EXECUTIVE BOARD MEETING

EBS/22/82

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September 16, 2022

To: Members of the Executive Board

From: The Secretary

Subject: **October 2022 World Economic Outlook—Executive Summary, Chapter 1, and Online Annex**

Board Action:	Executive Directors' **consideration** (Formal)
Tentative Board Date:	**Thursday, September 29, 2022**
Publication:	Yes, it is intended that the full set of the World Economic Outlook documents will be released to the public at the time of the World Economic Outlook press conference, tentatively scheduled for **Tuesday, October 11, 2022.**
Questions:	Ms. Koeva Brooks, RES (ext. 39809) Mr. Leigh, RES (ext. 34747)
Additional Information:	Please note that, as usual, the WEO forecast remains under review. Final projections will be featured in the WEMD presentation to the Board. The paper will be revised for publication in light of the Executive Board discussion. If Executive Directors have additional comments, they should notify Ms. Koeva Brooks and Mr. Leigh by **5:30 p.m. on Friday, September 23, 2022**.

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EXECUTIVE SUMMARY

- *The global economy is experiencing a number of turbulent challenges. Inflation higher than that seen in several decades, tightening financial conditions in most regions, Russia's invasion of Ukraine, and the lingering COVID-19 pandemic all weigh heavily on the outlook. Normalization of monetary and fiscal policies that delivered unprecedented support during the pandemic is cooling demand as policymakers aim to lower inflation back to target. But a growing share of economies are in a growth slowdown or outright contraction. The global economy's future health rests critically on the successful calibration of monetary policy, the course of the war in Ukraine, and the possibility of further pandemic-related supply-side disruptions, for example in China.*

- *Global growth is forecast to slow from 6.0 percent in 2021 to 3.2 percent in 2022 and 2.6 percent in 2023. This is the weakest growth profile since 2001 except for the global financial crisis and COVID-19 pandemic and reflects significant slowdowns for the largest economies: a US GDP contraction in the first half of 2022; a euro area contraction in the second half of 2022; and prolonged lockdowns in China with a growing property sector crisis. About a third of the world economy faces two consecutive quarters of negative growth. Global inflation is forecast to rise from 4.7 percent in 2021 to 8.7 percent in 2022 but to decline to 6.4 percent in 2023 and to 4.1 percent by 2024. Upside inflation surprises have been most widespread among advanced economies, with greater variability in emerging markets and developing economies.*

- *Risks to the outlook remain unusually large and to the downside. Monetary policy could miscalculate the right stance to reduce inflation. Policy paths in the largest economies could continue to diverge, leading to further US dollar appreciation and cross-border tensions. More energy and food price shocks might cause inflation to persist for longer. Global tightening in financing conditions could trigger widespread emerging market debt distress. Halting gas supplies by Russia could depress output in Europe. A resurgence of COVID-19 or new global health scares might further stunt growth. A worsening of China's property sector crisis could spill over to the domestic banking sector and weigh heavily on the country's growth, with negative cross-border effects. And geopolitical fragmentation could impede trade and capital flows, further hindering climate policy cooperation. The balance of risks is tilted firmly to the downside, with about a 25 percent chance of one-year-ahead global growth falling below 2.0 percent—in the 10th percentile of global growth outturns since 1970.*

- *Warding off these risks starts with monetary policy staying the course to restore price stability. As demonstrated in Chapter 2, more front-loaded and aggressive monetary tightening is critical to avoid inflation de-anchoring arising from households and businesses looking at their recent inflation experience when shaping their wage and price expectations. Fiscal policy's priority is the protection of vulnerable groups through targeted near-term support to alleviate the burden of the cost-of-living crisis felt across the globe. But its overall stance should remain sufficiently tight to keep monetary policy on target. Addressing growing government debt distress caused by lower growth and higher borrowing costs requires a meaningful improvement in debt resolution frameworks. With tightening financial conditions, macroprudential policies should remain on guard against systemic risks. Intensifying structural reforms to improve productivity and economic capacity would ease supply constraints and in doing so support monetary policy in fighting inflation. Policies to fast-track the green energy transition will have long-term payoffs for energy security and avoiding the costs of ongoing climate change. As Chapter 3 shows, phasing in the right measures over the coming eight years will keep the macroeconomic costs manageable. And lastly, successful multilateral cooperation is needed to avoid fragmentation that could reverse the gains in economic well-being from 30 years of economic integration.*

CHAPTER 1

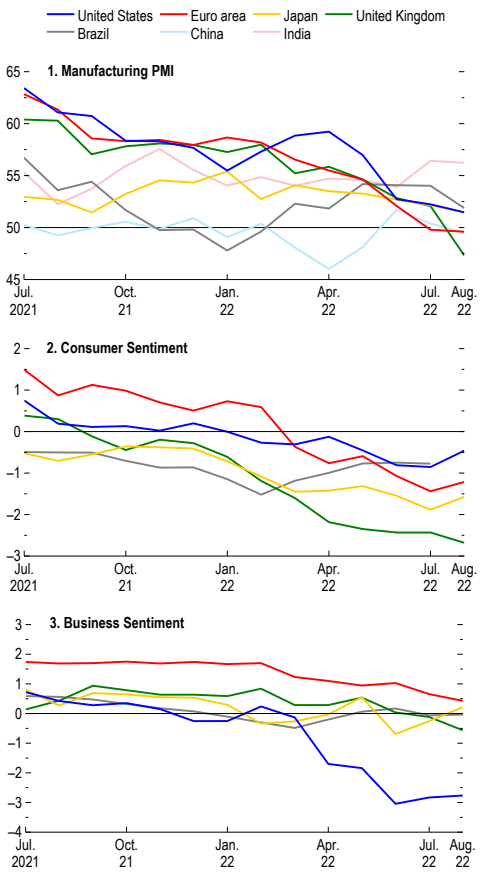
GLOBAL PROSPECTS AND POLICIES

Countering the Cost-of-Living Squeeze

The world is in a volatile period: economic, geopolitical, and ecological changes all impact the global outlook. Inflation has soared to multidecade highs, prompting rapid monetary policy tightening and squeezing household budgets, just as COVID-19-pandemic-related fiscal support is waning. Many low-income countries are facing deep fiscal difficulties. At the same time, Russia's ongoing war in Ukraine and tensions elsewhere have raised the possibility of significant geopolitical disruption. Although the pandemic's impact has moderated in most countries, its lingering waves continue to disrupt economic activity, especially in China. And intense heat waves and droughts across Europe and central and south Asia have provided a taste of a more inhospitable future blighted by global climate change.

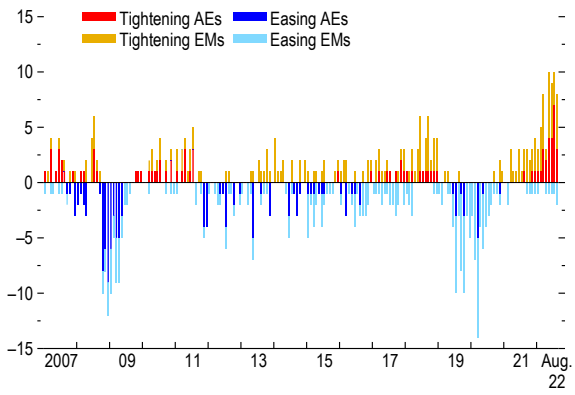
Amid these volatile conditions, recent data releases confirm that the global economy is in a broad-based slowdown as downside risks—including risks highlighted in the July 2022 *World Economic Outlook* (WEO) *Update*—materialize, although with some conflicting signals. The second quarter of 2022 saw global real GDP growth fall to just 0.2 percent (at a quarterly annualized rate), with negative growth in China, Russia, and the US, as well sharp slowdowns in eastern European countries most directly affected by the war in Ukraine and international sanctions aimed at pressuring Russia to end hostilities. At the same time, some major economies did not contract—euro area growth surprised on the upside in the second quarter, led by growth in tourism-dependent southern European economies. Forward-looking indicators, including new manufacturing orders and sentiment gauges, suggest a slowdown among major economies (Figure 1.1). In some cases, however, signals conflict—with some indicators showing output weakness amid labor market strength.

Figure 1.1. Leading Indicators Show Signs of Slowdown
(Indexes)



Sources: Haver Analytics; and IMF staff calculations.
Note: For panel 1, purchasing managers' indexes (PMIs) greater than 50 denote expansion. In panels 2 and 3, values are normalized *z*-scores.

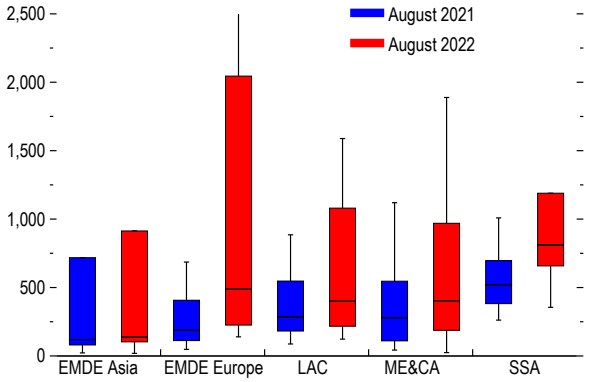
Figure 1.2. Change in Monetary Policy Cycle among G-20 Economies
(Number of increases and cuts in policy rates)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: AEs = advanced economies; EMs = emerging market economies.

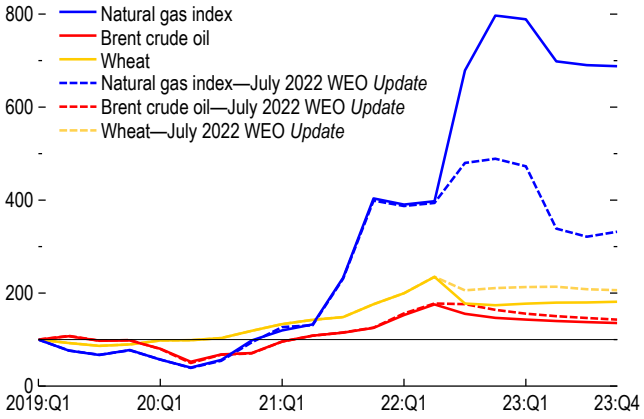
An important factor underpinning the slowdown in the first half of this year was the rapid removal of monetary accommodation as many central banks seek to moderate persistently high inflation (Figure 1.2). Higher interest rates, and the associated rise in borrowing costs, including mortgage rates, are having their desired effect in taking the heat out of domestic demand, with the housing market showing the earliest and most evident signs of slowdown in such economies as the US. Monetary policy tightening has been generally accompanied by a scaling back of fiscal support which had previously propped up households' disposable incomes. Broadly speaking, nominal policy rates are now above prepandemic levels in both advanced and emerging market and developing economies. With elevated inflation, real interest rates have generally not yet reverted to prepandemic levels. Tightening financial conditions in most regions, with the notable exception of China (October 2022 *Global Financial Stability Report*), reflected in a strong real appreciation of the US dollar, have also driven up yield spreads—the difference between countries' U.S.-dollar- or euro-denominated government bond yield and US or German government bond yields—for debt-distressed lower- and middle-income economies (Figure 1.3). In sub-Saharan Africa, yield spreads for more than two-thirds of sovereign bonds breached the 700-basis-point level in August 2022—significantly more than a year ago. In eastern and central Europe, the effects of the war in Ukraine have exacerbated the shifting global risk appetite.

Figure 1.3. EMDE Sovereign Spreads
(Basis points)



Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: For each region, box denotes upper quartile, median, and lower quartile of the members, and whiskers show maximum and minimum values within the boundary of 1.5 times interquartile range from upper and lower quartiles. *Y*-axis is cut off at 2,500 basis points. EMDE = emerging market and developing economy; LAC = Latin America and the Caribbean; ME&CA = Middle East and Central Asia; SSA = sub-Saharan Africa.

Figure 1.4. Wholesale Food and Fuel Prices Expected to Moderate
(Index, January 2019 = 100)



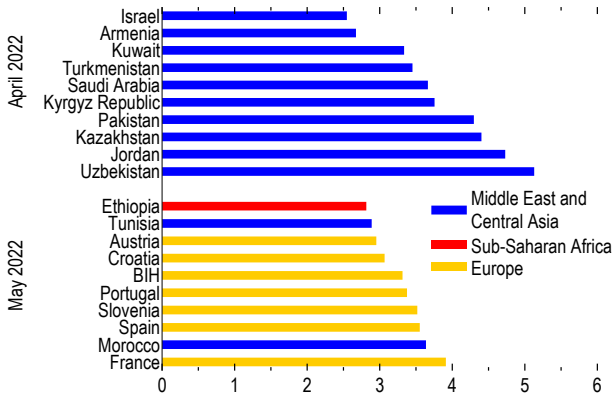
Source: IMF staff calculations.
Note: Natural gas index comprises European, Japanese, and US natural gas price indices. WEO = *World Economic Outlook*.

Beyond monetary policy alone, China's COVID-19 outbreaks and lockdowns, and Russia's invasion of Ukraine have also pulled down economic activity. China's lockdowns have imposed sizable constraints domestically and gummed up already-strained global supply chains. Russia's invasion of Ukraine and deepening cuts to supplies of gas to Europe have amplified preexisting stresses in global commodity markets, driving natural gas prices higher once more (Figure 1.4). European economies—including the largest, Germany—are exposed to the impact of the gas supply cuts. Continued uncertainty over energy supplies has contributed to slower real economic activity in Europe, particularly in manufacturing, dampening consumer and, to a lesser extent,

business confidence (Figure 1.1). However, strong recovery in the tourism-dependent southern economies helped deliver better-than-anticipated overall growth in the first half of 2022.

Food prices—a prime driver of global inflation so far this year—have provided a rare slice of good news, with futures prices falling (Figure 1.4) and the Black Sea grain deal providing some hope of improved supply in coming months. More generally, some signs show that commodity prices might be starting to ease off as global demand slows, helping to moderate inflation. However, recent extreme heat waves and droughts have provided a stark reminder of the near-term threat from climate change and its likely impact on agricultural productivity (Figure 1.5).

Figure 1.5. Mean Land Temperature
(Degrees Celsius, departures from 1960–1991 normal)

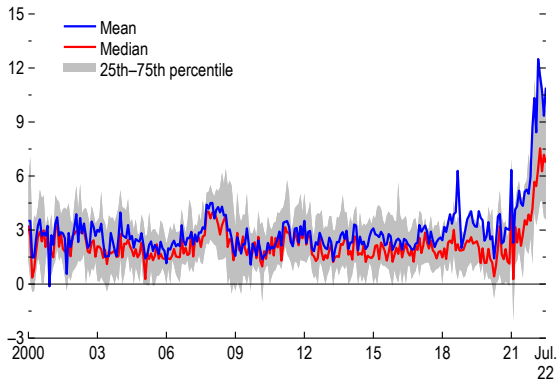


Sources: Osborn and others (2020); and IMF staff calculations.
Note: Figure shows deviation from 1960 to 1991 normal monthly temperatures and hottest 10 countries by month. BIH = Bosnia and Herzegovina.

Although a slight rebound is forecast for the second half of the year, full-year growth in 2022 will likely fall far short of average prepandemic performance and the strong growth rebound in 2021. In 2022, the world economy is predicted to be 3.2 percent larger than in 2021, with advanced economies growing by 2.4 percent and emerging market and developing economies growing 3.7 percent. The world economy will expand even more slowly in 2023, at 2.6 percent, with advanced economies growing 1.1 percent and emerging market and developing economies 3.7 percent.

Three key factors critically shape this economic outlook: monetary policy's stance in response to elevated inflation, the impact of the war in Ukraine, and the ongoing impact of pandemic-related lockdowns and supply chain disruptions. The following sections discuss each of these forces in turn before presenting the outlook in detail.

Figure 1.6. Core Inflation and Its Distribution across Countries
(Annualized percent)



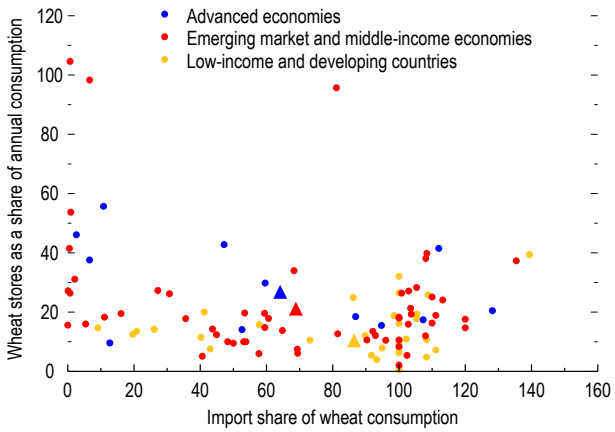
Sources: Haver Analytics; and IMF staff calculations.
Note: The set of economies includes ARG, BRA, CAN, CHE, CHL, CHN, COL, CZE, DEU, DNK, ESP, FRA, GBR, HKG, HUN, IDN, IND, ISR, ITA, JPN, KOR, MEX, MYS, NOR, PER, PHL, POL, RUS, SGP, SWE, THA, TUR, TWN, USA, and ZAF. The group represents 89.4 percent of advanced economy GDP, 75 percent of emerging market and developing economy GDP, and 81 percent of world GDP based on purchasing-power-parity weights. Economy list uses International Organization for Standardization (ISO) country codes.

Central Banks Tackle Stubbornly High Inflation

Since 2021, inflation has risen faster and more persistently than expected. In 2022, inflation in advanced economies reached its highest rate since 1982. Although inflation is a broad phenomenon, affecting most economies across the world (Figure 1.6), it has the most severe impact on lower-income groups in developing economies. In these countries, up to half of

household consumption expenditure is on food, meaning that inflation can have particularly acute impacts on human health and living standards (Figure 1.7). Despite a slight decline in the consumer price index in July and August, US inflation reached one of its highest levels since 1982, with prices in August 8.3 percent higher than a year previously. The euro area saw inflation reach 9.1 percent in August, while the UK saw annual inflation of 9.9 percent. Emerging market and developing economies are estimated to have seen inflation of 10.1 percent in the second quarter of 2022 and face a peak inflation rate of 10.8 percent in the third quarter: the highest rate since 1999. The reverberations of last year's strong demand recovery and a continued rebalancing of demand toward services such as travel (Figure 1.8) have driven up inflation. Although futures prices have fallen, the delayed pass-through of past increases in food and energy prices from global commodity markets to consumer prices may continue to drive inflation yet higher in the short term. In Europe, a significant impact from war-related energy shocks compounds these effects, whereas in Asia a more moderate impact on food prices is helping to keep inflation from rising as much as elsewhere (Figure 1.9).

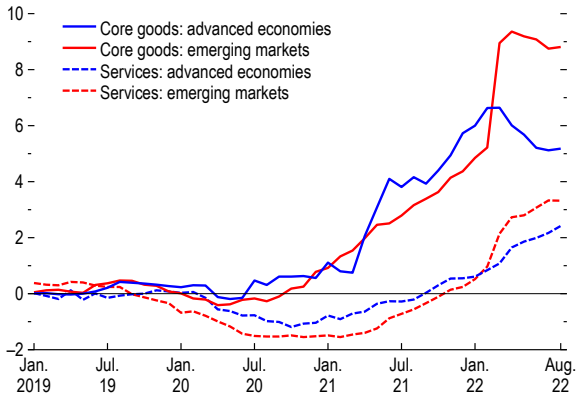
Figure 1.7. Inflation Hits the Poorest Hardest
(Percent, 2022)



Sources: Food and Agriculture Organization of the United Nations; US Department of Agriculture, Foreign Agricultural Service; and IMF staff calculations.
Note: Data reflect storage-level estimates at the end of the first quarter of 2022, and projected consumption levels for 2022. Import share can exceed 100 because of stock building and reexport. Triangles show country group averages.

An important recent development is that although volatile headline shocks to items such as energy and food prices still account for much of inflation, they are no longer the overwhelmingly dominant drivers. Instead, underlying inflation has also increased—as measured by different gauges of core inflation—and is likely to remain elevated well into the second half of 2022. Global core inflation, measured by excluding food and energy prices, is expected to be 6.6 percent on a fourth-quarter-over-fourth-quarter basis, reflecting the pass-through of energy prices, supply chain cost pressure, and tight labor markets, especially in advanced economies. In contrast, the cooling of economic activity in China has also eased core inflation. On average, nominal wages take time to increase in response to inflation, leading real wages to decline and acting as a dampener on demand (see Chapter 2). Yet despite some pockets of uncertainty, long-term inflation expectations have generally remained stable in most major economies.

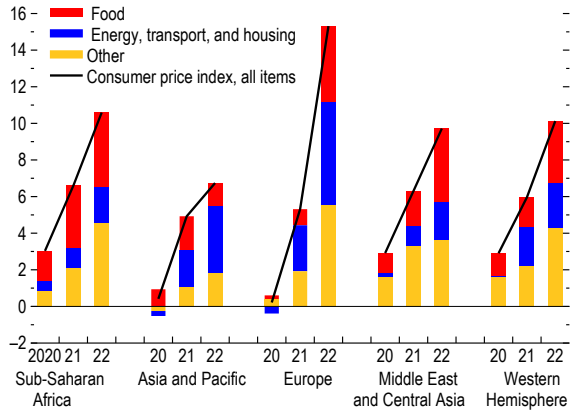
Figure 1.8. Rebalancing of Demand: Goods versus Services
(Percent deviation from pre-COVID-19 averages)



Sources: Haver Analytics; and IMF staff calculations.
Note: Lines show the difference between the year-over-year percentage change in price indices each month and the average observed during 2018 and 2019 for each sector. Core goods exclude energy and food. Countries are aggregated using purchasing-power-parity weights. Advanced economies include Australia, Canada, euro area, Japan, Korea, and the United States. Emerging markets include Brazil, Chile, Colombia, Indonesia, Malaysia, Mexico, Russia, and South Africa.

High inflation in 2021 and 2022 has surprised many macroeconomic forecasters, including the IMF staff. The simple question is: Why? While our understanding is still evolving, forecasters likely underestimated the impact of the strong economic recovery in 2021—supported by fiscal intervention in advanced economies—coinciding with strained supply chains and tight labor markets (Box 1.1). Across advanced economies, forecast errors are related to the size of COVID-19-related fiscal stimulus packages. The correlation of output and inflation forecast errors is positive in both 2021 and 2022 but the relationship was stronger in 2021 than it has been so far in 2022. That errors were in the same direction suggests that excess demand has been a dominant factor, particularly in 2021, as some large economies may have been at the steeper end of the aggregate supply curve. The declining cross-country correlation in 2022 hints at an increased role for supply shocks, related to clogged supply chains and, more recently, the war in Ukraine. Headline inflation forecast errors have been larger for eastern European economies in 2022, consistent with the war in Ukraine driving up headline inflation. More generally, forecast errors for the noncore part of inflation (mainly reflecting food and energy prices), which can reflect supply shocks, have contributed more to unexpected increases in inflation in 2022 than in 2021. Core inflation forecast errors in China and developing Asia have been negative and relatively small so far this year, consistent with the slowdown in real activity.

Figure 1.9. Inflation Driven by Food and Fuel
(Annualized percent)



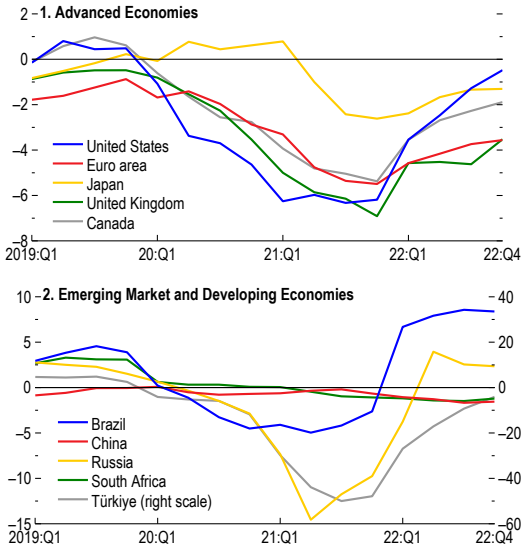
Sources: IMF, Consumer price index (CPI) database; and IMF staff calculations.
Note: Figure shows inflation contributions from broad categories. Contributions are computed first by country, annualized over available months in cases in which data are partial (for example, for 2022). The figure shows both the median contributions and aggregate inflation rate for each region.

Public debate has also included discussion of the role of business markups—the price-to-marginal-cost ratio—during the pandemic as a potential driver of inflation. Markups have risen steadily over several years, prompting intense debate. Yet their recent dynamics do not suggest that markups are contributing in any sizable way to the current inflationary environment (Box 1.2). Elevated markups in fact make persistent wage-price spirals less likely, since they provide flexible buffers between general wage and general price increases (see Chapter 2 and in particular, Box 2.1). And despite historically tight labor markets in advanced economies, incipient wage-price spirals are not yet on the horizon.

The rise in US inflation has attracted especially intense attention, as it came earlier than in other advanced economies and surprised many economists. One factor explaining the surprise was unexpected adverse shocks from the disruption of supply chains and the rise in energy prices. The effects of those shocks appear to have passed through to underlying inflation. Another reason that economists' expectations missed the high inflation was that they typically measured labor market tightness using the unemployment rate, which has historically had a relatively flat relationship with inflation and did not decline below prepandemic levels. Meanwhile, other measures of labor market tightness, including the ratio of vacancies to unemployed workers and the intensity of search-on-the-job, unexpectedly rose to historic highs and better explain the rise in inflation (Ball, Leigh, and Mishra, forthcoming).

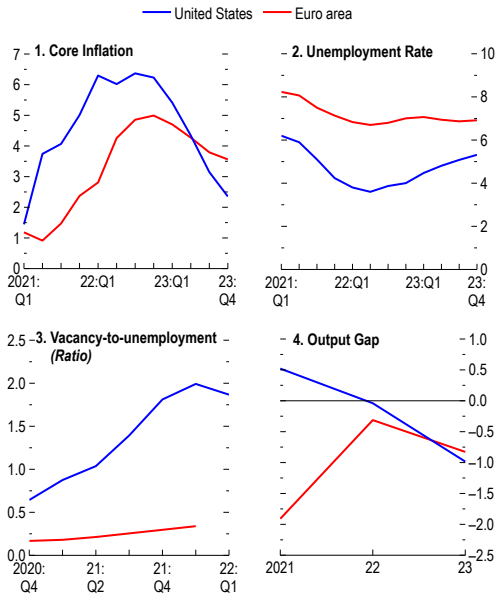
To prevent inflation from becoming systematically entrenched, central banks have rapidly lifted nominal policy rates. The Federal Reserve has increased the federal funds target rate by 2.25 percentage points since early 2022 and has communicated that further rises are likely. The Bank of England has raised its policy rate by 1.5 percentage points since the start of the year despite projecting weak growth. The European Central Bank has raised its policy rate by 1.25 percentage points this year. But because inflation has outstripped these increases, with a few exceptions real policy rates remain below prepandemic levels (Figure 1.10). Differences in the paths of monetary policy normalization are partly due to core inflation rising rapidly in some advanced economies, most notably in the US, before it did in others. Real activity and financial markets have responded to the removal of monetary accommodation, with tentative signs of cooling housing markets, especially in the US, and of slowing momentum in labor markets. Interest rates and spreads have also risen in many countries and across the yield curve, inducing volatility in financial markets.

Figure 1.10. Real Short-Term Rates Are Rising
(Percent)



Source: IMF staff calculations.
Note: Projection for the euro area is estimated using projections for 16 individual euro area countries. Real rate computed as short-term nominal interest rate less core inflation one year ahead.

Figure 1.11. A Transatlantic Divergence
(Percent, unless noted otherwise)



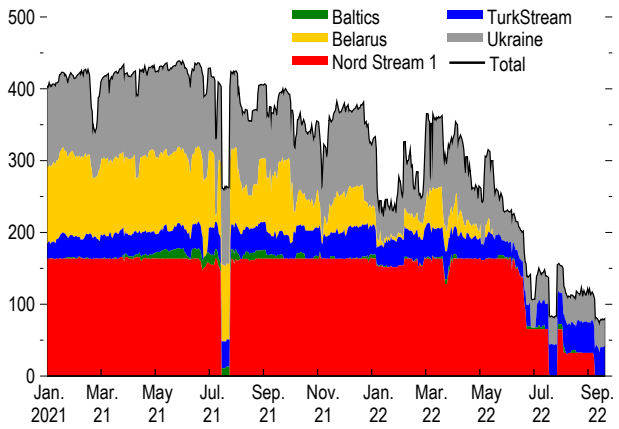
Sources: Haver Analytics; and IMF staff calculations.
Note: Vacancy-to-unemployment is defined as the ratio between the number of vacancies and the number of unemployed. For the latter, the age group is 15–64 in the euro area and 16 or older in the United States. Job vacancies data may comprise all sectors or only industry-construction-services depending on data availability at the country level. Euro area's vacancy-to-unemployment ratio is computed by summing the country-level data on number of vacancies and unemployed and then computing the ratio.

The Federal Reserve has raised interest rates more aggressively than the European Central Bank in part because of differences in underlying inflation dynamics and economic conditions to date. Core inflation rose sooner and has run higher in the US than in the euro area, with tighter labor markets and a higher estimated output gap (Figure 1.11). These differences partly reflect transatlantic differences in the level of direct fiscal stimulus earlier in the pandemic, as well as differences in the impacts of commodity price shocks and changes in private saving (see Figure 2.6). The gap between real and nominal wage growth has also closed more rapidly in the US than in the euro area, which has added further to underlying US inflation momentum. But inflation pressures are building in the euro area: the war in Ukraine continues to have a very clear impact, with energy and food prices accounting for about 70 percent of the rise in headline inflation and energy price increases passing through into broader inflation measures.

War in Ukraine Causes More Human Suffering and Economic Damage

Russia's war in Ukraine continues to leave a mark on the region and internationally. The war has displaced millions of people and led to substantial loss of human life and damage to physical capital. In addition to financial and technological sanctions aimed at pressuring Russia to end hostilities, the European Union implemented embargoes on imports of coal in August 2022. It also announced a ban on seaborne oil starting at the end of 2022 and a maritime insurance ban. Reduced exports from Russia, most notably of gas, have also affected fossil fuel trade, with the flow of Russian pipeline gas to Europe down to about 20 percent of its level one year ago (Figure 1.12). This has contributed to the steep increase in natural gas prices . The war is having severe economic repercussions in Europe, with higher energy prices, weaker consumer confidence, and slower momentum in manufacturing resulting from persistent supply chain disruptions and rising input costs. Adjoining economies—Baltic and eastern European states—have felt the largest impact, with their growth slowing sharply in the second and third quarter and their inflation rates soaring.

Figure 1.12. Russian Pipeline Gas Supplies to EU by Route
(Million cubic meters per day)



Sources: European Network of Transmission System Operators for Gas; Gas Transmission System Operator of Ukraine; and IMF staff calculations.
Note: Latest data available are for September 11, 2022. Recent data are provisional. Gas flow volumes are measured at EU border cross-points; Belarus excludes flows to Kaliningrad (Russia). EU = European Union.

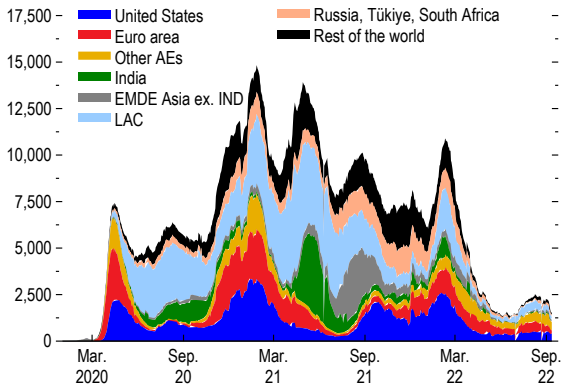
Russia's economy is estimated to have contracted by 21.8 percent (at a quarterly annualized rate) during the second quarter, although crude oil and nonenergy exports held up. Russian domestic demand is showing some stability, thanks to containment of the effect of sanctions on the domestic financial sector and a resilient labor market. .

The war in Ukraine is also having global consequences for food prices. Despite the recent agreement on Black Sea grain exports, global food prices remain elevated, although they are expected to soften somewhat. This chapter's Special Feature, "Market Developments and Food Price Inflation Drivers," points to supply-side factors dominating current food price dynamics, compounded by the export restrictions several countries have implemented. Overall, international inflation has moved higher, propelled by further increases in consumer energy and food prices, as the war has led to a broadening of inflationary pressures. Countries with diets tilted toward foods with the largest price gains, especially wheat and corn; those more dependent on food imports; and those with diets including sizable quantities of foods with large pass-throughs from global to local prices have suffered most. Low-income countries whose citizens were already experiencing acute malnutrition and excess mortality before the war have suffered a particularly severe impact, with especially serious effects in sub-Saharan Africa, as food accounts for about 40 percent of that region's consumption basket, on average, and the pass-through from global to domestic food prices is relatively high at 30 percent (April 2022 *Regional Economic Outlook: Sub-Saharan Africa*).

COVID-19 Continues to Hold Back Economic Progress

As inflation, monetary and fiscal tightening, and the war in Ukraine continue to squeeze global activity, the pandemic (Figure 1.13) is also weighing on the macroeconomic outlook. Pandemic-related forces have been particularly important in China, where a second-quarter contraction contributed to slower global activity. There, temporary lockdowns due to COVID-19 outbreaks have weakened local demand, which is reflected in the new-orders component of the purchasing managers' index (Figure 1.1). Other data corroborate this picture of slowing economic activity in China. Manufacturing capacity utilization in the country, for example, slowed to less than 76 percent in the second quarter: its lowest level in five years, outside of the pandemic. Such disruptions in China not only have a domestic effect but also spill over internationally, as lower demand implies fewer exports for foreign suppliers. And capacity constraints in production and logistics delay the unclogging of supply chains, keeping global supply pressures—and hence inflation—elevated.

Figure 1.13. New Confirmed COVID-19 Deaths
(Persons; seven-day moving average)



Sources: Our World in Data; and IMF staff calculations.
Note: Data as of September 13, 2022. Economy group and regional classifications are those in the *World Economic Outlook*. "Other AEs" in terms of International Organization for Standardization (ISO) country codes are AUS, CAN, CHE, CZE, DNK, GBR, HKG, ISL, ISR, JPN, KOR, MAC, NOR, NZL, SGP, SMR, SWE, TWN. AEs = advanced economies; EMDE Asia ex. IND = emerging market and developing economy Asia excluding India; LAC = Latin American and Caribbean economies.

Resurgent variants of the COVID-19 virus threaten economic recovery elsewhere too. Limited vaccinations make sub-Saharan Africa more prone to ongoing illness and increase the risk of exposures to new variants. African vaccination rates are still a fraction of those of all other regions, at about 26 percent, compared with about 66 percent in other regions. Booster shots have been administered to a mere 2 percent of people in African countries, on average, orders of magnitudes lower than the rate on other continents, where booster shots cover between a third and a half of their populations. This low vaccination rate has partly contributed to sub-Saharan Africa's real per capita GDP growth lagging behind that of advanced economies in 2022. Pandemic-induced scarring has also slowed human capital buildup as a result of learning losses from schooling and on-the-job skill acquisition (see Barrett and others 2021).

The Forecast: Output Lower Still, but Inflation Peaking

The developments described in the preceding section, with downside risks materializing, mean that projected global growth is declining and, in 2023, now falls between the July WEO *Update* baseline and alternative scenarios. Uncertainties continue to cloud forecasts of global growth and inflation. The baseline forecasts described in the following discussion are predicated on several assumptions that plausibly may fail to hold: that no further sharp reductions in flows of natural gas from Russia to the rest of Europe occur in 2022, beyond the current 80 percent reduction compared with a year ago; that long-term inflation expectations remain stable; and that disinflationary monetary policy tightening does not induce widespread recession (a broad-based contraction in economic activity that usually lasts more than a few months) and disorderly adjustments in global financial markets.

To recognize the uncertainty surrounding the global economy's evolution, this *World Economic Outlook* report presents a baseline forecast in this section and—later on—a fan chart illustrating the distribution of probabilities around the baseline (Box 1.3).

Table 1.1. Overview of the *World Economic Outlook* Projections
(Percent change, unless noted otherwise)

		Projections		Difference from July 2022 WEO Update 1/		Difference from April 2022 WEO 1/	
	2021	2022	2023	2022	2023	2022	2023
World Output	**6.0**	**3.2**	**2.6**	**0.0**	**–0.3**	**–0.4**	**–1.0**
Advanced Economies	**5.2**	**2.4**	**1.1**	**–0.1**	**–0.3**	**–0.9**	**–1.3**
United States	5.7	1.6	0.9	–0.7	–0.1	–2.1	–1.4
Euro Area	5.2	3.0	0.6	0.4	–0.6	0.2	–1.7
Germany	2.6	1.5	–0.3	0.3	–1.1	–0.6	–3.0
France	6.8	2.5	0.7	0.2	–0.3	–0.4	–0.7
Italy	6.6	3.2	–0.2	0.2	–0.9	0.9	–1.9
Spain	5.1	4.2	1.2	0.2	–0.8	–0.6	–2.1
Japan	1.7	1.7	1.6	0.0	–0.1	–0.7	–0.7
United Kingdom	7.4	3.6	0.3	0.4	–0.2	–0.1	–0.9
Canada	4.5	3.3	1.5	–0.1	–0.3	–0.6	–1.3
Other Advanced Economies 2/	5.3	2.8	2.4	–0.1	–0.3	–0.3	–0.6
Emerging Market and Developing Economies	**6.6**	**3.7**	**3.7**	**0.1**	**–0.2**	**–0.1**	**–0.7**
Emerging and Developing Asia	7.2	4.4	4.9	–0.2	–0.1	–1.0	–0.7
China	8.1	3.2	4.4	–0.1	–0.2	–1.2	–0.7
India 3/	8.7	6.9	6.1	–0.5	0.0	–1.3	–0.8
ASEAN-5 4/	3.4	5.3	4.9	0.0	–0.2	0.0	–1.0
Emerging and Developing Europe	6.8	–0.2	0.4	1.2	–0.5	2.7	–0.9
Russia	4.7	–3.9	–3.1	2.1	0.4	4.6	–0.8
Latin America and the Caribbean	6.9	3.5	1.9	0.5	–0.1	1.0	–0.6
Brazil	4.6	2.8	1.3	1.1	0.2	2.0	–0.1
Mexico	4.8	2.1	1.2	–0.3	0.0	0.1	–1.3
Middle East and Central Asia	4.5	5.0	3.6	0.2	0.1	0.4	–0.1
Saudi Arabia	3.2	7.6	3.7	0.0	0.0	0.0	0.1
Sub-Saharan Africa	4.7	3.6	3.7	–0.2	–0.3	–0.2	–0.3
Nigeria	3.6	3.2	3.0	–0.2	–0.2	–0.2	–0.1
South Africa	4.9	2.1	1.1	–0.2	–0.3	0.2	–0.3
Memorandum							
World Growth Based on Market Exchange Rates	5.8	2.8	2.1	–0.1	–0.3	–0.7	–1.0
European Union	5.4	3.2	0.7	0.4	–0.9	0.3	–1.8
Middle East and North Africa	4.1	5.0	3.6	0.1	0.2	0.0	0.0
Emerging Market and Middle-Income Economies	6.8	3.6	3.6	0.1	–0.2	–0.2	–0.7
Low-Income Developing Countries	4.1	4.8	4.9	–0.2	–0.3	0.2	–0.5
World Trade Volume (goods and services)	**10.1**	**4.1**	**2.5**	**0.0**	**–0.7**	**–0.9**	**–1.9**
Imports							
Advanced Economies	9.6	5.8	1.9	–0.4	–0.9	–0.3	–2.6
Emerging Market and Developing Economies	11.7	2.2	3.0	1.1	–0.3	–1.7	–1.8
Exports							
Advanced Economies	8.7	4.1	2.5	–0.4	–1.0	–0.9	–2.2
Emerging Market and Developing Economies	11.8	3.2	2.8	0.0	–0.5	–0.9	–0.8
Commodity Prices (US dollars)							
Oil 5/	65.9	41.4	–12.9	–9.0	–0.6	–13.3	0.4
Nonfuel (average based on world commodity import weights)	26.3	7.3	–6.2	–2.8	–2.7	–4.1	–3.7
World Consumer Prices 6/	**4.7**	**8.7**	**6.4**	**0.4**	**0.7**	**1.3**	**1.6**
Advanced Economies 7/	3.1	7.3	4.3	0.7	1.0	1.6	1.8
Emerging Market and Developing Economies 6/	5.9	9.8	7.8	0.3	0.5	1.1	1.3

Table 1.1. Overview of the World Economic Outlook Projections (continued)
(Percent change, unless noted otherwise)

	Q4 over Q4 8/						
		Projections		Difference from July 2022 WEO Update 1/		Difference from April 2022 WEO 1/	
	2021	2022	2023	2022	2023	2022	2023
World Output	**4.5**	**1.8**	**2.5**	**0.1**	**–0.7**	**–0.7**	**–1.0**
Advanced Economies	**4.7**	**0.8**	**1.3**	**–0.5**	**–0.2**	**–1.7**	**–0.7**
United States	5.5	0.0	0.9	–1.0	0.3	–2.8	–0.8
Euro Area	4.6	0.8	1.7	0.1	–0.4	–1.0	–0.6
Germany	1.2	0.6	0.5	0.1	–1.0	–1.8	–2.0
France	5.1	0.4	0.9	0.0	–0.2	–0.5	–0.6
Italy	6.4	0.5	0.6	–0.1	–1.0	0.0	–1.6
Spain	5.5	1.0	2.1	–0.3	–0.2	–1.3	–1.9
Japan	0.5	2.1	0.9	–0.3	0.3	–1.4	0.1
United Kingdom	6.6	1.0	0.2	0.9	–1.1	–0.1	–1.3
Canada	3.2	2.2	1.3	–0.3	–0.4	–1.3	–0.9
Other Advanced Economies 2/	4.9	1.4	2.5	–0.6	–0.3	–1.1	–0.3
Emerging Market and Developing Economies	**4.3**	**2.7**	**3.6**	**0.6**	**–1.1**	**0.2**	**–1.3**
Emerging and Developing Asia	3.8	4.3	3.8	0.3	–0.9	–0.1	–2.0
China	3.5	4.3	2.6	0.2	–0.6	–0.5	–2.1
India 3/	3.9	5.0	4.9	0.9	–2.3	2.3	–4.1
ASEAN-5 4/	4.7	3.8	6.0	0.4	–0.1	–1.3	0.7
Emerging and Developing Europe	6.4	–4.5	4.5	2.5	–3.2	1.5	1.2
Russia	4.8	–8.8	1.0	5.1	–3.8	5.3	–2.3
Latin America and the Caribbean	4.0	2.3	2.0	0.5	–0.1	0.7	–0.5
Brazil	1.6	3.0	1.1	1.5	–0.4	2.2	–0.8
Mexico	1.2	2.4	1.2	–0.5	0.2	–0.9	–0.7
Middle East and Central Asia	. . .	. . .	. . .	...	...	...	...
Saudi Arabia	6.7	4.5	3.7	–2.4	0.0	–2.4	0.1
Sub-Saharan Africa	. . .	. . .	. . .	...	...	...	...
Nigeria	2.4	2.1	2.3	0.0	0.0	0.0	0.0
South Africa	1.8	2.1	1.0	–0.1	–0.7	–0.2	–0.1
Memorandum							
World Growth Based on Market Exchange Rates	4.5	1.5	2.0	–0.1	–0.5	–1.1	–0.9
European Union	5.0	0.8	2.0	–0.1	–0.8	–1.0	–0.7
Middle East and North Africa	. . .	. . .	. . .	...	...	...	...
Emerging Market and Middle-Income Economies	4.3	2.6	3.6	0.6	–1.1	0.2	–1.3
Low-Income Developing Countries	. . .	. . .	. . .	...	...	...	...
Commodity Prices (US dollars)							
Oil 5/	77.0	15.7	–8.3	–12.9	5.1	–12.9	3.3
Nonfuel (average based on world commodity import weights)	16.7	–0.3	–0.3	–6.0	0.3	–9.7	2.2
World Consumer Prices 6/	**5.6**	**9.2**	**4.6**	**0.9**	**0.5**	**2.3**	**0.7**
Advanced Economies 7/	4.9	7.6	2.9	1.3	0.6	2.8	0.7
Emerging Market and Developing Economies 6/	6.2	10.5	6.0	0.5	0.3	1.7	0.7

Source: IMF staff estimates.
Note: Real effective exchange rates are assumed to remain constant at the levels prevailing during July 22, 2022 --August 19, 2022. Economies are listed on the basis of economic size. The aggregated quarterly data are seasonally adjusted. WEO = World Economic Outlook.
1/ Difference based on rounded figures for the current, July 2022 WEO Update, and April 2022 WEO forecasts.
2/ Excludes the Group of Seven (Canada, France, Germany, Italy, Japan, United Kingdom, United States) and euro area countries.
3/ For India, data and forecasts are presented on a fiscal year basis, and GDP from 2011 onward is based on GDP at market prices with fiscal year 2011/12 as a base year.
4/ Indonesia, Malaysia, Philippines, Thailand, Vietnam.
5/ Simple average of prices of UK Brent, Dubai Fateh, and West Texas Intermediate crude oil. The average price of oil in US dollars a barrel was $69.42 in 2021; the assumed price, based on futures markets, is $98.19 in 2022 and $85.52 in 2023.
6/ Excludes Venezuela. See the country-specific note for Venezuela in the "Country Notes" section of the Statistical Appendix.
7/ The inflation rates for 2022 and 2023, respectively, are as follows: 8.3 percent and 5.5 percent for the euro area, 2.0 percent and 1.4 percent for Japan, and 8.2 percent and 3.4 percent for the United States.
8/ For world output, the quarterly estimates and projections account for approximately 90 percent of annual world output at purchasing-power-parity weights. For Emerging Market and Developing Economies, the quarterly estimates and projections account for approximately 85 percent of annual emerging market and developing economies' output at purchasing-power-parity weights.

Table 1.2. Overview of the *World Economic Outlook* Projections at Market Exchange Rate Weights

(Percent change)

		Projections		Difference from July 2022 WEO Update 1/		Difference from April 2022 WEO 1/	
	2021	2022	2023	2022	2023	2022	2023
World Output	**5.8**	**2.8**	**2.1**	**–0.1**	**–0.3**	**–0.7**	**–1.0**
Advanced Economies	**5.2**	**2.3**	**1.0**	**–0.2**	**–0.4**	**–1.0**	**–1.3**
Emerging Market and Developing Economies	**6.7**	**3.6**	**3.6**	**0.1**	**–0.1**	**–0.2**	**–0.6**
Emerging and Developing Asia	7.4	4.0	4.7	–0.1	–0.1	–1.0	–0.7
Emerging and Developing Europe	6.5	0.7	–0.2	1.2	–0.3	2.8	–1.0
Latin America and the Caribbean	6.7	3.2	1.8	0.4	–0.1	0.8	–0.6
Middle East and Central Asia	4.4	4.7	3.3	0.0	0.1	0.1	–0.1
Sub-Saharan Africa	4.6	3.6	3.6	–0.2	–0.3	–0.2	–0.3
Memorandum							
European Union	5.3	3.0	0.6	0.3	–0.9	0.2	–1.8
Middle East and North Africa	4.2	4.7	3.2	–0.1	0.1	–0.1	0.0
Emerging Market and Middle-Income Economies	6.9	3.5	3.5	0.1	–0.2	–0.2	–0.7
Low-Income Developing Countries	4.1	4.8	4.8	–0.1	–0.3	0.2	–0.5

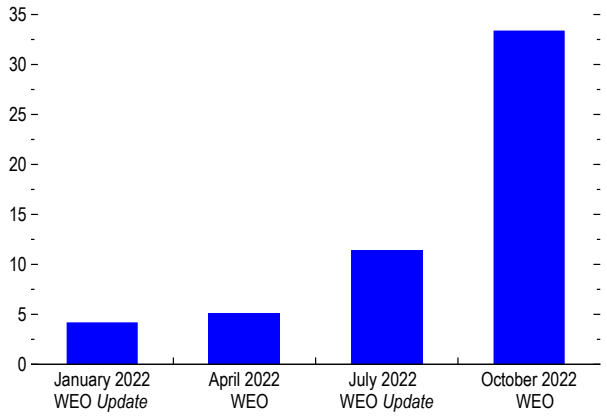
Source: IMF staff estimates.

Global Growth: Near-Term Slowdown

A slowdown in global growth is forecast, from 6.0 percent in 2021 to 3.2 percent in 2022 and 2.6 percent in 2023 (Table 1.1). The global slowdown in 2022 is as projected in the July 2022 WEO *Update* while the forecast for 2023 is lower than projected by 0.3 percentage point (Table 1.1). This prognosis for the global economy is far below average: global economic growth averaged 3.6 percent during 2000–21 (and the same during 1970–2021). For most economies, the outlook is significantly weaker than projected six months ago, in the April 2022 WEO. Forecasts are weaker than expected for over 50 percent of economies for 2022 and over 70 percent of economies for 2023. The forecast for 2023 is the weakest since the 2.5 percent growth rate seen during the global slowdown of 2001—with the exception of those during the global financial and COVID-19 crises.

Figure 1.14. Countries in Contraction as a Share of Global GDP, 2022–23

(Percent)

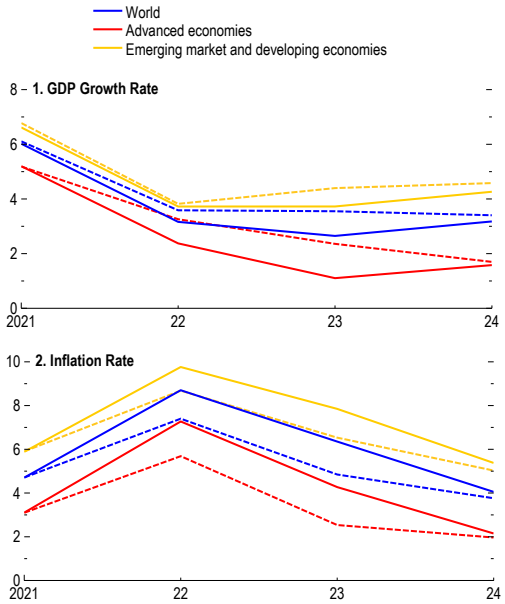


Source: IMF staff calculations.
Note: Contraction is defined as having consecutive negative quarter-over-quarter growths in 2022 or 2023. The bars show the countries' share in global GDP using purchasing-power-parity based GDP in 2022 as weights. WEO = *World Economic Outlook*.

The world's three largest economies—China, the euro area, and the US—will slow significantly in 2022 and 2023, with downgrades compared to the predictions made in April and, in most cases, July. The negative revisions reflect the materialization of downside risks highlighted in the April 2022 WEO and July 2022 WEO *Update* and discussed at length in the previous section: tightening global financial conditions in most regions, associated with expectations of steeper interest rate hikes by major central banks to fight inflation (October 2022 *Global Financial Stability Report*); a sharper slowdown in China due to extended lockdowns and the worsening property market crisis; and spillover effects from the war in Ukraine with gas supplies from Russia to Europe tightening.

A decline in global GDP or in global GDP per capita—which often happens when there is a global recession—is not currently in the baseline forecast. However, a contraction in real GDP lasting for at least two consecutive quarters (which some economists refer to as a "technical recession") is seen at some point during 2022–23 in about one-third of economies with quarterly data forecasts (30 out of 70 economies, amounting to about 33 percent of world GDP, Figure 1.14). Moreover, projections for global growth on a fourth-quarter-over-fourth-quarter basis are pointing to a significant weakening, to only 1.8 percent in 2022 and to 2.5 percent in 2023 (Table 1.1). Negative revisions are more pronounced for advanced economies than those for emerging market and developing economies, for which differing exposures to the underlying developments imply a more mixed outlook (Figure 1.15). Overall, the outlook is one of increasing growth divergence between advanced and emerging market and developing economies.

Figure 1.15. Global Growth and Inflation Forecasts
(Percent)



Source: IMF staff estimates.
Note: Solid lines = October 2022 *World Economic Outlook*; dashed lines = April 2022 *World Economic Outlook*.

Growth Forecast for Advanced Economies

For advanced economies, growth is projected to slow from 5.2 percent in 2021 to 2.4 percent in 2022 and 1.1 percent in 2023. With the slowdown gathering strength, growth is revised down compared with the July WEO *Update* (by 0.1 percentage point for 2022 and 0.3 percentage point for 2023). The projected slowdown and the downgrades are concentrated in the US and European economies.

Growth in the *United States* is projected to decline from 5.7 percent in 2021 to 1.6 percent in 2022 and 0.9 percent in 2023, with no growth in 2022 on a fourth-quarter-over-fourth-quarter basis. Growth in 2022 has been revised down by 0.7 percentage point since July, reflecting the unexpected real GDP contraction in the second quarter. Declining real disposable income continues to eat into consumer demand, and higher interest rates are taking an important toll on spending, especially spending on residential investment.

In the *euro area*, the growth slowdown is less pronounced than in the United States in 2022 but is expected to deepen in 2023. Projected growth is 3.0 percent in 2022 and 0.6 percent in 2023. There is an upward revision of 0.4 percentage point since July for 2022 on account of a stronger-than-projected second quarter outturn in most euro area economies, and a downward revision of 0.6 percentage point for 2023. This average for the euro area hides a significant heterogeneity among individual member countries. In Italy and Spain, a recovery in tourism-related services and industrial production in the first half of 2022 has contributed to projected growth of 3.2 percent and 4.2 percent, respectively, in 2022. However, growth in both countries is set to slow sharply in 2023, with Italy experiencing negative annual growth. Projected growth in 2022 is lower in France, at 2.5 percent, and in Germany, at 1.5 percent,

and the slowdown in 2023 is especially sharp for Germany, with negative annual growth. Weak 2023 growth across Europe reflects spillover effects from the war in Ukraine, with especially sharp downward revisions for economies most exposed to the Russian gas supply cuts, and tighter financial conditions, with the European Central Bank having ended net asset purchases and rapidly raising policy rates by 50 basis points in July and 75 basis points in September 2022. At the same time, a number of factors have contributed to a less rapid near-term slowdown than in the United States, including policy interest rates at still lower levels and, in a number of European economies, NextGenerationEU funds supporting economic activity.

In the *United Kingdom*, a sharp slowdown also prevails. Growth is forecast at 3.6 percent in 2022 and only 0.3 percent in 2023. The slowdown is concentrated in the second half of 2022, with fourth-quarter-over-fourth-quarter growth near zero, and reflects the Bank of England's swift response of interest rates to address high inflation in the context of weakening consumer and business confidence.

Growth in *Japan* is expected to be more stable at 1.7 percent in both 2021 and 2022, and 1.6 percent 2023, with a downward revision for 2023 since July of 0.1 percentage point. The revisions reflect mainly external factors, with a negative shift in the terms of trade (ratio of export to import prices) from higher energy import prices as well as lower consumption as price inflation outpaces wage growth.

Growth Forecast for Emerging Market and Developing Economies

Growth in the emerging market and developing economy group is expected to decline to 3.7 percent in 2022 and remain there in 2023, in contrast to the deepening slowdown in advanced economies. The forecast for 2022 is modestly upgraded from the July forecast, reflecting a smaller-than-expected contraction in emerging and developing Europe.

In *emerging and developing Asia*, growth is projected to decline from 7.2 percent in 2021 to 4.4 percent in 2022 before rising to 4.9 percent in 2023, with a –0.2 percentage point and –0.1 percentage point downgrade since July for 2022 and 2023, respectively. The revisions reflect the downgrade for growth in *China*, to 3.2 percent in 2022 (the lowest growth in more than four decades, excluding the initial COVID-19 crisis in 2020). COVID-19 outbreaks and lockdowns in multiple provinces, as well as the worsening property market crisis, have held back economic activity in China, although growth is expected to rise to 4.4 percent in 2023. The outlook for *India* is for growth of 6.9 percent in 2022—a 0.5 percentage point downgrade since the July forecast, reflecting a weaker-than-expected outturn in the second quarter and more subdued external demand—and 6.1 percent in 2023, with no change since July. For the *Association of Southeast Asian Nations* (*ASEAN*)*-5* economies, projected growth in 2023 is revised down to reflect mainly less favorable external conditions, with slower growth in major trading partners such as China, the euro area, and the US; the decline in household purchasing power from higher food and energy prices; and in most cases, more rapid monetary policy tightening to bring inflation back to target.

In *emerging and developing Europe*, growth is projected at –0.2 percent in 2022 and 0.4 percent in 2023, with a 1.2 percentage point upgrade for 2022 and a 0.5 percentage point downgrade for 2023, compared with the July forecast. The economic weakness reflects –3.9 percent and –3.1

percent projected growth rate in Russia in 2022 and 2023 and a forecast contraction of 45.0 percent in Ukraine in 2022, as a result of the war in Ukraine and international sanctions aimed at pressuring Russia to end hostilities. The contraction in Russia's economy is less severe than earlier projected, reflecting resilience in crude oil exports and in domestic demand with greater fiscal and monetary policy support and a restoration of confidence in the financial system.

Growth in *Latin America and the Caribbean* is forecast at 3.5 percent in 2022 and 1.9 percent in 2023. Growth for 2022 is higher by 0.5 percentage point than projected in July, reflecting stronger-than-expected activity in the first half of 2022 on the back of favorable commodity prices, still-favorable external financing conditions, and the normalization of activities in contact-intensive sectors. However, growth in the region is expected to slow in late 2022 and 2023, as partner country growth weakens, financial conditions tighten, and commodity prices soften.

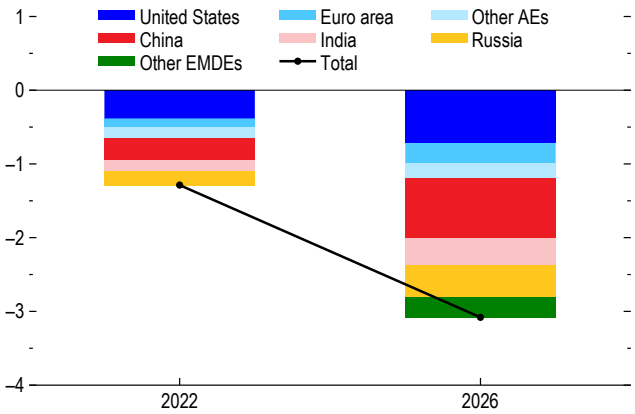
Growth in the *Middle East and Central Asia* is projected to increase to 5.0 percent in 2022, largely reflecting a favorable outlook for the region's oil exporters and an unexpectedly mild impact of the war in Ukraine on the Caucasus and Central Asia. In 2023, growth in the region is set to moderate to 3.6 percent, as oil prices decline and the headwinds from the global slowdown and Russia's invasion of Ukraine take hold.

In *sub-Saharan Africa*, the growth outlook is slightly weaker than predicted in July, with a decline from 4.7 percent in 2021 to 3.6 percent and 3.7 percent in 2022 and 2023, respectively—downward revisions of 0.2 percentage point and 0.3 percentage point, respectively. This weaker outlook reflects lower trading partner growth, tighter financial and monetary conditions, and a negative shift in the commodity terms of trade.

Medium-Term Scarring

The adverse shocks of 2022 are expected to have long-lasting effects on output. The fall in global real GDP in 2022 compared with forecasts made at the start of 2022 (published in the January WEO *Update*) amounts to 1.3 percent (Figure 1.16). Although windfall gains and gains from reform may protect some countries (for example, Gulf Cooperation Council members), by 2026, the output loss (cumulative growth) compared with those early 2022 forecasts is projected at 3.1 percent: about double the initial impact. About half of the projected 2022 decline is due to lower growth in China, the euro area, Russia, and the US, with this composition holding fairly steady over the forecast horizon. Long-lasting and widening output losses across economies from the shocks

Figure 1.16. The Shocks of 2022: Persistent Output Losses
(Percent deviation of real GDP from preshock forecasts)

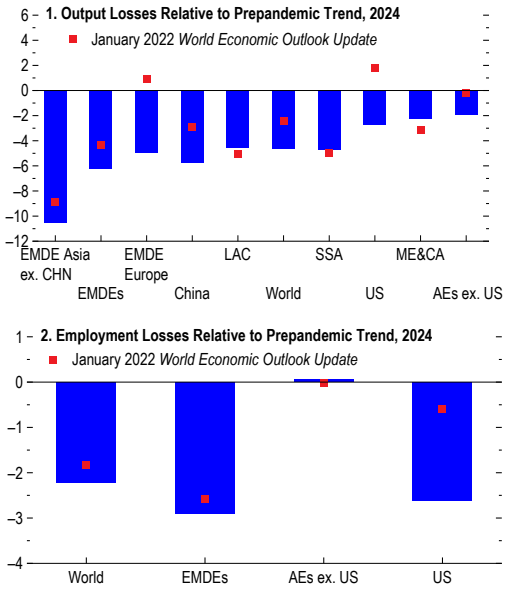


Source: IMF staff estimates.
Note: Figure reports deviation of real GDP level (cumulative growth) from forecasts in the January 2022 *World Economic Outlook Update*. AEs = advanced economies; EMDEs = emerging market and developing economies.

of 2022 reflect several factors, including the combination supply-side nature of the initial shocks and macroeconomic policy tightening. For economies directly affected by the war in Ukraine, the damage to activity is likely to last for long and affect most industries (Novta and Pugacheva 2021, 2022). The fading of COVID-19 fiscal support packages and anti-inflation monetary policy tightening contrast with the expansive policy support put in place in many economies in 2020. The persistent effects are consistent with economic slowdowns resulting in less investment in capital, training, and research and development, implying scarring to economic potential.[1]

The shocks of 2022 are exacerbating the ongoing economic scarring from the pandemic (Figure 1.17), particularly for emerging market and developing economies. At the start of 2022, the pandemic's medium-term impact on global GDP was already projected at about –2.4 percent by 2024 (the difference between the January 2022 WEO *Update* projection and the January 2020 projection, which preceded the pandemic's onset). Emerging market and developing economies bore the projected output and employment losses disproportionately. Advanced economies had on average no projected economic losses, reflecting their ability to implement exceptionally large policy support packages. For the US as of January 2022, real GDP in 2024 was expected to *surpass* prepandemic forecasts by 1.8 percent. In contrast, in emerging market and developing economies, with a younger population, greater pandemic disruption to schooling, less policy space, and greater preexisting investment needs, output and employment were expected to remain some way below prior trends for years to come (with average losses of 4.1 percent for output and 2.5 percent for employment in 2024). The shocks of 2022 have approximately doubled the projected global output loss for 2024, to 4.7 percent.

Figure 1.17. Scarring from the Pandemic
(Percent deviation from prepandemic trend)



Source: IMF staff calculations.
Note: The figure shows medium-term losses, which are the differences between forecasts of the indicated variable (for 2024) relative to the January 2020 WEO *Update*. The sample of countries in panel 2 comprises those that have comparable employment projections for both time depicted. The emerging market and developing economies (EMDE) employment aggregate excludes China and India due to changes in employment definitions across vintages. AEs ex. US = advanced economies excluding the United States; EMDE Asia ex. CHN = EMDEs in Asia excluding China; LAC = Latin American and Caribbean economies; ME&CA = Middle Eastern and Central Asian economies; SSA = sub-Saharan African economies.

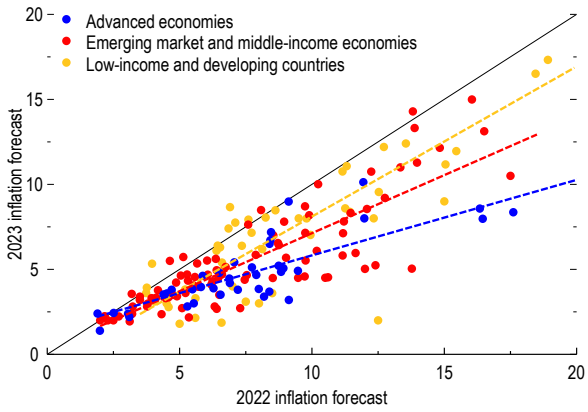
Inflation Peaking

The forecast for global headline CPI inflation is for a rise from 4.7 percent in 2021 to 8.7 percent in 2022—an upward revision of 0.4 percentage point since July—and a decline to 6.4 percent in 2023 and 4.1 percent in 2024. Forecasts for most economies have been revised up modestly since July but are significantly above forecasts made earlier in 2022. On a four-quarter basis, projected inflation peaks at 9.5 percent in the third quarter of 2022 before declining to 4.6 percent by the fourth quarter of 2024. The disinflation projected for 2023 occurs in almost all

[1] For a discussion of such hysteresis effects on the supply side of the economy, see, for example, Yellen (2016), Ball (2009, 2014), Blanchard, Cerutti, and Summers (2015), and Adler and others (2017).

190 economies for which forecasts are available but is most pronounced in advanced economies (Figure 1.18). The faster disinflation for advanced economies—a sharper reduction in 2023 for a given level of inflation in 2022—is consistent with the notion that these economies benefit more than emerging markets from greater credibility of monetary frameworks and that this aspect helps to reduce inflation.

Figure 1.18. Inflation Likely to Stabilize Next Year
(Percent)



Source: IMF staff calculations.
Note: Figure reports 45-degree line (solid) and lines (dashes) of best fit for each group of economies with matching colors. 15 emerging market and developing economies with 2022 inflation higher than 20 percent are not shown. 13 of those countries show 2023 inflation at the same or lower levels than that in 2022.

The upward inflation revision is especially large for *advanced economies*, in which inflation is expected to rise from 3.1 percent in 2021 to 7.3 percent in 2022 (up by 0.7 percentage point compared with the July forecast) before declining to 4.3 percent by 2023. Significant increases in headline inflation among such major economies as the US (a 0.5 percentage point upward revision to 8.2 percent) and the euro area (a 1.0 percentage point upward revision to 8.3 percent) are driving the increase for the group. Forecasts for 2024 are relatively unchanged—up by only 0.1 percentage point—reflecting confidence that inflation will decline as central banks tighten policies and energy prices decline. At the same time, the projected inflation reduction is, as mentioned, proportionately greater for advanced economies than for other country groups.

For *emerging market and developing economies*, inflation is expected to rise from 5.9 percent in 2021 to 9.8 percent in 2022, before declining to 7.8 percent in 2023. Prices in the fourth quarter of 2023 are projected at 6.0 percent higher than in the same quarter of 2022. Revisions for these economies display greater variation across economies than those for advanced economies, with relatively modest increases in emerging and developing Asia (partly because of a slowdown of activity in China and limited increases in prices of foods that make up a large part of diets) but larger revisions for Latin America and the Caribbean (up by 3.0 percentage points) and for emerging and developing Europe (up by 2.9 percentage points).

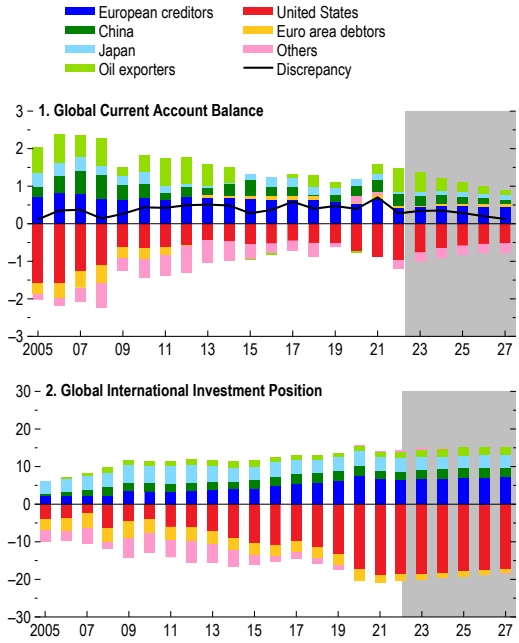
Global Trade Slowdown, with Wider Imbalances

Global trade growth is slowing sharply: from 10.1 percent in 2021 to a projected 4.1 percent in 2022 and 2.5 percent in 2023. This is higher growth than in 2019, when rising trade barriers constrained global trade, and during the COVID-19 crisis in 2020, but well below the historical average (4.6 percent for 2000–21 and 5.4 percent for 1970–2021). The slowdown, which is 0.7 percentage point steeper than projected for 2023 in the July WEO *Update*, mainly reflects the decline in global output growth after the rebound in 2021. Supply chain constraints have been a further drag: the Federal Reserve Bank of New York's Global Supply Chain Pressures Index has declined in recent months, largely because of a decrease in Chinese supply delivery times, but is still above its normal level, indicating continuing disruptions. Nevertheless, supply chains are complex and pandemic-era disruptions were a product of multiple factors. If other factors continue to improve even as challenges in China remain, supply-side pressures

might continue to ease. The dollar's appreciation in 2022—by about 9 percent in nominal effective terms as of August compared with the 2021 average—is likely to have further slowed world trade growth, considering the dollar's dominant role in trade invoicing and the implied pass-through in consumer and producer prices outside the US (Gopinath and others 2020).

Whereas global trade growth is declining, global trade balances have widened. After shrinking during 2011–19, global current account balances—the sum of all economies' current account surpluses and deficits in absolute terms—increased during the COVID-19 crisis and are projected to stay high in 2022 (Figure 1.19). The widening of balances has reflected the pandemic's impact. It has also, in 2022, mirrored the increase in commodity prices associated with the war in Ukraine, which has raised balances for oil net exporters and reduced them for net importers (2022 *External Sector Report*). A widening in global current account balances is not necessarily a negative development, though excessive global imbalances can fuel trade tensions and protectionist measures or increase the risk of disruptive currency and capital flow movements.

Figure 1.19. Current Account and International Investment Positions
(Percent of global GDP)



Source: IMF staff estimates.
Note: European creditors = Austria, Belgium, Denmark, Finland, Germany, Luxembourg, Netherlands, Norway, Sweden, Switzerland; euro area debtors = Cyprus, Greece, Ireland, Italy, Portugal, Spain, Slovenia; oil exporters = Algeria, Azerbaijan, Iran, Kazakhstan, Kuwait, Nigeria, Oman, Qatar, Russia, Saudi Arabia, United Arab Emirates, Venezuela.

Creditor and debtor stock positions are expected to remain elevated in 2022, although they have, on average, moderated slightly from their 2020 peaks, because valuation changes have more than offset the concurrent widening of current account balances. The 2022 decline in asset prices in the US—the economy with the world's largest net liability position (external assets minus external liabilities)—could cause valuation losses for foreign holders of US assets. At the same time, however, US dollar appreciation could lead to valuation gains in emerging market and developing economies, which tend to have long positions in foreign currency, while increasing the burden of dollar-denominated public sector debts.

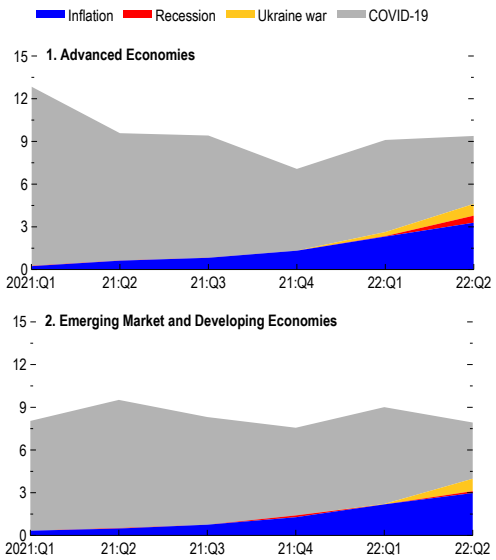
Risks to the Outlook: The Downside Still Dominates

Risks to the outlook continue to be on the downside. Overall, risks are elevated, as the world grapples with the impact of Russia's invasion of Ukraine, a slowdown in economic activity as central banks ramp up efforts to quell inflation, and the lingering pandemic. The risks described in this section, if realized, are likely to depress growth further and keep inflation higher for longer. Some of these risks are currently top of mind for the world's largest firms as they navigate a highly uncertain environment. While inflation is increasingly important, firms still see COVID-19 as the dominant risk (Figure 1.20). However, the continued high numbers of COVID-19 mentions in firms' earnings calls could reflect the pandemic's lingering effect on labor markets and supply chains. Further complicating the outlook is that how these risks

influence one another is not at all straightforward. They may well interact to magnify some adverse effects. In what follows, the most prominent risks and uncertainties surrounding the outlook are discussed, followed by a model-based analysis that quantifies the balance of risks to the outlook (Box 1.3).

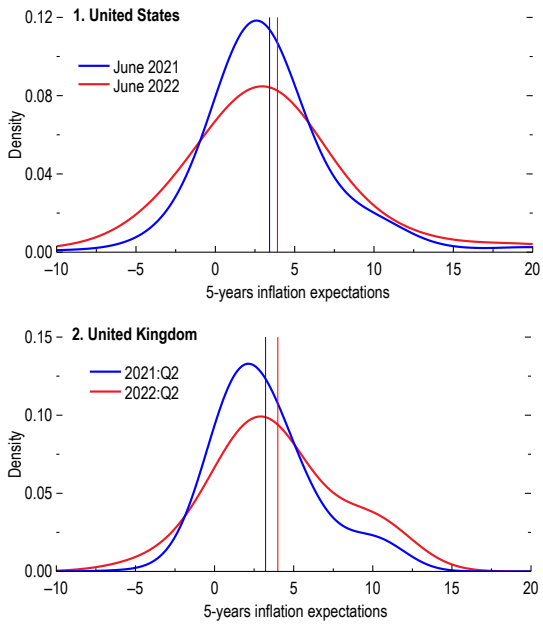
- *Policy mistakes: under- or overtightening monetary policy.* Major central banks must chart a difficult course. A deteriorating growth outlook with subdued consumer and investor sentiment sits somewhat awkwardly alongside still tight labor markets. The major economies are also seeing mixed economic readings, such as contradictory signals in output and labor markets in the US and tourism-supported strong growth in Europe during the summer despite the war's impact. While conditioning policy on incoming data, there is a risk that inflation expectations could de-anchor if the fight against inflation loses momentum. So far, consumer inflation expectations seem to remain anchored in major economies (Adrian 2022; Adrian, Erceg, and Natalucci 2022). It is worth noting, however, that disagreement in views among households regarding the longer-term outlook for inflation is widening and, in some cases, beginning to shift, with a larger share of households expecting very high inflation (Figure 1.21). The risk of policy mistakes—under- or overtightening—is elevated in these conditions. Not tightening enough may prove a costly mistake, as it risks inflation becoming entrenched, prompting a more hawkish future stance on interest rates at a significant cost to output and employment. On the other hand, overtightening risks sinking many economies into prolonged recession. The outlook already projects a growing number of economies to be in contraction in 2022–23 (Figure 1.14). Uncertainty about the neutral rate of interest and potential transatlantic monetary policy divergence makes navigating this narrow path complicated. Moreover, over- and under-tightening do not necessarily have symmetric costs: a policy mistake that leads to spiraling inflation would be the much more detrimental of the two. In addition, uncertainly also clouds the natural level of unemployment: the pandemic significantly changed labor market dynamics in many advanced economies, with low

Figure 1.20. Corporate Talk of Key Macroeconomic Risks
(Cumulative percent)



Sources: NL Analytics; and IMF staff calculations.
Note: Each area in the figure shows the number of sentences in companies' earnings calls that mention the respective risk as a percentage of the total number of "risk" mentions.

Figure 1.21. Long-Term Inflation Expectations
(Percent; 5 years ahead)



Sources: Bank of England, Inflation Attitudes Survey; University of Michigan, Surveys of Consumers; and IMF staff calculations.
Note: The vertical lines indicate the mean of each distribution.

employment coexisting with elevated labor market tightness. Given the uncertain outlook, the coming months are likely to test central banks' mettle in rooting out inflation. In this fight, advanced economy central banks may be able to depend on a larger credibility buffer. While central banks in emerging market economies and lower-income countries have made significant progress in policy strategy and communications in recent years, gaps between these economies and advanced economies persist (Unsal, Papageorgiou, and Garbers 2022). Emerging market economies and lower-income countries may struggle more to defeat inflation. In all cases, however, durably reducing inflation will depend crucially on monetary policymakers' resolve to stay the course and avoid repeating the "stop-go" cycle of the 1970s.

- *Divergent policy paths and dollar strength.* Divergences in economic policies may continue to contribute to US dollar strength, which could create cross-border tensions. The course of monetary policy tightening in the US and the euro area might continue to diverge if inflation persists for longer and a sharp monetary normalization proves difficult to implement in the euro area in the presence of debt market fragmentation risks. Another dimension of macroeconomic policy divergence is that among China, Japan, and the US. In China, output growth has slowed with the COVID-19 outbreaks and troubles in the property sector, and with relatively benign inflation readings, the central bank decided to reduce lending rates in August. Japan's policy rates could continue to remain low given low underlying core inflation and weak wage growth. Overall, such policy divergences, and any flight-to-safety effects should geopolitical tensions rise, may cause further US dollar strength. The associated currency movements may add to cross-tensions regarding competitiveness; stoke inflation in many economies, given the predominance of dollar pricing in international trade; and lead some countries to tighten policies further to prevent excessive currency depreciation, with negative effects on growth.

- *Inflationary forces persisting for longer.* Inflation is projected to cool by the end of 2024, with the forces shaping the outlook pointing to faster disinflation in advanced economies than in emerging market and developing economies (Figure 1.18). However, several factors could delay the moderation of inflation rates. Further shocks to energy and food prices could keep headline inflation higher for longer. Energy prices are and will remain particularly sensitive to the course of the war in Ukraine and the potential flaring up of other geopolitical conflicts. Sustained high energy prices may also pass through to core inflation and so warrant a more hawkish monetary policy response. This would deepen the drag on growth owing to higher cost of borrowing and depressed disposable incomes. And extreme weather events might undermine the global food supply, placing upward pressure on the prices of foods that make up a large part of diets, with dire consequences for the world's poorest countries. Higher-for-longer inflation would also raise the risk of inflation de-anchoring or a wage-price spiral persisting when expectations are more backward looking. So far, these risks appear contained, partly because of more aggressive monetary tightening (see Chapter 2). Firms enjoying higher markups might choose to absorb the increase in the cost of intermediate goods (Box 1.2), but a prolonged increase in input costs might prompt firms to pass on higher costs to preserve margins. Although the risk of this seems low, firms are increasingly regarding inflation as a prominent risk (Figure 1.20). On the upside, the current surge in inflation is partly related to the stronger-than-anticipated demand recovery from the pandemic shock (Box 1.1). With continued tightness in labor markets, some advanced economies seem to be at the steeper end of the supply curve. This may support rapid disinflation, with lower output and

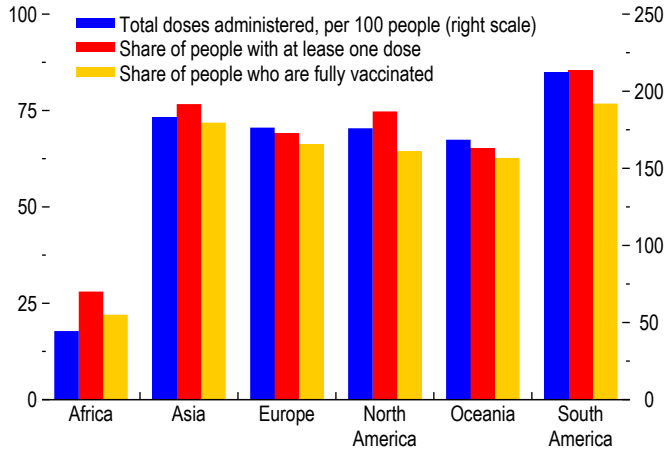
employment costs. Also, a combination of a deteriorating growth outlook and efforts to ramp up crude oil production by the largest producers may soften energy-induced inflationary pressures.

- *Widespread debt distress in vulnerable emerging markets.* The war in Ukraine has helped precipitate a surge in sovereign spreads for some emerging market and developing economies (Figure 1.3). This surge comes amid record debt due to the pandemic. Should inflation remain elevated, further policy tightening in advanced economies may add pressure to borrowing costs for emerging market and developing economies. Some larger emerging market economies are well positioned. But if sovereign spreads increase further, or even just remain at current levels for a prolonged period, debt sustainability may be at risk for many vulnerable emerging market and developing economies, particularly those hit hardest by energy and food price shocks. With a larger import bill, strained fiscal budgets, and limited fiscal space, any loss of access to short-term funding markets will have significant economic and social consequences. The poor are particularly vulnerable, as fiscal policy support is critical to shielding them from the impact of the food inflation shock. A surge in capital outflows might also cause distress in emerging market and developing economies with large external financing needs. A widening debt crisis in these economies would weigh heavily on global growth and might precipitate a global recession. Further US dollar strength can only compound the likelihood of debt distress. The weakening of national currencies in emerging market and developing economies might trigger balance sheet vulnerabilities in economies with large dollar-denominated net liabilities, with immediate risks to financial stability.

- *Halting of gas supplies to Europe.* The war in Ukraine is still sending aftershocks through Europe and global markets. The amount of Russian gas supplied to Europe has fallen to about 20 percent of last year's level, compared to 40 percent at the time of the July 2022 WEO *Update.* The latest forecasts incorporate the expectation that the volume will decline further, to even lower levels, by mid-2024, in line with major European economies' energy independence goals. Should Russia completely halt gas supplies to Europe in 2022, energy prices would likely increase further over the short term, placing even more pressure on households, and would be expected to cause headline inflation in the euro area to remain elevated for longer. The economic impact of the shock would—as analysis underlying the July 2022 WEO *Update* (Flanagan and others 2022) suggests—vary across the continent with the degree of dependence on Russian gas imports and the ability to address infrastructure bottlenecks to secure alternative gas shipments. In such a scenario, countries in central and eastern Europe—particularly the Czech Republic, Hungary, and the Slovak Republic—might face severe disruption, given their dependence on Russian gas and the potential difficulty of securing alternative gas supplies. Severe gas shortages could force energy rationing during the winter in Germany, Europe's largest economy, with drastic effects for industry, weighing heavily on the euro area growth outlook, with potential for negative cross-border spillover effects. Of course, commodity prices might also decline—perhaps if the global downturn is more severe than expected—something that would have an adverse impact on exporting countries.

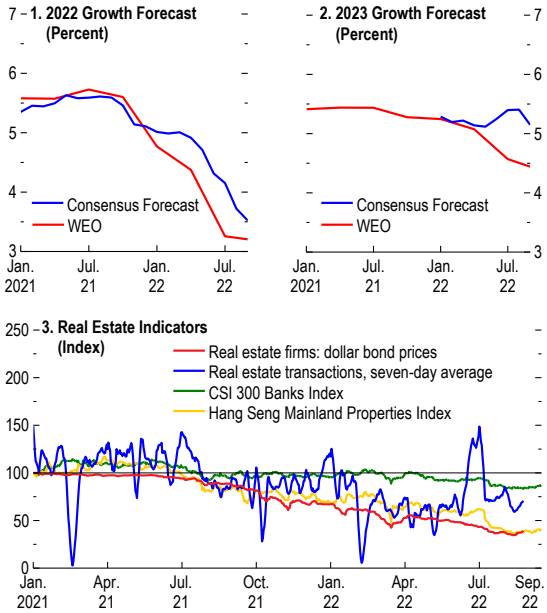
- *A resurgence of global health scares.* While the latest coronavirus variants are less deadly than earlier ones and show far more manageable hospitalization rates, they are also highly contagious. As such, the COVID-19 pandemic is still taking a heavy toll on the workforce, resulting in prolonged absenteeism, reduced productivity, and falling output. Yet the evolution of more aggressive and lethal coronavirus variants remains a risk for the global economy. Regions where exposure to new variants is highest and those, such as Africa, where vaccination rates are still low are likely to bear a higher burden in any pandemic resurgence (Figure 1.22). Similarly concerning is the risk of new global health scares. For instance, monkeypox currently represents a public health emergency of international concern. While a scenario in which a new pandemic emerges has very low probability, the return to strict lockdowns could reduce demand for contact-intensive services once more. Given squeezed household budgets, there is little likelihood of a partial offset through a rotation toward demand for goods. While this might lessen inflationary pressures, further outbreaks could instead magnify supply chain bottlenecks, which are finally starting to ease. The interplay between these two forces will shape the inflation-output trade-off that central banks now confront. Over the coming years, such risks, if realized, would only deepen the pandemic's human capital scarring and bring productivity down.

Figure 1.22. Africa Least Vaccinated Against COVID-19
(Percent, unless noted otherwise)



Sources: Our World in Data; and IMF staff calculations.
Note: Latest data available are for September 13, 2022.

Figure 1.23. Slowdown in China



Sources: Bloomberg Finance L.P.; Consensus Economics; Wind Information (HK) Co. Ltd.; and IMF staff calculations.
Note: For panels 1 and 2, the latest dates are September 9, 2022. All series indexed to 100 on 1 January 2021, except real estate transactions, which is indexed to average 100 in 2021. WEO = *World Economic Outlook*.

- *Worsening of China's real estate woes.* Growth in China has weakened significantly since the start of 2022 and has been subject to downward revision, after the April 2022 lockdowns and an expected slowdown in global trade (Figure 1.23, panels 1 and 2). Downside risks to China's growth recovery dominate the outlook, with signs of a significant slowdown in the real estate sector, historically an engine of growth for China's economy (Figure 1.23, panel 3). The decline in real estate sales prevents developers from accessing a much-needed source of

liquidity to finish ongoing projects, putting pressure on their cash flows and raising the possibility of further debt defaults. Concerned with the delay in the delivery of residential units, thousands of buyers are calling for a moratorium on mortgage payments that would lead to forbearance and exacerbate the risk of nonperforming loans for banks, as well as the liquidity squeeze developers face. Uncertainty about the property sector could also impact consumption and local government finances. A further intensification of negative feedback loops between housing sales and developer stress risks a larger and more protracted real estate adjustment. This would be a large blow, given that the real estate sector makes up about one-fifth of GDP in China. Furthermore, the potential for banking sector losses may induce broader macro-financial spillovers that would weigh heavily on China's medium-term growth.

- *Fragmentation of the world economy, hampering international cooperation.* The Russian invasion of Ukraine fractured the relations between Russia and the West. New geopolitical tensions—in east Asia and elsewhere—are also becoming more likely. Such tensions risk disrupting trade and eroding the pillars of multilateral cooperation frameworks that took decades to build. While the recent Black Sea grain deal bodes well for increasing the supply of commodities to global markets and is a positive step for international diplomatic efforts, the risks of the world economy fragmenting further are real and could weigh on the outlook, especially over the medium term (the next three to five years). Backtracking on the Black Sea grain deal might lead to a food security crisis, most notably in low-income countries. Further fragmentation in global cooperation would create a significant risk for climate change cooperation. Heightened tensions might also see the world fragmenting into different spheres of geopolitical influence, with adverse impacts on global trade and capital flows.

Globally consistent risk assessment of the WEO forecast. Confidence bands for the WEO forecast for annual global growth are obtained using the G20MOD module of the IMF's Flexible System of Global Models. For some regions, the WEO forecast has asymmetric confidence bands, skewed toward lower growth than in the baseline. This skewing reflects the preponderance of negative growth surprises in the past. The resulting risk assessment, displayed in a fan chart, can also be used to calculate the probability of a global economic downturn. The estimated probability of one-year-ahead global growth below 2.0 percent—an outcome that has occurred on only five occasions since 1970 (in 1973, 1981, 1982, 2009, and 2020)—now stands at about 25 percent: more than double the normal probability (Box 1.3). The probability of negative *per-capita* real GDP growth in 2023 is more than 10 percent.

Policy Actions: From Inflation to Growth

Although the economic environment is one of the most challenging in many years, difficult times need not last forever. Judicious policy choices can help guide the global economy out of inflation and into an era of sustainable and inclusive growth. Such policies have impacts and interactions in the short, medium, and long terms.

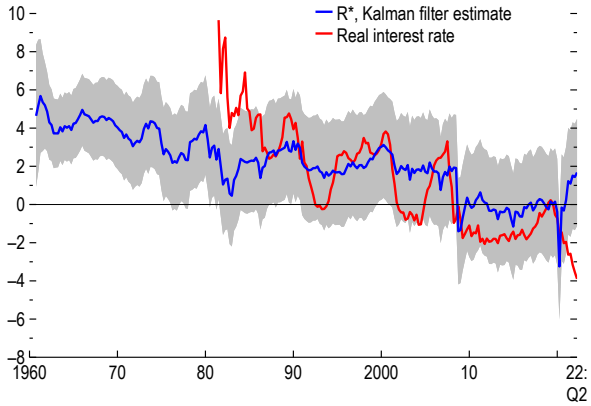
Policies with Immediate Impact

Fighting inflation. The priority must be to tackle inflation, normalize central bank balance sheets, and raise real policy rates above their neutral level fast enough and for long enough to keep inflation and inflation expectations under control. Fiscal policy also needs to support monetary

policy in softening demand in economies with excess aggregate demand and overheating labor markets. Without price stability, any gains from future growth are at risk of being eaten up by a renewed cost-of-living squeeze. Central banks need to act resolutely while communicating clearly objectives and the steps to achieve them (October 2022 *Global Financial Stability Report*). Yet taming inflation will come at a cost: unemployment will rise and wages will decline as monetary policy tightens. The appropriate path of anti-inflation policies will be country specific and depend crucially on the following issues.

- *The timing of the costs and benefits of disinflation.* The costs of monetary contraction tend to come before the benefits. The last major US disinflation began in 1980 and brought an almost immediate recession. But inflation took about three years to fall to manageable levels. More systematic evidence points to similar conclusions. Monetary policy seems to have its peak impact on real variables after about one year, but on inflation after nearer three to four years (Coibon 2012; Cloyne and Hurtgen 2016). This lag between the near-term costs of disinflation policies and their longer-term benefits poses credibility challenges for monetary policymakers, who may expect to receive calls to ease off monetary tightening amid job losses and continued inflation. And if the interest rate consistent with stable inflation (often termed the "natural rate of interest") is higher than previously believed, the costs of disinflation—and the pressures to slow the pace of tightening—will be correspondingly higher. Indeed, some evidence suggests this has already occurred in the US. Although real rates are low, historical relationships between output and inflation are not consistent with the observed increase in inflation alone; instead, it seems possible that the natural rate may have increased slightly, loosening the stance of policy further (Figure 1.24), although there is still a great deal of uncertainty about the natural rate at medium- and long-term horizons. In any case, central banks must stay the course to ensure that inflation durably declines. In this, qualitative forward guidance on objectives and reaction functions will remain valuable. Yielding to pressure to slow the pace of tightening will only undermine credibility, allow inflation expectations to rise and necessitate more aggressive and painful policy actions later. By reversing course, monetary policymakers will deliver only the pain of tightening, with none of the gain. Moreover, in some economies, slowing the pace of monetary tightening could exacerbate the risks associated with policy divergences. Finally, supply-side efforts can support monetary policy in reducing inflation. Policies to prevent supply shortages will ease pressure on inflation as demand recovers and include upgrading transportation infrastructure, pandemic preparedness, and creating more reliable and resilient supply chains. In turn, long-lasting supply shocks may also necessitate policy responses.

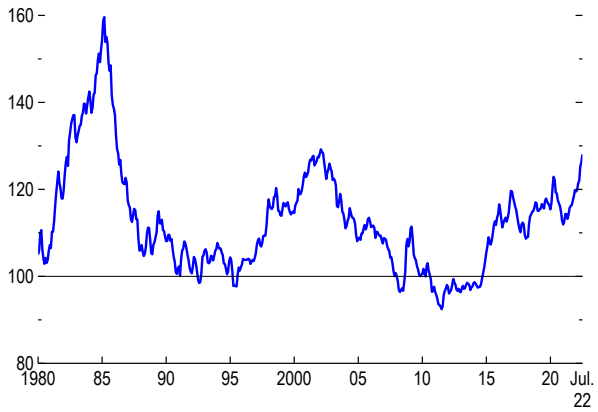
Figure 1.24. Natural Rate of Interest, United States
(Percent)



Sources: Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters (SPF); Holston, Laubach, and Williams (2017); and IMF staff calculations.
Note: The Kalman filter estimate is computed from the model of Holston, Laubach, and Williams (2017). Real interest rates are computed using SPF forecasts of inflation.

- *International capital flows.* Tighter financial conditions and fear of global recession influence global capital flows, often with negative consequences for emerging market and developing economies. There has been a surge in the US dollar, which in real terms has risen to highs not seen since the early 2000s (Figure 1.25). Higher US interest rates and the strong dollar will raise financing costs for emerging market and developing economies, which are already generally facing real rates higher than those in advanced economies. It will also make dollar-invoiced imported goods more expensive, boosting inflation. In this context, the policy response recommended by the IMF's Integrated Policy Framework (IPF), both in a prudential manner as well as during the shock, depends on country-specific circumstances. For countries with deep foreign exchange markets and low foreign currency debt, relying on the policy rate and exchange rate flexibility is appropriate. On the other hand, if foreign exchange markets are shallow, the turn in the global financial cycle may be associated with "taper tantrums," as portfolio-constrained investors sell domestic currency assets. In such cases, it would be appropriate to conduct foreign exchange intervention or loosen inflow capital flow management measures (CFMs), instead of moving monetary and fiscal policy away from their appropriate settings. For countries with large foreign currency debts, outflows may generate systemic financial stability risks and a tail risk in growth outcomes. It may be appropriate in certain circumstances for such countries to use preemptive CFM/MPMs (measures that are both CFMs and or macroprudential measures) to reduce their foreign exchange mismatches, to reduce the probability and severity of any subsequent capital flow reversals. . In crisis or near-crisis circumstances, outflow CFMs may be considered. . Foreign exchange intervention and inflow CFMs may also be appropriate in emerging market economies where there is a high risk of de-anchoring of inflation expectations owing to sharp exchange rate depreciations.

Figure 1.25. Broad-Based Dollar Appreciation
(Index, base year = 2010)

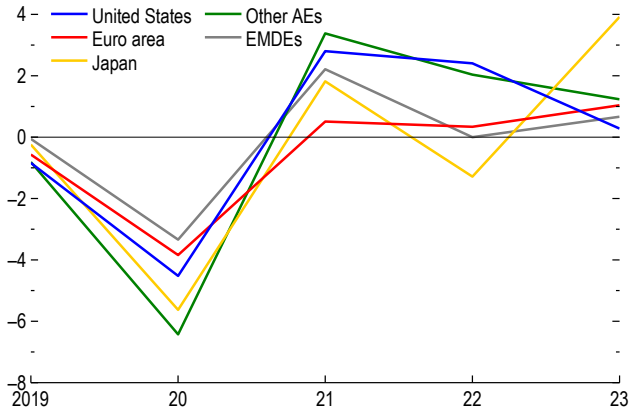


Source: IMF staff calculations.
Note: Figure shows real effective exchange rate of US dollar based on consumer prices.

- *Monetary and fiscal policy coordination.* Following a broad loosening of public purse strings during the pandemic, tightening is generally expected in 2022 and 2023 (Figure 1.26). However, in some countries fiscal policy is expected to loosen, potentially boosting aggregate demand and offsetting monetary policy's disinflationary effect. This is not to say that fiscal policy cannot cushion the disinflationary transition's impact on the vulnerable (more on this topic in the next subsection). Although targeted redistributive policies may be appropriate, deficits must

be reduced to help tackle inflation and address debt vulnerabilities. Fiscal consolidation can also send a powerful signal that policymakers are aligned in their fight against inflation. Countries will need to make difficult choices in the composition of spending, given the need to keep a tight fiscal stance. For example, the cost-of-living crisis may put pressure on governments to approve above-inflation public sector pay deals. Without fiscal contraction elsewhere, and with tight supply, doing so will only push up inflation further and make monetary policymakers' jobs harder.

Figure 1.26. Change in Cyclically Adjusted Primary Balance
(Percentage points)



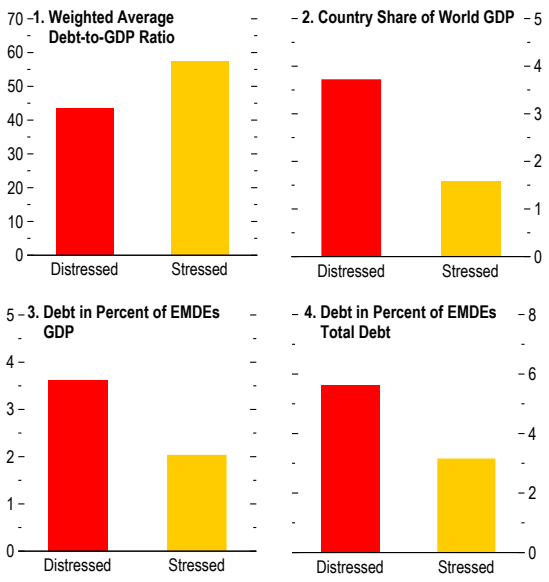
Source: IMF staff calculations.
Note: Each line denotes change in cyclically adjusted primary balance in percent of GDP series from the previous period. Other AEs and EMDEs include 11 and 10 economies, respectively. AEs = advanced economies; EMDEs = emerging market and developing economies.

Protecting the vulnerable during the adjustment. As the cost of living continues to rise, policymakers will need to protect the most vulnerable members of society from the impact of higher prices. Poorer households often spend relatively more than others on food, heating, and fuel: categories that have seen particularly steep price increases. Moreover, households cannot easily adjust consumption to minimize spending on these products; everyone must eat and use heating, while transport (the price of which is often largely determined by fuel costs) is often essential to get to work. In countries with well-developed social safety nets, targeted cash transfers to those particularly exposed to higher energy and food prices (such as children and older people) and existing automatic stabilizers (for example, unemployment insurance) are the best ways to limit the impact on those least able to bear it. However, measures to limit the inflationary impact should offset any increase in new spending. In countries lacking well-developed safety nets, governments should look to extend any already-active programs. In general, broad price caps or food and energy subsidies should be avoided, as they increase demand while diminishing or removing supply incentives. This can result in rationing and an exorbitant underground economy. Moreover, such programs are often expensive and regressive, funneling public cash to those who have the greatest consumption rather than to those with the greatest need (see October 2022 *Fiscal Monitor*).

Warding off pandemic risks. COVID-19 continues to have long-lasting effects on the global economy. Even though many of the new variants are less deadly than early ones, they continue to have considerable economic impact. Although stiff lockdowns are increasingly rare, the disease continues to cause economic disruption, as businesses may struggle to adapt to unpredictable absences when workers or their family members fall sick. As the virus persists and continues to evolve, ensuring equitable access to a comprehensive toolkit of vaccines, tests, and treatments worldwide is the best strategy not only to save lives, but also to reduce a key source of uncertainty holding back the global recovery. Regarding vaccinations, the primary focus should be on fully vaccinating the most clinically vulnerable populations. Ongoing investments in research, disease surveillance, and health systems will also be needed to keep a broad set of tools updated as the virus evolves.

The impact of the pandemic is perhaps most keenly felt in China, where intermittent lockdowns in parts of the country have continued to affect economic activity. Temporary disruptions to domestic logistics and supply chains during the largest outbreaks, besides being a drag on private consumption, have hit the country's manufacturers, adding to existing pressures on global supply chains. The recurring outbreaks stress the importance of paving the way for a safe exit from China's zero-COVID strategy, including by adding to the country's successful vaccination campaign, especially for the undervaccinated elderly.

Figure 1.27. Debt in Distress in Emerging Market and Developing Economies
(Percent)



Source: IMF staff calculations.
Note: Distressed group indicates debt of economies with spreads greater than 1,000 basis points; stressed group indicates debt of economies with spreads of 700–1,000 basis points. EMDEs = emerging market and developing economies.

Policies with Payoffs in the Medium Term

Improved frameworks for debt resolution. Some countries will find their fiscal sectors under considerable pressure, with rising interest rates and slowing global growth, a coming global slowdown, and towering pandemic-era debts. Although those most exposed account for only a small share of global output and financial assets (Figure 1.27), spillover effects—most notably a contagion, in which a crisis in one country induces investors to run from similar assets—can be significant. While the best solution is always an orderly adjustment within a well-founded medium-term fiscal strategy, driven by domestic policy priorities, the likelihood is that more countries will enter debt distress. In such cases, cooperative global policies are essential to stop the spread of crises and can be achieved preferably by setting up appropriate mechanisms or institutions in advance. The IMF, as one such institution, stands ready to support countries with temporary balance-of-payments difficulties in accordance with IMF policies. But other complementary approaches should be developed further. In particular, the common debt resolution framework of the Group of Twenty (G20) can be improved to allow swift and fair resolution in cases of distressed debt, enabling countries to get out of default without extended economic pain. Recent progress in regard to Zambia is welcome, but more is needed. Coverage should be expanded to include a broader set of countries, and creditor committees need to meet and formulate agreements swiftly and transparently. Debt distress in emerging market and developing economies is an increasing problem. It is imperative that a well-functioning G20 debt resolution mechanism be put in place as soon as possible.

Preparing for tighter international financial conditions. Tightening monetary policy may also put pressure on financial institutions. The best time to prepare for a tightening of financial conditions is now. As the economy slows, default rates rise and income from new loans decreases. Although higher rates may boost interest income, they are likely to have a negative effect overall on many institutions. As such, macroprudential policy will need to become ever more vigilant, guarding against the failure of systematic institutions, using select instruments to address pockets of elevated vulnerabilities (see October 2022 *Global Financial Stability Report*). In

particular, the housing market remains a potential source of macro-financial risk; authorities should assess the systemic effects of a correction in house prices through rigorous stress tests. In China, authorities should enable the restructuring of troubled housebuilders and prepare to tackle the housing market's impact on the financial system more broadly. Tighter international financial conditions may also put pressure on currency exchange rates. Depending on country circumstances and the nature of shocks, policymakers should be ready to step in when flexible exchange rates alone are unable to absorb external shocks. For instance, crises may require policymakers to intervene in foreign exchange markets or introduce capital flow management measures. However, such measures should be strictly temporary, with well-defined goals. And governments with high debt levels should preemptively reduce reliance on foreign currency borrowing. Prompt and reliable access to reserve currency liquidity—including that through IMF precautionary and disbursing arrangements—gives countries breathing space to implement adjustment policies in an orderly manner. Finally, competing pressures in the euro area make a well-designed European Central Bank facility, such as the Transmission Protection Instrument, more of a necessity. This will help policy interest rates better reflect macroeconomic conditions across the euro area. Such an instrument should complement the existing conditional Outright Monetary Transactions instrument and the European Stability Mechanism's lending program. At the same time, it should not distort markets so much that prices no longer reflect fundamental risks.

Structural reforms. Policies that expand supply can boost economic activity while easing inflation, though with something of a lag. In advanced economies, such policies include those that expand the workforce, such as childcare subsidies, earned income tax credits, reformed immigration systems, and better access to COVID-19 vaccinations and treatment. In emerging market and developing economies, better education, business climates, and digital infrastructure can also help.

Policies with Longer-Term Benefits

Climate policies. Climate change continues apace. Extreme temperatures are but one manifestation of the challenges such change presents. Without prompt remedial action, climate change will eventually have catastrophic impacts on health and economic outcomes the world over. Current global targets are not aligned with global temperature goals. Meeting these goals will require emission cuts of 25 to 50 percent by the end of the decade. Recent geopolitical developments have also sharpened the energy security benefits countries can derive from transitioning to clean and reliable energy sources to reduce or eliminate their reliance on fossil fuels. To accelerate this transition, governments should both set a minimum price for carbon and promote clean alternatives, including subsidies for renewables, investment in enabling infrastructure such as smart grids. In a world of already-high prices, shifting to new energy sources may be politically challenging and apparently risky. But policies to offset the cost of the transition, such as feebates and targeted compensation for those losing out, can help ease the transition. And although the green transition may entail risks, they are minimal compared with the risks of doing nothing. Indeed, new IMF analysis highlighted in Chapter 3 suggests that the cost of the transition to clean electricity need not be inflationary and can be achieved with impacts on GDP that are smaller than the annual variation in normal times. Delay will only cause those costs to rise. The passage of the Inflation Reduction Act in the US, which includes $369 billion for energy security and climate change policies, is welcome. The act aims to reduce US carbon emissions by about 40 percent by 2030, mostly through tax credits and incentives to

increase investment in clean energy. Yet the omission of broad-based carbon pricing and sectoral feebates, as well as any elimination of subsidies for fossil fuel and carbon-intensive agriculture, still leaves room for improvement. Likewise, the sizeable energy package planned by the UK government also has room for measures that help save energy and to continue to align future energy policy decisions with the country's climate mitigation goals.

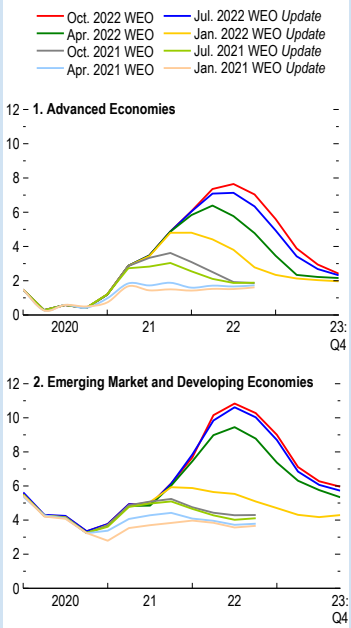
Strengthening multilateral cooperation and avoiding fragmentation. The recent spike in global inflation has prompted a corresponding wave of short-term protectionism, most notably in regard to food. And although protectionist policies may be appealing in the short term, there are ultimately no winners. When countries ban exports, they deny themselves the income to buy other goods they might need from abroad. Moreover, export bans in one country often provoke retaliatory bans elsewhere, leaving all parties worse off. A similar principle applies to medical products, which have been subject to trade restrictions at various times during the pandemic. Governments should unwind prepandemic trade restrictions and follow through on their commitment to World Trade Organization reform. This includes restoring a fully functioning dispute settlement system and enhancing rules in areas like agricultural and industrial subsidies. In addition, multilateral cooperation is key to advance technologies to support climate change mitigation and boost green financing. Also, support for low-income countries through concessional funding is needed to catalyze growth-enhancing reform and help them meet their climate targets.

Box 1.1. Dissecting Recent WEO Inflation Forecast Errors

Inflation has repeatedly exceeded World Economic Outlook (WEO) forecasts during 2021–22 across geographic regions by an abnormally high amount. The forecast errors were generally larger for 2022 than for 2021, but those for core inflation were less prominent for 2022. Larger-than-expected demand recovery in advanced economies and emerging market and developing economies partly explains core inflation forecast errors for 2021, with COVID-19 fiscal stimulus packages likely playing a supporting role in advanced economies.

Inflation has surprised consistently on the upside since 2021 Q2. This has led to successive upward revisions in WEO inflation forecasts (Figure 1.1.1), for both headline and core inflation and for both advanced and emerging market and developing economies, although the former have seen larger successive revisions. The October 2022 WEO forecast views inflation in advanced economies as peaking later than expected in the January WEO *Update* and April 2022 WEO. Headline inflation in emerging market and developing economies is now expected to peak higher, yet not later than previously thought.

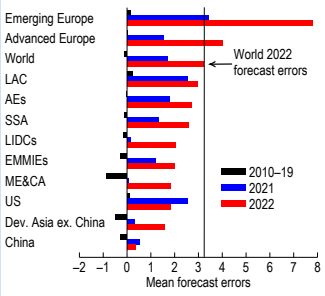
Figure 1.1.1. Headline Inflation Forecasts
(Percent)



Source: IMF staff calculations.
Note: The lines plot the four-quarter purchasing power parity GDP-weighted inflation forecasts from January 2021 WEO *Update* to October 2022 WEO. WEO = *World Economic Outlook*.

Inflation forecast errors are larger for 2022 than those for 2021.[1] The increase for 2022 is especially large for economies in Europe (Figure 1.1.2). The errors realized for 2021 and 2022, which average 1.7 percentage points for Europe and 3.2 percentage points globally, compare with a near-zero average for the decade that preceded the COVID-19 crisis. The root-mean-square error is 2.5 times larger for 2021 and 5 times larger for 2022 than it was for 2010–19. The large 2022 inflation surprises for emerging Europe are due to exceptionally high realized inflation in Baltic and other eastern European states due to the Russian invasion of Ukraine. Only China and the US saw smaller errors for 2022 than for 2021. China faces an economic slowdown, putting downward pressure on inflation. The US has seen a significant upward revision to the inflation forecast in the January 2022 WEO *Update*, as early signs of overheating were evident from the elevated core inflation readings since the second quarter of 2021 and from increasingly tight labor markets.[2] Evidence also shows that forecasts of inflation's persistence may have been understated. On average, an additional 1 percentage point inflation surprise for 2021 is associated with an additional subsequent forecast error of 0.22 percentage point for 2022. The relation is statistically significant (t-statistic = 2.68). Since the forecast error for 2021 was known when the forecasts for 2022 were made, it should in principle be uncorrelated with subsequent forecast errors.

Figure 1.1.2. WEO Annual Headline Forecast Errors with Respect to Preceding January WEO *Updates*
(Percentage point)



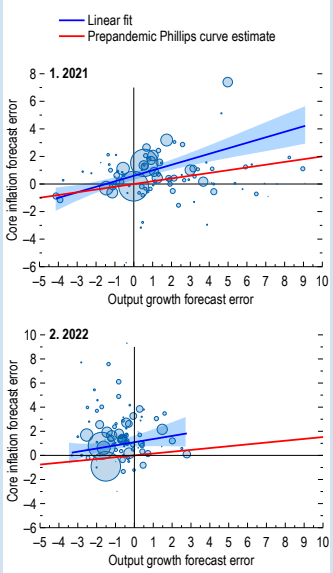
Source: IMF staff calculations.
Note: Mean inflation forecast errors from January 2021 WEO *Update* for 2021 inflation and January 2022 WEO *Update* for 2022 inflation compared with respective mean forecast errors with respect to January WEO *Updates* from 2010–2019. Within-group forecast errors are weighted by purchasing power parity. LAC = Latin America and Caribbean economies; AEs = advanced economies; SSA = sub-Saharan African economies; LIDCs = low-income developing countries; EMMIEs = emerging market and middle-income economies; ME&CA = Middle Eastern and Central Asian economies; Dev. Asia ex. China = Developing Asia excluding China.

Core inflation drove inflation forecast errors for 2021, but less so for 2022. Core inflation forecast errors represented the bulk of errors for 2021, at 53.6 percent for advanced economies

and 71.9 percent for emerging market and developing economies. In regard to 2022, the core inflation contribution is lower, at 46.5 percent for advanced economies and 47.9 percent for emerging markets. The large contribution of core inflation forecast errors for 2021 likely reflects wide demand-supply imbalances as the strong demand recovery from the COVID-19 shock hit persistent supply disruptions, a topic that is explored later in this box. On the other hand, the inflation errors for 2022 are relatively more concentrated in noncore inflation, suggesting a stronger role for energy and food supply-side shocks, in large part due to the war in Ukraine.

Can the stronger-than-anticipated demand recovery partly explain core inflation forecast errors? A scatterplot of the respective forecast errors shows a positive association between output and core inflation surprises for 2021 (Figure 1.1.3, panel 1). The line of best fit (weighted by purchasing power parity GDP) traces out a Phillips curve relationship with a greater slope compared with that of the prepandemic Phillips curve estimate.[3] This suggests the global economy may have been at the steeper end of the aggregate supply curve in 2021, as the rapid demand recovery met continually disrupted supply. The July 2021 WEO *Update* and October 2021 WEO documented the strength of the demand recovery. Advanced economies showed a noticeably strong recovery in output (manufacturing and services). Also, supply strain was at its worst in the second half of 2021, as indicated by purchasing managers' index supply delivery times. For 2022 core inflation forecast errors, the line of best fit is flatter and nonsignificantly different from the slope of the prepandemic Phillips curve (Figure 1.1.3, panel 2).

Figure 1.1.3. Core Inflation and Output Forecast Errors
(Percentage points)



Source: IMF staff calculations.
Note: Outlier observations excluded if the absolute forecast errors exceed 10 percentage points. Russia and Ukraine are excluded in 2022. Regression is PPP-GDP weighted using weights for 2021 in panel 1 and weights for 2022 in panel 2. Bubble size indicates the size of the economy according to the PPP-GDP weights. PPP = purchasing power parity.

The authors of this box are Christoffer Koch and Diaa Noureldin.

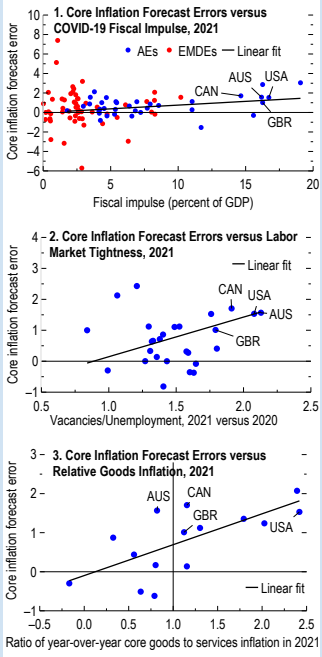
[1] The forecast error in a given year refers to the difference between the actual realization and the forecast issued at the start of the year (January WEO *Update*). Since actual inflation is yet to be realized for 2022, "forecast error" here refers to the forecast revision for 2022 annual inflation made in the October 2022 WEO relative to the January 2022 WEO. A positive "forecast error" for a particular country for 2022 thus indicates that 2022 inflation is projected (as of October 2022) to be higher than anticipated at the start of 2022.

[2] See Ball, Leigh, and Mishra (forthcoming) for a recent discussion of labor market tightness and its impact on inflation in the US after the pandemic. See also Duval and others (2022) for evidence in selected advanced economies.

[3] The prepandemic estimate is based a hybrid Phillips curve specification over 2000–19. See Chapter 2 of the October 2021 WEO for further details.

The strong association between inflation and output forecast errors for 2021 likely reflects, in part, the COVID-19 fiscal stimulus packages and tight labor markets, particularly in advanced economies. Ambitious fiscal stimulus packages in reaction to the pandemic shock likely boosted demand recovery in 2021. With interest rates at the zero lower bound in most advanced economies, policymakers resorted to fiscal policy to cushion the impact of the pandemic shock and avert long-term scarring. Figure 1.1.4 (panel 1) shows a wide range of magnitudes of fiscal packages announced in 2020, based on the Database of Country Fiscal Measures in Response to the COVID-19 Pandemic (January 2021 *Fiscal Monitor*). A number of large economies (for example, Japan, the UK, and the US) committed to spending in excess of 15 percent of GDP in response to the pandemic. The overall scatterplot does not exhibit a strong positive association, confirming that other factors are also at play, yet advanced economies show a strong relation between inflation forecast errors and fiscal packages. For advanced economies, an additional 10 percent of GDP in fiscal support is associated with a 0.8 percentage point larger-than-expected core inflation rate (*t*-statistic = 3.38). In real time, forecasters likely underestimated fiscal packages' impact on inflation in those economies. Supply disruptions were not visible merely in the market for goods and in clogged global supply chains: the pandemic and subsequent rapid demand rebound also squeezed domestic labor markets. To highlight the relationship between labor markets and core inflation forecast errors, the ratio of vacancies to unemployment in 2021 relative to that in 2020 is computed. This ratio displays a positive relation with inflation forecast errors (Figure 1.1.4, panel 2). A regression accounts for more than 50 percent of the error variations. Finally, Figure 1.1.4 (panel 3) highlights the role of reshuffling of sectoral demand from services to goods. It plots the ratio of core goods inflation to services inflation in 2021, which was about 2.5 in the US, against core inflation forecast errors in 2021. The positive correlation suggests a role for sectoral demand dislocations in driving unanticipated inflation aberrations. Overall, the patterns in regard to fiscal impulses, labor market tightness, and sectoral shifts are consistent with the notion that fiscal policy supported buoyant demand, when the economy's supply side was still impaired, and so contributed meaningfully to inflation forecast misses.

Figure 1.1.4. Impacts on Core Inflation Forecast Errors
(Percent)



Source: IMF staff calculations.
Note: In panel 1, "fiscal impulse" refers to the announced COVID-19 fiscal support packages in 2020. The solid line is a linear fit of a weighted regression for advanced economies, in which the weights are the 2021 PPP GDP. In panel 2, the linear fit line is using 2021 PPP GDP weights. In panel 3, regression is PPP-GDP weighted using weights for 2021. All three panels exclude outlier observations if the absolute forecast errors for core inflation or output growth exceed 10 percentage points. AEs = advanced economies; EMDEs = emerging market and developing economies; PPP = purchasing power parity. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Box 1.2. Market Power and Inflation during COVID-19

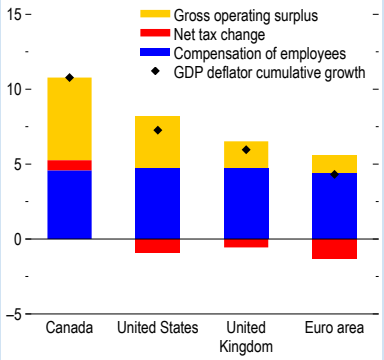
Is corporate market power behind the current wave of inflation? With consumer price growth surging in 2021 and 2022 across numerous advanced economies, this question is at the forefront of policy and academic debates. One potential explanation is that firms take advantage of low competition to shield profits by passing rising input and labor costs on to households through higher prices. This box, however, presents new evidence suggesting that market power has not contributed substantially to inflation in the current conjuncture.

Profits rebounded in 2021 after taking a hit in 2020. Some of the recovery may have resulted from firms' charging higher prices. Decomposing GDP deflator growth into factor income growth shows that the private sector's gross operating surplus, which includes profits, has been an important driver of higher output prices in several advanced economies, alongside rising unit labor costs (Figure 1.2.1). In the US, where the GDP deflator increased 7 percent between 2019 and 2021, roughly 40 percent of this increase can be attributed to rising gross operating surplus, while rising employee compensation accounts for 65 percent. In contrast, production taxes, the decomposition's final component, contributed negatively, reflecting fiscal support during COVID-19. Other advanced economies show similar patterns.

While market power has grown steadily over past decades in several advanced economies (Díez, Leigh, and Tambunlertchai 2018; April 2019 *World Economic Outlook,* Chapter 2), the recent rise in profits and prices does not necessarily mean that market power has increased further during the pandemic. A variety of other channels could be driving rising profits, such as higher demand or a (temporary) decline in firms' capital expenditures.

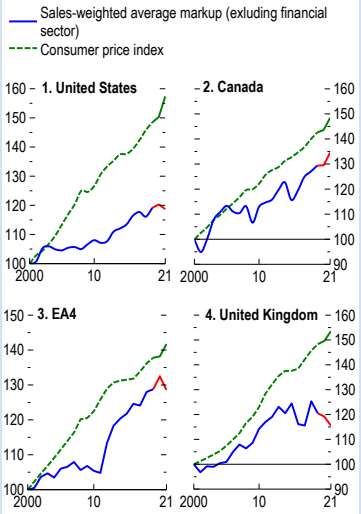
To shed light on market power's role in the recent inflationary wave, this box estimates markups for nine advanced economies (Australia, Canada, France, Germany, Italy, Japan, Spain, UK, US) over 2000–21 based on Worldscope data on publicly traded nonfinancial firms.[1] These markups—defined by the price-to-marginal-cost ratio—are common indicators of market power. The analysis follows closely the methodology of De Loecker, Eeckhout, and Unger (2020) and Díez, Leigh, and Tambunlertchai (2018).[2]

Figure 1.2.1. Decomposition of GDP Deflator Growth by Income Components
(Percent)



Sources: Haver Analytics; Organisation for Economic Co-operation and Development; and IMF staff calculations.
Note: Black diamonds report the aggregate growth in the GDP deflator from the fourth quarter of 2019 to the fourth quarter of 2021. Each stacked bar computes the contribution of the respective income component by multiplying the component's share of GDP in the fourth quarter of 2019 by the difference between the component's nominal growth rate and the growth rate of aggregate real GDP.

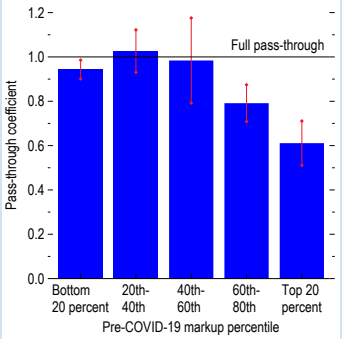
Figure 1.2.2. Sales-Weighted Markups and CPI for Selected Advanced Economies
(Index, 2000 = 100)



Sources: Worldscope; National Statistical Offices; and IMF staff calculations.
Note: EA4 = France, Germany, Italy, Spain. Markups were computed following Díez, Leigh, and Tambunlertchai 2018. The solid blue lines report the sales-weighted average markup, with the red segment representing the years of the COVID-19 pandemic. To compute the sales-weighted average, raw values of markups and net sales at the firm level are censored below the 5th percentile and above the 95th percentile of the distribution for each country and year. The dashed green lines report the consumer price index. CPI = consumer price index.

Figure 1.2.2 shows that, as discussed in earlier studies (April 2019 *World Economic Outlook*, Chapter 2; Akcigit and others 2021), markups increased steadily across advanced economies in past decades, suggesting long-term consolidation of firms' market power.[3] However, during the pandemic, markup growth slowed, halted, or even turned slightly negative in some countries. The figure also shows how consumer price inflation, which had grown moderately in the prepandemic period, accelerated over 2020–21. While markup and consumer price growth have historically been positively correlated, growing steadily, especially in services, the two have diverged markedly over the past two years.

Figure 1.2.3. Coefficient of Production Costs Pass-Through to Prices
(percent)



Sources: Worldscope; and IMF staff calculations.
Note: The bars represent the coefficients of pass-through from costs of goods sold (COGS) per employee to firms' markups over 2019–21 for different quintiles of the distribution of pre-COVID-19 markups. The coefficients are computed through a firm-level regression of the percent change in markups on the percent change in COGS per employee, in which the COGS-per-employee variable is interacted with a categorical variable for the quintiles of the distribution of prepandemic markups (using the 2016–19 average). This interaction allows the regression coefficient to vary for each quintile of the distribution. The pass-through coefficient is then computed as 1 plus the regression coefficient for the respective quintile.

Despite the slowdown in the growth of markups during COVID-19, the already-high markup levels at the pandemic's onset may have affected the link between rising production costs (due to supply chain disruptions, commodity prices, and labor costs) and consumer prices. On the one hand, thanks to their market power, high-markup firms may have a greater ability to pass higher costs on to consumers through higher prices. On the other hand, high initial markups also imply a greater capacity to absorb cost increases without incurring losses (an issue also potentially related to market power in input markets).

The evidence suggests the latter mechanism was more prominent during the pandemic, as firms with higher prepandemic markups absorbed increasing costs to a larger extent than low-markup firms. Figure 1.2.3 reports the estimated pass-through coefficients from a firm-level regression of percent changes in markups on percent changes in variable costs per employee between 2019 and 2021 for US firms. Firms in the top 20 percent of the pre-COVID-19 markup distribution passed 60 percent of their cost increases through to prices, absorbing the remaining 40 percent through markup reductions. In contrast, firms at the bottom 40 percent of the pre-COVID-19 distribution fully passed cost increases on to prices. A similar result also emerges for other advanced economies. Overall, this finding supports the hypothesis that markups are not a major driver of inflationary pressures right now.

The authors of this box are Federico Díez, Longji Li, Myrto Oikonomou, and Carlo Pizzinelli.

[1] The financial sector is excluded, because markups estimated from a traditional production function may not be the best measure of market power for financial institutions (see Akcigit and others 2021). Konczal and Lusiani (2022) find that 2021 growth in markups in the financial sector was substantially higher than that in other industries. In contrast to Worldscope, national accounts data, used in Figure 1.2.1, encompasses the entirety of the economy.

[2] A key assumption of this method is that firms face an unconstrained short-term supply of intermediate goods and labor. The assumption of flexible inputs is reasonable even under some labor market rigidities and amid recent supply chain disruptions: the cost-of-goods-sold measure used for the estimation encompasses a diverse basket of labor and intermediate goods, resulting in a flexible composite of inputs.

[3] These results should be interpreted with caution because, while listed firms account for a sizable share of output (especially in the US), evidence shows that privately held firms have different markup dynamics (Díez, Fan, and Villegas-Sánchez 2021).

Box 1.3 Risk Assessment around the World Economic Outlook Baseline Projection

The risks around the World Economic Outlook's baseline projection are usually assessed by constructing alternative scenarios with the help of the IMF's suite of multi-country models, most notably the G20 model presented in Andrle et al. (2015). To further the risk analysis, this box explains how the G20 model can also be used to quantify the uncertainty around the baseline projection through confidence bands, drawing on historical data as well as explicit judgment about the likelihood of (variations of) historical episodes reoccurring.1 The approach should be thought of as complementary to the growth-at-risk framework presented in the Global Financial Stability Report, which links the probability distribution of growth projections to financial conditions. As explained below, under the approach presented here the risk of global growth next year falling below 2 percent—a low growth outcome that has occurred on only five occasions since 1970—is currently estimated to be about 25 percent.

Confidence bands around central projections are a well-known device for conveying forecast uncertainty, and they often reflect both statistical properties of the data and expert judgment. The benefit of using a structural, global model such as the G20 model for this exercise is the ability to analyze many individual countries jointly, consistently, and for multiple macroeconomic variables.

The model is first used to interpret the historical cross-country data on output, inflation for some countries, and oil prices, and to estimate the implied economic shocks – to aggregate demand and supply, and oil supply. The economic shocks that are estimated this way are correlated across countries and through time, which helps address possible limitations in the propagation mechanisms in the model. Drawing all global and country-specific economic shocks for a given year jointly captures periods where shocks are synchronized, such as 2020, and periods where there is greater variation across countries, such as in the recovery from the Great Financial Crisis. The resulting distribution of macroeconomic variables is shaped by the distribution of economic shocks, the properties of the model, and the initial conditions for the projection, including the effective lower bound on monetary policy rates (which is less relevant for the current outlook risk assessment than it was in previous years).

The principle underlying the construction of the bands is that, while history does not repeat itself, it rhymes, and so future shocks may partially resemble those in the past. The historical parallels can also be introduced explicitly through expert judgment. If there is a historical episode that shares some features with the current period, then shocks from that episode could be sampled more often when constructing the confidence bands. If no judgment is imposed, then historical shocks are sampled uniformly.

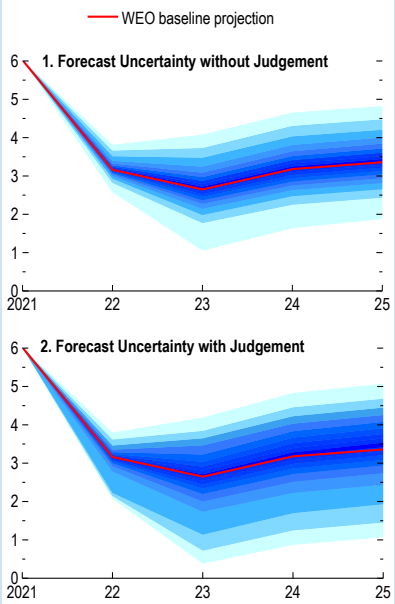
The authors of this box are Michael Andrle, Jared Bebee, and Rafael Portillo.

[1] An early version of the approach is described in Andrle and Hunt (2020).

Figure 1.3.1 shows the distribution for global growth that results from this approach, with and without judgment, and under the assumption that the current WEO baseline projection is the mode of the distribution.[2] Each shade of blue represents a five percentage point interval and so the entire band captures 90 percent of the distribution. The top panel shows the distribution when shocks are sampled uniformly; the bottom panel shows the distribution when shocks from the year 1982 are considered to be ten times more likely than other years. The year 1982 stands out: at that time the world economy was experiencing a slowdown in activity, reflecting contractionary monetary policy in advanced economies to address high inflation, most notably in the US.[3] There are limits to the historical parallel: while the current inflationary environment is reminiscent of the 1970s or early 1980s, the Covid shock is unprecedented, and policy frameworks today are very different. Nonetheless, drawing on events such as the 1982 episode can help illustrate the balance of risks to the current outlook. .

Without judgment, very low growth outcomes are already somewhat likely because global growth is unusually low under the baseline (the mode of the distribution). With the added judgment, however, the distribution skews further down, increasing the probability of historically low outcomes such as 2 percent.

Figure 1.3.1. Distribution of World GDP Growth Forecast
(Percent)



Source: IMF staff calculations.
Note: Each shade of blue represents a five percentage point interval. Shocks are sampled uniformly in panel 1 while shocks from 1982 are considered to be 10 times more likely than other years in panel 2. WEO = *World Economic Outlook*.

[2] Shocks to demand, supply and global oil shocks were estimated using the entire WEO sample starting in 1960; shocks to demand were estimated for all G20 countries while shocks to supply were only estimated for the US. Future work will expand the estimation to include supply shocks for all G20 countries, which will allow for a richer assessment of uncertainty around inflation projections.

[3] While there are other episodes in the 1970s and 1980s that share similarities with the current period, 1982 stands out by the impact on global growth.

Special Feature: Market Developments and Food Price Inflation Drivers

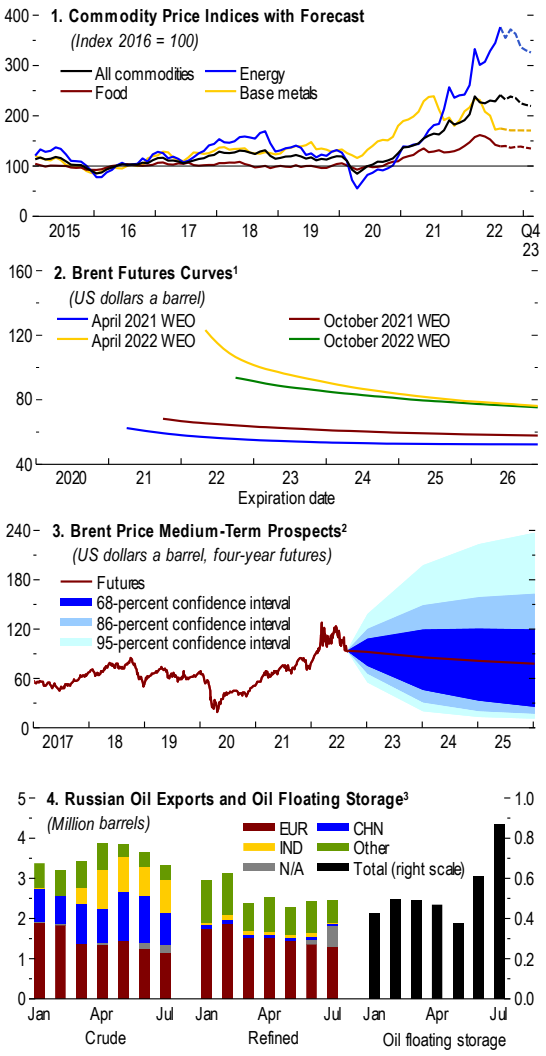
Commodity prices rose 19.1 percent between February and August 2022. Energy—especially natural gas, up 129.2 percent—led the increase, as Russia cut gas supplies to Europe. Base-metal prices declined by 19.3 percent, and precious-metal prices fell by 6.0 percent, while those of agricultural commodities fell by 5.4 percent. This special feature analyzes developments in food prices in detail.

Energy Prices Stay Elevated

Crude oil prices, up by 3.5 percent between February and August 2022, surged to $120 per barrel in early March following Russia's invasion of Ukraine (Figure 1.SF.1, panel 1). Prices reflected fears of oil export disruptions at a time of tight supply-demand balances as well as a muted response by the Organization of the Petroleum Exporting Countries and other producers following prior divestments in the fossil fuel sector (see the April 2022 WEO).

Strategic oil reserve releases by members of the International Energy Agency and slower demand amid COVID-19 lockdowns in China caused oil prices to fall below $100 in April. However, announced bans of Russian oil and expectations of broader sanctions, including sanctions in the areas of maritime insurance and trade finance, coupled with outages elsewhere led prices to surge to $120 in early June. Since then, rising interest rates and recession fears have weighed on prices, as the International Energy Agency revised global 2022 oil demand growth downward from 3.3 million barrels per day (mb/d) to 2.0 mb/d in September. As European firms reduced Russian oil purchases, floating storage rose, and Russian oil was rerouted to China and India at a discount to Brent (Figure 1.SF.1, panel 4). Refined-product prices reached multiyear highs as European refineries adjusted inputs and hit capacity constraints.

Figure 1.SF.1. Commodity Market Developments

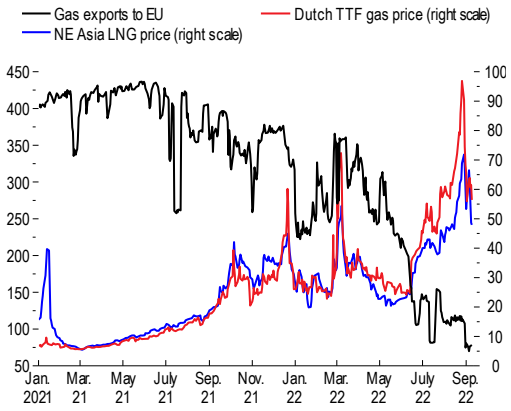


Sources: Bloomberg Finance L.P.; IMF Primary Commodity Price System; Kpler; Refinitiv Datastream; and IMF staff estimations.
Note: WEO = *World Economic Outlook*.
[1]WEO futures prices are baseline assumptions for each WEO and are derived from futures prices. October 2022 WEO prices are based on August 17, 2022, closing.
[2]Derived from prices of futures options on August 17, 2022.
[3]Legend N/A means that oil is exported to unknown destination.

Futures markets suggest that oil prices will rise by 41.4 percent in 2022, to average $98.2 a barrel, but fall in the coming years, to $76.3 in 2025 (Figure 1.SF.1, panel 2). Short- and medium-term risks to the oil futures price outlook are balanced (Figure 1.SF.1, panel 3). Upside risks from additional supply disruptions as a result of sanctions and war as well as higher demand owing to gas-to-oil switching are offsetting downside risks from a slowing global economy, possible additional oil supplies from Iran, and higher-than-expected oil production growth in the US. Sanctions and Russia's potential retaliation have raised uncertainty, and oil price projections may be subject to large revisions.

Supply concerns in Europe have been driving natural gas prices. Russia reduced pipeline gas exports to Europe by about 80 percent in September 2022 relative to the previous year, citing maintenance problems or some countries refusing to pay for gas in rubles. Dutch Title Transfer Facility gas futures have risen by 159 percent from February to August 2022, to record highs (Figure 1.SF.2). This has led European countries to increase reliance on global liquefied natural gas supplies (see Albrizio et al, 2022) and to discuss a price cap on Russian gas. Prices are expected to stay high until the end of 2023. Coal prices rose 61.4 percent over the reference period, and remain historically high, reflecting gas-to-coal switching, an embargo on Russian imports by EU and Group of Seven countries, and production disruptions.

Figure 1.SF.2. Russian Gas Exports and Prices
(Million cubic meters a day; US dollars per million British thermal units)



Sources: Argus Media; European Network of Transmission System Operators for Gas (ENTSOG); Gas Transmission System Operator of Ukraine; Refinitiv Datastream; and IMF staff calculations.
Note: Last observation is Sep. 9, 2022. Pipeline deliveries from Russia to the European Union. EU = European Union; LNG = liquefied natural gas; NE = Northeast; TTF = Title Transfer Facility.

Metal Prices Retreat after Rallying

The base-metal price index surged, on account of Russia's invasion of Ukraine, before retreating amid slowing global economic growth to a net 19.3 percent decline from February to August (Figure 1.SF.1, panel 4). The price of aluminum is down by 25.0 percent, that of copper down by 19.6 percent, and that of iron ore down by 21.9 percent. New COVID-19 lockdowns in China, supply chain issues, and monetary policy tightening in the US and elsewhere have depressed both demand for metals and expectations about future demand. The IMF's energy transition metal index covering metals critical for electric vehicles and renewable energies fell 21.0 percent, while precious metals fared better, with the IMF index slipping just 6.0 percent.

Base-metal prices are expected to fall 5.5 percent, on average, in 2022, compared with a 9.9 percent increase projected in the April WEO, and to decrease by a further 12.0 percent in 2023. Precious-metal prices are expected to decline more moderately, by 0.9 percent in 2022 and an additional 0.6 percent in 2023. Risks to this outlook are balanced, as investors weigh potential supply reductions by European smelters amid higher energy costs against weakening global demand.

Agricultural Prices Correct from Peak Following Russia's Invasion of Ukraine

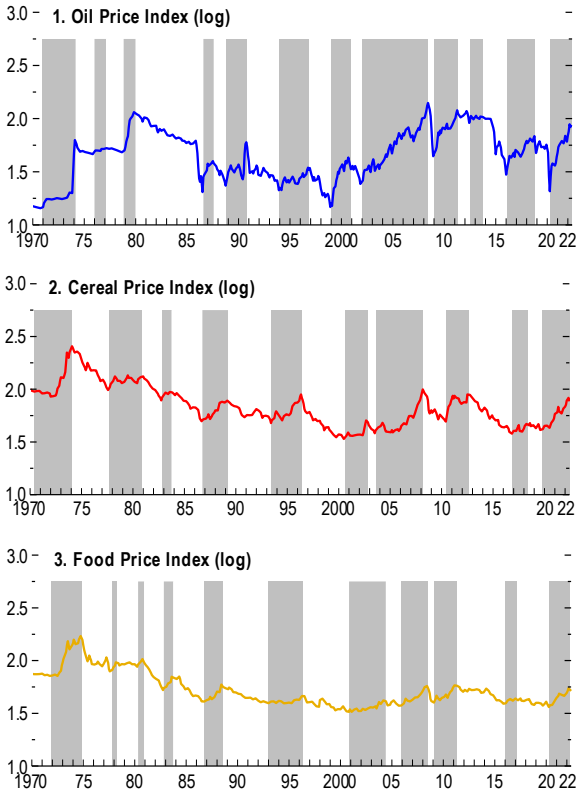
Food commodity prices surged after Russia's invasion of Ukraine but corrected to prewar levels in June and July, halting a two-year rally (see following sections). Improved supply conditions and a gradual end to Russia's blockade of Ukrainian grain exports drove the decline, along with macro factors—including rising interest rates and global recession concerns. Looking ahead, risks of renewed export restrictions (such as Indonesia's April 2022 ban on palm oil exports), droughts in part of China and the US, and pass-through from higher fertilizer prices—which reflect the reduced availability of fertilizers produced in Belarus and Russia—tilt the balance of risks to the upside.

Drivers of Global Food Prices and Transmission to Food Price Inflation

Global food commodity prices entered an expansionary phase in 2020, increasing by 54 percent, from trough to peak, with the prices of foods that make up large parts of diets increasing by 107 percent (Figure 1.SF.3). Although food prices are not new to cyclical fluctuations, this price rally stands out historically (Table 1.SF.1).

The price surge has contributed to domestic inflation, making monetary policy more difficult, especially in low-income countries, where food accounts for half of total consumption and has raised concerns about food security and social unrest (Bellemare 2015; Bogmans and others 2021). Moreover, food-importing countries have seen deteriorations of their balance of payments and fiscal balances which typically occur when social protection increases in response to higher food prices (Ng and Aksoy 2008). The following sections examine trends in cereal prices and their drivers, providing evidence on the pass-through from international food prices to domestic food price inflation. The analysis focuses on cereals (wheat, corn, rice, and a few smaller crops) that are common in diets and hard to substitute; together, these cereals account for two-thirds of global food production.

Figure 1.SF.3. Selected Commodity Price Indexes
(Percent)



Sources: Haver Analytics; IMF, Consumer Price Index and Primary Commodity Price Series databases; World Bank; and IMF staff calculations.
Note: Shaded areas indicate periods of expansion. All series are deflated by the US consumer price index. Last observation is June 2022.

Table 1.SF.1 Oil, Cereal, and Food Prices Boom Phases

		Duration	Amplitude	Sharpness
Oil	Latest	25	322%	12.9%
	Average	29	165%	5.8%
Cereal	Latest	32	107%	3.3%
	Average	32	78%	2.4%
Food	Latest	24	54%	2.3%
	Average	22	45%	2.1%

Note: Boom phases identified using the Harding and Pagan (2002) algorithm. Duration is in months. Sharpness is amplitude devided by duration per cycle.

Factors behind Food Price Movements

Food and energy prices have often moved in tandem, magnifying their macroeconomic effects. Food and oil prices have been in the same phase

(boom or bust) about 66 percent of the time since 1970; this *concordance* increases to 75 percent for the period since 2004. There are at least three reasons behind the comovement: (1) oil is used *directly* as fuel for farm equipment and transportation, and gas affects farming *indirectly*, being the main input of nitrogen-based fertilizers and pesticides; (2) global economic activity is a common demand factor (even though it is more relevant for energy); and (3) some agricultural products are used as biofuels.

After the introduction of biofuels mandates in the European Union and US in the mid-2000s, the correlation between oil and cereals prices strongly increased (Table 1.SF.2). This was particularly true for corn, which was favored in biofuels policies relative to other cereals. The correlation also rose for vegetable oil. The higher correlation is not confined to commodities used as biofuels, in part because of price spillovers. A more prominent role of common shocks and the increased financialization of commodity markets in mid-2000s may have also contributed. Finally, the US dollar value and interest rates are also common factors driving food commodity prices (Gilbert 2010; Baffes and Haniotis 2016).

Table 1.SF.2. Oil-Cereal Price Correlation

	1970–2004	2005–Jun. 2022
Cereal	-0.9%	17.4%
Corn	-2.3%	23.1%
Vegetable oil	-4.6%	44.5%

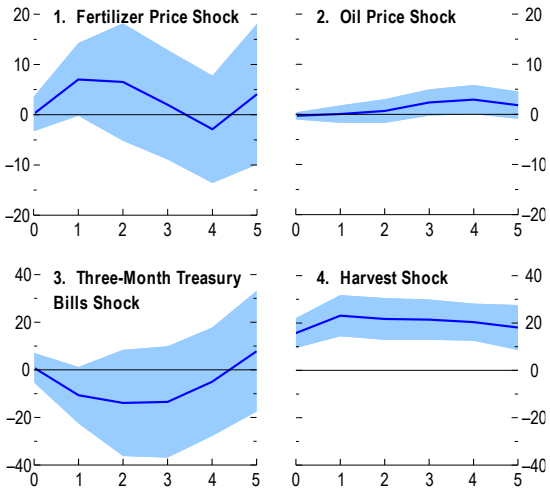
Sources: World Bank; and IMF staff calculations.
Note: Five-year rolling correlations of monthly log differences of oil prices with cereal, corn, and vegetable oil prices. All prices are deflated by the US consumer price index.

Econometric Analysis

Four drivers of cereal prices are studied here in detail: shocks to fertilizer and oil prices, cereal production, and US interest rates. Control variables include global GDP growth and the US dollar real effective exchange rate (see Online Annex for technical details).

Supply shocks dominate fluctuations in cereal prices. A typical (negative) global harvest shock induces a 16 percent rise in prices in the same quarter, with the increase peaking at 23 percent after one quarter (Figure 1.SF.4). Energy shocks have a smaller magnitude, especially those related to oil, acting with lags. A negative oil supply shock that raises oil prices by 10 percent leads cereal prices to rise by about 2 percent after three to four quarters (suggesting a modest effect from biofuels, since the cost share of oil in cereal production varies from about 10 percent to 15 percent). Fertilizers, in contrast, have a delayed but important effect. A 10 percent rise in fertilizer prices (due to a natural gas supply shock) has no immediate effects but leads to a 7 percent rise in cereal prices after one quarter. Though persistent, the effect becomes less precisely estimated at longer horizons. Finally, a 100 basis point US monetary policy shock reduces cereal prices by about 13 percent with a quarter lag.

Figure 1.SF.4. Response of Cereal Prices to Major Drivers
(Cumulative percent)



Sources: Haver Analytics; IMF, Consumer Price Index and Primary Commodity Price Series; World Bank; and IMF staff calculations.
Note: Quarters on the x-axis. Panels show cumulative impulse response of cereal prices to (panel 1) ten percent fertilizer price shock; (panel 2) ten percent oil price shock; (panel 3) 100-basis-point shock to three-month Treasury bills; and (panel 4) one-standard-deviation harvest shock. Shaded areas are 90 percent confidence intervals. See Online Annex 1.SF.1 for data descriptions and methodology.

Domestic Food Price Inflation Rising Following Higher Global Food Prices

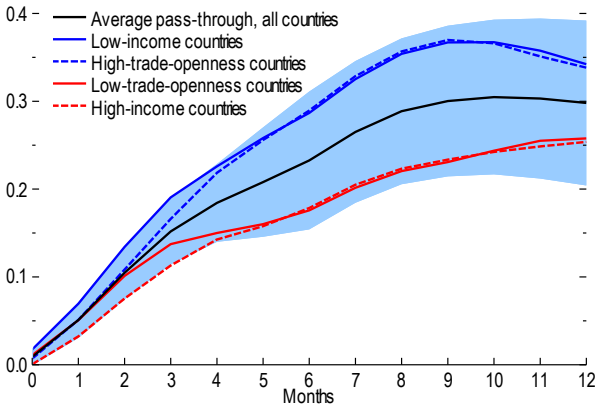
Taxes, subsidies, price controls, weak market integration, and local distribution costs often limit the transmission of international (producer) food price variations across borders to domestic retail food prices (Figure 1.SF.5). In fact, even though the recent rise in *domestic* food price inflation has been broad based, heterogeneity across regions is substantial, with recent inflation levels as low as 5.3 percent in south and eastern Asia and as high as 12.6 percent in central Asia and Europe.

It is therefore relevant to know the following: (1) What is the timing and the magnitude of the pass-through from international to domestic food prices? and (2) Do certain country characteristics, such as income level and trade openness, make countries more susceptible to such pass-through?

Pass-Through from Global Food Prices to Domestic Food Price Inflation

Panel data and local-projections methods are used here to trace the impact of food commodity prices (instrumented by harvest shocks) on domestic food price inflation. Several control variables are included, such as oil prices (to proxy for road transportation costs), the Baltic Dry Index (to proxy for shipping costs), headline consumer price inflation (to capture monetary factors), and exchange rates (in local currency units per dollar).

Figure 1.SF.5. Response of Food CPI to International Food Price Shock
(Percent)



Sources: Haver Analytics; World Bank; and IMF staff estimates.
Note: Response of domestic food consumer price index (CPI) to a one percentage point shock to international food prices. Shaded areas are 90 percent confidence bands.

After an international food price shock, consumer food price inflation rises linearly and peaks after 10 months, then starts declining but persists at a higher level. In total, food consumer price inflation increases about 0.3 percentage point in response to a 1 percentage point change in international food prices after about 10–12 months (Figure 1.SF.5). The pass-through, which is limited by the cost share of food commodities in food consumer prices, is about 30 percent for the average country.

Some Countries Are More Vulnerable to Global Food Price Shocks

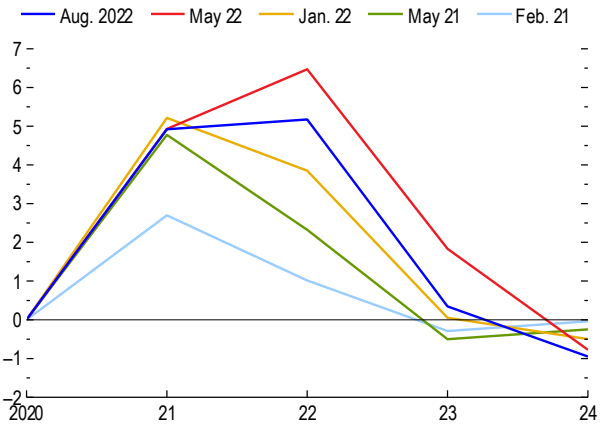
The pass-through is larger for emerging market economies than for advanced economies, in part because food commodities have a higher cost share in the former group. It is also larger for countries that score higher on trade openness, as greater cross-border arbitrage opportunities raise domestic prices' responsiveness to global food price shocks. This greater responsiveness holds for both net food importers and net food exporters and can explain why food exporters are tempted to introduce food export restrictions when commodity prices rise (Laborde Debucquet and Mamun 2022). For a one-standard-deviation rise in GDP per capita, the pass-through declines by 6 percentage points, while it increases by 7 percentage points for a one-

standard-deviation rise in trade openness above the global mean (Figure 1.SF.8). High degrees of trade openness can thus explain the relatively high levels of average food price inflation in central Asia compared with those in countries in south and east Asia.

Conclusions and Outlook for Food Prices

International food prices are estimated to have added 5 percentage points to food price inflation for the average country in 2021 and forecast to add an estimated 6 percentage points in 2022 and 2 percentage points in 2023 (Figure 1.SF.6). A combination of supply-side factors (the 2020–22 La Niña episode and food trade restrictions), cereals-specific demand (China's 2021 restocking), low interest rates, and more recently, the war in Ukraine and the Russian blockade of wheat exports from Ukraine created a "perfect storm" for global food commodity markets that kept prices on an upward trajectory between April 2020 and May 2022.

Figure 1.SF.6. Conditional Forecast Domestic Food Price Inflation
(Percent)



Sources: Bloomberg L.P.; and IMF staff estimates.
Note: Projected domestic food inflation based on recent commodity price forecasts at various dates.

The outlook for domestic food price inflation remains uncertain, as global food prices could surprise again on the upside, given the high uncertainty about the impact of the war in Ukraine and weather events, and the delayed effect of high fertilizer prices. Current estimates already suggest a negative shock for global cereal production equivalent to about 0.6 standard deviation in cereal growth for 2022 (FAO 2022)—contributing to a 23 percent rise in cereal prices this year, outweighing the effects of higher interest rates on food price inflation. Finally, differences in the timing and magnitude of the price pass-through make low-income and high-food-openness countries more susceptible to a resumption of the global food price rally.

Recent events underscore the importance of well-functioning international food markets and of appropriate (domestic) policies to address inevitable price swings, including targeted food aid to vulnerable consumers as well as incentives for the buildup of global food stocks over the medium term. Open food trade raises consumer variety, promotes deeper and more stable markets, and constitutes a hedge against the volatility of domestic production. Policies that promote self-sufficiency weaken the world food trading system and raise environmental costs through land conversion or more intensive farming practices. Especially for small countries (because of within-country spatial correlation of weather patterns), densely populated countries, and countries particularly vulnerable to climate change, international trade will remain indispensable.

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Annex Table 1.1.1. European Economies: Real GDP, Consumer Prices, Current Account Balance, and Unemployment

(Annual percent change, unless noted otherwise)

	Real GDP			Consumer Prices 1/			Current Account Balance 2/			Unemployment 3/		
		Projections			Projections			Projections			Projections	
	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
Europe	**5.9**	**2.0**	**0.5**	**4.9**	**15.3**	**10.6**	**3.0**	**1.7**	**1.7**	. . .	. . .	. . .
Advanced Europe	**5.5**	**3.0**	**0.6**	**2.6**	**8.4**	**6.1**	**3.3**	**1.4**	**1.5**	**6.9**	**6.1**	**6.4**
Euro Area 4/, 5/	5.2	3.0	0.6	2.6	8.3	5.5	2.5	1.3	1.5	7.7	6.8	6.9
Germany	2.6	1.5	–0.3	3.2	8.5	7.2	7.4	4.2	5.3	3.6	2.9	3.4
France	6.8	2.5	0.7	2.1	5.8	4.0	0.4	–0.8	–1.0	7.9	7.5	7.3
Italy	6.6	3.2	–0.2	1.9	8.7	5.2	2.4	–0.2	0.3	9.5	8.8	9.4
Spain	5.1	4.2	1.2	3.1	8.8	4.9	0.9	–0.1	–0.2	14.8	12.7	12.3
The Netherlands	4.9	4.5	0.8	2.8	12.0	8.0	9.0	7.5	7.7	4.2	3.5	3.9
Belgium	6.2	2.4	0.4	3.2	9.5	4.9	–0.4	–2.2	–0.9	6.3	5.4	5.6
Ireland	13.6	8.5	5.0	2.4	8.4	6.5	14.2	11.9	9.7	6.3	4.7	4.8
Austria	4.8	3.9	1.5	2.8	7.7	5.1	–0.5	–1.0	–1.1	6.2	4.5	4.6
Portugal	4.9	6.2	0.7	0.9	7.9	4.7	–1.2	–1.1	–0.4	6.6	6.1	6.5
Greece	8.3	3.8	2.3	0.6	9.1	3.2	–6.5	–6.6	–6.4	15.0	12.8	12.4
Finland	3.0	2.1	0.5	2.1	6.5	3.5	0.9	–0.8	–0.2	7.6	7.0	7.4
Slovak Republic	3.0	1.8	2.1	2.8	11.9	10.1	–2.0	–3.9	–3.1	6.8	6.2	6.2
Lithuania	5.0	1.8	1.1	4.6	17.6	8.4	1.4	–1.6	–2.1	7.1	7.3	7.0
Slovenia	8.1	6.3	1.9	1.9	8.9	5.1	3.8	0.0	–0.9	4.8	4.3	4.1
Luxembourg	6.9	1.6	1.1	3.5	8.4	3.7	4.8	4.3	4.4	5.7	5.0	5.0
Latvia	4.5	2.5	1.6	3.2	16.5	8.0	–2.9	–3.3	–3.0	7.6	7.4	7.2
Estonia	8.0	1.0	1.8	4.5	21.0	9.5	–1.6	–0.2	0.1	6.2	6.6	6.8
Cyprus	5.6	3.5	2.5	2.2	8.0	3.8	–7.2	–8.5	–7.2	7.5	6.7	6.5
Malta	10.3	6.2	3.3	0.7	5.9	4.6	–4.9	–3.1	–2.2	3.5	3.2	3.3
United Kingdom	7.4	3.6	0.3	2.6	9.1	9.0	–2.6	–4.8	–4.5	4.5	3.8	4.8
Switzerland	4.2	2.2	0.9	0.6	3.1	2.4	9.4	6.2	6.4	3.0	2.2	2.4
Sweden	5.1	1.9	0.9	2.7	7.1	5.4	5.4	4.5	4.6	8.8	7.6	7.4
Czech Republic	3.5	1.9	1.5	3.8	16.3	8.6	–0.9	–4.3	–2.2	2.8	2.5	2.3
Norway	3.9	3.6	2.6	3.5	4.7	3.8	15.0	19.4	14.5	4.4	3.9	3.8
Denmark	4.9	2.6	0.6	1.9	7.2	3.8	8.8	8.2	7.4	5.1	5.2	5.3
Iceland	4.4	5.1	2.9	4.5	8.4	6.7	–1.6	–2.0	–0.3	6.0	4.0	4.0
Andorra	8.9	6.6	2.0	1.7	5.3	2.8	15.9	16.7	17.3	2.9	2.0	1.8
San Marino	5.4	3.1	0.8	2.1	6.9	4.5	4.0	1.4	0.8	6.1	5.9	5.7
Emerging and Developing Europe 6/	**6.8**	**–0.2**	**0.4**	**9.5**	**28.1**	**19.2**	**1.7**	**2.9**	**2.8**	. . .	. . .	. . .
Russia	4.7	–3.9	–3.1	6.7	13.8	5.0	6.9	12.2	11.2	4.8	4.0	4.4
Türkiye	11.4	5.0	3.0	19.6	73.1	51.2	–1.7	–5.7	–3.8	12.0	10.8	10.5
Poland	5.9	3.8	0.5	5.1	13.8	14.3	–0.7	–4.0	–3.3	3.4	2.8	3.2
Romania	5.9	4.8	3.1	5.0	13.3	11.0	–7.0	–8.4	–8.0	5.6	5.5	5.5
Ukraine 7/	3.4	–35.0	. . .	9.4	. . .	. . .	–1.6	. . .	. . .	9.8	. . .	. . .
Hungary	7.1	5.7	1.8	5.1	13.9	13.3	–3.2	–6.7	–3.0	4.1	3.4	3.8
Belarus	2.3	–7.0	0.2	9.5	16.5	13.1	2.7	–1.5	–1.1	3.9	4.5	4.3
Bulgaria 5/	4.2	3.9	3.0	2.8	12.4	5.2	–0.4	–0.9	–1.4	5.3	5.1	4.7
Serbia	7.4	3.5	2.7	4.1	11.5	8.3	–4.4	–8.4	–7.0	10.1	9.9	9.7
Croatia	10.2	5.9	3.5	2.6	9.8	5.5	3.4	2.2	2.0	8.1	6.9	6.6

Source: IMF staff estimates.

Note: Data for some countries are based on fiscal years. Please refer to Table F in the Statistical Appendix for a list of economies with exceptional reporting periods.

1/ Movements in consumer prices are shown as annual averages. Year-end to year-end changes can be found in Tables A6 and A7 in the Statistical Appendix.

2/ Percent of GDP.

3/ Percent. National definitions of unemployment may differ.

4/ Current account position corrected for reporting discrepancies in intra-area transactions.

5/ Based on Eurostat's harmonized index of consumer prices except for Slovenia.

6/ Includes Albania, Bosnia and Herzegovina, Kosovo, Moldova, Montenegro, and North Macedonia.

7/ See the country-specific note for Ukraine in the "Country Notes" section of the Statistical Appendix.

Annex Table 1.1.2. Asian and Pacific Economies: Real GDP, Consumer Prices, Current Account Balance, and Unemployment

(Annual percent change, unless noted otherwise)

	Real GDP			Consumer Prices 1/			Current Account Balance 2/			Unemployment 3/		
		Projections			Projections			Projections			Projections	
	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
Asia	**6.5**	**4.0**	**4.4**	**2.0**	**4.0**	**3.4**	**2.2**	**1.5**	**1.4**	. . .	. . .	. . .
Advanced Asia	**3.7**	**2.2**	**2.3**	**1.2**	**3.6**	**2.6**	**4.9**	**3.5**	**3.5**	**3.4**	**2.9**	**2.9**
Japan	1.7	1.7	1.6	–0.2	2.0	1.4	2.9	1.4	2.2	2.8	2.6	2.4
Korea	4.1	2.6	2.0	2.5	5.5	3.8	4.9	3.2	3.5	3.7	3.0	3.4
Taiwan Province of China	6.6	3.3	2.8	2.0	3.1	2.2	14.8	14.8	12.7	4.0	3.6	3.6
Australia	4.9	3.8	1.9	2.8	6.5	4.8	3.1	2.1	0.7	5.1	3.6	3.7
Singapore	7.6	3.0	2.3	2.3	5.5	3.0	18.1	12.8	12.5	2.7	2.1	2.1
Hong Kong SAR	6.3	–0.8	3.9	1.6	1.9	2.4	11.3	8.6	5.9	5.2	4.5	4.0
New Zealand	5.7	2.3	2.0	3.9	6.3	3.9	–5.8	–7.6	–6.0	3.8	3.3	3.9
Macao SAR	18.0	–22.4	56.7	0.0	2.5	2.4	13.8	–2.4	22.8	3.0	3.0	2.7
Emerging and Developing Asia	**7.2**	**4.4**	**4.9**	**2.2**	**4.1**	**3.6**	**1.0**	**0.8**	**0.6**	. . .	. . .	. . .
China	8.1	3.2	4.4	0.9	2.2	2.2	1.8	1.6	1.3	4.0	4.2	4.1
India 4/	8.7	6.9	6.1	5.5	6.9	5.1	–1.2	–2.8	–2.6	. . .	. . .	. . .
ASEAN-5	**3.4**	**5.3**	**4.9**	**1.9**	**4.7**	**4.4**	**–0.3**	**0.5**	**0.8**	. . .	. . .	. . .
Indonesia	3.7	5.3	5.0	1.6	4.6	5.5	0.3	2.2	1.1	6.5	5.5	5.3
Thailand	1.5	2.8	3.7	1.2	6.3	2.8	–2.2	–0.5	1.9	1.5	1.0	1.0
Vietnam	2.6	7.0	6.2	1.8	3.8	3.9	–2.0	0.3	1.0	2.7	2.4	2.3
Philippines	5.7	6.5	5.0	3.9	5.3	4.3	–1.8	–4.4	–3.3	7.8	5.7	5.4
Malaysia	3.1	5.4	4.4	2.5	3.2	2.8	3.8	1.6	2.2	4.7	4.5	4.3
Other Emerging and Developing Asia 5/	**3.0**	**3.7**	**4.4**	**5.0**	**12.5**	**11.5**	**–2.9**	**–4.5**	**–3.5**	. . .	. . .	. . .
Memorandum												
Emerging Asia 6/	**7.4**	**4.4**	**4.9**	**2.1**	**3.7**	**3.3**	**1.1**	**0.9**	**0.8**	. . .	. . .	. . .

Source: IMF staff estimates.

Note: Data for some countries are based on fiscal years. Please refer to Table F in the Statistical Appendix for a list of economies with exceptional reporting periods.

1/ Movements in consumer prices are shown as annual averages. Year-end to year-end changes can be found in Tables A6 and A7 in the Statistical Appendix.

2/ Percent of GDP.

3/ Percent. National definitions of unemployment may differ.

4/ See the country-specific note for India in the "Country Notes" section of the Statistical Appendix.

5/ Other Emerging and Developing Asia comprises Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Fiji, Kiribati, Lao P.D.R., Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Nepal, Palau, Papua New Guinea, Samoa, Solomon Islands, Sri Lanka, Timor-Leste, Tonga, Tuvalu, and Vanuatu.

6/ Emerging Asia comprises the ASEAN-5 economies, China, and India.

Annex Table 1.1.3. Western Hemisphere Economies: Real GDP, Consumer Prices, Current Account Balance, and Unemployment

(Annual percent change, unless noted otherwise)

	Real GDP			Consumer Prices 1/			Current Account Balance 2/			Unemployment 3/		
		Projections			Projections			Projections			Projections	
	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
North America	**5.5**	**1.8**	**1.0**	**4.7**	**8.0**	**3.7**	**–3.2**	**–3.4**	**–2.8**	. . .	. . .	. . .
United States	5.7	1.6	0.9	4.7	8.2	3.4	–3.7	–3.9	–3.1	5.4	3.8	4.9
Mexico	4.8	2.1	1.2	5.7	7.9	5.9	–0.4	–1.0	–1.2	4.1	3.5	3.8
Canada	4.5	3.3	1.5	3.4	6.9	4.2	0.0	0.5	–0.3	7.4	5.3	5.9
Puerto Rico 4/	2.7	4.8	0.4	2.4	4.4	3.5	. . .	. . .	. . .	7.9	6.0	7.9
South America 5/	**7.3**	**3.6**	**1.8**	**12.1**	**16.5**	**12.5**	**–2.0**	**–1.8**	**–1.5**	. . .	. . .	. . .
Brazil	4.6	2.8	1.3	8.3	9.7	4.6	–1.7	–1.3	–1.4	13.2	9.8	9.5
Argentina	10.4	4.0	2.5	48.4	63.1	60.0	1.4	0.4	0.4	8.8	7.0	7.0
Colombia	10.7	7.6	2.2	3.5	9.7	7.1	–5.7	–5.1	–4.4	13.8	11.3	11.1
Chile	11.7	1.8	–0.3	4.5	11.2	7.8	–6.7	–7.7	–4.9	8.9	7.8	8.2
Peru	13.6	2.7	2.6	4.0	7.5	4.4	–2.5	–3.0	–2.1	10.9	7.6	7.5
Ecuador	4.2	2.9	2.7	0.1	3.2	2.4	2.9	2.4	2.1	4.2	4.0	3.8
Venezuela	0.5	6.0	6.5	1,588.5	210.0	195.0	–2.1	4.0	6.0	. . .	. . .	. . .
Bolivia	6.1	3.8	3.2	0.7	3.2	3.6	2.0	–1.4	–2.1	7.0	4.5	4.0
Paraguay	4.2	0.2	4.3	4.8	9.5	4.5	0.8	–3.8	–0.1	7.7	7.2	6.4
Uruguay	4.4	4.7	3.1	7.7	8.9	7.8	–1.8	–0.2	–0.3	9.4	7.2	6.9
Central America 6/	**11.0**	**4.6**	**3.5**	**4.5**	**7.4**	**5.4**	**–1.9**	**–3.1**	**–2.4**	. . .	. . .	. . .
Caribbean 7/	**5.1**	**12.7**	**7.4**	**8.4**	**12.8**	**9.3**	**–3.5**	**4.7**	**4.4**	. . .	. . .	. . .
Memorandum												
Latin America and the Caribbean 8/	6.9	3.5	1.9	9.8	13.5	10.2	–1.6	–1.6	–1.3	. . .	. . .	. . .
Eastern Caribbean Currency Union 9/	5.0	7.3	5.5	1.6	5.6	3.3	–17.0	–17.1	–13.2	. . .	. . .	. . .

Source: IMF staff estimates.

Note: Data for some countries are based on fiscal years. Please refer to Table F in the Statistical Appendix for a list of economies with exceptional reporting periods.

1/ Movements in consumer prices are shown as annual averages. Year-end to year-end changes can be found in Tables A6 and A7 in the Statistical Appendix. Aggregates exclude Venezuela.

2/ Percent of GDP.

3/ Percent. National definitions of unemployment may differ.

4/ Puerto Rico is a territory of the United States, but its statistical data are maintained on a separate and independent basis.

5/ See the country-specific notes for Argentina and Venezuela in the "Country Notes" section of the Statistical Appendix.

6/ Central America refers to CAPDR (Central America, Panama, and the Dominican Republic) and comprises Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

7/ The Caribbean comprises Antigua and Barbuda, Aruba, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

8/ Latin America and the Caribbean comprises Mexico and economies from the Caribbean, Central America, and South America. See the country-specific notes for Argentina and Venezuela in the "Country Notes" section of the Statistical Appendix.

9/ Eastern Caribbean Currency Union comprises Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines as well as Anguilla and Montserrat, which are not IMF members.

Annex Table 1.1.4. Middle East and Central Asia Economies: Real GDP, Consumer Prices, Current Account Balance, and Unemployment

(Annual percent change, unless noted otherwise)

	Real GDP			Consumer Prices 1/			Current Account Balance 2/			Unemployment 3/		
		Projections			Projections			Projections			Projections	
	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
Middle East and Central Asia	**4.5**	**5.0**	**3.6**	**12.9**	**13.8**	**13.1**	**2.3**	**6.5**	**5.2**	**. . .**	**. . .**	**. . .**
Oil Exporters 4/	**4.5**	**4.9**	**3.5**	**11.3**	**12.8**	**11.4**	**4.2**	**9.5**	**7.7**	**. . .**	**. . .**	**. . .**
Saudi Arabia	3.2	7.6	3.7	3.1	2.7	2.2	5.3	16.0	12.3	6.7	. . .	. . .
Iran	4.7	3.0	2.0	40.1	40.0	40.0	0.7	1.6	1.5	9.2	9.4	9.6
United Arab Emirates	3.8	5.1	4.2	0.2	5.2	3.6	11.4	14.7	12.5	. . .	. . .	. . .
Kazakhstan	4.1	2.5	4.4	8.0	14.0	11.3	–2.9	3.0	1.8	4.9	4.9	4.8
Algeria	3.5	4.7	2.6	7.2	9.7	8.7	–2.8	6.8	0.1	13.4	11.1	9.8
Iraq	7.7	9.3	4.0	6.0	6.5	4.5	7.8	16.3	13.0	. . .	. . .	. . .
Qatar	1.6	3.4	2.4	2.3	4.5	3.3	14.7	21.2	22.1	. . .	. . .	. . .
Kuwait	1.3	8.7	2.6	3.4	4.3	2.4	16.3	29.1	23.0	1.3	. . .	. . .
Azerbaijan	5.6	3.7	2.5	6.7	12.2	10.7	15.2	31.7	31.4	6.0	5.9	5.8
Oman	3.0	4.4	4.1	1.5	3.1	1.9	–6.1	6.2	3.6	. . .	. . .	. . .
Turkmenistan	4.6	1.2	2.3	14.9	17.5	10.5	0.6	2.5	2.5	. . .	. . .	. . .
Oil Importers 5/ 6/	**4.5**	**5.1**	**3.7**	**15.5**	**15.2**	**15.7**	**–3.9**	**–4.8**	**–4.1**	**. . .**	**. . .**	**. . .**
Egypt	3.3	6.6	4.4	4.5	8.5	12.0	–4.4	–3.6	–3.4	7.3	7.3	7.3
Pakistan	5.7	6.0	3.5	8.9	12.1	19.9	–0.8	–4.6	–2.5	6.3	6.2	6.4
Morocco	7.9	0.8	3.1	1.4	6.2	4.1	–2.3	–4.3	–4.1	11.9	11.1	10.7
Uzbekistan	7.4	5.2	4.7	10.8	11.2	10.8	–7.0	–3.3	–4.2	9.5	10.0	9.5
Sudan	0.5	–0.3	2.6	359.1	154.9	76.9	–7.5	–5.9	–7.2	28.3	30.6	30.6
Tunisia	3.3	2.2	1.6	5.7	8.1	8.5	–6.1	–9.1	–8.0	16.2	. . .	. . .
Jordan	2.2	2.4	2.7	1.3	3.8	3.0	–8.8	–6.7	–4.8	24.4	. . .	. . .
Georgia	10.4	9.0	4.0	9.6	11.6	6.0	–10.1	–7.2	–6.8	20.6	18.7	19.5
Armenia	5.7	7.0	3.5	7.2	8.5	7.0	–3.7	–5.5	–5.1	15.3	15.2	15.1
Tajikistan	9.2	5.5	4.0	9.0	8.3	8.1	8.4	3.8	0.0	. . .	. . .	. . .
Kyrgyz Republic	3.7	3.8	3.2	11.9	13.5	12.4	–8.7	–12.5	–9.6	9.0	9.0	9.0
West Bank and Gaza	7.1	4.0	3.5	1.2	4.9	3.4	–8.2	–10.7	–8.9	26.4	25.7	25.0
Mauritania	2.4	4.0	4.8	3.8	7.1	7.8	–9.4	–11.6	–9.1	. . .	. . .	. . .
Memorandum												
Caucasus and Central Asia	5.6	3.8	4.0	9.2	12.9	10.5	–1.0	4.8	3.8	. . .	. . .	. . .
Middle East, North Africa, Afghanistan, and Pakistan 6/	4.3	5.1	3.6	13.4	13.9	13.4	2.6	6.7	5.3	. . .	. . .	. . .
Middle East and North Africa	4.1	5.0	3.6	14.2	14.2	12.4	2.9	7.4	5.9	. . .	. . .	. . .
Israel 7/	8.6	6.1	3.0	1.5	4.5	3.6	4.2	2.5	3.7	5.0	3.9	3.8
Maghreb 8/	7.8	0.9	4.4	4.7	8.0	6.8	–1.1	1.9	0.0	. . .	. . .	. . .
Mashreq 9/	2.7	5.9	4.2	8.3	11.6	12.1	–5.4	–4.5	–4.2	. . .	. . .	. . .

Source: IMF staff estimates.

Note: Data for some countries are based on fiscal years. Please refer to Table F in the Statistical Appendix for a list of economies with exceptional reporting periods.

1/ Movements in consumer prices are shown as annual averages. Year-end to year-end changes can be found in Tables A6 and A7 in the Statistical Appendix.

2/ Percent of GDP.

3/ Percent. National definitions of unemployment may differ.

4/ Includes Bahrain, Libya, and Yemen.

5/ Includes Djibouti, Lebanon, and Somalia. See the country-specific note for Lebanon in the "Country Notes" section of the Statistical Appendix.

6/ Excludes Afghanistan and Syria because of the uncertain political situation. See the country-specific notes in the "Country Notes" section of the Statistical Appendix.

7/ Israel, which is not a member of the economic region, is shown for reasons of geography but is not included in the regional aggregates.

8/ The Maghreb comprises Algeria, Libya, Mauritania, Morocco, and Tunisia.

9/ The Mashreq comprises Egypt, Jordan, Lebanon, and West Bank and Gaza. Syria is excluded because of the uncertain political situation.

Annex Table 1.1.5. Sub-Saharan African Economies: Real GDP, Consumer Prices, Current Account Balance, and Unemployment

(Annual percent change, unless noted otherwise)

	Real GDP			Consumer Prices 1/			Current Account Balance 2/			Unemployment 3/		
		Projections			Projections			Projections			Projections	
	2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
Sub-Saharan Africa	**4.7**	**3.6**	**3.7**	**11.1**	**14.4**	**12.1**	**–1.1**	**–1.7**	**–2.5**	**. . .**	**. . .**	**. . .**
Oil Exporters 4/	**2.9**	**3.2**	**3.0**	**17.0**	**18.1**	**15.5**	**1.0**	**2.3**	**0.6**	**. . .**	**. . .**	**. . .**
Nigeria	3.6	3.2	3.0	17.0	18.9	17.3	–0.4	–0.2	–0.6	. . .	. . .	. . .
Angola	0.8	2.9	3.4	25.8	21.7	11.8	11.2	11.4	5.7	. . .	. . .	. . .
Gabon	1.5	2.7	3.7	1.1	3.5	3.2	–5.7	–1.4	–2.9	. . .	. . .	. . .
Chad	–1.1	3.3	3.5	–0.8	4.1	3.1	–4.5	1.3	–2.3	. . .	. . .	. . .
Equatorial Guinea	–3.2	5.8	–3.1	–0.1	5.1	5.7	–3.4	–1.6	–2.1	. . .	. . .	. . .
Middle-Income Countries 5/	**5.3**	**3.1**	**2.8**	**5.6**	**9.2**	**6.8**	**0.5**	**–1.5**	**–2.4**	**. . .**	**. . .**	**. . .**
South Africa	4.9	2.1	1.1	4.6	6.7	5.1	3.7	1.2	–1.0	34.3	34.6	35.6
Ghana	5.4	3.6	2.8	10.0	27.2	20.9	–3.2	–5.2	–4.4	. . .	. . .	. . .
Côte d'Ivoire	7.0	5.5	6.5	4.2	5.5	4.0	–3.8	–5.2	–5.0	. . .	. . .	. . .
Cameroon	3.6	3.8	4.6	2.3	4.6	2.8	–4.0	–2.3	–2.8	. . .	. . .	. . .
Zambia	4.6	2.9	4.0	22.0	12.5	9.5	7.6	–1.8	–3.7	. . .	. . .	. . .
Senegal	6.1	5.0	8.1	2.2	7.5	3.1	–13.2	–12.9	–9.3	. . .	. . .	. . .
Low-Income Countries 6/	**5.8**	**4.5**	**5.3**	**11.2**	**16.4**	**14.4**	**–5.1**	**–6.5**	**–6.2**	**. . .**	**. . .**	**. . .**
Ethiopia	6.3	3.8	5.3	26.8	34.9	33.3	–3.2	–4.6	–4.1	. . .	. . .	. . .
Kenya	7.5	5.3	5.1	6.1	7.7	7.2	–5.2	–6.0	–5.6	. . .	. . .	. . .
Tanzania	4.9	4.5	5.2	3.7	4.0	5.3	–3.3	–4.4	–3.9	. . .	. . .	. . .
Uganda	6.7	4.4	5.9	2.2	6.4	6.4	–8.3	–8.0	–10.2	. . .	. . .	. . .
Democratic Republic of the Congo	5.7	6.4	6.9	9.0	6.4	6.1	–1.0	–0.3	–0.3	. . .	. . .	. . .
Burkina Faso	6.9	4.4	4.9	3.9	12.5	2.0	–2.2	–5.2	–5.5	. . .	. . .	. . .
Mali	3.1	2.5	5.3	3.8	8.0	3.0	–10.0	–7.9	–7.1	. . .	. . .	. . .

Source: IMF staff estimates.

Note: Data for some countries are based on fiscal years. Please refer to Table F in the Statistical Appendix for a list of economies with exceptional reporting periods.

1/ Movements in consumer prices are shown as annual averages. Year-end to year-end changes can be found in Table A6 and A7 in the Statistical Appendix.

2/ Percent of GDP.

3/ Percent. National definitions of unemployment may differ.

4/ Includes Republic of Congo and South Sudan.

5/ Includes Botswana, Cabo Verde, Eswatini, Lesotho, Mauritius, Namibia, and Seychelles.

6/ Includes Benin, Burundi, Central African Republic, Comoros, Eritrea, The Gambia, Guinea, Guinea-Bissau, Liberia, Madagascar, Malawi, Mozambique,

Annex Table 1.1.6. Summary of World Real per Capita Output

(Annual percent change; in constant 2017 international dollars at purchasing power parity)

	Average									Projections	
	2004–13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
World	**2.5**	**2.1**	**2.1**	**1.9**	**2.5**	**2.4**	**1.7**	**–4.1**	**5.4**	**2.4**	**1.6**
Advanced Economies	**1.0**	**1.5**	**1.7**	**1.3**	**2.0**	**1.8**	**1.3**	**–4.9**	**5.1**	**2.1**	**0.8**
United States	0.9	1.6	2.0	0.9	1.6	2.4	1.8	–4.2	5.4	1.3	0.6
Euro Area 1/	0.5	1.2	1.7	1.6	2.4	1.6	1.3	–6.5	5.3	2.8	0.4
Germany	1.4	1.8	0.6	1.4	2.3	0.7	0.8	–3.8	2.6	1.4	–0.4
France	0.6	0.4	0.6	0.7	2.2	1.5	1.5	–8.2	6.5	2.3	0.4
Italy	–0.9	–0.1	0.9	1.5	1.8	1.1	0.7	–8.8	7.4	3.3	–0.1
Spain	–0.4	1.7	3.9	2.9	2.8	1.9	1.3	–11.3	5.0	3.8	0.7
Japan	0.7	0.5	1.7	0.8	1.8	0.8	–0.1	–4.3	1.9	2.0	2.1
United Kingdom	0.5	2.2	1.8	1.4	1.5	1.0	1.1	–9.7	7.0	3.2	–0.1
Canada	0.9	1.8	–0.1	0.0	1.8	1.4	0.4	–6.4	3.9	1.9	0.0
Other Advanced Economies 2/	2.6	2.2	1.5	1.8	2.5	2.1	1.2	–2.3	5.4	2.4	1.9
Emerging Market and Developing Economies	**4.7**	**3.2**	**2.8**	**2.9**	**3.3**	**3.3**	**2.3**	**–3.2**	**5.9**	**2.6**	**2.6**
Emerging and Developing Asia	7.3	5.8	5.9	5.8	5.7	5.6	4.4	–1.5	6.5	3.7	4.3
China	9.7	6.7	6.5	6.2	6.4	6.3	5.6	2.1	8.0	3.2	4.5
India 3/	6.2	6.2	6.8	7.1	5.7	5.4	2.7	–7.5	7.6	5.9	5.1
ASEAN-5 4/	4.0	3.4	3.7	3.9	4.3	4.3	3.7	–4.5	2.5	4.3	3.9
Emerging and Developing Europe	4.1	1.5	0.5	1.6	3.9	3.3	2.3	–1.6	6.8	7.1	0.0
Russia	4.2	–1.1	–2.2	0.0	1.8	2.9	2.2	–2.3	5.2	–3.8	–2.9
Latin America and the Caribbean	2.7	0.1	–0.8	–1.9	0.3	0.2	–1.1	–8.2	6.0	2.6	1.1
Brazil	3.0	–0.4	–4.4	–4.1	0.5	1.0	0.4	–4.6	4.2	2.2	0.7
Mexico	0.8	1.6	2.1	1.5	1.0	1.1	–1.2	–8.9	3.8	1.2	0.3
Middle East and Central Asia	2.3	1.1	0.7	2.0	0.0	0.5	–0.3	–4.7	6.0	3.0	1.8
Saudi Arabia	1.3	2.5	1.7	–0.6	–3.3	0.1	–2.0	–6.3	1.9	5.5	1.6
Sub-Saharan Africa	2.7	2.3	0.5	–1.2	0.2	0.7	0.5	–4.3	2.0	1.0	1.1
Nigeria	4.5	3.5	0.0	–4.2	–1.8	–0.7	–0.4	–4.3	1.1	0.6	0.5
South Africa	1.9	–0.1	–0.2	–0.8	–0.3	0.0	–1.1	–7.7	4.0	0.6	–0.4
Memorandum											
European Union	0.9	1.5	2.1	1.9	2.8	2.0	1.8	–5.8	5.4	2.9	0.6
Middle East and North Africa	1.8	0.7	0.5	2.3	–0.7	0.0	–0.9	–5.1	2.4	3.0	1.8
Emerging Market and Middle-Income Economies	5.0	3.3	3.0	3.2	3.6	3.6	2.5	–3.2	6.1	3.0	2.8
Low-Income Developing Countries	3.6	3.8	2.3	1.5	2.5	2.7	2.6	–1.2	2.5	2.5	2.6

Source: IMF staff estimates.

Note: Data for some countries are based on fiscal years. Please refer to Table F in the Statistical Appendix for a list of economies with exceptional reporting periods.

1/ Data calculated as the sum of individual euro area countries.

2/ Excludes the Group of Seven (Canada, France, Germany, Italy, Japan, United Kingdom, United States) and euro area countries.

3/ See the country-specific note for India in the "Country Notes" section of the Statistical Appendix.

4/ ASEAN-5 comprises Indonesia, Malaysia, Philippines, Thailand, Vietnam.

COMMODITY SPECIAL FEATURE: ONLINE ANNEX

Annex 1.SF.1.

Dynamic Causal Effects of Energy, Harvest, and Monetary Policy Shocks on Food Commodity Prices

We use Local Projection Instrumental Variables to obtain causal estimates of the spillover effects from fertilizer to cereal prices as well as dynamic causal effects of US monetary policy shocks and of cereal harvest shocks. To study how oil prices affect cereal prices we expand the framework introduced by Kilian (2009), which disentangles the effect of oil supply shocks, oil-specific demand shocks and aggregate demand shocks on oil prices.

The LP-IV can be expressed as:

$$y_{t+h} = a_h + \theta_h x_t + \lambda_h(L) z_{t-1} + u_{t+h} \qquad \text{for } h \in \{0,1,2,3,4\} \tag{1}$$

where y_t is the delta log of real price of cereals, x_t is the regressor of interest representing each of the three channels, namely, delta log of fertilizers' price (average across urea, potash, and phosphates[1]) in real terms, absolute change of the interest rate on the three months treasury bill and (standardized) delta log of global cereal production[2]. The vector z_{t-1} contains predetermined controls like global GDP growth and the US dollar real effective exchange rate. Our specification of the right-hand side variables is standard in the literature (Gilbert, 2010, Baffes and Haniotis, 2016).[3] Further, $\lambda_h(L)$ is a polynomial of order 4 in the lag operator and θ_h is the dynamic effect of the regressor of interest at horizon h.

Dynamic causal effects of each channel are represented under the form of Impulse Response Functions (h, θ_h). Each $\theta_{h,z}$ is estimated via classical instrumental variables (IV) $\frac{E(y_{t+h}z)}{E(y_t z_t)}$. To ease the interpretation of the IRF, the unit effect normalization is imposed automatically in the 2SLS approach, whereby a 1% increase in one of the shocks, say the monetary policy shock, leads to a 1% increase in the 3-months treasury bill rate. To give θ_h a causal interpretation we use instruments to induce exogenous variation in each of the three channels given respectively by: changes in real gas prices, US monetary policy shocks from

[1] Nitrogen-based fertilizers like urea account for around two thirds of total fertilizer consumption, 60% of which is used to grow cereals.

[2] This variable was built by assigning FAO's annual production figures to a specific quarter based on each country's crop calendar and aggregating at the global level. The global series is then seasonally adjusted assuming a deterministic seasonal pattern.

[3] An appreciation (depreciation) of the US dollar reduces (increases) demand of commodities traded in US dollars through a price effect which, in turn, reduces (increases) the dollar price of the commodity. Higher interest rates, instead, increase the *cost of carry* for physical commodities, pushing down their prices.

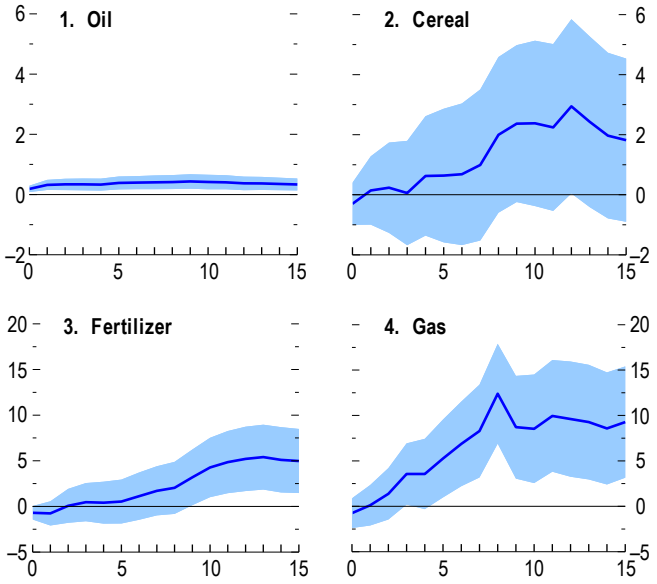
Jarocinski and Keradi (2020)[4] and cereal harvest shocks from De Winne and Peersman (2016)[5]. Due to data limitations on some of the variables, our final estimation sample covers from 1991Q1 to 2021Q1. All variables are deflated by the US GDP deflator.

Further, we estimate the following SVAR

$$\boldsymbol{A y_t = \alpha + \sum_{i=1}^{p} B_i y_{t-i} + e_t} \quad (2)$$

Where A and B are matrices of coefficients, y_t is a 6-dimentionsional vector that includes the original three variables in the same order as in Kilian (2009), i.e., delta log of global oil supply, global real economic activity indicator, and log oil prices, to which we add the log of gas prices, the log of fertilizer prices and the log of cereal prices. The vector of structural shocks is assumed to be mutually uncorrelated. Pre-multiplying both sides of equation (2) by A^{-1} it is easy to obtain the reduced form VAR as $\boldsymbol{y_t = \omega + \sum_{i=1}^{p} B_i^* y_{t-i} + u_t}$ and the corresponding errors $\boldsymbol{u_t = A^{-1} e_t}$.

Annex Figure 1.SF.1. Price Responses to Oil Supply Shock
(Percent; months on the x-axis)



Sources: Haver Analytics; World Bank; IMF, Consumer Pirce Index; IMF, Primary Commodity Price System; and IMF staff estimates.
Note: 95 percent confidence bands. Orthogonalized impulse response function to 10 percent oil supply shock.

We rely on zero restrictions on contemporaneous relations to recover the structural shocks and from them the cumulative orthogonalized IRF. Based on (Kilian, 20019)[6], the shocks corresponding to the first three equations are identified as the oil supply shock, the aggregate demand shock and the oil-specific demand shock. For the bottom three equations, our short-term restrictions imply that within the period (month) fertilizer prices don't affect gas

4 The authors identify monetary policy shocks and central bank information shocks using sign and zero restrictions in a VAR that includes the surprises in the three-month fed funds futures and the S&P 500 stock market index as well as five lower frequency macro variables.

5 One instrument is the unexpected caloric shock from global cereal production, constructed as the residual from a regression of log cereal yields on country- and crop-specific time trends, which are then summed over all countries and crops using production weights and the caloric content of each crop. The second one is a "narrative" instrument given by a dummy equal to 1 for notorious global cereal shortcomings mostly from weather events and -1 for unexpected bumper harvests.

6 Global oil supply is taken to be the "most exogenous" of all variables since its production is controlled by few large producers and elasticity of supply is low in the very short term (with the month) due the capital-intensive nature of the production. Second, global demand responds with the month to oil supply shock, but it will take more than one month for the global economy to respond to oil price changes.

prices and cereal prices don't affect fertilizer prices. While the first assumption seems plausible, since fertilizers are a small share of total gas usage, the second assumption may be less tenable, as fertilizer demand may react quickly to current or expected changes in cereal prices. However, the gas and fertilizer prices are included only as transmission channels from oil towards cereal prices, which is our only IRF of ultimate interest in this exercise. We do not attempt to label the corresponding shocks, as we don't include quantities in the last three equations.

Finally, we assume the top block of variable to be exogenous, within the month, to changes in any of the variables in the bottom block. Structural IRFs are shown in figure 1.SF.A.1. The top left chart shows that a 10% negative oil supply shock leads to an increase in oil prices of 0.4% after 9 months. The top right graph is the monthly frequency equivalent of the top-right IRF in figure 1.SF.7 Further, the effects of a 10% negative oil supply shock on fertilizer prices are mostly statistically insignificant, while for gas prices they peak at 10% after 8 months and stabilize afterwards.

We also explore the influence of speculative demand and of the financialization of commodities markets on cereal prices. We define speculative periods as those during which cereal prices and net long positions of non-commercial traders (surplus of long positions over short positions for futures contracts with cereals as underlying held by non-commercial traders, typically, asset managers and other financial institutions) change in the same direction. We then build a dummy (S_t) that equals 1 for speculative periods and 0 otherwise. We estimate a triple "difference in difference"-type specification:

$$y_t = a + \beta_1 S_t + \beta_2 D_t + \beta_3 I_t + \beta_4 I_t S_t + \beta_5 D_t S_t + \beta_6 I_t D_t + \beta_7 D_t S_t I_t + e_t \qquad (2)$$

where y_t is the delta log of cereal prices and D_t is a dummy that equals 1 after 2003, which is the time identified in the literature when asset managers substantially increase involvement in commodities' futures and options, thus marking a stark intensification of financialization of commodities markets (Peersman, 2021). Further, I_t is the delta log of the S&P500 index. We empirically verify our hypothesis that the correlation between traditional financial asset prices (I_t) and cereal prices increased due to speculative demand after the start of the financialization process through a t-test on the interaction coefficient ($H_0: \beta_7 = 0$). We use monthly data covering the period 1980M1-2022M3. Results reported in Table A1 show that this is in fact the case. Financialization led the pass-through from the S&P500 to cereal price to be 56 percent higher in speculative periods than in non-speculative periods.

Table A1: Effect of financialization and speculative demand

I_t	0.114
	(0.0732)
S_t	0.00304
	(0.00460)
S_t*I_t	-0.188
	(0.133)
D_t	0.0110**
	(0.00510)
$D_t * S_t$	-0.0101
	(0.00775)
$D_t * I_t$	-0.142
	(0.127)
$D_t * S_t * I_t$	0.557**
	(0.239)
_cons	-0.00219
	(0.00273)
N	507

Note: * 0.10 ** 0.05 *** 0.01

Dynamic Causal Effects of Food Commodity Price Shocks on Domestic Food Inflation and the Role of Country Characteristics

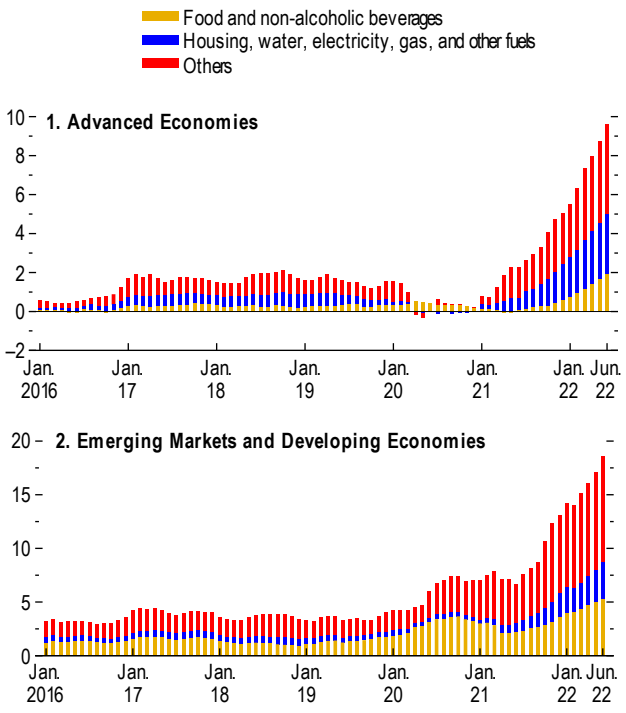
To track the magnitude and trajectory of the pass-through from global food commodity prices to domestic food prices, we follow Jordà (2005), Montiel Olea and Plagborg-Møller (2021), De Winne and Peersman (2021), and others, and estimate impulse response functions (IRFs) from lag-augmented local projections with instrumental variables (LP-IV). For each horizon $h = 0,1,2, \ldots 18$, the following eq. is estimated using monthly data:

$$ln(\mathrm{P}_{i,t+h}) - ln(\mathrm{P}_{i,t-1}) = \delta_h(L)\Delta\ln(\mathrm{P}_{i,t}) + \rho_h(L)\Delta ln(W_{i,t}) + \vartheta_k^h char_{k,i}$$

$$+\left[\beta_0^h + \beta_k^h char_{k,i}\right]\Delta ln(X_t) + \alpha_i^h + \lambda^h t + \varepsilon_{i,t+h}$$

Where $P_{i,t}$ is the food CPI in country i at time t, X_t is the vector of endogenous variables, i.e., the IMF's food price index and the Baltic Dry Index as our measures of food commodity prices and shipping costs respectively, and $W_{i,t}$ is a vector of controls determined before date t, i.e., the exchange rate (in LCU/USD), headline inflation, and real oil prices. The parameters α_i^h, $\lambda^h t$ and $\varepsilon_{i,t+h}$ represents country fixed effects, a year trend, and the error term respectively, while $\delta_h(L)$ and $\rho_h(L)$ are polynomials in the lag operator (L=18). The parameter $char_{k,i}$ reflects a set of country characteristics, specifically real income per capita (in 2010 USD) and trade openness (% of GDP), both of which are expressed in standard deviations from the global mean. Note that all regressors in *P*, *X* and *W* are incorporated on the right-hand side in monthly log-differences.

Annex Figure 1.SF.2. Contribution of Food and Energy to Inflation
(Percent)



Sources: IMF Consumer Price Index database and IMF staff calculations.
Note: The inflation contribution is calculated based on the Organisation for Economic Co-operation and Development (OECD) classification of individual consumption by purpose (COICOP) methodology.

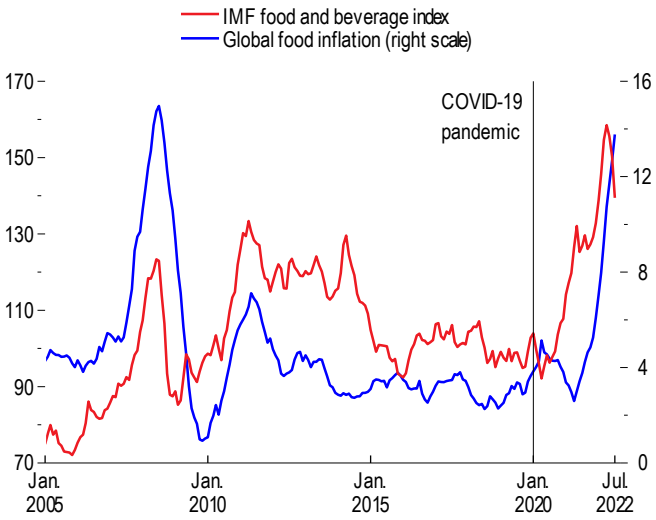
Dynamic causal effects of our two endogenous regressors are represented as impulse response functions (k, β_0^k). To isolate exogenous variation in our main predictor of interest and thus identify a causal effect through β_0^k, we follow De Winne and Peersman (2021) and employ harvest shocks as an instrumental variable for food commodity prices, and borrow the idea from Carriere-Swallow et al. (2022) to use closure events of the Suez Canal to instrument for the Baltic Dry Index. We thus depart from the existing literature by recognizing the potential for reverse causality between domestic food prices in large economies on the one hand and international food prices and shipping costs on the other hand.

To create the harvest shocks, we allocate annual production of the 4 most important staple foods (maize, rice, soybeans, and wheat) to a specific quarter by making use of crop and country-specific harvesting calendars. For each country, a rest-of-world harvest quantity is then obtained by taking the calorie-weighted average of all 4 crops across all countries minus harvests from countries in the same region. The harvest shocks are then obtained as the prediction errors from a regression of the harvest quantities on several lagged values and some control variables.

The sample covers more than 100 countries for the period 1991-2020 and spans two episodes of high international food prices (2007-2008 and 2010-2012). Our main results are reported in Table A2, where, by column, we display the regression coefficient estimates for various horizons. The pass-through from a 1pp food commodity price shock to domestic food prices is about 0.30pp after 12 months. The exchange rate pass-through is, as expected, very similar, as it shouldn't matter to food importers whether the source of the increase in commodity prices (in local currency units) is an exchange rate depreciation or an increase in the US dollar price of a food commodity. Over the same 12 month horizon, a 1pp increase in shipping costs translates into a 0.09pp increase in domestic food prices.

Annex Figure 1.SF.3. Food Inflation Follows Higher International Commodity Prices

(Index 2016 = 100; precent)



Sources: Haver Analysis; IMF Consumer Price Index database and Primary Commodity Price System database; World Bank; and IMF staff calculations.

Note: 58.19 percent global population and 75 countries are covered at this time (based on 2018 world population).

Finally, as our trade openness and income per capita variables are expressed in deviations from their global means, we can infer immediately from Table A2 that a country whose income per capita is 1 standard deviation below average will feature a food commodity price pass-through that is about 35 percent rather than 29 percent 9 months after the shock. Similarly, for a country with a degree of trade openness that is 1 standard deviation above average, the pass-through increases from 29 to 37 percent.

Table A2: Food commodity price pass-through and role of income per capita and trade openness.

	cumulative food inflation					
	h=1	**h=3**	**h=6**	**h=9**	**h=12**	**h=18**
food price index (mom log-diff)	0.009+	0.104***	0.207***	0.288***	0.302***	0.326***
	0.005	0.015	0.032	0.042	0.046	0.057
exchange rate (in LCU/USD) (mom log-diff)	-0.040***	0.080	0.197**	0.268***	0.341***	0.354***
	0.006	0.049	0.071	0.077	0.086	0.091
Baltic Dry Index (BDI) (mom log-diff)	-0.003	-0.019+	0.002	0.040	0.088**	0.075*
	0.003	0.011	0.020	0.027	0.030	0.037
headline CPI (mom log-diff)	1.234***	1.624***	1.722**	1.739*	1.712*	1.922*
	0.056	0.419	0.615	0.700	0.754	0.895
real oil price (in USD) (mom log-diff)	-0.006**	-0.000	-0.013	-0.024+	-0.032*	-0.037+
	0.002	0.006	0.010	0.013	0.015	0.019
income per capita X food price index	-0.010*	-0.025*	-0.045**	-0.060**	-0.047*	0.016
	0.004	0.011	0.016	0.020	0.023	0.028
trade openness X food price index	-0.002	0.004	0.049+	0.069+	0.049	-0.003
	0.005	0.016	0.029	0.037	0.044	0.059
trade openness	0.188***	0.683***	1.121***	1.462***	1.651***	1.336**
	0.041	0.131	0.231	0.297	0.364	0.481
income per capita	0.207	-0.002	0.474	1.132	1.526	1.917
	0.137	0.473	0.772	0.954	1.097	1.410
Observations	13788	13788	13788	13788	13788	13788
# of countries	97	97	97	97	97	97
R-sq	0.793	0.496	0.394	0.348	0.304	0.262
model	iv	iv	iv	iv	iv	iv

Sources: Food and Agriculture Organization; Haver Analytics; World Bank, World Bank Development Indicators database; IMF; and IMF staff calculations.

Robust standard errors clustered at the country level in parentheses. Country fe included but not reported

iv = instrumental variables. fe=fixed effects. Mom = month-on-month. LCU=local currency units.

+ p<0.10; * p<0.05; ** p<0.01; *** p<0.001.

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