal prices are close to their 2008 peak, while oil prices remain some way below. In the case of wheat, prices are far lower today compared to their peak in the 1970s, but close to their 2008 level.

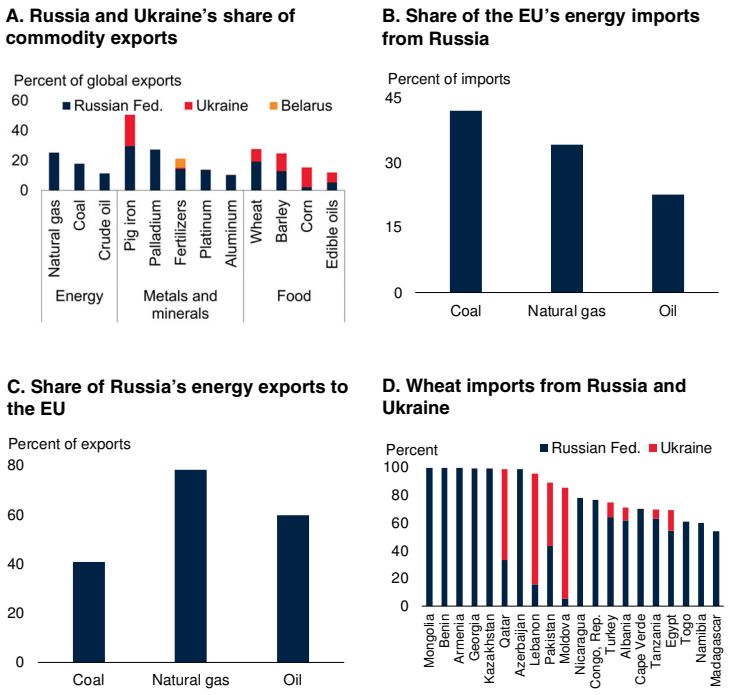


Sources: Haver Analytics; World Bank.
A.-D. Monthly data from 1970 to March 2022. Prices deflated by January 2022 Consumer Price Index (CPI). Oil refers to the Dubai benchmark. Wheat refers to the US HRW benchmark.

[3] The European Commission released a communique discussing policy options to mitigate the price impact on households and businesses, proposing the creation of a Task Force on common gas purchases to consolidate EU bargaining power, and advocating for a jointly coordinated European gas storage policy (European Commission 2022). The International Energy Agency has also released policy suggestions to reduce demand for oil, as well as for the EU to reduce its dependency on Russian natural gas (IEA 2022b, c).

FIGURE SF.3 Commodity dependence

Russia and Ukraine are major exporters of energy, metals, fertilizers, and agriculture. The European Union imports a large proportion of its energy from Russia, and, in turn, the majority of Russia's energy exports go to the European Union. Russia and Ukraine account for more than half of wheat imports in many EMDEs, especially in ECA, MNA, and SSA.



Sources: BP Statistical Review; Eurostat; UN Comtrade; U.S. Department of Agriculture; World Bank.
Note: MNA = Middle East and North Africa; SAR = South Asia; SSA = Sub-Saharan Africa.
A. Data for 2020. Data for energy and food are in trade volumes, and data for metals and minerals are in trade values. Fertilizers include phosphate rock and potash minerals, and ammonia-based non-minerals.
D. Data is for 2020.

maintenance parts and other inputs. In the case of agriculture, this includes farm machinery, chemicals, and seeds. In the case of energy, sanctions, and the exit of oil companies from Russia are likely to reduce oil and gas production. The inability to import parts for wells or pipelines may reduce supplies in the short term, while tighter financial conditions, reduced investment, and restricted access to technology are likely to have a longer-term impact. For metals, Australia's decision to ban exports of alumina to Russia will inhibit Russia's aluminum production (alumina is an input into the production of aluminum).

Trade in commodities is also being affected by Russian countermeasures, which at the moment do not include critical energy commodities. Trade restrictions, including tighter licensing quotas on grains introduced prior to the war and export bans announced in March, have been extended to the Eurasian Economic Union.[4] Russia has recommended that fertilizer manufacturers halt exports. In addition, it has requested to be paid in rubles for its energy exports, which will cause complications as existing contracts are in different currencies.

Impact of disruptions

The impact of these disruptions on global commodity markets depends on the magnitude of the disruption, the possibilities for sanctioned exports to be diverted via other countries, the availability of inventories that can be drawn upon, the potential for increased production elsewhere, and the extent to which demand can be reduced. These factors differ in importance between commodities.

Crude oil

Prior to the war in Ukraine, Russia exported about 5 mb/d of crude oil and 3 mb/d of refined petroleum. The International Energy Agency estimates that current sanctions could reduce Russia's exports of oil by 2.5 mb/d from May onward, equivalent to about 3 percent of global supply (IEA 2022a). If the European Union reduced or banned oil imports from Russia, the disruption to Russian exports could be much larger—currently the EU imports 3.4 mb/d from Russia. This would require more diversion of trade or new, incremental sources of oil (figure SF.4).

- **Diversion of trade.** The sharp discount on Russian oil has already spurred the diversion of its exports to other countries. For example, India has increased its imports of Russian oil. In the event of deeper sanctions, additional diversion to other countries is likely. However, the actual magnitude of this channel will depend on the willingness of

[4] High global food prices, and fears of shortages, are leading to restrictions on food exports in some countries. These include export bans on some food commodities in Algeria, Egypt, Hungary, Turkey, and Serbia, as well as export taxes by Argentina and Indonesia.

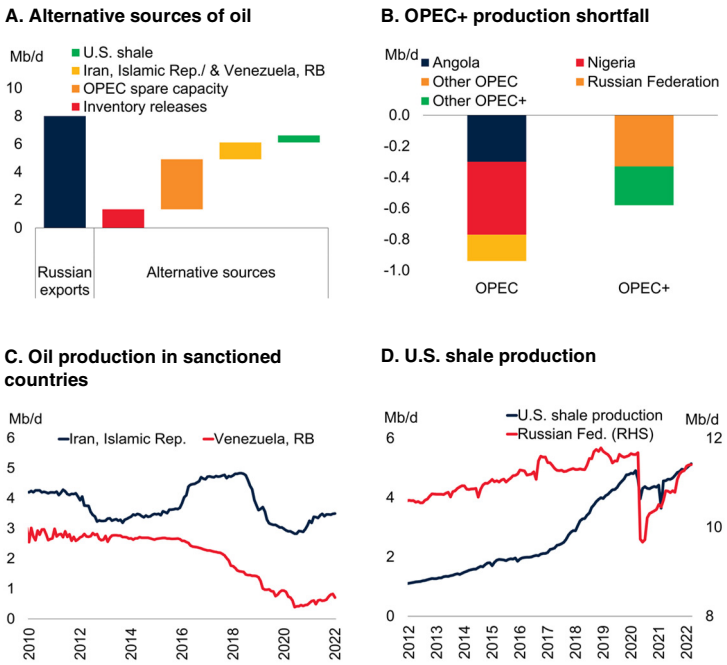
other consumers to purchase Russian oil, as well as on infrastructure constraints. For example, 9 percent of Russia's oil in 2020 was exported by pipeline to Europe, and this would be difficult to redirect elsewhere. Finding alternative sources of oil would, however, be a challenge for the European Union since its refineries are designed to process Russian oil.

- **Inventory drawdown.** Oil inventory releases from strategic national reserves is the fastest tool to respond to shortfalls in supply. Coordinated inventory releases have been used by IEA members in response to previous shocks (Kilian and Zhou 2021; World Bank 2019). On March 31, 2022, the United States announced the release of 180 million barrels from its Strategic Petroleum Reserve from April-October 2022 with other IEA members agreeing to release 60 million barrels. This represents a release of about 1.3 mb/d of oil over six months—more than 1 percent of global daily consumption. Overall, the IEA countries hold just over 4 billion barrels of oil in inventories, equivalent to 90 days of their oil consumption— 1.5 billion held in strategic government reserves and 2.5 billion held by industry. However, inventory releases are a temporary solution as they don't tackle longer-term supply and demand imbalances. Furthermore, strategic reserves most likely would be refilled in the future.

- **Potential for increased production.** Spare production capacity is considered an alternative source of oil, although it typically takes several months to become available. The majority of spare capacity is held by OPEC countries, notably Saudi Arabia (2 mb/d), the United Arab Emirates (1.1 mb/d), and Iraq (0.6 mb/d). So far OPEC+ countries have been reluctant to raise production faster than they have previously announced, and the group as a whole is producing well below their agreed target, perhaps suggesting that spare capacity among the group may be lower than estimated. Other potential sources of oil are the Islamic Republic of Iran and República Bolivariana de Venezuela, which are both currently under U.S. sanctions. A new nuclear deal with the former could potentially bring about 1 mb/d of additional oil into the global market within six months (IEA 2022a). However, in the case of the latter, the chronic deterioration of its oil industry suggests that a meaningful increase in oil production and would require significant new investment. Increasing U.S. shale output beyond the expected 1.4 mb/d growth for 2022 would be difficult (EIA 2022). The industry is facing significant capacity constraints due to a lack of skilled labor as well as shortages of physical inputs such as sand (Dallas Fed 2022). Additional production increases among other

FIGURE SF.4 Alternative sources of additional oil supply

As Russian oil supply is increasingly disrupted, alternative sources will be needed. These include inventory releases and spare capacity in other producers, including OPEC, sanctioned countries such as the Islamic Republic of Iran and República Bolivariana de Venezuela, and non-OPEC countries, notably the United States. However, additional supply from OPEC and the United States may be limited by capacity constraints



Sources: International Energy Agency (IEA); U.S. Energy Information Administration; World Bank.
A. Figure shows Russian exports of oil and oil products prior to the war in Ukraine and alternative sources of supply. Inventory releases refer to the current announced release of oil by IEA members including the United States. Estimates for production are author calculations based on the IEA's "Oil Market Report—April 2022." OPEC spare capacity refers to Iraq, Saudi Arabia, and UAE only.
B. Change in crude oil production compared to target set by OPEC countries for March 2022 based on IEA Oil Market Report April 2022. Other OPEC + includes Bahrain, Brunei Darussalam, Malaysia, South Sudan and Sudan.
D. U.S. shale production refers to Permian Basin production.

producers, such as Brazil or Canada, will take significant investment and time.

- **Demand reduction.** Higher prices will likely induce households and firms to adjust their consumption behavior. In the short run, however, demand for oil and petroleum products such as gasoline and diesel are very price inelastic (Dahl 2012).[5] This implies that demand is unlikely to fall significantly without a much larger increase in prices. While the IEA released guidelines for policy measures to reduce demand, most government policies so far have taken the form of tax cuts and fuel subsidies, especially for gasoline (IEA 2022c). Such measures actually increase demand and put further upward pressure on the prices of crude oil and other petroleum products.

Natural gas

The majority of Russia's exports of natural gas go to the European Union, and so far these have not been disrupted as much as crude oil (although Russian flows to Europe had been much lower than normal in the months preceding the war). However, the EU has announced plans to sharply reduce its reliance on Russian natural gas by two-thirds by the end of 2022. In its place, the EU will increase its imports of LNG from other countries and expand its own LNG processing capacity. It is also stepping up the use of renewable energy, increasing the generation of biomethane, and seeking to lower demand for natural gas through efficiency measures as well as changes in consumer behavior, namely lowering heating temperatures (EC 2022).

Demand for natural gas in Europe had already been affected by higher prices, with energy-intensive activities, such as fertilizer plants and aluminum and zinc refineries, curtailing production in response to higher prices.

In the event of a disruption of imports of natural gas from Russia, Europe would rely on inventory drawdowns and further increase its imports from other countries, or drastically reduce its consumption. Inventories of natural gas in Europe have risen from their recent lows, but their level in April 2020 of 32 billion cubic meters (bcm) was around one-third of their maximum theoretical storage capacity of about 100 bcm. For comparison, total natural gas consumption in the EU in 2021 was close to 400 bcm, while imports from Russia were 155 bcm. While low-season summer demand may not experience a shortfall, peak-winter demand could pose a problem. Rationing may be necessary, with Germany announcing that it may have to ration natural gas consumption if imports from Russia are shut off.

The potential for redirection of Russia's natural gas exports is much more limited than for crude oil. Seventy percent of Russia's natural gas is exported by pipeline to Europe, and Russia's capacity to increase exports elsewhere is severely limited. For Russia to increase its exports of natural gas in the form of LNG would require major investment in new processing facilities.

There is also minimal spare global production capacity in natural gas at present. Some producers have announced plans to increase production and export capacity, including Algeria and the United States, but this will take time to come onstream. As a result, increased imports of LNG by the EU would likely come at the expense of other countries. This could drive up the cost of energy globally. It may also force other countries, especially EMDEs, to turn to more polluting forms of energy, especially coal.

Coal

While Russia's exports of coal also appear to have been less affected by disruptions than crude oil, import bans by the EU and Japan are being phased in. In 2020, about one-third of Russia's coal exports went to Europe (including non-EU

[5] In an analysis of 240 studies on gasoline price elasticities, Dahl (2012) found gasoline price elasticities ranged from −0.11 to −0.33. For some countries, elasticities are estimated to be much lower. For example, in the United States, the price elasticity of gasoline is estimated to be in the range of −0.02 to −0.04 in the short term, meaning it takes a 25 to 50 percent increase in the price of gasoline to lower automobile travel by 1 percent (EIA 2014). Elasticities have also been found to have declined over time, likely reflecting the falling share of fuel in consumer expenditure.

countries) and 10 percent to Japan. In the short term, the import bans will likely lead to significant disruption in coal markets and may raise prices for all importing countries. In the medium term, there will be diversion of trade of coal as the EU and Japan seek alternative supplies from Australia, Colombia, Indonesia, South Africa, and the United States.[6] As a result, other coal importers such as China and India could reduce their imports from these countries and import more from Russia. This change in trade patterns would be costly since it would greatly increase transport distances, and coal is bulky and expensive to transport. In addition, the magnitude of the changes in trade flows may be limited by logistical issues such as capacity constraints for land and sea transport.

Fertilizers

The global fertilizer market was already under severe stress before the war. Because nitrogen-based fertilizers are produced from natural gas (or coal in the case of China), high prices of these commodities had already pushed some fertilizer prices to their highest level since 2010. The European Union imposed sanctions on Belarus in June 2021, followed by Canada, the United Kingdom, and the United States in August 2021 (World Bank 2021). Additional trade restrictions could further disrupt global fertilizer supplies, as Russia (and Belarus) are important exporters of potassium and nitrogen-based fertilizers. For example, in early March, Russia's Industry Ministry announced that it would temporarily suspend fertilizer exports. The announcement followed an earlier ban on ammonium nitrate (effective from February 2 until April 1), in order to guarantee supplies to domestic farmers. China has also suspended urea and phosphate exports until June 2022 in order to ensure adequate supplies for domestic food production. Shortages in fertilizers could lead to a reduction in their use, particularly in EMDEs, further reducing agricultural yields and production.

[6] This type of diversion of commodities is common in response to sanctions or tariffs (World Bank 2019).

Wheat

Russia and Ukraine have in recent years accounted for about one-quarter of global exports of wheat.[7] Exports from Ukraine have been halted due to closures of all Ukrainian ports on the Black Sea, which account for about 90 percent of Ukraine's wheat exports. This disruption was due to blockades and as such there is less scope for diversion. Limited quantities of wheat exports have started taking place since early March through rail and road corridors. While precise estimates of such exports are not available, perhaps as much as half of Ukraine's exportable wheat (estimated at 20 million tons, or 10 percent of global exports) could eventually be exported overland, although at a greater cost than shipping. Exports of wheat from Russia have, so far, not been affected.

Disruptions to wheat exports from Ukraine have already affected several importing countries, especially in the Middle East and North Africa, including Egypt and Lebanon. As a result, several countries have introduced (or announced) trade policy measures that either reduce or ban wheat exports. By the end of March, 53 new policy interventions affecting the trade of food commodities had been imposed. However, the trade restrictions imposed so far are not nearly as extensive as they were during the 2007-08 and 2011-12 commodity price spikes.

On current projections, global supplies of wheat for 2022 are adequate by historical standards.[8] A difficulty is that wheat inventories are heavily concentrated in China and India, which have not been important exporters. In response to the increase in wheat prices, India announced it would release wheat from its stockpiles. In terms of

[7] Despite their large share of global exports, the two countries produce only seven percent of total global production, since many countries produce wheat primarily for domestic consumption.

[8] According to the United States Department of Agriculture's latest update, released on April 9, the end of season global stocks-to-use ratio (a measure of expected supply availability relative to consumption) for the 2001-22 season stood to 35.3 percent. While lower than 40 percent in 2019-20, it much higher than the historical low of 20.9 percent in 2007-08 and above the 60-year average of 30.5 percent.

production, while planting will be reduced in Ukraine, early reports show that other wheat producers, including Argentina, Australia, Brazil (a net wheat importer, mainly from Argentina), and the United States, will increase the area allocated to wheat production, helping to partly offset the lower production in Ukraine (Colussi, Schnitkey, and Cabrini 2022).[9] Furthermore, output in Canada is likely to rebound strongly following droughts of 2021. Major caveats on the downside for global wheat harvests (and food more broadly) stem from high input prices, especially fertilizers.

Metals

Disruptions to metal markets have been less severe than in other markets, although Russia's production and exports of aluminum and nickel have been partially disrupted by sanctions, and potential further curtailments have impacted prices. The war has reduced imports of alumina, a key input into the production of aluminum. In February, Russia's state-owned Rusal had already suspended production at its alumina refinery in Ukraine, while in March, Australia imposed a ban on alumina exports to Russia. These losses amounted to two-thirds of Russia's alumina imports. The nickel market has been affected by production disruptions following sanctions imposed on Nornickel, Russia's mining giant. Russia accounts for 6 percent of global nickel supplies, but 20 percent of high-grade nickel for batteries (due to strong EV demand).

These problems have been compounded at the global level by reduced production elsewhere. For example, high energy costs across Europe forced many smelters to cut aluminum output by an estimated 17 percent of European capacity. Traders of metal commodities, as those for energy, may also choose to avoid Russian metal exports. The same is true for precious metals such as gold, palladium, and platinum, where Russia has a significant export share, especially for palladium. However, in general, metals exports are easier than energy products to divert to alternative export markets.

Lessons from past commodity price shocks

The war in Ukraine will have longer-term consequences for global commodity markets. Numerous countries, including EU members, are undertaking measures to reduce their energy imports from Russia while several countries are also restricting exports of key equipment to that country. These measures have been met with some retaliatory actions on the part of Russia. If the war is prolonged or intensified, the mutual barriers to trade may harden. To further understand the longer-term consequences of such barriers, likely market responses, and how the current situation might evolve, this section examines major shocks to commodity markets over the past 50 years.

The global oil market has experienced three major price increases during the past 50 years (Hamilton 2010). What has come to be known as the "first oil price shock" occurred in 1973 when several Gulf OPEC members imposed an oil embargo on exports to the United States and its allies in response to U.S. aid to Israel during the Yom Kippur War. OPEC producers subsequently cut oil production and raised prices almost five-fold (in nominal terms) from September 1973 to January 1974. The "second oil price shock" occurred in 1979 as a result of the Iranian revolution and was intensified by the Iran-Iraq war that began in September 1980, leading to a tripling in oil prices within a year. The "third shock" took place during the early 2000s in a more gradual fashion as a result of strong EMDE demand, especially in China and India (Baffes et al. 2018). At their peak, in July 2008, nominal oil prices exceeded $130/bbl (or $172/bbl in inflation-adjusted 2022 terms). The boom ended abruptly during the global financial crisis, but oil prices recovered rapidly, averaging $100/bbl until mid-2014.

Food commodity markets, especially grain markets, have experienced two major price

[9] Because of input substitutability, in response to a sharp rise in the price of one crop (wheat in the current context), farmers typically reallocate land from other crops, in turn spreading the price increase across all crops. Typically, land reallocation takes place within a season.

increases during the past half-century, both during similar time periods to the oil price shocks. The first occurred during the 1972-74 oil crisis—the World Bank's food price index increased 70 percent from 1972 to 1974 in real terms—reflecting weather-related production shortfalls in grain-producing countries, including Australia, Canada, the Soviet Union, and the United States. These shortfalls were compounded by higher input costs, including energy and fertilizers, due to the first oil price shock. Other contributing factors included earlier policies of major exporting countries to reduce stocks and idle cropland. The depreciation of the U.S. dollar following the removal of the gold standard played a role as well. The second price shock took place during the 2000s, as part of the broader commodity price boom—the real food price index gained 45 percent from 2006 to 2008.[10] As in the case of oil, food prices declined during the 2009 financial crisis but spiked again in 2011. These price increases occurred alongside adverse weather and a broad-based rise in input costs, including energy and fertilizers. Policies encouraging the use of food commodities for biofuels exacerbated the price spike (World Bank 2019).

The rest of this section examines: (i) how policies responded to these shocks and (ii) how market mechanisms responded to both policies and shocks. The section also summarizes similarities and differences between the ongoing shock and earlier episodes of price hikes.[11]

Policy responses

Energy

The oil price spikes of the 1970s triggered a number of policy responses, and both became the catalyst for demand reduction, the substitution to other fuels, and the development of new sources of energy supply (Baffes and Nagle, forthcoming). Following the first oil price shock, several OECD members set up the International Energy Agency in 1974 to safeguard oil supplies under a binding oil emergency sharing system, and to promote common policymaking and data collection and analysis. Key policy decisions included the requirement to create national oil reserves equal to 60 days of imports (later expanded to 90 days) and a ban on building new oil-fired electricity plants with a directive to switch to coal (enacted in 1977; Scott 1994).[12] Additional policies were adopted after the second oil price shock, under which member countries agreed to reduce oil demand by 5 percent, with individual policies varying by country.

Policies at the country level, while broadly similar, had some differences. The United States initially responded to high prices with a complex array of price controls for different types of oil. These policies were generally deemed to have impeded the normal functioning of markets and led to significant distortions (McNally 2017). The United States subsequently implemented numerous policy measures designed to address the underlying demand and supply imbalance with the Energy Policy and Conservation Act of 1975 (U.S. Congress 1975). On the demand side, these included energy conservation programs as well as regulations such as the prohibition of the use of

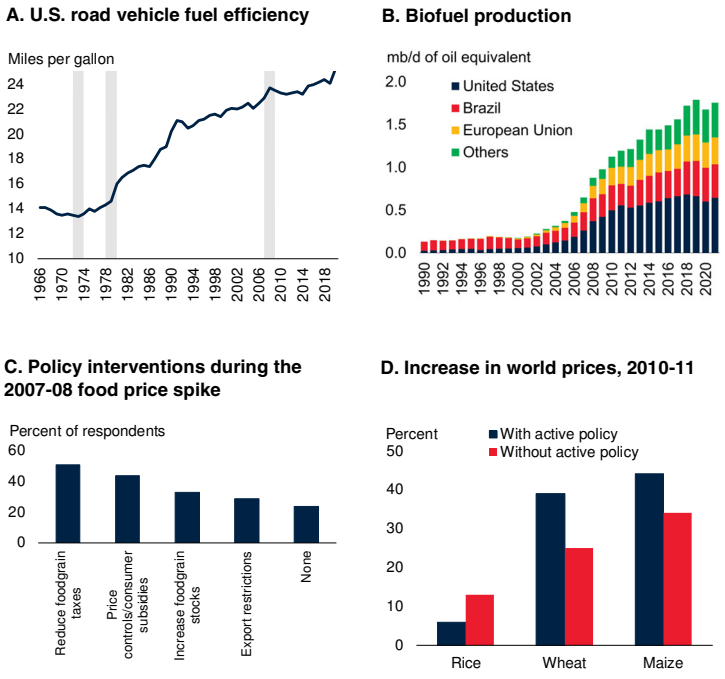
[10] A different type of shock to global food commodity markets was the breakup of the Soviet Union in the early 1990s. The objective of agricultural policies during the Soviet era was to achieve self-sufficiency and low food prices for urban consumers. However, because of inefficient production and marketing systems, neither objective was met. Consumption was rationed due to severe shortages, ultimately forcing the Soviet Union and several Eastern European countries to start importing food commodities on a large scale in the early 1970s.The transition to market economies in 1991 led to a major restructuring of agriculture, including removal of subsidies, and resulted in substantial improvements in productivity. Russia, along with Ukraine and Kazakhstan, became key exporters in the global grain market.

[11] Although policies and market responses are discussed in separate sections, it does not necessarily imply that they are independent of each other. Indeed, policies are a key driver to market responses, while the latter also affects the former.

[12] The IEA banned its member countries from building new oil-fired electricity plants. The ban, introduced under the "Principles for IEA Action on Coal" directive, was justified as follows (IEA 1979, p. 1 & 4): "The Principles are based on the conclusion that greatly increased coal use is required to meet growing energy demand in the medium and long term, and that this is both desirable and possible in light of the world's abundant coal reserves and the economic advantages which coal already has over oil in many energy markets … [T]he world is still confronted with the serious risk that within the decade of the 1980's it will not have sufficient oil and other forms of energy available at reasonable prices unless present energy policies are strengthened."

FIGURE SF.5 Policy responses to price shocks

As a result of the first oil price shock, the United States introduced legislation to increase the fuel efficiency of automobiles. During the energy price increases of the 2000s, governments mandated significant increases in biofuel production. Insulation policies undertaken during the 2010-11 episode amplified the increase of world prices and accounted for about 40 percent of the increase in the world price of wheat and one-quarter of the increase in the world price of maize.



Sources: Ag-Incentives Database; BP Statistical Review; Energy Information Administration; International Energy Agency (IEA); Ivanic and Martin (2014b); Organisation for Economic Co-operation and Development (OECD); World Bank.

A. Figure shows the fuel efficiency of U.S. vehicles in miles driven per gallon of gasoline consumed. Shaded areas refer to oil price shocks in 1973, 1979, and 2008.

C. Percent of respondents based on a survey of 80 EMDEs.

D. Estimates based on an error correction model described in Laborde, Lakatos and Martin (2019). Based on data for 82 countries, of which 26 are advanced economies, 44 are non-LIC EMDEs, and 12 are LICs for the period 2010-2011.

crude oil in electricity generation, and improved fuel efficiency standards for new automobiles and consumer appliances. The average fuel efficiency of U.S. autos rose from 13 miles per gallon (mpg) in 1973 to 20 mpg by 1990 (figure SF.5). On the supply side, measures included price incentives and production requirements to increase the supply of fossil fuels, including loan guarantees for new coal mines. The Act also mandated the creation of the Strategic Petroleum Reserve and measures to improve energy data, which led to the formation of the U.S. Energy Information Administration. In addition, in 1979, the United States announced it would remove price controls for oil (eliminated in January 1981), allowing market forces to address imbalances in supply and demand (Ilkenberry 1988).

In Japan, policies focused on measures to reduce energy use, develop alternative sources of energy to oil (notably nuclear power), and stabilize the supply of oil to Japan, for example through joint ventures with other countries (Shibata 1982). The Japanese government also phased out energy-intensive industries such as aluminum and petrochemicals. European countries implemented some similar domestic policies (Ilkenberry 1988).

Steadily increasing oil prices in the 2000s again led to policies to address concerns about energy shortfalls. In the United States, the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007 included numerous provisions pertaining to demand reduction and boosting production (EPA 2007). These included improving fuel efficiency in vehicles, tax breaks for the purchase of hybrid vehicles, as well as tax breaks and incentives for investing in energy-efficient buildings, both for commercial use and housing. On the supply side, the Act mandated a sharp increase in the use of biofuels; established renewable fuel standards; provided energy-related tax incentives for fossil fuels, nuclear, and renewable energy sources; and provided loan guarantees for zero-carbon technologies. Other countries adopted similar policies. For example, the European Union introduced the Renewable Energy Directive in 2009 which mandated that 20 percent of all energy usage in the EU, including at least 10 percent of all energy in road transport fuels, be produced from renewable sources by 2020, alongside measures to increase energy efficiency (European Parliament 2009). These directives were further expanded by the European Green Deal of 2019, especially regarding competitive practices and the use of renewable energy sources. Biofuel policies were also introduced in some EMDEs such as Brazil and India.

Food

The 1970s food price spike was beneficial for food-exporting countries. In the United States, the government was able to reduce expensive support

programs that it had previously implemented (Baffes and Nagle 2022, forthcoming). Among commodity importers such as Japan, the commodity price boom of the 1970s (as well as an embargo on soybean exports by the United States) reinforced the desire for self-sufficiency in food commodities. Japan promoted international cooperation to stabilize agricultural commodity prices and guarantee reliable supplies for importers (Honma and Hayami 1988). Other East Asian countries, including the Republic of Korea, increased protection of domestic agriculture and expanded the scope of state trading agencies.

During the 2008 price increase, governments in several EMDEs were confronted with difficult policy choices. Allowing domestic prices to adjust to world food price changes would have led to higher food price inflation, thereby causing a decline in real incomes of poor households that were net food buyers (Easterly and Fischer 2001). Instead, many countries attempted to reduce the transmission of international food price shocks to domestic markets. Indeed, during the 2007-08 food price spike, close to three-quarters of EMDEs undertook policy actions to insulate their economies from the sharp increase in international food prices, especially for rice (World Bank 2009). Similar policy actions were undertaken during the spike of 2010-11 (Chapoto and Jayne 2009; Ivanic and Martin 2008, 2014).[13]

Several studies (Laborde, Lakatos, and Martin 2018; World Bank 2019) have shown that the use of such trade policy interventions compounded the volatility of world prices. In addition, when undertaken by many countries simultaneously, they may not have been effective in protecting vulnerable populations. Instead, the use of targeted safety net interventions, such as cash and food in-kind transfers can better mitigate the negative impact of food price shocks while reducing the economy-wide distortionary impacts of trade policies.

[13] According to one estimate, the 2010-11 food price spike tipped 8.3 million people globally (almost 1 percent of the world's poor) into poverty (Laborde, Lakatos, and Martin 2019).

Market responses

There are three channels through which market mechanisms respond to price shocks and associated policies: demand reduction, substitution, and supply responses. This section discusses how these channels apply to energy and food commodities. Over the medium term, the demand reduction channel is less applicable for food, except in the most severe circumstances.

Energy

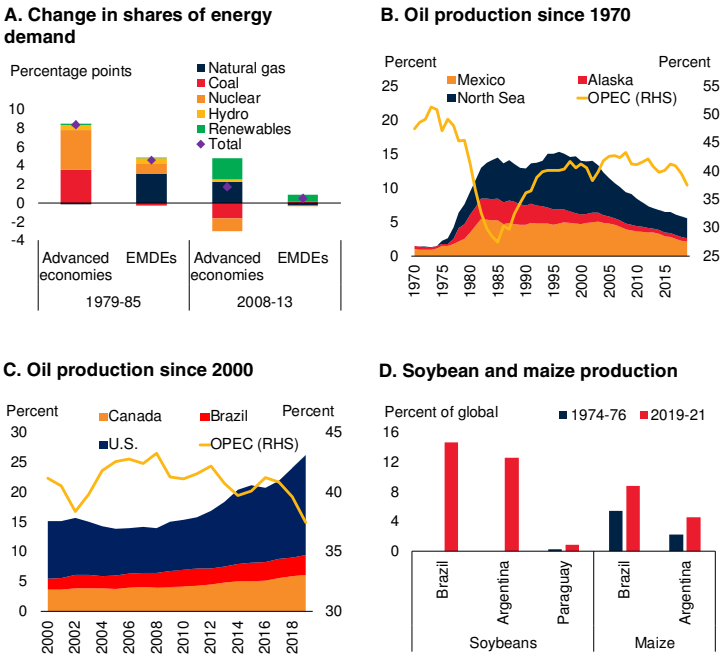
Demand reduction. Between 1979 and 1983, global oil demand fell by 11 percent, or 6 mb/d, with demand in advanced economies declining almost 20 percent. While the drop in oil demand was partly a result of the global recession in 1982, energy efficiency and substitution policies implemented by oil-importing countries caused a permanent reduction in underlying demand growth. Changes in consumer preferences in response to higher prices also played a role. For example, in the United States, there was a shift in preference away from domestically-produced and less fuel-efficient vehicles in favor of more efficient Japanese-made cars—the share of Japanese cars in U.S. auto purchases rose from 9 percent in 1976 to 21 percent in 1980 (Cole 1981).

In the 2000s, high oil prices and policy changes once again induced efficiency improvements in the use of oil, while there was less substitution to other fuels as a much smaller amount of crude oil was being used in electricity generation. After peaking in 2005, oil consumption in advanced economies steadily declined, such that by 2014 it had fallen by 14 percent from the peak. Once again, consumer preferences played a role. For example, in the United States, there was a shift toward fuel-efficient hybrid cars (supported by government policies) away from sports utility vehicles (SUVs). Indeed, in 2008, sales of SUVs began to plunge, and by mid-2008 they were down more than 25 percent from the same period a year earlier (Hamilton 2009). Among EMDEs, oil demand also decelerated in the 2010s.

Substitution. In the five years after the 1979 oil price shock, the share of crude oil in the energy

FIGURE SF.6 Market responses to price shocks

The share of non-oil energy sources rose sharply after the 1979 oil price spike, notably nuclear and coal in advanced economies, while increases were smaller during the 2008 oil price spike. The oil price increases also led to increased production from alternative sources of oil such as the North Sea and Alaska in the 1970s-80s, and U.S. shale and Canadian tar sands in the 2000s. The food price spikes of the 1970s encouraged the emergence of South American countries as major food exporters.



Sources: BP Statistical Review; Energy Information Administration (EIA); U.S. Department of Agriculture; World Bank.

A. Chart shows the change in the composition of energy consumption in advanced economies and EMDEs in the five years after the oil price shocks of 1979 and 2008. The total change reflects the equivalent decrease in oil consumption.

mix in advanced economies fell by more than 7 percent (figure SF.6). This shift was chiefly due to the prohibition of the construction of oil-powered electricity power stations—which were replaced by nuclear and coal-powered stations. The shift to nuclear power, which had started in the late 1960s, was particularly pronounced in France and Japan, where its share in total energy consumption reached 23 and 8 percent, respectively, by 1984.[14] Among EMDEs, the share of oil fell by 4 percent and was largely replaced by natural gas.

In the years following the 2008 oil price increase, the share of natural gas and renewables in the energy mix rose, reflecting the U.S. shale boom for natural gas, as well as mandates and technological improvements for renewables. However, since oil was no longer used widely in electricity generation, the decline in its share was of marginal significance. Moreover, substituting other energy commodities for oil in its main current uses—transport and petrochemicals—is much harder. As a result of mandates, the share of biofuels—ethanol and biodiesel—rose from about 0.15 percent of total oil consumption in 2005 to 1.7 percent in 2019, a large overall increase although still a very small share of overall oil consumption.

New sources of production. High oil prices in the 1970s induced investment in oil production by non-OPEC countries, particularly for reserves with a higher cost of production. These included Prudhoe Bay in Alaska, the North Sea offshore fields of the United Kingdom and Norway, the Cantarell offshore field of Mexico, and oil sands in Canada. High and stable prices in the 2000s also facilitated the development of alternative sources of crude oil. The most notable of these was the development of U.S. shale oil deposits, output from which rose from 5 mb/d in 2008 to 9 mb/d in 2014. In addition, Canadian oil sand production and Brazilian deep-water production also rose rapidly.

Food

Substitution. Most of the substitution in food commodities takes place on the input side since different crops can be grown with much the same inputs of land, labor, machinery, and fertilizers. This flexibility allows shifts in crop patterns from one season to another, in turn preventing sustained price gaps among commodities. For example, the price spikes of the 1970s and 2000s were mostly focused in one commodity and subsequently spread to the prices of other crops. Indeed, despite the large increase in maize and edible oil demand due to biofuels and for animal feed over the past two decades, the prices of these commodities moved in tandem with other grains and oilseeds. For example, global demand for maize doubled during 2000-20, compared to the 26-28 percent increase in global demand for rice and wheat (in line with world's population growth of 27 percent over this period).

[14] By the turn of this century the share of electricity from nuclear power in France had reached 70 percent.

Some agricultural commodities are also highly substitutable in terms of consumption. Most edible oils (including palm, soybean, and rapeseed oil) can be substituted for each other. Such substitutability explains the high comovement in edible oil prices. Substitutability also takes place in animal feed, especially between maize and soybean meal. Other food commodities, however, are less substitutable as they depend mostly on cultural factors (e.g., Asia is mostly a rice-consuming region while Europe and the Americas are mostly wheat-consuming regions).

New sources of supply. The food price increases in the 1970s induced a supply response from some South American countries, including Argentina and Brazil. Today, these two countries account for 17 and 50 percent of global soybean production, respectively, whereas they produced virtually no soybeans in the 1970s. Over the same period, their share of global maize production has almost doubled, to about 8 and 4 percent, respectively. High food commodity prices in 2008 and 2011, however, did not bring any major new producers into the global food markets. Indeed, some of the factors behind the spikes reversed (including the decline in energy prices and removal of restrictive trade policies), thus replenishing stocks of most grains and oilseeds. In the current context, if high food prices persist, an alternative source of food supplies could be the easing biofuel mandates, which today account for as much as 4 percent of global arable land.

Comparison of the current episode with earlier commodity price shocks

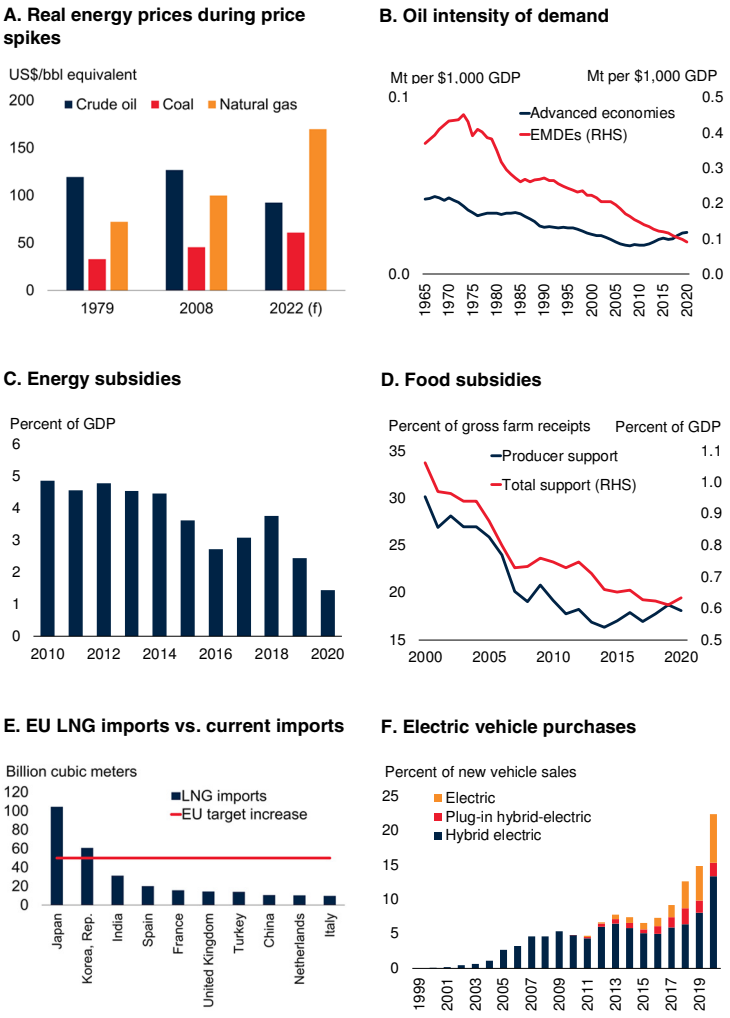
Energy

The previous two oil price spikes bear some similarities to the current situation, but there are three key differences:

- **Prices.** All energy prices have seen significant increases, particularly natural gas and coal (figure SF.7). In the earlier episodes, oil prices rose much more sharply than those for coal and gas. The price of oil in real terms is currently 35 percent below its 2008 peak, while the price of European natural gas has reached a historical high. With all energy prices elevated, there is less opportunity to substitute for cheaper fuel. In fact, as oil is now relatively cheap, there has been some substitution for it from natural gas for electricity generation (World Bank 2021). In

FIGURE SF.7 Energy and food markets during the current price spike

The spike in energy prices today is broad-based, whereas earlier price spikes primarily affected oil. The oil intensity of demand has fallen sharply since the 1970s as efficiency has improved, and the global economy has shifted toward less-energy-intensive services. Energy subsidies have been falling globally. Food subsidies declined through 2015, but governments have increased support to producers since then. The EU has mandated a sharp increase in LNG imports to diversify its sources of natural gas. In the longer term, the energy price spike may accelerate the adoption of electric vehicles.



Sources: BP Statistical Review; European Commission; International Energy Agency (EIA); Organisation for Economic Co-operation and Development; World Bank.
A. Chart shows the annual price of coal, Brent crude oil, and European natural gas, deflated using U.S. CPI.
B. Oil intensity of demand is calculated as oil consumption in metric tonnes per unit of GDP.

addition, high prices of some commodities (such as energy) are pushing up the production cost of other commodities (such as fertilizers, foods, and metals). While renewables—mainly solar and wind power—offer an alternative source of energy, their cost has also risen recently as a result of sharply higher prices for the metals used in their construction, including aluminum and nickel.

- **Intensity**. The oil intensity of GDP has fallen considerably since the 1970s. Similarly, consumer spending on energy as a share of total spending has also fallen, especially in advanced economies (although it will increase significantly this year). As a result, consumers may respond less to energy price changes, at least in the short term, than in the 1970s. The price elasticity of demand in energy-intensive industries may be higher than that of consumers, however, and so more adjustment may take place in industry. For example, in Europe high natural gas and electricity prices have already led to reduced production of fertilizer and aluminum.

- **Policies**. Policy responses to high energy prices in many countries have focused on reducing fuel taxes or introducing fuel subsidies—a marked reversal of a broader trend of declining subsidies over the past few years. These policies are also in sharp contrast to recent policy announcements to combat climate change (such as during COP26), which included promises to phase out fossil fuel subsidies. Although these policies may somewhat alleviate the immediate impact of price spikes, they do not provide large benefits to vulnerable groups, and by increasing energy demand, they tend to prolong the imbalance of demand and supply. They are also very costly at a time when government debt levels have already soared during the COVID-19 pandemic.

The current energy supply disruptions have the potential to present a major setback to the energy transition. Several countries have announced plans to increase production of fossil fuels. China intends to increase its coal production by 300 million tons (an amount equal to its current imports), and an increase of nearly 8 percent from its current production. Canada has authorized a new offshore oil project which could increase production by 0.2mb/d. The EU has also announced plans to increase imports of LNG to reduce its reliance on Russian natural gas. It is not clear, however, how much will come from new sources of natural gas in the near term or simply greater competition with other countries for a relatively fixed supply of natural gas. While increasing the supply of fossil fuels will help alleviate current energy shortages, it will make achieving climate change goals more challenging. Although some countries have announced intentions to boost energy production from renewable sources or to revive or extend nuclear power plants, it will take time before such projects materialize.

Some countries have announced plans to reduce energy demand, but these will take time to be implemented. For example, the United States announced a faster increase in fuel efficiency requirement for car manufacturers, with fuel efficiency now required to increase to 49 mpg by 2026, an increase of about one-quarter relative to 2021. The EU announced plans to encourage the installation of heat pumps, which are a more energy-efficient method of heating homes. In addition, high fossil fuel prices will likely encourage consumers to shift to low carbon technologies such as electric vehicles. Even before the most recent increase in oil prices, such a shift had been underway.

Food

A key similarity between the Ukraine war and the earlier food price shocks is the role of high energy (and fertilizer) prices in driving the food price increases. However, the extent and breadth of price increases differed markedly across the three spikes. Whereas the 1970s food price increases were among the largest of the past 100 years, the more recent increases have been much smaller in magnitude. While the 1970s price boom was broad-based, in 2008-09 it was led by rice, and the current price spike has been lead by wheat (with increases in maize and oilseeds as well).

Substitution has also played an important role in recent developments and explains differences in prices movement following the Ukraine war. While the prices of agricultural commodities where Ukraine is a major exporter rose, increases were smaller for sunflower oil compared with wheat. That is because sunflower oil can be substituted by soybean and palm oil (the prices of all edible oils rose following the war, reflecting this substitutability). The larger price spike for wheat reflects the fact that it is less easily substituted by other commodities. Substitution of wheat will instead come from land reallocation, which takes place from one season to the next.

On the policy front, exports bans and other trade restrictions so far have been less common today compared to the previous spike. However, if the reductions in grain supplies from Ukraine (and possibly from Russia) become much larger, it could lead to increased use of restrictive policies. Such supply reductions combined with restrictive policy measures could introduce enormous uncertainty for future food supplies and prices.

The recent food price increases have nonetheless accelerated domestic food price inflation and increased food insecurity in most EMDEs. Even before the Ukraine war, the pandemic had already taken a toll on food insecurity. According to the Global Report on Food Crises, an estimated 161 million people were facing crisis or worse. This is up from 147 and 115 million in 2020 and 2019, respectively. Populations facing a crisis, which are typically in countries with some type of conflict, include DRC (26 million), Afghanistan (23 million), Nigeria (23 million), Ethiopia (16 million), and Yemen (16 million).

The war-driven disruptions in food trade, higher food price inflation, and higher cost of assistance are likely to make more people food insecure. The U.S. Agency for International Developments estimated that between 2.5 and 5 million people in Ukraine (around 5 to 10 percent of its population) will likely need humanitarian assistance to prevent food consumption gaps and protect livelihoods in the near term (FEWS NET 2022).

Conclusions and policy implications

The war in Ukraine has delivered a major shock to energy and food commodity markets. This shock comes on top of pandemic-related supply chain disruptions and a stronger-than-expected rebound in demand. Food shortages and inflation are negatively impacting the poor and may worsen inequality (World Bank 2022). Higher food prices will exacerbate food insecurity in many countries, with particularly severe impacts on the poorest households (Gill and Nagle 2022; Ha, Kose, and Ohnsorge 2019). Over the next year, many low-income countries in Northern Africa, Asia, and the Near East face a risk of widespread hunger and malnutrition as a result of reduced supply from Ukraine and Russia (FAO 2022; WFP 2022). Ukraine itself will have localized problems of food adequacy because of destruction of farming assets, losses of labor to refugee displacement and defense, and deprivation of employment income.

In advanced economies (and EMDEs), rapidly rising energy and food prices will weigh on growth and materially increase inflation, further complicating policy decisions facing central banks. Higher interest rates are forecast, and tighter global financial conditions have historically had strong negative effects on EMDEs, particularly on those with large foreign financing requirements.

A comparison of the current energy price shock with previous episodes suggests that the current crisis has three key features that could make addressing the energy shortfall more difficult. First, there is less room today than in the past to substitute away from the most-affected energy commodities—gas and coal—as price increases have been broad-based across all fuels. Higher prices of some commodities such as energy have also increased the production costs of other commodities. Second, the energy intensity of GDP has fallen sharply since the 1970s, and so consumers may be less sensitive to relative price changes, at least in the short term. It may also be more difficult for countries to reduce energy use (i.e., less "low hanging fruit" available). Third,

policy responses in many countries have prioritized energy subsidies and tax breaks, aggravating the situation, with fewer policies designed to tackle the underlying imbalance between supply and demand.

Policy responses will be key to providing a long-term solution to the current price hike. The comparison with earlier shocks highlights how some policies have been highly effective and beneficial, while others have provided short-term fixes but at the expense of market distortions or new problems. Increased efficiency standards for automobiles, incentives for more efficient home appliances, and renewable energy mandates (except biofuels) have all generated long-term benefits. Similarly, setting up institutions to improve market transparency, coordinate policy responses, improve data quality, and facilitate policy dialog, have also been beneficial. These institutions include the International Energy Agency (set up by the OECD after the first oil price shock) and more recently the Agricultural Marketing Information System (set up by the G-20 in response to the 20007-08 prices spike).

In the past, some policies that provided short-term respite to higher prices exacerbated problems in the medium-term or led to new problems. For example, price controls in the United States after the first oil price shock in 1973 distorted markets and may have increased oil demand. The promotion of coal use for electricity generation in the late 1970s reduced reliance on oil; however, it created environmental problems, including air pollution and the acceleration of climate change. Similarly, the introduction of biofuels provided an alternative to crude oil and may have increased the share of renewable energy, but its overall effectiveness has been questioned because biofuel production requires large amounts of energy and fertilizers and leads to upward pressure on food prices. Export bans on food commodities during the 2007-08 and 2010-11 price increases, while temporarily softening the impact of food price inflation on some poorer households, also induced high volatility in world prices as well as reciprocal policy responses by other countries. In the current context, well-intentioned energy subsidies could delay the transition to a zero-carbon economy.

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Commodity Market Developments and Outlook

Energy

The war in Ukraine has resulted in major disruptions to the supply of Russian energy exports, building on existing pressures in the aftermath of the COVID-19 pandemic. As a result, energy prices in March 2022 were double their level in March 2021, with the largest price increases for natural gas and coal. All energy prices are now expected to remain higher for longer. Brent crude oil prices are forecast to average $100/bbl in 2022, their highest level since 2013, before moderating to $92/bbl in 2023 as production grows. Natural gas prices are expected to remain high in 2022, with the European benchmark more than doubling compared to 2021, while coal prices are set to nearly double, partly reflecting their use as a close substitute for natural gas. The main risk to energy markets is the duration of the war and the extent of disruption to Russia's exports. If the war is prolonged and energy exports are further curtailed, prices could be muhc higher. Downside risks include a further slowdown in global growth as well as further outbreaks of COVID-19, especially in China.

Crude oil

Recent developments

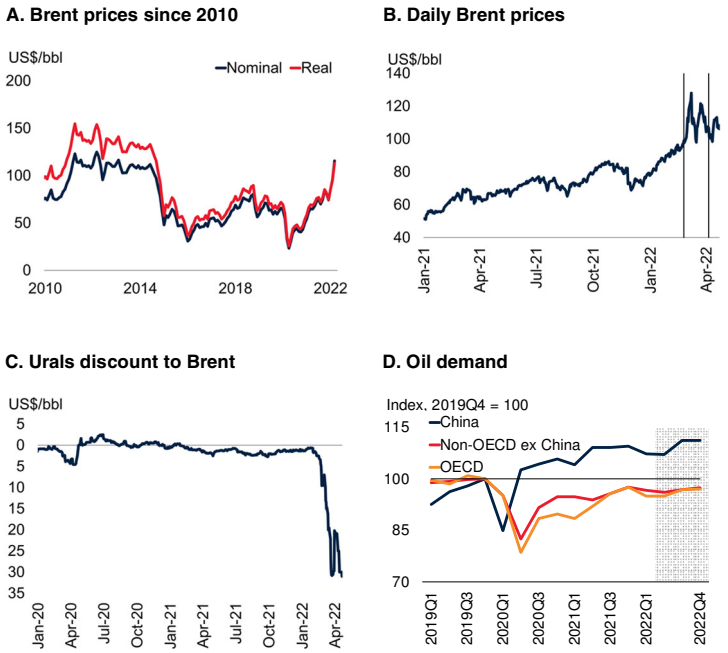
The price of Brent crude oil averaged $116/bbl in March 2022, a 55 percent increase from December 2021 and its highest level since 2013 (figure 3). The war in Ukraine has started to disrupt Russia's exports of crude oil (and oil products) raising concerns about global supply as Russia accounts for about 10 percent of global oil production. Several countries, including Canada, the United Kingdom, and the United States, announced plans to ban or phase out imports of oil from Russia, causing the price of Urals, the Russian benchmark, to trade at a discount of more than $30/bbl to Brent.

These developments have added to concerns about oil consumption outpacing production, given insufficient investment in new oil supplies. Amid the uncertainty, crude oil prices have been extremely volatile in recent months, with large daily fluctuations. After rising to $130/bbl in early March, prices declined to a low of $100/bbl in early April following an announcement of a major oil inventory release by International Energy Agency (IEA) members, as well as renewed outbreaks of COVID-19 in China.

Global consumption of crude oil has fallen since the start of the year, due to a combination of slowing economic growth, outbreaks of COVID-19 in China, and the impact of higher oil prices on consumption. After having regained pre-pandemic levels in 2021Q4, oil demand dropped by 2 percent in 2022Q1 (q/q) and is expected to decline further in 2022Q2. Global GDP growth is expected to slow sharply in 2022 and 2023, which will weigh on oil demand, while spillovers from the war will add to several pre-existing headwinds, including the exhaustion of pent-up demand, the

FIGURE 3 Oil market developments

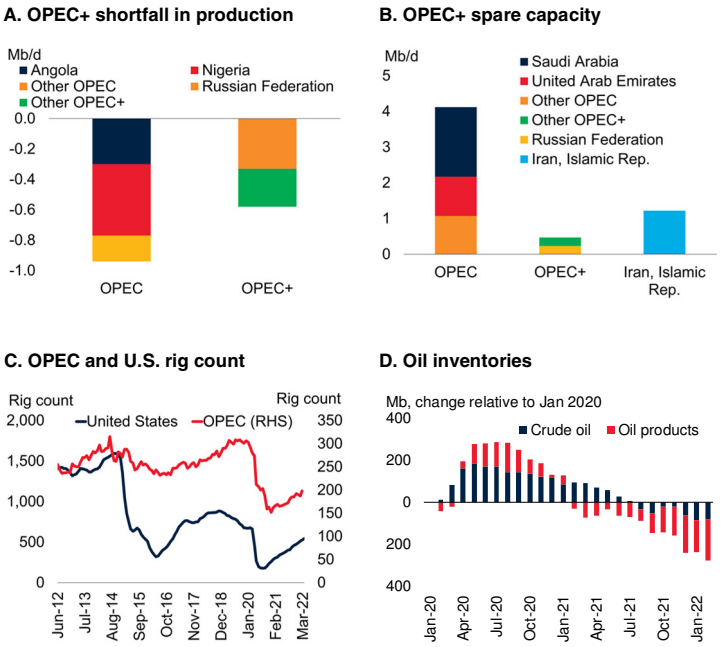
Oil prices have surged since the start of 2022, particularly after the Russian invasion of Ukraine, building on an existing rally in 2021. Prices have been extremely volatile since the war began. The price of Urals, the Russian benchmark, has been trading at a sharp discount to Brent due to a lack of buyers. Lockdowns in China amid outbreaks of COVID-19 have dampened demand, and slowing economic activity is also expected to weigh on demand.



Sources: Bloomberg; FRED; International Energy Agency; World Bank.
A. Real prices are nominal prices deflated by CPI inflation. Last observation is March 2022.
B.C. Last observation is April 22, 2022. Vertical lines on the events of February 23 for Russia-Ukraine war and April 5 for Shanghai lockdowns.
C. Urals is the Russian oil benchmark.
D. Shaded area indicates IEA forecasts.

FIGURE 4 Oil production

Oil production among OPEC+ continues to be well below targets, and levels of spare capacity may be lower than current estimates. U.S. production has been broadly flat in 2022Q1 despite a continued rise in the rig count. OECD oil inventories have steadily fallen as consumption has exceeded production.



Sources: Energy Information Administration; International Energy Agency (IEA); World Bank.
A. Change in crude oil production compared to target set by OPEC countries for March 2022. "Other OPEC +" includes Bahrain, Brunei, Malaysia, South Sudan and Sudan.
B. Chart shows estimates of spare capacity based on IEA Oil Market Report April 2022.
D. Last observation is February 2022.

withdrawal of policy support, and elevated commodity prices.

While higher oil prices will also dent oil demand, this impact is expected to be modest, and a substantial reduction in demand is not expected at current price levels. This is because price elasticities of demand for oil products, such as gasoline and diesel, are very low.[1] In addition, many governments have responded to the rise in oil prices by implementing fuel tax cuts or introducing subsidies, especially for gasoline, which will cushion the impact of higher oil prices on demand.

Global oil production rose just under 1 percent in 2022Q1(q/q) and remains around 3 percent below pre-pandemic levels.[2] The increase was entirely accounted for by OPEC+, where production rose by about 1 mb/d as the group continued to unwind its earlier cuts. Output among non-OPEC+ countries fell slightly by 0.2 mb/d in the first quarter, with a decline of 0.3 mb/d in the United States partially offset by a modest rise in Brazil.

Although OPEC+ production increased modestly, the group continues to produce well below its official target (figure 4). In March 2022, 12 of the 19 countries subject to production cuts were below their quotas. Since the start of 2022, the shortfall has averaged more than 1 mb/d, and in March the gap had widened to 1.4 mb/d as Russia's production declined. At present, the largest shortfalls are in Nigeria (0.5 mb/d) and Angola and Russia (each 0.3 mb/d). Production has been affected by a variety of temporary factors, including maintenance (Kazakhstan and Libya), protests (Kazakhstan), sabotage (Nigeria), and bad weather (Iraq, Libya). In addition to these factors, low investment in recent years, compounded by COVID-19, may have reduced productive capacity. The group is expected to fully unwind its agreed production cuts by September 2022, in line with previous announcements.

Russia's oil exports fell by about 0.3 mb/d in March. Some countries, including Canada, the United Kingdom, and the United States, banned or phased out Russian imports of oil. Several large oil companies announced they would cease operations in Russia, while many traders became reluctant to buy Russian oil due to difficulties in making transactions or obtaining insurance on cargoes. Conversely, several EMDEs have increased imports of Russian oil, taking advantage of the significant discount on Urals (the Russian oil benchmark) to Brent. This diversion, however, may be limited by infrastructure constraints, access to financing, and insurance coverage. For example, pipeline exports to Europe account for 9

[1] Dahl, C. 2012. "Measuring Global Gasoline and Diesel Price and Income Elasticities." *Energy Policy*, 41(C):2-13.

[2] International Energy Agency. 2022. "*Oil Market Report—April 2022.*" International Energy Agency, Paris.

percent of Russia's exports, and these would be difficult to redirect elsewhere. The decline in Russian exports is expected to deepen to 2.5 mb/d by May according to the IEA, as the impact of the war and sanctions become more severe.

Production in the Islamic Republic of Iran, an OPEC+ member but exempt from cuts, rose by about 0.1 mb/d in 2022Q1 to 2.6 mb/d, its highest level in nearly three years, facilitated by higher exports. Production in Libya, which is also exempt from the OPEC+ agreement, fell nearly 0.1 mb/d to 1.1mb/d in March as production at some oilfields fell short of capacity amid geopolitical tensions.

Among non-OPEC countries, production fell by 0.2 mb/d in the first quarter of 2022 (q/q). U.S. production declined as bad weather in Texas and maintenance difficulties elsewhere disrupted production early in the year. Production bounced back in March and is expected to keep increasing as the U.S. rig count slowly rises. The shale industry is nonetheless facing significant constraints: in a survey of 132 oil firms, 60 percent of respondents cited investor pressure to maintain capital discipline (i.e., to focus on returning cash to shareholders rather than increasing output) as the main obstacle to growth.[3] Shortages of labor and other inputs, including sand, were also cited.

Outside of the United States, output has started to ramp up in Guyana after its first oil fields started production. Supply has also risen by 0.15 mb/d in Brazil as production rebounded from a weather-related low in 2021Q4.

Oil inventories among OECD countries have declined for 14 months at an average rate per month of 1.2 mb/d, as consumption outpaced production. OECD inventories in February reached their lowest level since 2014, standing 12 percent below their five-year average. Oil inventories in non-OECD countries have also fallen.

In response to the sharp rise in prices, IEA member countries announced two coordinated emergency inventory releases. Perhaps most notably, the United States announced that 180 million barrels (mb) of oil would be released from its Strategic Petroleum Reserve over a period of six months from April, with the remaining IEA members announcing a combined release of 60 mb. Together, they amount to about 1.3 mb/d, the largest release in the IEA's history. Prior to the release, OECD oil inventories amounted to more than 4 billion barrels, of which just over one-third were held in strategic stockpiles and just under two-thirds were held by industry. That is equivalent to 90 days of consumption, or 156 days of IEA member countries' oil imports. The U.S. Strategic Petroleum Reserve has a maximum theoretical drawdown rate of more than 4mb/d for 90 days, although this rate of drawdown has never been tested and in practice is likely to be significantly lower.[4]

Price forecast and risks

Outlook. The price of Brent is forecast to average $100/bbl in 2022, a 42 percent increase from 2021, and its highest annual average since 2013. Prices are expected to fall slightly to $92/bbl in 2023 but will remain well above than their 2016-21 average of $60/bbl. Higher prices reflect the marked reduction in Russian exports and continued growth in oil consumption in advanced economies, despite the recent price increases.

Global oil consumption is expected to grow by 2 mb/d (2 percent) to 99.4 mb/d in 2022, slightly below its 2019 level, according to the IEA's April assessment (figure 5). Consumption growth in advanced economies is expected to be larger than that of EMDEs for the first time since 1999, largely due to a steep decline in demand in Russia and slower growth in China.

The IEA's demand growth forecast has been lowered by more than 1 mb/d since February, reflecting the impact of the war in Ukraine,

[3] Federal Reserve. 2022. *Energy Survey, Q1 2022*. Federal Reserve Bank of Dallas.

[4] For example, the sharp increase in U.S. crude oil production in recent years has also led to much higher utilization of pipelines and other infrastructure, reducing the capacity for inventory releases.

slowing global economic growth, and the spread of COVID-19 in China. However, downward revisions to total demand by other forecasters, such as OPEC and the EIA, have been smaller.

Global oil production is expected to rise by 1.7 mb/d between 2022Q1 and 2022Q4 as OPEC+ continues to unwind their production cuts and U.S. output increases. Russian exports of crude oil and oil products are expected to be severely disrupted as countries reduce their imports. Under current sanctions, the IEA estimates Russia's exports will be reduced by 2.5mb/d, about 30 percent of their total production. While there has been some diversion of Russia's exports to other countries, this is constrained by infrastructure and financing availability. Other OPEC+ members are assumed to unwind production cuts in line with their previous announcements. Outside of OPEC+, the U.S. is expected to increase production by nearly 1.3 mb/d in 2022, while Brazil and Canada will see increases of 0.2 mb/d, and Guyana 0.1 mb/d.

Risks. Risks to the price forecast are very large both to the upside and downside. Prices could be higher in the event of a more prolonged war or a greater disruption to Russia's oil exports. For example, the EU could ban, or phase out faster than currently expected, its imports of oil from Russia, which totaled 3.4 mb/d prior to the war. In such an event, the impact on oil markets and prices would depend on the extent of diversion of Russian exports to other countries, the scope for additional inventory releases, and the potential for production increases elsewhere.

In terms of additional production, the main alternative sources are OPEC+ spare capacity, increased production from countries currently under sanctions, and U.S. shale oil production. However, there are several reasons why these may be limited in their ability to provide additional oil, particularly in the short term.

The IEA estimates that the OPEC+ members that are participating in the cuts have spare production capacity of 4.6 mb/d. Most spare capacity is in Saudi Arabia (2 mb/d), UAE (1.1 mb/d), and Iraq (0.5 mb/d). Among the others, some countries are already struggling to meet their allocated quota. Even for countries with spare capacity, however, it would likely take a period of several months for production to come onstream, and it may prove difficult to reach their estimated maximum capacity. Saudi Aramco has announced a major investment in new production to raise Saudi Arabia's maximum production capacity to 13 mb/d, from about 12 mb/d currently. However, the investment is not expected to raise productive capacity above 12 mb/d until 2025, implying that significant investment is required just to maintain current production capacity.[5]

The IEA estimates that Iran could produce an additional 1 mb/d if sanctions were to be removed. In República Bolivariana de Venezuela, a further 0.2 mb/d could come onstream if sanctions were lifted, although the oil industry would likely need significant new investment to achieve a lasting increase in production.

In the United States, the IEA estimates an additional production increase of 0.5 mb/d could be achieved beyond the expected increase of 1.3 mb/d. However, this would lead to major production cost increases and push capacity to its limits. Amid recent low levels of new drilling, companies have been increasing production by bringing online "drilled but uncompleted" (DUC) wells.[6] By fracking these wells, companies have been able to bring onstream new production without incurring the additional cost of drilling new wells. However, as a result the stockpile of DUCs has fallen sharply, reducing the potential for this channel to allow companies to easily increase production in the future. Further increases in production will require additional labor and other resources (such as sand) and will also take longer to come onstream.

There are several risks to demand. High oil prices could lead to demand destruction. At current prices, however, this seems unlikely, as price elasticities of oil demand are very low in the short-

[5] Saudi Aramco. 2022. *Annual Report, 2021.*

[6] DUCs are oil wells that have previously been drilled but have not been fracked and therefore do not currently produce oil.

run, and governments in many countries have lowered fuel taxes and introduced subsidies to dampen the effect of price increases. If oil prices were to rise markedly higher there could be increasing demand destruction. In addition, global growth could fall more than currently expected, with the potential risk of a recession, while the spread of COVID-19 could worsen, with the impact depending on the severity of lockdown measures. Both risks would hit global oil demand.

The war is also likely to cause long-term changes to the outlook. Russian production of crude oil is expected to be permanently reduced as a result of the exit of foreign companies and reduced access to capital and foreign technology and machinery. At the same time, the sharp rise in prices, and worries about energy security could spur faster changes in demand. For example, patterns of trade in crude oil and oil products are likely to be permanently altered, potentially raising transport costs, while purchases of electric vehicles may be accelerated, lowering oil demand in the medium term.

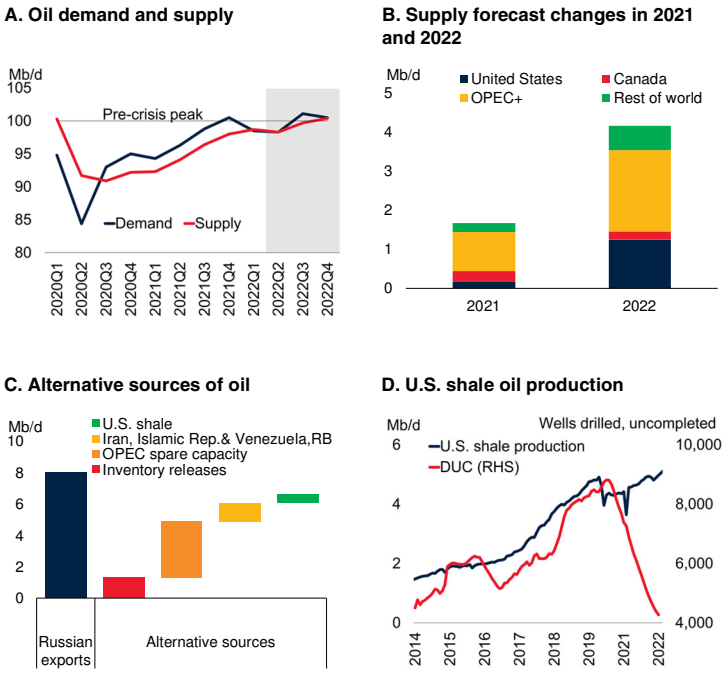
Coal and Natural Gas

Recent developments

Prices. The outbreak of war in Ukraine led to very steep increases in natural gas and coal prices, given the paramount importance of Russia as an exporter of both fuels (figure 6). In March 2022 European natural gas prices jumped more than 50 percent from February to an all-time high and were almost seven times higher than in March 2021. However average prices for 2022Q1 were similar to the previous quarter reflecting extreme tightness in global gas markets that predated the war. Japan and U.S. natural gas prices recorded much smaller gains in March, but were double and near-double, respectively, their levels a year ago. South African coal prices leapt 50 percent in March (m/m), also to an all-time high, and were triple that of a year ago. While potential disruptions to Russia's natural gas and coal exports have greatly impacted prices, rallies had been underway in the wake of COVID-19 amid rebounding demand and constrained supply that had led to declining inventories for both fuels.

FIGURE 5 Oil market outlook

After slowing in the first half of 2022 due to COVID-19 outbreaks, oil demand is expected to regain its pre-pandemic peak by the end of this year. Production is also expected to rise over the rest of this year as output increases in the United States and as OPEC+ continues to unwind its production cuts; however, it has been revised down to reflect the disruption to Russia's output. Production in the United States also faces constraints. In the event of further disruption to Russia's oil exports, other sources of oil are available but they would take time to come onstream.



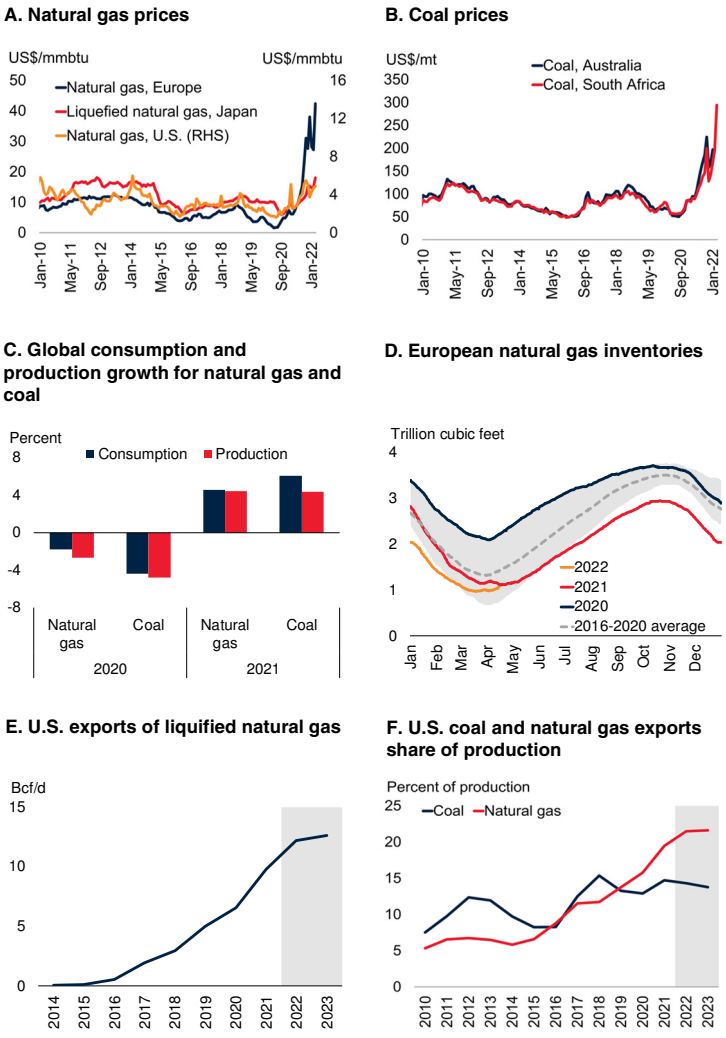
Sources: Energy Information Administration; International Energy Agency (IEA); World Bank.
A.B. Data from IEA *Oil Market Report April 2022* version.
A. Shaded area indicates IEA forecasts.
C. Figure shows Russian exports of oil and oil products prior to the war in Ukraine and alternative sources of supply. Inventory releases refer to the current announced release of oil by IEA members including the United States. Estimates for production are author calculations based on the IEA's "Oil Market Report—April 2022." OPEC spare capacity refers to Iraq, Saudi Arabia, and UAE only.
D. U.S. shale production refers to Permian Basin production.

Demand. Global natural gas demand rose 4.5 percent in 2021, more than reversing a 2 percent decline in 2020. The increase was due to rebounding economic activity, adverse weather which increased demand for natural gas for heating, reduced renewable output which increased the need for natural gas as a substitute in electricity generation, and some disruptions to production.[7] The increase in demand was particularly large in Brazil (+20 percent) and China (+12 percent), largely due to very low

[7] World Bank. 2021. *Commodity Markets Outlook Report.* October 2021. World Bank, Washington, DC.

FIGURE 6 Coal and natural gas markets

Coal and natural gas prices have surged since the start of 2022, with some benchmarks reaching record highs following the war in Ukraine. The increase has been driven by rebounding consumption, which has grown faster than production. Accordingly, inventories of natural gas in Europe fell well below their five-year average. Amid high prices, U.S. exports of liquefied natural gas and coal soared, with the United States exporting about 20 percent of its total production of natural gas and coal in 2021.



Sources: Energy Information Administration (EIA); Gas Infrastructure Europe (AGSI+) International Energy Agency; World Bank.
A.B. Monthly data. Last observation is March 2022.
D. Sample includes 20 EU countries and the United Kingdom. Last observation is April 19, 2022.
E.F. Shaded area indicates EIA forecasts.
F. Share of exports in total production for each commodity.

hydroelectric generation—in Brazil, the electricity sector saw a 60 percent increase in its use of natural gas.[8] Demand for natural gas slowed over the course of the year, however, as the sharp rise in prices from August 2021 resulted in some substitution to other fuels including coal and crude oil in electricity generation. In addition, high prices in Europe led some fertilizer, aluminum, and zinc operators to shut production.

Demand for coal also surged in 2021 by an estimated 6 percent, with the increase due to similar drivers as natural gas, in addition to substitution away from high-priced natural gas in the second half of the year. High gas prices in Europe also diverted liquefied natural gas (LNG) cargoes from Asia to Europe, which resulted in Asian countries using less natural gas and more coal to meet their energy requirements. As such, coal consumption for electricity generation rose rapidly in China (12 percent) and India (11 percent), taking consumption in both countries to all-time highs.[9] At the global level, the use of coal in electricity generation rose 9 percent in 2021, also reaching a new record high.

Production. Global production of natural gas rose 4.4 percent in 2021, taking production above its pre-pandemic level. More than half of the increase came from Russia, with production in Azerbaijan also rising by 25 percent as exports to Europe via the Trans Adriatic Pipeline increased. In addition, production in India rose 17 percent as new projects came on stream, leading to a reduction in its LNG imports. In the United States, production rose by just 2 percent. Exports of LNG, however, surged by 50 percent amid strong demand from the rest of the world, and the country exported 20 percent of its production in 2021, a record high.

Global production of coal is estimated to have risen just over 4 percent in 2021, well below the increase in consumption. Shortages of coal in China and India led to policies to increase domestic production. Output in the United States rose by about 9 percent in 2021 amid strong export demand, with exports increasing 23 percent, and its share of exports-to-production rose to 15 percent. Patterns of coal trade were also

[8] IEA. 2022. *Gas Market Report, Q2-2022*. International Energy Agency, Paris.

[9] International Energy Agency. 2021. *Coal 2021*. International Energy Agency, Paris.

disrupted, as China imposed a ban on imports of coal from Australia that reshuffled shipments. China imported a record amount of coal from the United States, while other countries, notably India and the Republic of Korea, imported more from Australia. Indonesia, the world's largest exporter, issued a temporary ban on exports in January of this year contributing to market tightness.

The war in Ukraine has not disrupted Russia's exports of coal and natural gas as much as for crude oil (although Russian natural gas flows to Europe had been much lower than normal in the months building up to the war). However, the EU announced plans to sharply reduce its reliance on Russian natural gas by two-thirds by the end of 2022, and the EU and Japan each announced a phase-out of imports of Russian coal, expected to commence this year. In 2020, about one-third of Russia's coal exports went to Europe (including non-EU countries), and 10 percent to Japan. The impact of reduced Russian imports on prices will depend on the degree to which trade flows can be rerouted, and the availability of coal and natural gas supply elsewhere. However, the potential for redirection of Russia's natural gas exports is much more limited than for crude oil or coal, since seventy percent of Russia's natural gas exports flow to Europe by pipeline, and Russia's capacity to redirect exports is severely limited.

Outlook and risks

Outlook. Coal and natural gas prices are forecast to increase sharply in 2022 before moderating somewhat in 2023, but remain well above their five-year average. The largest increase is for European natural gas (100 percent), followed by coal (80 percent). The smallest increase is for U.S. natural gas, although prices will be significantly higher than during 2016-21 due to continued strong demand for U.S. LNG exports.

The increase in prices in 2022 reflects disruptions to energy supplies as a result of Russia's invasion of Ukraine and related sanctions and policies. Trade patterns may be sharply altered, pushing up costs. The EU intends to increase imports of LNG by 50 billion cubic meters per day, (about 10 percent of global LNG trade), mainly relying on redirected flows in the short term. Similarly, for coal sanctions will lead to a reshuffling of trade as the EU (and Japan) seek alternative supplies from Australia, Colombia, Indonesia, South Africa, and the United States, while Russian coal may be diverted to India and elsewhere. Changes in trade patterns could greatly increase transport costs, as coal is bulky and expensive to ship.

Natural gas demand is expected to be broadly flat in 2022, as some modest growth in Asia and Africa is offset by large declines in Europe as high prices trigger demand destruction, particularly for industrial and power use in Europe. A subsequent moderation in prices reflects additional supplies coming onstream, changes to consumer behavior, and higher installation of renewable energy sources to generate power, particularly in Europe. Demand for coal will likely continue to be supported in the near term as a substitute for natural gas but medium-term plans in many countries still favor phasing out coal to reduce carbon emissions.

Risks. The risks to the outlook primarily relate to the duration of the war in Ukraine, related sanctions, and import policies. If disruption to Russia's natural gas or coal exports occurs more rapidly or proves larger than expected, prices would likely be much higher than forecast. In such an event, the EU would need to draw down inventories and increase imports from elsewhere. For gas, that means larger LNG imports, although the EU faces import and regassification capacity constraints.

There is also minimal spare global production capacity in natural gas. Some producers have announced plans to increase production and export capacity, including Algeria and the United States, but this will take time to come onstream. As a result, increased imports of LNG by the EU would likely come at the expense of other countries, particularly EMDEs. This could further drive up the cost of natural gas globally and may also force other countries to turn to more polluting forms of energy, especially coal.

Agriculture

The World Bank's Agricultural Price Index gained 11 percent in 2022Q1 (q/q), reaching an all-time nominal high. The index stands 25 percent higher than a year ago, with all four sub-groups posting similar gains. The price surge reflected trade disruptions in some commodities due to the war in Ukraine, production disruptions in wheat (due to the war) and soybeans (due to adverse weather in South America), a surge in input costs (especially energy and fertilizers), and recovering animal feed demand in the wake of the African swine fever in China. Among key food commodities, wheat prices rose fastest, by 31 percent over the previous quarter (57 percent higher than a year ago), followed by maize and soybeans (20 percent each q/q); in contrast, rice prices have been fairly stable. Beverage prices increased marginally in the quarter, but they are more than 30 percent higher than a year ago, driven by increases in coffee prices due to weather-related production shortfalls in Brazil. Agricultural raw material prices were broadly stable. Following a projected increase of nearly 18 percent in 2022, agricultural prices are expected to fall by 8 percent in 2023 as some of the recent disruptions unwind but remain high by historical norms. Risks to the price outlook, which are skewed to the upside, include the likelihood of further production or trade disruptions from Ukraine and Russia, the path of input costs and, in the longer term, biofuel policies.

Grains, oils, and meals

Recent developments

The World Bank's *Grain Price Index* gained 14 percent in 2022Q1 (q/q) and stands almost 20 percent higher than a year ago; the broader *Food Price Index* increased by a similar magnitude (figure 7). Production shortfalls, trade disruptions, and high input costs fueled a rally that pushed some food commodity prices to record highs, with wheat prices increasing the most. For 2022, unusually strong consumption growth, driven in part by animal feed demand, is expected to more than offset a rebound in production of major crops. As a result, stocks-to-use ratios (a rough measure of supply relative to projected demand) are expected to decline somewhat, although still remain at historically elevated levels for most food commodities. For the three main grains—wheat, maize, and rice—the U.S. Department of Agriculture's (USDA) estimates that global production is set to grow by 3.8 percent this season, or 91 million metric tons (mmt), which is more than twice the average growth of 35 mmt over the past 30 years.[1]

Wheat prices soared more than 30 percent in 2022Q1 (q/q) to exceed $530/mt in March, an all-time high. Prices surged when exports from Ukraine, which account for nearly 10 percent of global exports, were halted due to the closure of all Ukrainian ports on the Black Sea, which account for about 90 percent of Ukraine's wheat exports. Limited quantities of wheat exports resumed in early March through rail and road corridors. Although precise estimates of such exports are not available, perhaps as much as half of Ukraine's exportable wheat could eventually be exported overland, although at a greater cost than by sea. Exports of wheat from Russia so far have not been affected. At a global level, production during the ongoing season (which ends in August) appears favorable as good crops in Argentina, Australia, and the European Union are expected to compensate for lower-than-expected yields in parts of Canada, Kazakhstan, and the United States. Global consumption, however, is projected to grow at a much faster pace (almost 2 percent) on strong demand for animal feed. As a result, the stocks-to-use ratio will be two percentage points lower than last season, which is still high by historical standards.

Maize prices gained 20 percent in 2022Q1 (q/q) to reach $335/mt in March, exceeding its July 2012 record by a small margin. The surge reflects uncertainties in the global grain markets due to the war in Ukraine—the country accounts for 3.5 percent of global maize production. Growing conditions in the Northern Hemisphere, particularly India and Mexico, are favorable and sowing in China and the U.S. has commenced as

[1] U.S. Department of Agriculture (database). "Foreign Agricultural Service: Market and Trade Data—PSD Online." USDA, Washington, DC. https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery.

expected. There are some yield reductions in the Southern Hemisphere, notably Argentina and Brazil as a result of La Niña. At a global level, maize production is expected to grow 7.5 percent this season from the 2020-21 season, while consumption is projected to increase 3.4 percent.

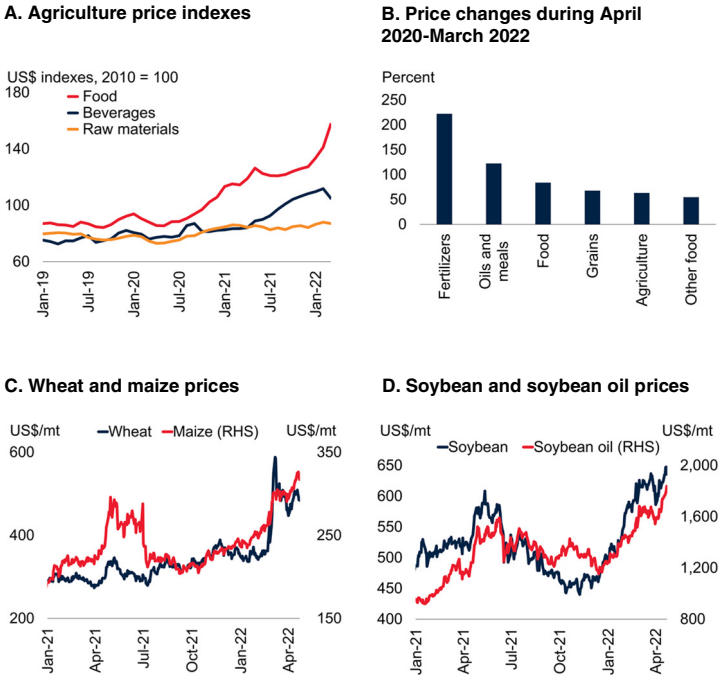
Rice prices have been more stable than prices for other grains. Rice prices gained 6 percent in 2022Q1 (q/q) but are more than 20 percent lower than a year ago. The relative stability of rice prices during the past three quarters followed a seven-year high in early 2021 amid heightened pandemic-related concerns about global supply and announcements of export restrictions (which did not materialize). The USDA expects global rice production to increase nearly one percent this season, with higher output projections for Thailand (the world's top rice exporter) offsetting expected lower supplies from Indonesia.[2] Elsewhere in Asia, conditions are normal, including in China. Global consumption is set to grow more than 2 percent, leaving the stocks-to-use ratio similar to last season's ratio and high by historical norms.

The *Oils and Meal Price Index* gained nearly 20 percent in 2022Q1 (q/q), reaching an all-time high in March. Palm, palm kernel, and soybean oil experienced the largest price increases. The surge reflects a broad-based tightness in the markets for the main edible oilseeds—which tend to be close substitutes to each other—after supply disruptions in Ukraine, which accounts for more than 30 percent of global sunflower production. Indonesia's recent export ban on palm oil aggravated an already tight edible oil market, where output is lower-than-expected in South America (soybeans, partly in response to La Niña), East Asia (palm oil due to yield reductions), and Europe (rapeseed and sunflower oil due to weather issues, and the war in Ukraine for the latter).

This season's global production of the eight most important edible oils—including soybean and palm oil, which together account for two-thirds of global supplies—is expected to grow about 2 percent, or 4.5 mmt in 2022 (figure 8). Although this growth is a substantial downward revision from the 4 percent growth expected six months ago, it is on par with historical averages. Most of the production growth is expected to come from palm oil (up 5.4 percent) and palm kernel oil (up 5.6 percent); soybean oil production will remain largely unchanged (3.5 percent growth was anticipated six months ago). Production of the seven major oilseeds is projected to decline by almost 25 mmt (or 3 percent) in 2021-22. This is a considerable reversal for the season's outlook—six months ago the expectation was a 5 percent increase. Lower production of soybeans (South

FIGURE 7 Commodity price movements

Most food commodities surged in 2022Q1, pushing the World Bank's Agricultural Price Index to an all-time high in March 2022. Contributing factors to the surge include trade disruptions of some commodities due to the war in Ukraine, ongoing supply shortfalls in wheat and soybeans, a surge in input costs (especially energy and fertilizers), and recovering animal feed demand.

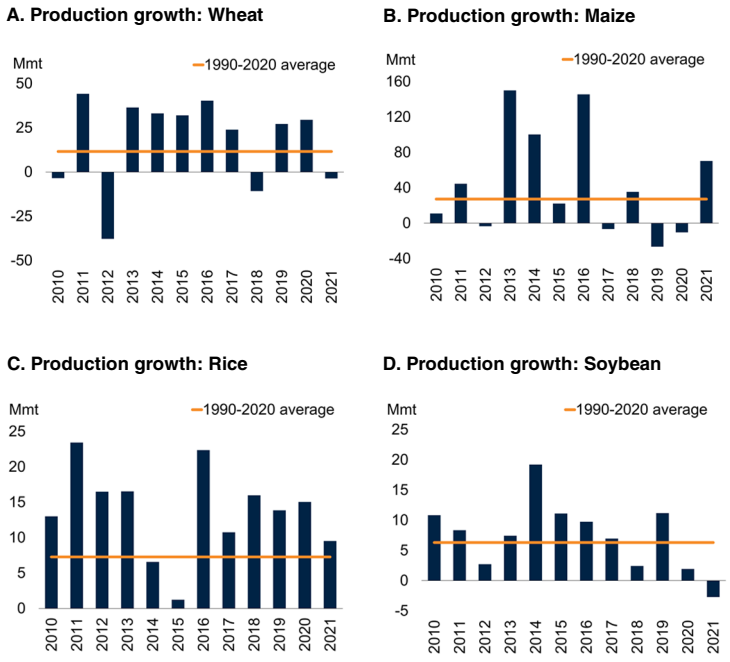


Sources: Bloomberg; World Bank.
A.B. Monthly data. Last observation is March 2022. Panel B shows year-on-year change.
C.D. Daily data. Last observation is April 22, 2022.

[2] U.S. Department of Agriculture (database). "Foreign Agricultural Service: Market and Trade Data—PSD Online." USDA, Washington, DC. https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery.

FIGURE 8 Production of grains and soybeans

In addition to the war in Ukraine, some food commodities have been subjected to production shortfalls. Wheat, for example, has seen lower yields in the United States, while soybeans have been impacted by adverse weather in South America, partly linked to La Niña.



Sources: U.S. Department of Agriculture; World Bank.
Note: All charts show change from the previous year.
A.B. Years represent crop season (for example, 2019 refers to 2019-20). Supply is the sum of beginning stocks and production.

America) and rapeseed oil (Europe) account for the shortfall.

Price forecasts and risks

The *Grain Price Index* is expected to increase over 20 percent in 2022 before easing in 2023 as recent production and trade disruptions unwind. The forecasts represent considerable upward revisions from the October 2021 assessment. Maize is projected to average nearly 20 percent higher this year and decline 10 percent in 2023, while wheat is expected to rise 43 percent in 2022 and decline 16 percent in 2023. In contrast, rice is projected to register small declines both this year and next. The *Oils and Meals Index* is projected to average 30 percent higher in 2022 (also a large upward revision from October) before easing 14 percent in 2023. Among its components, the largest increases this year are in palm oil (+46 percent), coconut oil (+34 percent), and soybean oil (+30 percent).

These forecasts are subject to a number of risks, including a prolonged conflict in Ukraine, higher and more volatile input prices (especially energy and fertilizers), biofuel policies, the current La Niña weather pattern, and macroeconomic uncertainties.

Ukraine war. The war in Ukraine has been a major shock to commodity markets, coming on top of pandemic-related supply chain disruptions as well as production shortfalls (see Special Focus). The war has led to significant disruptions to the production and trade of commodities for which Russia and Ukraine are key exporters, including food commodities (such as wheat and sunflower oil) as well inputs used to grow food (coal, natural gas, and fertilizers). A continuation of the war beyond this year could reverse the expected easing of food commodity prices in 2023.

Energy costs. Energy is an important cost component to grain and oilseed crops, with both direct channels (fuel prices) and indirect channels (chemical inputs and fertilizer prices). Energy prices surged in 2021 and are expected to increase further in 2022 (figure 9; also see *Energy* section). The three main natural gas price hubs (Europe, United States, and LNG in Asia) are projected to average 111, 35, and 77 percent higher, respectively, this year compared to 2021 before easing in 2023. Similarly, fertilizer prices are projected to increase almost 70 percent in 2022 before easing 11 percent in 2023. Energy market developments have been taking a toll on fertilizer markets since early 2021. Several chemical companies curtailed output or temporarily shut production facilities due to surging input prices and/or the unavailability of feedstocks. Russia has announced restrictions on fertilizer exports which, combined with sanctions on exports from Belarus, further destabilizes an already tight market (see *Fertilizer* section). If energy and fertilizer prices do not moderate next year as expected, food prices will be subject to significant upward pressure.

Biofuels. Diversion of arable land to biofuels is projected to increase in the medium term, notably

for sugarcane and maize (for ethanol production) and edible oils (for biodiesel production). While Brazil, the European Union, and the United States account for more than two-thirds of global biofuel production, the share of other producers (including China, Indonesia, and Thailand) has been growing—reaching more than 30 percent in 2021, up from 13 percent a decade ago. Biofuel production declined in 2020 in response to lower energy use due to lockdowns but reached pre-pandemic levels in 2021 and is expected to grow further in 2022. For example, in an effort to stabilize fuel prices, the United States will temporarily allow gasoline containing 15 percent (up from 10 percent) ethanol blend to be sold this summer.

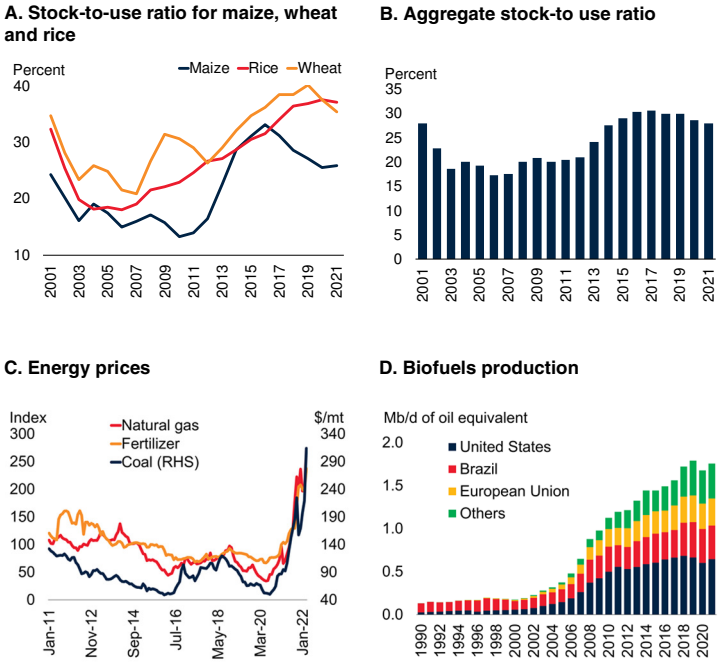
Biofuel production could continue to rise in coming years, with numerous countries announcing plans to increase output as part of efforts to meet climate change targets, address energy security issues, and supplement shortfalls of oil supplies. Global biofuel production could increase as much as 50 percent during the next five years. If such targets materialize, food prices could increase further, given that an additional 2 percent of world agricultural land would need to be allocated for biofuel crops—currently biofuels account for about 4 percent of global land and 0.5 percent of global energy consumption. Another biofuel-related risk is the price of crude oil. Most of the world's biofuel production is a result of policy mandates rather than profitability. However, if crude oil prices continue to increase, biofuel production from some crops could become profitable, in which case energy prices could act as a floor to the prices of food commodities.

Weather. The current La Niña weather phenomenon has already affected crops in South America, including soybeans and coffee. According to the National Oceanic Atmospheric Administration, La Niña is expected to remain in place until June (80 percent probability) or July (65 percent probability), further affecting crops especially in the southern hemisphere.

[3] World Bank (2015). Commodity Market Outlook—Understanding El Niño: What does it Mean for Commodity Markets?

FIGURE 9 Risks to the food commodity outlook

Although food commodity markets are better supplied than they were during the spikes of 2008-09 and 2010-11, there are several risks to the outlook, including disruptions associated with the war in Ukraine, high energy and fertilizer prices, and a likely surge in biofuel production.



Sources: BP Statistical Review; Organisation for Economic Co-operation and Development U.S. Department of Agriculture; World Bank.
C. Monthly data. Last observation is March 2022.

Historically, La Niña's impact on agriculture is milder and more mixed than El Niño.[3]

Macroeconomic conditions. Elevated inflation and interest rate hikes also pose risks to commodity prices. Persistently high inflation could exert further upward pressure on the cost of labor as well as intermediate materials used to produce, store, and transport commodities. In addition, anticipated interest rate hikes in response to high inflation by several major central banks will increase the global cost of borrowing, which could constrain investment in new production of agricultural commodities, as well as in supply chains to overcome bottlenecks caused by the pandemic.

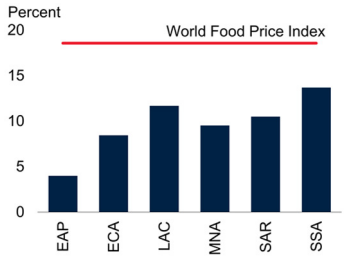
Implications for food insecurity and inflation

Global food price increases along with reduced incomes following pandemic-related lockdowns

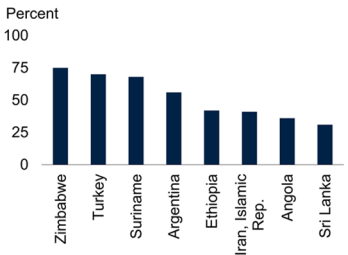
FIGURE 10 Domestic food price inflation and food insecurity

Pandemic-related income and employment losses, higher global and domestic food prices in part related to the war in Ukraine, and supply constraints increase risks of food insecurity. According to the Global Report on Food Crises, an estimated 161 million people experienced food crises or worse in 2021 (up from 147 million in 2020).

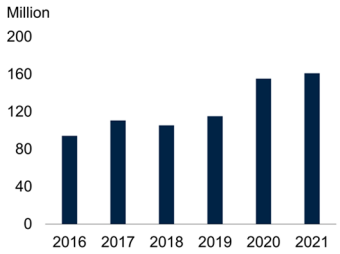
A. Domestic food price inflation and world food price index



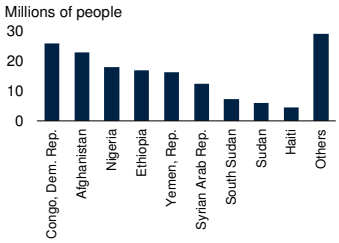
B. Food price inflation in selected countries



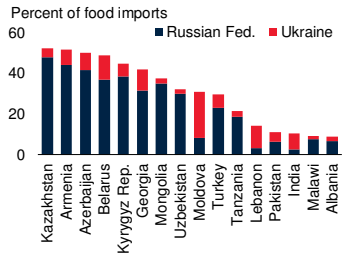
C. Number of people in acute food insecurity in the world



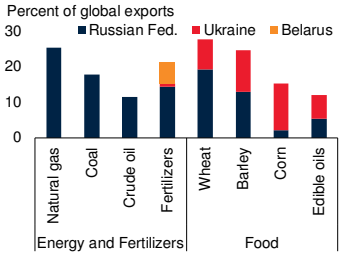
D. Projected number of people in acute food insecurity, 2022



E. Dependency on Russia and Ukraine food imports



F. Major commodity exports from Russia, Ukraine, and Belarus



Sources: Food and Agriculture Organization of the United Nations; UN Comtrade; World Bank; World Food Program.

A. EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MNA = Middle East and North Africa, SAR = South Asia, SSA = Sub-Saharan Africa. Chart shows year-on-year inflation, as of February 2022.

B. Year-on-year food price inflation in February for 10 countries with the highest rates. Data for Angola and Nigeria are from "Hunger Hotspots: FAO-WEP Early Warnings on Acute Food Insecurity (August to November 2021 Outlook)."

C. Data are as reported in and discussed in the text of *Global Report on Food Crises 2021* by the Global Network Against Food Crises (Figure 1.6).

D. Data are for 2022 and based on the most recent projections. Bars represent the sum of IPC Acute Food Insecurity phases 3 (crisis), 4 (emergency), and 5 (catastrophe/famine), as well as severely and modestly food insecure categories. "Others" includes the following countries: Angola, Burkina Faso, Central African Republic, Chad, Honduras, Kenya, Lebanon, Madagascar, Mali, Mauritania, Mozambique, Niger, and Somalia.

E.F. Data for 2020.

F. Data for energy and food are trade volumes. Fertilizers are phosphate rock and potash minerals, and ammonia-based non-minerals.

pose risks to food insecurity and domestic food price inflation.

Food insecurity. Rising food prices have increased food insecurity in most EMDEs. It could increase even more, given the reliance of a number of EMDEs on food imports from Ukraine and Russia. Even before the Ukraine war, the pandemic had already taken a toll on food insecurity. According to the Global Report on Food Crises, an estimated 161 million people were facing a food crisis or worse in 2021, up from 147 million in 2020. Populations facing a crisis, which are typically in countries with conflict, include Democratic Republic of Congo (26 million), Afghanistan (23 million), Nigeria (23 million), Ethiopia (16 million), and Yemen (16 million). The war-driven disruptions in food trade, higher food price inflation, and higher costs of administering food assistance efforts are likely to make more people food insecure. The U.S. Agency for International Development estimated that between 2.5 and 5 million people in Ukraine (around 5 to 10 percent of the national population) will likely need humanitarian assistance to prevent food consumption gaps and protect livelihoods in the near term.

Domestic food price inflation. Local food prices have been surging in response to increasing energy and fertilizer prices since early 2021, pandemic-induced supply-chain constraints, and more recently, disruptions because of the war in Ukraine. Depreciation of some currencies as well as increasing costs have played a role as well. The net effect is elevated food price inflation in several EMDEs, especially in Latin America and the Caribbean (e.g., Argentina, Suriname, Venezuela), Sub-Saharan Africa (e.g., Angola, Ethiopia, Zambia, Zimbabwe), and the Middle East (Iran, Lebanon, Turkey; figure 10). Among EMDE regions, median food price inflation ranged between 4 percent (East Asia and the Pacific) and 14 percent (Sub-Saharan Africa) percent in December 2021-February 2022 (y/y). During this period, global food prices increased 19 percent. Given the lag between world and domestic food price changes, there is considerable risk that food prices in some EMDEs could increase further.

Beverages

The World Bank's *Beverage Price Index* has been broadly stable during the past two quarters, but it is still up more than 30 percent in 2022Q1 from a year ago. Coffee (Arabica) prices strengthened a little while Robusta, cocoa, and tea prices have remained stable (figure 11). Following a projected increase of 11 percent this year (largely driven by coffee), the index is expected to ease 4 percent in 2023.

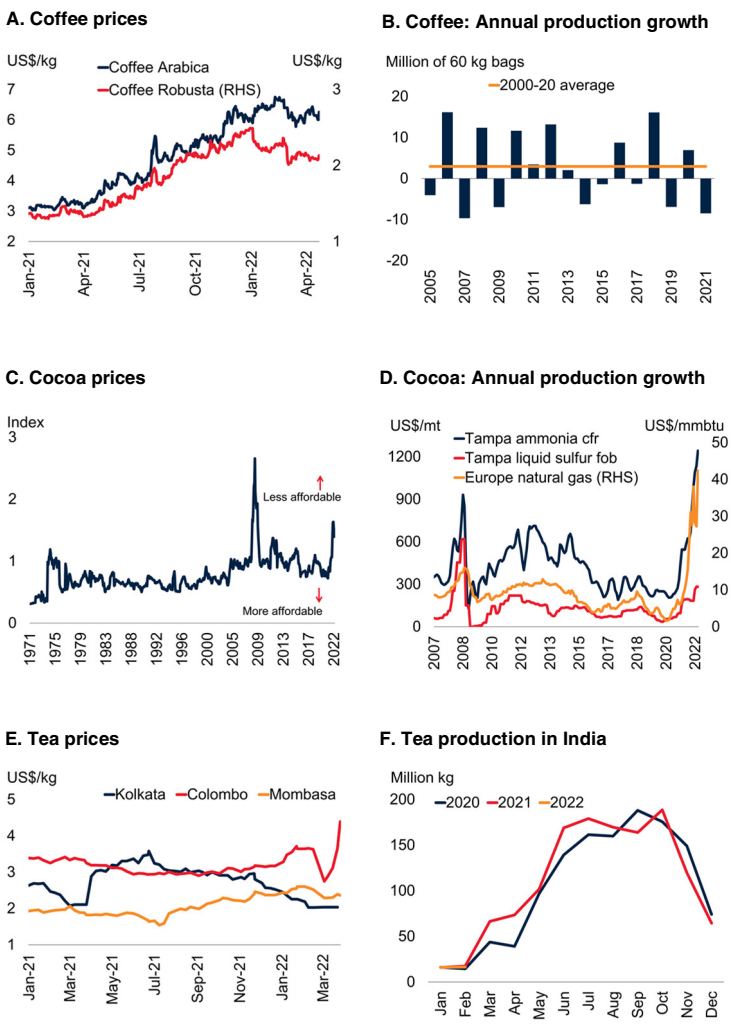
Arabica and *Robusta coffee* prices changed little in 2022Q1, but stand 64 and 48 percent higher, respectively, from a year earlier. Arabica prices reached nearly $6.20/kg in February, the highest since May 2011, driven by a shortfall in Brazil's output due to a frost that afflicted the country's coffee growing areas. Colombia's coffee output has also been affected by poor weather. Despite logistical bottlenecks, exports from Vietnam (the world's main Robusta producer) and Indonesia continued to improve in 2022Q1, thus moderating likely increases in Robusta prices. Global coffee production is expected to drop to 163 million bags during the 2021-22 season, almost 10 percent lower than last season's record crop of 179 million bags. With consumption projected to reach nearly 170 million bags, a sharp drawdown of inventories is expected in 2021-22. Arabica and Robusta prices are expected to average 22 and 16 percent higher, respectively, in 2022 than in 2021 before easing in 2023 as production recovers in Brazil and mobility restrictions ease in South Asia.

Cocoa prices have been broadly stable during the past six quarters, fluctuating in a narrow band of $2.30/kg and $2.55/kg. Global cocoa production during the current season is expected to reach almost 5 million tons, about 1 percent lower than last season's crop. Some uncertainties over Ghana's crop have been compensated by Côte d'Ivoire's good prospects—these two countries are the world's largest suppliers. Global grindings, a measure of demand, which declined considerably during the pandemic, are projected to increase 2 percent, pushing stocks down by 1 percent. Cocoa prices are expected to remain fairly stable in 2022 and 2023, as the global market appears adequately supplied and as pandemic-related disruptions steadily ease.

Tea prices gained 8 percent in 2022Q1 (q/q), led by a surge in Mombasa, Kenya, followed by Colombo, Sri Lanka. Prices at Kolkata, India

FIGURE 11 Beverage commodity market developments

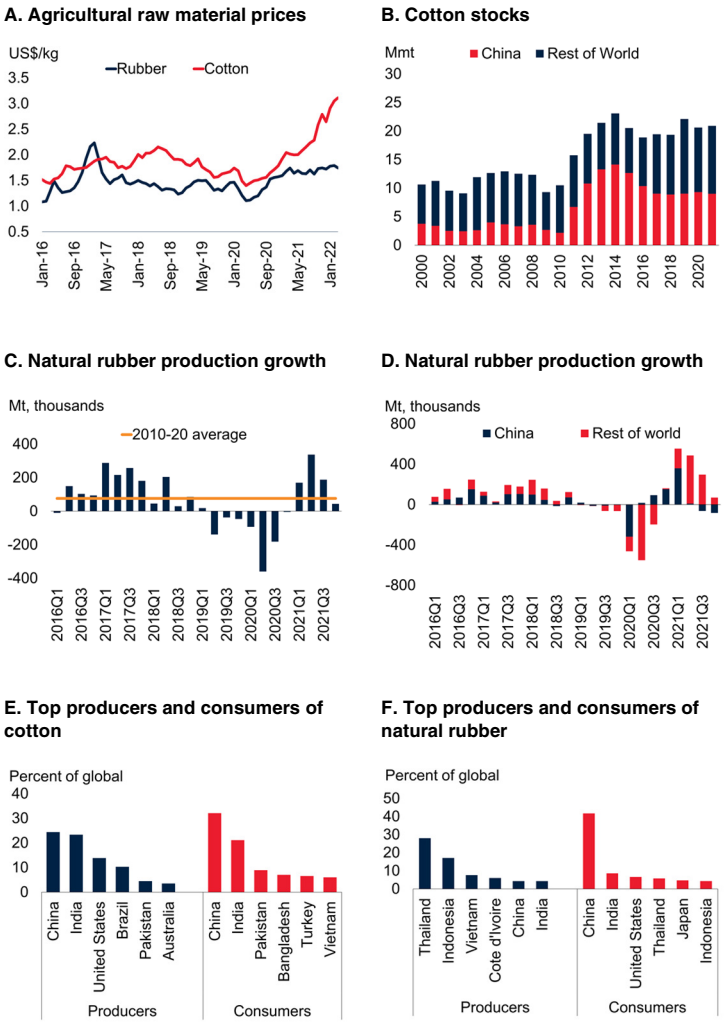
Coffee (Arabica) prices strengthened in 2022Q1 due to adverse weather in Brazil. Robusta, cocoa, and tea prices have been stable amid steady production and robust demand.



Sources: Africa Tea Brokers Limited; Bloomberg; International Cocoa Organization; Tea Board India; Tea Exporters Association Sri Lanka, U.S. Department of Agriculture; World Bank.
A.C. Last observation is April 22, 2022.
B.D. Years represent crop seasons (for example, 2020, refers to 2020-21). Annual change in production.
E. Weekly data. Last observation is April 1, 2022.
F. Tea production in India for 2020, 2021, and 2022.

FIGURE 12 Agricultural raw materials market developments

Cotton prices continued to rise in 2022Q1 in response to reduced supplies. The natural rubber market is fairly balanced, but China's lockdown and potential supply-chain disruptions to automobile production are key risks to the outlook.



Sources: Bloomberg; International Cotton Advisory Committee; International Rubber Study Group; U.S. Department of Agriculture; World Bank.
A. Monthly data. Last observation is March, 2022.
B. Years represent crop season (for example, 2020 refers to 2020-21 crop season).
C.D. Last observation is 2021Q4. Year-on-year growth in each quarter.
E.F. Shares are based on the average values of 2020 and 2021.

declined 8 percent in the quarter and are down 24 percent compared to a year ago. The firming in Mombasa reflects robust demand and some weather-related production shortfalls in East Africa, especially in Kenya, the world's largest tea exporter. However, early indications for the upcoming season's crop indicate broadly stable tea production. Prices (three-auction average) are expected to remain broadly stable for the next two years. Risks to the outlook relate to the easing of mobility restrictions from the pandemic and reduced consumption by Eastern European and Central Asian countries.

Agricultural raw materials

The World Bank's *Raw Material Price Index*, which had been broadly stable through end-2021, made moderate gains in 2022Q1 (up 2.8 percent, q/q). However, its two key components—cotton and natural rubber—followed diverging paths in response to reduced cotton supplies and weakening demand for natural rubber (figure 12). The index is expected to rise marginally in 2022 and stabilize in 2023. Risks to the outlook emanate from weakening demand due to lockdowns (especially in China).

Cotton prices continued their upward trend that began in early May 2020 to reach an 11-year high in March. Prices have increased in 20 of the past 23 months. The overall price strength reflects gradual improvement in the outlook for global demand, which is expected to average 26.2 mmt in the current season, 2 percent higher than 2020-21. This outlook is a marked improvement over the previous season's pandemic-related contraction of more than 13 percent. On the supply side, global production is projected to increase 8.4 percent, led by the world's largest exporters—Brazil and the United States (with shares of about 20 percent each). Production in China and India, the world's largest producers, is expected to decline marginally due to weather-related challenges. Cotton prices are expected to be nearly 40 percent higher in 2022, before easing 6 percent in 2023 as weather-related challenges unwind.

Natural rubber prices gained 9 percent in 2022Q1 (q/q) but are down 11 percent from a year earlier. The recent increase partly reflects the high prices of synthetic rubber (a substitute of natural rubber) caused by soaring feedstock and energy prices. On the supply side, global output was up 4 percent in March 2022 from a year earlier. Thailand and Côte d'Ivoire led the recovery (up 9.3 and 15.4

percent, respectively), followed by Indonesia, Malaysia, and Vietnam. Demand for natural rubber has recovered due to rising auto sales; most natural rubber goes to the manufacturing of tires. Natural rubber prices are expected to remain broadly stable this year and next. Risks to the outlook relate to production in the supply-constrained automobile sector (e.g., semiconductors) and the extent of China's lockdown.

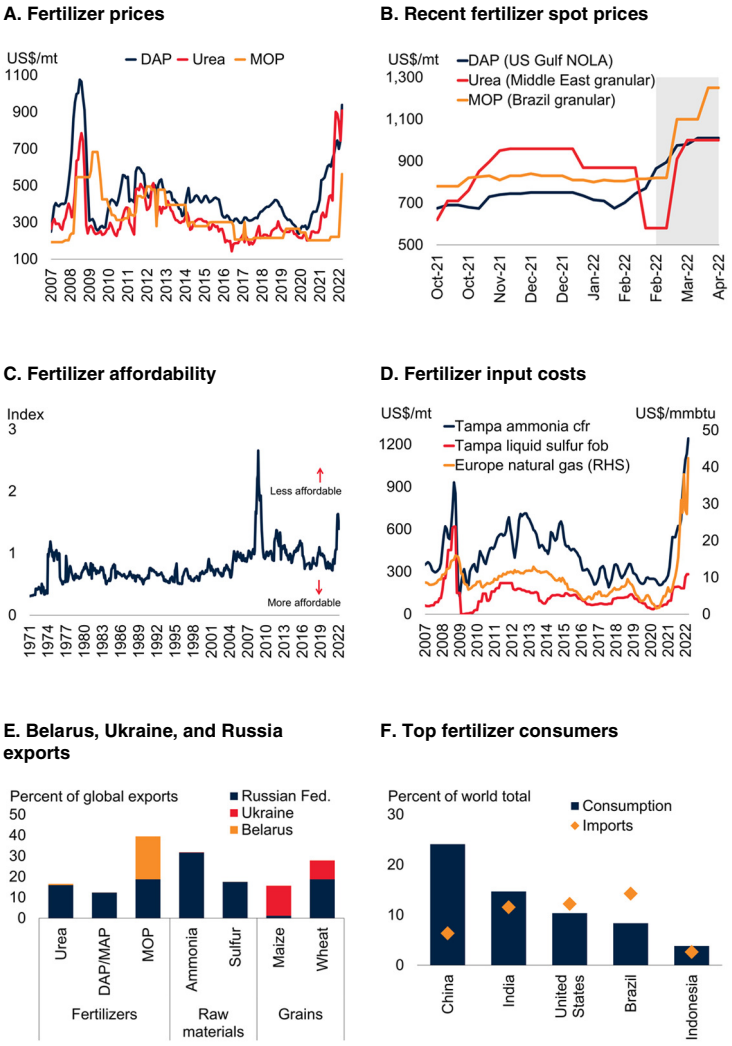
Fertilizers

The World Bank's Fertilizer Price Index rose nearly 10 percent in the first quarter of 2022 (q/q) to an all-time high in nominal terms. The increase follows last year's 80 percent surge due to supply disruptions, soaring input costs, and trade restrictions in China and Russia. The Ukraine war threatens further disruptions, as Russia and Belarus are major producers and exporters of fertilizers and their main input, natural gas. Fertilizer prices are projected to rise by almost 70 percent in 2022 before easing in 2023. Risks to the outlook include supply disruptions in Russia and Belarus, higher input costs, and a prolonging of Chinese export restrictions.

Nitrogen (urea) prices surged following Russia's invasion of Ukraine to levels well above the peaks during the 2008 global food price crisis (figure 13). The price surge, which began last year, also reflects production cuts in response to sharply rising raw material costs and trade policies. Production cuts have been pronounced in Europe due to soaring prices for natural gas. In China, rising coal prices and power rationing forced fertilizer producers to cut production and exports as well—the latter to ensure domestic availability. Russia also temporarily banned exports of ammonia nitrate, a high nitrogen-rich fertilizer. While demand is under increasing pressure, soaring prices are likely to bring online significant volumes of new capacity, including in Brunei Darussalam, India, and Nigeria. Urea prices are projected to gain more than 75 percent in 2022, and ease in 2023 as new production from Brunei, Nigeria and India comes onstream, but will likely remain at historically high levels for as long as coal and natural gas prices remain elevated.

FIGURE 13 Fertilizer market developments

Fertilizer prices continued to surge in the first quarter of 2022, driven by a confluence of factors—record-high energy and raw material costs, supply disruptions and uncertainty due to sanctions on Belarus and Russia, Chinese export restrictions, and strong demand. Urea prices surpassed their peaks during the food price crisis in 2008, while phosphates and potash prices inched closer to 2008 levels.



Sources: Bloomberg; Food and Agriculture Organization; International Fertilizer Association; U.S. Department of Agriculture; World Bank.
A.B.E. DAP = diammonium phosphate; MOP = muriate of potash.
A.C.D. Last observation is March 2022.
B. Shaded area represents the period after Russia's invasion of Ukraine. Last observation is the week of April 8, 2022.
C. Ratio of World Bank's fertilizer price index to food price index. A higher ratio represents lower fertilizer affordability, and vice versa.
D. cfr = cost and freight; fob = free on board.
E. Data for 2019, except grains (2020).
F. Sum of all nitrogen, phosphates, and potash fertilizers. Data for 2019.

DAP (diammonium phosphate) prices continued to rise in 2022Q1, up 11 percent (q/q), following large increases throughout 2021. Prices at end-March were more than four times higher than at the start of 2020. Rising input costs, particularly for ammonia and sulfur, have contributed to the price rise. The entire supply chain has also been impacted by increasing freight costs as a result of the war in Ukraine. Russia is the world's second largest exporter of both ammonia and sulfur but, since the beginning of the war in Ukraine, has struggled to maintain shipments. Supply woes have been compounded by policy actions in China and Russia. China, which accounts for 30 percent of global phosphate trade, has introduced an export ban through at least June 2022 while Russia has imposed an export ban on ammonia nitrate, a key input to the manufacture of DAP. Demand has been robust both in North and South America, especially by soybean and maize producers which are both phosphate-intensive crops. Demand is also strong in China due to increased feed use, especially maize and soybean meal. The country is rebuilding its pork herd following a deadly African swine fever disease that slashed its pig production. Following a near doubling in 2021, DAP prices are projected to increase further by 50 percent in 2022 before moderating in 2023 as production bottlenecks and trade restrictions are eased. Apart from input costs, risks to the outlook depend on whether China's exports will resume after June.

MOP (muriate of potash, or potassium chloride) prices jumped nearly 80 percent in 2022Q1 following the recent contract settlement by Chinese and Indian importers at $590/mt through to year-end 2022. Global spot prices have more than doubled to record-high levels in the past year. The price surge has been driven by sanctions last year on Belarus as well as supply disruptions and difficulties shipping through Black Sea ports since Russia's invasion of Ukraine. Belarus and Russia together account for two-fifths of global potash exports. In addition to the sanctions, on February 1st, Lithuania halted the use of its railways' network to transport Belarusian potash to the port of Klaipeda, which typically handles 90 percent of Belarus's exports. Although some shipments apparently have been rerouted to Russia, it is difficult for Belarus to ship significant volumes. Elsewhere, shortages have been aggravated by a rail strike in Canada due to a labor dispute. Potash prices are projected to average 1.5 times higher in 2022 than in 2021 and remain elevated in 2023 unless supply returns to international markets from Russia and Belarus.

Metals and Minerals

The World Bank's Metals and Minerals Price Index rose 13 percent in the first quarter of 2022 (q/q) with some metal prices reaching all-time highs in March amid historically low inventories. The war in Ukraine has been a key driving force behind aluminum and nickel price movements, while high energy prices have affected most metals, especially aluminum and zinc. Metal prices are projected to increase 16 percent in 2022 and ease somewhat in 2023. Risks to the outlook are skewed to the upside, emanating from further disruptions of commodity flows into and out of Russia. Key downside risks include prolonged lockdowns in China and weaker global growth. In the longer term, the energy transition could significantly lift the prices of some metals, notably aluminum, copper, and nickel.

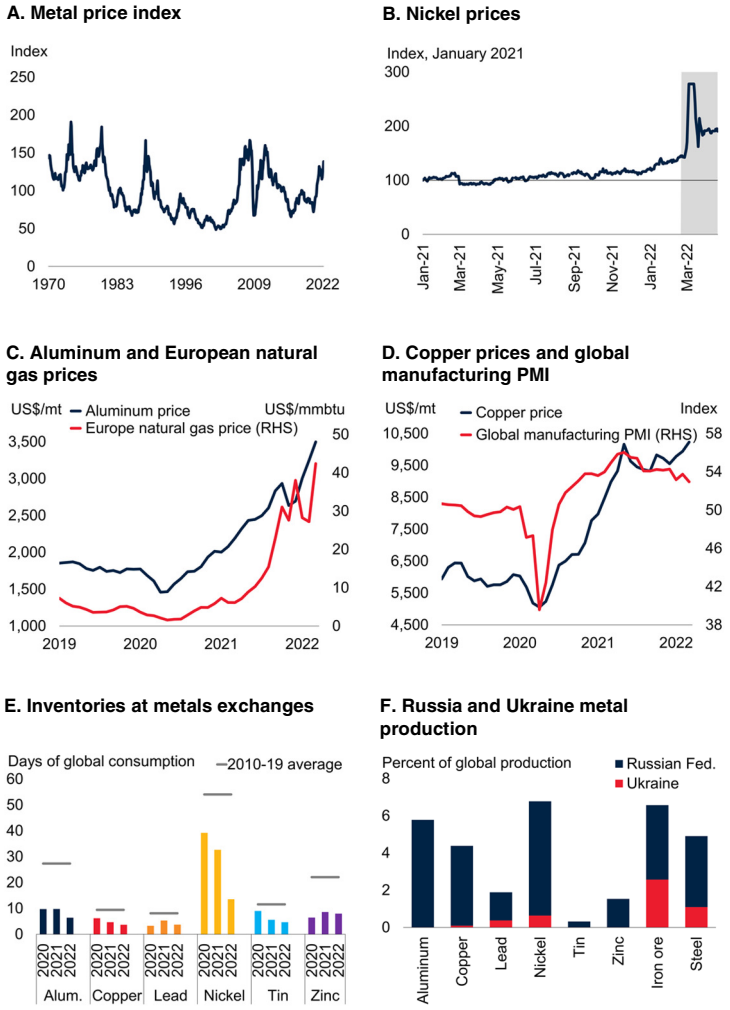
Iron ore prices surged 27 percent in 2022Q1 (q/q), reversing the declines in the second half of 2021. Acute pandemic-related labor shortages in Australia have disrupted production, while heavy rains and flooding significantly curbed output and exports from Brazil; the two countries account for more than 70 percent of the seaborne iron ore market. Supply losses are also expected due to damaged export infrastructure in Ukraine and the difficulty in rerouting exports from Russia, the two countries together account for 4 percent of global exports. On the demand side, Chinese steel production is recovering and is expected to be propelled by government infrastructure spending and policy support. Brazil's key iron ore company, Vale, is increasing production after a tailings dam collapse in 2019 and is adding new capacity, while new supplies are coming online in Australia, Canada, and Liberia. Iron ore prices are projected to fall by 13 percent in 2022 and 25 percent in 2023. Risks to the forecast include further disruptions to supply as a result of the war (on the upside) and slowing global growth (on the downside).

Aluminum prices jumped 18 percent in the first quarter of 2022 (q/q), the seventh straight quarterly gain, reaching nearly $4,000/mt in early March. The market has been affected by production curtailments (especially European smelters) due to high energy costs, depleted global inventories, and disruptions to alumina supplies—a key input to aluminum. High energy costs have forced many European smelters to reduce output by an estimated 17 percent in 2022. Russia, which accounts for 6 percent of global aluminum production, faces sanctions-related losses. It has already lost access to two-thirds of its alumina imports, forcing state-owned Rusal to suspend production at its alumina refinery in Ukraine in February. This reflects, in part, Australia's ban on alumina exports to Russia imposed in March. Supply woes have been compounded by pandemic-induced lockdowns in Guangxi, an alumina-producing region in China that represents 14 percent of the country's production. Amid supply disruptions and high energy costs, aluminum prices are projected to increase 38 percent in 2022 before easing in 2023. Downside risks include further weakness in China's property sector and concerns about global economic growth. On the upside, production could be further reduced if disruptions to alumina supplies persist, and energy prices are higher than expected.

Copper prices reached an all-time nominal high of $10,845/mt in early March. Prices have been buoyed by low inventories and solid demand in China and advanced economies stemming from robust durable goods consumption. The copper market has been affected by water shortages in Chile and labor disputes in Peru. Copper prices are projected to increase by 8 percent in 2022 as constraints in Chile and Peru persist, and as one of China's major smelters is facing credit issues. Prices are expected to ease in 2023, however, as new projects come online, including in Chile, the Democratic Republic of Congo, Mongolia, and Peru. Upside risks to the outlook include further supply disruptions in Russia, while a more severe slowdown in global growth poses the greatest downside risk. In the longer term, copper will increasingly benefit from growing demand in the renewable (mainly photovoltaics) and electric vehicle (EV) sectors, as well as related grid and recharging infrastructure. In particular, the decision by European countries to reduce their dependence on Russian natural gas could increase copper consumption if it causes them to accelerate investment in renewable energy.

FIGURE 14 Metals and minerals market developments

Metal prices continued to climb higher in the first quarter of 2022, with aluminum, copper, nickel, and tin prices reaching historic highs in early March. The price surge largely reflected production curtailments due to high energy costs (aluminum, zinc), supply concerns due to Russia's invasion of Ukraine (aluminum, nickel), and pandemic-induced disruptions (iron ore, tin). Inventories at metal exchanges have declined to very low levels, adding to price volatility.



Sources: Bloomberg; British Geological Survey; COMEX; Haver Analytics; London Metal Exchange (LSE); Shanghai Futures Exchange (ShFE); U.S. Geological Survey; World Bank; World Bureau of Metal Statistics; World Steel Association.

A. Deflated by U.S. Consumer Price Index (CPI), January 2022.

B. Daily data. Last observation is April 22, 2022. Shaded area is from February 23, 2022.

D. PMI (purchasing managers' index) readings above (below) 50 indicate an expansion (contraction). Last observation is March 2022.

E. Average of combined daily inventories at COMEX, LME, and ShFE. Data for 2022 is through April [22].

F. Based on 2021 production, except for iron ore (2019) and steel (2020).

Lead prices have been flat during the past three quarters. Compared to other metals, the energy used in smelting lead is low, and so higher energy prices have not increased production costs as much as for other metals. Furthermore, the war in Ukraine has had little effect on output, as Russia is a small producer. Global lead demand is expected to rise in the medium term, due to steady new vehicle and replacement battery use, as well as the utilization of lead batteries in EVs for auxiliary functions. Lead supply is also expected to grow, mainly as a by-product of zinc and silver mining. Recycled batteries will add to supply, accounting for some 60 percent of total lead supplies. Lead prices are projected to increase modestly in 2022 before easing in 2023. Risks to the outlook are tilted to the downside both in the short term, given constraints in the auto industry, and over the longer term, from a possible phase-out of auxiliary lead batteries.

Nickel prices soared more than 35 percent in the first quarter of 2022 (q/q), driven by supply concerns from the escalation of the war in Ukraine amid depleted inventories. Prices breached $100,000/mt on March 8 after short selling by China's Tsingshan Holdings—the world's largest producer of nickel and stainless steel—was met by a short squeeze, leading the London Metal Exchange (LME) to suspend trading for several days and canceling some trades. The nickel market has been affected considerably by the war in Ukraine. Russia accounts for 6 percent of global nickel supplies, but 20 percent of high-grade nickel for batteries, the fastest growing demand segment. Russian mining giant Nornickel has been incurring supply disruptions following sanctions. On the demand side, production of stainless steel, which accounts for 70 percent of nickel consumption, is slowing, mainly in China. Demand for nickel-contained batteries continues to grow, however, and is now the second-largest use for nickel (its share was 13 percent in 2021 compared with 4 percent in 2019). Nickel prices are expected to remain elevated until potential new supply from Indonesia ramps up. In 2022, nickel prices are projected to average more than 50 percent higher than last year. Prices are expected to drop by about 20 percent in 2023 as large nickel pig iron capacity by Indonesia comes on stream. Risks are skewed to the upside given potential export disruptions from Russia and possible problems bringing on new capacity in Indonesia. Weaker demand growth and, in the

longer term, competition from non-nickel batteries pose downside risks.

Tin prices have continued to increase for seven consecutive quarters, growing by 12 percent in 2022Q1 (q/q) to surpass an all-time high of $50,000/mt in early March. Prices have been supported by strong demand from the electronics sector where solder applications account for more than half of total tin demand. Meanwhile, there have been prolonged supply chain disruptions in key tin-producing areas, due partly to COVID-19 outbreaks. In February, Indonesia suspended operations of more than 1,000 miners (including tin, coal, and other minerals) in an effort to improve oversight of its resource sectors. Tin concentrate supplies from Myanmar, a key source of raw material, have also been affected by sporadic closures along the border of Myanmar and the Yunnan province of China. Tin prices are forecast to increase by 27 percent in 2022 before declining 15 percent in 2023 as consumer goods demand softens and supply improves. Risks to the outlook include an export ban by Indonesia. In the longer term, tin demand prospects (and prices) remain solid in the semiconductor, photovoltaic, and auto sectors, and stand to benefit from the energy transition and green technologies.

Zinc prices rose by 11 percent in 2022Q1 (q/q), a 15-year high amid closures of zinc smelters in Europe due to elevated energy prices—European smelters account for 15 percent of global refined zinc production. Closures included smelters in Italy and France owned by Glencore and Nyrstar smelters, respectively—the world's largest zinc producers. Reduced utilization impacted smelters in other countries as well. In China, zinc inventories are higher than in Europe due to weak construction and auto production, in part due to COVID-19 lockdowns. However, logistical challenges stemming from lockdowns and rising shipping costs have prevented China from releasing inventories to global markets. Zinc prices are expected to increase by 23 percent in 2022, before falling by 14 percent in 2023. Risks are tilted to the upside, as high energy prices could further disrupt zinc production in Europe. A global growth slowdown and the supply-constrained auto sector are downside risks. Over the longer term, zinc consumption will continue to be driven by rising demand for galvanized steel, which accounts for half of total zinc use, as well as the use of zinc in batteries.

Precious Metals

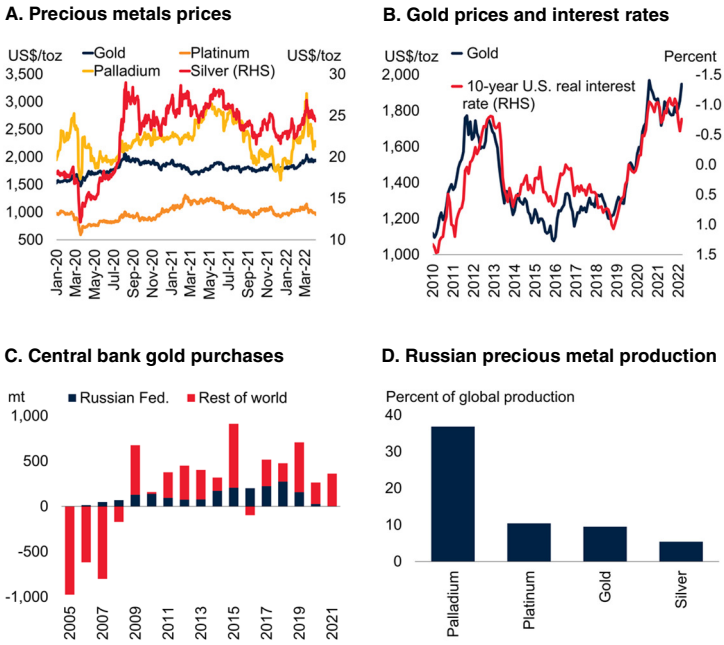
The World Bank's Precious Metals Index gained 4 percent in the first quarter of 2022 (q/q), driven by higher investment demand due to rising inflation and increased safe-haven buying following Russia's invasion of Ukraine. The index is projected to increase slightly in 2022 but fall by 9 percent in 2023 on expectations of tighter monetary policy. Upside risks to this outlook include an intensification of geopolitical tensions and inflationary pressures.

Gold prices gained 4.3 percent in 2022Q1 (q/q), as rising inflation and geopolitical risks more than offset the impact of higher nominal interest rates in advanced economies. Strong investor flows into gold-backed exchange-traded funds (ETFs) due to safe-haven buying contributed to the gains. Gold prices have since receded along with rising yields, and an initial rate hike by the U.S. Federal Reserve—rising real yields are typically a headwind for gold prices because they dampen investor flows, a key driver of gold prices. The war in Ukraine had an impact, as Russia is the world's second-largest gold producer, accounting for 10 percent of global output. It had also been the largest buyer of gold during 2006-20, with its gold reserves reaching nearly 2,300 mt, equivalent to 6.5 percent of global official gold reserves. Concerns during the early phases of the war in Ukraine that Russia would sell gold reserves did not materialize. On the contrary, following a two-year hiatus, the Bank of Russia resumed purchases of gold from domestic producers in March, initially at a fixed ruble price, and then a negotiated price as the ruble firmed.

Gold prices are expected to increase modestly in 2022, before falling by 10 percent in 2023, weighed down by tighter monetary policy in the EU and the United States, with additional rate increases expected this year and next by the U.S. Federal Reserve to address inflationary pressures. Upside risks include rising inflationary pressures along with increasing geopolitical uncertainty and

FIGURE 15 Precious metals market developments

Precious metal prices increased in 2022Q1, driven by rising inflation and increased demand for safe-haven assets following Russia's invasion of Ukraine, despite higher nominal interest rates. Gold prices were lifted by a surge in inflows into gold-backed exchange-traded funds, and Russia's central bank has resumed gold purchases following international sanctions. Robust industrial demand supported silver prices, while concerns around Russian supply and a recovery in global auto demand boosted platinum and palladium prices.



Sources: Bloomberg; Federal Reserve Bank of St. Louis; Haver Analytics; International Monetary Fund; Silver Institute; World Bank; World Gold Council; World Platinum Investment Council.
A. Last observation is April 6, 2022.
B. Interest rate is the 10-year U.S. Treasury inflation-indexed security with constant maturity (not seasonally adjusted). Last observation is March 2022.
C. Annual reported changes in central bank net reserve holdings of gold.
D. Production in 2021, except for silver (2020).

larger purchases of gold by central banks. To the downside, an easing of the conflict and more aggressive central bank rate hikes could weigh on prices. In the longer term, gold prices could be affected by the Bank of Russia's policies, and should it engage in large gold sales, prices could drop materially.

Silver prices increased little in 2022Q1 as investor inflows were more modest than in the case of gold. After posting solid price gains last year in response to strong consumer electronics demand, consumption demand for silver has started to wane, in part due to weak demand by China's manufacturing sectors amid lockdowns. However, photovoltaic demand as well as demand from the electric vehicle (EV) sector have continued to grow in line with the push to cleaner energy. Prices are projected to ease in both 2022 and as production rises with new capacity coming online mainly in North and South America as well as more output as a by-product from expanding zinc mine production. Risks to the forecast include a faster pace of the energy transition if countries choose to accelerate investment in zero-carbon sources of energy in place of fossil fuel imports (on the upside) and weaker demand by the auto sector (on the downside).

Platinum prices were mostly stable, especially compared to other metals—including palladium, a close substitute. Palladium prices surged, as Russia accounts for 40 percent of global palladium supply, compared to 10 percent of global platinum output. Platinum prices are expected to register modest increases in 2022 and 2023 as demand rises in line with the recovery in global auto production, which accounts for more than a third of platinum demand, as well as higher imports into China. In the longer term, prices could also be affected by substitution away from palladium (used as a catalyst mainly in gasoline-powered vehicles) to platinum (a catalyst mainly for diesel engines). Substitution is expected to continue due to the large price differential and tightening emissions regulations. Risks to the near-term outlook include weaker global growth and constraints in auto output. In the longer term, penetration of EVs could weigh heavily on demand.

The war in Ukraine has caused major supply disruptions and led to historically higher prices for a number of commodities. Most commodity prices are now expected to see sharp increases in 2022 and remain high in the medium term. The price of Brent crude oil is projected to average $100/bbl in 2022, a 40 percent increase from 2021. Non-energy prices are expected to rise by about 20 percent in 2022, with the largest increases in commodities where Russia or Ukraine are key exporters. Wheat prices in particular are forecast to increase more than 40 percent this year. While price pressures are expected to ease in 2023, commodity prices will remain much higher than previously expected. The outlook depends on the duration of the war and the severity of disruptions to commodity flows.

A Special Focus section investigates the impact of the war on commodity markets and compares the current episode with previous price spikes. It finds that previous oil price spikes led to the emergence of new sources of supplies and reduced demand in response to efficiency improvements and substitution to other commodities. In the case of food, new land was made available for food production. For policymakers, a short-term priority is providing targeted support to poorer households facing higher food and energy prices. For longer-lasting solutions, they facilitate investment in new sources of zero-carbon energy.

The World Bank's *Commodity Markets Outlook* is published twice a year, in April and October. The report provides detailed market analysis for major commodity groups, including energy, metals, agriculture, precious metals, and fertilizers. Price forecasts for 46 commodities are also presented together with historical price data. Commodity price data updates are published separately at the beginning of each month.

The report and data can be accessed at:

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