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Food price situation in Europe

Food prices in the EU have risen dramatically in 2022 and the first half of 2023. The drivers of this increase originated in energy cost increases, aggravated by the effects of drought and animal disease outbreaks, but high global market prices in part due to the Russian invasion of Ukraine after February 2022 also helped to pull food prices higher and may have facilitated some element of profit-led inflation. Households have responded by buying less and trading down, with an increasing number turning to food banks to help make ends meet. Some limited steps were taken at EU level to help protect consumers from the effects of higher prices, but the important interventions have been at Member State level. These measures have primarily been focused on energy prices, but several Member States in addition directly tackled food price inflation either by lowering VAT rates on food products, by introducing temporary price controls on a basket of basic food products, or by providing food vouchers. Given the lags in price transmission along the food chain, food prices are likely to remain high for several more months. Lower energy and commodity prices, together with higher interest rates, should be reflected in lower food prices in the second half of 2023, in the absence of further adverse shocks to the food system, but food prices will not return to pre-war levels.

Keywords: food price, inflation, drivers, Europe

JEL classification: Q11

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Received: 19 June 2023, Revised: 5 July 2023, Accepted: 10 July 2023.

The recent experience of food price inflation

Food prices in the EU rose dramatically in 2022 and 2023 (in this article, food prices include non-alcoholic beverages but exclude alcoholic beverages whose prices have risen at a slightly slower rate). In the EU as a whole food prices were 41% higher in May 2023 relative to the price level in 2015, while the overall price level rose by just 26% during this period. The monthly annual rate of food price inflation reached 19.2% in the EU in March 2023, although it has fallen back slightly since then. Even higher rates of food price inflation were recorded in Central and Eastern Europe, with Hungary a particular outlier, recording food price inflation of 46% in February 2023.

It is not only food prices that have been increasing. Energy prices have also soared, while higher interest rates associated with the end of the European Central Bank's easy monetary policy mean that rents and mortgages are also rising. As a result, purse strings are being tightened even more to make ends meet. Many low-income households have faced real difficulties in managing household budgets as a result.

Figure 1 shows food price inflation relative to the other main components in the consumer price index, non-energy industrial goods, energy, and services. The left-hand panel shows the trend in prices for each of these components as well as the trend in the all-items Harmonised Index of Consumer Prices (HICP). In the right-hand panel, the price trends for each of the four components are shown relative to the trend in the all-items HICP.

The dynamics of inflation emerge clearly from these charts. After January 2021 inflation was driven by rising energy prices. Non-energy industrial goods and services helped to moderate the overall rate of inflation, while food prices increased in line with inflation up to early 2022. After

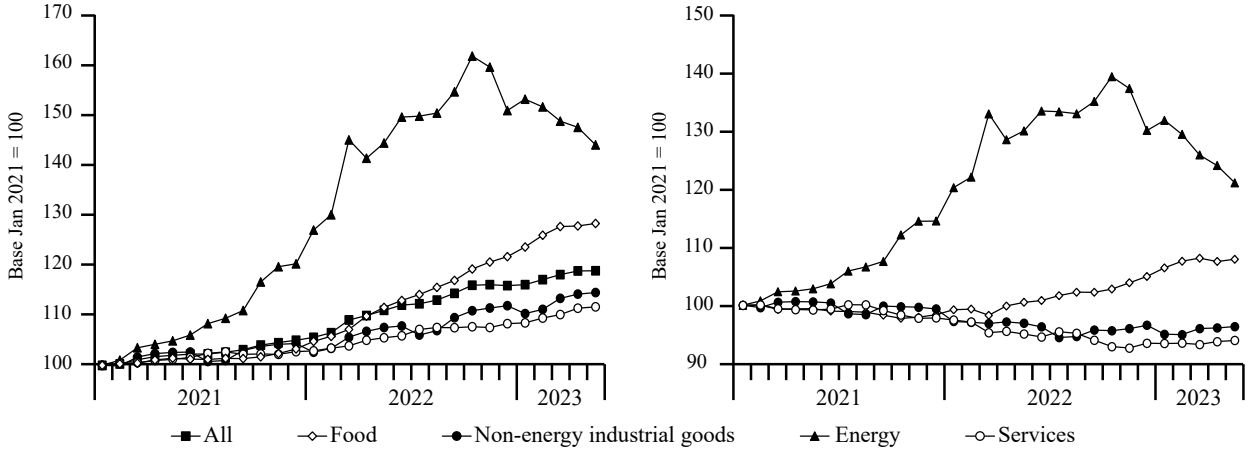

Figure 1: Food price inflation in the EU relative to general inflation, January 2021 – May 2023.

Note: The left-hand panel shows the monthly price index for the major categories of expenditure in the consumer price index to base January 2021 = 100. The right-hand panel shows the same data relative to the trend in the all-items HICP.
Source: Eurostat, HICP – monthly data (index) [PRC_HICP_MIDX].

March 2022 energy prices continued to rise while food price increases also led general inflation, while non-energy industrial goods and services continued to moderate the overall increase in prices. Since October 2022 however, energy prices have been falling while prices of non-energy industrial goods and prices of services have increased but no faster than the all-items inflation rate. In that period, food emerged as the leading inflationary pressure.

These dynamics are further illustrated by examining the monthly annual rate of change in inflation, shown in Figure 2. Food price inflation rose broadly in line with general inflation until the Russian invasion of Ukraine on 24 February 2022, after which the monthly food price inflation figures have all exceeded the overall inflation rate. The divergence since October 2022 when the overall rate of inflation began to fall while food price inflation gathered pace emerges clearly. The rate of food price inflation peaked in March 2023 but remains at very high levels.

The war in Ukraine increased global prices for various commodities, notably wheat and vegetable oils. Figure 3 shows the monthly annual rate of change in prices for some specific food items. The fact that prices of oils and fats and butter (whose prices are closely linked) and of bread increased more rapidly than general food inflation immediately after the Russian invasion is very clear. However, prices of eggs, fresh milk and particularly sugar also rose more rapidly than overall food price inflation. On the other hand, prices of meat and vegetables rose but not by more than food prices generally, while prices of fruit moderated the overall increase. The increase in butter prices moderated towards the end of 2022, while increases in oils and fats prices have now also fallen below general food inflation. The recent advance in food prices appears to be driven largely by the increases in egg and milk prices and particularly sugar, but it should be noted that the graph only includes a small sub-set of the food items that make up the consumer price index.

Figure 2: Monthly annual rate of change in prices, EU, Jan 2021-May 2023.
Source: Eurostat, HICP – monthly data (annual rate of change) [PRC_HICP_MANR]

Figure 3: Monthly annual rate of change in prices of individual food groups and items between January 2021 and April 2023.
Source: Eurostat, HICP – monthly data (annual rate of change) [PRC_HICP_MANR]

What is particularly striking is the uneven impact of food price inflation across EU Member States. Figure 4 shows that food price inflation has been higher in Central European countries relative to the rest of the EU, with Hungary being an exceptional outlier. In March 2023 (the month when food price inflation in the EU reached its highest level) food price inflation in Hungary was 45% on an annual basis, well ahead of the EU average of 19%. Of the new EU Member States, only Slovenia, Croatia and Cyprus had a lower rate of food price inflation than the EU average in March 2023. Higher rates of food price inflation in Central European countries are even more significant because the populations in these countries spend more on food as a percentage of overall household expenditure than they do in Western Europe.

Drivers of food price inflation

Eurostat has developed a food price monitoring tool which allows one to follow price developments at different stages of the food chain, month by month. Figure 5 shows price developments at the primary producer or farm level (agricultural producer price index), the processor or wholesale level (food industry price index) and at the consumer or retail level (HICP Food).

The chain of disruptions caused by the Covid-19 pandemic, extreme weather events, animal disease outbreaks, tight global markets and the Russian invasion of Ukraine in 2022 have all contributed to higher consumer food prices. However, the Covid impact in early 2020 was relatively short-lived and largely reversed itself as supply chains adjusted to the pandemic lockdowns, whereas the increase in food prices since the Russian invasion of Ukraine has been much more sustained.

Figure 5 shows that prices increased most at the farm level and least at the retail level up to April 2023. But it is also clear from the chart that the price transmission process takes time. Farm prices increased for several months before this was reflected in the sale prices of processing firms, and in turn their prices began to increase several months before this was reflected in retail prices. The implication is that firms at the downstream end of the food chain take time to adjust prices to increased input costs, either because they are locked into fixed price contracts, or because they are uncertain initially about the extent to which they can pass

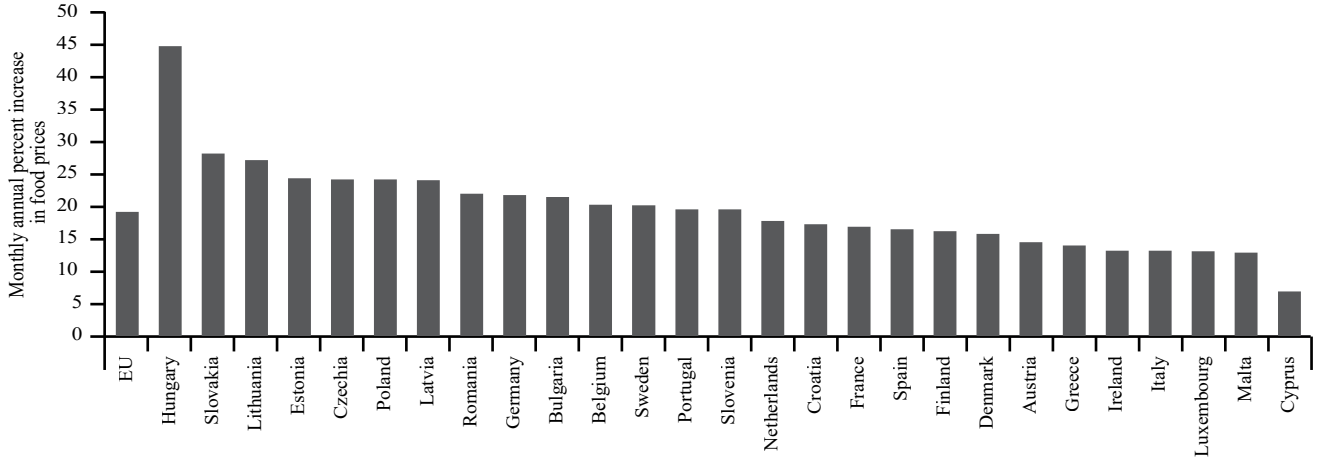

Figure 4: Annual rate of food price inflation in March 2023 by Member State.

Note: Data are shown for March 2023 as this is the month with the highest annual rate of food price inflation across the entire EU.
Source: Eurostat, HICP – monthly data (annual rate of change) [PRC_HICP_MANR]

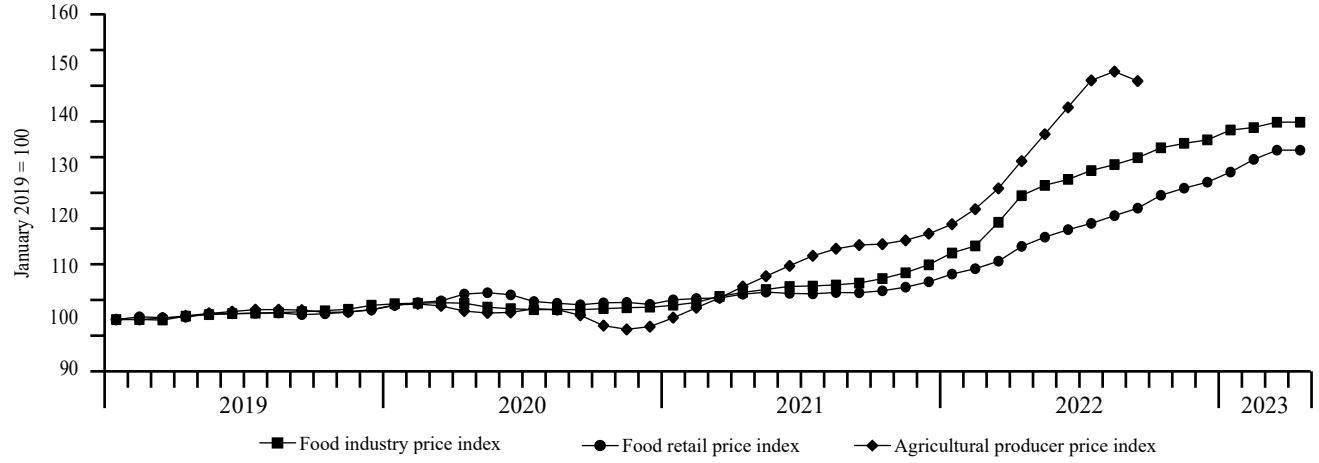

Figure 5: Price movements in the EU food chain, Jan 2019 to April 2023.

Source: Eurostat, Food Prices Monitoring Tool PRC_FSC_IDX

the higher costs on in the form of higher prices due to competitive pressures.

There is thus a type of domino effect as it takes time for price changes at the upstream end to cascade through the food supply chain. Dairy products are an example. High gas prices in Europe drove increased prices for fertiliser. This in turn drove up production costs for animal feed and raised input costs for milk production. Milk processing is also an energy-intensive activity requiring an increase in dairy product prices to cover costs. Similar cascade effects can be seen in other food supply chains. As contracts are renewed and firms become more confident in their ability to recoup their higher costs from downstream actors including consumers, we see downstream prices also begin to increase but with a lag.

Still, the observed price increases cannot be fully explained by supply-side cost pressures. Higher world market prices in response to the Ukraine war also helped to pull EU market prices higher. Despite the substantial increases in costs faced by EU farmers in 2022, the year as a whole was a record year for farm incomes, even if not all countries and sectors shared in this income growth, indicating that rising prices more than compensated for the increase in costs.[1] Similarly, there has been debate about the extent to which rising profit margins at the input, processing and retail levels may also have contributed to food price inflation, a phenomenon dubbed 'greedflation'.[2]

At the input level, the top global fertiliser companies saw record profits in 2022 despite increases in their energy costs as they increased prices faster than production costs.[3] Oxfam put the spotlight on the contribution of profit margin increases to food price inflation when it claimed that corporate price profiteering was driving at least 50% of inflation in Australia, the US and Europe (Oxfam International, 2023). Its claim is supported by analysis undertaken by the European Central Bank for inflation generally,[4] and by UBS[5] and Allianz Research[6] specifically for food price inflation. The UBS report quotes an example of profit-led inflation in the UK milk market. For almost two decades, the UK retail price for milk added a markup of around 25 pence to 30 pence to the farm-gate price. By March 2023, the retail price was adding 41 pence, with all this abnormal markup increase taking place in the early months of 2023.

Allianz argues that the source of the pressure has been packaged food companies rather than retailers. It notes that retailers have only passed some of their increased costs on to consumers and that gross margins of listed retailers shrank in 2022 and fell below their pre-pandemic levels. Data presented by McKinsey-Eurocommerce yields a slightly different picture. They concluded that margins decreased for both grocery retailers and food processors (consumer–packaged–goods companies) between 2019 and 2022. The EBITDA margins of grocery retailers (sample of 12 European grocery retailers) decreased by 1.0 percentage point, while the EBITDA margins of food processors (sample of top-7 consumer packaged goods companies) decreased by 0.8 points (McKinsey & Company and Eurocommerce 2023). One way to reconcile these narratives is to note the importance of timing in determining these trends. Profit margins may have been squeezed in the first half of 2022 but may have grown strongly in the second half of the year and into the first half of 2023. Allianz reports that since mid-2022 about 10% of the change in food prices cannot be explained by increases in producer and energy prices. Taking account of timing might explain not only the reduced overall margin in 2022 as a whole, but also the existence of profit-led inflation in the more recent period.

The response of households

The response of households to the food price inflation 2022-2023 was quite different to their response to the Covid-19 pandemic in 2020-2021. Changes in consumption patterns during Covid were triggered by the closure of physical workplaces, canteens, cafés and restaurants, schools, and childcare institutions, changes in households' grocery shopping frequency, a switch to online shopping, and income losses due to the pandemic. In some countries, there was an overall reduction in the consumption of fresh foods but an increase in the consumption of food with a longer shelf life (Janssen *et al.,* 2021). Other studies reported a substitution of fish and red meat consumption by increases in fruit and vegetables, legumes and cereals, but overall an increase in food intake (Mignogna *et al.,* 2022), and also an increase in organic food sales (USDA, 2023).

The impact of food price inflation on household behaviour has been very different. The big story has been that consumers bought less and traded down. The McKinsey-Eurocommerce survey of European grocery trade estimated that overall grocery sales in Europe grew by 2.9% in 2022 compared with 2021. This growth was the result of 10.7% higher prices, a decrease of 3.6% in volume sold, and a downtrading effect of 3.6%. Across Europe, consumer downtrading has led to substantial growth for private labels. Discounters gained 1.4% in market share in Europe relative to 2021. Consumers increasingly prioritised price while healthy and sustainable products became less of a priority (McKinsey & Company and Eurocommerce, 2023). The USDA is projected a 5% decline in organic food sales in current prices in Europe in 2022, implying an even larger volume drop (USDA, 2023).

Although all households are affected by rising food prices, inflation impacts are asymmetric across the income distribution. Poorer households spending a higher share of their income on food are more adversely affected (World Bank, 2023, 37–43). For low-income households, where food budgets were already squeezed and the scope for trading down more limited, food insecurity has increased.[7] There has been a surge in demand in the use of food banks, leading many of these voluntary organisations to turn away new applicants.[8] In Belgium, the number of people applying for

[1] Matthews, A., 2022: a record year for farm income, capreform.eu, 6 January 2023.
[2] Chassany, A.-S., Greedflation': profit-boosting mark-ups attract an inevitable backlash, Financial Times 31 March 2023.
[3] Grain and IATP, 'A corporate cartel fertilises food price inflation', May 2023.
[4] Arce, O., Hahn, E. and Koester, G., How tit-for-tat inflation can make everyone poorer, ECB blog 30 March 2023.
[5] Donovan, P., What is profit-led inflation, UBS Chief Economist's Comment 16 March 2023.
[6] Allianz Research, European food inflation – hungry for profits?, 14 April 2023.
[7] The European Commission has created a new Food Security section on its agri-food data portal providing the latest data on food price inflation, household spending, and inability to afford a meal.
[8] Financial Times, On the breadline: inflation overwhelms Europe's food banks, 2 December 2022.

aid from food banks increased by 18% in 2022, yet the volume of food that was distributed barely grew, resulting in a fall in the average amount of food donated per person.[9] Eurostat publishes an indicator of food insecurity based on the proportion of households that are unable to afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day (online data code: ILC_MDES03). Overall, there was an increase in the proportion of the EU population in this category from 7.3% to 8.3% between 2021 and 2022, with larger percentage point increase in several Central European countries but also France.

However, concerns about the cost of living are much more widely shared. The most recent Eurobarometer published in January 2023 and based on survey responses between mid-October and early November 2022 found that the rising cost of living was the most pressing worry for 93% of Europeans. The second most mentioned worry with 82% was the threat of poverty and social exclusion, followed by climate change and the spread of the war in Ukraine to other countries equal in third place with 81%. Only a third of Europeans express satisfaction with measures taken by their national governments or the EU to tackle the rising cost of living.[10] The following section examines the responses that governments have made to address food price inflation specifically.

The response of governments

In the second half of 2021, the EU saw a significant increase in wholesale energy prices, due to a combination of the recovery in demand after the Covid-19 lockdowns, tighter supplies particularly of liquified natural gas imports, a longer heating 2021-22 season and unfavourable weather conditions to produce renewable energy.[11] The focus of EU action at this time was to protect vulnerable consumers against the impacts of high energy prices, which led to the publication of a Commission Communication 'Tackling rising energy prices: a toolbox for action and support' on 13 October 2021 (European Commission, 2021). This set out a range of short- and medium-term measures that EU countries could take under the existing legislative framework as well as other potential measures under the Commission's remit.

The surge in food prices that followed the Russian invasion of Ukraine (see Figure 1) led to additional policy focus on this domain. Following the Russian invasion, EU leaders held an informal meeting on 10-11 March 2022 at Versailles, France. In the Versailles Declaration, the Heads of State or Government invited the Commission 'to present options to address the rising food prices and the issue of global food security as soon as possible' (European Council, 2022). At the same time, the Declaration called for reduced dependence on key imported agricultural products and inputs, particularly by increasing the EU production of plant-based proteins.

Following the Versailles Declaration, in March 2022 the European Commission adopted a series of measures aimed at supporting Ukraine's agricultural production, safeguarding food security, strengthening the resilience of the EU's food system, and mitigating the surge in food prices for European consumers (European Commission, 2022). The package included financial assistance for farmers and the temporary relaxation of ecological conditions for the receipt of farm direct payments to encourage increased production for food and feed purposes. The Communication recognised that food availability was not an issue in the EU but that food affordability for low-income consumers was. It advised that "In a context of rising food prices, social policy measures are important to both protect the most vulnerable citizens from food insecurity and to ensure everyone can afford sufficient amounts of healthy and nutritious food, especially vulnerable groups such as families with children, elderly and low-income persons."

Specifically, the Communication pointed to two measures that Member States could take to alleviate the pressures of higher food prices. It highlighted that Member States could make use of the Fund for European Aid to the Most Deprived (FEAD) which supports EU countries' actions to provide food and/or basic material assistance to the most deprived, reaching over 15 million people with food aid. Member States could add to the resources to fund additional support under this measure by mobilising the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU)[12] as well as making use of the additional flexibilities to fund their FEAD programmes provided by the Cohesion's Action for Refugees in Europe (CARE).

The Communication also recalled that Member States could implement reduced rates of Value Added Tax (VAT) and could encourage economic operators to reduce prices for consumers. In December 2021, the Council agreed on a reform of VAT rates at EU level, which enabled Member States to further reduce their rates, down to 0%, on certain goods and services which address basic needs, notably food.

The Communication was a recognition that the ability at EU level to protect low-income households from the impact of higher food prices was limited. It was ultimately up to Member States whether to prioritise such measures or not, at a time when they were heavily engaged in protecting their consumers against higher energy prices. No comprehensive overview exists of Member State responses to shield consumers from higher food prices, as exists for measures to protect consumers from higher energy prices.[13] In general, countries fall into two camps. In one camp are those countries that have introduced general support packages for households, principally focused on reducing energy costs or providing additional targeted income supports, but not containing any measures specific to food prices. Countries in this category include Germany, Italy, Austria, Ireland, and the Czech Republic. In the other camp are those countries that have, in addition, introduced specific measures to address food

[9] The Brussels Times, Demand for food banks rose by one-fifth in 2022, 14 Feb 2022.
[10] Eurobarometer, EP Autumn 2022 Survey: Parlemeter, accessed 8 May 2023.
[11] European Commission, Action and measures on energy prices, accessed 8 May 2023.
[12] The Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU) is an initiative that continues and extends the crisis response and crisis repair measures delivered through the Coronavirus Response Investment Initiative and the Coronavirus Response Investment Initiative Plus. REACT-EU provided a €50.6bn additional investment under the investment for growth and jobs goal. €39.6bn was allocated in 2021 with €11bn allocated in 2022. Member States could use the REACT-EU budget for the European Social Fund, the European Regional Development Fund, the Fund for European Aid to the Most Deprived (FEAD), and the Youth Employment Initiative.
[13] The Brussels think tank Brueghel has maintained a dataset of all national measures to shield consumers from rising energy costs. As of 24 March 2023, €758 billion has been allocated and earmarked across European countries for this purpose. See Brueghel, National fiscal policy responses to the energy crisis, accessed 8 May 2023.

price inflation following the Commission's recommendations, either reducing VAT rates on food, introducing price controls on foodstuffs, introducing food vouchers, or taxing the excess profits of food retailers. Countries in this camp include Spain, France, Poland, Romania, Greece, Portugal, Hungary and to some extent, Bulgaria.

The following examples illustrate the range of interventions undertaken.

- **Spain**. Spain was already experiencing rocketing energy prices prior to food price inflation beginning to take hold from January 2022 onwards. The government reacted by imposing an excess profits tax on energy companies and financial institutions, while using the proceeds to increase social supports. In addition to petrol subsidies, a rent cap and lowering VAT on electricity from 21% to 5%, the government made a one-off payment of €200 to all individuals, families, and the self-employed with a household income less than €27,000 per year and increased non-contributory pensions (widows, orphans, invalids, social pensions, etc.) by 15%.[14] Temporary VAT reductions on so-called basic products (such as milk, fruit, vegetables or bread) from 4% to 0% and on pasta and oils (from 10% to 5%) were introduced on 1 January until the end of June or until inflation fell below 5.5%. These VAT reductions on food were subsequently extended into the first half of 2023.[15]
- **France**. France decided not to follow its southern neighbour by cutting VAT on food, arguing that this would likely mostly benefit the margins of the large supermarket chains. Instead, the government focused its efforts on arm-twisting the supermarket chains to offer a basket of 20 everyday items including food at fixed or reduced prices. First broached in January 2023 and branded as an 'anti-inflation quarter' (*'trimestre anti-inflation*'), the government announced in March 2023 that it had reached agreement with several supermarkets to launch the initiative for a three-month period. The government's original idea had been to have a harmonised basket of everyday items, but the supermarkets held out that they should be the ones to decide the selection of products. In early March, Carrefour, Europe's largest retailer, pre-empted the government announcement by saying it would offer its own selection of 200 low-cost items whose prices would be frozen between March 15 and June 15. Another rival, Casino, also said it would offer a selection of 500 low-cost items at less than one euro from March 15 with prices frozen for three months.[16]

  Ministers have also discussed the idea of a 'food cheque (chèque alimentaire)', to help the lowest-income households with food costs. This idea had been floated previously in 2020 by the Citizens' Climate Convention and the principle had been included in the framework of the Climate and Resilience Law but never introduced. It was subsequently substituted by the idea of the 'anti-inflation quarter'. However, the government resurrected the idea at the time of the March 2023 announcement in the form of a possible experiment, possibly at the scale of a department, with the food cheque limited to low-income households and only to be used to purchase certain products, depending on their origin and method of production. The intention would be both to protect the purchasing power of the poorest while also providing support to specific agricultural sectors.[17]
- **Germany**. As in other EU countries, high energy and food prices have eroded the purchasing power of households. The government introduced several relief packages, including tax breaks, a cap on energy prices, subsidised transport, and higher social welfare payments. The German government is a coalition of Social Democrats, Liberals, and the Greens. Several voices among the Greens as well as The Left party called for the government to take advantage of the greater flexibility to reduce VAT rates introduced at EU level by reducing the VAT rate on fruits, vegetables, and legumes to 0%. However, this was opposed by the Liberals who hold the Finance Ministry on the grounds that this would not be a targeted measure (it would benefit all households regardless of income).[18] The three relief packages introduced by the German government up to September 2022 to help households deal with inflation generally are worth a total of €95 billion.[19]
- **Poland**. At the beginning of 2022, the Polish government introduced the so-called 'Anti-inflationary Shield', consisting of a reduction in VAT on the most key products and utilities, for example, electricity, fuel, and food. Only the full reduction in VAT on food is still in force in 2023, where the exemption has been extended until 30 June 2023.[20]
- **Romania**. Romania opted not to reduce VAT rates on food which already benefits from a lower rate. Instead, as part of its 'Support for Romania' programme, it has handed out electronic meal vouchers to around 3 million Romanians at risk of poverty. These vouchers (essentially electronic cards that can be used in shops equipped with cash registers) are worth RON 250 (EUR 50) and will be distributed bi-monthly until January 2023. Half of their total cost, of around €620 million, will come from non-repayable European funds and the rest from the state budget.[21]
- **Bulgaria**. Bulgaria is the EU Member State with the lowest income per capita. Not only has it experienced an above-average rate of food inflation, but low levels of income also mean that households are most vul-

[14] Euractiv, Agrifood Special CAPitals Brief: Controlling food prices, 27 Jan 2023; IPS Journal, How European countries are dealing with rising inflation and energy prices, 3 Aug 2022.

[15] Spain in English, Spain announces another €10 billion of state aid to ease inflation pain in 2023, 27 Dec 2022.

[16] The Connexion, Major French supermarkets agree to keep essential food prices down, 7 March 2023; Reuters, French government says has deal on anti-inflation shopping basket, 6 March 2023.

[17] Journal du Net, Chèque alimentaire 2023 : qui pourra en bénéficier ?, 9 March 2023.

[18] Euractiv, Agrifood Special CAPitals Brief: Controlling food prices, 27 Jan 2023.

[19] German Federal Government, Fighting price increases together, 15 September 2022.

[20] Euractiv, Agrifood Special CAPitals Brief: Controlling food prices, 27 Jan 2023.

[21] Radio Romania International, Vouchers for vulnerable people, 10 May 2022; Romania-Insider.com, Govt. hands out electronic meal vouchers to 2.5 million Romanians at risk of poverty, 2 June 2022.

nerable to higher food prices. The government has introduced some general income support measures for vulnerable families (for example, there has been a significant increase in pension rates) and some measures to compensate for higher fuel prices. As regards food, the government reduced the VAT rate on bread from 20% to 0% although there are mixed views on the extent to which the benefit of this has been passed on to consumers.[22] The caretaker Prime Minister in February 2023 following inconclusive elections in October 2022 called for a regular monitoring and control mechanism of food prices focused on apparent significant disparities between the (higher) prices paid by Bulgarian consumers for the same products sold in neighbouring countries.[23] Some evidence suggests that large retail chains are putting an 80-90% markup on food products and the caretaker cabinet proposes to introduce a ceiling on the trade markup of up to 20 or 25% with a view to reducing prices by 20-30%. Retailers charging a larger margin will be obliged to declare it to the Consumer Protection Commission, which will check the formation of the price.[24]

- **Greece**. Greece ruled out the option of a lower VAT rate on food because it would lead to a loss of government revenue. Instead, it opted both to try to control prices in supermarkets and to provide targeted income support for food purchases to households. In November 2022, the government launched a "basket" allowing all households to find one product in 31 categories (bread, milk, pasta, rice, meat, etc.) at a discounted price in supermarkets making more than €90 million in turnover per year. All large chains must provide one product for each category at a low price and advertise it on the internet or in advertising brochures. Those who fail to do so risk a fine of €5,000 per day of delay. This measure, which came into effect on November 2, should last at least until the end of March 2023. From February 2023 the Greek government will cover 10% of its citizens' food bills, in a bid to lessen the burden of inflation. The scheme was intended to run initially for six months, and individuals receive a maximum pay-out of €220 per month. For large families with several beneficiaries, this limit is increased by €100 per person up to a cap of €1,000.[25]
- **Portugal**. Portugal introduced a windfall tax on both energy companies and major food retailers, including supermarket and hypermarket chains, in line with that approved by the European Union for the energy sector. The 33% tax is applied to profits that are at least 20% higher than the average of the previous four years. The new rate applies in 2022 and 2023. Revenue raised goes to welfare programs and to help small food retailers.[26]
- **Hungary**. Hungary has experienced the highest rate of food price inflation in the EU which has also led to efforts to control those prices. Apart from the impact of higher energy costs and global food prices, a specific contributory cause to high food inflation in Hungary has been the rapid depreciation of the forint, because of a widening balance of payments deficit due to energy imports as well as fiscal stimulus in the run up to the April 2022 election.[27] In January 2022, the government announced that it decided from 1 February to freeze at their October 2021 level the prices of six commodities - granulated sugar, wheat flour, sunflower oil, pork thighs, chicken breast and 2.8% milk - as a measure to combat inflation. In November, the list was expanded with eggs and potatoes, the prices of which cannot be higher than their levels registered on Sept. 30, 2022, and the price controls were successively extended until June 30, 2023. Retailers are required to sell at least the average daily volume for that day of the week in 2021 to avoid that stores simply avoid stocking the price-capped products.
  The measure did not have a discernible impact on the rate of food price inflation. Indeed, the Hungarian central bank governor warned that the price caps increase the inflation rate by 3 to 4%, as stores make up for their losses on staple food by increasing the prices of other products. In April 2023, the government announced a further two measures. One is a system of mandatory promotions in larger retail chains with annual net sales exceeding HUF 100 billion which came into force on 1 June 2023. The essence of the scheme is that one product in 20 product ranges must be sold 10% cheaper than the lowest price of the last 30 days for one week, with the products changing on a regular basis. To monitor the scheme, retailers will be required daily to upload the prices of specific product groups and products – 62 in all - to a website operated by the Economic Competition Authority. Early indications are that supermarkets are voluntarily offering larger discounts on a wider range of products as they compete in a context of moderating inflation. Increasing price comparability and price transparency may have the effect of further increasing competition. Whether and when the price caps will be removed will depend on the evolution of food price inflation.

To summarise, households' purchasing power in the EU has been dramatically reduced by high inflation particularly in energy and food prices. All EU Member States have responded by introducing measures to protect households and particularly low-income households. These initiatives

[22] China-CEE Institute, Bulgaria social Weekly Briefing: Bulgarian Government Adopted a large Package of Anti-Crisis Social Measures, 27 May 2022

[23] The Sofia Globe, Bulgaria's caretaker government to introduce daily food price monitoring, 7 Feb 2023.

[24] Bulgarian National Radio, Bulgaria's government wants to reduce food prices by at least 20 percent, 7 March 2023.

[25] Euractiv, Agrifood Special CAPitals Brief: Controlling food prices, 27 Jan 2023; Food Matters Live, Greek government to help citizens pay for their food bills amid high inflation, 19 Dec 2022; Le Monde, To combat inflation, Greek government forces supermarkets to reduce prices on basic products, 3 Nov 2022.

[26] Reuters, Portugal approves windfall tax on energy firms, food retailers, 21 December 2022.

[27] Information on the Hungarian response has been gathered from Cohn Bech E., Foda, K. and Roitman A., *Drivers of Inflation: Hungary*, Selected Issues Paper SIP/2023/004, International Monetary Fund; Hungary Today, Supermarket chains in a rush to cut prices, 29 March 2023; Bloomberg, Hungary to Push Retailers to Cut Food Prices to Slow Inflation; Hungary Today, Mandatory Promotions in Supermarkets Seem to be Effective, 5 June 2023.

have been dominated by measures to address rising energy costs, either directly by attempting to compensate for higher energy costs by reducing government taxes, or indirectly by increasing social welfare payments or by providing 'inflation cheques' to households to help them to pay for the higher bills. These latter measures also help households to cope with higher food prices. In addition, some but not all Member States have directly tackled food price inflation either by lowering VAT rates on food products, by introducing temporary price controls on a basket of basic food products, or by providing food vouchers.

The reduction of VAT on food has been particularly contentious. It has been introduced in some countries such as Spain and Poland, but calls from left-wing parties, for example, in Germany and Greece, to follow these examples have been rejected. Three arguments have been used to argue against VAT reductions. The first is that a reduction in VAT rates is not targeted on low-income households and much of the benefit therefore accrues to households higher up the income scale. The second follows from this, namely, that it can result in a significant loss of government revenue while providing a limited support to households at risk of poverty. The third argument is that the impact of a reduction in VAT rates is not transparent, with a significant risk that the benefit is absorbed by the food supply chain rather than being passed on to consumers. It is, of course, the wide impact of a reduction in VAT on food that makes it politically popular and appealing.

Future prospects for food price inflation

At the time of writing, overall inflation in the EU shows some signs of moderating in the latest figures for the Harmonised Index of Consumer Prices (HICP) from Eurostat. From a peak monthly annual rate of inflation of 11.5% in October 2022, the annual rate fell to 7.1% in May 2023. This is entirely due to a fall in energy costs which also reached their peak in October 2022. Food price inflation increased further to an unheard-of annual rate in recent decades of 19.2% in March 2023 but has subsequently abated somewhat to an annual rate of 15.0% in May 2023. While there can be EU-specific explanations in particular cases (for example, severe outbreaks of avian flu have contributed to rising egg prices), the explanation for the continuing rise in food price inflation is mostly likely down to the lags in transmitting price changes through the food price chain although, as noted previously, there may also be an element of profit-led inflation in the most recent figures.

Looking to the future, the European Central Bank has raised its key interest rate (its rate on refinancing operations) in the euro area from the 0.0% level maintained for several years until July 2022 in seven successive steps to 3.75% in May 2023, with further increases expected. Global food prices have been falling now for thirteen consecutive months to May 2023 (Figure 6). Also here, there is evidence that the transmission to EU farm prices takes place with a lag. Reweighting the FAO food price sub-indices to reflect the composition of EU production shows that EU farm prices only reacted after several months to the increase in global prices, and there has been a similar delay in responding to the fall in global prices. However, it now appears that EU farm prices have also peaked. The latest monthly data from Eurostat at the time of writing for agricultural producer prices is only for October 2022 and shows a small dip in farm level prices. Further falls will be expected in the coming months in line with the fall in global prices that has already occurred.

Given the lags in price transmission, these falls in producer and energy prices may not be reflected in processor and particularly retail prices for several months more. Food price increases in the past year, though very high, have not fully reflected the increases in prices at primary producer level. As food manufacturers and retailers continue to adjust their prices to these higher input costs, food price inflation is likely to continue at a high level. However, leaving aside the possibility of some further adverse shock to food markets (such as an extension of the Ukraine war, or drought conditions this summer in Europe), EU consumers can expect some relief from high food prices in the second half of 2023, although prices cannot be expected to fall back entirely to pre-war levels.

Figure 6: EU vs. global agricultural prices, base Jan 2019=100.

Note: The FAO global food price index is divided into five sub-indices, meat, dairy, cereals, oils, and sugar. These five sub-indices have been weighted by the relative importance of these commodities in EU production, rather than by global export shares in 2014-2016 as is done by the FAO in constructing their global index. These five commodity groups account for 57% of the value of EU production in 2022, as major sectors including fruits and vegetables, wine and olive oil are not covered.

Source: FAO Global Food Price Index; EU agricultural producer price index from Eurostat, Food Prices Monitoring Tool PRC_FSC_IDX.

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The food price situation in Central Asia

The COVID-19 pandemic has had serious implications for food security around the world. The Russian-Ukrainian military conflict led to another surge in food prices. Central Asia, despite its diverse levels of economic development, has undoubtedly experienced a tangible shock from the food crisis of recent years. Food inflation in the region has many aspects to it. It was initially determined by global food price trends and the depreciation of national currencies during the pandemic period. Several national factors affected the local food situation: a series of adverse weather conditions, the different fiscal consequences of pandemic, and national strategic policies in support of agri-food exports. The countries of the region used all regulatory measures to protect their markets - export restrictions and export quotas, import subsidies and VAT zeroing, as well as subsidies for production and support to consumers. The forecasts for food prices in the region in 2023/2024 are not optimistic: prices will remain relatively high, and future changes largely depend on the still volatile geopolitical situation. The impact of COVID-19 may have long-term consequences for Central Asia. Over the coming 10-20 years, the development of agriculture in the region will be dictated by the need to address the growing threats of resource shortages (thereby ensuring that urgent needs can still be met during a crisis situation), the modernisation of the currently prevalent models of food systems, and growing problems relating to biosafety and nutrition.

Keywords: food price, inflation, trends, Central Asia
JEL classification: Q11

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Received: 6 June 2023; Revised: 30 June 2023; Accepted: 5 July 2023.

Introduction

The COVID-19 pandemic that emerged in 2019 had a huge impact on food security all over the world, something which has extensively been discussed in the literature. At the very end of the pandemic, just when hopes for an easing of the global food crisis had begun to appear, military conflict between two significant suppliers to the world agricultural market - Russia and Ukraine - broke out, leading to a renewed surge in food prices. Since that initial shock, food price inflation has subsided significantly, but prices remain above pre-pandemic levels.

Food inflation affects different regions and strata of the population in different ways: households who spend a higher share of their budget on budget normally suffer deeper and take longer to recover. Central Asia, despite its diverse levels of economic development, has undoubtedly experienced a tangible shock from the food crisis of recent years. In this article, we shall investigate the main drivers of food price inflation in the region; we shall also describe the major government actions that have been taken to mitigate the consequences of crisis. An attempt to describe the price outlook for 2023/24 will be made at the end of the paper.

General description of the region

Central Asia is a vast landlocked region of Asia. Precise definitions of the region vary between institutions. FAO describes the region as including Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Turkey, and Uzbekistan (FAO, 2023). For the World Bank, Central Asia comprises the countries of Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan[1]. OECD also includes in Central Asia such countries as Afghanistan and Mongolia[2]. In the Soviet Union, the term "Middle Asia" was used to define the region, which was deemed to include Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan as well as Kazakhstan. Since Turkmenistan presents statistical data on its development at the international level rather poorly, for the purposes of this article we shall exclude this country from consideration. Thus, the article deals mainly with four major countries: Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan.

The region is rather diverse in terms of its economic development: Kazakhstan belongs to the group of middle-income countries, while Tajikistan and Kyrgyzstan belong to the poorest countries of the world. The level of poverty and state of undernourishment vary considerably across the region. According to WDI data, Kazakhstan's per capita GDP in 2021 was $28,684, while Tajikistan's was $4,288 (in PPP, current international $). The poverty headcount ratio at national poverty lines (% of population) in 2018-2021 in Kazakhstan was around 4.8-5.2%, while in Tajikistan it was more than 27% (World Bank, 2023). In 2022, Global Food Security Index scores for the economies of the region ranged from 56.7 (Ranked 75 out of 113 countries) in Tajikistan to 72.1 (Ranked 32) in Kazakhstan (The Economist Group, 2022).

Nevertheless, there is a commonality in the region's development. The states of the region have made significant progress in their development since 2000 and have real growth prospects. The total GDP of the countries has increased 8.6 times, the accumulated volume of incoming foreign investments has grown 17.2 times, and the foreign trade turnover of goods is now 8.4 times greater (Vinokurov *et al.,* 2023). The growing population of the region represents a capacious sales market and an increase in available labour resources. The population of 77 million people

[1] See e.g. https://www.worldbank.org/en/region/eca/brief/central-asia

[2] See e.g. https://www.oecd.org/coronavirus/policy-responses/covid-19-crisis-response-in-central-asia-5305f172

continues to grow at a rate of almost 2% annually. Over the past 20 years, the number of residents in the region has increased 1.4 times. According to UN estimates, this growth will continue at least until 2040, and a large proportion of the young population will ensure a stable supply of labour resources. Due to the dynamic rate of economic growth, the income level in Central Asian countries is now starting to converge with the levels of developed countries. In Kazakhstan, GDP in PPP per capita lags behind the level of developed countries twice, in Turkmenistan the ratio is three times, and in other Central Asian countries the gap separating them from developed economies is greater, ranging from 7 to 14 times (Vinokurov *et al.,* 2023).

The main part of the population of the countries of Central Asia is still the rural population. In 2021, the share of the rural population in Tajikistan was 72%, in Kyrgyzstan 63%, in Uzbekistan 50% and Kazakhstan 42% (Figure 1).

Since domestic production of basic foods fails to meet overall demand, these countries must rely on agricultural imports (2), leaving them vulnerable to global price fluctuations and impacting their export revenues.

It is also important to note that these countries depend significantly on supply of food from Russia (25-55%) and to a smaller extent, from Ukraine (5-10%). This import dependence is especially noticeable in the case of wheat. Consequently, these countries are exposed not only to global food price fluctuations, but also to price inflation in Russia. The Russian-Ukrainian conflict could, in theory, seriously affect them. Moreover, dependence on food imports from Russia can affect domestic food prices in the Central Asia countries due to exchange rate fluctuations in Russia, which have been marked since the beginning of COVID-19 pandemic, and especially so since the commencement of military operations in Ukraine.

Furthermore, at the beginning of pandemic there were serious concerns at the international level about the worsening of the fiscal situation in the Central Asia due to (i) the sudden surge in governmental gross debts and (ii) the sudden fall in remittances which normally comprise the lion's share of national finance in countries such as Tajikistan, Kyrgyzstan and Uzbekistan. It was feared in some quarters that this situation could hamper the ability of governments

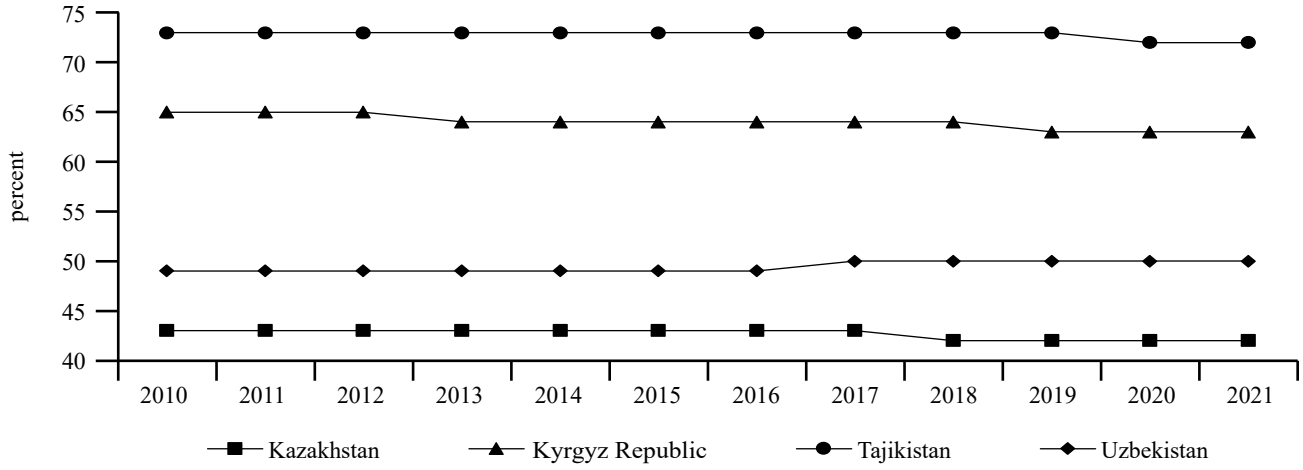

Figure 1: Share of rural population in total population in Central Asia.
Source: Own composition based on FAOSTAT (2023).

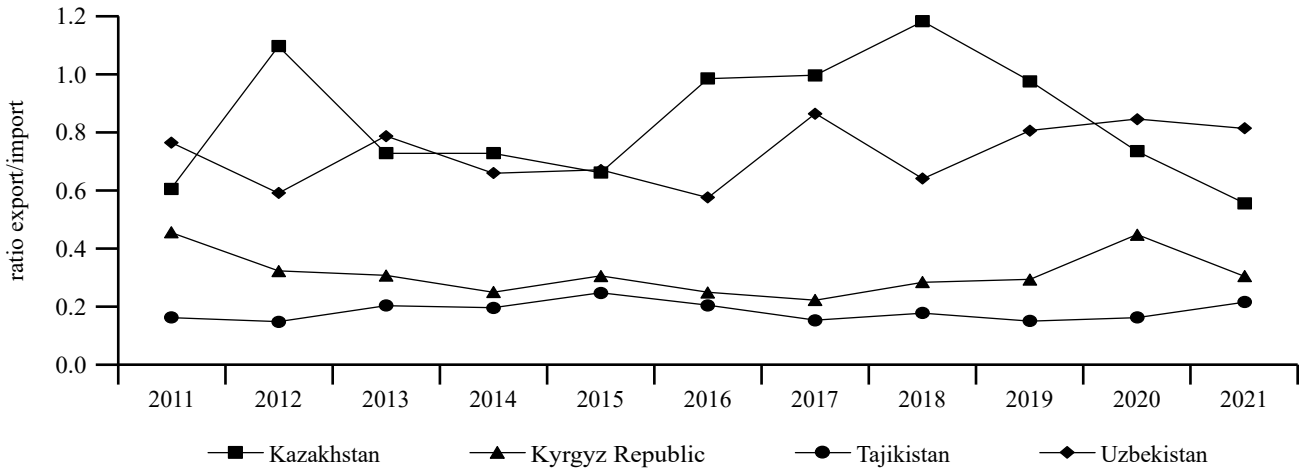

Figure 2: Share of agricultural export in import in Central Asia.
Source: Own composition based on FAOSTAT (2023).

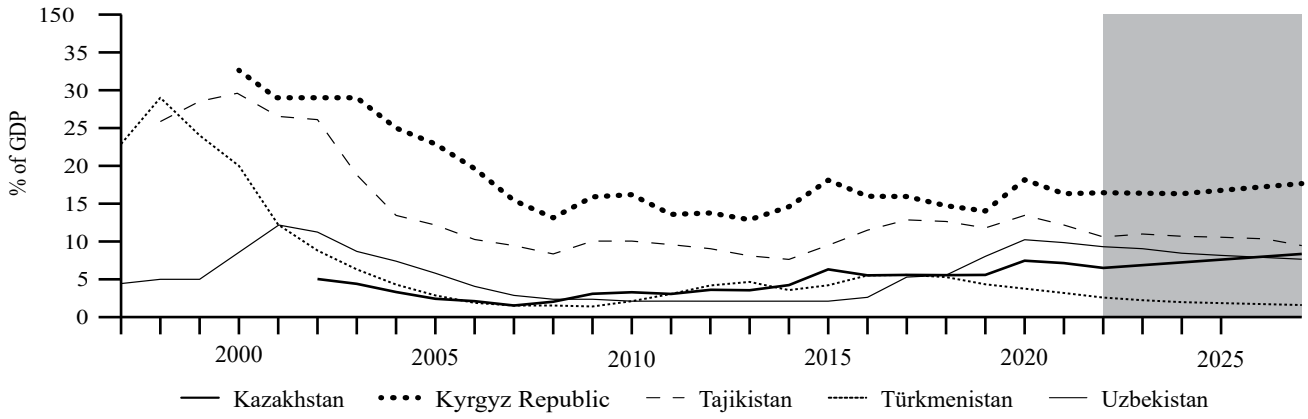

Figure 3: General government gross debt in Central Asia, % of the GDP.
Source: IMF (2023)

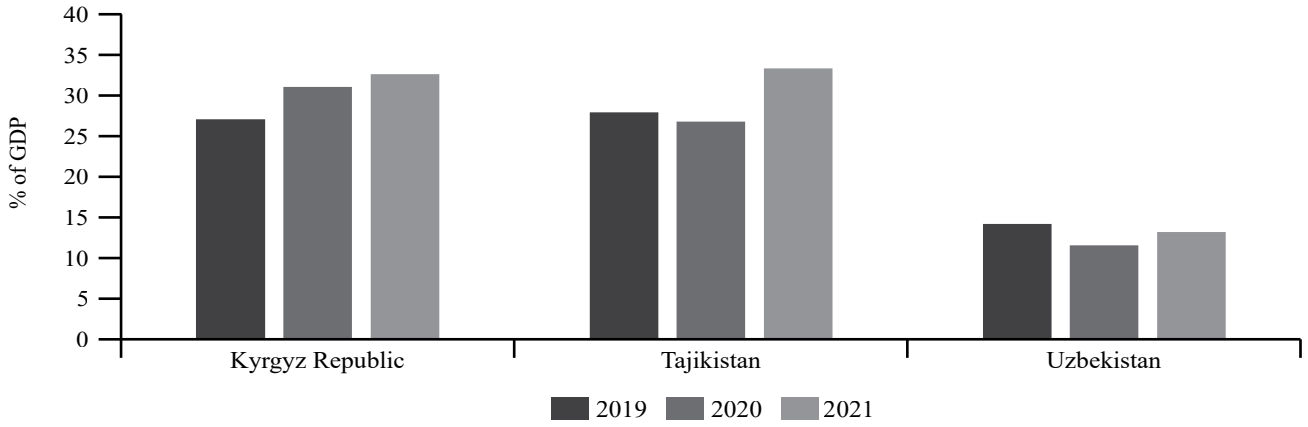

Figure 4: Personal remittances received in Central Asia (% of GDP).
Source: Own composition based on World Bank (2023) data.

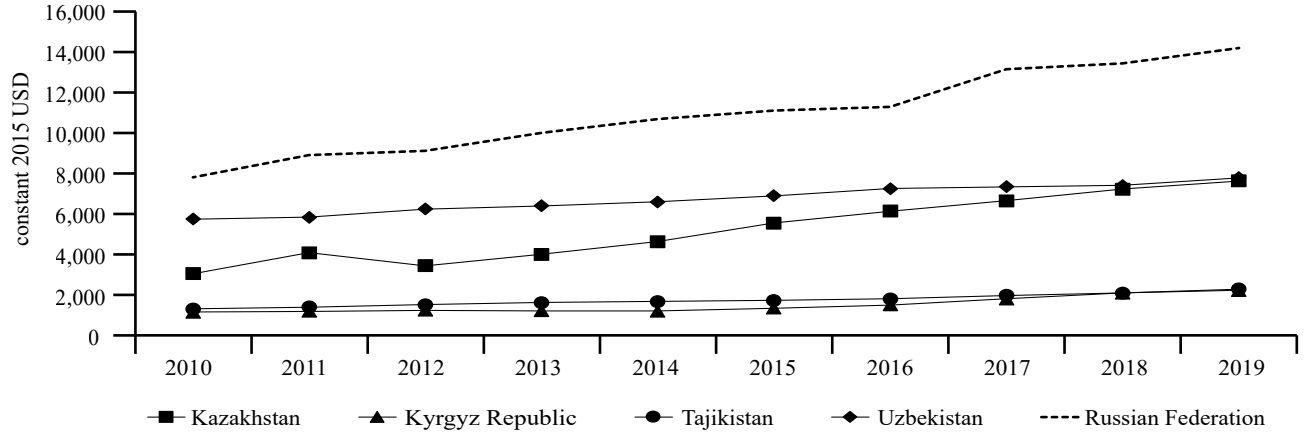

Figure 5: Value added per worker in agriculture, forestry, and fishing in Central Asia (constant 2015 USD).
Note: Russia's data is provided for benchmarking.
Source: Own composition based on World Bank (2023) data.

and the private sector to cope with food inflation and food security risks in Central Asian countries. However, neither of these feared outcomes ultimately happened (Figure 3 and 4).

The agri-food sector plays an important role in the economy of the Central Asian countries. Agriculture accounts for a large share of GDP in percentage terms. Uzbekistan and Tajikistan are at the top in this respect, with 25.0% and 24.0%, respectively. Kyrgyzstan has 14.7% and Kazakhstan 5.0% (World Bank, 2023). Agriculture is very labour intensive in most of the countries of the region. Productivity in the sector is not very high and apart from in Kazakhstan, is not growing significantly (Figure 5). The low productivity of the food sector, coupled with a high dependence on food imports from a limited number of countries, increases the vulnerability of the food security system, as well as the risks of price fluctuations.

Food price inflation

Contrary to initial expectations, food inflation in Central Asia in general has not been so dramatic. In each of the four countries analysed, price dynamics over the last 4½ years have been very different. In Kazakhstan, there was a spike in prices immediately after the beginning of the Russian-Ukrainian conflict, but then prices reverted to previous levels. In Tajikistan, food prices reacted by growing in response to the pandemic and to the start of the war, but since then, the country has been experiencing deflation. Food prices in Uzbekistan are subject to very high seasonal fluctuations, but the trend has remained stable throughout the years under consideration. It is only Kyrgyzstan that has demonstrated a noticeable increase in food prices: it reacted both to the start of the pandemic and to the war (Figure 6). However, the prices of individual food may have spiked significantly during this period without being reflected in the overall average trend. Thus, for instance, it is worth pointing out that in Uzbekistan in May-June 2022, sugar prices increased by 45%, and later prices returned to their previous level. Meanwhile, in 2023 right across the whole region onion prices are surging due to the poor yield outlook.

Russian food prices did not affect the markets of the economies of Central Asia despite Russia being the main supplier of food to the region. Also, there is no direct correlation between inflation in the economies of Central Asia and the exchange rate of the Russian rouble.

Factors behind food inflation

We can identify several factors behind food inflation in Central Asia. The first and main driver of food prices in the region is **global price trends**, which are well described in the literature (growth in prices for inputs, mainly for energy and fertilisers, disruption of food chains, restrictive measures for exports, decline in production due to quarantine restrictions and limitations for migration, etc.). The economies of Central Asia are relatively open to global markets, so global trends influence their own food price situation directly. Moreover, they are also heavily dependent on supplies of food from Russia; thus, the situation on the Russian food market also affects food prices in the region.

The next driver is **depreciation of national currencies**. The damage wrought by international sanctions on the rouble is sowing varying levels of alarm in currency markets in Kazakhstan, Kyrgyzstan, and Tajikistan, whose economies are all strongly tied to that of Russia. However, Uzbekistan appears to be holding firm. The graphs clearly show that the two global events under consideration led to the depreciation of the national currencies in all these countries.

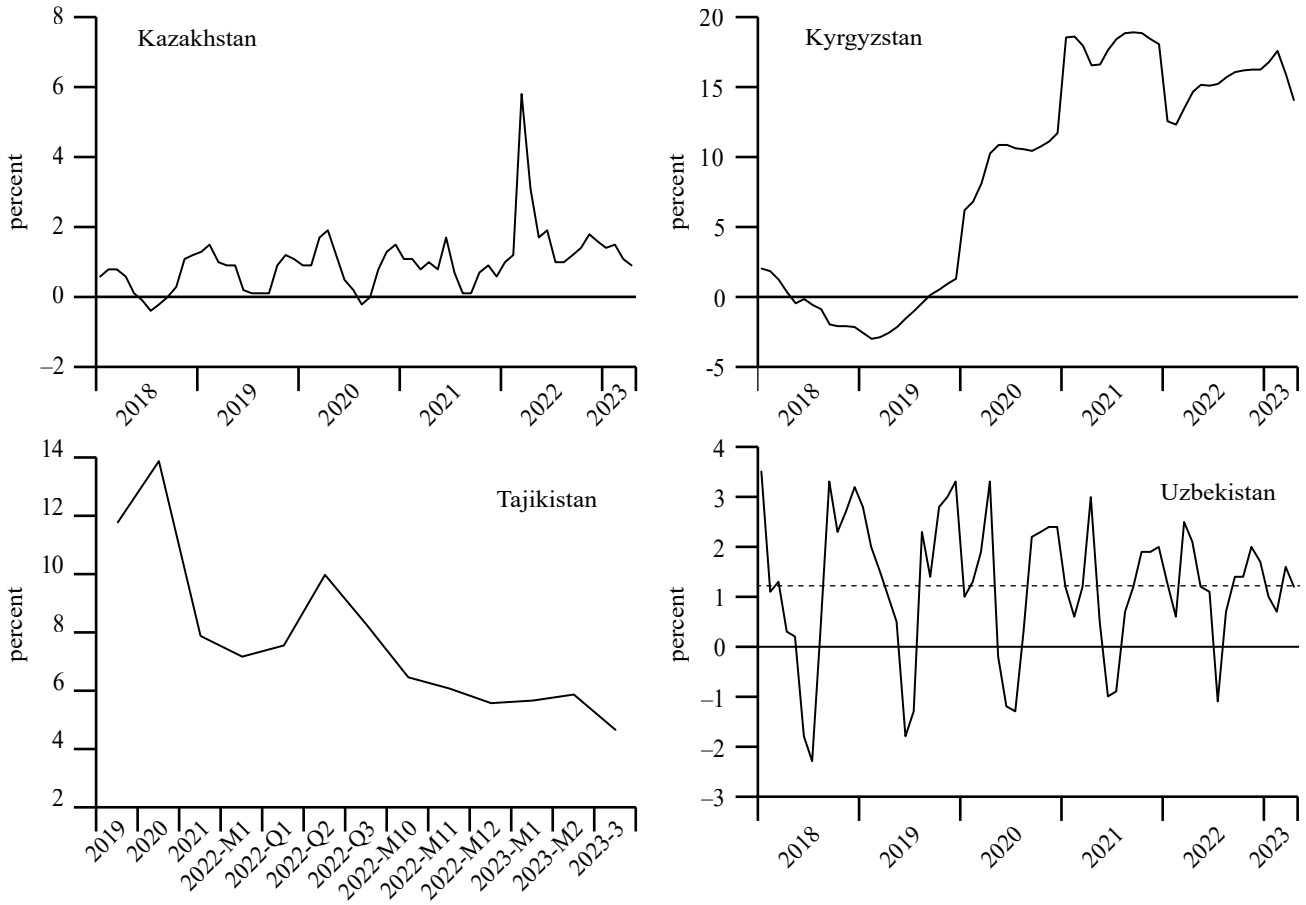

Figure 6: Monthly food prices indices in Central Asia.

Note: Kazakhstan data are not seasonally adjusted
Source: Own composition based on Corresponding National Statistic Agencies.

Third, there are purely **national factors behind food inflation**. The long-term regional factor in the growth of food prices is undoubtedly population growth coupled with a slow increase in the efficiency of local production. In recent years, as uncertainty in the food markets has risen, buying panic has also been driving up prices in these countries, as in the example of sugar in Uzbekistan described previously. It was a global trend during the COVID-19 pandemic: researchers noted a type of herd behaviour, whereby consumers started to buy uncommonly huge amounts of products because of a perception of scarcity. However, regionally speaking, this phenomenon needs to be understood within a much broader context: over the last 40-50 years all post-Soviet countries, including Central Asia, have experienced food shortages. Panic buying has become part of social psychology.

During the COVID-19 pandemic, as a reaction to the fall in incomes of the population, many countries, including some of those that are considered in this paper, introduced additional monetary payments to the population. The Kyrgyz government, for instance, increased the salaries of state employees and pensions. Kazakhstan launched a broad programme of support for vulnerable groups within the population, which included direct subsidies to the unemployed, food support to households, etc. In Uzbekistan, a large cross-section of the population was granted a tax exemption; subsidies were given to the unemployed, and so on. Such monetary injections into the economy could also have had an inflationary effect, although the degree of this influence has not yet been quantitatively assessed.

Another factor of uncertainty that pushed prices for certain food products in the region upward is a **series of adverse weather conditions** in 2020-2023. In 2021, severe drought in Central Asia caused a mass loss of livestock and a lack of irrigation water. In spring of the same year, late frost in Uzbekistan affected orchards. In winter at the start of 2023, there was extreme cold and snowfall across all the region: the temperature in Astana fell below -30C^0, and even Turkmenistan, typically the warmest country in the region, was blanketed in white. All of these events have affected the agricultural production of the current calendar year.

Lastly, all countries of the region not long ago adopted **national strategies for support of agricultural export**. In 2018, Kyrgyzstan notably approved a state programme of export development for 2019–2022 intended to provide support to some priority sectors, including dairy production and processing of fruits and vegetables. In Tajikistan, the Agency for Export was established under the direction of the country's government, its mission being to enhance the country's export potential and to assist exporters in promoting their products to foreign markets. In Uzbekistan a decision was made to establish the UzAgroExportBank joint-stock commercial bank, one of whose goals is to finance investment projects for the development of production and exports of agricultural goods. Among the export support measures, partial reimbursement for the costs of exporters' participation in international specialised exhibitions was made. It is one of the most frequently practised measures of financial support in the countries of the region.

The main goal of the national export strategy of Kazakhstan is the creation of conditions for increasing the volume of non-resource exports by 1½ times by 2022, as well as diversifying sales markets and exports of goods and services. The programme is aimed at creating a unified and holistic policy that provides the right conditions for growth of non-commodity exports to double by 2025 and triple by 2040 in line with the Kazakhstan-2050 Strategy. The programme defines a promising export basket and priority markets, and features both specific measures promoting Kazakhstani exports and a system of measurable target outcomes enabling the effectiveness of its implementation to be monitored. Its main objectives are: (1) Strengthening the institutional framework supporting exporters; (2) Provision of financial and non-financial support measures for exporters; (3) Removal of barriers hindering the development of exports; (4) Improving the conditions for the development of exports of services.

Similar goals have been introduced in other Central Asian countries. All such programmes aim to bring into existence an institutional structure that increases the speed and efficiency of solving both operational and long-term issues related to the activities of exporters.

At the same time (coinciding with the onset of the COVID-19 pandemic), export restrictions were introduced in many countries to contain food prices, but already in 2021, it was apparent that exports of basic agri-food products had begun to grow. This development can also contribute to food inflation. Another poignant moment arose from the threat of sanctions from the European Union for helping to circumvent sanctions against Russia. Despite statements by European Council President Charles Michel at the EU-Central Asia summit that "the EU is not going to impose sanctions on Central Asian countries for circumventing restrictions on Russia," such a threat remains. In the final communiqué of the summit, the fact that this is so is expressly spelled out in one key paragraph. "The leaders stressed the importance of further expanding mutual trade and investment mechanisms to accelerate the socio-economic development of all parties," the communiqué said. "They also stressed the importance of close dialogue in the context of the European Union sanctions regime." Only time will tell how this difficult situation will ultimately affect food inflation.

National and private sector measures taken to fight food inflation

Both national and private sector measures have been taken in the region. The Government of the Republic of Tajikistan has created an Interdepartmental Headquarters, which has developed an action plan to prevent the impact of possible risks on the national economy. This Anti-Crisis Action Plan includes the issues of providing consumer markets with essential goods, including flour, butter, meat, sugar, eggs, vegetables, increasing their production and stocks, preventing unreasonable price increases, supporting vulnerable segments of the population, labour migrants and entrepreneurship, ensuring the timely fulfilment of the state's social obligations, and preventing possible risks in the banking system.

The measures involve support for vulnerable segments of the population, labour migrants and entrepreneurship;

providing loans to industrial entrepreneurs at low interest rates; and timely provision and fulfilment of the state's social obligations. Several measures aimed at improving the investment climate, postponing non-tax audits, attracting additional financial assistance, etc. were also carried out. In the sphere of trade, the country has temporarily imposed a ban on the export of onions, carrots, potatoes until prices stabilise in the market.

A contradictory policy was adopted in Kyrgyzstan. On one hand, the government increased salaries to education and health workers and pensions, and subsidised both loans and public investments, thereby fuelling demand and inflationary pressures. Instead of exporting gold as in the past, in 2022 the NBKR purchased it, thereby accumulating reserves and injecting money in the economy - this was the main instrument of monetary expansion. On the other hand, to contain the inflation, the NBKR's key policy rate was been increased from 8.5% to 14% during 2022 but lowered to 13% at the end of November 2022. In an attempt to limit imported inflation, the government exempted imports of sugar and vegetable oil from VAT. It also introduced a temporary ban on exports of wheat and some other food products and is now considering a ban on fertiliser exports: these all are products that are traditionally imported, not exported by the country.

With a view to the stabilisation of prices for socially significant food products, two key mechanisms were implemented in Kazakhstan: the financing of business entities within the framework of the "circulating scheme" and commodity interventions of regional stabilisation funds. According to the first mechanism, local executive bodies allocated about 57.6 billion tenge to stimulate production and contain prices in the retail segment. The key principle of this mechanism is the allocation of working capital to business entities at a rate of zero interest; in return, manufacturers and retail entities undertake to sell goods at below-market prices. According to the second mechanism, food stocks are formed due to the allocation of stabilisation funds. Formed stocks will be released to the domestic market, also at below-market prices, especially during the off-season, or in the event of an increase in prices on the domestic market.

The issue of food prices in Uzbekistan is under special control. Daily monitoring of prices in dekhkan (farmer) markets is carried out by different government bodies. The data of such monitoring is generally open and published on the websites of ministries and departments. For example, the Ministry of Economy publishes daily food prices at the largest wholesale market in Tashkent.

Government measures taken in Uzbekistan included the zeroing of customs duties and VAT, the diversification of supplies and a search for new logistics routes. There is a gradual phasing out of import restrictions and a reduction in export bans. The customs rates for specific types of fruits that Uzbekistan is not able to produce have been reset to zero. This measure enabled a significant reduction in the price of bananas in the domestic market, which in turn led to a significant increase in their consumption. Given that children make up most of the population, and that there are practically no local fruits in the off-season, this was a very necessary measure for Uzbekistan.

To sum up, the countries of the region used all regulatory measures to protect their markets: export restrictions and the introduction of export quotas, import subsidies and VAT zeroing on imported goods, subsidies for agricultural production, and various measures to support consumers, especially from low-income groups, etc. From this, it can be concluded that the trading system that has been built within the WTO for decades is experiencing a large-scale crisis.

Outlook for 2023/24

The outlook for 2023/2024 in terms of food prices in the countries of the region is not so optimistic. Experts note that prices in the region will remain at a relatively elevated level, future changes largely depend on the geopolitical situation in the region. Over the past three years, we have seen several "black swans" that have completely changed the situation in the food markets.

It is most likely that there will be continued growth in prices for such important food products as sugar, butter, flour, meat products and for those foodstuffs where a given country significantly depends on imports; in practice, this means primarily imports from Kazakhstan and Russia. It is possible that there will be a geographical diversification of food imports into the country; if so, the importance of Turkey, Iran, and a few other Central Asian countries will increase in this regard.

As global food inflation goes down, inflation in the countries of the region can be expected to go down, too. In some countries, inflation may have its own dynamics as the effects of salary and pension increases ought still to be felt strongly in 2023, only gradually declining in 2024. However, an importance caveat needs to be observed: this prediction is based on the assumption that there will be no major exogenous shocks in the coming years.

Currently, it is difficult to talk about upcoming sharp rise in prices in the food market. Everything will depend primarily on the volume of a country's own production, which in the Central Asian countries is increasing every year in line with population growth. But it must also be acknowledged that the volume of agricultural production depends directly on unpredictable weather conditions, which will, in turn, affect the pricing chain if they turn adverse.

The tendency of governments to take short-term measures aimed at strengthening state support for domestic producers so as to stimulate production and saturate the domestic market, as well as reduce the level of import dependence, can be expected to continue.

A couple more general considerations should be noted about challenges that Central Asian countries can expect to face soon, if not already. The availability of natural resources such as fresh water and productive arable land is becoming increasingly constrained. Climate change and ongoing urbanisation constrains these already limited resources. Central Asian countries are still seeking a sound and coherent land and water resources policy. Despite declaring adherence to following United Nations SDGs, most of them still treat nature in a manner that is far from sustainable. Agriculture is seen as an important source of exports or as the main

livelihood for a significant share of rural population, while environmental regulation at a national level lags behind. Consequently, the pressure on land continues to grow, and agricultural practices remain far from efficient. The resilience of farmers and the rural population, when viewed in terms of their preparedness for emergencies and disaster risk management, is decreasing.

Climate change is a global issue, but evaluation of its impact on the Central Asia countries is complicated and need not always be negative. Melting glaciers in the mountains of Central Asia increases river flow and provides more water for irrigation. However, the regional drive to increase self-sufficiency in terms of food supply may also be increasing the impact of agriculture on the environment. Efforts to mitigate climate-related risks are being undermined by budget constraints and prioritising of funding for producers' subsidies, a trend which raises concerns for mid-term productivity growth in the Central Asian countries with high climate risks. The reduction of food losses and waste in the region is also very important in minimising environmental damage and increasing the efficiency of agricultural and food systems.

Innovation and digitalisation in the region is the new paradigm of agricultural development. The countries with larger economies such as Belarus, Kazakhstan, Russia, and Ukraine are already implementing digitalisation in various sectors of agriculture, developing e-commerce, together with various platforms for tracking product quality, using precision farming and drones. But outside of Kazakhstan, Central Asia has very limited capacity for public and private investment in digital agriculture. The development of scientific potential and the introduction of innovative solutions is becoming critically important to ensuring the sustainability and further development of agriculture in the Central Asia region.

Agriculture is no longer the main source of employment and income in rural areas for most countries, yet Uzbekistan, Tajikistan and Kyrgyzstan are still exceptions to this global trend. Extreme rural poverty is not an acute issue in Central Asia countries, with the exception of Tajikistan, which reports slightly more than half of its rural population as being relatively poor. International remittances play an important role in the economies of some Central Asia countries. Labour migration, chiefly to Russia, has become a typical strategy for a significant part of the working-age population of several countries in Central Asia. The main countries that are dependent on remittances are Tajikistan and the Kyrgyz Republic.

One of the most evident drivers of the food systems is the rapid development of Global value chains (GVCs) which account for almost 50% of the global trade today. They have become longer and more technologically advanced, and they employ smart and sophisticated practices and solutions. The GVC participation index of ECA countries is still not very high – it was around 10% for Russia and Kazakhstan in 2016 and much lower for other Central Asia countries.

The inclusiveness of the food chains in the region is the important factor affecting their stability. The small farmers, processors, logistic companies, and other smaller players of the food systems face a severe problem as regards integration in the value chains, in their endeavour to obtain a fair share of the final food cost and to comply with key food safety requirements. In those countries where small farmers dominate the agrarian structure, non-inclusive value chains cause poverty to grow in rural areas. In contrast, where countries have a dualistic agrarian structure, non-inclusive chains result in the marginalisation of small players and the concentration of production in the hands of the big players. This compromises the sustainability of food systems. The inclusion of smallholder farmers and other rural entrepreneurs in agriculture value chains means that their access to finance, inputs, services, and markets is demonstrably improved. This can be achieved through various activities that include the establishment and strengthening of producer organisations, cooperatives, and other forms of farmer groups; the branding of locally produced products and products with traditional specificities; plus, the extension of advisory services to farmers etc.

Infrastructure development, including access to the Internet, in rural settlements remains one of the preconditions for rural development and the return migration of part of the population to rural areas in the long term. Nevertheless, the level of house improvement in rural areas still lags far behind what is seen in urban areas. With the development of online technology, telemedicine, e-schools, e-commerce it may yet be possible to reduce this infrastructure gap between urban and rural areas.

The impact of COVID-19 may have long-term consequences for the Central Asia countries. Slow economic recovery, and the bankruptcy of some employers will likely lead to a slow recovery in terms of jobs for migrant workers, reductions in their wages, and a greater prevalence of wage abuse on the part of employers. The likely decline in labour migrants' incomes will have an immediate impact on people's livelihoods back in their countries of origin.

Economic contraction due to COVID-related lockdown measures has threatened the smaller players of the value chain the most. Closures of farmers' markets dramatically affected their ability to sell their products directly to consumers. However, at the same time, new niches and opportunities are appearing for the small farms. New direct supply chains from farmers to consumers are being built on online platforms.

While export restrictions and other trade measures introduced in response to COVID-19 are most likely to be temporary and some have already been lifted, shifting the policy focus towards greater self-sufficiency in food production will remain a long-term trend, and will most likely result in higher subsidies to producers in the region.

Over the next 10-20 years, the development of agriculture in the region will be dictated by the need to address the growing threats of resource shortages (thereby ensuring that urgent needs can still be met during a crisis situation), modernisation of the prevailing models of food systems, and growing problems relating to biosafety and nutrition. Regional food production should in future depend more than ever on technologies capable of increasing yields, improving productivity and preventing losses, but less than ever on the impact of external climatic and biological factors.

Acknowledgement

The authors would like to appreciate assistance of the colleagues in the considered region (namely Mavzuna Karimova from Tajikistan, Darya Ilyina from Uzbekistan, Nurlan Kulbatyrov from Kazakhstan, Roman Mogilevskii from Kyrgyzstan) who shared their expert opinions regarding these research issues in the informal interviews which were undertaken in spring 2023. Some useful data was provided by an expert of the Eurasian Development Bank Anna-Maria Chikonya. The researcher of the Institute Sadaf Abdolova kindly helped the authors in some calculations.

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Yunyi ZHOU* and Kevin Z. CHEN*,**

Food Price Inflation in East and Southeast Asia: Situation, Driving Forces, and the Outlook

Food price inflation has raised concerns about food insecurity and systemic crises in East and Southeast Asia, given the region's population size, economic significance, and role in the international food market. COVID-19 repercussions, extreme climate- and weather-induced events, anthropogenic stressors such as global economic softness and the Russia-Ukraine war, and many other uncertainties enlarged the supply-demand imbalance of food. Those factors are not likely to ease in the short term and in the meantime, potentially new food crises are simmering in East and Southeast Asia. Meanwhile, China's reopening and deepened intraregional integration have allowed the region's food price situation to be less grim than elsewhere. This article conducts a political-economic analysis in order to identify the major forces driving recent food price inflation in the region as well as to explore what proactive measures can build greater food system resilience during the post-COVID-19 recovery. This article recommends that countries refrain from imposing further export restrictions (whatever their form), and instead deepen dialogues and cooperation in order to facilitate food system resilience against the looming risks, such as El Niño.

Keywords: food price inflation, driving force, political economy, East and Southeast Asia
JEL classification: Q11

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Received: 12 June 2023; Revised: 25 June 2023; Accepted: 30 June 2023.

Introduction

Achieving a sustainable recovery from the COVID-19 disruption is challenging, with levels of resilience and vulnerabilities differing across countries, sectors, and population groups. Factors including global economic recession, surging commodity prices, geopolitical tensions, and their nested repercussions continue to burden global social-economic activities and are likely not to ease in the short term. Given such a context, global economic growth is forecasted to decelerate in 2023 and to revive to a 0.3-percent-lower pace in 2024 as compared to the 3.4 percent growth witnessed in 2022. At the regional level, the socio-economic development situation for East and Southeast Asia looks relatively robust when contrasted with other world regions. Most countries in the region started to enjoy revivals in 2022 and are expected to increase their rate of growth by a further 1.6 percent to 5.1 percent in 2023, catalysed by China's reopening (IMF, 2023). However, price inflation, short-term interventions intended to rein in the price surge, imbalances that have become more apparent during the post-COVID-19 recovery, and the war in Ukraine can still weigh down the rebound of developing East and Southeast Asia.

Since 2022, steep price inflation has edged its way up to becoming one of the foremost concerns amongst all the mid- and long-term risks globally. For East and Southeast Asia, one of the world's most densely populated regions, the price inflation of food has increasingly generated concerns about food insecurity and systemic crises (Jones and Nti, 2022). Food price inflation (or simply food inflation) is commonly indicated by the price change of a basket of food commodities using Consumer Price Index (CPI). It normally occurs when food supply cannot meet demand, or when the cost of food production and distribution increases due to factors such as weather conditions, input costs, currency exchange rates, etc. According to documented experiences, the increase and volatility of food prices affect the purchasing power of consumers, particularly the low-income and the poor relying on agriculture, and can generate wider economic impacts through the dynamics of multi-level agri-food systems and the forces within (food insecurity, weakened human capital accumulation, added fiscal burden on subsidies, etc.) (Dessus *et al.,* 2008; Fujii, 2013).

As recent price inflation became a critical concern for policymaking and under the lens of political economists, knowledge of the price inflation of food has developed progressively. East and Southeast Asia attract particular attention due to the region's share of the global population and economy, as well as its substantial role in the international food market. However, there remains a research gap when it comes to in-depth and comprehensive knowledge about sources and solutions to the region's food price inflation. This article provides a political-economic analysis of the major forces driving the recent food inflation in East and Southeast Asia. By reviewing key policy reactions across East and Southeast Asian countries, it also contributes to the exploration of proactive measures for cultivating food system resilience in the region's economies. Finally, it paints a broader picture of the post-COVID-19 "new normality".

The remainder of this article is organised into four sections. The next section outlines the background to the recent cereal price change. The third section delineates the major driving forces of the price change, based on a political economy perspective. The fourth section highlights vulnerabilities, major policy interventions, and the way forward for the region. The last section concludes with the key policy implications and the limitations of this article.

Recent Food Price Inflation in East and Southeast Asia

Global commodity price inflation peaked in 2022 as the record high in the recent two decades, generally raised concerns about a perfect storm with social-economic disruptions by the COVID-19 pandemic and the war in Ukraine, etc. Compared to the rest of the globe, East and Southeast Asia retained a lower inflation rate on average (Figure 1). However, pictures across the subregions and the countries largely differ. Whereas East Asia had a 2.3 percent inflation rate in 2022, the rate for the south-eastern subregion increased by 3 percent from 2021 and hit 5 percent. Price inflation in most Southeast Asian countries more than doubled. Laos and Myanmar both experienced a surge in commodity prices and their price inflation rates sextupled and quadrupled respectively. The inflation rate for Mongolia had been stubborn at around 7 percent even before the pandemic and reached 15.2 percent in 2022.

Amid low economic growth and high price inflation, the global agricultural Commodity Price Index ramped up in 2022, in line with price hikes affecting fertiliser, fuel (energy) and food (Figure 2). Food prices have fluctuated around a record-high level since 2021, and then picked up. Although global food prices retreated in late 2022, the possibility of further food price change demands continued vigilance. Domestic food price inflation has turned out to be rather stubborn. While global fertiliser and energy price indices tilted downwards in the first quarter of 2023, the year-on-year domestic food price inflation rate surged again and averaged nearly 20 percent. Amongst all the regions, East Asia and the Pacific witnessed the lowest rate of domestic food price inflation – 11 percent (Baffes and Mercer-Blackman, 2023).

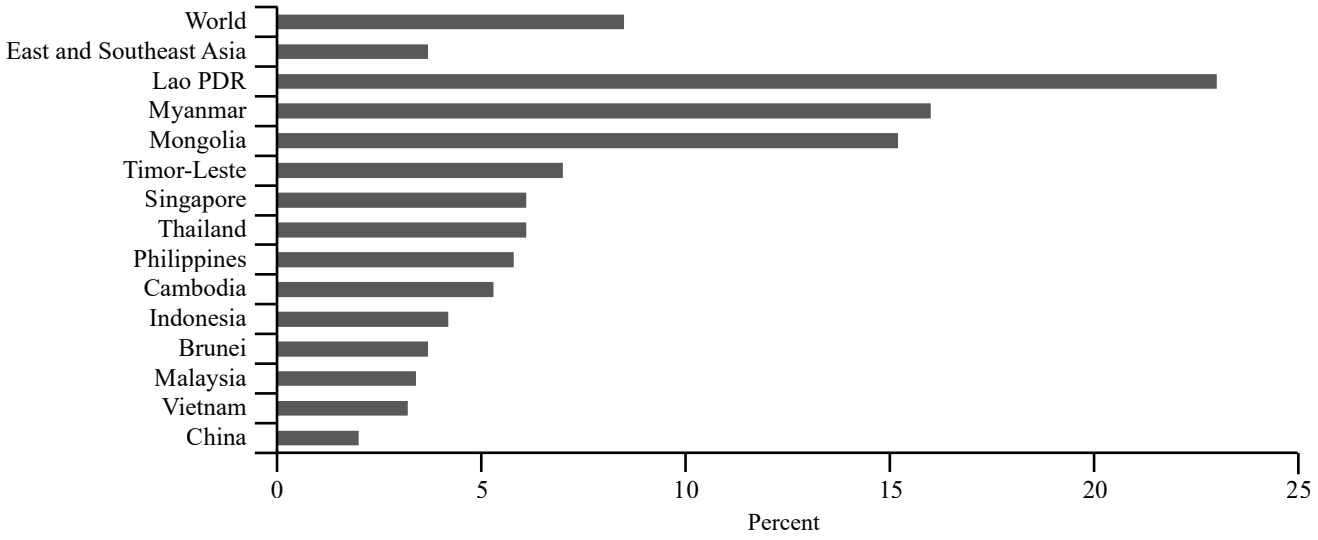

Figure 1: Price Inflation Worldwide and in East and Southeast Asia, 2022.
Source: Own composition based on ADB (2023) and IMF (2023) data

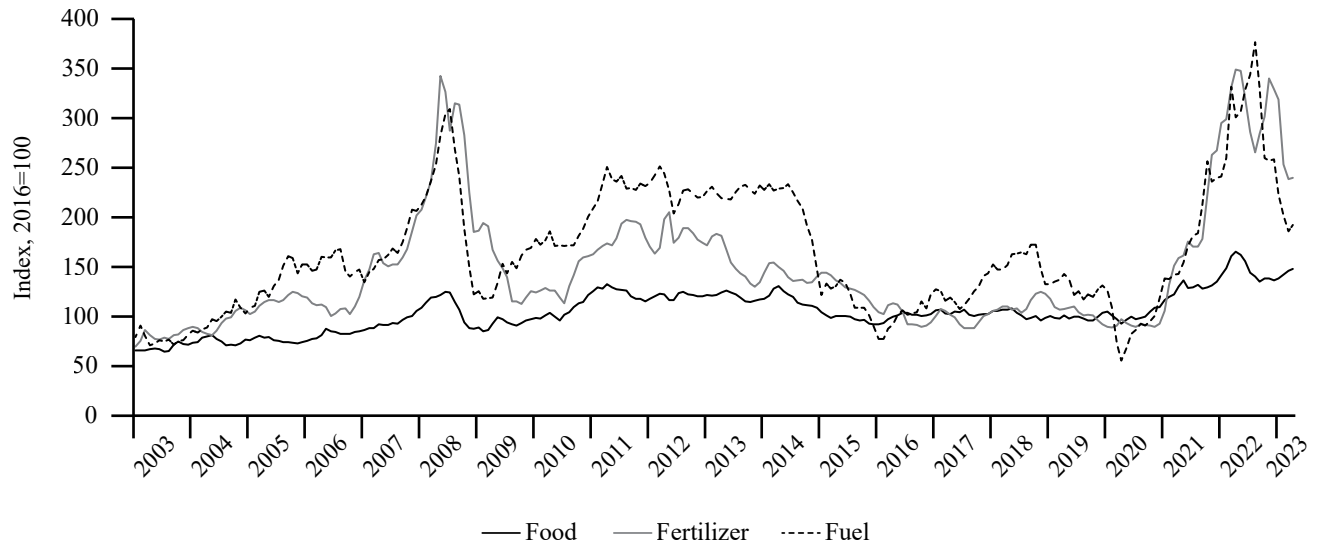

Figure 2: Commodity Price Index, January 2003 – April 2023.
Source: Own composition based on IMF (2023) data

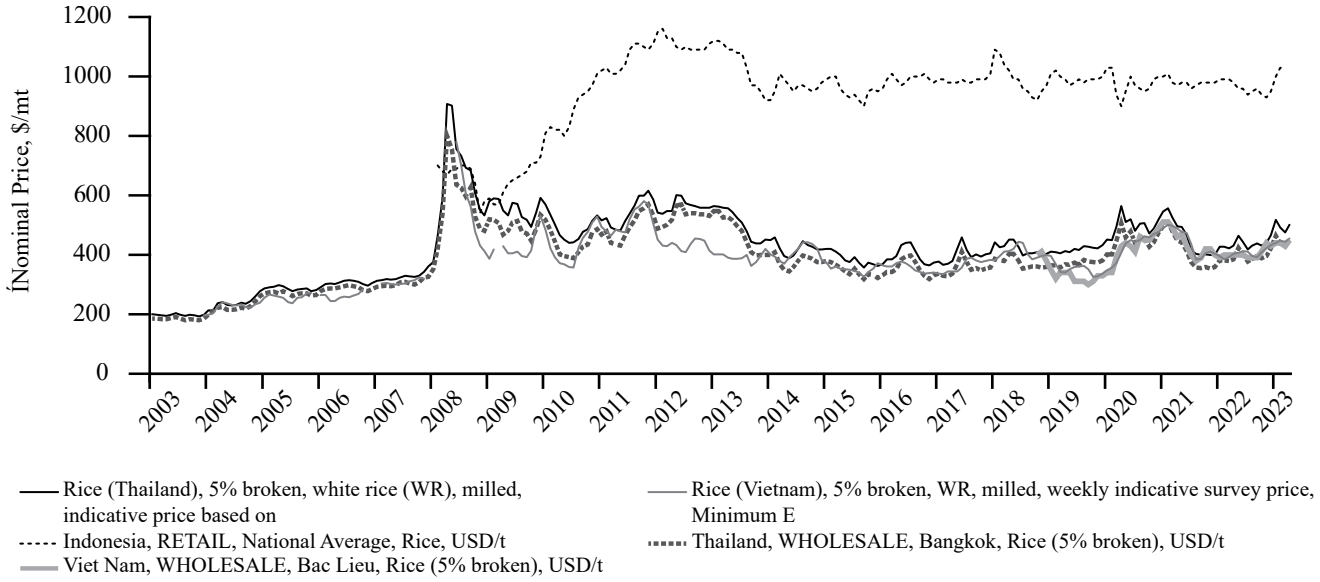

Figure 3: Export Price and Domestic Price of Rice, January 2003 – April 2023.
Source: Own composition based on FAO (2023), Bloomberg, US Department of Agriculture and World Bank (2023) data.

Among all food categories, cereals are closely engaged in food security and sovereignty concerns. While food price inflation situations vary largely across countries, global maize and wheat prices were 17 percent and 38 percent lower respectively on a year-on-year basis in the first quarter of 2023. However, the price of rice was 15 percent higher (WorldBank, 2023a). In East and Southeast Asia, rice is the most important staple in terms of production, consumption, and trade. Vietnam and Thailand are the pre-eminent rice exporting countries in the region and are among the top three globally. China, the Philippines, and Japan are the region's major rice importers, and China is the leading rice producer and consumer in the world. According to IRRI (2018), rice provides half of the calorie intake for residents in Southeast Asian countries.

Figure 3 shows the price trend of rice over the recent two decades. Export prices of rice from Thailand and Vietnam have both rebounded by around a quarter since 2022 but the extent of this remains modest when compared to the strong recovery that followed the global financial crisis in 2008. Meanwhile, food price inflation has continued to edge upwards in the region's food importing countries. In China, where year-on-year food price inflation rate averaged around 6 percent in 2022, food inflation headed upwards in early 2023 after the roll-back in late 2022 (ADB, 2023). For rice, the retail price in Indonesia has risen again sharply since the first quarter of 2023.

Driving Forces of Food Price Inflation in East and Southeast Asia

Major forces driving global food price inflation have dented the fast development of East and Southeast Asian countries, and further negative effects still seem possible in future. If we consider that the region supports about 30 percent of the global population and contributes over a quarter of world GDP (World Bank, 2022d), it is vitally important to delineate the driving factors of food price inflation in order to indicate the way that must be taken towards resilience and sustainability.

Imbalance of Food Supply and Demand by COVID-19

Rapid urbanisation and structural change in the region's developing economies have been driving up both the demand for, and the prices of, agri-food products. The COVID-19 pandemic resulted in recurrent disruptions of global supply chains, which have taken their toll on food price inflation via imbalances between supply and demand that have arisen due to, for example, trade protectionism measures and adverse market sentiment.

Agri-food production in East and Southeast Asia has long relied on intensified input usage, including labour, chemical fertilisers, pesticides, herbicides, and financial inputs. An especially intensive input pattern of synthetic Nitrogen fertiliser use prevails in China and the Southeast Asian subregion. The region's fertilisation rate is amongst the highest globally (Menegat *et al.,* 2022). Recurrent lockdowns that coincided with delays and disruptions in transportation, logistics networks and exports that can all be attributed to COVID-19, made it challenging to procure agricultural inputs like seeds, fertilisers, and pesticides during the pandemic period. China is a major fertiliser exporter to Southeast Asia. Reduced production of fertilisers as well as their export from China during the pandemic upset the supply of chemical fertilisers to major agricultural producing countries in the Southeast Asian subregion. Given the limited availability and high prices of agricultural inputs such as fertilisers, energy and fuel, cereal planting areas and yields in countries such as Myanmar were estimated at below-average levels in 2022 (FAO, 2022a). Less-than-average plantings in

some countries and higher production costs in general can be assumed eventually to translate into increased cereal prices for consumers.

Other than the production costs *per se*, the pandemic-induced disruptions have also burdened the limited finances of agri-food producers, especially smallholder farmers. As many working-age adults in the region's developing countries have migrated out to non-farm sectors, cities and abroad for better-paying jobs, remittances have for a while been an important source of finance for agribusinesses. However, lockdown conditions and travel restrictions within and across countries reduced the overall quantity of remittances, including those made to rural households. While the remittance inflows were relatively robust in the Philippines and Vietnam, countries including Laos, Cambodia, Indonesia and Myanmar witnessed a greater than 10 per cent drop after the pandemic shocks (ADB, 2022b). In the rural areas, where access to credit had in any case been limited before the pandemic, the disruptions of livelihoods (including farming activities, migrant jobs, etc.) further reduced the scant deposits of rural households. This may have served to discourage farmers from quickly adopting new technologies and good agricultural practices during the post-COVID-19 recovery, thereby dampening the sustainable growth of agricultural production in the pandemic's aftermath.

Export restrictions, bans, and the imposition of other controls (including higher freight charges and sanitisation measures at ports and warehouses) on basic food items by major producers naturally have implications throughout food supply chains. If we take rice as an example, India, Thailand, and Vietnam are the leading exporters worldwide. Rice export prices were depressed before the COVID-19 outbreak, but after the onset of the pandemic soon acquired a buoyant rising momentum due to expanding market demand. Given the pandemic shock and many other perceived risks, factors that reflect market sentiments (such as consumers' panic food-buying behaviour and importers' stockpiling to supplement domestic production) contributed to this turnaround. On the supply side, in September 2022, India banned broken rice exports and imposed higher taxes on several other varieties of rice exports to stabilise domestic prices (Jacob, 2022). As a subsequent reverberation, Thailand and Vietnam reportedly met to agree on a rice-export cartel plan, which might serve to ramp up their export prices by a fifth (Muramatsu and Onishi, 2022). On the demand side, despite the existence of such a cartel plan being in doubt, the actual protectionism and uncertainty that have been witnessed have triggered market panic across East and Southeast Asia.

Thus, COVID-19 challenged both the availability and the affordability of food products (including rice, cooking oil, canned goods, etc.), and this was especially so for countries highly dependent on food imports. Many of the member states of the Association of Southeast Asian Nations (ASEAN) are net importers of fuel and food (rice, wheat, soybean, and maize). Being the front importers of main staple in the Southeastern subregion, Indonesia, the Philippines, and Malaysia were estimated to be the most vulnerable to the embargoes and price changes. As indicated by Figure 3, the retail price of rice in Indonesia soared back to a high level after the pandemic outbreak and remained elevated in the first quarter of 2023. For the largest importer of various food commodities, China, the effects of both domestic lockdowns and international food price inflation both passed through to the fluctuation of its food prices and raised concerns about risks considered more broadly (e.g. rice imports in the first quarter of 2020 increased by 60 percent). Nevertheless, the impact mechanisms have been complicated. Greater demand for domestic agri-food products facilitated the expansion of planting areas of cereals and so forth, the provision of which cushioned demand growth and price inflation regarding key foods.

As the COVID-19 waves subsided and the lockdown measures were lifted, and very much in tandem with China's reopening and pro-growth policy stances, the pandemic-related supply chain suspensions abated. This backdrop has been reflected in the sober food price trends in the second half of 2022. However, crises emanating from extreme climate and weather events and global market conditions are increasingly affecting food markets in East and Southeast Asia, bringing more uncertainty to food prices.

Extreme Weather Events and looming El Niño

Most of the social-economic activities of East and Southeast Asia have occupied coastal areas and river basins, while many governments of the developing areas have lacked the capacity to respond to natural hazards. Food systems of the region, whether these have been irrigated, rainfed or dependent on some other set of practices, have been rather sensitive to abnormal patterns of precipitation and temperature as well as other extreme climate- and weather-induced events (e.g., droughts, floods, typhoons, and sea level rise). By disturbing all stages of agri-food value chains (e.g., the growth, harvesting, and storage of crops, as well as livestock rearing, together with the storage and transport of animal products), weather shocks can have an impact on the cost and supply of nearly all agricultural products, and thus also their prices.

The embeddedness of East and Southeast Asian economies into regional and global value chains continues to deepen via trade and cooperation. It serves an important role in meeting the region's transformative dietary demands and keeping prices within affordability, in such a way as to underpin food security. However, the cascading impacts of climate change on the supply of the region's bulk food products (e.g., cereals, palm oil, and sugarcane) can obstruct trade flows, and further impair global food prices. If we take staple foods as an example, on the importing side, countries in the Southeast subregion are warned that they can expect to encounter rice yield gaps between the yield potential and the average outputs, which is about 48 percent of the potential at the subregional mean. Indonesia and the Philippines will likely endure further dependence on regional trade by 2040 (World Bank, 2022c). On the exporting side, a mere percent year-over-year growth in temperature is projected to increase the rate of producer food price inflation by some 0.5 percent in Thailand and Vietnam (Oxford Economics, 2022a). If we consider the wider picture, Southeast Asia has been a major food supplier for East Asia, Central Asia, and Africa. The food system risks of the subregion can function as a magnifier of global food crises regarding availability, price inflation, and even food sovereignty for some economies.

Among the world's most affected by long-term climate risks, Myanmar, the Philippines, and Thailand have persisted in the top tier over the past two decades. Vietnam and Cambodia have ranked afterwards but remain highly affected. China and Japan have sustained middle-range scores, yet have born the highest climate-risk-induced economic losses (Eckstein *et al.,* 2021). In 2022, China's agricultural production was challenged by a combination of record-breaking heatwaves, severe drought, and heavy rainfall. While domestic reserves and output served as a buffer to some extent, these problems still contributed to overall market sentiment concerning food price inflation. According to IPCC (2022), the direct negative impacts of the extreme events on agri-food systems will far outweigh the expected growth in crop yields as global warming exceeds 1.5°C above pre-industrial levels. The outcomes, which will be disproportionately felt across food value chains and countries in the region, may lead to higher fluctuations in food prices and more complicated price transmissions.

El Niño has about an 80 percent likelihood to eventuate during the second half of 2023 (WMO, 2023). It exacerbates global warming and makes extreme weather events assume both a higher intensity and a longer duration, factors which can serve to complicate global food demand and supply. For example, continuous temperature growth fosters thermal effects that reduce soil fertility and food yields, and it also increases producer costs by challenging energy supply and water resource management. Globally, El Niño events will affect more than 25 percent of cropland, with slight increases in soybean yields and losses in maize, rice, and wheat yields at the global mean (WorldBank, 2023b). Besides grains, El Niño events usually coincide with a bullish price trend for palm oil, one of the key exports of Southeast Asia. So far as developing East and Southeast Asia are concerned, China is forecasted to experience floods in the south and droughts in the north, while countries in Southeast Asia are likely to encounter higher incidences of temperature spikes and droughts (WMO, 2023)/EndNote>.

At the country level, the rice output of Thailand is estimated to decline by 4 to 6 percent under a moderate El Niño impact; but the gap may far exceed the lower bounds of expectation once severe droughts have slashed output (KasikornResearchCenter, 2023). As such, farmers in Thailand have been advised to cultivate just one crop in 2023 and to opt for less water-intensive crops (Nguyen and Ng, 2023). On the demand side, for example, importing more rice has been considered by Indonesia as a possible way to offset El Niño and the fact that it has insufficient reserves (Mentari, 2023). The impact of El Niño on the region's rice supply is a latent driving force of a new round of food price inflation (Mamun and Glauber, 2023).

Extended extreme climate- and weather-induced events can further challenge many other food-system dimensions (e.g., human health, eco-environmental systems, rural infrastructure, etc.), all of which add further uncertainty to the picture concerning food availability and affordability. While improving productivity is fundamental to stabilising the food supply, change in land use and the overuse of agrichemicals and water are substantially compromising environmental resilience in developing East and Southeast Asia (Chen and Zhan, 2022). Meanwhile, knowledge of and resolutions on farmers' health status while enduring extreme events such as heatwaves remain scant (IPCC, 2022). In addition, the region's economies have generally pledged to reach carbon neutrality and/or net zero by 2050 (Zhou *et al.,* 2023). Although there may yet be positive spillovers that serve to stabilise food prices, a successful transition to net zero may give rise to substantial additional cost pressures – mainly concerning energy and labour – to agricultural producers, which may also eventually be passed on to consumers (OxfordEconomics, 2022a).

Political and Economic Factors at Multiple Levels

In addition to extreme climate- and weather-induced events, external stressors such as global economic softness and the Russia-Ukraine war exacerbated the supply-demand imbalance of food during the pandemic. Those anthropogenic factors are not likely to ease in the short term and potentially new food crises continue to simmer during the post-pandemic recovery in East and Southeast Asia. Simultaneously, as a group of political and economic characteristics (e.g. China's reopening and deepened intraregional integration) facilitated food system resilience in East and Southeast Asia, the region's food inflation situation was less grim against global food price trends (Chen *et al.,* 2023).

The war in Ukraine was the foremost factor accounting for food price inflation reaching record highs during the pandemic. On the one hand, Russia and Ukraine have been major global suppliers of wheat, barley, and sunflower oil. The war directly imperils the global grain supply, the threat to which triggered the price surge of wheat to record highs in 2022. Given the relatively tranquil price of rice, the price inflation of wheat may progressively intensify the demand for rice as a substitute, which can lead to the depletion of rice stocks and then lead to higher rice prices, especially across Asia. As the growth in rice consumption outpaced that of production, what used to be a surplus of production over demand has turned into a gap since 2018. Whereas abundant rice reserves in China buttressed over 60 percent of global rice stocks, national rice stocks were low elsewhere and have shrunk further since the pandemic outbreak (including in China). The world's largest rice exporters (India, Thailand, and Vietnam) have all witnessed a slip in domestic rice reserves since 2021. In particular, the 2023 rice stock level of Vietnam is projected to be around 20 percent lower than in 2022 (IGC, 2023). For the net rice importers, rice stocks in Indonesia and the Philippines lingered at a low level (as shown in Figure 4). The symptoms are expected to expose those import-reliant countries to higher dependency on the global market, incurring additional uncertainties regarding food availability and affordability across East and Southeast Asia and beyond.

On the other hand, the outbreak of the Russia-Ukraine war interfered with the trade in energy (fuel) and fertiliser (and its raw ingredients). The upsurge in fertiliser prices (e.g. nitrogen and phosphates) that was induced by the war in Ukraine coincided with downgraded fertiliser production in the EU, as well as a contraction in Chinese fertiliser production and export – all of which stoked up agricultural produc-

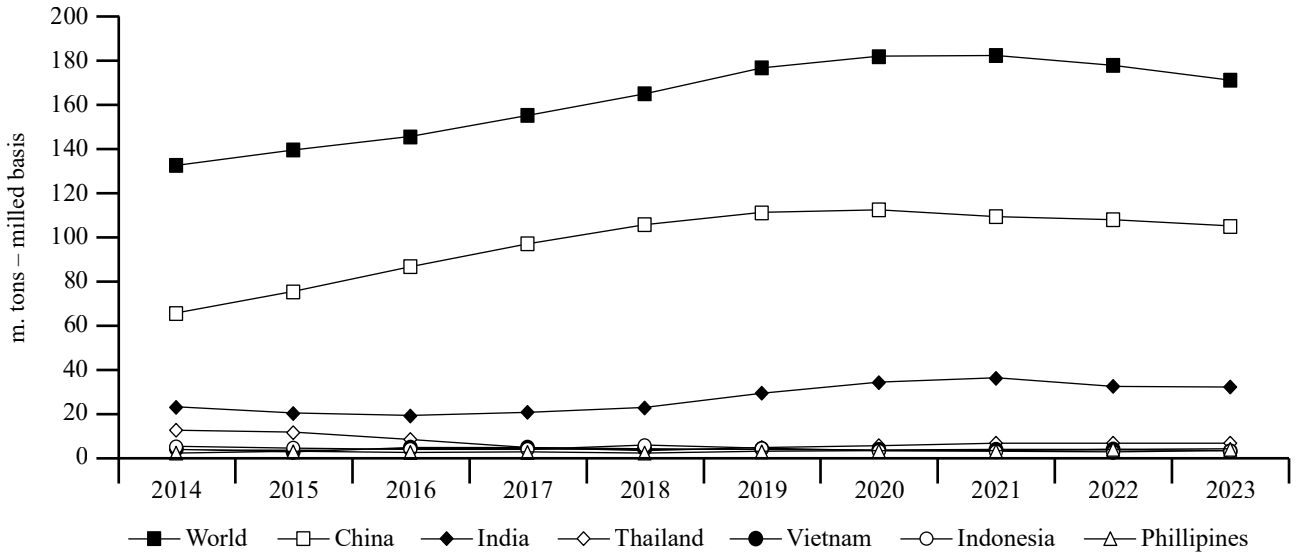

Figure 4. Rice Stocks, 2014-2023.
Source: IGC (2023) data

tion costs and thus also food prices (Jones and Nti, 2022). Cereal production across Southeast Asia was especially negatively affected in 2022 (FAO, 2022a). However, the supply of fertiliser has begun to increase since the renewal of the Black Sea Grain Initiative. Since global fertiliser prices subsided sharply in the first quarter of 2023 from their previously perilous level, improved fertiliser availability is expected progressively to boost agricultural production and to tame food price inflation in Southeast Asian countries as compared with last year.

On the other hand, the outbreak of the Russia-Ukraine war interfered with the trade in energy (fuel) and fertiliser (and its raw ingredients). The upsurge in fertiliser prices (e.g. nitrogen and phosphates) that was induced by the war in Ukraine coincided with downgraded fertiliser production in the EU, as well as a contraction in Chinese fertiliser production and export – all of which stoked up agricultural production costs and thus also food prices (Jones and Nti, 2022). Cereal production across Southeast Asia was especially negatively affected in 2022 (FAO, 2022a). However, the supply of fertiliser has begun to increase since the renewal of the Black Sea Grain Initiative. Since global fertiliser prices subsided sharply in the first quarter of 2023 from their previously perilous level, improved fertiliser availability is expected progressively to boost agricultural production and to tame food price inflation in Southeast Asian countries as compared with last year.

A general equilibrium trade model suggests that the war in Ukraine has increased the price of global agricultural products by 10 to 30 percent and lessened the purchasing power of 52 countries (areas) by 15 to 25 percent on average (Feng *et al.,* 2023). However, at the regional level it has had modest direct impacts on food systems in East and Southeast Asia if compared with elsewhere (e.g. Africa and Central Asia). Associated economic sanctions imposed by Japan, Singapore, and the major developed economies elsewhere had limited economic reverberations from most of the region, but spillover effects have been gathering (e.g., price fluctuations of both oil and gas). Deepened intraregional trade and value chain embeddedness, overall stable rice yields and inventories, and relatively limited wheat consumption in the Southeastern subregion were key factors enabling East and Southeast Asia to blunt the effect of costs arising from the war in Ukraine. However, given that the conflict between Russia and Ukraine has not yet found a solution, risks in agricultural product supplies persist across the region.

Beyond such geopolitical tensions, global economic softness represents another backdrop to food price inflation. Over the recent decade, aggressive and ultra-loose monetary policy further propped up by expansionary fiscal stimulus in many developed countries had not escorted economies to sustainable and buoyant growth, but instead has generated rather high inflation pressures globally since the pandemic outbreak. As the Federal Reserve increased interest rates to curb domestic inflation, the picture has worsened for many developing countries, especially those relying on importing food and fuel (e.g., Cambodia, Mongolia, the Philippines, and Thailand). During the pandemic, a group of East and Southeast Asia countries implemented loose monetary policies, which contributed further to local currency devaluation, declines in real income, and rising food import bills. Meanwhile, given the presence of large primary deficits and extended debt vulnerabilities during the pandemic, weak currencies exacerbated the risks of a debt crisis occurring in many East and Southeast Asian developing economies (e.g., Mongolia and Laos). If we take into consideration China's structural slowdown in economic growth and the unbalanced sectoral revival of ASEAN member states from COVID-19, the macroeconomic pressures appear rather stubborn and imply that there will be more challenges affecting access to food (WorldBank, 2022a).

In addition, as the trend towards financialisation has coincided with the development of biomass energy, different markets (e.g., grain, currency, financial futures, and energy) have become progressively more interconnected. However, the financialisation of both the grain market and the energy market has increased the volatility of global food prices to

some extent. Meanwhile, greater control on the part of international grain merchants over grain spot and futures markets has contributed to driving up global food price inflation and has reduced confidence in global food markets since the pandemic. Countries that are highly dependent on an international food supply are likely to be exposed to higher market uncertainties. Nevertheless, from a long-run perspective, the primary driving forces of food prices remain the fundamentals of supply and demand.

Vulnerabilities, Measures and the Way Forward

Food System Vulnerabilities

Food systems are a cornerstone for the sustainable development and resilient recovery of most East and Southeast Asian countries. On the one hand, the sectoral contribution of agriculture to domestic value-added remains at around ten percent or better, although the share of agriculture in the region's developing economy has declined in relative terms during the structural transformation (WorldBank, 2022d). Both the driving forces behind, and the consequences of, food price inflation have extensive implications for the welfare of agri-food producers, who are mainly smallholder farmers in East and Southeast Asia. Facing increasing production costs and consumer prices, farmers may switch from staple food crop production to cash cropping (or even quit farming) for the sake of a higher surplus. As food production in East and Southeast Asia plays an important role in sustaining global food security (e.g., by delivering half of the planet's rice yields, as well as a portion of maize, wheat, rubber and oil palm), changes in the region's food production system can destabilise the domestic supply of many strategic agri-food products and adversely affect global food security (Thanichanon *et al.,* 2018).

On the other hand, many countries in the region rely on imports to meet domestic food demands. Among developed nations in the eastern subregion, Japan imported (especially meat products, corn and wheat) about 62 percent of its food on a calorie basis in 2021 (JapanNews, 2022). Inflationary food prices throughout the international market and the devaluation of the yen have intensified pressures on the food imports of Japan. In the case of developing economies in East and Southeast Asia, rapid urbanisation and structural transformation have been reshaping food demands, but the extent of a nation's dependency on international food markets differs between countries. For example, as wheat consumption is expected to grow due to demographic and dietary changes, Indonesia and the Philippines are likely to increase wheat imports for both food and feed use. However, while China's wheat consumption is projected to rise, the level of imports may stay steady due to bountiful domestic crop harvests and competitive corn prices (USDA, 2023). Nevertheless, rising food prices can expose the vulnerabilities of the region's agri-food systems to international uncertainties (such as protectionism) during their efforts to secure food accessibility.

On the consumption side, the share of consumer expenditure on food is at or beyond 20 percent for most developing economies in the region. Myanmar (56.6%), Laos (50.6%), and Cambodia (42.7%) feature the highest Engel's coefficient in the region. For Vietnam and Myanmar, the average expenditure on food is not sufficient to sustain the cost of a healthy diet (USDA, 2023). Meanwhile, although the region's 2022 Global Hunger Index scored low, many nations in the southeast subregion saw their progress against child stunting (for example, Timor-Leste, Laos and Indonesia) and wasting (Indonesia, Malaysia and Cambodia) stagnate (von Grebmer *et al.,* 2022). In 2022, Myanmar, Cambodia, and the Philippines suffered from the highest rate of insufficient food consumption among ASEAN member states. No country in either subregion is on schedule to meet its targets for curbing anaemia in women of reproductive age and adult obesity (DevelopmentInitiatives, 2021). Given that the cost of a healthy diet in all East and Southeast Asian economies has already tilted upward, the price surge affecting food (especially staples) and energy can be expected to further magnify the welfare losses for vulnerable groups.

The adverse effects of food price inflation on the region's social-economic development and the progress toward Sustainable Development Goals (SDGs) are large and likely to carry long-term implications. For example, given limited and uncertain access to the social safety net and nutrition security, the poor living in rural areas and informal employment and migrant workers in cities fared worse in many developing countries of East and Southeast Asia (FAO, 2022b). Although poverty alleviation in some developing countries in the region has been brought back on track since 2022 after a hiccup, the recovery remains fragile as low-income and vulnerable households face increasing food and energy prices. Latent inequality traps (for example, those affecting nutrition and health) during recovery can dent the human capital accumulation of those on a low income and the vulnerable, with long-term implications for both social mobility and economic development (Deaton, 2003).

Key Measures

In response to recent food system crises (COVID-19, the war in Ukraine, extreme weather events, global economic softness, etc.) and their nested repercussions for food demand and supply, governments in East and Southeast Asia have all prescribed measures to mitigate the adverse impacts and pursue development.

On the consumption side, most nations provided rescue packages and targeted measures to secure food accessibility and affordability for the poor and most vulnerable during the pandemic, including in-kind food distribution, cash transfer programmes, and widened social protection schemes. To meet the shortfalls of domestic food consumption and offset consumer price inflation, governments have generally considered increasing food imports (e.g., rice and meat) and seeking alternative sources of imports. In the private sector, E-commerce had already developed in major regional economies before the pandemic and has since demonstrated its proactive use in organising food distribution. Meanwhile,

the innovative use of fintech has facilitated the recovery of small- and medium-sized enterprises (SMEs) in ASEAN member states like Indonesia, where SMEs account for a large share of the economy (ADB, 2022a). Finally, and dealing with a much broader context than simply the food sector, China has drafted a financial stability law to deal with systemic risks (WorldBank, 2022b).

Besides, many policies and budgets were deployed on the production side, in such a way as to stabilise domestic food supplies and tame food price inflation. To protect and support agri-food producers, East and Southeast Asian governments carried out subsidies and distribution of input, price support through procurement and regulation, and other policies targeting broad-based rural development and urban-rural linkages. In particular, many have implemented programmes to stimulate local food production and short value chains (Elbehri *et al.,* 2022). For example, Malaysia has set up RM1 billion via the Bank Negara Malaysia Agrofood Financing Scheme to raise self-sufficiency levels, encouraging local food production and improving productivity with digital technologies and credits incentives for agribusinesses (Basyir, 2022). Given its robust food production, Vietnam also maintained a relatively low food price inflation rate. Nevertheless, the government has remained vigilant with regard to global inflation and has been improving food safety standards and trade policies (Elbehri *et al.,* 2022).

Governments in the region have often increased agricultural production support, and even introduced export restrictions, food price controls and food self-sufficiency programs, to tame domestic price pressures in food (grain, especially rice) and fuel under the crisis backdrop. However, many short-term measures (e.g., public policy support through price fixation and trade barriers) have distorted the market. Meanwhile, the loosening of environmental regulations and the staple-biased form taken by production support during the pandemic contradicted the previously established trend of green production and dietary diversification. Further price surges and inflation regarding agri-food commodities are likely to ramp up the budgetary costs of government subsidies and price controls, limiting the scope of future policy support in agriculture (WorldBank, 2022c). Given that the abilities (due to their fiscal positions) of different governments to sustain fiscal buffers may vary, supply conditions for the agri-food sector in the Philippines, Thailand, and Malaysia may be more at risk from tightening support (OxfordEconomics, 2022b).

As for the cascading impacts of climate change, regional economies have strived to protect ecosystems and decarbonise the food supply chain (Mosnier *et al.,* 2022). To balance agriculture productivity within the bounds of climate, many countries supported technologies and practices of climate-smart agriculture (CSA), including capacity building, climate-resilient crops and planting calendar adjustment systems, efficient machinery, etc. In the case of the China Weather Index Insurance Project, digital insurance has shown that it has the potential to stabilise the income of small-scale farmers in the event of a natural disaster (GlobalIndexInsuranceFacility, 2021). A cross-country review of experiences that involves scaling out location-specific CSA models in ASEAN recommends that the best approach involves starting out with knowledge sharing, then mainstreaming tested interventions as government policies, and finally sustaining efficiency with proper market strategies (Barbon *et al.,* 2021).

The Way Forward

Different approaches have been taken to the post-COVID-19 recovery across global economies. Central banks of the major developed countries and even some emerging markets have raised interest rates significantly in 2022 (and beyond) in an effort to curb inflation. In line with rising interest rates and tightening financial conditions, most economies are expected to experience slower growth in 2023. In contrast, China enjoyed a fast economic rebound after the optimisation of its pandemic controls. The pro-growth stances of its macroeconomic policies have had significant impacts on its economic recovery. Although institutions differ on China's performance outlook, its GDP growth rate is expected to be around 5.9 percent in 2023 (Gu, 2023). The reopening and solid economic growth in the economic powerhouses of East and Southeast Asia are now galvanising the prospects for the region through trade, tourism, and other positive spillovers to the rest of developing Asia.

Simultaneously, the consumer price index of the United States persisted at a relatively high level in the first quarter of 2023, which means the Federal Reserve remains under pressure. Higher debt and interest rates in the United States and Europe can intensify the risks to preserving financial stability, expanding adverse effects on energy and food markets. The indeterminacies of geopolitical conflicts can in the meantime trigger repeated supply chain disruptions and food price spikes that will reinforce pressures on global inflation and monetary tightening. The looming El Niño and elevated economic protectionism will represent persistent challenges in the next few years.

The global inflation rate is projected to be moderated in 2024, which may lift burdens for food prices. For East and Southeast Asian economies, whereas the inflation rate in such as Brunei, China and Thailand remain steady and low, pictures for the high-inflation countries largely differ. As shown in Figure 5, Laos is expected to further lessen the inflation rate and roll back to around 5 percent in 2024. However, the 2024 inflation levels of Mongolia (8.7 percent) and Myanmar (8.2 percent) are still likely to be haunted by high risks, even though the inflation rates for both nations have entered a continuous decline since 2022 (ADB, 2023). The governments of the high-inflation economies in East and Southeast Asia should remain rather vigilant in respect of the concurrent crises such as food price inflation, debt and the looming El Niño.

Conclusions

Food price inflation has been a global concern since 2022, particularly in densely populated regions like East and Southeast Asia. Rising food prices have raised concerns about food insecurity and systemic crises, affecting

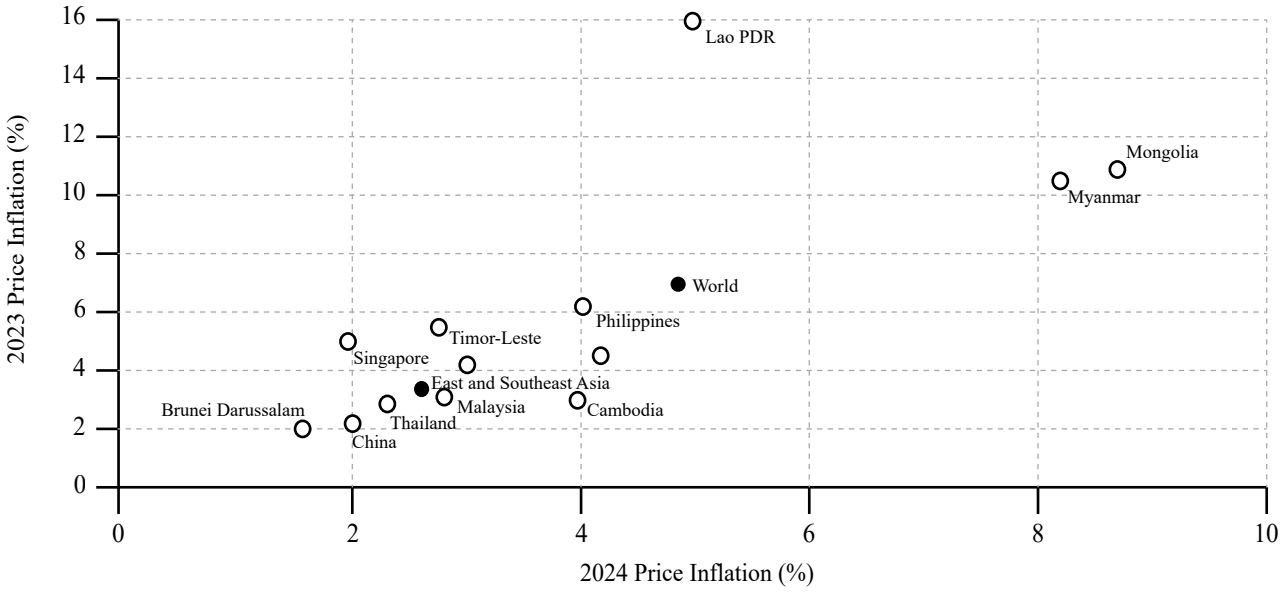

Figure 5: Forecasts Price Inflation Worldwide and in East and Southeast Asia, 2023-2024.
Source: ADB and IMF (2023) data.

consumers' purchasing power, especially the low-income and poor populations reliant on agriculture. Global economic recession, extreme weather events, geopolitical tensions, and their intertwined effects have been driving up food price inflation in East and Southeast Asia. Those forces have posed significant challenges to achieving a sustainable recovery.

The point has increasingly been emphasised that building resilience is essential for the fast recovery and sustainable development of food systems in the post-COVID-19 world (IFPRI, 2023; IMF, 2023). Policies should devote more to improving the responding mechanisms to food system crises and strengthening international cooperation. It is vital to assemble early-warning systems, prevention measures and targeted solutions in anticipation of food system crises, instead of responding only when situations arise and relying on short-term stimuli. Concerted efforts and innovative approaches (technologies) supported by authorities, private sectors and civil societies are in demand to bring SDGs within reach by 2030. So far, the relatively proactive food price trends in East and Southeast Asia can shed some light on elsewhere. First, countries should refrain from imposing additional export restrictions (whatever their form), which can worsen the picture of food price inflation and dampen food and nutrition security. Blockages in supply chains tend to be rather detrimental to the import-reliant countries and a population already left behind. Second, dialogues and cooperation can facilitate food system resilience when the region faces added burdens. For example, the Regional Comprehensive Economic Partnership (RCEP), institutionalised in 2022, is expected to propel regional integration and to allow ASEAN member states and its East Asian partners to better manage a complex array of food system crises and cultivate a resilient and sustainable future through the multilateral trading system.

While research on global food price inflation has progressed, there has remained a gap in terms of providing comprehensive knowledge about the sources and solutions specific to East and Southeast Asia. This article addresses the gap by conducting a political-economic analysis of the major forces driving recent food price inflation in the region. By reviewing targeted reactions across countries in East and Southeast Asia, the article also contributes to exploring proactive measures to enhance food system resilience during the post-COVID-19 "new normality". However, the mechanisms which drive food price inflation are complicated and cannot comprehensively be discussed in a single article. Future research could do more to compare the driving forces and positive measures implemented during multiple food price inflation crises. In this way, and building on the extended empirical evidence, countries in East and Southeast Asia as well as the rest of the world can be better prepared for future uncertainties.

Acknowledgement

We would like to acknowledge the financial support from ASEAN-CGIAR Regional Program of Innovate for Food and Zhejiang University-IFPRI Center for International Development Studies.

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Food prices in Africa

Food prices in Africa respond in familiar ways to changes in the global environment, but there are a number of unique characteristics that have to be accounted for in understanding how these prices play out in domestic markets. African countries are price takers in global agricultural commodity markets, and face high farm gate to consumer costs, which are a major driver of food price inflation. Furthermore, the uncertainty that accompanies poor policy formulation and implementation distorts markets and results in the skewing of investment to mitigate the negative impacts of policy uncertainty rather than to build future opportunities. Finally, the high levels of poverty as well as of inequality distort consumer markets, which are fragmented by these extremes, and which compete with informal markets and with own consumption. In this paper, we address the role that these factors play in understanding trends in food prices across a spectrum of commodities in Ghana, Kenya, South Africa and Zambia. These characteristics make it difficult to find relevant and timely data to help understand what is really going on in the real world.

Keywords: food price, inflation, Africa
JEL classification: Q11

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Received: 6 June 2023; Revised: 30 June 2023; Accepted: 3 July 2023.

Introduction

This paper sets out to identify and discuss the main drivers of food inflation in Africa, with a view to analysing the impact of shocks, specifically the aftermath of the Covid-19 pandemic and the conflict in Ukraine. Since Africa is a large continent, the analysis has been confined to 4 countries: Ghana, Kenya, Zambia, and South Africa, which have been selected as representing some of the key underlying trends in food prices on the African continent, namely:

- Net importers of staples versus net exporters (e.g. Kenya as a net importer of maize versus Zambia as a net exporter). South Africa is an interesting case: the country is regarded as a net exporter of maize, but poor natural resources and climate change have meant that there have been three years of net imports since 2005 (2006, 2007 and 2015), whereas, for example, Zambia became a net importer only once, in 2006.
- Landlocked countries versus those with relatively easy access to and from global markets (Zambia versus Ghana and Kenya). In this regard, it should be noted that while South Africa has a long coastline and two major coastal cities, economic activity is concentrated around Johannesburg in the interior. Given the long distance from Cape Town and the steep escarpment from Durban, the interior (Gauteng province) resembles a landlocked market in many respects.
- Countries where there are significant protectionist policy interventions (most staple food items in Ghana, Kenya, and Zambia) versus unsupported markets, especially in South Africa.

Moreover, we have chosen to examine the period starting in 2005 so as to cover the major policy events that still affect food price inflation. These include the price spikes caused by biofuel policy shifts in the early part of the period (e.g. Guo and Tanaka, 2022); the 2008 financial sector meltdown and the accompanying Great Recession of 2009-2010 (e.g. Headey *et al*., 2010; Abbott and Borot de Battisti, 2011); and the aftermath of the COVID-19 pandemic (e.g. Amewu *et al.*, 2020; Agyei *et al.*, 2021; Laborde *et al.*, 2021) and the Russian invasion of Ukraine (e.g. Mamonov *et al.*, 2022).

In the rest of this paper, we first describe the real-world influences on producer prices in agriculture as well as consumer prices of food. This is followed in section 3 by a discussion of food price inflation trends (including an outlook on food price inflation for 2023/24) in the four focus countries, and the drivers of food prices. Section 4 provides case studies of public and private actions that have been taken to address the impacts of these price fluctuations. Section 5 then concludes.

Food prices in the real world

Okou *et al.* (2022) identify "net import dependence, consumption share of staples, global food prices, and real effective exchange rates" as the key influencers of changes in staple food prices across 15 African economies, with the consumption share the most influential in terms of the impact on prices. Hence, the actual prices paid by buyers of farm commodities and of processed food, and received by the sellers are influenced by more than the conventional determinants used to measure demand and supply. The policy implications are legion and multifaceted at the macro a well as the micro level. Iddrisu and Alagidede (2020) show, to cite only one example, how conventional monetary policy that targets inflation with a view to maintaining macroeconomic stability can exacerbate food price inflation, which disproportionately harms the poor.

In this section, the micro-level influences of producer and consumer food price inflation of relevance to this chapter are discussed in turn.

Producer prices

On the supply side, producer prices across Africa are susceptible to influences such as the fact that many countries are small (hence with limited market demand), face high transport costs (for numerous reasons discussed below), are caught in the middle of agricultural transformation where important commodities are switching from being largely imported to becoming exported goods (or in some cases the other way around), and are affected by global exchange rate regimes. In this regard, three main real-world influencers of the producer prices of specific commodities are discussed in turn below.

Import vs export parity prices. When a tradeable commodity is imported into a country, the upper bound to the price of a commodity that must be processed before it is ready for consumption by humans or animals is set by the fact the processor can also source the unprocessed commodity in foreign markets. Hence, if the seller (farmer) asks for a price that is too high, the buyer (processor) will import. That import parity price is, of course, dependent on the cost of getting the commodity to the factory gate so as to make it comparable to the domestic price. The opposite is true for a commodity that is usually exported. In this case, the buyer (processor) has a lower limit to the price that they can pay to the seller (farmer), as the latter has the option of selling in a foreign market. Again, the cost of getting the commodity to that export market will determine the exact export parity price, which becomes the lowest level to which the price can decline in the domestic market. The familiar supply and demand factors will then determine the exact price level on the domestic market. What makes Africa unique is first, the prevalence of switching between import and export parity during the transformation process (Jayne, *et al.*, 2019; Dorosh and Minten, 2020). Many basic commodities switch between deficit and surplus production and back during the process of the commercialisation of agriculture. This situation is exacerbated by a combination of factors that accompany and define the transformation process, such as the prevalence of rainfed agriculture, climate change, policy uncertainty and the time it takes to learn new ways of doing business. Furthermore, the costs of importing and exporting, as well as domestic margins between farm and consumer are very high (see Meyer *et al.,* 2019 and the discussion below).

The physical *costs of doing business* in Africa are high because, while transport distances are not always great because of the many small countries, transport costs are also determined by other factors. These include the mode of transport (maritime, roads, air) and the condition of the required infrastructure (ports, roads, railway lines, airports); the degree of competition between these transport modes as well as between buyers and sellers of transport services such as handling, storage, freight costs, insurance, etc.; and the condition of infrastructure as well as expectations around the maintenance of infrastructure into the future. These costs, termed indirect costs[1], constitute up to 30% of total manufacturing costs in African countries (Eifert *et al.*, 2008 in a study that includes Kenya and Zambia, and the food and beverage manufacturing sector), and are often not included in assessments of manufacturing performance in Africa, leading to understatement in their relative performance and are also an important factor in trade (Porteous, 2019). Despite these high costs, however, world prices of especially imported staples are transmitted smoothly into African economies (Okou *et al.*, 2022). In their view, "… *Economic policy can lower food price inflation, as the strength of monetary policy and fiscal frameworks, the overall economic environment, and transport constraints in geographically challenged areas account for substantial cross-country differences in staple food prices*" (page 1).

As the physical costs are denominated mostly in US dollars, *exchange rates* are an important influence on commodity prices, and particularly so in Africa, where these costs are high. In this regard, structural reforms of developing country economies, including those in Africa, were motivated by consideration of the benefits perceived to be gained from reforms to trade, exchange rate, monetary, fiscal, and agricultural sector policy (Jaeger and Humphries, 1988), and most of the earlier literature confirmed these benefits. For example, Sahn *et al.* (1996) showed that both the rural and the urban poor benefited from trade and exchange rate reforms, while other reforms have not harmed the poor. This is despite there being a persistent policy bias against agriculture in many countries (e.g. Bautista *et al.,* 2001; Thiele, 2002; Anderson *et al.*, 2010).

Exchange rates, in their turn, impact producer prices in several ways. Boubakri *et al.* (2019), for example, analyse the impact of poor financial market integration with global financial markets on the relationship between the volatility of commodity prices and the real effective exchange rate (REER) for a range of developing countries and four industries, including food and beverages. In their view poor financial market integration exacerbates the impact of price volatility on the REER in a non-linear manner.

More recently, the literature highlights the paucity of research on the direct and indirect relationships between exchange rates and transformation, e.g. Bahmani-Oskooee and Arize (2019) who find that volatility (uncertainty) in exchange rates affects trade negatively, but that the impact is larger in poor countries due to the relative lack of hedging instruments. The effects seem to be country-specific and asymmetric (i.e., the response to increased volatility is not the same as the response to decreased volatility). These findings are important to policy makers and traders in situations when floating exchange rates create volatility in both directions. Meanwhile, Kassouri and Altıntaş (2020) also investigate the effects of shocks in the terms of trade on the REER in Africa. They also find evidence of asymmetry, noting also that these asymmetrical effects differ for different commodities. Real appreciation should be countered with coordinated monetary and fiscal policies. Asymmetric pass-through of exchange rates has other effects as well, for example on the prices of imports (Brun-Aguerre, *et al.*, 2016).

[1] Indirect costs include energy, transport, telecoms, security, water, travel and insurance, etc.

Consumer prices

The real impact of food prices on households is hard to analyse because consumers react differently to changes in prices according to their circumstances (e.g. Houthakker, 1957; Ansah, *et al.*, 2020; Alioma *et al.*, 2022), and the circumstances across the African continent differ amongst countries (see Table 1), amongst households (e.g. Femenia, 2019) and compared to the rest of the world. Although South Africa has the largest economy and the highest per capita GDP by a significant margin, for example, the levels of food insecurity resemble those found in Ghana, Kenya, and Zambia. Ghana has experienced the most rapid improvement in food security indicators - the percentage of the population living below $1.90 a day has declined from 29% in 2002 to 9% in 2022, Kenya is the least urbanised, while South Africa has the highest rate of unemployment. Despite these disparities, the countries are relatively similar in terms of food security measures and the Human Development Index.

In these circumstances, when food commodity prices rise farmers (predominantly small-scale farmers in Africa) benefit, while when food prices decline consumers gain (Ivanic and Martin, 2008)[2]. Another factor that influences the impact of food price inflation is the fact that the food share of discretionary expenditure is high across the African continent (Tschirley *et al.*, 2015), and that value chains are evolving rapidly (Jing *et al.*, 2021; Barrett *et al.*, 2022). The result is rapidly changing food consumption patterns, with a rising proportion of foods that are purchased (Tschirley *et al.*, 2015) and processed (Reardon *et al.*, 2021). Unexpectedly, where consumption of unhealthy foods has increased (Dolislager *et al.*, 2022), a "double burden of malnutrition" has arisen, with overweight and obesity now found together with the more familiar stunting and wasting, etc. among children (Reardon *et al*., 2021). At the same time, contrary to expectations, the consumption patterns of the poor have also changed, and are no different from those of the new middle class (Sauer *et al.,* 2021)[3], with the result that urban and rural consumption patterns are also similar.

It is also evident that the prices of different food products increase asymmetrically under food price inflation for a range of reasons (e.g. Colen *et al.*, 2008; Hussein *et al.*, 2021; Vroegindewey *et al.*, 2021). Under circumstances prevalent across large parts of the continent, consumer decisions to substitute for cheaper foods can become distorted because the observed prices may convey insufficient information: substitution may be in the wrong direction given the observed cross-elasticities of demand.

Table 1: Socio-economic status of the target countries.

	Ghana	Kenya	South Africa	Zambia
Population size (2021)[a]	32.8m, increase: 2.6% p.a. from 2010	52.5m, increase: 2.5% p.a. from 2010	59.1m, increasing by 1.3% p.a. from 2010	19.2m, increase: 3.7% p.a. from 2010
Urban population share (2020)[b]	57% [2050: 73%]	28% [2050: 46%]	67% [2050: 80%]	45% [2050: 62%]
Unemployment rate (2022)	10.4%	9.3%	32.7%	13%
GDP per capita in U.S.D (2022)	$2353	$2277	$6694	$1423
% of population living below $1.90 a day (2022)[c]	9% (29% in 2002)	25% (44% 2004)	20% (33% in 2002)	59% (66% in 2010)
% of population living below $3.20 a day (2022)	23% (58% in 2002)	54.8% (70% in 2004)	40% (53% in 2002)	76% (81% in 2010)
Food security: Global Food Security Index 2022[d] Rank out of 113 countries	52.6 Affordability: 59.9 Availability: 52.4 Quality, safety: 50.5 (Ranked 83)	53.0 Affordability: 41.7 Availability: 52.5 Quality, safety: 68.8 (Ranked 82)	61.7 Affordability: 63.4 Availability: 60.1 Quality, safety: 66.1 (Ranked 59)	43.5 Affordability:26.8 Availability: 46.7 Quality, safety: 54.2 (Ranked 102)
Nutrition: Prevalence of undernourishment (2018)[e]	7% (15% 2001)	23% (35% in 2003)	6% (4% in 2010)	Data not available
Nutrition: Adult nutrition status – underweight (2019)[f]	Male 10% Female 7% [Trend: improving]	Male 13% Female 9% [Trend: improving]	Male 6% Female 3% [Trend: improving]	Male 13% Female 8% [Trend: improving]
Nutrition: Adult nutrition status – overweight (2019)[g]	Male 24% Female 43% [Trend: worsening]	Male 17% Female 37% [Trend: worsening]	Male 43% Female 67% [Trend: worsening]	Male 20% Female 39% [Trend: worsening]
Human Development Index (2021)[h]	0.63 Trend: improving	0.58 Trend: improving	0.7 Trend: improving	0.57 Trend: improving

[a] United Nations, Department of Economic and Social Affairs, Population Division (2022). World Population Prospects 2022, Online Edition.
[b] United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
[c] Global Nutrition Report 2022, based on World Bank global poverty monitoring data.
[d] The Economist. 2022. Global Food Security Index. https://impact.economist.com/sustainability/project/food-security-index/reports/Economist_Impact_GFSI_2022_Global_Report_Sep_2022.pdf
[e] Global Nutrition Report 2022, based on FAO Statistics Division. Food Security/Suite of Food Security Indicators.
[f] Global Nutrition Report 2022, based on NCD Risk Factor Collaboration.
[g] Our World in Data (based on UNDP data): Available at https://ourworldindata.org/human-development-index#country-by-country-perspective-over-the-last-three-decades
Source: own composition based on World Bank (2023) data.

[2] In the long run, however, the evidence shows that an increase in food prices results in a reduction in poverty as well as inequality (Heady, 2014; 2016; 2018). Note also that some analyses conflate commodity prices with food prices. Consumers mostly do not consume commodities.

[3] This conclusion has been challenged, at least for Nigeria, largely on methodological grounds (de Brauw and Herskowitz, 2021).

Furthermore, it has long been known that the proportion of expenditure on food declines as income increases (e.g. Chisanga and Zulu-Mbata, 2018) – but that this relationship, known as Engel's Law – is valid only between certain ranges of income (e.g. Zimmerman, 1932, who describes Engel's law as "…*but a description of a part of the total food expenditure behaviour*" (page 101.)) For poor households, food expenditure always increases with income, but at an arithmetic rate, while above a certain level income increases geometrically. Notwithstanding, the impact of food price increases is more severe where expenditure on food constitutes a high proportion of total discretionary income, as is the case amongst households across most of the African continent (Pope, 2012). However, we must recall that the relationship only holds *ceteris paribus*, especially where prices are concerned (Houthakker, 1957). This has been used to estimate the "proper" or unbiased CPI (Hamilton, 2001) because price changes result in changes to real income, and thus influence consumers' decisions.

Consumer prices are also affected by the exchange rate pass-through to domestic prices (e.g. Goldberg and Campa, 2010), who show that the main channel is via the impact on inputs into domestic production rather than directly on consumer goods. Exchange rate changes impact the consumption of non-tradables, domestic tradables and imported goods via their prices. However, pass-through is lower sub-Saharan Africa in the presence of flexible exchange rates, higher income, lower inflation, and prudent and sustainable monetary and fiscal policy (Razafimahefa, 2012; Jooste and Jhaveri, 2014).

The literature shows that there are a wide range of influences on producer and consumer prices that go beyond the conventional ways of measuring supply and demand at the farm gate or in retail. Care must be exercised, therefore, in assessing the impact of price changes, whether of individual commodities, or for inflation of all prices.

Following the discussion of general food inflation trends in the following section, we will provide a more detailed analysis of the key drivers of food inflation for maize, cassava, wheat, vegetable oil and poultry, food items that are widely consumed in the selected countries.

Food inflation trends in focus countries

In this section, we present the overall food price inflation trends, followed by detailed descriptive analytics of a selection of food items that were picked based on how widely they are consumed and the country's level of trade dependency.

Although the main food price inflation events in African markets mostly coincide with the major global food and energy price events (2008, 2011 & 2021/22), it is apparent from Figure 1 that there are also meaningful differences, not only with respect to the magnitude of change, but also on the overall direction that food prices are trending. For example, food price inflation in Zambia already peaked in 2021 and has since been declining, despite global markets continuing to rise. On the other hand, Ghana food price inflation has skyrocketed and only seemed to find a turning point in January 2023 at 61 percent from a trend that commenced in December 2021. Food price inflation in South Africa was lower than in most African countries over the period under review and remained resistant to increases in global market prices in 2021. However, since the end of 2022, food price inflation in South African has accelerated and for the first quarter of 2023 has been trending in line with Zambia and Kenya. Hence, it is apparent that there are a wide and diverse range of external and internal drivers at play in each of the focus countries.

Figure 1 presents the overall food inflation trends, but the real impact on household food security, especially in low-income households, is determined by the combination of food items that are most widely consumed, the ability to substitute them (the cross-elasticities of demand), the supply chains that deliver the food, the percentage share of the

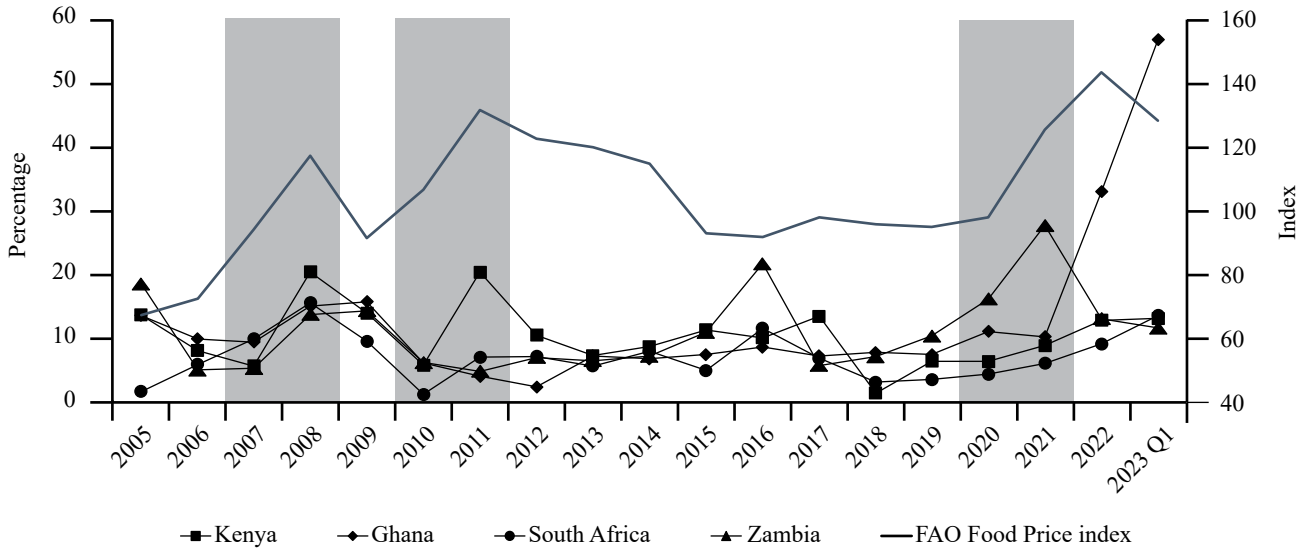

Figure 1: The distribution of the technical efficiency (TE) level by ADC.

Source: Own composition

households' income that is spent on food and the country's relative import dependence. Table 2 presents a list of the top ten most widely consumed food items in each of the focus countries, based on annual per capita consumption. Where data is available, the percentage share of total food expenditure is also provided.

Latest estimates of IFPRI show that Ghana's spending on food amounts to 54 percent of total spending for all households. The top four items are all staples, with cassava ranked first and maize only in seventh position. Kenyan households spend 46 percent on food, with milk the most widely consumed and with the highest share of consumer spending. Maize is the dominant staple from a volume perspective, but Kenyans spend almost as much on wheat as on maize. Zambian households spend 44 percent on food, with cassava and maize filling the top two positions.

South Africa is regarded as the most unequal society in the world with more than 30 percent of its households classified as poor and spending approximately 35 percent of household income on food, compared to the high-income households that spend only 6 percent of their monthly income on food (BFAP, 2022). However, over the years government grants (pensions, child support, school feeding, etc.) have made a significant contribution to the household income of poor families, and currently contribute more than 50 percent of their income. This has had a major impact on food consumption patterns, with overall spending increasing rapidly on affordable proteins like chicken meat in the early 2000's. South African households also spend more on wheat products than on maize; however, maize is more widely consumed than wheat.

Six products have been selected for deeper analysis, namely cassava, maize, wheat, rice, chicken, and palm oil. Apart from palm oil, all products feature under the top ten most widely consumed food items in all the focus countries, while palm oil features under the top three imported food items for all focus countries. Palm oil is widely consumed in the preparation of food and various other uses and can be classified as Africa's most import dependent food item from a value perspective.

Drivers of food price inflation

There is substantial cross-country heterogeneity in the domestic production and net import dependence of staple foods in the four focus countries. Global market dynamics that drive prices, like supply and demand imbalances and supply chain disruptions due to COVID-19, have a bigger impact on in-country food price dynamics for food items that are either imported or exported, compared to non-traded food items where local markets are not meaningfully integrated with world markets (Meyer *et al*., 2006). As discussed in section 2, there is a strand of literature where empirical models have been applied to estimate the level of market integration between local and global markets. Furthermore, unexpected changes in supply and/or demand due to production shocks, supply chain disruptions and trade policies, for example import and export tariffs and/or bans, imply that the level of integration between local and global markets can switch from one season to the next, which results in even greater food price volatility.

In an unregulated market, the relative supply and demand fundamentals of a specific product in a country determine to what extent local markets are integrated with international markets. Table 3 provides a summary of the level of import dependence and the extent to which any relative changes between production and consumption have occurred over the past five years. These relative changes are calculated as the difference between the average annual increase in production and domestic consumption. A negative percentage implies that, on average, consumption has increased faster than production and *vice versa*.

Zambia is the most self-sufficient of all the countries with respect to staple grain production. It is also the only country that produces a surplus of wheat, mostly commercially based under centre pivot irrigation. The other countries are major wheat importers, with 50 percent and more of local requirements imported. Ghana is the only country that produces some palm oil.

Table 2: Widely consumed food items in focus countries.

	Ghana			Kenya			Zambia			South Africa		
		CS	%		CS	%		CS	%		CS	%
1	**Cassava**	239	n.a	Milk	81	14.5%	**Cassava**	182	n.a.	**Maize**	88	6.0%
2	Yams	157	n.a	**Maize**	70	5.7%	**Maize**	121	n.a.	**Wheat**	56	11.3%
3	Plantains	141	n.a	Fruit	61	12.2%	Vegetables	22	n.a.	Potatoes	35	1.8%
4	**Rice**	66	n.a	Vegetables	61	9.6%	Fish	14	n.a.	**Chicken**	36	11.5%
5	Vegetables	28	n.a	**Wheat**	39	5.4%	Beef	10	n.a.	Milk	35	5.9%
6	Fruit	49	n.a	Potatoes	31	1.4%	Beans	10	n.a.	**Rice**	16	3.0%
7	**Maize**	26	n.a	**Rice**	21	3.9%	**Wheat**	9	n.a.	Beef	12	7.1%
8	Fish	25	n.a	**Cassava**	18	2.5%	Fruits	7	n.a.	Onions	12	0.7%
9	**Wheat**	19	n.a	Sweet pot.	14	1.3%	Milk	6	n.a.	Tomatoes	10	1.0%
10	Chicken	9	n.a	Beans	13	0.7%	Groundnuts	6	n.a.	Eggs	8	2.1%

Note: CS: domestic consumption in kg/capita/annum; %: percentage share of total food expenditure
Source: FAOSTAT, Household surveys where available for countries

Apart from Kenya, all countries are self-sufficient in maize, with South Africa producing the biggest crop and exportable surpluses. However, Ghana's production relative to consumption has increased the fastest, a measure of the extent to which the country is improving its local self-sufficiency rate, and of where local prices are trading relative to the import-export parity price band.

Figure 2 provides a prime example with the local maize futures market prices in South Africa (SAFEX) fluctuating between import and export parity prices, depending on the local supply and demand dynamics. Since South Africa mainly produces exportable surpluses of maize, local prices trade closer or at export parity levels. However, in a year of shortfalls, such as 2016, where South Africa and most of the Southern African countries experienced the worst drought in 100 years, SAFEX prices traded at import parity levels. In the next season, these high price levels plus favourable weather conditions triggered an expansion in production, leading to a record harvest in 2017 and a drop in prices to export parity again. If South Africa had not produced large surpluses over the past 3 years when global prices spiked, local prices and consequent staple food inflation would have been much higher, with local prices trading closer to R7000/ton (import parity) compared to the actual levels of R4500/ton (export parity).

Nevertheless, South African maize consumers experienced a sharp rise in maize meal prices as export parity prices for maize increased from R2200/ton in 2020 to R4500/ton in 2022, purely on the back of global price trends, shipping rates and the local exchange rate. Local supply and demand fundamentals did not play any part in this shift of parity prices.

Most grain and oilseed prices in South Africa are trading on the futures exchange with transparent information on supply and demand dynamics, including projected ending stock levels, which are published on a monthly (and sometimes even weekly) basis. However, despite all this information, maize markets can occasionally trade outside of the parity band. In the current 2023 production season, the maize harvest is estimated to be the third largest in history and significant volumes will have to be exported. However, ports are congested due to a combination of adverse exogenous impacts, like electricity blackouts, lack of maintenance and rail infrastructure that has deteriorated to the extent that most of the grain is now transported to the ports by truck. Furthermore, slots in the export terminals are at a premium due

Table 3: Relative import dependence and supply/demand dynamics**.**

	Ghana		Kenya		South Africa		Zambia	
	% Imported	S/D change	% Imported	S/D change	% Imported	S/D change	% Imported	S/D change
Maize	0.0%	5.9%	12.0%	–0.2%	0.0%	1.7%	0.0%	1.7%
Wheat	100.0%	n.a	91.0%	8.5%	51.0%	7.5%	0.0%	5.0%
Rice	20.0%	–0.4%	60.0%	18.0%	100.0%	n.a.	0.0%	11.6%
Cassava	0.0%	2.2%	0.4%	–4.1%	82.0%	n.a.	0.0%	–0.8%
Palm Oil	76.0%	1.1%	100.0%	n.a.	100.0%	n.a.	100.0%	n.a.
Chicken	72.0%	–1.6%	0.0%	4.6%	20.0%	4.3%	18.0%	7.6%

Note: % Imported: Percentage of domestic demand that is imported; S/D: % increase in production relative to % increase in consumption over past five season.
Source: FAOSTAT, Commodity Insight Africa, 2023

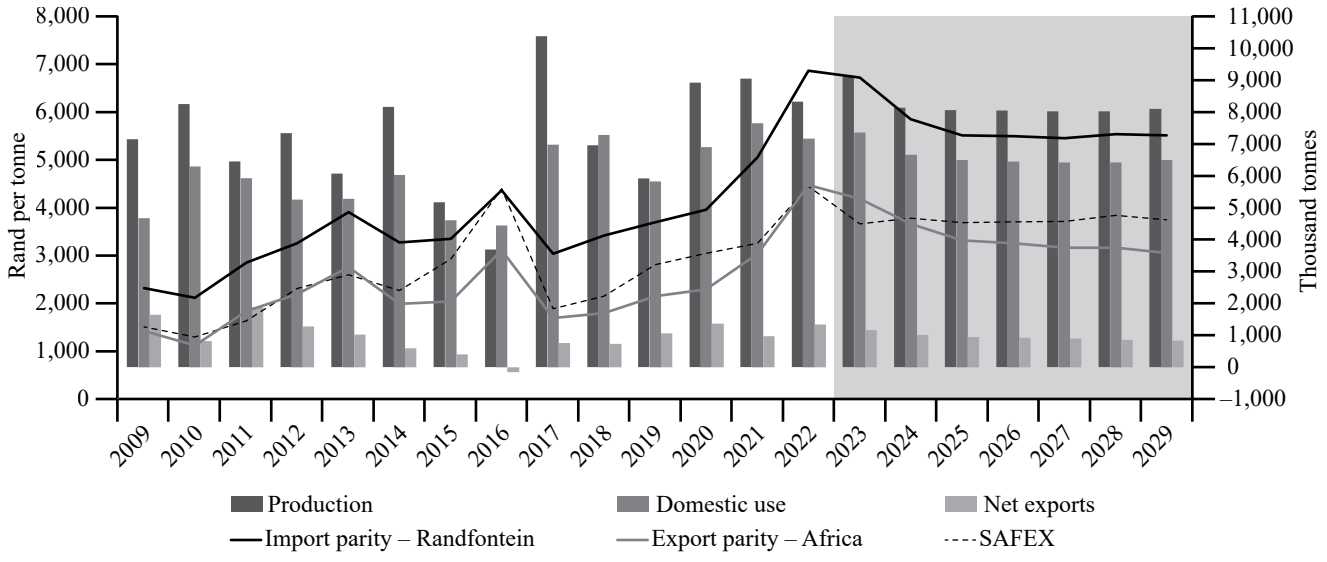

Figure 2: South African white maize prices and market fundamentals.
Source: BFAP, 2023

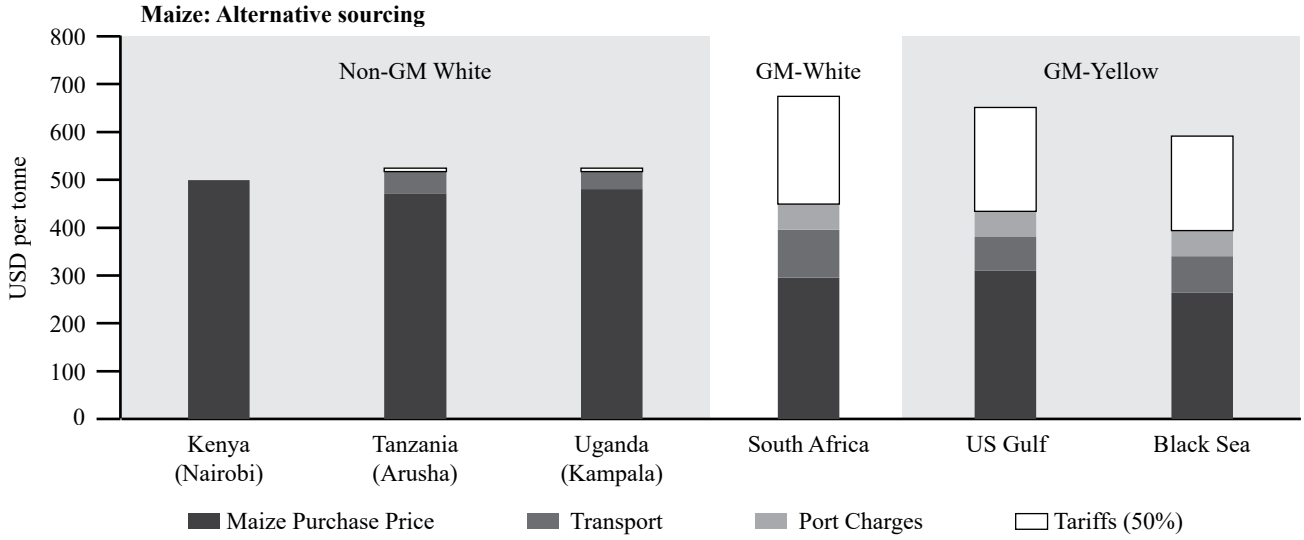

Figure 3: Kenya maize import parity versus domestic market prices, 2022.
Source: Commodity Insight Africa & Own calculations

to significant exportable surpluses of soybeans. The result is that at the time of writing, South African white maize was one of the cheapest sources of maize in the world, trading at $190/ton on the futures market in May 2023, compared to the US No.2 Yellow maize, free on board (FOB) Gulf price, trading at $272/ton.

Switching from one of the cheapest to one of the most expensive sources, Kenya's maize price was trading well above $500/ton in May 2023. Kenya imports around 12 percent (500 000 tons) of its local requirements, which implies that local prices are trading at import parity. Traders typically refer to the gap between FOB and CIF prices as the cost build-up of traded goods that ultimately determines if trade is economically viable. Figure 3 illustrates the cost build-up for imported maize into Kenya in 2022. The fact that genetically modified (GM) maize cannot be produced nor traded in Kenya implies that the potential sources of imported maize are limited. Non-GM white maize is typically imported from Uganda and Tanzania where GM crops are also banned. However, these markets also typically trade much higher than world markets. Apart from restrictive GM regulations, there is a 50 percent import duty on maize. Due to sharp price increases, the Kenyan government has introduced a temporary waiver of the import duty, yet it has not had a meaningful impact on local prices because non-GM maize trades at significant premiums in the world market, while excessive transport costs, inefficiencies at the ports, and taxes are keeping import parity prices at elevated levels (Figure 3).

From the discussion above, exchange rates and global prices are clearly the most prominent external drivers of food price inflation for goods that are either imported or exported. Consequently, declining trends in global commodity prices have ensured that import parity prices for African countries have already declined in dollar terms and are expected to trade even lower in the near-term future. Furthermore, shipping costs have also declined significantly on the back of lower energy prices, making it cheaper to bring agricultural imports to African coastlines. However, this does not imply that food prices are expected to fall significantly in the near future, because exchange rates, transaction costs, and macro and trade policies also all play a significant role.

In this regard, Figure 4 compares the food inflation trends in the focus countries to the exchange rate fluctuations relative to the US dollar. Although further econometric modelling can be undertaken, the trend in Kenya visually presents the closest fit. Kenya can be regarded as the most import dependant country with respect to food staples and vegetable oils. However, if all agricultural imports and exports are considered, it is important to note that Kenya is a net exporter, with significant foreign revenue generated, mainly from tea and flower exports.

The most drastic impact of exchange rate volatility on food prices can be witnessed in Ghana, and more specifically in the staple rice market (Figure 5). When Ghana's current economic crisis began in 2022, rice prices started to rise. In November 2022, the Bank of Ghana announced a policy restricting the supply of foreign exchange for the importation of some selected products e.g., rice, poultry, pasta, and vegetable oil. Although Ghana has more than doubled rice production over the past decade, it must still import approximately 20 percent of local demand. Hence, when the supply of foreign exchange was restricted in December 2022, the supply of imported rice was shut down, which sent local prices spiralling. Currently, on average, the price of a 50kg bag of locally produced rice is almost twice the price it sold for in the last quarter of 2022. According to Table 2, rice is the fourth most widely consumed food item and currently the single largest driver of the food inflation rate of more than 50 per cent.

Apart from Ghana, rice prices in Zambia and South Africa have been trending downwards over the past year, in line with global trends. In fact, rice prices in Zambia have decreased further due to a significant jump in local production in the past two years: local surpluses have pushed prices down to export parity levels.

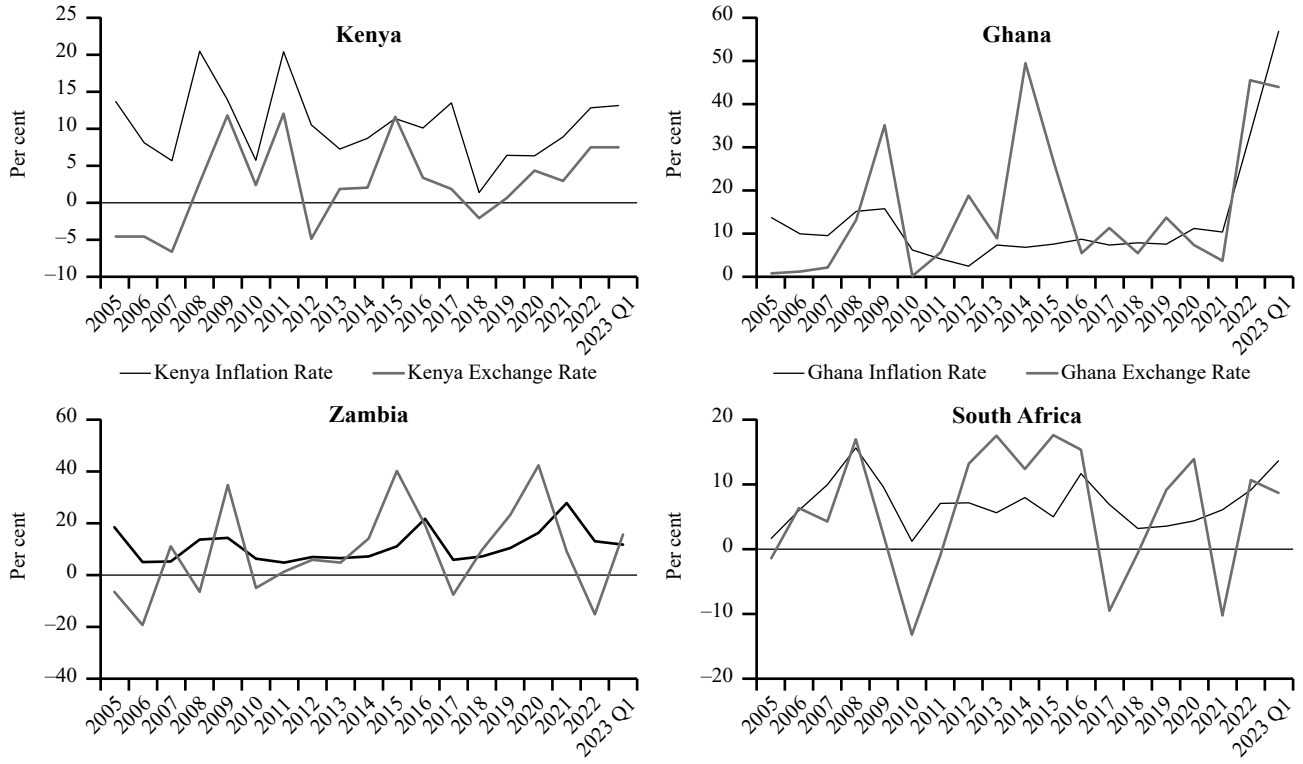

Figure 4: Food inflation versus exchange rate.
Source: FAO & IMF, 2023

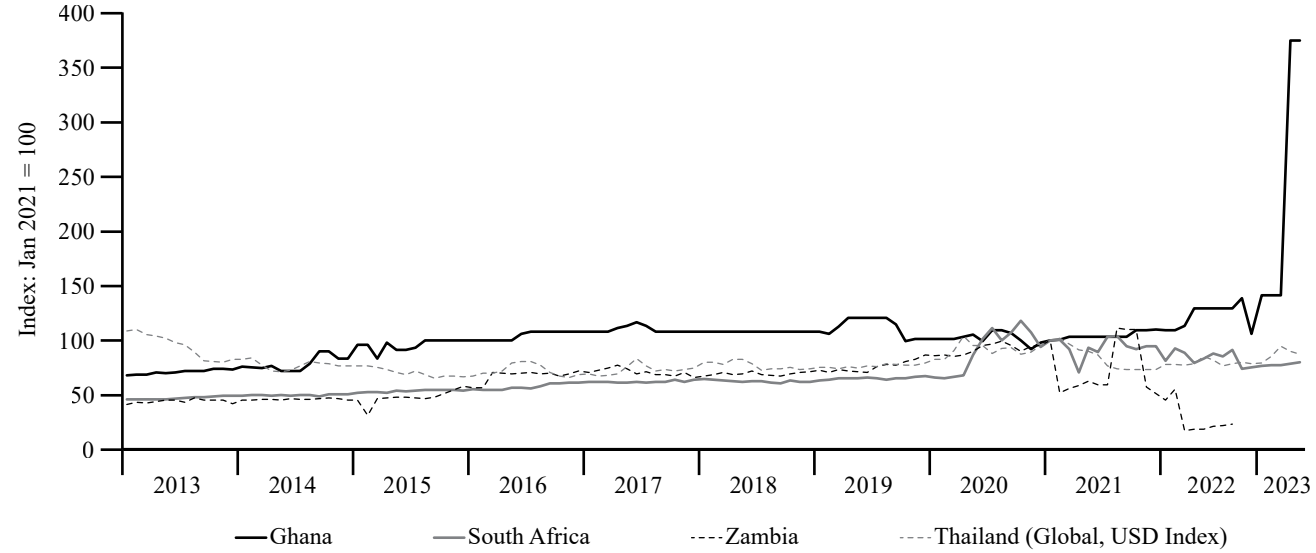

Figure 5: Rice wholesale price index.
Source: FAO GIEWS, 2023

The last set of analytics focuses on farm-to-retail price margins, because ultimately food inflation is not measured at the farm gate, but rather at retail level. There are significant gaps in monthly time series data to analyse and compare margins across various commodities and over a long period of time. Fortunately, there has been a much more concerted effort to collect these time series in recent years. This will provide critical insights to assist in the prioritisation of policy reforms and investments beyond the farm gate, where often significant drivers of food inflation influence the prices that consumers pay. The analysis obviously becomes far more complex due to the heterogenous nature of retail products, where the level of value addition and many other factors play a role in the final price. However, there is one common driver in the processing of all agricultural produce and that is energy. Energy costs influence the processing and transportation of food items.

Figures 6 and 7 present the maize-to-maize meal price spreads for Zambia and South Africa. In both instances, there is a long-term inflationary trend in the margin between producer and retail prices as costs within the supply chain are increasing. Although short-run volatility in margins seems

to be similar in both the South African and Zambia market, the drivers of price discovery in these two markets are fundamentally different. Whereas local market forces are driving competition and consequently relative price levels in South Africa, markets in Zambia are highly regulated with the Food Reserve Agency actively setting reference prices for maize and maize meal. Furthermore, the government also announces export bans from time-to-time, which raises the level of uncertainty in the market for all private sector stakeholders.

Zambia is not unique in deploying government intervention and regulations which have an adverse impact on the functioning and overall efficiency of markets. South African food value chains have been riddled by the electricity crises that the country is facing due to mismanagement and state capture of the state-owned electricity company over many years. Whereas large-scale processors have the financial means to invest in alternative sources of electricity generation, small scale operations are simply closing during the period where no electricity is supplied. Alternative sources of energy are far more expensive at approximately four times the price per unit of electricity supplied, compared to the standard rates of the national grid. These costs eventually all filter through to consumers and overall food inflation.

Conclusions

Food prices in Africa respond in familiar ways to changes in the global environment as in any other part of the world, but several unique characteristics of African countries must

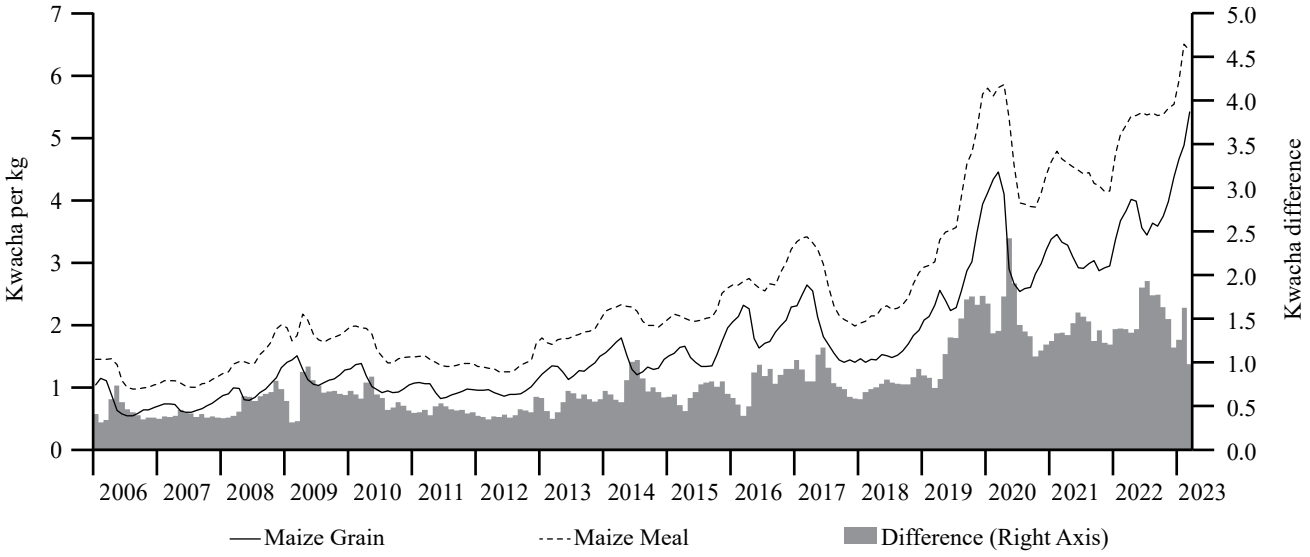

Figure 6: Zambia maize to maize meal price spread.
Source: FAO GIEWS, 2023

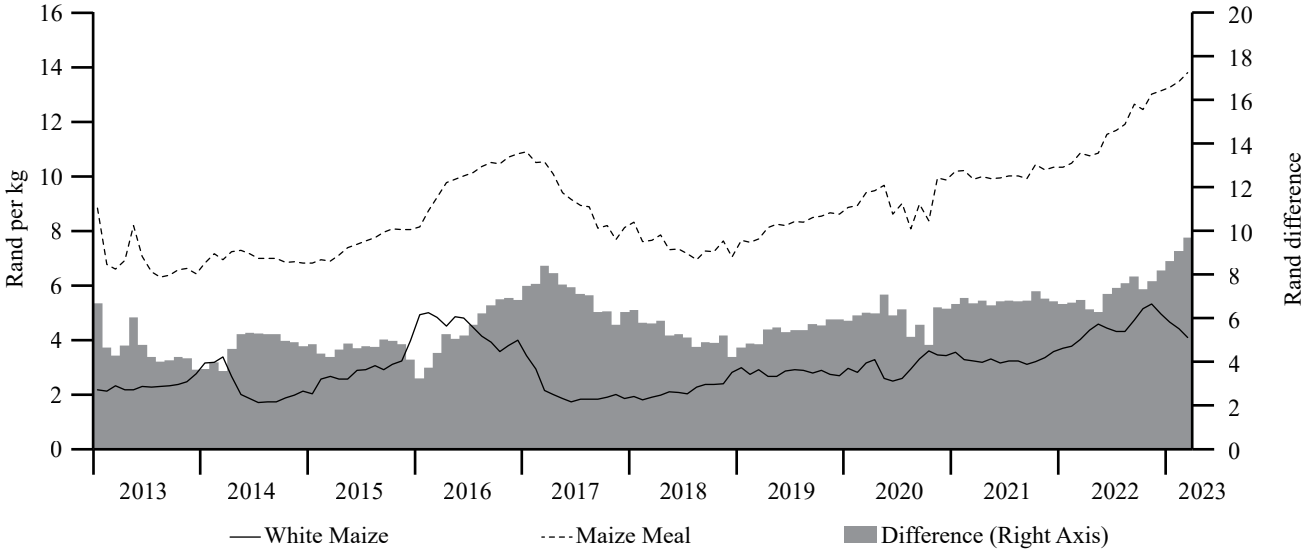

Figure 7: South Africa maize to maize meal price spread.
Source: FAO GIEWS, 2023

also be accounted for if we wish to understand how these prices play out in domestic markets.

First, African countries are largely price takers in the global market, with very few exceptions. Second, exceptionally high farm gate-to-consumer costs for both imported and domestically produced commodities distort domestic prices in relative terms (import vs. exportable commodities, along the value chain, etc.) and are a major driver of food price inflation. Over the past two decades, much emphasis has been placed on farm-level productivity by policymakers, often guided by academic research. However, evidence clearly shows that off-farm investments in the value chain can make a significant contribution to overall value chain competitiveness and consequently lower food price inflation. Third, the uncertainty that accompanies poor policy formulation and implementation, and that is engendered by state failure as has been the case in South Africa, distorts markets and results in the skewing of investment to mitigate the negative impacts of policy uncertainty rather than to build future opportunities. Furthermore, macro-economic policy formulation and geo-political orientations have significant impacts on exchange rate volatility and consequent parity pricing. In the case studies, we have shown that recent food price spikes such as in Ghana have been caused by extreme exchange rate volatility. Fourth, the high levels of poverty as well as of inequality (with South Africa at the extreme in this regard) distort consumer markets, which are fragmented by these extremes, and which compete with informal markets and with own consumption. Finally, these characteristics make it difficult to find relevant and timely data capable of helping researchers more fully understand what is really going on in the real world.

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Fazal MALAKHAIL*, Deepayan DEBNATH*, and Patrick WESTHOFF***

Causes of food inflation in North America: COVID-19 and the Russia-Ukraine war

Food inflation in North America reached its peak in 2022, mainly driven by two factors: COVID-19 and Russia's invasion of Ukraine. COVID-19 disrupted the global supply chain, and triggered labour shortages; consequently, governments in all three North American countries adopted fiscal and monetary policies to offset the impact of the pandemic, mostly by providing direct assistance to businesses and households and by lowering interest rates. The invasion of Ukraine, a major exporter of grain and vegetable oil, increased commodity prices and contributed to higher food prices. Overall, food inflation in the U.S. varies according to both sector and timeframe. In response to the Russian invasion, cereal product prices in the U.S. have increased, whereas meat prices spiked during the COVID-19 pandemic. This study focuses on determining the key factors that have led to higher food inflation in North America, and more specifically the United States. We have found that the unemployment rate, an index of global supply chain pressures, and COVID-19 related aid have directly contributed to U.S. food inflation. Projections from several organisations suggest food inflation will decline in 2023 and 2024.

Keywords: COVID-19, food inflation, meat price volatility, and Russia-Ukraine war
JEL classification: Q11

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Received: 2 July 2023, Revised: 21 July 2023, Accepted: 25 July 2023.

Introduction

Over the last two decades, average annual inflation in North America has been low or stable. In the U.S. and Canada, annual food inflation averaged 2.3% and 2.6%, respectively, between January 2001 and February 2020 (BLS, 2023a; Statistics Canada, 2023). However, things have changed since then, as two major events occurred. They are: firstly, in 2020, the COVID-19 pandemic; and secondly, in February 2022, the Russian invasion of their neighbouring country Ukraine, which significantly disrupted the supply chain - resulting in a substantial increase in food inflation across the globe. While both events are still ongoing, it is undeniable that the combination of COVID-19 plus the invasion of Ukraine by Russia has substantially increased inflation, and food inflation is not an exception.

In March 2020, the World Health Organisation declared the outbreak of COVID-19 to be a pandemic[1]. Following that declaration, many countries adopted stricter lockdowns and consumer food consumption patterns changed. Disruptions of supply chains impacted the availability and price of many food products. Later, another major world event occurred in February 2022 when the conflict between Russia and Ukraine started, which reduced supplies of grains and vegetable oil and otherwise strained the already fragile supply chain globally (Kim, 2022). As a result, COVID-19 and the war have raised inflation to a level that the world has not seen in decades.

Russia and Ukraine are the world's largest exporters of grains and oilseeds. Between 2016-17 and 2020-22, their combined export share in respect of barley, wheat, and maize was 32%, 38%, and 18%, respectively (Just & Echaust, 2022). The onset of war between those two countries, as well as the resultant disruption of the global supply chain of wheat, significantly affected trade and agricultural production, resulting in higher prices in 2022. Moreover, the war has disrupted the supply of energy, fertiliser production, and the supply chain, whose combined impact can be felt far beyond the immediate region – leading to levels of inflation that the world has not seen since 1970s. This poses a threat to food security.

In keeping with other parts of the world, in Northern America food inflation increased during the COVID-19 pandemic and it has been further aggravated since the start of the war, as shown in Figure 1. In the U.S., average annual food inflation has increased from 2.3% pre-COVID to 4.2% during COVID-19 between March 2022-February 2022 and still further to 10.4% during both COVID-19 and the period after the war began, between March 2022 and December 2022. Canada and Mexico have followed similar patterns. Food inflation in Canada has increased from a pre-COVID-19 level of 2.6% to 9.4% and in the case of Mexico, it has increased from 4.5% to 13.7% (BLS, 2023a; SNIEG, 2023; Statistics Canada, 2023).

The conflict between Russia and Ukraine started in February 2022, when the global food price was still recovering from the disruption of the supply chain due to COVID-19. Agricultural commodity markets were still rebounding after the COVID-19 episode. Just and Echaust (2022) have found that the Russia–Ukraine war may have increased uncertainty in the global food market. There is enough evidence to support the belief that the high food inflation witnessed across the world was triggered by those two events. However, since January of 2023 food inflation has been falling sharply as shown in Figure 1, as the Central Bank is tightening the money supply in a process which is commonly known as 'Quantitative Tightening'[2]

[1] https://www.who.int/europe/emergencies/situations/covid-19

[2] https://www.stlouisfed.org/en/open-vault/2019/july/what-is-quantitative-tightening

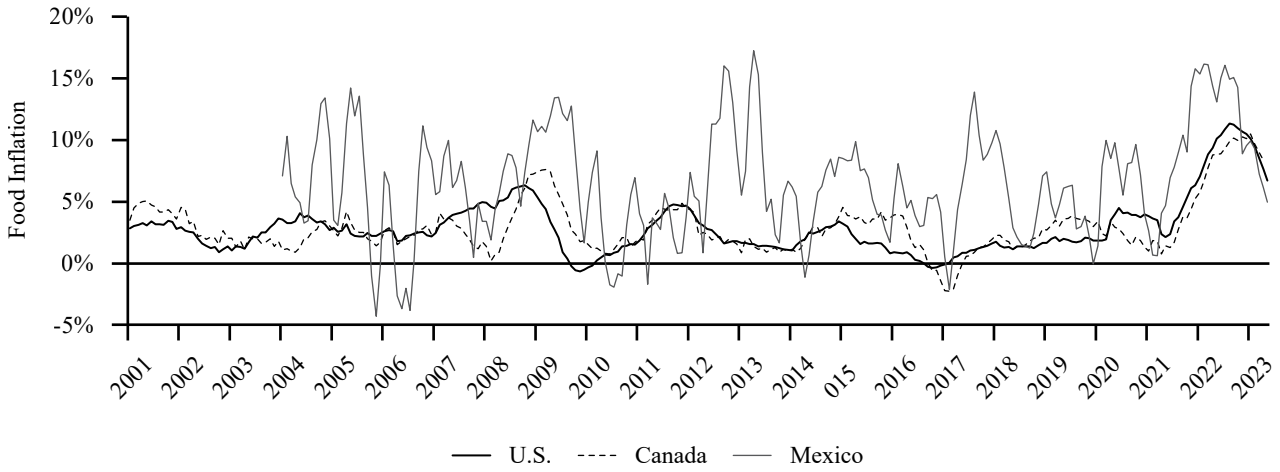

Figure 1: Food inflation in the U.S., Canada, and Mexico.
Source: BLS, 2023a; SNIEG, 2023; Statistics Canada, 2023

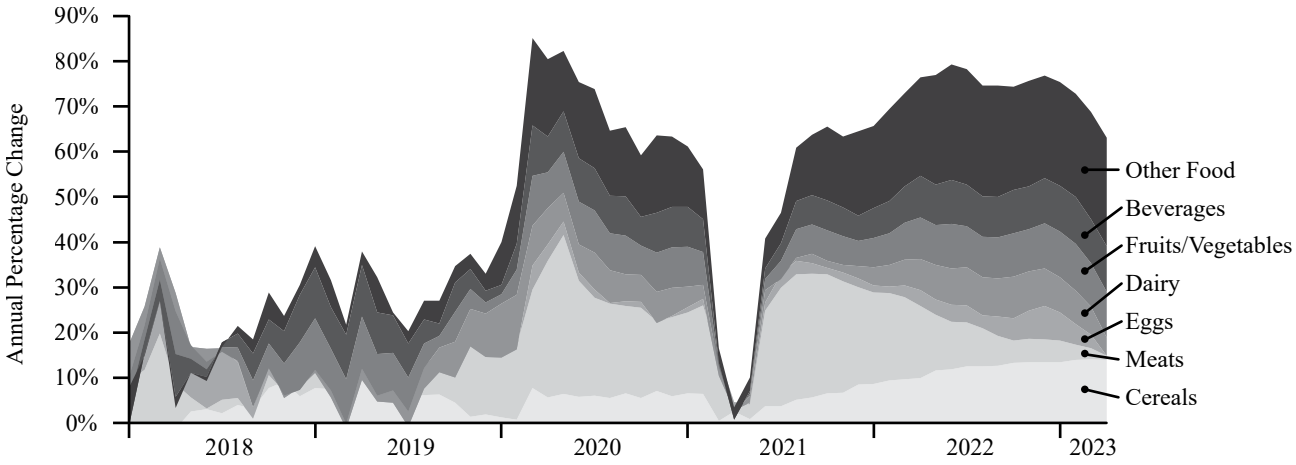

Figure 2: Product-level contributions to monthly U.S. food at home price inflation. Each food group is weighted by its share in BLS's food basket.
Source: BLS, 2023a

Inflation in North America

The countries in Northern America have seen record inflation as shown in Figure 1. In this section we will discuss inflation during the COVID-19 and COVID-19 + War era in first the U.S., then Canada, and finally, Mexico.

Inflation in the United States

There are both domestic and international or external factors that played a significant role in drastically increasing inflation in the U.S. The major international (external) factors are: the COVID-19 pandemic and associated policy responses; disruption in the global supply chain; the U.S.-China trade war; the imposition of a stricter lockdown in China, and Russia's invasion of Ukraine. Domestic factors include: governmental fiscal and monetary responses to the pandemic which, led by the Federal Reserve, substantially lowering interest rates during the COVID-19 period (Chafuen, 2021), and labour shortages, to name just a few. The agricultural labour shortage during the COVID-19 period was triggered by a lack of available immigrant labour attributable to border closures and transportation challenges[3], followed-by the "great resignation" period[4]. The impact of inflation was felt everywhere in the economy. Between December 2021 and 2022, the consumer price index for food prices in the U. S. increased by 10.4%, and the price of energy increased by 7.3% (Mbah *et al*., 2023). The food basket of the U.S. CPI – a standard measure of food inflation – is divided into two parts: 1) food at home, and 2) food away from home. The first component carries more weight and, hence, is more important to understand food inflation in the U.S. Overall, food-at-home inflation has increased consistently since COVID-19 started, but its sub-categories have changed in different ways within that timeframe, suggesting that the underlying reasons behind high food inflation in the U.S. may vary. Figure 2 shows that different factors have impacted U.S. food prices at different times. Meats were the dominant factor behind high food inflation when COVID-19 started, for example, in mid-2020 it comprised more than one-third of the food-at-home inflation.

[3] https://agamerica.com/blog/labor-shortage-impact-on-fruit-and-nut-farms/
[4] https://hbr.org/2022/03/the-great-resignation-didnt-start-with-the-pandemic

However, the contribution of other food at home, i.e., fats and oils, and cereals, became significant and began to outweigh meats' contribution following Russia's invasion of Ukraine. While overall food inflation has started to recede in 2023, other food and cereal prices are still contributing to the overall U.S. food inflation.

However, the inflation rate is expected to fall to 3.5% in 2023 and it is projected to fall further to 2.2% by 2024 (International Monetary Fund, 2022), as the Federal Reserve is periodically increasing interest rates.

Inflation in Canada

Inflation in Canada has been driven by the following similar factors: the rise in commodity prices due to disruptions in the supply chain induced by the Russia-Ukraine war; a significant spike in consumer demand; and a tightened labour supply due to the impact of COVID on immigration. According to a recent survey performed by Statistics Canada, 43% of respondents believed that inflation has impacted food prices the most. Between April 2021 and April 2022, food prices in Canada increased by 9.7%, causing Canadian to pay substantially higher prices for basic foods items that include fruits, vegetables, and meat (Statistics Canada, 2022). Amid the current high inflation, the Canadian administration – in an attempt to lower the inflation rate to 2% – announced several new monetary policies, including hiking the interest rate (Maguina, 2022). However, Canada may find itself heading towards a recession in 2023, if their interest rate hike – whose purpose was to bring down inflation – has worse consequences than anticipated (Lajartre, 2022).

Inflation in Mexico

During the pandemic, the food supply chain in Mexico was affected by a sudden change in consumer behaviour, as more people has started dining at home: either by choice, or because they were forced to do this by lockdown. This abrupt change forced food suppliers to pivot from producing foods designed to be served in restaurants to instead producing goods for grocery stores (Smith, 2022). In fact, changed eating habits on the part of consumers has impacted the food and agriculture industry not only in Mexico, but also in the U.S. and Canada. Russia's invasion of Ukraine, which triggered disruption of the wheat supply chain from the world's food basket to the rest of the world, has significantly impacted energy and commodity prices in Mexico. Food inflation, when taken to include processed food and beverage prices, rose by 14.1% while fresh produce rose by 9.5%. In 2021, energy costs went up by 2.9% (Harrup, 2023). A Banxico (Bank of Mexico) study hinted that the rate of inflation may have reached the highest level during the third quarter of 2022, and it is expected to drop to 3% by the end of the third quarter of 2024 (CE Noticias Financieras, 2023). After reaching 8% in 2022, overall inflation is expected to fall to 6.3% in 2023 and it could fall further to a stable rate of 3.9% in 2024.

Previous studies have applied time series techniques to estimate spillover effect of inflation from one country to another (Aharon and Qadan, 2022; Caldara *et al.,* 2022; Jordan, 2016; Pham and Sala, 2022; Saâdaoui *et al.,* 2022; Shahzad *et al.,* 2023; Tiwari *et al.,* 2019). Another group of studies (Cao and Cheng, 2021; Hung, 2021; Just and Echaust, 2022; MacLachlan *et al.,* 2022; Zhu *et al.,* 2021) have focused on cross commodity inflation, while others have emphasised analysing the role of monetary policies on inflation (Frick, 2022; Friedman, 1970, 1983; Hansen, 1951; Jahan and Papageorgiou, 2014; Mbah *et al.,* 2023). However, unlike these studies, we have focused on tracing the root cause of inflation in Northern America. In this study, we determine the factors that have led to food inflation in Northern America, and more specifically, the U.S. The primary objective of this study is to estimate the impact of COVID-19 and Russia's invasion of Ukraine on the U.S. food inflation. We further estimate several alternative models to gauge whether there is a causal relationship between U.S. food inflation and external and internal factors related to the inflation.

Data and Methodology

Data

This article utilises several data sources to measure factors behind recent high food inflation in the U.S. We have used observations for the last five years on monthly basis from January 2013 to December 2022 to capture the most frequent variations in the food inflation.

The majority of the information used in this study was obtained from the U.S. Bureau of Labor Statistics (BLS, 2023a), notably national inflation and labour market statistics. For the target variable, we used seasonally adjusted monthly Consumer Price Index (CPI) for food, collected throughout major cities in the U.S. We then converted the food CPI to food inflation (FI) by calculating the monthly percentage change in CPI from one year to another year to understand how food prices changed from year to year on monthly basis. We also used CPI for all items and converted it into headline inflation. Our target variable remains food inflation; however, we wanted to understand how the two measures changed over the observed period.

We used the Current Population Survey of the BLS (BLS, 2023b) to understand labour force linkages with food inflation. We used seasonally adjusted monthly total unemployment (TU), seasonally adjusted monthly unemployment rate (U), and total job openings in non-farm sector (TV). To capture both elements of labour supply and demand in the market, we used the ratio of total job openings to total unemployment represented henceforth as unemployment ratio (UV):

$$UV_t = TV_t/TU_t \tag{1}$$

Ball *et al.* (2022) observed that the ratio explained more variation in core inflation, hence, we also relied on this ratio to capture its influence on food inflation. In macroeconomics, this association is captured through the Beveridge curve

and suggests an inverse link between the two where more job openings reduce unemployment level (Yashiv, 2006).

To capture supply-side disturbances, we used the newly established Global Supply Chain Pressure Index (GSCPI) by the Federal Reserve Bank of New York. The index captures many aspects of the trade and supply lines among major trading economies in the globe. The set of indicators used in the index captures cost of shipping and air transportation, cost of raw materials, country specific manufacturing data in seven global economies, and indicators that capture delivery time, backlogs and purchased stocks (Benigno *et al.,* 2022). The GSCPI comprises data on Baltic Dry Index (BDI), Harpex index, BLS data, and IHS Markit's Purchase Manager Index (PMI) surveys. Among the seven economies, China is of the particular importance when it comes to supply chain conditions. Other economies are Japan, Korea, Taiwan, EU, UK, and the U.S. We believe this index is comprehensive enough to capture many supply issues encountered since onset of the COVID-19.

We used COVID-19 stimulus (COVIDAID) data to understand how COVID-19 related financial aid could have impacted food inflation in the U.S. (USASPENDING, 2023). We used the amount of money awarded through contracts by federal government to individuals, organisations, businesses, or state, local, or tribal governments. We then aggregated the award spendings by month to capture demand side influence arose from pandemic related aid on food inflation.

Russia's invasion of Ukraine has also contributed to food inflation in the U.S. since it began in February 2022. Input costs such as oil, natural gas, and market uncertainty arising from supply chain disruption increased commodity prices in the U.S., which in turned increased food prices. Wheat futures increased by 60% and corn and soybean futures by more than 15% in the immediate aftermath of Russian invasion (Glauber, 2023). In 2021, the top Ukrainian agricultural exports were corn, wheat and barley among grains, and sunflower seed, sunflower oil, and sunflower meal among oilseed products (USDA, 2022). We extracted monthly Ukrainian export (EXPUR) data for these six commodities from UN Comtrade Database and then aggregated them in our model to understand the war's effects on food inflation (UN, 2023).

Additionally, we added two dummy variables: COVID and COVID+WAR to capture the overall impact of those events. COVID is a dummy variable with two levels capturing the timing since COVID-19 started. "Pre-COVID" refers to the timing from January 2018 to February 2020, while "COVID" refers to the period after COVID infections began to increase rapidly around the world in March 2020. Though COVID-19 broke out in early 2020, its influence began to be felt in earnest around March 2020, and particularly so in the U.S., in terms of affected cases and deaths from the virus. COVID+WAR is also a dummy variable with two levels that captures the timing of the war started in Ukraine in late February 2022. "Pre-War" refers to the timing from January 2018 to February 2022, while "War" refers to the time from March 2022 to December 2022. The "War" period also overlaps with the "COVID" period, that war occurred while COVID-19 was still ongoing. Therefore, we called this period as "COVID+WAR".

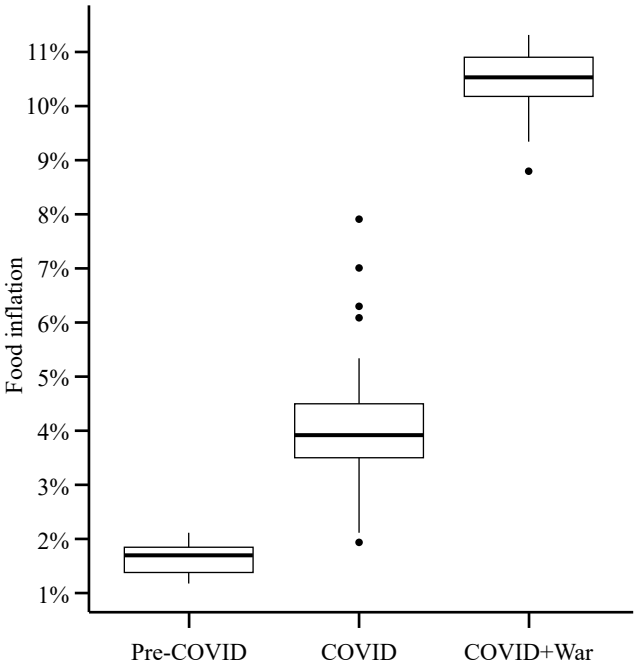

Figure 3: Comparison of the U.S. food inflation between pre-COVID period and COVID and COVID+War period.
Source: BLS, 2023a

U.S. food inflation increased substantially during the COVID period, and further accelerated as the war between Ukraine and Russia commenced. Average food inflation was 2.3% before COVID-19, jumped to 4.2% when COVID-19 started, and it averaged 10.4% between March and December 2022 as shown in Figure 3.

Table 1: Descriptive statistics of the monthly data from January 2018 to December 2022.

	Headline Inflation, %	Food Inflation (FI), %	Unemployment Rate (U), %	UV[a)]	GSCPI[b)]	Covid Aid (COVIDAID) Million USD	Ukraine Exports (EXPUR) 000 MT
MIN	0.23	1.16	3.50	0.20	–0.65	0	1,232
1st Qu.	1.70	1.76	3.60	1.00	0.39	0	3,608
Mean	3.64	4.12	4.94	1.20	1.39	654	4,823
3rd Qu.	6.02	5.13	5.70	1.52	2.67	942	5,838
MAX	8.93	11.33	14.70	2.01	4.31	4,893	7,791
SD	2.64	3.20	2.33	0.46	1.33	921	1,493
CV	0.73	0.78	0.47	0.38	0.95	1.41	0.31

[a)] The ratio of job openings to unemployment. [b)] Global Supply Chain Pressure Index.
Note: SD: Standard Deviation, CV = Coefficient of Variation.
Source: Own composition based on UN (2023) and USDA (2023) data

Methodology

We arranged all data on a month-to-month basis and ran ordinary least square (OLS) regressions to understand COVID-19 and war-related factors affecting food inflation in the U.S. We only used the last five complete years of monthly data, from January 2018 to December 2022, with 60 observations. In so doing, we followed the approach of Ball *et al.* (2022), who used OLS regressions to understand variations in food inflation using, food prices, Global Supply Chain Pressure Index, and backlogs of work among others. Table 1 provides descriptive statistics for the data we used in this model.

Table 1 indicates that in the last five years on average, food inflation was higher than headline inflation and exhibited both more extreme values and more variation, since it has a higher coefficient of variation. GSCPI data indicates that the overall index remained low except in the last quantile, which drove the mean value and variation. COVIDAID indicates that around five billion USD had been spent on COVID-19-related award contracts by the end of 2022 (USASPENDING, 2023). EXPUR has gradually increased over the last five years, except during the time of the Russian invasion, at which point Ukrainian agricultural exports dropped significantly until the Black Sea Grain Initiative was signed in late July 2022.

We have estimated multiple regression models to understand how food inflation is influenced by some of the factors mentioned earlier in Table 1:

$$FI_t = \alpha_1 + \beta_1\, U_t + \gamma_1\, GSCPI_t + \\ +\ \delta_1\, COVIDAID_t + \ \varepsilon_1 \tag{2}$$

where food inflation (FI) is a function of unemployment rate (U), the global Supply Chain Pressure Index (GSCPI), and COVID assistance (COVIDAID) in year *t*. α_1, β_1, γ_1, and δ_1 are the intercept and slope coefficients, respectively. ε_1 is the error term which is independent and identically distributed $\varepsilon_1 \sim iid\ (0, \sigma^2)$.

From the macroeconomic literature, we expect a negative sign on β_1 since this represents the well-known Philips Curve. γ_1 shows how the supply chain issues could have impacted food inflation, and we expect a positive sign on this parameter. We also expect a positive sign on δ_1, implying that increased COVID-19 assistance could have impacted food inflation through demand-pull.

Model 2 also estimate U.S. food inflation. Here, we introduce the ratio of job openings to unemployment:

$$FI_t = \alpha_2 + \beta_2\, UV_t + \gamma_2\, GSCPI_t + \\ +\ \delta_2\, COVIDAID_t + \ \varepsilon_2 \tag{3}$$

where, α_2, β_2, γ_2, and δ_2 are the intercept and slope coefficients, respectively. ε_2 is the error term which is independent and identically distributed $\varepsilon_2 \sim iid\ (0,\sigma^2)$.

Here, all right-hand side variables have remained the same from Eq. (2), expect that we have changed the unemployment rate with UV from Eq (1). Since UV is the ratio of job openings to unemployment, it satisfies all the properties of ratio, where we expect a positive correlation between food inflation and job openings and a negative one between food inflation and unemployment.

In model 3, we have extended Eq. (3) by adding Ukrainian agricultural exports to the model to capture influence of war-related factors on food inflation, as shown in Eq. (4):

$$FI_t = \alpha_3 + \beta_3\, UV_t + \gamma_3\, GSCPI_t + \\ +\ \delta_3\, COVIDAID_t + \theta_3\, EXPUR_t + \ \varepsilon_3 \tag{4}$$

where, α_3, β_3, γ_3, and δ_3 are the intercept and slope coefficients, respectively. ε_3 is the error term which is independent and identically distributed $\varepsilon_3 \sim iid\ (0,\sigma^2)$. θ_3 can explain how the Russian-Ukraine war elements contributed to the food inflation.

Lastly, in model 4, we introduced two dummies along with the unemployment ratio as shown in Eq. (5):

$$FI_t = \alpha_4 + \beta_4\, UV_t + \ \rho_4\, COVID_t + \\ +\ \lambda_4\, (COVID + WAR)_t + \ \varepsilon_4 \tag{5}$$

where, α_4, β_4, γ_4, and δ_4 are the intercept and slope coefficients, respectively. ε_4 is the error term which is independent and identically distributed $\varepsilon_4 \sim iid\ (0,\sigma^2)$. ρ_4 explains if the difference between "Pre-COVID" and "COVID" was significant, while λ_4 shows if the true difference between "NO–WAR" and "COVID+WAR" was significant on food inflation.

Results and Discussion

We have estimated four models to understand how COVID-19 and war-related factors influenced food inflation in the U.S. Table 2 presents the findings of our regression models. The components of our first equation are unemployment rate (U), the Global Supply Chain Pressure Index (GSCPI), and COVID-19-related assistance provided by federal government (COVIDAID). We have found that all the three variables contributed significantly to food inflation in the U.S.

From the macroeconomics literature we expect a negative link between unemployment and inflation (including food inflation). This relationship is well documented through the famous Phillips curve. We found that estimated β_1 is -0.297 significant at the 5% level. This was particularly evident when unemployment rate jumped to record-high 14.7% in April 2020 with the start of COVID and then gradually decreased from there, eventually reaching a plateau at the end of 2022, whose level was similar to where it started out before COVID-19 occurred.

With the start of COVID-19, global supply and trading issues emerged due to labour shortages and lockdowns. The GSCPI index shot up for the first time by 1.37 points in March 2020, but subsided in the later months. However, the GSCPI started to increase further in 2021 and peaked at 4.31 at the end of 2021, from there it receded but remained higher than pre-COVID-19 levels. In our model estimated γ_1 is 0.798 and contributed to food inflation positively, as expected.

Plotting monthly food inflation against GSCPI in Figure A1 supports the hypothesis that food inflation positively responded to global supply issues. Sub-setting data among COVID-19 and the COVID+WAR period further indicates that throughout 2020 and 2021, food inflation increased to coincide with supply-chain constraints, but later supply issues gradually improved as countries adjusted to the "new" normal conditions during COVID-19 period. However, since 2022 food inflation and GSCPI were not positively correlated. In fact, the relationship turned negative, as other factors started to influence food inflation in the U.S., notably factors related to the Russia-Ukraine War.

On the demand side, our model indicates that the COVID-19 stimulus encouraged food inflation in the U.S. by injecting money into the market, leading to higher expenditure and more personal consumption while supply issues were still persistent. This is because in response to the weakening economy due to COVID-19 spread, the U.S. government passed the Coronavirus Aid, Relief, and Economic Security (CARES) Act promising 2.2 trillion USD in March 2020. Later, the American Rescue Plan Act further obligated 1.9 trillion to COVID-19 response in March 2021. In total, 4.51 trillion USD has been earmarked for pandemic response, out of which, so far 4.21 trillion USD has been paid to individuals, organisations, businesses, or state, local, or tribal governments as contracts or financial assistance (USASPENDING, 2023). In our model estimated δ_1 is 0.002 and hence supported our hypothesis that COVID-19 assistance positively contributed to food inflation. Figure A2 highlights that linkage.

Model 2 improved on the first one, as we are using the ratio of job openings to unemployment (unemployment ratio) instead of just using unemployment rate. Using the unemployment ratio significantly improved the model fit by increasing R-squared from 0.59 to 0.70, while retaining the remaining variables. The reason could be that the ratio captures both labour supply and demand into the market. The two significantly diverged when COVID-19 hit unemployment, causing the ratio to decline significantly. However, later job openings outpaced unemployment and the ratio peaked around the start of 2022. In our second estimated model, β_2 is 2.984 indicating that higher job openings from economic prosperity leads to higher food inflation, or that a lower unemployment rate leads to food inflation (as shown in Figure A3).

In Model 3, we have improved things further by adding an indicator EXPUR that was impacted by Russia-Ukraine war. EXPUR predict how war intensity could have impacted food inflation in the global level, including the U.S. Adding that element has further improved our model; R-squared increases to 0.72. Interestingly, while the estimated θ_3's sign is consistent with the theory, the coefficient is not statistically significant. This suggests that we have no evidence to conclude that the impact of Russia's invasion of Ukraine on agriculture commodities has influenced U.S. food inflation.

Finally, we have run a regression with two dummies representing COVID-19 and COVID+WAR periods along with the unemployment ratio – Model 4. This model shows the most variation in food inflation with improved R-squared of 0.93. Both coefficients ρ_4 and λ_4 were statistically significant,

Table 2: U.S. food inflation estimates.

Explanatory variable	Dependent variable: Food Inflation, %			
	(Model 1)	(Model 2)	(Model 3)	(Model 4)
Intercept	3.097	–1.303	–0.030	–0.213
Unemployment Rate (U)	0.297* (0.123)			
Unemployment Ratio (UV)		2.984*** (0.541)	2.951*** (0.533)	1.600*** (0.340)
Global Supply Chain Pressure Index (GSCPI)	0.798*** (0.226)	0.516** (0.184)	0.491** (0.182)	
COVIDAID	0.0021*** (0.0003)	0.0017*** (0.0002)	0.0017*** (0.0002)	
Ukrainian export (EXPUR)			-0.0002 (0.0001)	
COVID-19 dummy (COVID)				2.841*** (0.254)
Russia-Ukraine War dummy (COVID+WAR)				4.787*** (0.451)
Observations	60	60	60	60
R^2	0.590	0.706	0.720	0.932

Notes: Standard errors reported in parentheses. Statistically significant difference *** at the 0.1% level, ** at the 1% level, and * at the 5% level.
Source: Own calculations

Table 3: ANOVA statistics.

	Df	Sum of Squares	Mean Square	F-value	P-value
COVID	1	278.85	278.85	273.9	0.000***
COVID+WAR	1	276.72	276.72	271.8	0.000***
Residuals	57	58.03	1.02		

Statistically significant difference *** at the 0.1% level, ** at the 1% level, and * at the 5% level.
Source: Own calculations

Table 4: The U.S. food inflation elasticities during the COVID+War period.

	Unemployment Ratio (UV)	Global Supply Chain Pressure Index (GSCPI)	Covid Assistance (COVIDAID)	Ukrainian Exports (EXPUR)
U.S. Food Inflation	0.60	0.19	0.33	–0.19

Source: Own calculations

suggesting that there are many unaccounted variables that we failed to capture in Models 1-3. Model 4 suggest that both COVID-19 and the war, along with the unemployment ratio, have significantly impacted U.S. food inflation.

Furthermore, we have performed an ANOVA test to understand if the means of those two external events are statistically different. Table 3 shows that both COVID and COVID+WAR had significant impacts, and they are not redundant.

We have further utilised Model 3 to better understand the factors contributing to U.S. food inflation. We have calculated average U.S. food inflation elasticities with respect to 1) Unemployment Ratio, 2) Global Supply Chain Pressure Index, 3) Covid Assistance, and 3) Ukrainian Exports over the period since the start of Russia-Ukraine war. Table 4 shows that the unemployment ratio (UV) was the highest impact among other variables, suggesting that a 1% increase in the UV triggers 0.60% increase in food inflation, followed by the Covid Assistance elasticity (0.33). Both GSCPI and EXPUR have comparable elasticities but with opposing directional effect; 1% increase in COVIDAID or 1% decrease in EXPUR lead to 0.19% increase in food inflation. The outcome met our expectation and is consistent with economic theory.

Conclusion

Across identification schemes, the supply-side factors we have modelled make the dominant contribution to food price changes over time. Yet, beginning with the onset of the pandemic, the demand factors in our models (the money supply and per-capita U.S. income, leaving aside core prices, which are also potentially affected by these variables but modelled explicitly) have grown in importance in terms of the contribution they make to realised food price changes by about 20% relative to the previous 5-year period (on average). As these demand-side factors were affected by monetary and fiscal stimulus programmes, which supported economic activity during and after the initial pandemic-driven contraction, our results suggest that stimulus measures may be partially responsible, among other factors, for the food price inflation observed. Other potential explanations for a growing role of demand factors in food prices include the rapid release of pent-up demand, or preference changes generated by the lifting of pandemic lockdowns. Our findings invite further research to investigate precisely why recent rising food prices appear more sensitive to demand pressures.

When food inflation among North American countries reached its peak, it was mainly driven by two factors: COVID-19, and the Russia-Ukraine war. Multiple COVID-19-related factors have led to such inflation. COVID-19 has disrupted the global supply chain, triggered a shortage of labour as a lower number of migrants began to arrive, and lastly central banks in all three North American countries adopted monetary and fiscal policies to reduce the impact of the pandemic, mostly by lowering interest rates and providing financial relief. Russia's invasion of Ukraine has caused food inflation to deteriorate further. Our study shows that both external and internal factors have impacted U.S. food inflation.

External forces such as the spread of COVID-19 and the spillover effects of Russia's invasion of Ukraine – both in the region and elsewhere – have significantly impacted food inflation in the North American countries. We used proxy variables to gauge the intensity of the two events on the U.S. food inflation. First, the Global Supply Chain Pressure Index that captures the global supply chain issues was aggravated by the onset of COVID-19 and significantly impacted food inflation in the U.S. Second, we used Ukrainian agricultural exports to estimate the intensity of the war's effects on food inflation. However, we found no statistical evidence to support the conclusion that the agricultural trade disruption in Ukraine has directly impacted the U.S. food prices.

In association with external factors, internal elements also contributed to food inflation in the U.S. The U.S. government used both of its fiscal and monetary tools to limit impact of COVID-19 and war to their economy. On the monetary front, the Federal Reserve Bank lowered interest rates to boost economic activity that was hit hard by onset of the pandemic. This led to more job openings and lower unemployment and ultimately contributed to higher food inflation. In our estimated model we captured this behaviour by means of the unemployment ratio and discovered that it has substantially contributed to food inflation in the U.S. On the fiscal policy front, increased government spending through financial assistance also accelerated economic activity through more consumption which in turn impacted food inflation in U.S. We captured this behaviour with COVID-19 stimulus and found that its impact was statistically significant to food inflation in the U.S.

However, it is anticipated that the overall inflation among these countries may be lower in the coming years and could reach 2% equilibrium in the long run (Mbah *et al.,* 2023). Figure 4 shows the long-term inflation among North America countries and Figure 5 depicts the U.S. long-term consumer food price.

In 2023, food inflation in the U.S., Canada, and Mexico has consistently been falling as shown in figure 4, which indicate that the monetary policies – which include interest rate rises – adopted by these counties are effective.

The food and agricultural policy research institute (FAPRI) predicted in January 2023 that food inflation in the U.S. will gradually recede in the coming years, due to the Federal Reserve's aggressive monetary policy stance. The Fed has increased interest rates 10 times in a row since March 2022 to combat food inflation (Smialek, 2023).

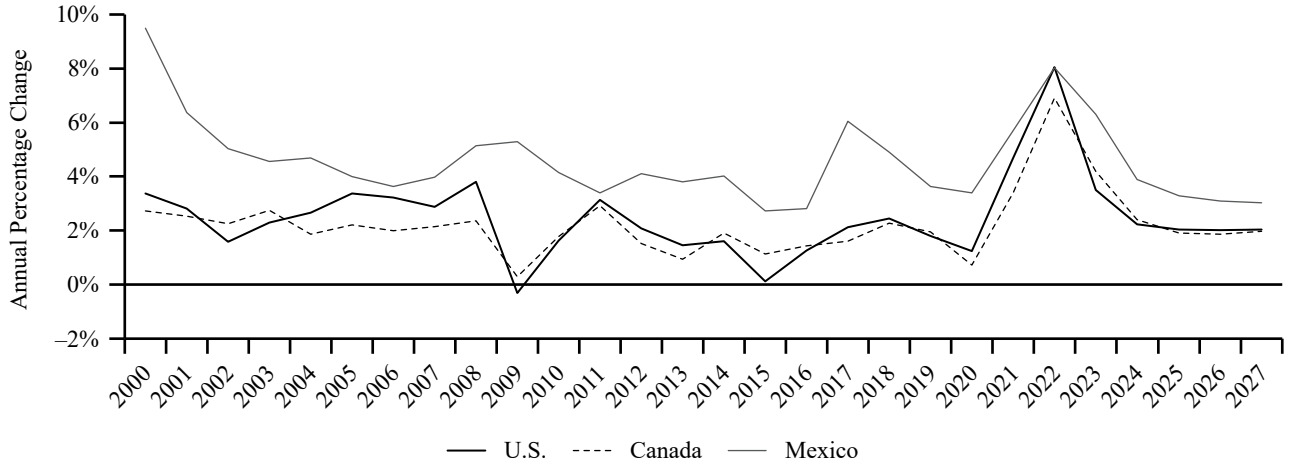

Figure 4: Inflation percent change for average consumer prices in among three North American countries.
Source: International Monetary Fund, 2022

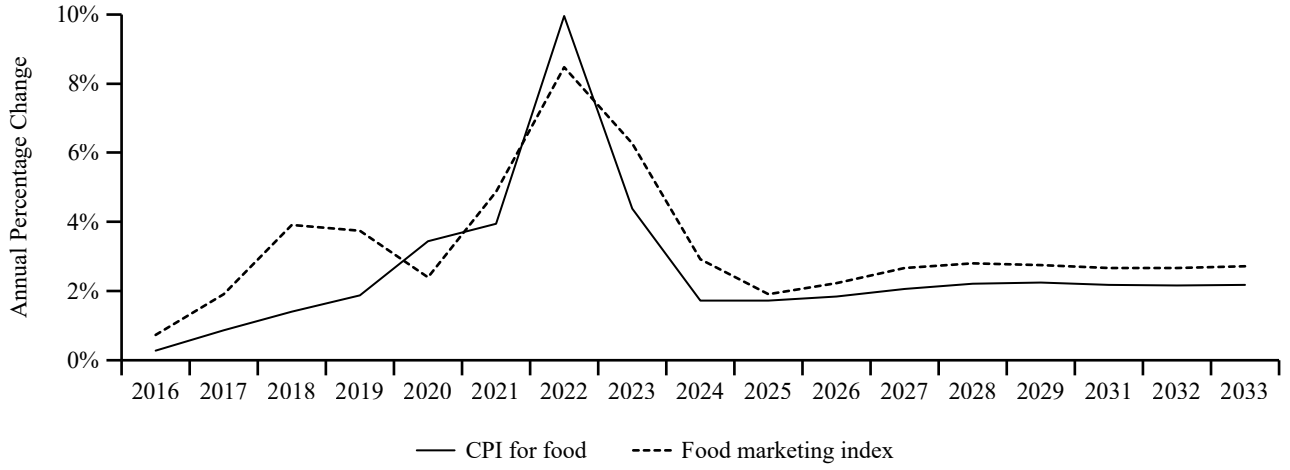

Figure 5: Long term outlook of the U.S. Food price indices.
Source: FAPRI, 2023

Acknowledgements

This research paper is based upon work supported by the U.S. Department of Agriculture, under Agreement No. 58-0111-22-015. The authors acknowledge helpful insights from Marc Rosenbohm of University of Missouri during discussing this topic and his elaborative ideas. Any opinion, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture nor the University of Missouri.

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Appendix

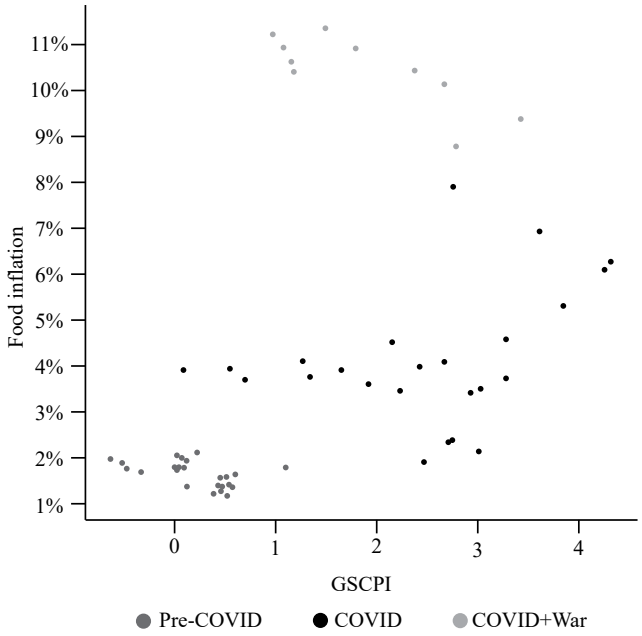

Figure A1: The relationship between U.S. food inflation and global supply Chain Price Index (GSCPI) during Pre-COVID, COVID, and COVID+War era.

Source: Own composition

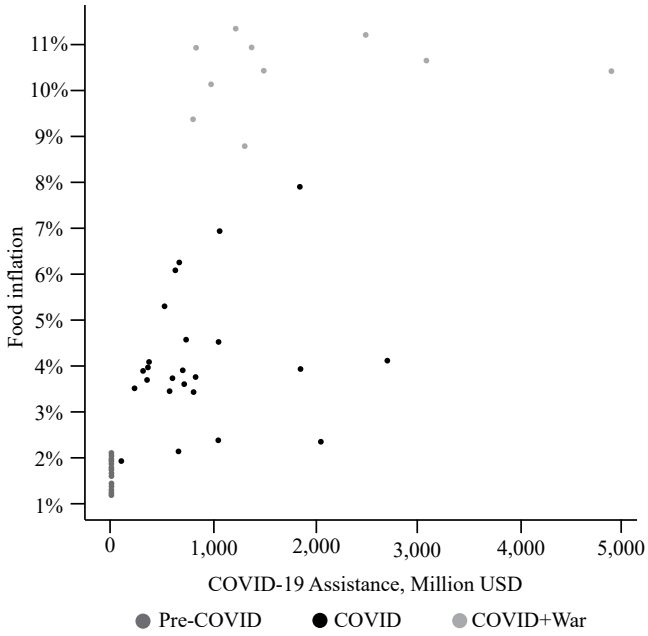

Figure A2: The relationship between U.S. food inflation and COVID-19-related assistance during Pre-COVID, COVID, and COVID+War era.

Source: Own composition

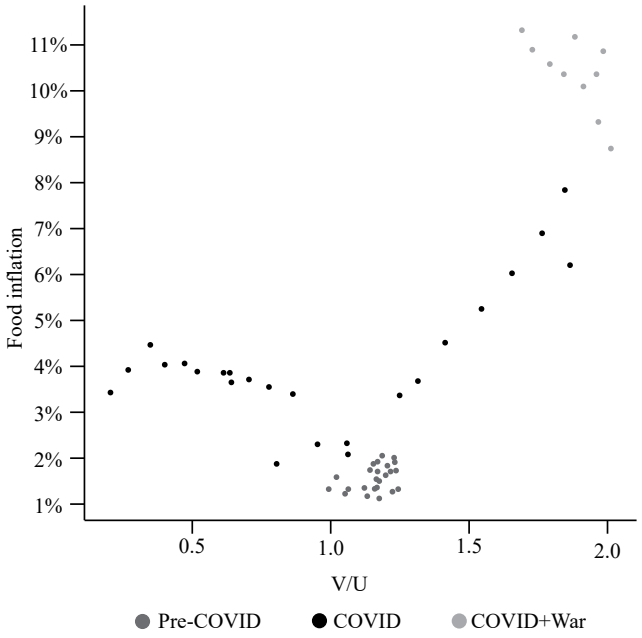

Figure A3: The relationship between U.S. food inflation and unemployment ratio (U/V) during Pre-COVID, COVID, and COVID+War era.

Source: Own composition

Rodrigo VALDÉS*

Food price inflation and policy responses in Latin America: an assessment of the causes and impacts on local food value chains

This exploratory article focuses on the factors influencing recent food price inflation in Latin America. The onset of the pandemic has significantly heightened concerns regarding food price inflation. Quarantines, mobility restrictions, and uncertainty all occurring in quick succession have led to substantial disruptions in both local and global value chains. Furthermore, the Ukraine-Russia conflict has exacerbated the existing inflationary situation, introducing additional interruptions and disturbances to agribusiness value chains. Drawing upon empirical research, this article examines the impact of the SARS-CoV-2 pandemic and the subsequent Ukraine-Russia conflict on food price inflation in Latin America. It also assesses the policy measures implemented by countries and provides future projections in this regard. Regional food inflation processes have prompted concerns regarding the vulnerability of food security and the weakness of supply chains in the region. It is crucial to consider the relationship between these processes and the overall price level of the economy. The evidence indicates that food prices have experienced more pronounced increases compared to the rest of the economy, suggesting a surge in prices relative to other consumer goods. This has directly impacted agricultural producers and end consumers of food.

Keywords: Food price inflation, Latin America, pandemic, Ukraine-Russia conflict, food security, supply chains
JEL classification: Q11

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Received: 30 June 2023; Revised: 17 July 2023; Accepted: 20 July 2023.

Introduction

In April 2023, Chile experienced an annual inflation rate of 10.5% for basic foodstuffs, and indications suggest that this rate will continue to rise in the coming months - reaching approximately 12% per year, before declining in the latter part of the year to around 9.0% per year by December 2023 (Castillo *et al.,* 2021b). This upward price trend is not unique to Chile, but rather a widespread phenomenon observed in most Latin American countries. The process began, on average, in the second quarter of 2020 and intensified significantly in March due to the impact of the Russia-Ukraine conflict (Aminetzah and Denis, 2021).

Initially, the higher food prices witnessed during 2020 and 2021 were attributed to supply-related factors, including logistical challenges that increased transportation costs and insufficient supply of goods, which did not keep pace with the heightened global demand as governments gradually lifted mobility restrictions imposed due to the pandemic (Albacete, 2021). Additionally, during the same period, the strong economic performance of the United States led to a sustained appreciation of the dollar in international markets, causing depreciation of most Latin American currencies and exacerbating domestic price hikes, particularly in emerging economies.

It was anticipated that the easing of pandemic-related mobility restrictions would normalise the supply chain by improving logistics and reducing transportation costs from production sources to various countries. This expectation fuelled the belief that inflation driven by supply factors would be transitory, resulting in a short-duration inflationary process (Cano *et al.,* 2021). However, this expectation did not fully materialise due to the outbreak of the Russia-Ukraine conflict, which was compounded by China's zero-COVID-19 policy. This situation not only led to a renewed surge in international food prices but also accelerated the inflationary process in Latin America. This persistence has been more easily transmitted to other domestic prices, compelling several central banks in the region to expedite interest rate hikes.

In summary, the prevailing evidence indicates that most of the inflation observed in different Latin American economies stems from supply factors generated in the global economy as mobility increased post-COVID as well as due to the recent escalation in international oil, gas, and food prices triggered by the Russia-Ukraine conflict (Aldana Rosillo, 2022). This general assessment is equally applicable to the Chilean economy. Additionally, alongside these factors, there has been a significant and recent spike in international oil and food prices, which constitute new external shocks accounting for a substantial portion of the heightened inflation observed between March and April. This is because over 70% of the goods comprising the food price index are tradeable goods, and thus susceptible to international prices and the cost of raw materials used as inputs in the local industry.

This article is based on an empirical review of the effects of the SARS-CoV-2 pandemic and the subsequent Ukraine-Russia conflict on food price inflation in Latin America. In this context, an analysis of the current inflationary process in Chile is conducted to identify both domestic and external sources that account for the sustained increase in the inflation rate of the basic food basket since mid-2020. Lastly, the policies implemented by Latin American countries to address this phenomenon are presented, along with future projections in this area.

Drivers of food price inflation in Latin America and Chile

Latin America is currently experiencing a significant surge in food prices, which has become a matter of concern for both the public and government. Central banks in the

region attribute this inflationary phenomenon, with global implications, to the rise in international commodity prices, increasing energy sector prices, and the depreciation of domestic currencies against the dollar as the primary sources of external inflationary pressures (CEPAL, 2022). In line with this, the agricultural price index for the Latin American region, as reported by the Food and Agriculture Organisation of the United Nations (FAO), has consistently been on the rise since 2019. By the end of 2020, for the first time in the series, this index – which is linked to industrial or producer prices – reached 105 points. The upward trajectory of prices continued in January 2021, with the indicator averaging 125.7 points, and reaching 135.6 points in the last quarter of 2021. By March 2022, the index had risen to 159.7. At the close of 2022, the index shows that oils and vegetables led the relative index with 229.3 points, followed by cereals (173.4), dairy products (141.6), meat (122.0), and sugar (120.3).

According to the FAO, the increase in commodity prices can be attributed to the economic activity restrictions imposed in response to the SARS-CoV-2 pandemic, along with the subsequent recovery of the international economy starting from mid-2021. Additionally, the armed conflict between Russia and Ukraine, which began on February 24, 2022, has had a notable impact on the prices of oils and cereals (FAO, 2022a).

Turning to Chile, from a macroeconomic standpoint, attention is drawn to the increased liquidity resulting from various pension fund withdrawals approved by the Chilean parliament since 2020, as well as the recovery of economic activity following the lifting of mobility restrictions related to the SARS-CoV-2 pandemic (INE, 2022). Looking at the historical context, the annual variation of the Consumer Price Index (CPI) was 4.1% in 2015, which dropped to 2.3% in 2016. In 2017 and 2018, the variations were 1.9% and 1.6%, respectively (Figure 1). However, since the end of 2019, the trend of the Chilean index has reversed, with the effects of sanitary restrictions on the food value chain becoming more pronounced from 2020 onward. By the end of that year, the CPI recorded a rate of 6.9%. In 2021, the rate closed at 4.8%, while in the first four months of 2022, the upward trend accelerated significantly, with a variation of 9.9%. During the last four months of 2022, prices increased by 3.2%. In summary, the inflation in the Chilean food segment between January 2020 and April 2022 amounted to 24.9%. Figure 1 provides a comparative analysis of the movement of the FAO agricultural price indicator for Latin America and Chilean food prices (CPI).

The reasons behind these trends can mainly be attributed to supply factors resulting from logistical issues that led to increased transportation costs and insufficient availability of inputs for the food industry between 2019 and 2021 (IPEA, 2022). Additionally, during the same period, there was a persistent strengthening of the dollar in global markets, which caused most currencies – particularly those of emerging economies, like those in Latin America, that heavily rely on external markets – to depreciate. This depreciation further fuelled the escalation of domestic food prices in these economies.

At the start of 2022, there was an expectation that the lifting of pandemic-related mobility restrictions would facilitate a normalisation process in the regional supply chain. This assumption was based on the belief that inflation resulting from supply factors would be temporary, leading to a short-lived inflationary period. However, the anticipated cost reduction has not materialised, as logistical problems and stock shortages persist. In this context, significant supply shocks, coupled with the war between Ukraine and Russia, resulted in a steady increase in international commodity and raw material prices during the latter half of 2022. Given the high susceptibility to international prices, this has triggered a cascade of inflationary processes in the domestic prices of tradeable goods, contributing to the continuous rise in monthly inflation rates across various Latin American economies.

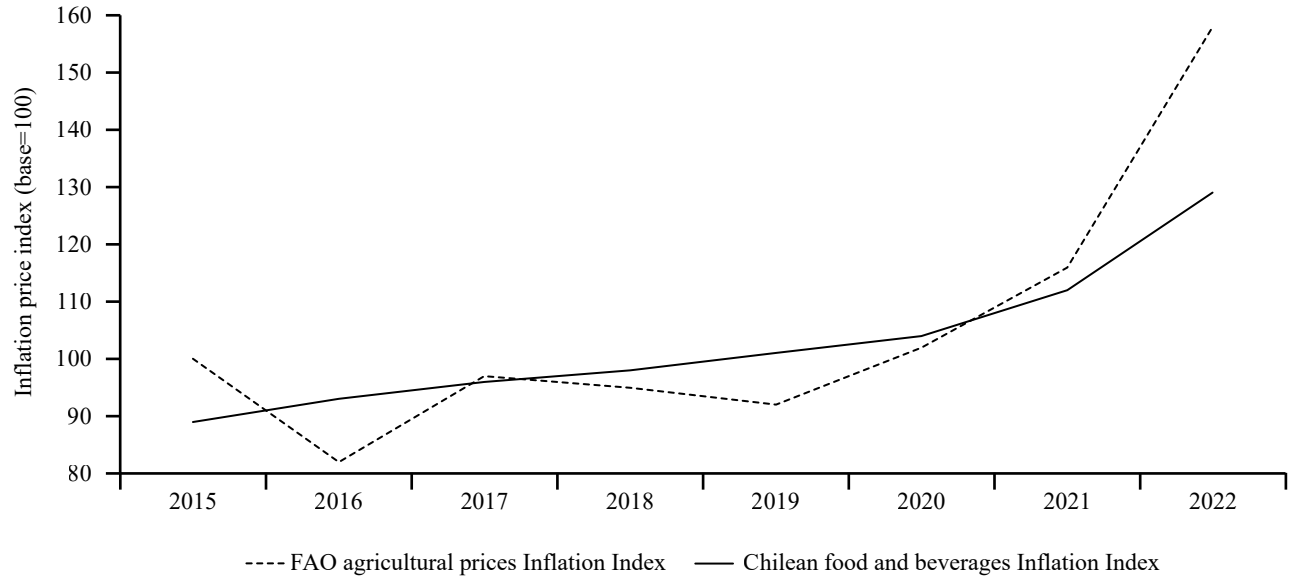

Figure 1: FAO monthly agricultural price index and Chilean food consumer index (2015-2022).
Source: FAOSTAT (2023) and National Statistics Institute of Chile (INE)

Post Covid-19 imbalances and the Russian-Ukraine war: their current effects on food prices

The COVID-19 pandemic followed by the war in Ukraine has created an international crisis, and it is crucial to analyse its effects in Latin America in the context of nearly two decades of external shocks. These shocks, although varying in magnitude and impact from country to country, have eroded the efficiency of agricultural markets, disrupted food supply and demand conditions, and particularly affected price formation processes (IIF, 2022). As depicted in Figure 1, the increase in food inflation as of March 2022 serves as a warning sign for the region's food security vulnerability. Several countries, including Colombia, Paraguay, Mexico, Chile, Brazil, and Uruguay, have experienced double-digit food inflation, despite their lack of recent chronic inflation history. These high figures can be primarily attributed to the transmission of elevated international prices of agricultural commodities (particularly cereals and oils) and raw materials associated with energy and maritime transport (FAO, 2022b). The food industry operates within a highly integrated production system, and persistent disruptions in maritime transportation, such as port congestion, long waiting times for ships, and rising freight rates, have exerted significant effects on the food price formation process due to the inherent vulnerability of logistic chains to external variables (Albacete, 2021).

Furthermore, there has been a widespread trend towards regionalisation, involving strategies such as reshoring, nearshoring, multi-country locations (multi-shoring), and choosing countries considered "friendly" (friend-shoring) to reduce external dependence on industrial inputs and food products (Cano *et al.,* 2020). From a macroeconomic perspective, the current expansionary monetary policies implemented to overcome the global health crisis have stimulated financial and stock markets. This expansion, coupled with massive support measures to mitigate the economic and social effects of the pandemic, has contributed to the acceleration of food price increases. In this regard, food prices have risen at a faster rate than general inflation in most Latin American countries, negatively impacting not only the poor but also households in the middle and lower-middle income brackets (Castillo *et al.,* 2021a). This is because the proportion of income allocated to food increases as income decreases. According to Niño *et al.* (2022), if the relationship between the annual increase in food prices persists, the poorest quintile would face inflation rates 1.0 percentage point higher than the richest quintile. Similarly, the second and third quintiles would experience a difference of 0.9 and 0.6 percentage points, respectively.

The war in Ukraine has further exacerbated disruptions in key production chains within the food industry, stemming from reduced productive areas and fertiliser exports (Laborde and Mamun, 2022). Firstly, the destruction of agricultural production capacity in Ukraine and the disruption of grain and fertiliser trade with Russia have raised concerns about a potential global food crisis. This directly impacts the process of agricultural price formation in Latin America, particularly for cereals. In 2022, Russia and Ukraine accounted for 28% of global wheat exports, 15% of corn exports, and approximately 60% of sunflower oil exports. Due to the ongoing conflict, about one-third of crops and agricultural land in Ukraine cannot be harvested or cultivated this year, potentially resulting in the disappearance of around 26.4 million tons of wheat, corn, and barley from the markets. The impact could lead to a reduction of exports ranging from 19 million to 34 million tons (Peach, 2022). Secondly, it is estimated that in 2022, Latin American imports of nitrate and phosphate-based fertilisers were 88% sourced from Russia, along with 74% of ammonium nitrate purchases. The region has one of the lowest self-sufficiency rates for this input globally, surpassing only Oceania in this respect (Figure 2). The shortage of fertilis-

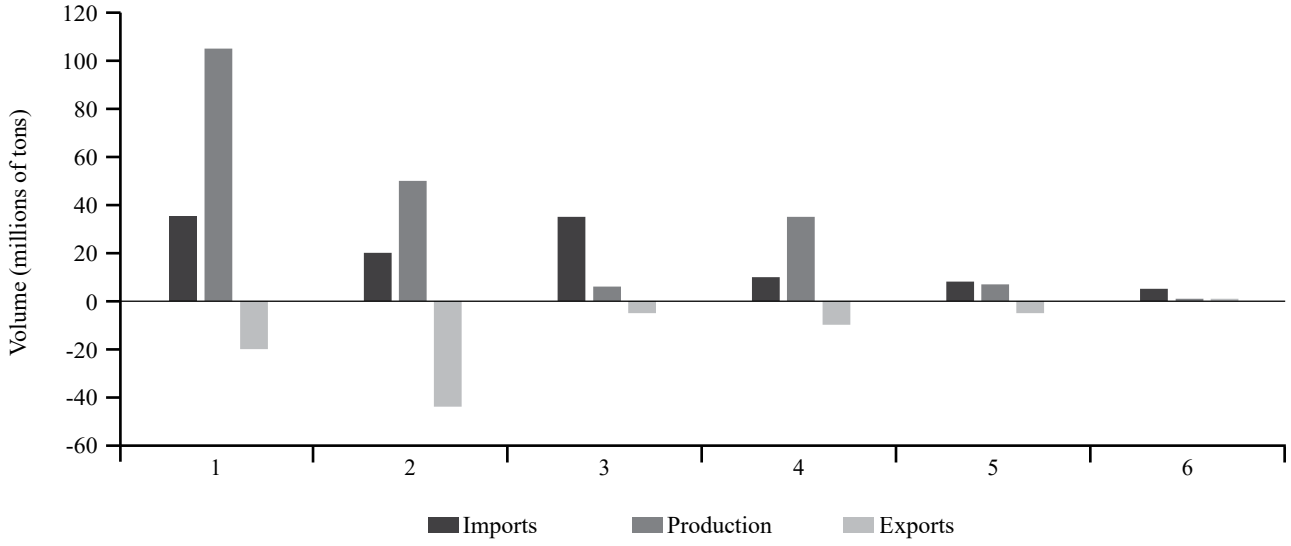

Figure 2: Fertiliser production, imports, and exports, by world region, 2022 (millions of tons).
Source: OECD (2023)

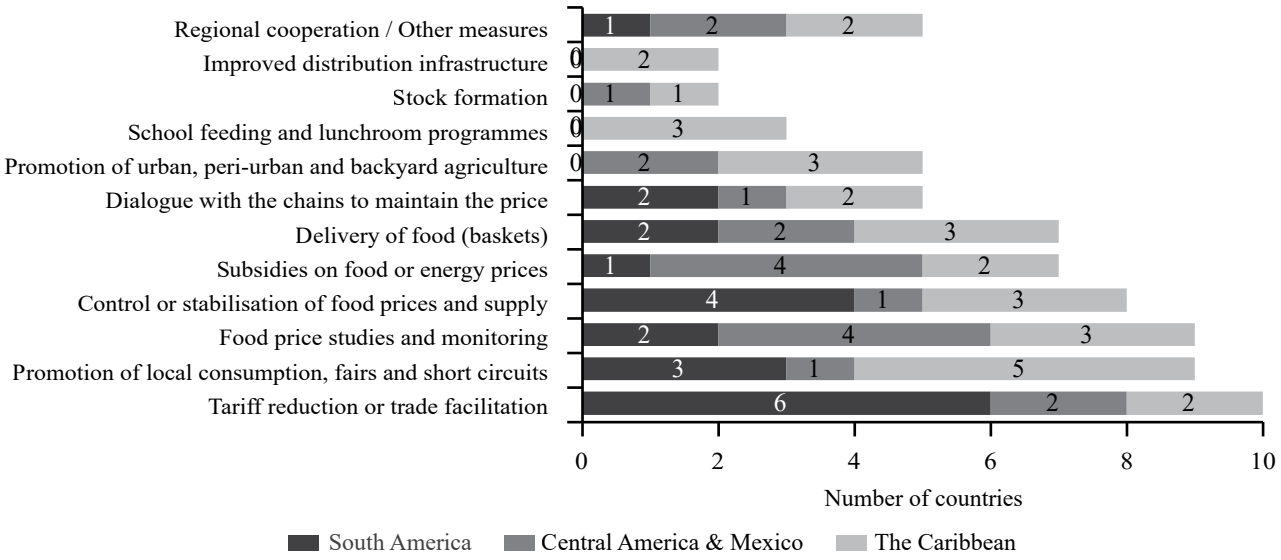

Figure 3. Countries in Latin America and the Caribbean that have implemented measures to address rising food prices, by subregion, January-December 2022.
Source: FAO (2023), ECLAC (2023).

ers significantly affects agricultural costs, with percentages of the total cost ranging from around 20% for crops like rice, potatoes, and sugarcane to 40% for yellow corn and coffee (Aldana Rosillo, 2022). This directly impacts food prices, creating a sustained upward pressure that persists to this day.

In general, the supply and demand imbalances that arose following the COVID-19 pandemic have had varied effects on food prices. The aforementioned factors have not only hindered the return of food price inflation to pre-pandemic levels but have also led to ongoing stabilisation or even acceleration processes.

The local characteristics of value chains and their connection with food price inflation

Local characteristics in relation to food price inflation in Latin America reveal a significant concentration of power in the processors-manufacturers segment and particularly in the retail market, dominated by supermarkets and formal wholesalers (USDA, 2021). This concentration reflects a form of "hierarchical market capitalism," as described by Ross-Schneider (2013)[1], and is often associated with inflationary processes.

Analysing specific countries in the region, Brazil and Argentina demonstrate greater competition at both the processing and retail levels. As a result, the transmission of cost increases to final consumers lags behind the rise in international prices of agricultural raw materials. However, in other Latin American countries, the increase in international food prices reinforces the upward trend in domestic prices that began in early 2020, and these price increases are quickly passed on to the end consumer.

Overall, given the concentration levels in the food processing and retail distribution markets, it is highly likely that upward shocks to food prices will persist in the face of an international inflationary scenario.

Regional/local and government/ private sector policies implemented to deal with food price inflation

The war between Russia and Ukraine, coupled with the COVID-19 pandemic, must be understood within the context of the crises that have impacted the global economy over the past 15 years. These crises have disrupted global value chains and exerted pressure on food prices, contradicting the trend of globalisation observed in previous decades. Moreover, these crises have resulted in disruptions across various primary and manufacturing production chains, and the rise of protectionism has led to increased trade barriers. The vulnerabilities of supply chains to external changes have been exposed by disruptions in the maritime transport system. In response to these challenges, Latin American countries have implemented diverse measures.

Several countries have focused on reducing the cost of food imports through measures such as tariff reductions and trade facilitation (Rollen and Carter, 2022). Additionally, campaigns have been designed to promote the consumption of local foods, support local fairs and short supply chains, and establish effective systems for monitoring prices and food supply dynamics (Figure 3).

[1] The prevailing scheme in Latin America is characterised by concentrated domestic markets, where economic groups and multinational corporations hold dominant positions, but with low productivity. Additionally, there are a low-skilled labour force and fragmented labour relations. Within this context, hierarchical relations within economic groups and multinational corporations play a crucial role in capital and technology organisation in Latin America.

Caribbean countries have concentrated their efforts on implementing measures like price subsidies, providing fertilisers and other inputs, offering technical assistance, and supporting agroecological production. Central American countries and Mexico are prioritising support for the production and consumption of organic fertilisers, improving input efficiency, and enhancing agricultural insurance.

In South America, policy initiatives have centred around income transfers to farmers, tariff reductions, soft credits, price monitoring, multi-stakeholder roundtables, and support for domestic fertiliser production. At the country level, Argentina announced an increase of 50% in the cash transfer programme aimed at low-income families, facilitated through the *Tarjeta Alimentar* ("Food Card"). This increase was preceded by an extraordinary payment to cardholder families, varying from 9,000 to 18,000 pesos (approximately US$76 to US$153) based on the number of children in the household. The government also proposed a special payment of 12,000 pesos (US$101) for retirees, pending congressional approval (Poy *et al.,* 2021). Brazil extended the *Auxílio Brasil* ("Help Brazil") programme in May, which provides cash assistance to low-income families, covering 18 million households (8.5% of the total population). Alongside the extension, the minimum transfer amount was increased from 400 reais to 600 reais (US$111) per month until December 2022 (PMA, 2020). Chile announced the expansion of cash transfers to recipients of the Sole Subsidy for Families (SUF, *Subsidio Único Familiar*) and Family Allowance (AF, *Asignación Familiar*) through the *Canasta Básica Protegida* ("Basic Household Goods Protection") programme. This programme aims to reach over 3 million individuals (16% of the population) with an additional monthly payment of 6,410 pesos (US$17) until the end of 2023, subject to adjustments based on the evolution of the price index of a basic basket of goods. Additionally, the Chilean government planned a gradual increase in the minimum wage starting from May 1, 2022. In Guyana, the government provided a one-time payment of G$25,000 (equivalent to US$120) to each of the 32,000 households in coastal and inland communities in May. They also announced the allocation of G$1 billion (US$4.8 million) for the purchase of fertiliser to distribute free of charge to farmers. The Dominican Republic has implemented various measures to help households cope with escalating inflation. This includes a 10% subsidy for basic food items (such as corn, wheat, soybeans, flour, and vegetable oil) announced in March. Moreover, under the terms of the *Programa Supérate* ("Programme 'Overcome'") social protection strategy, the government plans to incorporate 300,000 new households into the nutrition component of the *Aliméntate* (broadly, "Feed yourself") cash transfer programme, aiming to reach approximately 1.65 million households by the end of 2022. The transfer amount will increase from 825 Dominican pesos to 1,650 Dominican pesos (US$30) per month. Similarly, 400,000 new households will be included in the *Bono Gas* ("Natural Gas Subsidy") component of the cash transfer programme, benefiting 1.4 million households with monthly payments increased from 228 Dominican pesos to 470 Dominican pesos (approximately US$8.5) per household.

Outlook in terms of food prices in Latin America; perspectives for 2023/2024

In 2023, food value chains in Latin America face many challenges. The external context, characterised by a slowdown in economic activity and international trade even before the onset of the war, has been further complicated by the conflict between Russia and Ukraine, the persistence of COVID-19, and the rise in energy and food prices. These factors have made it even more difficult to restore the levels of efficiency seen before the pandemic.

As the severe impacts of the pandemic begin to subside, most Latin American countries have gradually begun to increase mobility, generating a strong demand for food. It is expected that by 2023/2024, there will be a normalisation of transport and logistical costs, which would help alleviate upward inflation pressures in almost all Latin American countries. Consequently, external factors are expected to become the main drivers of these inflationary processes. However, the conflict between Russia and Ukraine has emerged as an externality that has triggered price increases in raw materials and food, including oil, gas, cereals, and vegetable oils. As a result, inflationary processes, which had been showing a downward trend, have experienced a resurgence this year (FAO, 2022b).

Given the current circumstances, the rising prices of fertilisers are of particular concern. Globally, these prices have reached levels comparable to those observed in 2008, which contributed to the food crisis of 2007-2008. The potential impact of the war in Ukraine on the fertiliser market is particularly worrisome. Russia is one of the main global producers of fertilisers and a key supplier to many countries in the region. Therefore, close monitoring of the evolution of the war and its effects on the agricultural value chain, especially where these relate to the formation of food prices, is of the utmost importance.

Conclusions

The beginning of inflationary episode in the food segment in Latin America can be traced back to 2019, with the regional backdrop being characterised by the beginning of the first SARS-Cov-2 outbreaks and subsequently by the beginning of the containment measures in each of the countries. This situation resulted in disruptions in global value chains, creating pressures on food prices that went against the globalisation trend observed in previous decades. On the other hand, in the economic sectors, these crises led to various primary and manufacturing production chains fragmenting. An examination of the structure of food sector markets in Latin America reveals a greater oligopolistic concentration, or little competition, in the processor-manufacturer segment and, above all, in the supermarket retail market. This situation also triggers higher levels of inflation, since asymmetric structures or behaviour are generated along the value chains, limiting the capacity for arbitrage among the agents involved. Currently, this scenario has been reinforced by the

effect that the war between Russia and Ukraine has had on global food commodity prices. This conflict represents a new global disruption in supply chains and international trade. Both Ukraine and Russia are major producers and exporters of commodities such as cereals and vegetable oils, which are inputs to many everyday food preparations. Russia is also a key supplier of fertilisers globally. Thus, the conflict may generate a further acceleration in food inflation rates while slowing the pace of recovery. It will be very important to continue monitoring and evaluating the different policies applied by the countries as they attempt to face this situation and reduce the effect on consumers and participants in the value chain of the food industry in Latin America.

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