

ANALYSIS

Rockets and Feathers

How climate and energy price shocks have a long term impact

May 2026

Executive summary

Food prices in the UK have entered a new and troubling phase. After the steepest rise in nearly four decades, prices remain far above pre-pandemic levels, even as many of the shocks that drove them - energy spikes, climate extremes, geopolitical instability - have eased.

New analysis of more than thirty years of UK food price data points to a clear structural pattern: food prices rise rapidly during shocks but reverse only slowly and partially afterwards. In other words, food prices shoot up like rockets but drift down like feathers.

This effect has significant consequences for living standards and food security. Since 2019, food price inflation has outpaced general inflation in almost every OECD country, with UK food price growth peaking at a 45 year high in 2023. Households especially those on the lowest incomes are being hit hardest. Though eating more vegetables, beans and pulses can be cheaper¹, for families in the lowest income quintile a healthy diet now requires spending around 70% of disposable income after housing costs, placing basic nutritional security increasingly out of reach².

The drivers of rising prices are clear and increasingly climate linked. Extreme heat, drought, floods, and climate-enabled crop disease have disrupted harvests across major producing regions from Spain to India to North America. These shocks no longer occur occasionally; they increasingly arrive in overlapping waves, compounding and reinforcing one another. Global food systems – still heavily dependent on fossil fuels for fertiliser, transport, processing, and packaging - remain acutely exposed. When the Ukraine invasion triggered a gas price crisis, fertiliser and feed costs surged, cascading rapidly into food prices, and pushing up household food bills by hundreds of pounds³. Renewed conflict in the Middle East will generate similar pressures through energy and fertiliser markets.

ECIU's analysis shows that these shocks do not simply lift prices temporarily but reset the entire system onto a higher cost baseline. In nominalⁱ terms, prices show only limited reversal after a shock. Across the price rises examined here, the median reversal is just 1% after six months, 5% after one year and 7% after two years. In wage-adjusted terms, the reversal is larger, but still incomplete: after two years, around 35% of the initial affordability shock has unwound. This still leaves around two-thirds of the original affordability shock embedded, particularly in periods where wage growth is weak or unevenly distributed. Since the financial crisis, subdued wage growth has meant that recovery in food affordability has been slow and incomplete. Although wage growth has strengthened since 2020, it has still been outpaced by rising food prices.

i Nominal prices are the actual amount paid for a good, service, or wage at the time of transaction, in pounds. Wage-adjusted prices indicate the amount of labour (time) required to purchase a good or service, calculated by dividing the nominal price of the item by the average wage rate

A closer look at everyday staples reveals the scale of the divergence between costs and retail prices. During recent shocks commodity and energy costs spiked. As these only account for a proportion of food costs, underlying commodity and energy costs rose modestly compared to consumer prices, which typically increased by three to seven times as much.

Bread: wheat + energy costs up +6p; retail prices up +41p (*2008 food price crisis*)

Pasta: durum wheat + energy costs up +8p; retail prices up +40p (*North American drought of 2021*)

Olive oil: wholesale + energy prices up +51p; retail prices up +£2.65 (*Mediterranean droughts of 2022 and 2023*)

Milk: farmgate + energy costs up +38p; retail prices up +91p (*Wet winters, hot summers and Ukraine energy crisis*)

Coffee: farmgate + energy costs up +42p; retail prices up +56pⁱⁱ (*Ongoing climate shocks to major producers*)

These gaps rarely close after shocks subside. Climate change and volatile fossil fuel markets drive costs up quickly, but the system appears to lack mechanisms to bring prices back down. There are several potential reasons for this, that we outline in the penultimate section.

This matters for inflation, economic security, and the UK's resilience. The Bank of England has warned that climate impacts are increasingly generating precisely the kind of inflationary shocks it is least equipped to tackle⁴. This risks creating a vicious cycle in which climate-driven price pressures trigger higher interest rates, raise borrowing costs and slow wider economic growth, including in investments that reduce emissions – leaving us exposed to future climate shocks reinforcing the cycle.

These dynamics sit against a wider backdrop of risk. A recent national security assessment warns that UK food security is dangerously vulnerable to global ecosystem degradation and collapse⁵. Highly concentrated supply chains – e.g. a single farm in Senegal supplies 60% of UK radishes and 50% of green beans in some months⁶ – leave the UK acutely exposed to climate-driven disruption.

With climate impacts intensifying, national security warnings of incoming ecosystem degradation and collapse, geopolitical tensions rising, and fossil fuel dependence and volatility still baked into food production, **further shocks are inevitable**. Without action to build resilience - through diversified supply chains, lower fossil fuel reliance, and climate compatible agriculture – we risk eroding food affordability, deepening inequalities and undermining economic security.

ii Commodity and consumer prices for coffee remain volatile at the time of the last data analysed, so the full scale of the divergence is yet to be fully understood.



Climate change and volatile fossil fuel markets drive costs up quickly, but the system appears to lack mechanisms to bring prices back down.

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What goes up must come down?

UK food prices have surged in recent years. Food price inflation peaked at 19.1% in early 2023 its highest level in 45 yearsⁱⁱⁱ and despite inflation falling it remains elevated at the time of writing⁷. Looking abroad, a Financial Times analysis (2025) of 32 OECD countries plus China found that food price rises have exceeded general inflation since 2019 in all but two countries analysed⁸.

This report asks a fundamental question: **when food prices go up, do they ever come back down?** Using more than 30 years of UK data, this analysis shows that food prices rise quickly during crises but fall slowly, incompletely, or not at all afterwards. In other words, food prices shoot up like rockets but drift down like feathers. While the shocks that triggered these increases - heatwaves, droughts, war, disease outbreaks, and extremely volatile fossil fuel prices - eventually ease, prices often do not. In an environment of heightened geoeconomic and climate volatility, periods of stability between shocks are shortening, increasing the likelihood that successive shocks compound the residual effects of earlier ones.

We also look at how wholesale and energy costs have shifted and what climate science and geopolitical outlook suggest is coming our way. The implications are significant for living standards, monetary policy, and national security.

What's happened to food prices?

In the four years to December 2025 food prices have increased by 40%. Average wages have increased too for some, up 30% on average. As a result, food costs have taken up a larger share of household budgets, squeezing living standards. These averages conceal significant variation in impact. Most recently, the Food and Drink Federation and the Institute for Grocery Distribution has warned that UK food inflation will hit 9-10% by the end of 2026. That would push up overall inflation by 1.0 percentage points for the richest 20% of households and 1.4 percentage points for the poorest quintile. As poorer households spend a larger share of their income on food, rising prices translate into a much bigger effective reduction in living standards for those on the lowest incomes, hitting them 50% harder⁹.

The result is that a healthy diet is out of reach for a large share of the population. For example, analysis by the Food Foundation with academics from the University of Oxford and the London School of Hygiene & Tropical Medicine (2025) estimates that households with children in the lowest 20% of the income distribution would need to spend 70% of their income (after housing) to afford a healthy diet¹⁰.

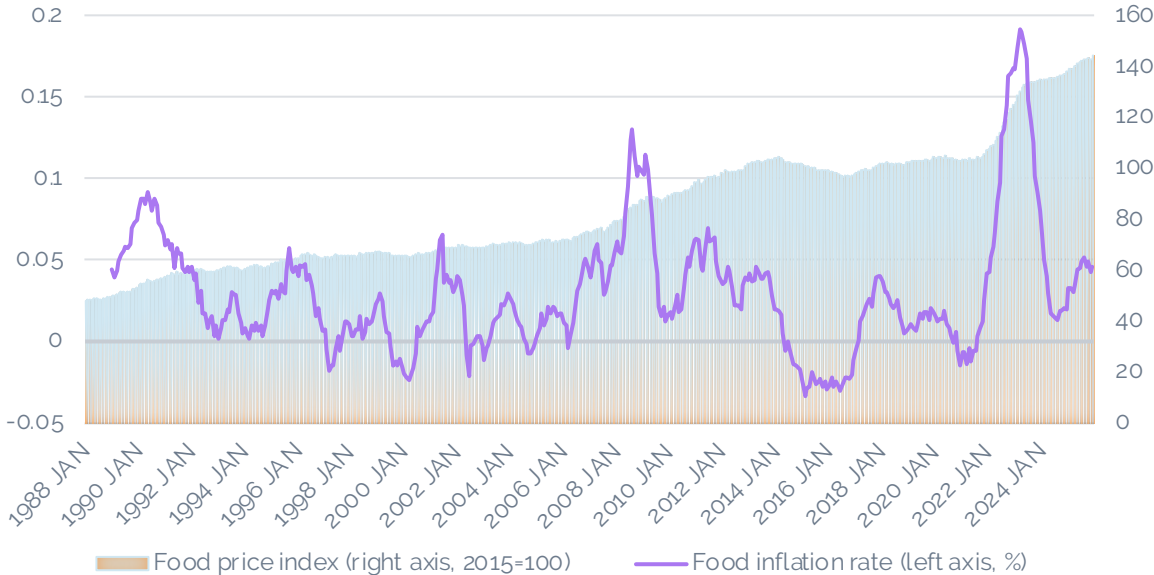
iii Likely it's highest level since 1977 or 1975: <https://www.ons.gov.uk/economy/inflationandpriceindices/articles/consumerpriceinflationhistoricalestimatesandrecenttrendsuk/1950to2022>

With living standards under pressure, it's no surprise that polling and focus groups (e.g. Joseph Rowntree Foundation, 2025¹¹) - repeatedly show that living standards, the cost of living, and economic security together rank as the most politically salient issue with UK voters.

This has been driven by a confluence of factors. In early 2021, a global rebound in economic activity increased demand for energy, while post-pandemic supply chain disruptions also pushed up prices. Then conflict in Ukraine turned a tight gas market into a full-scale energy crisis, meaning synthetic fertiliser and feed costs surged, as did energy costs. This represents a profound disruption to a food system that is currently deeply dependent on fossil fuels at every stage of production, from the manufacture of chemical fertilisers and the heating of greenhouses to the production of (ultra) processed foods and the use of plastic packaging^{iv}. Indeed, energy costs can account for 40% to 50% of total variable costs of on-farm producing in advanced economies such as the United States¹².

UK food prices have risen by around 40% since 2021

Figure 1: UK food and non-alcoholic beverages price index and food and non-alcoholic beverages price inflation since 1988



Source: Office for National Statistics (ONS), CPI 01: Food and non-alcoholic beverages

Climate change has compounded these pressures by turning once-occasional shocks into a near-constant feature of the food system. Academic work led by the Barcelona Supercomputer Centre¹³ (2025) (and supported by ECIU) found that extreme climate events in the 2022-24 period drove sharp food price spikes. European heatwaves sent olive oil prices soaring, while droughts in major producing regions sharply increased global rice prices.

Other geopolitical events such as tariffs and trade embargoes have also played a role.

iv Such that roughly ten calories of fossil energy are expended for every calorie of food consumed <https://ipes-food.org/fuel-to-fork/>

The threat of US tariffs on Irish butter in early 2025 – where 80% of UK butter imports come from¹⁴ – saw exporters frontload shipments to the US^v, tightening EU and UK supplies for months. There have also been cascading shocks. 2022 witnessed not only the Russian invasion of Ukraine - the world's fifth largest wheat exporter in 2021¹⁵, where production fell 35% year-on-year - but also saw India, an even larger producer and the 11th largest exporter in 2021¹⁶, respond by banning exports. In the same year, climate change caused poor harvests in other major producers such as the US (2nd largest exporter¹⁷), EU (the largest), Pakistan, and India, such that the reduced harvest in climate impacted producers outweighed the reduced output in Ukraine – more detail on this is included in appendix B.

Even disease outbreaks, some of which have been made more likely by climate change¹⁸, have contributed to higher food prices. Bluetongue in European dairy herds put upward pressure on butter and milk prices in 2025, while avian flu has repeatedly impacted poultry production, contributing to a 15% decline in egg production between 2021 and 2023¹⁹. All these shocks have converged to drive food prices upward, creating a perfect storm for consumers.

The rise of disequilibrium and beyond

While the past five years have been far from smooth sailing, we're now entering a potentially more serious storm. A new national security assessment warns that every critical ecosystem globally is now on 'a pathway to collapse', with extinction rates suggesting a sixth mass extinction may already be underway. The assessment states that impacts including crop failures, intensified natural disasters and infectious disease outbreaks are most vital for UK national security. It also warns that, without significant increases in the resilience of the UK food system and supply chains, the UK is unlikely to be able to maintain food security if ecosystem collapse drives geopolitical competition for food. This risk is exacerbated by the UK's heavy reliance on food imports and its inability, within current dietary habits, to produce enough food to feed its population.

The assessment also sets out the other likely risks of ecosystem degradation, including geopolitical instability, economic insecurity, conflict, migration, and increased inter-state competition for resources.

Our analysis just focuses on prices, but more severe shocks and a highly centralized supply chain can also be expected to impact availability of food going forward. For example, during certain months of the year, a single farm in northern Senegal provides 60% of UK radishes and 50% of green beans, while a neighbouring farm provides 30% of the UK's corn on the cob²⁰. Were a climate shock to impact supply chains like these, the result would likely be not only higher prices but significant supply disruptions.

Global surveys indicate that uncertainty is increasing, with the World Economic Forum's Global Risk Perception Survey showing a substantial increase in the proportion of respondents expecting a turbulent short and medium term²¹ - even prior to the onset of war in the Middle East. Geoeconomic confrontation, armed conflict, and extreme weather ranked as the top three concerns.

^v Q1 of 2025 saw exports from Ireland to the US more than double in volume to that of Q1 in 2024, ahead of potential US tariffs.

In the face of these risks, further change in the food system appears increasingly likely.²² The outcomes of the food system as it undergoes this transformation, however, merit closer examination.

Food prices rise quickly but fall slowly

Using monthly price and wage data since 1988, we identify upward price runs across food and drink categories. We define an upward run as a period of two or more months in which (smoothed) prices are moving up month-to-month, with a bit of flexibility for short pauses. Across categories, this produces 81 upward price runs in the data from 1988 to 2025.

We then ask a simple question: once a run ends, how much of that rise is reversed? The answer is not much – at least in the short term. In wage-adjusted terms, a typical food price rise reverses only partially: after six months, 6% has unwound; after one year, 15%; and after two years, 35%^{vi}. In nominal terms, the reversal is smaller still, with list prices falling by just 1%, 5% and 7% respectively over the same horizons.

So once food prices rise, they largely remain elevated^{vii}. Instead, the recovery in the affordability of these foods occurs as wages catch up over time. But with wage growth subdued in the UK since the 2007/08 financial crisis, this has increasingly been a slow and incomplete process.

In the 1990s, average wage growth generally outpaced food prices, which rose only modestly. From 2000 until the end of 2006, food price inflation was low and again significantly outpaced by earnings growth. Since 2007, however, wage growth has slowed while food price inflation has picked up, leading to persistent increases in food prices relative to wages. Although wage growth has strengthened since 2020, food price inflation has increased even more rapidly, continuing to outstrip earnings. Periods of very high food price inflation have become more frequent, driven in part by climate-related supply shocks and fossil fuel price volatility.

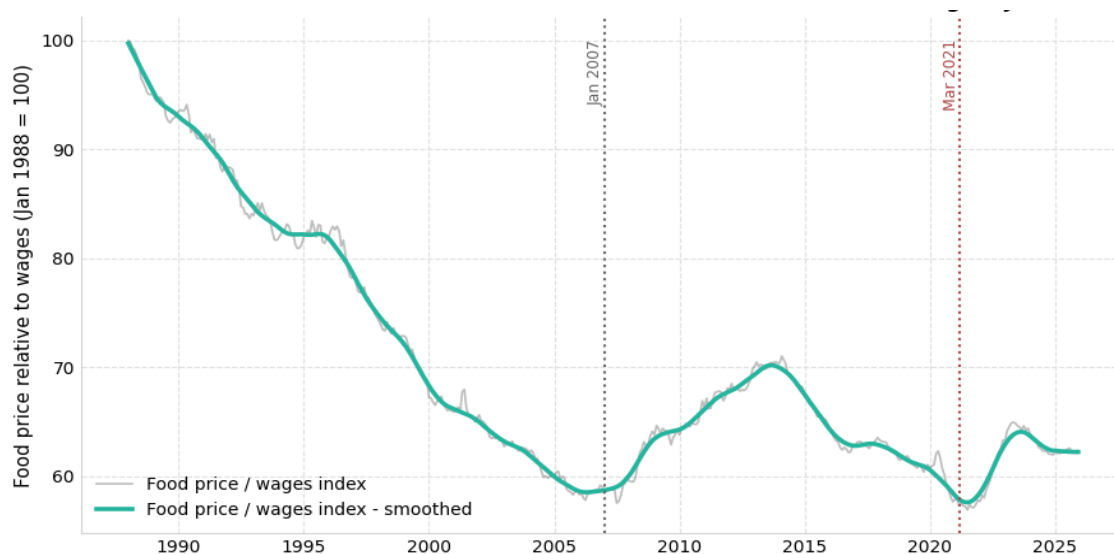
Before looking at how this picture varies across food types, it's worth pausing to highlight a simplification that's easy to skip over when comparing average food prices to average wages. Namely, the likely uneven segmentation that exists within the two series. Our food system is highly centralised, with the 10 largest retailers accounting for almost 97% of UK grocery sales²³. This means when supermarket prices go up, prices go up for almost all shoppers. Wage levels and wage growth, however, vary much more across households and places. The UK is highly spatially unequal – for example the median wage in Milton Keynes is around 50% higher than the median wage in Skipton²⁴ – and the hollowing out of the labour market²⁵ means average wages are becoming less representative of a typical lived experience. Additionally, pay growth is often concentrated in certain sectors – recently lower earners have benefitted from a higher minimum wage. It's also worth noting that because lower income households spend more of their income on food, the relative importance of food for inflation is around 50% higher for poorest fifth of households than it is for the richest fifth²⁶. This is easy to miss if we just focus on wage-adjusted prices.

vi Analysis figures for wage-adjusted prices are for the period since 2007 (Jan 2007 to Dec 2025), to reflect the structural shift seen in wage growth since then.

vii The nominal figures used here are generated by analysis prices indices from Jan 1988 to Dec 2025.

After decades of decline, wage-adjusted food prices rose after the Global Financial Crisis and remain elevated

Figure 2: Food and non-alcoholic beverages price index relative to average wages (Jan 1988 = 100)



Source: ECIU analysis of Office for National Statistics (ONS), CPI and average wage data (see technical appendix for more detail)

Prices fall more quickly for certain more perishable foods

Interestingly, there is substantial variation across food categories. This is most clearly observed using list prices, which avoids differences being driven by co-movement with wages – so figures below relate to nominal price movements.

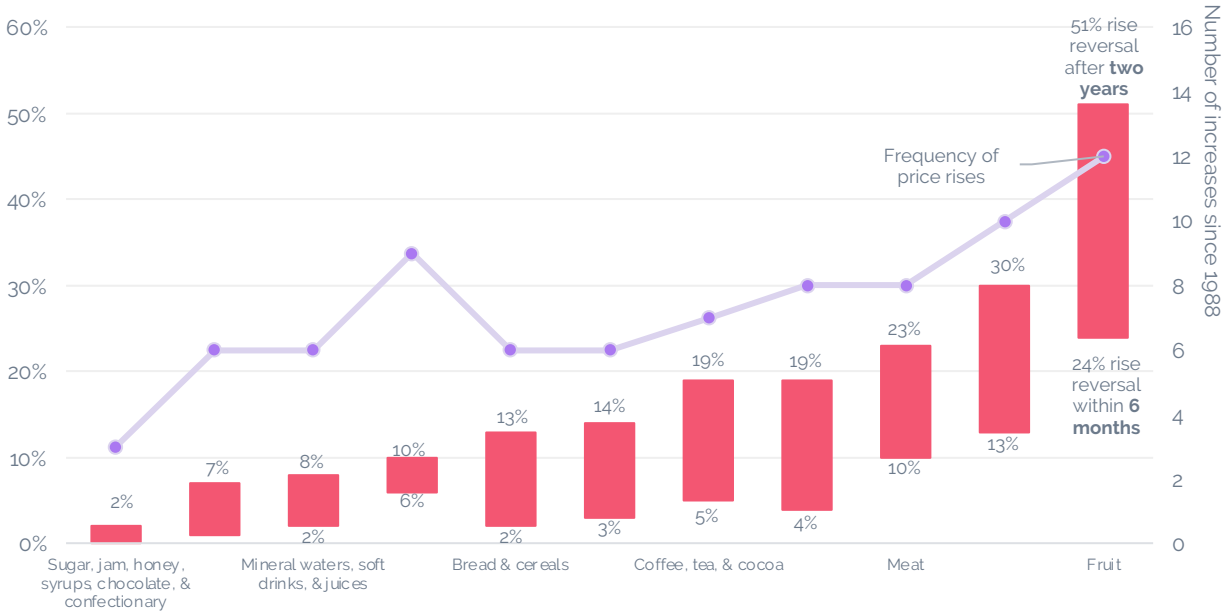
Price reversals tend to be larger for fruit and vegetables. After a price rise, fruit prices typically reverse 24% after six months, 38% after twelve months, and 51% after twenty-four months, while vegetables show reversals of 13%, 26% and 30% over the same periods. This likely reflects their perishable nature and shorter biological production cycles. Even so, a significant share of the initial price increase remains embedded.

By contrast, some categories show little evidence of reversion at all. Prices for sugar, chocolate and confectionery reverse by just 0.2% within six months, 0.4% within a year, and 2% after two years. This is particularly salient given the sharp rise in chocolate prices in recent years and the fact that the average UK consumer allocates around 6% of their food budget to chocolate - more than the 4% spent on bread, and well above the roughly 2% typically spent by consumers in the euro area²⁷. Prices for milk, cheese and eggs also adjust only slowly, with declines of only around 7% after two years.

It's important to note that this does not indicate that foods such as fruit and vegetables are becoming cheaper relative to less healthy foods. Indeed, the data show that they typically experience more frequent rises as well as more significant reversals. Analysis by the Food Foundation (2025) finds that healthier foods are more than twice as expensive per calorie as less healthy foods, with healthier food increasing in price at twice the rate of less healthy foods in 2023 to 2025^{viii}.

Meat, fruit and vegetable prices fall more meaningfully after a rise, while many categories barely fall

Figure 3: Frequency of nominal price increases and median price reversals (6 and 24 months later) across food and non-alcoholic drink categories since 1988



Source: ECIU analysis of Office for National Statistics (ONS), CPI and average wage data (see technical appendix for more detail).

The bottom of the bar indicates the median price reversal of the smoothed price index, 6 months after the price has stopped rising. The top of the bar indicates the median reversal within two years after the price has stopped rising. The purple line is the number of upward price runs in each smoothed index observed in the data from Jan 1988 to Dec 2025.



Table 1: Frequency of nominal price increases and median price reversals across food and non-alcoholic drink categories since 1988

CPI Index	No. of upward runs	Median reversal within:			
		6 months	12 months	18 months	24 months
Sugar, jam, honey, syrups, chocolate, & confectionary	3	0%	0%	1%	2%
Milk, cheese & eggs	6	1%	2%	5%	7%
Mineral waters, soft drinks, & juices	6	2%	3%	5%	8%
Oils & fats	9	6%	10%	10%	10%
Bread and cereals	6	2%	5%	9%	13%
Fish	6	3%	10%	13%	14%
Coffee, tea, & cocoa	7	5%	9%	11%	19%
Food products	8	4%	7%	8%	19%
Meat	8	10%	23%	23%	23%
Vegetables incl. potatoes & tubers	10	13%	26%	30%	30%
Fruit	12	24%	38%	51%	51%

Source: ECIU analysis of Office for National Statistics (ONS), CPI data (see technical appendix for more detail). While prices generally trend upwards, the volatility of certain foods prices such as fruit and vegetables is higher than that of other categories, such as bread and cereals. For more time series charts, see Appendix C.

Climate and fossil fuel shocks ratchet up consumer prices

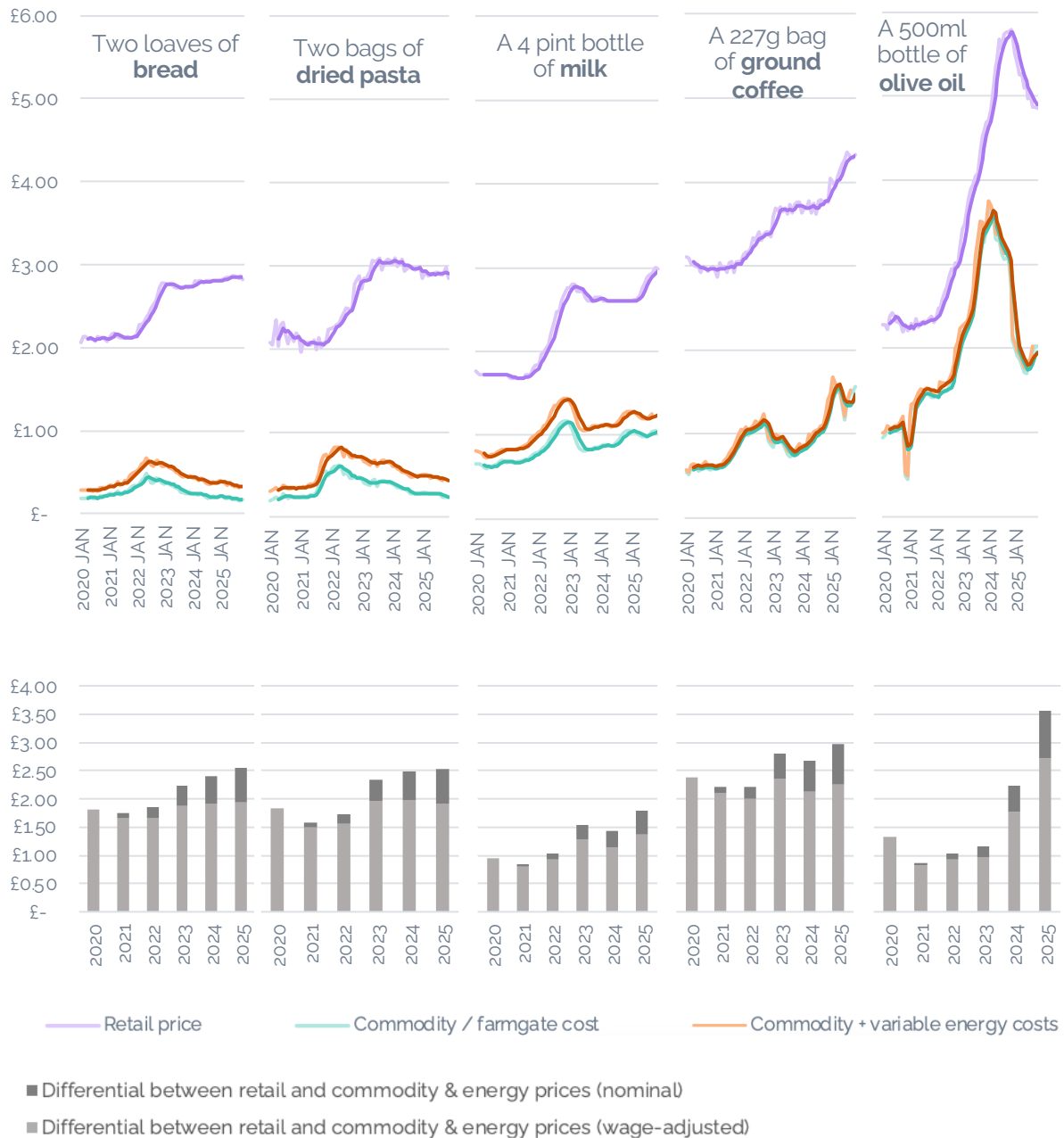
We examine five staple foods – bread, pasta, milk, coffee, and olive oil – to understand how recent shocks have affected retail prices. These case studies were chosen because there are relatively good data on retail prices and commodity or farmgate prices. Variable energy costs have been estimated by ECIU to understand the relative significance of the energy crisis, which overlaps with recent climate shocks.

What we see is quite striking. Retail prices have substantially increased in each category, while commodity prices and energy costs have generally risen but to a lesser extent before coming back down.

In the early phase of a shock, commodity prices often rise before retail prices fully respond, narrowing the gap between the two. As retail prices catch up and then exceed the increase in upstream costs, that gap widens again. When commodity and energy costs later ease, retail prices tend to remain elevated, leaving a larger spread than before the shock. These findings indicate that as supply shocks feed through the food system, they push prices up, but as their impacts on supply chains dissipate, this does little to bring prices down.

Energy and climate shocks have widened the gap between prices and upstream costs, since 2020

Figure 4: Nominal retail and post-farm upstream prices of bread, pasta, milk, coffee, and olive oil, and the nominal and wage-adjusted gap between them, since 2020



Sources: IMF, AHDB, USDA, St Louis Fed - FRED for commodity prices; ONS & Tesco for consumer prices; ECIU modelling for variable energy costs see technical appendix.

Prices are for the following quantities: Bread - two loaves of white, 800g, supermarket bread; Pasta - two 500g packs of dried penne; Milk - a four-pint bottle of whole milk; Coffee - 227g pack of ground coffee; Olive Oil - 500ml bottle virgin olive oil. More details in methodology note.

Case studies

In the section below we highlight a few recent examples to illustrate how shocks act to ratchet up consumer prices.



2008-10 food price spike

During the global food price crisis of 2008–10, shoppers saw the price of a loaf of bread rise sharply. Though prices later dipped slightly, they didn't return to pre-crisis levels.

Wheat prices surged in 2007/08 when poor wheat harvests in major exporters, especially Australia and Ukraine, sharply cut supplies. Run-down grain stocks meant there was little slack in the system. Financial speculation may also have amplified the spike, as large volumes of capital flowed into wheat futures markets at the same time.²⁸

The cost of the wheat in a standard 800g loaf more than doubled from a pre-crisis average of around 6p, peaking at 14p before remaining elevated and volatile after the initial shock, averaging around 11p in the following years. Around seven years later, wheat prices had eased somewhat, falling back to around 9p on average over 2009–2015.

Variable energy costs - used in milling, baking, packaging, warehousing, retail and transport - also jumped at the same time. Altogether, the combined cost of wheat and energy rose from around 8p before the crisis to an average of 15p per loaf from 2009 to 2014.

Table 2: Average prices of wheat, variable energy use and bread before and after the 2008 food price crisis

	Average prices, nominal					Change (Medium run)
	Pre-shock (2001- 2006)	Initial Crisis (2007-2008)	Post-shock (2009 - 2014)	Post shock (2015- 2021)	Change (Short run)	
Wheat	6p	9p	11p	9p	+5p	+4p
Wheat + energy	8p	13p	15p	14p	+7p	+6p
Bread	64p	£1.05	£1.22	£1.04	+58p	+41p

Sources: IMF, St Louis Fed - FRED for commodity prices; ONS for consumer prices; ECIU modelling for variable energy costs see technical appendix.

The shelf price of bread almost doubled, rising from 64p before the shock to £1.22 in the post-shock period. This increase was many times larger than the rise in wheat and energy costs alone, illustrating how global commodity shocks can be magnified as they propagate through supply chains and into consumer prices.

Notably, this episode also represents one of the clearest examples of consumer prices subsequently falling. From 2015 onwards, easing commodity prices and an intensified cost-of-living squeeze increased competitive pressure on traditional retailers. Discount supermarkets such as Lidl and Aldi expanded their market share rapidly from around 2014, contributing to a partial reversal in prices²⁹³⁰. On average, bread prices fell by around 31% of their initial rise, averaging £1.04 between 2015 and February 2021.

2022-23 food price spike

Global markets were hit again in early 2022, this time by a combination of pandemic aftershocks, energy price surges, and the invasion of in Ukraine – a major wheat exporter.

The cost of wheat used in a standard loaf rose once again, this time from around 9p to a high of 25p, before settling down to 11p. A more sustained rise in fossil fuel prices pushed the combined cost of wheat and variable energy inputs to 27p per loaf in the crisis period, leaving post-shock costs around 5p higher than in the pre-shock period. This increase in input costs was again reflected at the checkout. The average price of a loaf jumped by +36p, from just over a pound (£1.04) to around £1.41.

Table 3: Average prices of wheat, variable energy use and bread before and after the Ukraine invasion

	Average prices, nominal			
	Pre shock (2015-2021)	Crisis (2022-2023)	Post-shock (2024-2025)	Change
Wheat	9p	18p	11p	+2p
Wheat + energy	14p	27p	19p	+5p
Bread	£1.04	£1.30	£1.41	+36p

Sources: IMF, St Louis Fed - FRED for commodity prices; ONS for consumer prices; ECIU modelling for variable energy costs see technical appendix.

Taken together, these bread episodes suggest that shocks tend to ratchet consumer prices upwards rather than producing symmetrical rises and falls in line with commodity and energy costs.



Dried pasta is made from durum wheat - a hard, high-protein wheat that's known as semolina when milled coarsely. It's preferred to common or "bread" wheat because it produces a firm, "al dente" texture and holds its shape well when cooked.

North American drought of 2021

The price of durum wheat used to make dried pasta climbed significantly during 2021, as climate shocks rocked the world's dominant producers. In the previous year, the top three exporters of durum wheat were Canada (44% of global exports), France (10%), and the United States (7%)³¹. In 2021, Canada saw wheat yields fall -37%³² and the US -9%, following a heatwave deemed 'virtually impossible without human-caused climate change'³³.

In response, commodity prices for durum wheat spiked sharply, climbing from a pre-crisis average of about 12p to a high of 47p before falling to around 14p in the post-shock period. Industrial dried pasta making generally requires a third more energy than bread baking because the pasta must be dried for hours, so its production costs are more susceptible to energy price shocks. The shelf price of a 500g bag of dried pasta rose from an estimated £1.07 before the shock to £1.48 afterwards — an increase more than four times larger than the rise in wheat and variable energy costs alone.

Table 4: Average prices of durum wheat, variable energy use and pasta before and after the 2021 North American drought

	Average prices (nominal)			
	Pre-shock (2015- Jul 2021)	Crisis (Jul 2021 - 2023)	Post-shock (2024-25)	Change
Wheat	12p	24p	14p	+3p
Wheat + energy	17p	35p	25p	+8p
Pasta	£1.07	£1.31	£1.48	+40p

Sources: USDA, Federal Reserve Bank of St Louis - FRED for commodity prices; ONS & Tesco for consumer prices; ECIU modelling for variable energy costs see technical appendix.



OLIVE OIL

Spanish droughts of 2022 and 2023

Spain, the world's largest olive oil producer, usually supplies around 40% of the world's olive oil³⁴, which makes the world market unusually sensitive to Spanish weather. Spain experienced a historic drought in 2022, which was made 3-6 times more likely by climate change³⁵. As a result, production in Spain fell 55% year-on-year, driving prices sharply upward.

Pressure intensified the following year, when further droughts and extreme heatwaves scientists deemed 'almost impossible without climate change'³⁶, meant that 80% of all of Spain's farmland experienced drought in 2023³⁷. As a result, Spanish olive oil production was again down -43% compared to 2021. Commodity prices climbed even higher before levelling off in the second half of 2024. Improved weather conditions led to a stronger harvest in late 2024 and early 2025, prompting commodity prices to fall.

Commodity prices for olive oil rose from an average of £1.29 per 500ml before the shock to highs of £3.68 in early 2024, before falling back to £1.79 in the post-shock period. Olive oil production is far less energy intensive than that of bread and pasta, relative to the price of the commodity, meaning that energy makes up a small share of the final price and added just 5p pre- and 6p post-shock.

Consumer prices rose dramatically, climbing £2.65 over the period. This is over 5 times higher than the increase seen in energy and commodity costs.

Table 5: Average commodity and retail olive oil prices, and variable energy costs, before and after the Mediterranean droughts of 2023-24

	Average prices, nominal			
	Pre-shock (2017- Jun 2022)	Crisis (Jul 2022 - Mar 2025)	Post-shock (Apr - Sep 25)	Change
Commodity price	£1.29	£2.68	£1.79	+50p
Commodity + energy	£1.35	£2.75	£1.85	+51p
500ml Bottle of Olive Oil	£2.36	£4.48	£5.06	+£2.65

Sources: IMF, St Louis Fed - FRED for commodity prices; ONS & Tesco for consumer prices; ECIU modelling for variable energy costs see technical appendix.



In recent years, milk prices have been disrupted on a scale not seen in decades. Since 1990, when our price series begins, milk prices have been relatively stable. From 1999 to 2007, prices were stable at around £1.40 per 4 pint bottle. Prices climbed around 36p during the 2007-08 crisis before coming down slightly to sit at £1.73, until the end of 2021.

Wet winters, hot summers and Ukraine energy crisis

Farmgate prices for milk began to climb at the end of 2021, as a post COVID rebound tightened gas markets pushing up costs right through the dairy chain. From early 2022, price growth accelerated substantially with the Russian invasion of Ukraine pushing up fertiliser and wider farm costs. At the same time, extreme weather tightened the squeeze: the hot and dry summer of 2022 made more likely by climate change³⁸ reduced grass growth, raised heat stress risk and forced more bought-in feed later in the year. With costs surging and supply under pressure, farmgate milk prices peaked at £1.17p in December 2022.

Prices later eased, but the sector did not fully recover. Although some input costs fell by early 2024, they remained well above pre-Covid levels, keeping margins tight. Extreme weather made more likely by climate change also kept undermining grass and forage. A record-wet Oct 2023–Mar 2024 period that left fields waterlogged and damaged, was then followed by a long hot summer. This resulted in lower grass growth, which alongside other factors tightened the availability of milk and cream, holding prices high but steady. This turbulence resulted in an 88p uplift in consumer prices, following a 35p increase farmgate and energy costs.

Table 6: Average farmgate and retail prices of whole milk, and variable energy costs before and after the post pandemic shocks

	Average prices, nominal			
	Pre-shock (2015- Oct 21)	Crisis (Nov 21 - Aug 23)	Post-shock (Sep 2023- Jul 2024)	Change
Farmgate price	63p	95p	94p	+32p
Farmgate + energy cost	75p	£1.18	£1.11	+38p
A 4 pint bottle of whole milk	£1.73	£2.40	£2.64	+91p

Sources: AHDB for farmgate prices; ONS for consumer prices; ECIU modelling for variable energy costs see technical appendix.

2025 onward: renewed pressure on milk prices

Farmgate milk prices had been expected to ease from spring 2025, but the driest spring and hottest summer on record³⁹ reduced grass growth. This was highlighted in the Bank of England's August Monetary Policy Report which noted that '...dry weather conditions are pushing up the production costs of beef and some dairy products in the UK and elsewhere, as cows must be fed silage earlier in the year due to less grass growth.'⁴⁰

Hay and silage availability remains a major concern for many in the sector, with the dry summer limiting grass growth and the long, wet winter increasing the need to feed and house livestock. Having to house livestock for longer risks pushing farmers into the red and, with prices still high for animals sold for slaughter, increases the incentive to cut herd sizes – potentially reducing future supply as has happened in the beef sector⁴¹.

Reduced European supply caused partly by an outbreak of bluetongue - a virus spread by midges - has also helped sustain demand for British dairy. Research indicates that climate change is likely extending bluetongue's transmission season and increasing the scale of outbreaks.⁴² Although farmgate prices for milk have come down, this is not yet reflected in the most recent inflation data, which shows retail prices for whole milk continuing to rise as of January 2026⁴³.



Coffee has roughly the same energy intensity as bread per kg⁴⁴, but the commodity and retail prices are significantly higher.

Ongoing climate shocks coffee producers

Coffee prices are particularly exposed to climate risk with 97% of all coffee grown in countries vulnerable to climate impacts⁴⁵. Coffee prices in commodity markets rose sharply at the end of 2021 and again at the end of 2023 and continued to climb through 2024, reaching a peak in March and October 2025⁴⁶. The rise was driven largely by poor harvests in Brazil and Vietnam. Brazil is the dominant producer of arabica beans and Vietnam the leading supplier of robusta, the variety used in most instant coffee.

- Vietnam: Prolonged dry weather linked to El Niño, the warm phase of the El Niño Southern Oscillation (ENSO) whose intensity has been amplified by climate change⁴⁷, caused severe stress on crops. Production in 2023/24 fell by around -20%, while exports declined by -10% for the second consecutive year.

- Indonesia: Excessive rainfall during the April–May 2023 growing season damaged coffee cherries, leading to a -16.5% fall in production and a -23% drop in exports year-on-year.
- Brazil: Hot and dry conditions (again linked to El Nino) prompted successive downward revisions to official forecasts for the 2023/24 harvest — shifting from an expected +5.5% increase to a -1.6% decline.⁴⁸

Impacts on producer countries have been prolonged with coffee-growing countries accounting for about 97% of global production all experienced damaging heatwaves over 2021–25 because of climate change⁴⁹.

USDA forecast some recovery in Vietnam and Indonesia for 2025/26, but still expected Brazil's total crop to fall, with arabica output down because drought and high temperatures had damaged flowering, fruit set and development. Brazil's bean exports were also forecast to fall, while global stocks were expected to drop for a fifth consecutive year⁵⁰. As a result, commodity prices have eased from their 2025 peaks but have not normalised.

This means coffee prices remain volatile, so the full scale and persistence of the consumer price increase is not yet clear.

Table 7: Average commodity and retail prices of arabica coffee, and variable energy use costs before and after the 2021 climate coffee shock

	Average prices, nominal		Change
	Pre-shock (2020)	Crisis (2021 - 2025)	
Commodity price	59p	£1.01	+42p
Commodity + energy cost	61p	£1.03	+42p
A 227g bag of ground coffee	£3.00	£3.56	+56p

Sources: IMF, St Louis Fed - FRED for commodity prices; ONS for consumer prices; ECIU modelling for variable energy costs see technical appendix.

Potential explanations for the divergence

Food price spikes are often described as temporary, but UK data suggest a more persistent pattern. An examination of periods of rising food prices since 1988 shows that once prices go up, in nominal terms they barely come back down. In effect, each shock permanently resets list prices higher for households, while subdued wage growth has limited the extent to which affordability has recovered.

Part of this pattern is consistent with standard second-round effects. As the cost-of-living rises, workers seek higher pay, and some of those labour cost increases are then embedded in future prices. In this way higher prices drive higher wages which ensure that price rises never fully revert. These second-round effects are significant, but for them to be the sole driver of the phenomenon, wages would have to be a very large proportion of costs across the supply chain. Analysis however shows that labour costs make up 13% of the price of cheddar, 2% of beef prices, 39-54% of bread prices, 18-22% of apple prices, 20-29% of carrot prices⁵¹. These labour cost shares may explain part of the divergence, but they are unlikely to explain all of it.

Several structural features of the food system may also help explain the persistent divergence between input costs and retail prices. Modern food supply chains likely amplify shocks as they move from farm to fork, with costs added at every step: processing, packaging, shipping, storage, refrigeration, wholesale distribution, and retail operations. During shocks, these layers stack on top of one another and push retail prices sharply higher. When the underlying commodity or energy costs often eventually fall, these layers unwind only partially and at different speeds, meaning that prices remain stuck at elevated levels. This pattern is clear in staples such as bread: in the 2008 and 2021–23 crises, wheat and variable energy costs rose by around 5–6p per loaf, but shelf prices increased by 36–41p, well beyond the rise in underlying costs and have yet to fall.

A significant driver of this is the food system's heavy dependence on fossil fuels. Energy underpins almost every stage of production, from fertiliser manufacture and milling to refrigeration, plastics, transport and retail logistics. As a result, spikes in fossil fuel prices quickly transmit through the system. But when energy markets ease, businesses may remain locked into higher-cost contracts, hedges or logistics arrangements. This means that energy costs pass through to consumer prices quickly on the way up, but only weakly on the way down, embedding a long-term upward drift in retail food prices.

The way the food system is organised may also explain why prices surge quickly but drift down only slowly. It's often compared to an hourglass: millions of farmers at the top and millions of consumers at the bottom, with a tight pinch of powerful processors, manufacturers and retailers in the middle. That narrow waist concentrates pricing power, meaning that firms here are engaged in strategic competition with other big players. Isabella Weber's work on *sellers' inflation* gives a potential reason why these firms might be quicker to move prices up than down: large firms don't raise prices simply because costs rise, but because shared cost shocks act as a coordinating mechanism. Each firm expects its rivals to follow suit, and financial markets punish those who don't⁵². In this way, a shock becomes a tacit green light for a sector-wide jump in list prices.

Financial incentives reinforce this. Analysts and investors judge corporate performance not just on profits but on profit margins, which are expressed as a percentage. When costs rise, a firm must raise prices by *more* than the initial cost increase just to preserve its margin. For example:

- **Starting position:** Retail price: £100, Costs: £90, Profit: £10, Margin: 10%
- **Costs rise by £10** → new cost: £100.
- If the firm raises the shelf price to **£110**, profit stays at £10, but the margin falls from 10% to **9.1%**.
- For investors and analysts, that represents a deterioration in margins and may be read as weaker performance.
- To preserve the original 10% margin, the firm must raise the price to **£111.11**, not £110. In other words, a £10 increase in costs requires an £11.11 increase in price just to stand still.

Across a concentrated industry, this logic produces systematic above-cost price rises every time there is a shock, especially when investors expect firms to "hold their margins"⁵³ as a sign of competence.

Firms also respond to volatility by rebuilding financial buffers after large increases in energy or fertiliser costs, choosing to maintain higher price points to shore up margins against future shocks. In a world of growing climate and energy instability, this behaviour

is rational from a business perspective, but it reinforces the divergence between costs and consumer prices.

Weber's work suggests that while this concentrated structure can help coordinate price increases, there is no equivalent mechanism pushing prices back down again. Once prices have been lifted to protect or expand margins, no firm wants to be the first to cut for fear of sparking a price war that erodes profitability. Prices therefore stick.

With millions of farmers and millions of consumers but only a handful of gatekeepers in the middle, the food system naturally produces a ratchet dynamic: shocks travel quickly through the pinch point on the way up, but dissipate slowly on the way down, leaving prices stranded at a new, higher plateau.

Whatever the mix of mechanisms — second-round wage effects, margin preservation, buffer rebuilding or pricing power in concentrated markets — the result is similar: shocks move quickly through the system on the way up but unwind only slowly on the way down.

For households, especially those on lower incomes, this means the cost of a basic diet keeps ratcheting upward, even long after global markets have stabilised. And because climate disruption is expected to intensify and further geopolitical fossil-fuel volatility seems increasingly plausible, the divergence between producer costs and consumer prices is likely to grow. Without action to build a more resilient, lower-carbon food system, rising food prices risk becoming a defining feature of UK living standards.

Why this matters for monetary policy and investment

The Bank of England has become increasingly explicit about the challenge climate-driven supply shocks pose for inflation management. As senior official James Talbot observed last year, '...the most difficult shocks to deal with are those which push inflation and output in different directions – so called "trade-off inducing" shocks. There is evidence that the impact of climate change is increasingly exhibiting these characteristics.' (James Talbot, BoE, 2025)⁵⁴

An example of such a shock is the 2021 North American drought which saw the production of durum wheat fall 37% year-on-year in Canada, the world's largest producer resulting in price rises globally. These are some of the most difficult types of inflation for the bank to handle with its current toolkit because raising the interest rate – the bank's typical response to higher inflation – will do little to affect the harvest or reduce the climate-risk in the first place. It may be able to address inflation by reducing economic activity and so suppress demand, but this has downsides for living standards and employment and is of questionable efficacy for something as essential as food staples like bread.

Additionally, raising rates risks potentially making the Bank's job harder going forward by discouraging companies and governments from investing in future capacity. This risks slowing down economic activity, damaging living standards and likely worsening the government's fiscal position. Weaker investment could also slow progress towards net zero, increasing the economy's exposure to the climate-induced supply shocks that drive inflation in the first place. So, you have a scenario where inflation leads to the central bank making people worse off while increasing the likelihood of future inflation. This is a vicious

cycle where the consequences of climate change undermine action on climate change, known as derailment risk⁵⁵.

Research from the European Central Bank (2025)⁵⁶ has shown that without adaptation, global food price inflation could increase by 1 to 3 percentage points by 2035, adding between 0.3 and 1.2 percentage points to headline inflation. This may still understate the scale of the threat. Recent UK national security assessments warn that food security is dangerously exposed to global ecosystem degradation and collapse⁵⁷. It is little surprise then that senior officials at the Bank of England are warning that a more sophisticated analysis of climate change's role is needed⁵⁸.

ECIU's findings - that shocks act in an asymmetrical way on food prices - add to the growing literature that climate change is making it increasingly difficult for central banks to meet their inflation and financial stability mandates. The results suggests that impacts of shocks are unlikely to cancel each other out over time, as might be suggested by the shape of commodity markets. Instead, they suggest shocks will structurally shift inflation, making higher inflation more likely.

The important nuance here is that these findings imply that it's not just achieving net zero – the only way to stop further climate change – and reducing climate risk that's important, nor adapting farming approaches to be more resilient. Indeed, the structure of the food system beyond the farm gate itself ought to be reviewed, as it may well be extending the impact of these physical climate risks through supply chains.

Appendix A - Technical Appendix

This appendix sets out the methodology, data sources and robustness checks underpinning the estimates reported in the main text.

Contents

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Run reversal analysis

Methodology

When analysing the differences between different food types, prices are not deflated with wages so as not to confuse wage co-movement with differences in inter-food price variation.

Smoothing: The analysis here is concerned with significant changes in the price indices, rather than small price movements that could be mistaken for “noise”. To remove the noise, each index used in our analysis is smoothed using a LOWESS algorithm (Locally Weighted Scatterplot Smoothing). LOWESS is a non-parametric method that runs locally weighted polynomial regressions to fit simple models to localized data subsets to generate smoothed value. Visual inspection and sensitivity analysis are used when selecting a smoothing parameter – more in the robustness checks section below.

Run identification: Upward “runs” are defined as sequences of consecutive monthly increases, with a minimum run length of two months – more on this in the robustness checks section below.

Run reversal: For each run, the total rise in the price index from the start to the end of the run is measured. How much of that increase is reversed over fixed, post-run horizons of 6,

12, 18 and 24 months is then measured. Reversal is defined as the fall from the index level at the end of the run to the lowest value observed within the horizon window, divided by the size of the original rise. A value of 100% means the rise was fully reversed within that period; values below 100% indicate incomplete reversal; values above 100% indicate that prices fell below their pre-run level.

Summary analysis: We produce reversal statistics for the headline series, as well as for the sub-indices. Finally, we calculate a "typical category" measure by taking the median of each category's median reversal rate. This is intended to summarise how a typical food category behaves.

To understand price rises in affordability terms, the analysis uses the wage data (described in the data sources section) to deflate the headline index, then the data is smoothed and used to analyse upward price runs. The extent to which the rises are reversed is analysed, and finally the results from the individual price rises are summarised.

Data sources

Consumer prices

Consumer price analysis is based primarily on ONS CPI data. We analyse the headline food and drink index (CPI Index 01: Food and Non-Alcoholic Beverages 2015=100) as well as the following sub-indices:

1. CPI Index 01.1.1: Bread & Cereals
2. CPI Index 01.1.2: Meat
3. CPI Index 01.1.3: Fish
4. CPI Index 01.1.4: Milk, Cheese & Eggs
5. CPI Index 01.1.5: Oils & Fats
6. CPI Index 01.1.6: Fruit
7. CPI Index 01.1.7: Vegetables Including Potatoes and Other Tubers
8. CPI Index 01.1.8: Sugar, Jam, Honey, Syrups, Chocolate & Confectionery
9. CPI Index 01.1.9: Food Products
10. CPI Index 01.2.1: Coffee, Tea, Cocoa
11. CPI Index 01.2.2: Mineral Waters, Soft Drinks and Juices

Monthly data from January 1988 to December 2025 is used and all indices are rebased to Jan 1988 = 100.

Wage-adjusted prices

The data on wages is from two sources:

- From January 2000 onward we use 'Average Weekly Earnings - regular pay, Great Britain (seasonally adjusted)' from the ONS. This data is unavailable for the period prior to 2000.
- From January 1988 to January 2000 annual gross weekly earnings data is used, again from the ONS. Only an annual value is available in time series, so interpolation is used to create a monthly time series.

A bridge factor is used to merge the two series. Specifically, we compare the annual series with annual averages of the monthly series and uses the median ratio across overlap years as a robust scaling factor. The older annual series is then multiplied by this bridge factor, anchored to July in each year, and linearly interpolated to monthly frequency. From the point where the monthly AWE series begins, actual monthly AWE values replace the interpolated estimates. The result is a continuous monthly earnings series spanning the full analysis period.

Robustness checks

Smoothing coefficient sensitivity

The broad pattern of incomplete reversal is robust across specifications, although the estimated magnitude is sensitive to smoothing choices. Smoother time series materially affect both the number of runs detected and the estimated reversal rates. Lower coefficient values produce a less smooth series, which picks up more short-term movements. As a result, lower smoothing tends to generate many more upward runs and much higher reversal estimates. Higher smoothing coefficient values smooth over short-term fluctuations, which reduces the number of runs and lowers the estimated reversal. This means the smoothing choice has a significant effect on the magnitude of the results. The categories that are most sensitive to smoothing are the more volatile ones, especially fruit and vegetables. Some categories, such as milk, cheese & eggs and fish, appear relatively less sensitive, but none are completely unchanged across the smoothing range. The main implication is that the broad direction of the findings is robust, but the size of the estimated effect is not. The evidence for incomplete reversal often remains, but how strong that pattern looks depends quite a lot on how heavily the data are smoothed.

As our analysis is framed as an analysis of significant supply-shock-scale price movements, we're more inclined to be using higher smoothing coefficients. A visual inspection of the smoothed series shows that above 0.05 the smoothed series begin to miss significant portion of the series movements, particularly when prices rise quickly. It is for this reason that our baseline analysis uses a smoothing coefficient of 0.05.

Table A1: Sensitivity on nominal reversal estimates to smoothing parameter

Holding the minimum run length at 2 months

each cell = baseline [min-max across smoothing coefficients values of 0.03, 0.05, 0.07, 0.1, 0.15]

Series	No. of upward runs	Median reversal within 6 months	Median reversal within 12 months	Median reversal within 18 months	Median reversal within 24 months
Sugar, jam, honey, syrups, chocolate, & confec...	3 [1-8]	0.2% [0.1-9.6]	0.4% [0.1-10.1]	1.3% [0.1-10.1]	1.7% [0.1-10.1]
Milk, cheese & eggs	6 [3-12]	0.7% [0.6-3.1]	2.5% [2.0-6.4]	4.6% [3.4-7.5]	6.6% [3.4-10.1]
Mineral waters, soft drinks, & juices	6 [4-17]	1.9% [0.5-25.1]	3.2% [1.8-26.9]	4.9% [3.6-40.9]	8.5% [3.8-53.2]
Oils & fats	9 [3-17]	6.0% [0.5-13.7]	9.6% [1.4-28.2]	9.7% [2.7-28.2]	9.9% [3.9-28.2]
Bread and cereals	6 [3-13]	1.6% [0.3-14.0]	5.4% [0.9-17.9]	9.5% [1.3-23.2]	12.5% [1.3-25.8]
Fish	6 [3-8]	3.2% [0.6-8.0]	9.8% [1.8-14.2]	12.7% [3.0-15.5]	13.7% [4.2-15.5]
Coffee, tea, & cocoa	7 [4-15]	4.7% [0.7-13.7]	9.1% [3.0-24.1]	11.0% [4.6-38.1]	19.1% [4.6-40.7]
Food products	8 [3-15]	4.0% [0.3-15.3]	7.0% [1.2-18.6]	7.6% [1.6-18.6]	19.2% [3.0-30.5]
Meat	8 [3-16]	10.1% [0.7-21.1]	23.4% [2.7-23.4]	23.4% [4.6-27.5]	23.4% [5.8-33.1]
Vegetables incl. potatoes & tubers	10 [3-18]	13.1% [0.7-29.2]	26.0% [2.5-49.4]	30.2% [4.6-71.8]	30.2% [6.7-72.6]
Fruit	12 [3-32]	23.7% [1.0-33.8]	38.4% [3.2-38.4]	50.7% [5.0-50.7]	50.7% [5.1-50.7]
Headline index for food and non-alcoholic beve...	6 [2-14]	1.2% [0.3-13.7]	4.6% [1.2-13.7]	7.0% [2.0-18.7]	7.0% [2.3-18.7]

Run length sensitivity

Our results are found to be largely insensitive to the minimum number of months that we use define an upward rise. Even increasing the minimum number of months for an upward rise from 2 to 6 does not change the results for most series. The most significant result is for fruit, where increasing the number of consecutive months of rises required for a run, reduces the number of runs detected from 12 to 10 and significantly decreases the median reversion from 50.7% after 24 months to 14.6%. This suggests that fruit, and to a lesser extent vegetables, are prone to short lived rises and falls, but that longer lived periods of price rises – perhaps triggered by more significant supply shocks – are longer lived.

Table A2. Sensitivity of reversal estimates to minimum run length

Each cell shows the baseline estimate, followed by the minimum and maximum values observed across smoothing coefficients of 0.03, 0.05, 0.07, 0.10 and 0.15, holding the minimum run length at two months.

Series	No. of upward runs	Median reversal within 6 months	Median reversal within 12 months	Median reversal within 18 months	Median reversal within 24 months
Sugar, jam, honey, syrups, chocolate, & confec...	3	0.2%	0.4%	1.3%	1.7%
Milk, cheese & eggs	6	0.7%	2.5%	4.6%	6.6%
Mineral waters, soft drinks, & juices	6	1.9%	3.2%	4.9%	8.5%
Oils & fats	9 [8–9]	6.0% [1.6–6.0]	9.6% [8.8–9.6]	9.7% [9.1–9.7]	9.9% [9.5–9.9]
Bread and cereals	6	1.6%	5.4%	9.5%	12.5%
Fish	6	3.2%	9.8%	12.7%	13.7%
Coffee, tea, & cocoa	7	4.7%	9.1%	11.0%	19.1%
Food products	8	4.0%	7.0%	7.6%	19.2%
Meat	8	10.1%	23.4%	23.4%	23.4%
Vegetables incl. potatoes & tubers	10 [9–10]	13.1% [12.4–13.1]	26.0% [22.8–26.0]	30.2% [28.1–30.2]	30.2% [28.1–30.2]
Fruit	12 [10–12]	23.7% [3.4–23.7]	38.4% [6.0–38.4]	50.7% [11.3–50.7]	50.7% [14.6–50.7]
Headline index for food and non-alcoholic beverages	6	1.2%	4.6%	7.0%	7.0%

Commodity and energy analysis

To examine the role that commodity price shocks and energy costs play in shaping food prices, this analysis compares retail prices with relevant commodity prices and modelled variable energy costs between the farm gate and the consumer. These energy costs are not necessarily the price paid but are instead what is implied by energy markets. For each product, commodity prices are converted into product-equivalent quantities and combined with indicative estimates of variable energy costs across key stages of the supply chain.

The purpose of this approach is not to estimate full production costs, but to illustrate how movements in upstream inputs, particularly commodities and energy, relate to changes in consumer prices over time.

Bread

This analysis examines the relationship between retail bread prices, wheat commodity prices and variable energy costs using publicly available UK and international data.

Retail bread prices

Retail bread prices are proxied using the Office for National Statistics (ONS) series RPI: Average price – Bread: white loaf, sliced, 800g. This series was discontinued in January 2025. To extend the analysis beyond this point, the Consumer Prices Index (CPI) category for bread and flour is used as a proxy. While not a direct continuation of the RPI loaf series, this CPI category captures price movements for closely related products and allows bread price trends to be followed consistently over time.

Wheat prices and exchange rates

Commodity price data for wheat are taken from the International Monetary Fund's (IMF) commodity price database, with historical values supplemented using the Federal Reserve Bank of St. Louis' Federal Reserve Economic Data (FRED). Prices are quoted in US dollars and converted to pounds sterling using USD–GBP exchange rates sourced from FRED.

Converting wheat prices to bread-equivalent quantities

To relate wheat prices to the production of a standard 800g loaf of bread, a set of physical conversion assumptions is applied. Producing an 800g loaf requires approximately 500g of flour. Wheat typically has an extraction rate of around 70–75% when milled into flour. Using a conservative midpoint assumption implies that around 700g of wheat is required to produce 500g of flour. Wheat prices are therefore expressed on a per-700g basis to reflect the quantity of wheat embodied in a single loaf of bread.

Variable energy cost modelling

In addition to commodity prices, we estimate the variable energy costs associated with transforming wheat from the farm gate to consumers. This modelling is intentionally conservative and indicative, and is designed to show how the energy costs not already embedded in commodity prices change over time rather than to provide a comprehensive estimate of production costs.

Energy prices for electricity, diesel, gas and fuel oil are taken from the Department for Energy Security and Net Zero (DESNZ) Quarterly Energy Prices release. Where required, quarterly data are converted to monthly values. Diesel prices exclude VAT and fuel duties. Fuel conversion factors are drawn from the 2012 Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting and the Digest of UK Energy Statistics (DUKES).

Energy use is estimated for the most energy-intensive stages of the bread supply chain: milling, baking, packaging materials production and packaging, transport, warehousing and retailing. These stages are modelled separately to capture how changes in energy prices affect different parts of the supply chain over time.

Limitations

This analysis does not account for labour costs, capital costs, profit margins, taxes

or retailer pricing strategies. Absolute cost levels should not be interpreted as representative of the full cost of bread production. The focus is on relative movements over time and on illustrating how volatility in commodity and energy markets feeds through supply chains.

Pasta

This analysis examines the relationship between retail pasta prices, durum wheat commodity prices and variable energy costs using publicly available UK and international data.

Retail pasta prices

Retail pasta prices are proxied using the Office for National Statistics (ONS) Consumer Prices Index (CPI) series 01.1.1.6 Pasta products and couscous. To express prices on a per-500g basis, the index is scaled using the observed retail price of a 500g packet of Napolina dried pasta taken from Tesco's website in December 2025. This provides an approximate price level while preserving the time-series movements of the CPI data.

Durum wheat prices and exchange rates

Commodity price data for durum wheat are taken from the United States Department of Agriculture (USDA). Prices are quoted in US dollars and converted to pounds sterling using USD–GBP exchange rates sourced from FRED.

Converting wheat prices to pasta-equivalent quantities

Producing a standard 500g portion of dried pasta requires approximately 500g of flour. As with bread, durum wheat typically has an extraction rate of around 70–75% when milled into flour. Using a conservative midpoint assumption implies that roughly 700g of durum wheat is required to produce 500g of flour. Prices are therefore expressed on a per-700g basis to reflect the quantity of wheat embodied in a 500g portion of dried pasta.

Variable energy cost modelling

Energy costs for pasta production are assumed to be broadly comparable to those for bread, with adjustments made to reflect differences in processing. Evidence suggests that the pasta drying process is more energy-intensive than bread baking, using approximately four-thirds of the energy required for baking. This stage is therefore scaled accordingly, while energy costs for other supply-chain stages are assumed to be the same as in the bread analysis.

Limitations

As with bread, this approach does not capture labour costs, capital costs, profit margins, taxes or retailer pricing strategies. Energy cost estimates are indicative and intended to show relative changes over time rather than the full cost structure of pasta production.

Coffee

This analysis examines the relationship between retail coffee prices, arabica coffee commodity prices and variable energy costs using publicly available UK and international data.

Retail ground coffee prices

Retail coffee prices are proxied using the Office for National Statistics (ONS) series RPI: Average price – Coffee: ground fine, per 227g. This series was discontinued in January 2021. To extend the analysis beyond this point, the Consumer Prices Index (CPI) category for coffee is used as a proxy. While not a direct continuation of the RPI series, it captures price movements for closely related products and allows retail price trends to be followed over time.

Coffee prices and exchange rates

Commodity price data for green arabica coffee beans are taken from the International Monetary Fund's (IMF) commodity price database, with historical data supplemented using FRED. Prices are quoted in US dollars and converted to pounds sterling using USD–GBP exchange rates sourced from FRED.

Variable energy cost modelling

Variable energy costs are estimated for the most energy-intensive stages of the coffee supply chain beyond the farm gate. These include international transport from Brazil to the UK, roasting and grinding. Energy costs for packaging materials, packaging, warehousing and retailing are assumed to be the same as those used in the bread analysis.

Limitations

As with other products, this approach does not capture labour costs, capital costs, profit margins, taxes or retailer pricing strategies. Energy cost estimates are indicative and intended to illustrate relative changes over time rather than full production costs.

Olive oil

This analysis examines the relationship between retail olive oil prices, olive oil commodity prices and variable energy costs using publicly available UK and international data.

Retail olive oil prices

Retail olive oil prices are proxied using the Office for National Statistics (ONS) Consumer Prices Index (CPI) series for olive oil. To express prices on a per-500ml basis, the index is scaled using the observed retail price of a 500ml bottle of olive oil taken from Tesco's website in December 2025.

Olive oil prices and exchange rates

Commodity price data for olive oil are taken from the International Monetary Fund's (IMF) commodity price database, with historical values supplemented using FRED. Prices are quoted in US dollars and converted to pounds sterling using USD–GBP exchange rates sourced from FRED.

Variable energy cost modelling

Variable energy costs are estimated for the most energy-intensive stages of the olive oil supply chain beyond the farm gate. These include international transport from producing countries (primarily Spain and Italy) to the UK, bottle production and bottling,

warehousing and retailing.

Limitations

This analysis does not account for labour costs, capital costs, profit margins, taxes or retailer pricing strategies. Energy cost estimates are indicative and intended to illustrate relative changes over time rather than full production costs.

Milk

This analysis examines the relationship between retail milk prices, farmgate milk prices and variable energy costs using publicly available UK data.

Retail milk prices

Retail milk prices are proxied using the Office for National Statistics (ONS) series RPI: Average price – Whole milk, per pint. This series was discontinued in January 2025. To extend the analysis beyond this point, the Consumer Prices Index (CPI) category for milk is used as a proxy.

Farmgate milk prices

Farm-gate price data for milk are taken from the Agriculture and Horticulture Development Board (AHDB).

Variable energy cost modelling

Variable energy costs are estimated for the most energy-intensive stages of the milk supply chain beyond the farm gate. These include processing (pasteurisation, homogenisation and cooling), bottle production and bottling, transport, cold storage in warehousing and retail. Owing to milk's perishability and the need for continuous refrigeration, distinct estimates are applied for these stages.

Limitations

As with other products, this approach does not capture labour costs, capital costs, profit margins, taxes or retailer pricing strategies. Energy cost estimates are indicative and intended to illustrate relative changes over time rather than full production costs.

Appendix B – Climate Impacted Wheat

Our daily bread

The largest share of consumer baskets relates to breads and cereals. Excluding rice, which makes up just 0.5% of the average UK basket, breads and cereals account for 17.0% of consumer baskets, by value. Within this, bread makes up 4.0%, pizza and quiche 1.0%, breakfast cereals and other cereal products 3.2%, and other bakery product (like cookies, waffles, cakes, crumpets and croissants) make up 7.7%.

Though we produce and consume other cereals – among which oats and barley are most significant – the dominant grain in the UK, particularly for human consumption is wheat. Wheat accounts for 31% of typical daily energy intake for the UK, with bread alone making up a fifth of daily calories⁵⁹. Barley is the second most produced grain, typically accounting for around a third of UK cereal production by volume⁶⁰. Most of this is fed to livestock or used to make beer and whisky. Oats, while smaller in production (~5%) are more visible in human diets.

Largely self-sufficient, yet price takers

While in most years we are almost entirely self-sufficient in cereals (around 95%), during bad harvests – like 2025, 2024, and 2020⁶¹ – we import more. For example, in 2024 wheat self-sufficiency fell to 79% from 96% the previous year⁶².

Grain is easy to trade because it stores well, ships cheaply in bulk, and is standardised globally. In 2024/25 the 800.8 Mt of wheat was produced globally⁶³, with China, the EU, India, Russia, US, and Canada the largest producers. The UK typically produces around 12 Mt – a small fraction.

As a result, the prices of grain used for UK consumption are largely set by international markets, with the UK acting as a price-taker rather than a price-setter. We are also dependent on other countries for grains that aren't well suited to our climate, such as durum wheat for pasta or Canadian red wheat, an important component of UK bread flour.

Climate-risks to price and supply

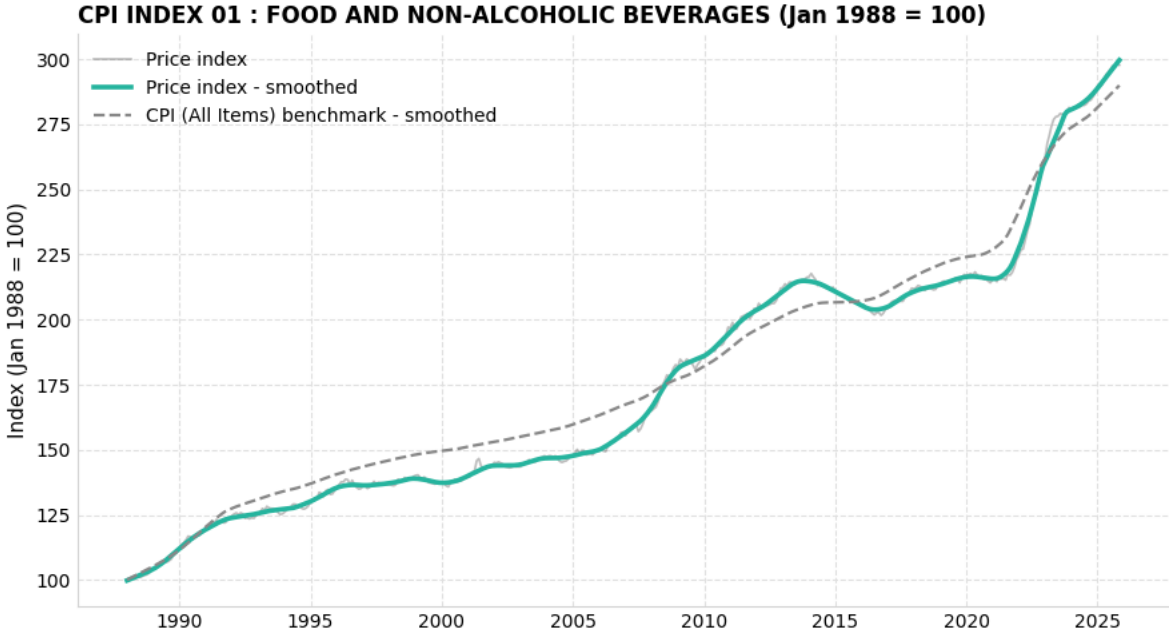
As a result of our role as price takers, we are very exposed to climate risks in the world's breadbasket regions – one study found that wheat yields are already down 10% because of climate change⁶⁴. Our analysis indicates that extreme weather made more likely by climate change has contributed to the commodity price for wheat being elevated between August 2020 to July 2024⁶⁵.

A summary of the clearest climate impacts is below:

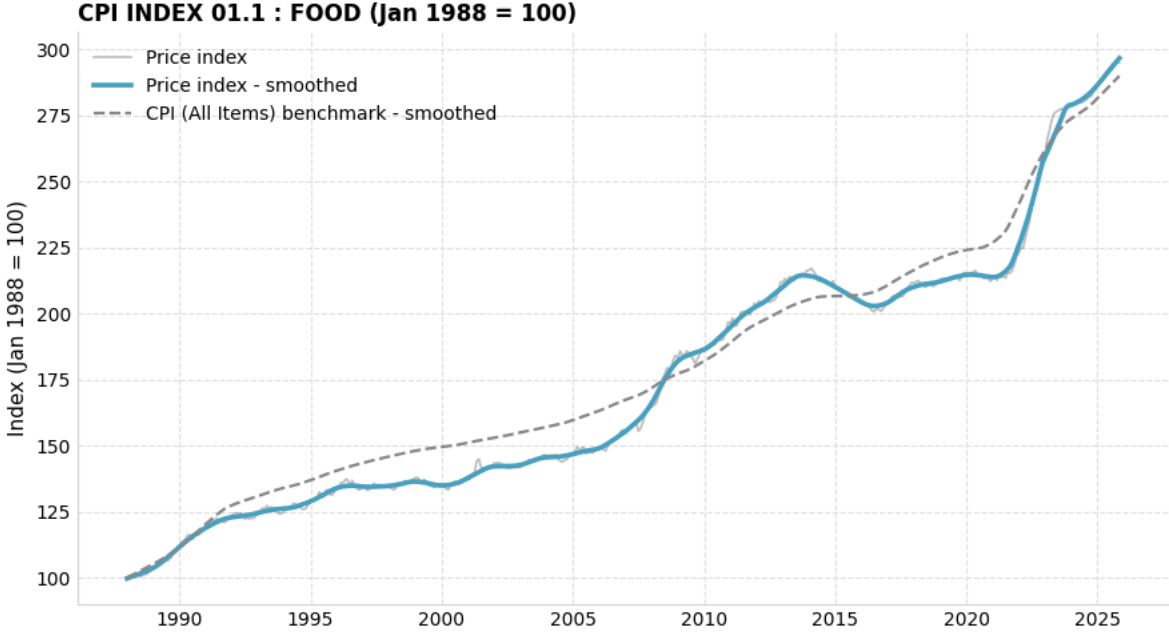
Year	Climate-impacts for wheat
<p>2020</p>	<p>EU: A wet end to 2019⁶⁶, made more likely by climate change⁶⁷, resulted in poor planting conditions in the autumn of 2019. This was followed by an extremely warm, dry growing season in the EU's two largest producing countries, France and Germany⁶⁸ and saw the total EU harvest fall from 138.8 million tonnes to 126.7 million tonnes.</p>
<p>2021</p> <p>A total decline of 27.9 Mt, where production was impacted by extreme weather attributed to climate change.</p>	<p>Russia: The Russian harvest fell from 85.4Mt to 75.2Mt (-12%), following drought.⁶⁹ There's strong evidence that the background risk for these droughts has been increased by climate change⁷⁰, but no event-level studies have been carried out.</p> <p>North America: Following a heatwave deemed 'virtually impossible without human-caused climate change'⁷¹ US wheat production fell to 44.8 Mt (-9% YoY), and Canadian production fell to 22.4 Mt (-37% YoY).</p>
<p>2022</p> <p>Reduced wheat production in climate-impacted regions was greater than the decline in production seen in Ukraine⁷²</p>	<p>Ukraine: wheat production fell to 21.5 mT (-11.5 mT / -35%) following the Russian invasion (and hot and dry weather attributed to climate change⁷³).</p> <p>US: US wheat production remained low at 44.9 Mt following dry weather⁷⁴ made more likely by climate change.⁷⁵</p> <p>EU: EU production fell to 134.5 (-4 mT) following drought and heat stress attributed to climate change.⁷⁶</p> <p>India: production in India fell from 109.6 to 104.0 following a heatwave⁷⁷ made 30 times more likely by climate change⁷⁸. Following this, and the outbreak of war in Ukraine, wheat exports were banned.</p> <p>Pakistan: production in Pakistan fell from 27.5 to 26.2 following a heatwave⁷⁹ made 30 times more likely by climate change⁸⁰</p>
<p>2023</p>	<p>Australia: Production fell from a record high of 40.5Mt to 26.0Mt due to dry weather.⁸¹</p> <p>Ukraine's production remained low due to conflict</p> <p>India's wheat export ban remained in force, continuing restrictions introduced after the 2022 heatwave-affected harvest.</p>

<p>2024</p> <p>A sharp fall in wheat output across the EU, Russia and Turkey -- together down ~25 Mt - driven by extreme rain and heat with strong links to human-caused climate change.</p>	<p>EU: Production fell from 135.4 Mt to 122.1 Mt after an exceptionally wet winter and spring caused waterlogged soils, delayed planting and poor conditions in France and the UK⁸². While France's rainfall has not been formally attributed, UK⁸³ and German⁸⁴ analyses show autumn–winter storm rainfall is now significantly more intense and more likely due to climate change, making it very plausible that climate change contributed to the EU-wide losses.</p> <p>Russia: Output fell from ~91 Mt to ~81 Mt following a season of heatwaves, drought in early summer, and heavy rain during harvest. Heavy rainfall associated with Storm Bettina was made more likely and more intense by climate change⁸⁵, contributing to losses that led some farmers to reduce wheat area.</p> <p>Turkey: Production declined from 21 Mt to 19 Mt due to record heat shown to be several times more likely because of climate change⁸⁶ and climate-amplified heavy rainfall around planting linked to Storm Bettina⁸⁷, stressing crops at both sowing and grain-filling stages.</p> <p>India's wheat export ban remained in force, continuing restrictions introduced after the 2022 heatwave-affected harvest.</p>
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Appendix C – Consumer price indices charts

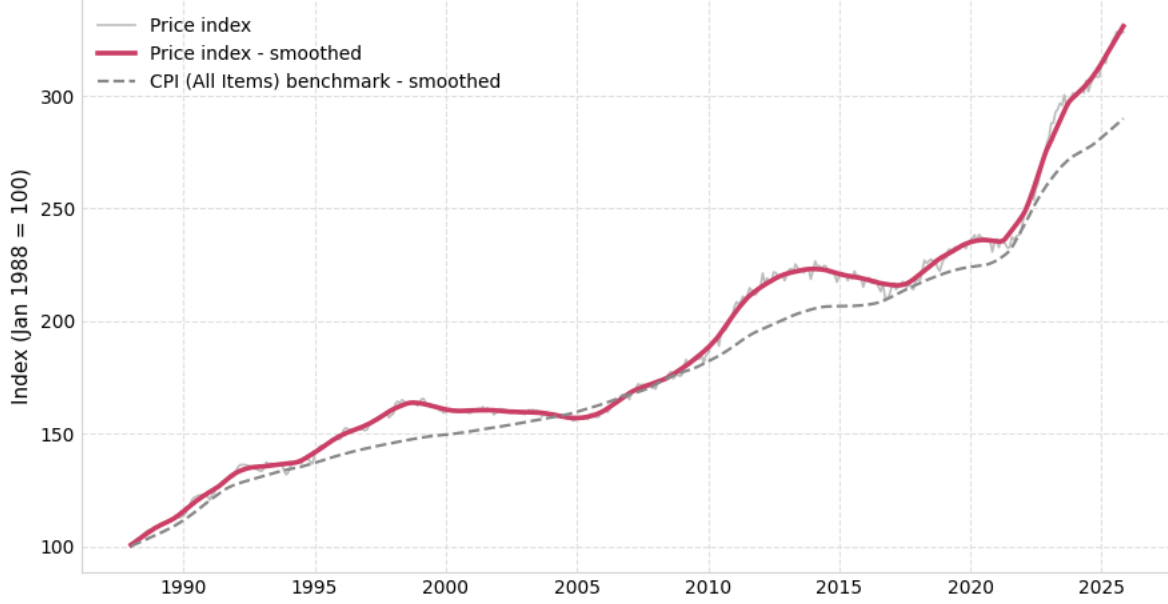


Source: ONS CPI time series



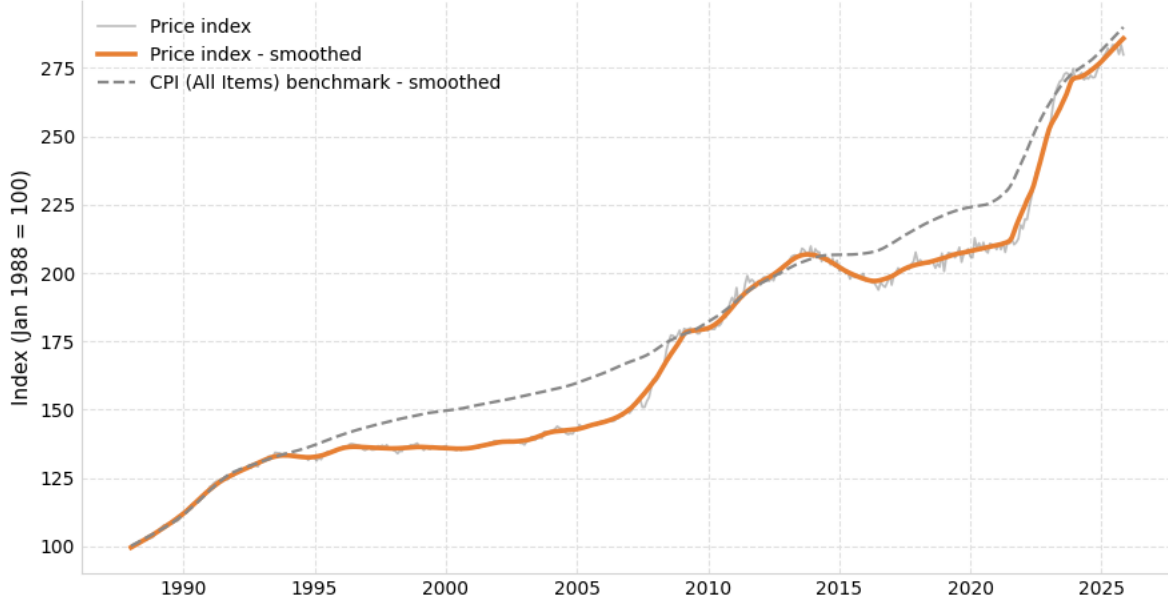
Source: ONS CPI time series

CPI INDEX 01.2 : NON-ALCOHOLIC BEVERAGES (Jan 1988 = 100)



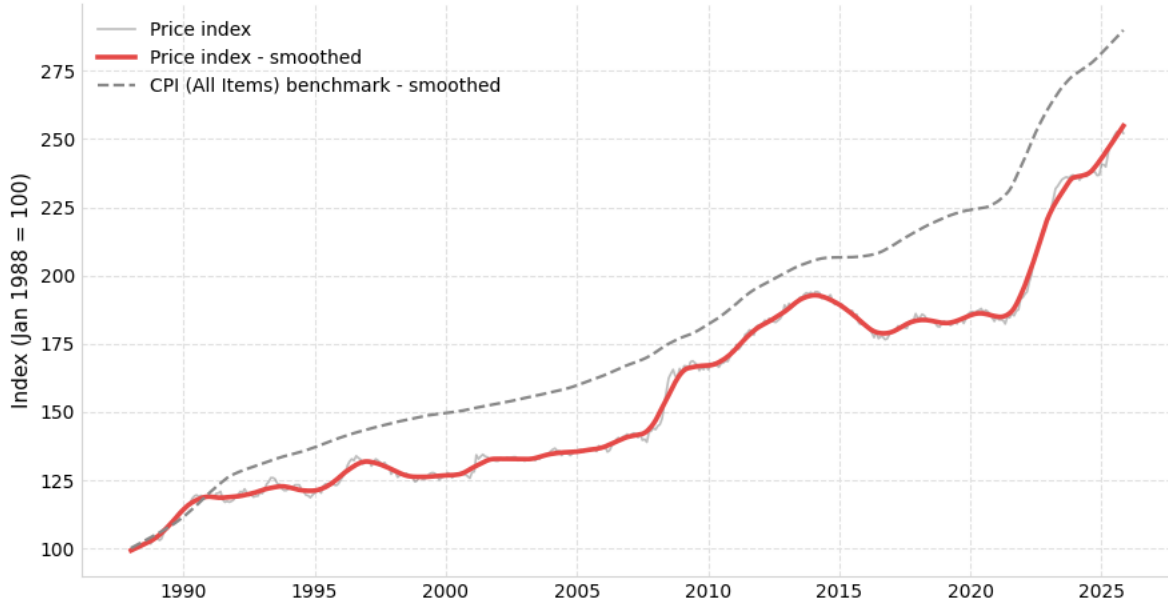
Source: ONS CPI time series

CPI INDEX 01.1.1 : BREAD & CEREALS (Jan 1988 = 100)



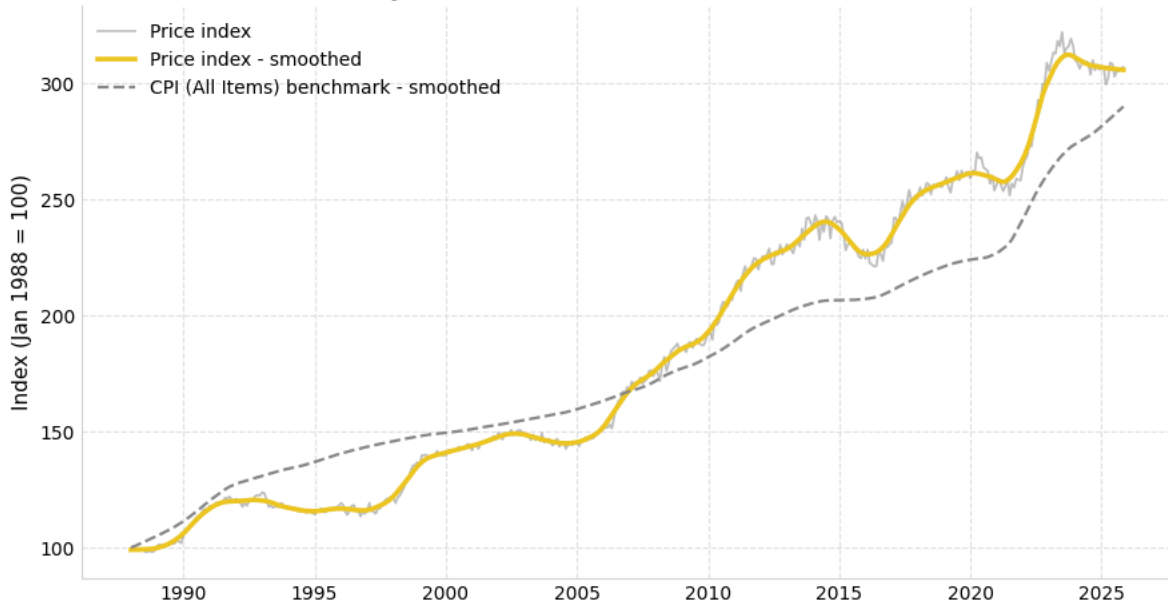
Source: ONS CPI time series

CPI INDEX 01.1.2 : MEAT (Jan 1988 = 100)



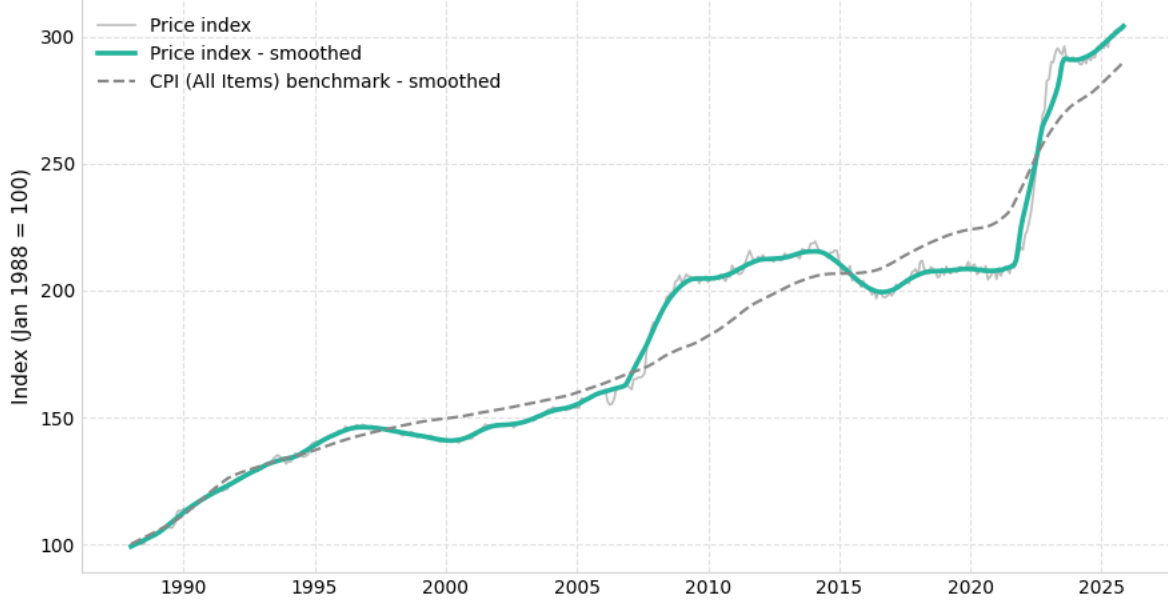
Source: ONS CPI time series

CPI INDEX 01.1.3 : FISH (Jan 1988 = 100)



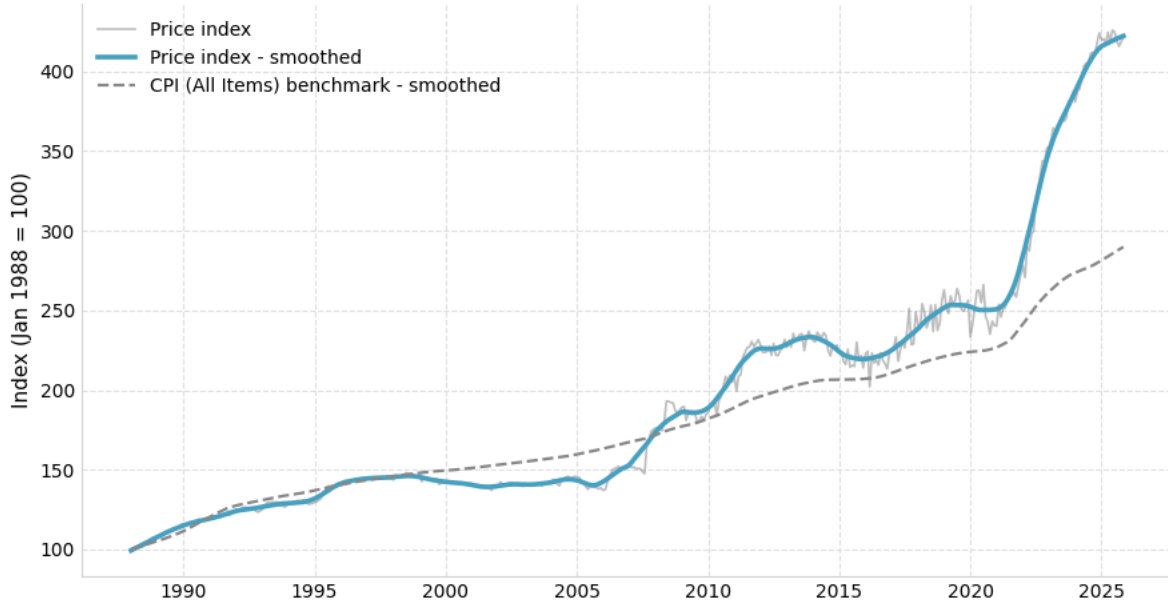
Source: ONS CPI time series

CPI INDEX 01.1.4 : MILK, CHEESE & EGGS (Jan 1988 = 100)



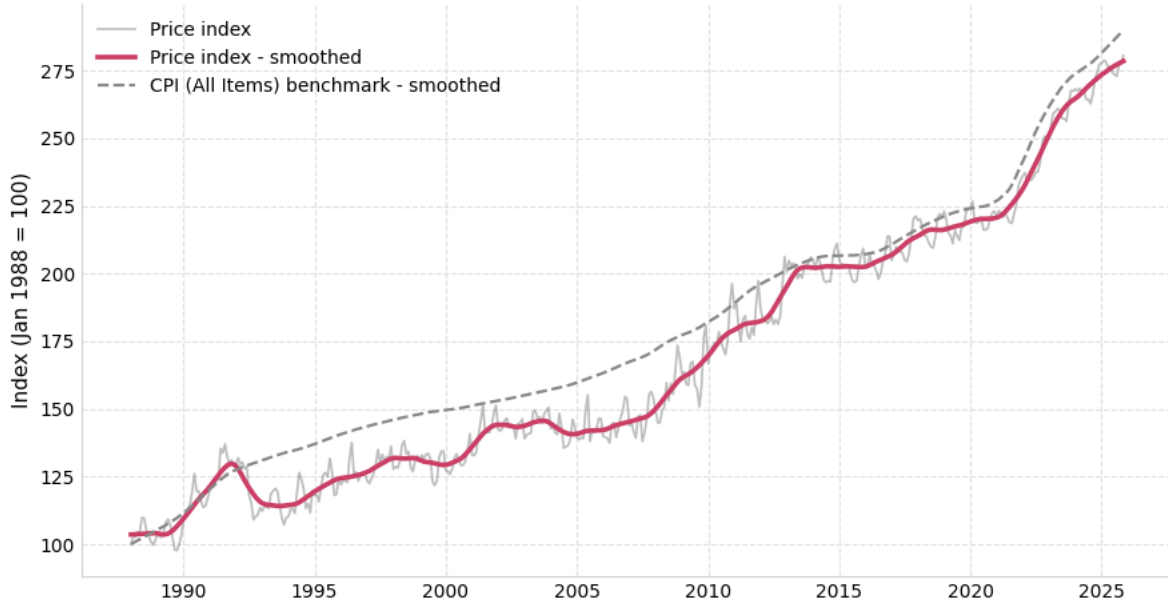
Source: ONS CPI time series

CPI INDEX 01.1.5 : OILS & FATS (Jan 1988 = 100)



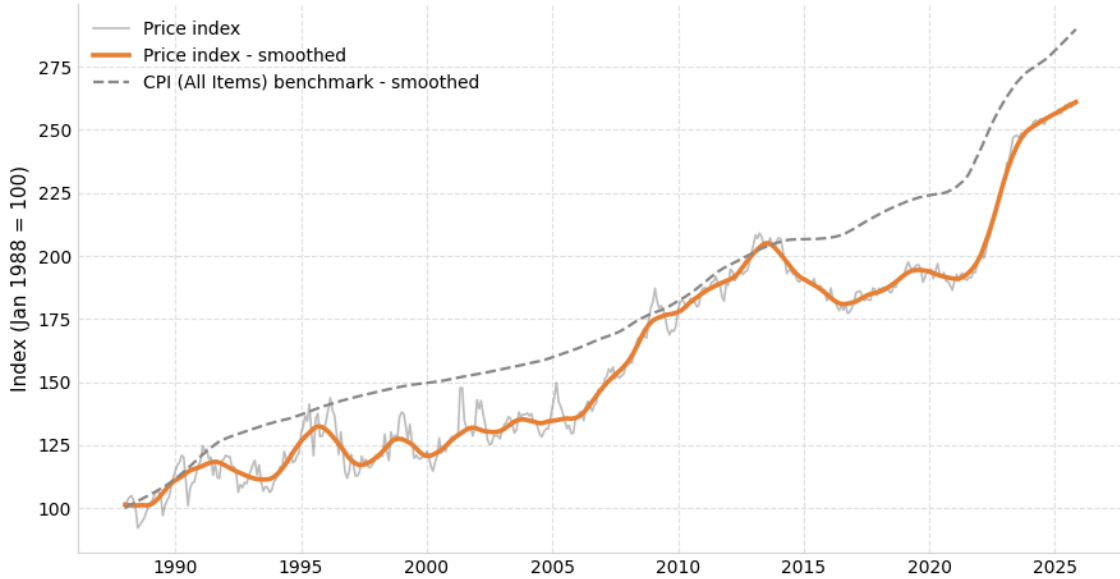
Source: ONS CPI time series

CPI INDEX 01.1.6 : FRUIT (Jan 1988 = 100)



Source: ONS CPI time series

CPI INDEX 01.1.7 : VEGETABLES INCLUDING POTATOES AND OTHER TUBERS (Jan 1988 = 100)



Source: ONS CPI time series

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