HSBC Global Research

16 October 2023

Food fragility

Climate change and food price stability in Asia

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Economics - Asia

- Climate-related extreme weather events have become more frequent and risk stoking food price volatility over time in Asia
- A rise in food trade restrictions could weaken trade's role as a cushion against local supply shocks, especially for importers
- Greater food price volatility may affect broader price stability via rising inflation expectations, warranting a central bank response

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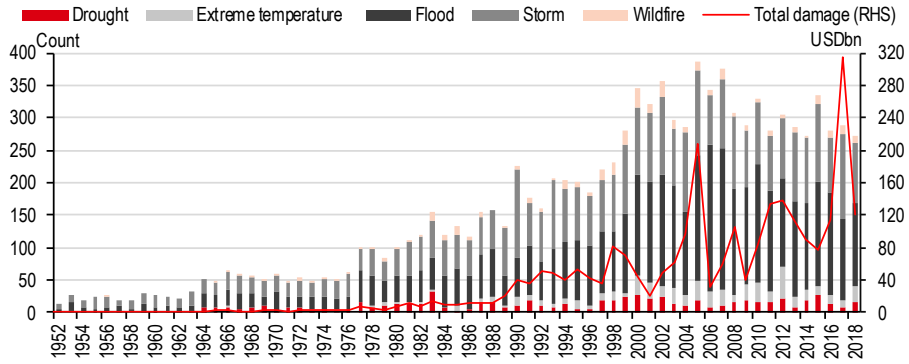
Asia is vulnerable to climate-related disasters

There is little doubt that the climate is changing, and extreme weather events have become more frequent across the world and in Asia (Chart 1). The number of climate-related disasters globally in the 20-year period between 1999 and 2018 soared by 95%, according to the Emergency Event Database, from around 3,000 events between 1979 and 1998 to over 6,200 over the subsequent two decades.

Asia suffered the highest number of disaster events. Data from the UN Office for Disaster Risk Reduction (UNDRR) show that between 2000 and 2019, four out of the top five economies that reported the highest number of disasters are located in Asia: China (1st), India (3rd), the Philippines (4th) and Indonesia (5th – the US ranked the 2nd).

Extreme weather events inevitably disrupt agricultural production, especially in poorer economies, where infrastructure is less developed and resilient. With climate change intensifying, there is, therefore, a risk that food prices will become more volatile. This, in turn, could affect inflation expectations, especially in markets where food accounts for a larger share of CPI baskets. If higher food price volatility pushes up inflation expectations, there is a need for central banks to respond, in the process raising interest rate volatility.

Chart 1: Climate-related disaster events by type and economic damage, 1952-2018



Source: Emergency Event Database (EM-DAT), HSBC

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Climate change and El Niño

Climate change increases food uncertainty

Climate change affects agricultural productivity through projected increases in temperatures, shifts in precipitation patterns, changes in extreme weather events, and reductions in water availability. The UNDRR predicts that, specifically, changing rainfall patterns and greater variability in precipitation pose a risk to 70% of global agriculture that is rain-fed and the 1.3 billion people dependent on degrading agricultural land.

Increasing incidences of extreme weather events are disruptive to food production

Table 1 shows the projections of global food production provided by the International Food Policy Research Institute (IFPRI). The baseline projections indicate that in the absence of climate change, world food production will grow by 37% between 2010 and 2030. However, considering the impact of climate change on agriculture, global food production will grow by 33% over 2010 levels by 2030 – 2.8% less than would be the case without climate change.

It is also clear that the impact of climate change on agriculture is not uniform across continents or countries. East Asia, comprising China, Japan and Korea, will likely see increased food production as a result of warmer temperatures. North America, on the other hand, will likely see the biggest fall in food production.

The water-intensive nature of rice cultivation makes it vulnerable to climate change

In Asia, the economies whose projected agricultural production will likely be most impacted by climate change are Thailand, Bangladesh, Vietnam and India. By 2030, Thailand may see an over 5% shortfall in food production as a result of climate change. Changes in rainfall patterns brought by climate change have a significant impact on these large rice-producing economies.

Projections highlight the threat to global food security

Table 1: Global food production projections, difference due to climate change

Index, 2010=1.00	Without climate change		With climate change		Difference between with and without climate change (%)	
	2030	2050	2030	2050	2030	2050
World	1.37	1.67	1.33	1.59	-2.8	-5.0
Developing	1.42	1.77	1.40	1.71	-1.8	-3.5
Developed	1.22	1.42	1.15	1.27	-5.7	-10.2
East Asia	1.26	1.39	1.28	1.43	1.9	3.4
China	1.26	1.38	1.28	1.43	1.8	3.3
Japan	1.20	1.41	1.25	1.53	3.9	8.5
Korea	1.26	1.46	1.27	1.45	0.5	-0.5
South Asia						
Bangladesh	1.44	1.70	1.36	1.53	-5.0	-9.9
India	1.68	2.25	1.62	2.11	-3.7	-6.3
Southeast Asia						
Indonesia	1.62	2.02	1.63	2.03	0.1	0.2
Malaysia	1.83	2.94	1.78	2.81	-2.6	-4.5
Philippines	1.33	1.68	1.31	1.65	-1.0	-1.7
Thailand	1.18	1.27	1.12	1.14	-5.2	-10.3
Viet Nam	1.25	1.36	1.20	1.24	-4.3	-9.3
Africa & Middle East	1.60	2.23	1.55	2.10	-3.2	-5.9
Latin America and Caribbean	1.44	1.79	1.40	1.68	-2.8	-6.0
North America	1.28	1.54	1.16	1.28	-9.8	-17.1
Europe	1.14	1.24	1.11	1.18	-2.5	-4.3

Source: 2019 Global Food Policy Report of International Food Policy Research Institute

The projections suggest that global food production may decline by as much as 5% by 2050. In addition to climate change, we also need to consider population growth, the rise in income levels and living standards, which together may widen the food supply-demand gap presented in this table. However, we need to stress that these projections are simulated by the IFPRI using the International Panel on Climate Change's Representative Concentration Pathway 8.5 (RCP 8.5), which is generally taken as the worst-case scenario among others and assumes no reduction in greenhouse gas (GHG) emissions throughout the 21st century. The RCP 8.5 is now thought to be quite unlikely, given global efforts to cut emissions.

On a global scale, studies have consistently found that the yield of maize, among the four major grains, including rice, soybean and wheat, is the most sensitive to heat stress brought by climate change, while rice shows the least impact. This finding likely explains why North American is most affected in Table 1. Losses in rice output in South and Southeast Asia could be partially offset by gains in Japan, Korea and Northern China.

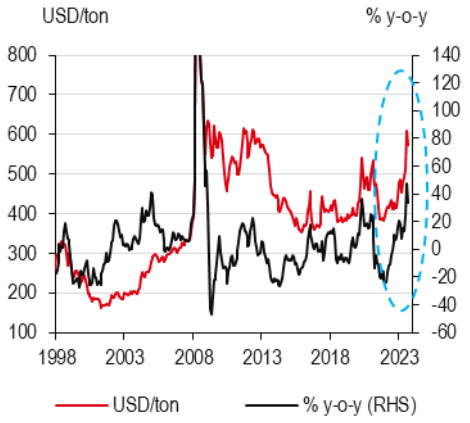
Global rice market is rocked by India's ban on rice exports

Even so, we should not underestimate the impact of disruptions to rice production on Asian economies. Rice is the crop that matters the most to Asia. About 90% of rice globally is grown and consumed in Asia, according to FAO statistics. Over the past few months, India's restrictions on rice exports have pushed global rice prices to multi-year highs, causing gyrations in global rice markets.

Rice-importing economies immediately felt the impact of the supply shock. In the Philippines, rice CPI rose by 17.9% y-o-y in September, an acceleration from August's 8.7% (Chart 3). Soaring rice prices have caused a deviation from the slowing inflation trend that began at the start of the year. On 4 October 2023, the Philippine government lifted the cap on rice prices, which did not seem to be effective in containing the price surge, roughly one month after implementing it. Scraping the price cap, the government recently announced farming subsidies and food stamps to mitigate the impact of elevated rice price on low-income groups.

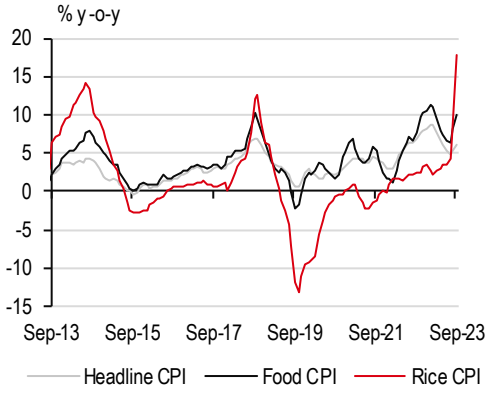
Rice CPI rose by 3% y-o-y in August in Malaysia, where 30% of rice consumption relies on foreign imports. Though moderate compared with the Philippines, the August figure was, nonetheless, a jump from the average of 1.1% y-o-y rise in the first six months of the year.

Chart 2: Benchmark Thai rice export prices



Source: IMF, Bloomberg, HSBC

Chart 3: Philippines rice, food and headline CPI



Source: CEIC, HSBC

Strengthening El Niño poses new threat to Asia's food supplies

Another weather-related event that also affects rice production is El Niño, whose effects are already visible in the past few months. El Niño is anticipated to continue through the Northern Hemisphere winter, with a greater than 95% chance through January-March 2024. Based on past records, the negative impacts of El Niño on seasonal rainfall are typically strongest and most consistent in India and Thailand. India's curbs on rice exports have likely been spurred by the anticipation of El Niño.

Fuelled by climate change, El Niño is in "uncharted waters"

What complicates things is that climate change affects El Niño, a naturally occurring event that normally diminishes after it has run its course. Scientists expect that climate change will increase the severity of El Niño episodes. Crop Monitor, a G-20 endorsed agricultural programme, estimated that average crop harvest declines in India and Thailand have been 2% to 4% with declines of 5% to 10% possible during past El Niño events. However, these figures, based on past records, likely underestimate the impact of future El Niño events that are "supercharged" by extreme weather events, which are themselves becoming more common and destructive (Chart 1).

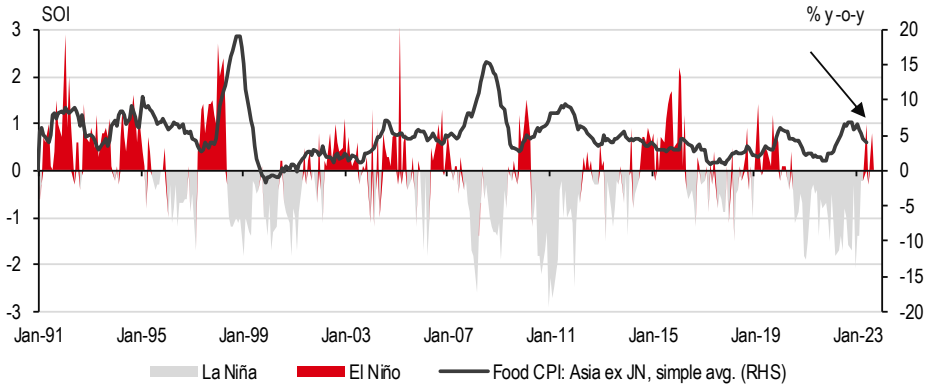
El Niño is expected to affect the yields of various crops in Asia

El Niño events also lower soybean yields in India by around 9%, on average, although, globally, the impact is likely to be more than offset by positive changes in yields in the US and Argentina. Palm oil production is expected to fall in Indonesia and Malaysia, with Indonesia being affected more than Malaysia. The Indonesian Palm Oil Association states that palm oil production is likely to decline in 2024, with the extent determined by the intensity of El Niño.

Relationship between El Niño and Asia's food inflation is not straightforward

While El Niño is a major weather event that influences Asia's food production significantly, the historical relationship between its occurrence and Asia's overall food inflation is not so clear, as suggested by Chart 4. This is, to a large extent, because production in other food-growing regions may benefit from favourable weather conditions created by El Niño and, through trade, fluctuations in global food supplies could be smoothed. Local food prices are also influenced by institutional factors.

Chart 4: El Niño and Asia food inflation, % y-o-y

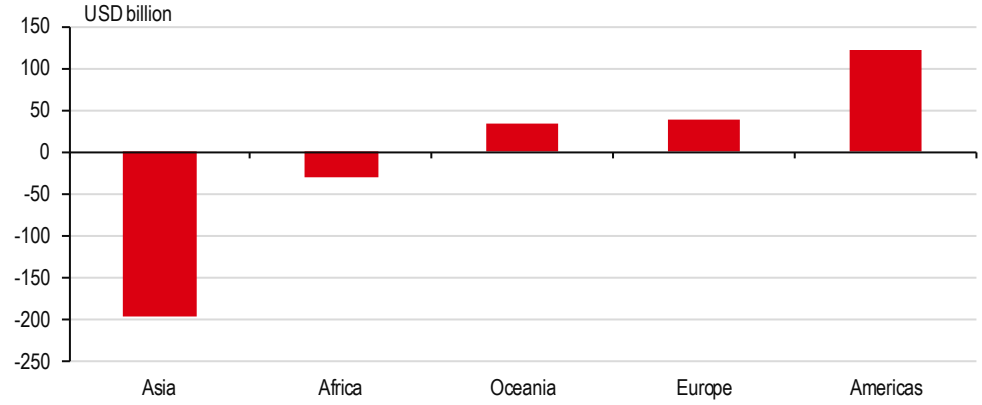


Source: National Oceanic and Atmospheric Administration, National Centers for Environmental Information, HSBC. Note: SOI – Southern Oscillation Index.

Asia is the world's largest food net importing region

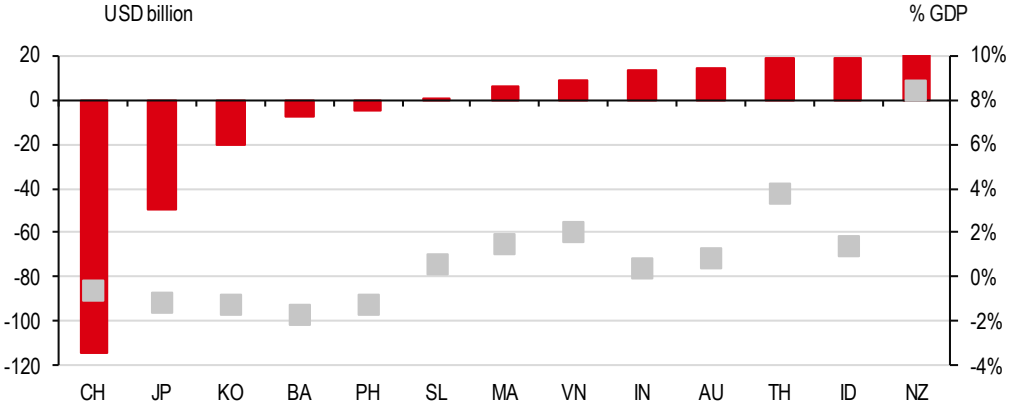
In fact, Asia is the world's largest food importer, FAO statistics show (Chart 5). Apart from rice, Asia depends on imports for many other food groups. Chart 6 shows that five out of the 12 Asian economies are net food importers. China, the world's biggest soybean importer, accounts for nearly 60% of Asia's food import value shown in Chart 5. Japan and Vietnam are key importers of maize, and Indonesia purchases a large amount of wheat from abroad.

Chart 5: Food net trade by region, 2020



Source: FAO, HSBC

Chart 6: Food net trade by country, 2020



Source: FAO, HSBC. Note: CH refers to mainland China.

India's ban on rice exports is estimated to have cut global supplies by roughly a fifth

However, given the current rice shortage, world trade is working in the opposite way and is not helping to fill the gap. India's rice export restrictions since July have created a shortfall of 10 million tonnes of rice exports, almost 45% of the country's total rice shipments and 18% of global exports. Other countries have also imposed or attempted to impose curbs on rice exports. Thailand, the world's second-largest rice exporter, has issued an appeal to its farmers to plant less rice and to transition to crops that require less water. Yet, incentivised by the price signal on the international market, Thai farmers are disregarding the government's advice. At the end of September, the Thai government turned to rainmaking operations to tackle the water shortage. In the 2023-24 season, rice production is expected to decline by 3% from last season to 23.5 million tonnes. Myanmar, the world's fifth-largest rice producer, also limited shipments of rice, although the scale of the impact on the global market will likely be small.

Food trade and protectionism

Climate change may fuel food protectionism

Protectionist measures weaken the global food trade system

India's ban on rice exports is unlikely to be an isolated event. Going forward, there is a rising risk that extreme weather events, which are increasing in frequency and intensity, and the resulting disruptions to agricultural production, may fuel food protectionism across countries. National interventions, such as export bans, quotas or tariffs and stockpiling of food staples, will weaken the global food trade system, dampening its ability to absorb local food supply shocks.

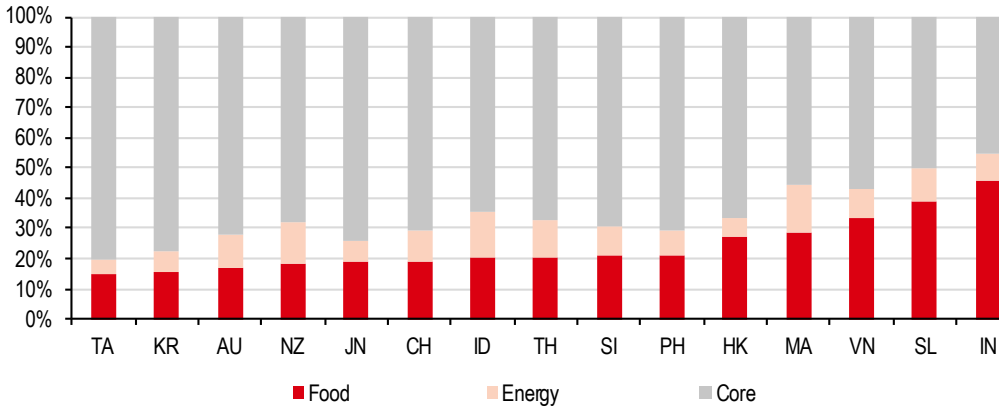
Heightened uncertainty due to a series of international events, including the pandemic and the subsequent supply chain disruptions, and the war in Ukraine, have already led to many countries turning to food protectionism. The IFPRI estimated that 27 countries have set up food-related trade barriers since the outbreak of the war.

Trade barriers exacerbate supply shortages and fluctuations in prices

Protectionism sends shock waves to both exporting and importing countries, demonstrated by India's move this summer. Low-income economies, where spending on food is generally a larger component of household consumption expenditure, are especially sensitive to food price fluctuations (Chart 7). They will be most anxious to secure domestic food supplies to ensure social stability. Such measures may exacerbate changes in international prices even more, if the intervening country is a large participant in world trade just as India is in rice.

The average weight of the food component in the CPI basket is 24.1% among 15 economies in the region. As Chart 7 shows, food typically takes up a larger share in CPI in lower income economies. The food component for Hong Kong and Singapore shown here contains meals at restaurants and takeaway food.

Chart 7: Weight of food component in CPI basket

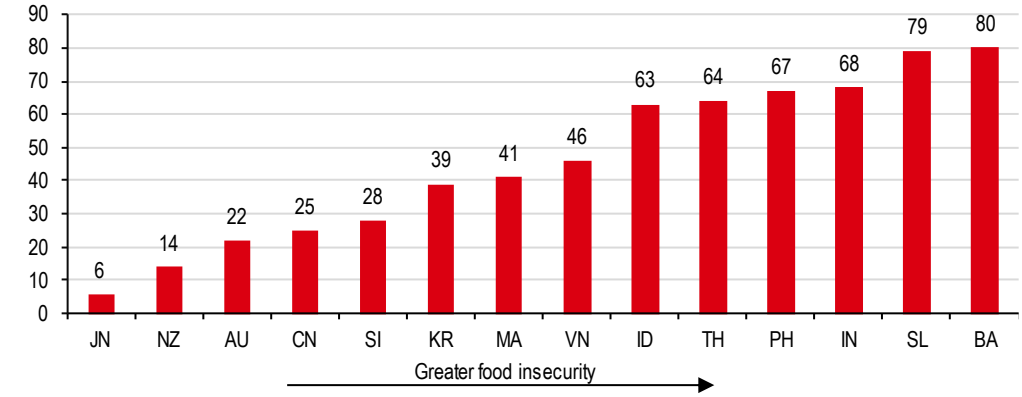


Source: CEIC, HSBC. Note: CH refers to mainland China.

During the current global rice price spike, we also see that some economies have reached bilateral agreements to secure supplies. For example, India has permitted some rice shipments to Singapore, Mauritius and Bhutan. Such bilateral deals help to ease the global trade disruptions to a degree, but they also underline a key risk: that food trade becomes more and more managed, leading to an uneven distribution of food security across the world.

Chart 8 shows the ranking of Asian economies in the 2022 Global Food Security Index, compiled by The Economist. Not surprisingly, lower income economies in the region are at higher risk of food insecurity. Bangladesh ranks the lowest among the economies we cover.

Chart 8: Country ranking in Global Food Security Index, 2022



Source: The Economist, HSBC. Note: Ranking out of 113 countries. CN refers to mainland China.

Food price inflation and its transmission to broader CPI

Climate change and protectionism threaten greater food price volatility

Pass-through from international to domestic food costs seems weak

Global agricultural prices are, therefore, at risk of greater volatility. In the past three decades, world food prices have experienced intermittent sharp increases, most notably in the period between 2006 and 2011, and the latest spike caused by COVID-19 and the war in Ukraine. The FAO food price index reached a new peak in March 2022. This peak exceeded the previous one in February 2011 by 16%.

Chart 9: FAO food price index

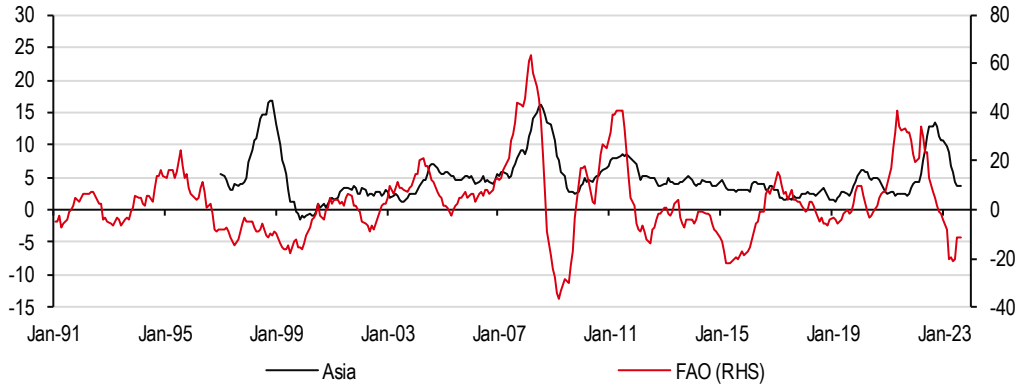
Source: FAO, HSBC

Broadly speaking, Asia as a region has been able to maintain greater food price stability compared with global prices (Chart 10). For example, while Asia's food prices followed global prices with a lag and soared in 2H22 due to the pandemic and the invasion of Ukraine, the pace was more moderate than that of international prices. The pass-through of global food prices to domestic retail costs is generally not pronounced.

Fiscal measures insulate households from volatile world food price shocks

Naturally, economies that rely more heavily on food imports will be more sensitive to internationally traded food prices. However, governments' administrative measures, such as food subsidies or price controls, help check the transmission. Domestic production and deeper intra-regional food trade also contribute to the alleviation of domestic food costs.

Chart 10: FAO food price index and Asia's average CPI, % y-o-y



Source: FAO, CEIC, HSBC

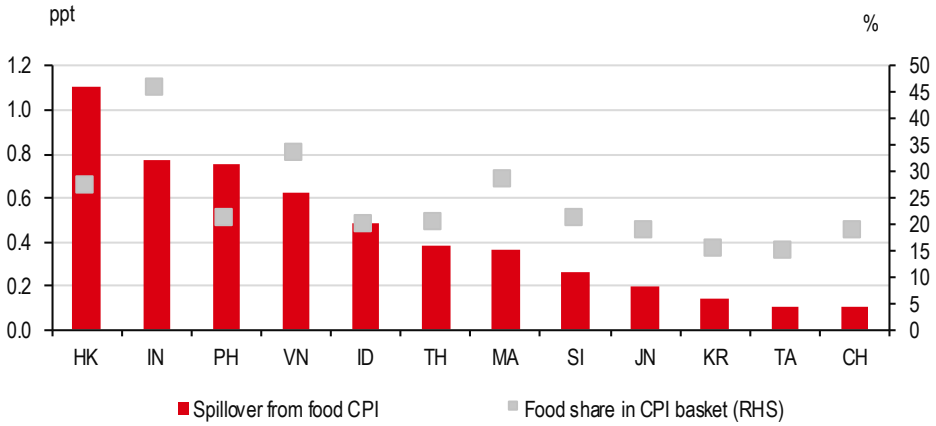
Does food price inflation affect broader price stability?

Food price inflation may feed into non-food inflation by generating inflation expectations

Chart 7 shows food price inflation's direct contribution to broad CPI, yet food prices may also be transmitted to non-food inflation through other channels. One of these channels is through their effect on inflation *expectations*. Persistent, significant rises in food prices may influence consumers' expectations or beliefs about future inflation and these views, in turn, influence consumers' current consumption behaviour and businesses' investment decisions.

Here we analyse the extent of spill-over by estimating the impact of a one percentage point (1ppt) increase in food CPI on core CPI, accumulated over six months' time after the initial increase in food CPI inflation. The analysis shows that the impact is the greatest for Hong Kong, where core CPI is estimated to rise by 1.1ppt over a span of six months following a 1ppt rise in food prices (Chart 11). For mainland China, the estimated impact is the smallest at 0.1ppt. It is possible that since mainland China's food inflation is primarily driven by the pork price cycle, which mainland Chinese households are familiar with and which, therefore, fails to overly affect broader inflation expectations.

Chart 11: Six-month accumulative impact of a 1ppt increase in food CPI on core CPI



Source: CEIC, HSBC. Note: CH refers to mainland China.

There is also a rough relationship between the extent of the spill-over and the size of the food component in the CPI basket. If we divide the group into two halves, food constitutes an average of 28.2% of the CPI basket for the group with greater spill-over (the six economies on the left-hand side of the chart), compared with 17.9% in the other group.

Food may play a disproportionate role in shaping consumers' inflation expectations

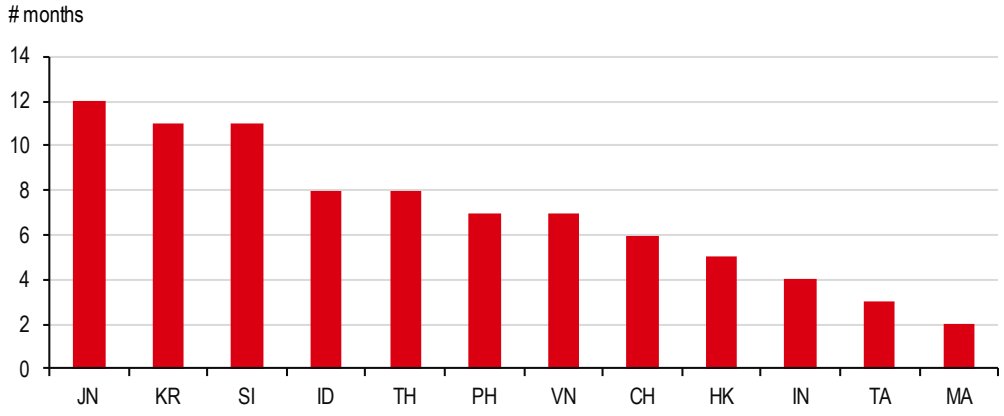
It is understandable that, if food takes up a larger share of a household's budget, the impact on consumers' inflation expectations will be greater. As food is the item consumers shop most frequently, consumers are especially sensitive to changes in the price tags of foodstuff. Due to this cognitive bias, food may play a disproportionate role in shaping consumers' inflation expectations beyond what is suggested by its weight in the CPI basket alone.

Is food price inflation "sticky"?

How long does it take for a food price shock to mean revert?

It is also interesting to see how a food price shock behaves with regards to time. The more persistent or "stickier" food price inflation is, the more important it is for governments to manage a food inflation episode to contain its impact on broader price stability. Chart 12 shows that stickiness varies among economies, as the mechanism through which inflation dissipates differs. It takes as much as a year for a food price spike to fade in Japan, for example.

Chart 12: Number of months it takes for a food price shock to dissipate



Source: CEIC, HSBC. Note: CH refers to mainland China.

It is slightly surprising that a food price spike in Malaysia and India seems to have a rather short lifespan, even if food is a relatively large component in their respective CPI basket (Chart 7) and the pass-through from food prices to non-food prices is relatively high (Chart 11). One possible explanation is that both economies rely heavily on food subsidy programmes to ensure food security for their respective populations. India's Public Distribution System (PDS) is one of the world's largest food subsidy programmes that provide essential commodities to households at subsidised rates. Government spending on the PDS is equivalent to about 1% of annual GDP.

The Malaysian government maintains one of the most regulated rice markets in Asia. In 2022, the government introduced subsidies for various food items, such as chicken, eggs, cooking oil and flour, to reduce inflationary pressure on the population. As the amount of fiscal expenditure on subsidies in 2022 is the highest amount in history, the Malaysian government is expected to have to roll back some subsidies in the Budget 2024 to narrow the fiscal gap.

Rising fiscal pressure to ensure food security

The pass-through to wider inflation and the sticky nature of food price inflation can potentially amplify food price volatility, a consequence from climate change and more frequent extreme weather events that we consider likely. This suggests rising pressure on Asian governments to step up fiscal support to mitigate food price fluctuations, as well as on central banks to implement monetary policy to anchor inflation expectations. As a result, policy rate changes could become more frequent over time, contributing to interest rate volatility in years to come.

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