

NAVIGATING A SHOCK-PRONE WORLD: LESSONS FROM COST-OF-LIVING CRISES - ONLINE ANNEXES

Online Annexes 2.1–2.5 to Chapter 2 of the October 2026 World Economic Outlook lay out the data sources, sample coverage, variable definitions and methodologies used in the main chapter.

Online Annex 2.1. Data Sources and Sample Coverage

This section describes the data sources and country coverage across different parts of the analysis.

Online Annex Table 2.1.1. Sample of Economies Included by Section

Countries	I	II	III	IV
Bulgaria; Hungary; Poland; Romania	X	X	X	X
Albania; Bolivia; Colombia; Côte d'Ivoire; Dominican Republic; El Salvador; Georgia; India; Kenya; Kyrgyz Republic; Mexico; Morocco; Mozambique; Nicaragua; Nigeria; Pakistan; Paraguay; Peru; South Africa; Sri Lanka; Türkiye; Ukraine	X	X	X	
Belgium; Czech Republic; Finland; France; Germany; Ireland; Italy; Portugal; Spain	X		X	X
Armenia; Azerbaijan; Belarus; Bhutan; Bosnia and Herzegovina; Burundi; Cabo Verde; Cameroon; Fiji; Gabon; Gambia, The; Guinea; Haiti; Honduras; Iraq; Kosovo; Lao P.D.R.; Lesotho; Liberia; Mauritania; Mauritius; Moldova; Namibia; North Macedonia; Panama; Republic of Montenegro; Rwanda; Serbia; Sierra Leone; Zambia	X	X		
Algeria; Argentina; Australia; Austria; Bangladesh; Brazil; Burkina Faso; Canada; Chile; Costa Rica; Denmark; Ecuador; Ethiopia; Ghana; Greece; Guatemala; Indonesia; Israel; Jamaica; Japan; Korea; Latvia; Lithuania; Madagascar; Malaysia; Nepal; Netherlands; New Zealand; Norway; Philippines; Russia; Senegal; Sweden; Switzerland; Thailand; Tunisia; United Kingdom; United States; Uruguay; Zimbabwe	X		X	
Croatia; Luxembourg; Malta; Slovak Republic; Slovenia	X			X
Afghanistan; Andorra; Angola; Antigua and Barbuda; Aruba; Bahamas, The; Bahrain; Barbados; Belize; Benin; Botswana; Brunei Darussalam; Cambodia; Chad; China; Comoros; Cyprus; Democratic Republic of the Congo; Djibouti; Dominica; Egypt; Equatorial Guinea; Estonia; Eswatini; Grenada; Guinea-Bissau; Guyana; Hong Kong SAR; Iceland; Iran; Jordan; Kazakhstan; Kiribati; Kuwait; Lebanon; Libya; Macao SAR; Malawi; Mongolia; Naoero; Niger; Oman; Palau; Qatar; Republic of Congo; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Samoa; San Marino; Saudi Arabia; Seychelles; Singapore; Solomon Islands; Somalia; Sudan; Suriname; São Tomé and Príncipe; Taiwan Province of China; Tajikistan; Tanzania; Timor-Leste; Togo; Tonga; Trinidad and Tobago; United Arab Emirates; Uzbekistan; Vietnam; West Bank and Gaza	X			
Venezuela				X

Source: IMF staff compilation.

Online Annex Table 2.1.2. Data Sources

Indicator	Source
Consumer Price Index (Aggregate; 1-Digit COICOP; 4-Digit COICOP)	Eurostat, Harmonized Index of Consumer Prices database; Haver Analytics; IMF, Consumer Price Index data set; Organisation for Economic Co-operation and Development; and national sources.
Consumer Price Index Weights (1-Digit COICOP; 4-Digit COICOP; Income-Quintile Specific)	Eurostat, Harmonized Index of Consumer Prices database; Eurostat, Household Budget Surveys; IMF, Consumer Price Index data set; Jaravel 2026; Kpodar and Liu 2022; and Luxembourg Income Study Database.
Commodity Price Indexes (All; Cereal; Energy; Fertilizers)	IMF, Primary Commodity Prices database.
Policy Interventions	Amaglobeli and others 2023; Economist Intelligence Unit; IMF Global Policy Tracker; and Sgaravatti and others 2023.
Aggregate Nominal Wages	International Labour Organization; Haver Analytics; and Organisation for Economic Co-operation and Development.
Inflation Expectations (1-Year and 5-Year Ahead)	Consensus Economics.
Final Domestic Demand; Aggregate Consumption; Fiscal Balance	Consensus Economics; Economist Intelligence Unit; Haver Analytics; IMF Balance of Payments statistics; and IMF-STA.
Current Account Balance	IMF Balance of Payments statistics; and Haver Analytics
Extreme Poverty (Rate and Count)	World Bank Poverty and Inequality Platform.
Calibration of Welfare Framework (Additional Data Sources)	European Central Bank, Household Finance and Consumption Survey; European Central Bank, Monetary Financial Institution Interest Rate Statistics; Eurostat Energy Database; Eurostat, Household Budget Surveys; IMF, International Financial Statistics; and national sources.

Source: IMF staff compilation.

Note: COICOP = Classification of Individual Consumption According to Purpose.

Online Annex 2.2. Anatomy of Cost-of-Living Crises

This section introduces the methodology to detect cost-of-living crises, characterizes their triggers and studies the dynamics of aggregate and distributional variables around the episodes.

2.2.1. An Algorithm to Identify Cost-of-Living Crises in the Data

The baseline algorithm to identify cost-of-living crises relies on seasonally adjusted quarterly data on consumer price indices (CPI) and nominal wages over 2005Q1-2025Q4. The price index of basic necessities is constructed as the weighted average of the consumer price sub-indices for “Food and non-alcoholic beverages” (COICOP division 01), “Housing, water, electricity, gas, and other fuels” (division 04), and “Transport” (division 07), using country-specific CPI weights.¹ The price index for other goods and services is constructed analogously. Nominal wages are measured as full-time wages per worker in local currency.² For each series, quarterly growth rates are standardized relative to their economy-specific distributions.³ The sample of countries with quarterly data for all three series includes 35 advanced economies, 44 emerging markets, and 6 low-income countries (Online Annex Table 2.1.1).

Baseline Episode Classification

For each country i , quarter t is considered the start of a cost-of-living crisis when the following conditions hold jointly: (i) standardized inflation of basic necessities exceeds two standard deviations; (ii) the average standardized inflation of other goods and services from t to $t+2$ does not exceed two standard deviations; and (iii) the average standardized inflation of nominal wages from t to $t+2$ does not exceed two standard deviations. Equivalently, writing nec , oth , and w for necessities inflation, other goods and services inflation, and nominal wage growth, a dummy variable captures the start of a cost-of-living crisis using

$$COLC_{i,t} = \mathbf{1}\{z_{i,t}^{nec} > 2 \wedge \bar{z}_{i,t}^{oth} \leq 2 \wedge \bar{z}_{i,t}^w \leq 2\}.$$

¹ CPI series are seasonally adjusted using X13ARIMA-SEATS and then the seasonally adjusted series from different sources are spliced using growth rates. Each category sub-index starts from the IMP’s consumer price statistics and is extended backward and forward by growth-rate linking with the corresponding Eurostat harmonized sub-index and with individual-economy series. Where gaps remain, the level of the Eurostat harmonized index (for most European economies in the sample), of the OECD index (for Chile and Japan), or of an individual-economy series fills them (Brazil’s food category uses the individual-economy series throughout), and for a small set of economies the expenditure weights themselves are taken from the Eurostat or the individual-economy source rather than from the national basket.

² The wage series is a splice: It begins with the level in local currency and substitutes an index-based series for 16 economies with better index coverage. The index-based splice is used for Estonia, Finland, France, Germany, Greece, Italy, Korea, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Trinidad and Tobago, and Türkiye. Short interior gaps are filled by log-linear interpolation for 12 economies with sparse reporting. These are Belize, Botswana, Colombia, the Dominican Republic, Ecuador, Egypt, Jordan, Mauritius, Pakistan, Paraguay, Rwanda, and West Bank and Gaza.

³ Quarterly growth rates are standardized using a centered window spanning five years on either side of t , $W(t) = [t - 20, t + 20]$ measured in quarters,

$$z_{i,t}^x = \frac{g_{i,t}^x - \mu_{i,t}^x}{\sigma_{i,t}^x}, \quad \mu_{i,t}^x = \text{mean}_{s \in W(t)} g_{i,s}^x, \quad \sigma_{i,t}^x = \text{sd}_{s \in W(t)} g_{i,s}^x,$$

where $g_{i,t}^x$ denotes the quarterly growth rate of variable x , for country i at time t while $\mu_{i,t}^x$ and $\sigma_{i,t}^x$ are the mean and standard deviation of the growth rate over the window.

The use of standardized inflation rates (and hence country-specific thresholds) avoids biasing the sample of episodes toward countries with chronically higher levels of inflation. Similarly, imposing the three conditions and a two-standard deviation threshold allows us to capture episodes of abrupt and large increases in the prices of basic necessities, with an important relative price component, rather than generalized inflation episodes.

Robustness—Alternative Episode Classification

For robustness, an alternative approach (in the spirit of the shift-share designs discussed in Goldsmith-Pinkham, Sorkin, and Swift 2020), referred to in the main text as a Bartik-style instrument, uses global commodity prices and country-specific CPI weights to construct an alternative price index of basic necessities:

$$\text{nec}_{i,t}^{\text{alt}} = \frac{w_{i,01} P_t^{\text{food}} + w_{i,04} P_t^{\text{gas}} + w_{i,07} P_t^{\text{oil}}}{w_{i,01} + w_{i,04} + w_{i,07}},$$

where $w_{i,c}$ is economy i 's expenditure weight on COICOP category c , and P_t^{food} , P_t^{gas} , and P_t^{oil} are the world food and beverage price index, the world natural gas price index, and the average petroleum spot price index. The rest of the procedure is the same as in the baseline. Since the classification is driven by world commodity prices weighted by consumption baskets that are fixed, the identified episodes are arguably exogenous to domestic conditions.

2.2.2. Dynamic Factor Model

To assess how much of the movement in necessities prices during cost-of-living crises is common across economies, a dynamic factor model is estimated on seasonally adjusted, quarter-on-quarter inflation, computed separately for the necessities and the other goods and services aggregates of Annex 2.2.1. The two aggregates are fitted separately, yielding parallel decompositions for the inflation of necessities and that of other goods and services. The exercise covers 39 advanced economies, 76 emerging markets, and 35 low-income countries over 2005Q1—2025Q4.

Let $y_{i,t}$ denote standardized inflation in economy i in period t , for a given aggregate. The model imposes a single global factor and an economy-specific idiosyncratic component,⁴

$$y_{i,t} = \lambda_i f_t + e_{i,t}, \quad i = 1, \dots, N, \quad t = 1, \dots, T,$$

where f_t is the latent global factor, λ_i is economy i 's loading on that factor, $e_{i,t}$ is the idiosyncratic component, and N and T are the number of economies and of periods. The factor is assumed to follow an autoregressive process and each idiosyncratic component follows an independent first-order autoregressive process,

⁴ A specification adding a layer of regional factors between the global factor and the idiosyncratic components is retained as a robustness check; it leaves the estimated global factor essentially unchanged and its explanatory content is absorbed into the idiosyncratic component when it is dropped, so the baseline is the more parsimonious two-component specification.

$$f_t = \sum_{\ell=1}^p \phi_{\ell} f_{t-\ell} + \eta_t, \quad e_{i,t} = \rho_i e_{i,t-1} + \varepsilon_{i,t},$$

where ϕ_{ℓ} are the autoregressive coefficients of the factor and p its lag order, with $p = 1$ in the baseline; ρ_i is the autoregressive coefficient of economy i 's idiosyncratic component; and η_t and $\varepsilon_{i,t}$ are independent normal innovations with variances σ_{η}^2 and σ_i^2 . The system is written in state-space form and estimated by maximum likelihood using the expectation-maximization algorithm with a Kalman smoother, following Bańbura and Modugno (2014).⁵

Decomposition of inflation during episodes. Because the fitted model satisfies $y_{i,t} = \lambda_i f_t + e_{i,t}$, inflation during crisis quarters can be decomposed additively into a global and an idiosyncratic contribution. For each economy in a crisis quarter, inflation is measured relative to that economy's own norm, and the excess is allocated between the two components in proportion to their contributions.

2.2.3 Dynamics of Aggregate and Distributional Variables During Cost-of-Living Crises

This section outlines the framework used to analyze macroeconomic and distributional dynamics around cost-of-living crisis onsets, including the local-projection approach and the construction of quintile-specific CPIs and adjusted poverty rates.

Baseline Estimation

For an outcome $y_{i,t}$ and each horizon h , the chapter estimates one regression per horizon of the cumulative change in the outcome on the onset indicator, following Jordà (2005):

$$\Delta_h y_{i,t+h} = \alpha_i^{(h)} + \beta_h D_{i,t} + \sum_{p=1}^P \theta_p^{(h)} y_{i,t-p} + \varepsilon_{i,t+h},$$

where $\Delta_h y_{i,t+h}$ is the cumulative change in the outcome between $t - 1$ and $t + h$; $D_{i,t}$ is the onset indicator;⁶ β_h is the response of the outcome h quarters after an onset, and the sequence of coefficients across horizons is the impulse response reported in the chapter; $\alpha_i^{(h)}$ are economy fixed effects; and the summation term contains $P = 12$ own lags of the outcome; standard errors are clustered by economy.⁷ Group-specific responses are obtained by interacting the onset with a set of mutually exclusive group indicators and tracing the level response of each

⁵ The estimator handles the unbalanced panel and the ragged edge of the sample natively: missing observations are skipped in the likelihood and recovered by the smoother, so no economy is dropped for incomplete coverage, and no series have to be interpolated in advance.

⁶ The treatment is the onset of an episode rather than the episode flag itself. For each episode identified in 2.2.1, the algorithm searches the 12 quarters preceding the first flagged quarter for a turning point in necessities-price pressure. Candidate onsets are quarters in which the standardized necessities series crosses zero from below or reaches a local trough, defined as a quarter in which the change in the series turns positive after a decline. The onset is dated as the latest such turning point before the first flagged quarter, corresponding to the beginning of the build-up in pressure. If no candidate is found, the onset is set to the first flagged quarter. To avoid overlapping treatments, onsets are then purged so that a new onset cannot occur within the response window of a previous one.

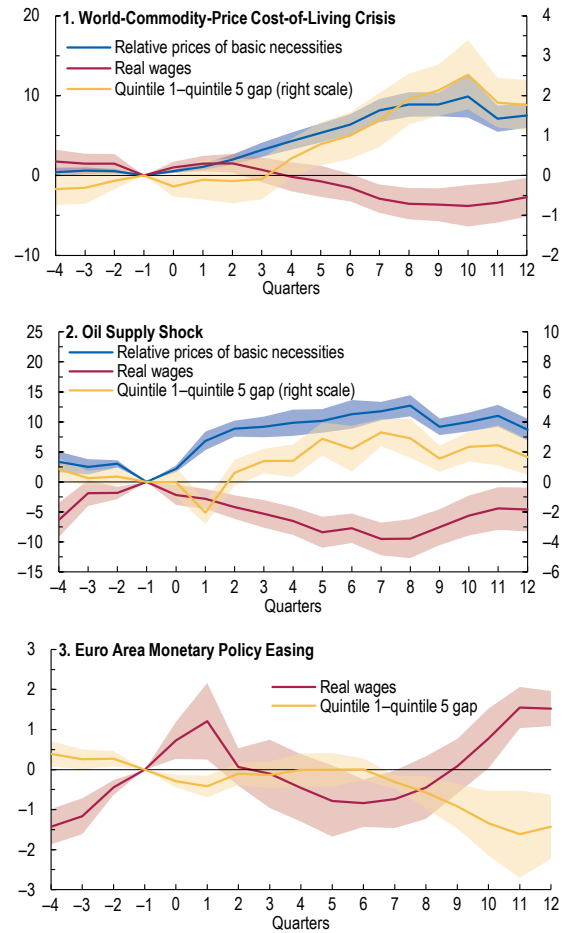
⁷ Lags of the dependent variable are included as a lag augmentation, which restores valid asymptotic inference in local projections and allows the reported standard errors to be interpreted directly (Montiel Olea and Plagborg-Møller 2021).

group separately (advanced economies versus emerging market and developing economies; and energy importers versus exporters, defined as the bottom and top quartiles of the net energy-export-share distribution). Following the clean-controls approach of Dube and others (2025) untreated observations within 12 quarters of an episode onset are excluded from the estimation sample, so that the comparison group contains only observations sufficiently distant from any episode. Treated onsets are always retained. The estimates represent conditional moments (that is, the average trajectory of an outcome around an onset, conditional on economy fixed effects and lagged outcomes) rather than causal effects.⁸

Alternative Treatments

As the baseline algorithm does not capture the effect of exogenous shocks, three additional exercises, based on the same specification, use instead:

Online Annex Figure 2.2.1. Relative Prices, Real Wages, and Inflation Inequality under Alternative Treatments
(Cumulative percent change; Percentage point difference in accumulated inflation, right scale)



Sources: Consensus Economics; Eurostat, Household Budget Surveys; Haver Analytics; IMF, Consumer Price Index dataset; IMF, *World Economic Outlook*; Jarociński and Karadi 2020; Känzig 2021; Kpodar and Liu 2022; Luxembourg Income Study Database; and IMF staff calculations.

Note: The figure reports local-projection estimates from a quarterly panel of countries over 2005–25 with country fixed effects for relative prices (in panels 1 and 2), real wages, and the inflation gap between quintiles 1 and 5. Shaded areas indicate 90 percent confidence intervals based on country-clustered standard errors. Panel 1 reports responses to onsets under the alternative classification described in Annex 2.2.1. Panel 2 reports responses to the oil supply news shock of Känzig 2021, summed within each quarter and normalized to a 150 percent increase in the world oil price on impact. Panel 3 reports responses to the euro area pure monetary policy surprise of Jarociński and Karadi 2020, normalized to a 25-basis-point easing surprise, with positive values indicating an expansionary shock. The relative price of basic necessities is the CPI for food, transport, and housing-related expenses, including utilities, relative to the CPI for all other items. Real wages are nominal wages deflated by headline CPI. CPI = consumer price index.

⁸ Time fixed effects are excluded from the baseline because cost-of-living crises cluster around global commodity-price shocks, and including them would absorb much of the variation of interest. With only country fixed effects, β_h traces the trajectory of the outcome around an onset.

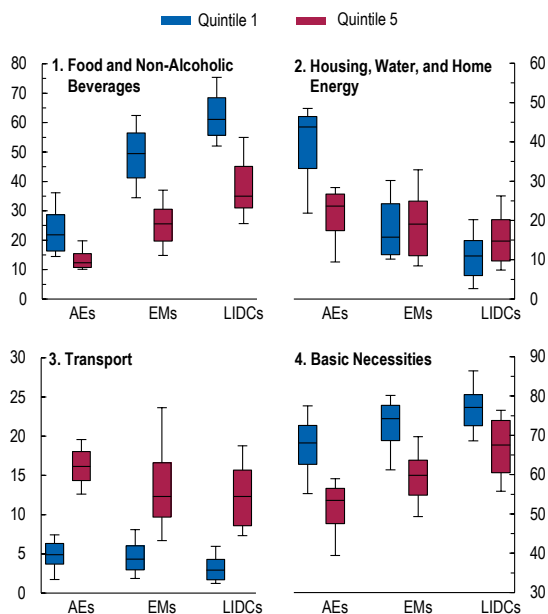
World-commodity-price cost-of-living crisis classification. The treatment is replaced by the onsets of the alternative classification of 2.2.1.

The country sample, specification, horizons, transformations, approach to time the onset, fixed effects, and inference are as in the baseline exercise.

- 1- **Oil supply news shock.** The discrete onset indicator is replaced by the continuous oil supply news shock of Känzig (2021), identified from the high-frequency response of oil futures to OPEC announcements. The monthly shock series is aggregated to quarterly frequency by summing within the quarter, which preserves the total impulse. The specification retains economy fixed effects and the same lag structure, horizons, and clustering.
- 2- **Monetary policy shock.** A third exercise explores how the results differ during demand-driven inflationary episodes. The treatment in this case is a monetary policy surprise for the euro area identified by Jarociński and Karadi (2020), measured in the monetary event window of the European Central Bank's event-study database (Altavilla and others 2019): the change in risk-free rates from just before the policy press release to just after the press conference, with one surprise per Governing Council meeting. The surprises are summed within the quarter; the series is signed so that a positive value is an expansionary surprise. The sample includes the 13 euro area economies that had adopted the euro by 2007. Otherwise, the specification of the regression equation and the clustering are unchanged.

Results. The estimates using the first two commodity-driven treatments produce similar responses to those documented under the baseline approach. Under the alternative world-commodity-price classification, the relative prices of essentials rises steadily, reaching 10 percent by the tenth quarter (Online Annex Figure 2.2.1, panel 1). The real wage holds up during the first year before falling to 4 percent below its pre-onset level, while the inflation gap turns positive after the fourth quarter and reaches 2½ log points by the tenth quarter. The responses to the oil supply shock are qualitatively similar though somewhat steeper (Online Annex Figure 2.2.1, panel 2). A 150 percent increase in the world oil price on impact raises the relative prices of essentials by 9 percent within two quarters and by 13 percent by the eighth quarter. The real wage falls to a trough 9½ percent below its pre-shock level in the seventh and eighth quarters and recovers to only 4½ percent below that level by the twelfth quarter. Meanwhile, the inflation

Online Annex Figure 2.2.2. Cross-Country Distribution of CPI Weights, by Income Quintile and Country Group (Percent)



Sources: Eurostat, Household Budget Surveys; Kpodar and Liu 2022; Luxembourg Income Study Database; and IMF staff calculations.
Note: The figure shows the cross-country distribution of CPI weights for basic necessities. The edges of the boxes represent the interquartile range, the line inside each box indicates the median country, and the whiskers denote the 90th and 10th percentiles of the cross-country distribution, respectively. In panel 4, "Basic Necessities" includes: "Food and non-alcoholic beverages", "Housing, water, and home energy", "Transport". AEs = advanced economies; CPI = consumer price index; EMs = emerging markets; LIDCs = low-income developing countries.

gap between the quintile-specific price indices widens to 3 log points by the seventh quarter. However, the results for demand shocks, proxied with monetary policy surprises, are diametrically different (Online Annex Figure 2.2.1, panel 3). A 25-basis-point easing surprise leads neither to a significant drop in real wages nor to a significant increase in the gap in the inflation experienced by low-income households relative to that experienced by high-income households.⁹ This suggests that the results from the baseline approach (Figure 2.3 in the main text) largely capture global supply shocks.

Distributional Consumer Price Index

Definition. Figure 2.4 in the main text reports the evolution of income-specific CPIs during cost-of-living crises, which are constructed as in Jaravel (2026). More precisely, for each household quintile q in economy i , the income-specific price index weights COICOP division price indices by that quintile's budget shares, using chained fixed-basket indices:

$$P_{i,t}^q = P_{i,t_b}^q \frac{\sum_c w_{i,c}^q(t_b) p_{i,c,t}}{\sum_c w_{i,c}^q(t_b) p_{i,c,t_b}},$$

where $P_{i,t}^q$ is quintile q 's price index in economy i in quarter t ; t_b is the quarter of the most recent measurement of expenditure weights at or before t ; c indexes COICOP divisions; $w_{i,c}^q(t_b)$ is quintile q 's budget share of division c ; and $p_{i,c,t}$ is the price index for division c in economy i in quarter t , taken from the same spliced COICOP division sub-indices that build the essentials and non-essentials aggregates of 2.2.1.

Budget shares. Expenditure shares by COICOP division and quintile are spliced from three sources in priority order: the Eurostat household budget surveys, which report the structure of consumption expenditure by quintile; the shares compiled by Kpodar and Liu (2022); and shares computed from household consumption-expenditure microdata in the Luxembourg Income Study.¹⁰ The priority is applied cell by cell. The spliced shares are then carried forward between observations.

Coverage. The index is computed only for country-quarters in which all twelve division price indices are available.

Figure 2.4 in the main text shows that lower-income households are disproportionately affected by a rise in the price of basic necessities. This is because basic necessities represent a larger share of their consumption basket, as shown in Online Annex Figure 2.2.2.

⁹ The exercises reported in Online Annex Figure 2.2.1, panel 1 and 2, remain qualitatively unchanged when the sample is restricted to that in Online Annex Figure 2.2.1, panel 3.

¹⁰ Households are grouped into within-economy quintiles —households are ranked on consumption, weights are built as,

$$w_{i,c}^q = \frac{\sum_{h \in q} e_{h,c}}{\sum_{c'} \sum_{h \in q} e_{h,c'}},$$

where $e_{h,c}$ is household h 's expenditure on division c ; the sums over h run over the households in quintile q of economy i ; and the sum over c' in the denominator runs over all COICOP divisions, so that each quintile's shares sum to one. Survey household weights were used for the totals.

Adjusted Poverty Rates

Figure 2.4, panel 3, in the main text reports ‘adjusted’ poverty rates, which use income-specific CPI—rather than headline CPI, as in official poverty metrics (World Bank, 2026). More precisely, and following the approach in Lokshin, Sajaia, and Torre (2025) and Jaravel (2026), for economy i and year t , define

$$\omega_{i,t} = \frac{P_{i,t}^{Q1} / P_{i,base}^{Q1}}{P_{i,t}^{head} / P_{i,base}^{head}},$$

where P^{Q1} and P^{head} are the annual quintile-1 and headline price indices. A value above one means households in the first income quintile faced higher cumulative inflation than the average household since the base year.

Poverty headcount. Let $H_{i,t}(\ell)$ denote the headcount ratio for economy i in year t at any poverty line ℓ . The counterfactual headcount and the additional poverty attributable to inflation inequality are

$$H_{i,t}^{cf}(z) = H_{i,t}(z \cdot \omega_{i,t}), \quad \Delta H_{i,t}(z) = H_{i,t}(z \cdot \omega_{i,t}) - H_{i,t}(z),$$

where z represents the poverty line and $\Delta H_{i,t}(z)$ is the difference between poverty rates computed using bottom-quintile and headline inflation. Headcount ratios are converted to counts using population data and then aggregated.¹¹ Poverty headcounts are taken from the World Bank’s Poverty and Inequality Platform, using the lined-up annual estimates, at the international line of \$2.15 per day in 2017 purchasing-power-parity terms.¹² The baseline anchors the wedge at 2015. Coverage is determined by the requirement that an economy both has a headline and a quintile-1 index in the base year, and a poverty headcount in the World Bank dataset.

Online Annex 2.3. Past Policy Responses to Cost-of-Living Crises

This section presents the methodological details for the analysis of policy responses to cost-of-living crises and their effectiveness.

2.3.1. A Novel Narrative Database on Fiscal Policy Interventions in Response to Cost-of-Living Crises

The chapter builds a novel narrative database documenting the introduction of government policies aimed at supporting households and firms in response to elevated food, energy, and housing prices. To this end, it relies on a large language model (LLM) to extract information from quarterly Economist Intelligence Unit (EIU) reports from 1996 to 2025 for 26 advanced

¹¹ Specifically, the additional people in poverty for poverty line z equals $\sum_{i \in \mathcal{S}} \text{pop}_{i,t} \cdot \Delta H_{i,t}(z)$, aggregated over the country sample $\mathcal{S}$.

¹² The headcount at the adjusted line is obtained by querying the platform directly at $z \cdot \omega_{i,t}$ for every economy-year-line, so that H^{cf} is the official poverty curve evaluated at the adjusted line rather than an interpolation; an alternative that computes the adjusted headcount locally from the published decile distribution, anchored to the official headcount at z , is used only for validation.

economies, 36 emerging markets, and 14 low-income countries (see Online Annex Table 2.1.1 for sample composition).

Policy perimeter and taxonomy. The database excludes monetary policy, broader policies that affect living costs only indirectly (such as trade liberalization or labor market deregulation), military operations (such as the protection of shipping lanes), humanitarian interventions by foreign governments, policies by supranational or non-governmental organizations, and interventions from sub-national authorities.

Each policy measure is classified along the following dimensions:

- Commodity sector. Policies are classified according to whether they address purchasing power for food and energy, and the specific sub-products targeted.
- Channel. Within each commodity sector, policies are classified as (i) *price-suppressing* (for example, reductions in VAT, sales taxes, excise duties, customs duties or import tariffs, as well as subsidies to producers, and the introduction or tightening of price controls); (ii) *income-supporting* (for example, cash, semi-cash—vouchers or discounts—or in-kind transfers to households, increases in public wages or pensions, and reductions in income or corporate taxes); (iii) *other* measures (for example, export bans, release of strategic reserves, government loans and guarantees to producers, equity injections into firms—including nationalization—and public investment in productive capacity).
- Timing. Policies are assigned to the quarter in which they are introduced.

In addition, the database records general context variables for each country-quarter, including whether the country was experiencing elevated food and energy price inflation, the social and economic consequences of price pressures, and the population groups affected.

LLM extraction method. A structured prompt defined all variables and classification categories. The model was required to produce output in a standardized tabular format collecting the variable name, the coded answer, the degree of confidence (a self-assessed confidence level from 1 to 100 based on the explicitness of the textual reference), the justification (a narrative explanation of up to 500 words), and the quote (the exact sentence or sentences from the report used to support the answer). Once a database with all measures identified for each country and quarter was constructed, a second LLM procedure assessed when a new measure was introduced (as opposed to mentions of ongoing measures, withdrawal of measures, or references to measures not implemented).

Validation. LLM accuracy was assessed through a human-validation exercise covering a random sample of 21 percent of the countries covered in EIU reports. Trained reviewers independently evaluated seven key variables, including the classification of cost-of-living policies and references to impacts on purchasing power or living standards. The overall agreement between human- and LLM-produced assessments was 98 percent, with rates ranging from 94 to 100 percent across policy types.

Caveats. As with any narrative coding exercise, policies not prominently discussed in EIU reports may not be captured, implying that the database may understate less prominent or gradual

measures. The validation exercise addresses false positives, but not false negatives, as reviewers assess coded entries rather than missing policies.

2.3.2. Policy Effectiveness: an Empirical Investigation

This section describes the approach used to assess the effect of newly introduced price-suppressing and income-supporting measures on key macroeconomic outcomes (inflation, inflation expectations, aggregate consumption, and the fiscal balance). Because such policies are typically adopted when cost-of-living pressures are most acute, simple comparisons would confound policy effects with underlying conditions. The analysis therefore combines two-way fixed-effects local projections with a doubly robust augmented inverse-propensity-weighted (AIPW) estimator to address selection on observables. Three mutually exclusive treatments are considered: price-suppressing measures, income-supporting measures and the simultaneous use of both types of measures. These are compared with a reference category in which no new policy is introduced. The estimation proceeds in two stages. First, the propensity score model estimates the probability that a policy is adopted given observable country-period characteristics. Second, local projection regressions estimate outcome variables at horizon h as a function of the policy indicator and controls. Then, the AIPW estimator re-weights residuals from the outcome model by the inverse propensity score, correcting for selection into treatment. More specifically:

First stage: propensity model. The probability of each of the policy arms is modelled with a multinomial logit,

$$\Pr(W_{it} = w) = \frac{\exp(\mathbf{X}'_{it}\beta_w + \mathbf{Z}'_{it}\eta_w + \delta_{\text{year}(t),w})}{\sum_{m=0}^3 \exp(\mathbf{X}'_{it}\beta_m + \mathbf{Z}'_{it}\eta_m + \delta_{\text{year}(t),m})},$$

where W_{it} is the policy arm; $\mathbf{X}_{it}$ includes four quarterly lags of headline, energy and food inflation; $\mathbf{Z}_{it}$ is the vector of controls such as a fiscal-space index, food-import exposure, indicators of government ideology and of public support for intervention, report-derived measures of social stress and of whether relief is targeted at low-income households or pensioners, the actual and expected monetary-policy stance, and the expected direction of inflation; and $\delta_{\text{year}(t)}$ are calendar-year effects (the multinomial logit cannot accommodate country effects). The fitted arm probabilities, truncated at their 5th and 95th percentiles, enter the second stage as inverse-propensity weights.

Second stage: policy responses. Next, the following outcome model is estimated, for each quarter ahead $h = 0, 1, \dots, 8$

$$y_{it+h} - y_{it-1} = \alpha_i + \delta_t + \sum_{w=1}^3 \theta_w^{(h)} \mathbf{1}\{W_{it} = w\} + \mathbf{X}'_{it}\phi + \mathbf{Z}'_{it}\pi + u_{it}$$

where the dependent variable is the cumulative change in the outcome from the first quarter before adoption to quarter h after adoption (winsorized at the 1st and 99th percentiles). The policy terms $\theta_w^{(h)}$ give the response to each policy arm relative to no new policy; α_i and δ_t are country and time fixed effects, and $\mathbf{X}_{it}$ and $\mathbf{Z}_{it}$ are defined as in the first stage. Standard errors are clustered by country.

Doubly-robust estimate. Combining the outcome regression with the propensity weights of the first stage, the AIPW estimator constructs a bias-corrected pseudo-outcome for each observation. Specifically, writing $\hat{\mu}_{w,it}^{(h)}$ for the fitted outcome under arm w and $\hat{p}_{w,it}$ for the fitted arm probability, the effect of arm w relative to no new policy at horizon h is

$$\hat{\tau}_w^{(h)} = \frac{1}{N} \sum_{it} \left[(\hat{\mu}_{w,it}^{(h)} - \hat{\mu}_{0,it}^{(h)}) + \frac{\mathbf{1}\{W_{it} = w\}}{\hat{p}_{w,it}} (y_{it}^{(h)} - \hat{\mu}_{w,it}^{(h)}) - \frac{\mathbf{1}\{W_{it} = 0\}}{\hat{p}_{0,it}} (y_{it}^{(h)} - \hat{\mu}_{0,it}^{(h)}) \right].$$

This augmentation term re-weights residuals from the outcome model by the inverse propensity score, correcting for selection into treatment.

Online Annex 2.4. A Framework to Investigate the Welfare Impact of Cost-of-Living Crises

This section describes the theoretical framework underlying the welfare analysis in the main chapter and its calibration to the 2021-23 crisis in a sample of 18 European countries.

Setting. Consider a deterministic framework, with no aggregate or idiosyncratic uncertainty, where time is discrete and indexed by t . There is a continuum of households, J consumption goods indexed by $j \in \{1, \dots, J\}$, and $K+1$ assets indexed by k available for trading in each period t . A household type is determined by a combination of their age a and group g . Within an age a and group g , households are identical and earn labor income w_t . Assets can be of two types: real ($k \in \mathcal{R}$) or nominal ($k \in \mathcal{N}$). Asset k pays a nominal or real dividend $\{D_{kt}\}_{t=0}^{\infty}$ and can be traded at price $\{Q_{kt}\}_{t=0}^{\infty}$, with $k \in \{\mathcal{R}, \mathcal{N}\}$. Assets are subject to convex adjustment costs $\chi_k(\Delta N_{kt}^{ag})$ —where N_{kt}^{ag} denotes the amount of asset k held by ag -type households—which provide a motive for holding different types of assets beyond differences in deterministic returns. Let T_t^{ag} denote government transfers (or taxes, if negative) to ag -type households. The representative ag household solves the following present value utility maximization problem

$$V^{ag}(\mathbf{s}, \{N_{k0}\}_{k=1}^K) = \max_{\{c_{jt}^{ag}\}_{j=1}^J, \{N_{kt}^{ag}\}_{k \in \mathcal{R}}, \{N_{kt}^{ag}\}_{k \in \mathcal{N}}}_{t \geq 0} \sum_{t=0}^{\infty} \beta^t U(c_t^{ag}, L_t^{ag}, \{N_{kt}^{ag}\}_{k \in \mathcal{R}}, \{N_{kt}^{ag}\}_{k \in \mathcal{N}}),$$

where an implicitly-defined aggregator of goods satisfies $c^{ag}(\{c_{jt}^{ag}\}_{j=1}^J, c_t^{ag}) = 1$ (Del Canto and others 2025), subject to a period-by-period budget constraint for all t ,

$$\sum_{j=1}^J \tilde{p}_{jt} c_{jt}^{ag} + \sum_{k \in \mathcal{R}} Q_{kt}^{\mathcal{R}} \Delta N_{kt}^{ag} + \sum_{k \in \mathcal{N}} \tilde{Q}_{kt}^{\mathcal{N}} \Delta N_{kt}^{ag} + \sum_{k \in \mathcal{R}, \mathcal{N}} \chi_k(\Delta N_{kt}^{ag}) = \tilde{w}_t L_t^{ag} + \tilde{T}_t^{ag} + \sum_{k \in \mathcal{R}} N_{k,t-1}^{ag} D_{kt}^{\mathcal{R}} + \sum_{k \in \mathcal{N}} N_{k,t-1}^{ag} \tilde{D}_{kt}^{\mathcal{N}}$$

expressed in real terms, such that $\tilde{x}_t \equiv \frac{x_t}{P_t}$, with P_t being the aggregate price level.

To explicitly account for good-specific taxes and subsidies, the observed price level for each product j can be rewritten as

$$p_{jt} = p_{jt}^* (1 + \tau_{jt}),$$

where p_{jt}^* is the pre-tax or raw price, and τ_{jt} captures good-specific taxes (if positive) or subsidies (if negative).

Welfare response to shock. Consider some arbitrary perturbation $d\mathbf{z}_t$ which induces a change in the household's state vector, but leaves unchanged the preferences U , consumption aggregator C , and discount rates. Denote by $\frac{dV^a}{dz}$ the first-order impact of the perturbation $d\mathbf{z}_t$ on the welfare of a household of type a, g . Following Pallotti and others (2024) and Del Canto and others (2025), define the *money metric welfare gain* from shock $d\mathbf{z}_t$ as the household's welfare gain scaled by the marginal utility of dollar consumption at time zero, λ_0 , that is,

$$\text{Money-Metric Welfare Gain} \equiv \frac{dV^{ag}}{dz} / \lambda_0$$

which may be interpreted as the household's willingness to pay to receive the shock measured in time-zero dollars. Building on Del Canto and others (2025), it can be shown that

$$\frac{dV^{ag}}{dz} / \lambda_0 = \sum_t \beta^t \left[- (w_t L_t^{ag} + T_t^{ag}) \frac{d \ln P_t}{dz} \right] + \sum_t \beta^t \left[- P_t^{ag} c_t^{ag} \left(\frac{d \ln P_t^{ag}}{dz_0} - \frac{d \ln P_t}{dz_0} \right) \right] + \sum_t \beta^t \left[- \sum_{k \in N} (N_{k,t}^{ag} D_{k,t} + Q_{k,t} \Delta N_{k,t}^{ag}) \frac{d \ln P_t}{dz_0} \right] + \sum_t \beta^t \left(\sum_{k \in R} (D_{k,t} N_{k,t}^{ag} \frac{d \ln D_{k,t}}{dz_0} + Q_{k,t} \Delta N_{k,t-1}^{ag} \frac{d \ln Q_{k,t}}{dz_0}) \right) + \sum_t \beta^t \left(\frac{d \ln w_t}{dz_0} w_t L_t^{ag} \right) + \sum_t \beta^t \left(- \frac{d \ln \tau_t^{ag}}{dz_0} P_t^{ag} c_t^{ag} + \frac{d \ln T_t^{ag}}{dz_0} T_t^{ag} \right),$$

where the first component captures the loss in real income, the second component captures the loss from the composition of the consumption basket, the third and fourth components capture the implied changes in nominal and real wealth, the fifth component captures the indexation of nominal income and the last component the role of price-suppressing and income-supporting measures. Online Annex Figure 2.4.1 shows the relative importance of each component. Figure 2.7 in the main text shows the total welfare losses implied by this equation, as well as the ones that would have occurred absent fiscal policy interventions (last component of the equation). Due to data availability, the calibration excludes the role of indexation of nominal income.

Calibration

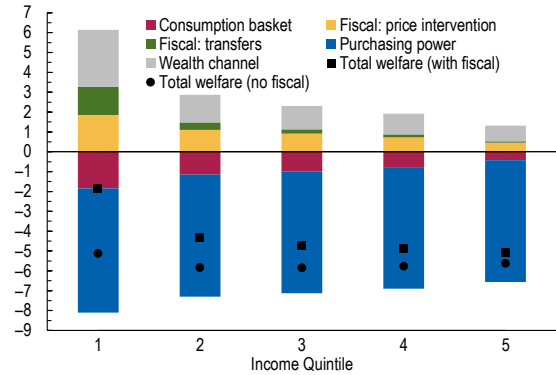
Following Pallotti and others (2024), the framework is calibrated to the 2021-23 crisis in a sample of 18 European countries (see Online Annex Table 2.1.1 for the sample composition):

- **Changes in the price level $\frac{d \ln P_t}{dz}$.** Changes in the price level are computed as deviations from the expected trend growth in prices in the absence of the shock. Flow variables (such as income) are discounted using deviations of monthly inflation relative to expectations for the entire period 2021-23 as follows:

$$\frac{d \log P}{dz} Y_{ag} = \sum_{t=2021}^{2023} \left[\log \frac{P_t}{P_{Dec2020}} - \log \left(\frac{P_t}{P_{Dec2020}} \right)^* \right] \times \frac{Y_{ag,preCrisis}}{12}$$

where

Online Annex Figure 2.4.1. Welfare Decomposition for the 2021–23 Cost-of-Living Crisis
(Percent of three-year income)



Sources: Consensus Economics; European Central Bank, Household Finance and Consumption Survey; European Commission, *Weekly Oil Bulletin*; Eurostat, Household Budget Surveys; Jordà and Taylor 2019; national sources; Sgaravatti and others 2023; and IMF staff calculations.

Note: The chart plots each channel affecting the welfare impact of households along the income quintiles from a panel of 18 European countries between 2021–23. The country average is weighted by 2019 GDP at purchasing power parity.

$$\log \frac{P_t}{P_{Dec2020}} - \log \left(\frac{P_t}{P_{Dec2020}} \right)^* = \left\{ \left[\log \frac{P_{Jan,t}}{P_{Dec2020}} - \log \left(\frac{P_{Jan,t}}{P_{Dec2020}} \right)^* \right] + \left[\log \frac{P_{Feb,t}}{P_{Dec2020}} - \log \left(\frac{P_{Feb,t}}{P_{Dec2020}} \right)^* \right] + \dots + \left[\log \frac{P_{Dec,t}}{P_{Dec2020}} - \log \left(\frac{P_{Dec,t}}{P_{Dec2020}} \right)^* \right] \right\} \times \frac{Y_{ag,preCrisis}}{12} \text{ for } t = 2021, 2022, 2023.$$

Stock variables (such as holdings of financial variables), instead, are discounted annually, multiplying annual changes in holdings as implied by life-cycle dynamics with annual deviations of inflation relative to expectations:

$$\frac{d \log P}{dz} \Delta Y_{ag} = \sum_{t=2021}^{2023} \left[\log \frac{P_{Dec,t}}{P_{Dec2020}} - \log \left(\frac{P_{Dec,t}}{P_{Dec2020}} \right)^* \right] \times \Delta Y_{ag,preCrisis}.$$

For this exercise and for each country, the realized monthly paths of aggregate prices are taken from Eurostat HICP; one-year ahead inflation expectations as of December 2020 are from Consensus Economics; and 2- and 3-year ahead inflation expectations are assumed to be equal to average inflation over 2015-2019.

- **Consumption.** Information on total expenditure and the composition of the consumption basket at the 4-digit COICOP level is computed by country, income quintiles and age from the Eurostat Household Budget Survey (2015). While consumption weights are computed using 2015 data, consumption levels are updated to end of 2020 by using realized inflation by 4-digit category between end of 2015 and end of 2020.
- **Income and net wealth.** Information on (gross) income (including from pension income) and households' balance sheet positions come from the Household Finance and Consumption Survey provided by the European Central Bank. The calibration uses the information available for the year 2017, and updates levels with the realized inflation until end of 2020. Nominal variables include deposits (da2101), bonds (da2103), money owed to households (da2107), monthly flow of mortgage and non-mortgage payments including interest payments (dl2000). Real variables include real estate (main residence and other, da1110 and da1120) and equity shares (da2105).
- **Interest rates and asset prices.** Changes in bond, share and house prices in response to the unexpected rise in inflation are computed using the estimated elasticities in Pallotti and others (2024), equal to -0.726, -0.41 and -0.138, respectively. Unexpected changes in the interest rates on deposits, bonds, and loans are computed as differences with respect to their value in 2019, under the assumption that they would have stayed constant had the shock not happened. Data on the different interest rates by country come from the ECB MIR database, IMF IFS and national sources.
- **Fiscal policy.** Data on all policy interventions (price-suppressing and income-supporting) implemented in a large sample of European countries in response to the energy shock of 2022 are obtained from Sgaravatti and others (2023). In the case of price-suppressing measures, governments introduced different measures for the prices of electricity, natural gas, and gasoline. The derivation of the counterfactual energy prices and transfers by household type (age a and income quintile g) is conducted as follows:
 - **Counterfactual prices.** For each month t between January 2021 and December 2023 and in each country c ,

$$\Delta price_{e,t}^c = \frac{\text{Total fiscal budget on price-suppressing measures}_{e,t}}{\text{Monthly consumption of } e_{pre\text{ Crisis}}}$$

where $e = \{\text{electricity, natural gas, gasoline}\}$, implicitly assuming that households kept energy consumption unchanged during the crisis period. For the numerator, monthly budget allocations are derived from information on the budget cost of each measure divided by the number of months in which the measure is implemented (and complemented with information from national authorities and other public sources when missing in Sgaravatti and others 2023). Monthly consumption of electricity and natural gas (in kWh) and gasoline (liters) by country is obtained from Eurostat and from the European Commission Weekly Oil Prices.¹³ Then, the monthly time series of prices for each of the three energy products are constructed by combining retail prices in early 2021 with the monthly evolution of the corresponding 4-digit COICOP HICP component.¹⁴ Adding $\Delta price_{e,t}^c$ to the resulting price time series for each energy product gives the counterfactual price series (that is, absent policy intervention) for each energy product and country.

- **Counterfactual transfers.** To construct monthly transfers for each country, income quintile, and age group, the total budget associated with each transfer measure is first divided by the number of months during which the measure was in effect, yielding a monthly budget allocation. Monthly allocations from all active transfer measures are then aggregated. The resulting amount is divided by the size of the targeted population group using detailed UN population data.

Online Annex 2.5. Model-Based Assessment of Policy Tradeoffs During Cost-of-Living Crises

This annex describes the Global Dynamic Network (GDN) model used in the chapter to assess policy tradeoffs during cost-of-living crises. The framework extends Ozhan and others (Forthcoming) by adding household-specific consumption baskets, fiscal instruments tailored to cost-of-living shocks, explicit public-debt dynamics, and welfare measures.

Overview. The model is quarterly and contains two regions: a ‘Home’ economy and the rest of the world (‘RoW’) economy. Separate Home-RoW pairs are calibrated for a representative advanced economy, emerging market economy, and low-income country (Online Annex Table

¹³ Electricity and natural gas consumption come from Eurostat *nrg_d_hhq*—total energy consumption by households (FC_OTH_HH_E) for electricity (E7000) and natural gas (G3000). Annual consumption values are divided by 12 to make them monthly.

¹⁴ The series for electricity prices from Eurostat is *nrg_pc_204* (Band DC, which refers to the typical household consumption of 2500 kWh to 4999 kWh) and for natural gas is *nrg_pc_202* (Band D2, which specifically refers to medium-sized household natural gas consumption of 20 GJ to 199 GJ per year). Since the data are available biannually, the monthly time series for the price level is computed as follows: $p_{electricity,t} = \frac{HICP_Coicop0451_t \times \frac{nrg_pc_204_2021semester1}{HICP_Coicop0451_2021semester1}}{HICP_Coicop0452_2021semester1}$. For gasoline, letting *price_pump_jan21* be the average price at the pump for euro 95 in each country in January 2021 from the European Commission Weekly Oil Prices, the monthly price series is constructed as $p_{gasoline,t} = HICP_Coicop0722_t \times \frac{price_pump_jan21}{HICP_Coicop0722_2021Jan}$.

2.5.1). Each region contains 12 production sectors, two heterogeneous household groups, a government, and a monetary authority.

Production network. Each sector produces a differentiated good combining value added with a composite of intermediate inputs purchased from every domestic and foreign sector. Sectoral output can be sold in the domestic market or exported, so a fiscal intervention that lowers a producer's marginal cost can affect both domestic purchasers and foreign customers. In compact form, output in region r and sector s at time t is written in a nested constant elasticity of substitution (CES) function structure as

$$Z_{r,s,t} = A_{r,s,t} \left((\alpha_{r,s}^{va})^{1/e_{r,s}^Z} VA_{r,s,t}^{(e_{r,s}^Z-1)/e_{r,s}^Z} + (\alpha_{r,s}^{ic})^{1/e_{r,s}^Z} IC_{r,s,t}^{(e_{r,s}^Z-1)/e_{r,s}^Z} \right)^{e_{r,s}^Z/(e_{r,s}^Z-1)}$$

$$IC_{r,s,t} = \left(\sum_{j=1}^{12} (\alpha_{r,j \rightarrow s}^{ic})^{1/e_{r,s}^{ic}} IC_{r,j \rightarrow s,t}^{(e_{r,s}^{ic}-1)/e_{r,s}^{ic}} \right)^{e_{r,s}^{ic}/(e_{r,s}^{ic}-1)}$$

$$IC_{r,j \rightarrow s,t} = \left((\alpha_{r \rightarrow r,j \rightarrow s}^{ic})^{1/e_{r,s}^{tic}} IC_{r \rightarrow r,j \rightarrow s,t}^{(e_{r,s}^{tic}-1)/e_{r,s}^{tic}} + (\alpha_{i \rightarrow r,j \rightarrow s}^{ic})^{1/e_{r,s}^{tic}} IC_{i \rightarrow r,j \rightarrow s,t}^{(e_{r,s}^{tic}-1)/e_{r,s}^{tic}} \right)^{e_{r,s}^{tic}/(e_{r,s}^{tic}-1)}.$$

where $A_{r,s,t}$ is sectoral total factor productivity, $VA_{r,s,t}$ is value added, $IC_{r,s,t}$ is the nested composite of intermediate input, and $IC_{r,j \rightarrow s,t}$ is the intermediate input from sector j , a combination of domestic input $IC_{r \rightarrow r,j \rightarrow s,t}$ and foreign input $IC_{i \rightarrow r,j \rightarrow s,t}$. Value-added in each sector is also a CES combination of labor and sector-specific physical capital. While labor is common and perfectly mobile across sectors, capital is heterogeneous and classified in four categories: agriculture capital, mining capital, oil-extraction capital, and other physical capital. The calibrated input-output matrix fixes the steady-state expenditure share α^{va} and α^{ic} for each source sector and country.

Sectoral price setting. Firms are monopolistically competitive and face sector-specific nominal rigidity. The pricing block can be summarized by a sectoral Phillips-curve relation in which inflation $\pi_{r,s,t}$ relative to a reference rate $\pi_{r,s,t}^{ref}$ depends on expected future inflation and the gap between desired and actual markups:

$$\log(\pi_{r,s,t}/\pi_{r,s,t}^{ref}) = \beta \log(\pi_{r,s,t+1}/\pi_{r,s,t+1}^{ref}) + \kappa_{r,s} \log(MC_{r,s,t}/P_{r,s,t})$$

The parameter $\kappa_{r,s}$ varies across sectors and is calibrated using the frequency of price adjustment $\delta_{r,s}$ described in Ozhan and others (Forthcoming) with the exception of food and energy-related sectors (Online Annex Table 2.5.5). The reference rate is fixed at the economy-wide inflation target without de-anchored inflation expectations.

Households. The Home and RoW economies each contain an asset-holding overlapping-generations household and a liquidity-constrained household. The main text refers to these two model groups as high-income households (HIHs) and low-income households (LIHs), respectively. A mapping that is described below combines the empirical expenditure pattern of the relevant income group with the model household type. LIHs account for 20 percent of households in the advanced economy calibration and 40 percent in the emerging market and

low-income developing country calibrations, within the ballpark of the numbers presented in Bracco and others (2026). Both household types consume goods from all 12 sectors, but their steady-state expenditure weights differ. For household h in region r , the consumption aggregate can be represented as follows (where weights α^c are constructed from household budget surveys as described below)¹⁵

$$C_{r,h,t} = \left(\sum_{j=1}^{12} (\alpha_{r,j \rightarrow h}^c)^{1/e_r^c} C_{r,j \rightarrow h,t}^{(e_r^c-1)/e_r^c} \right)^{e_r^c/(e_r^c-1)}$$

- **High-income households** are overlapping generations (Blanchard 1985; Yaari 1965), who supply labor, receive profits and labor income, pay taxes, and hold domestic government bonds and an internationally traded asset.
- **Low-income households** do not have access to financial assets, so their consumption is pinned down by current labor income, their share of distributed income, and fiscal transfers.

Aggregate consumer prices. The headline consumer price index (CPI) is constructed by aggregating the household-specific price indexes using the population weights of the two household groups. The corresponding gross inflation rate $\pi_{r,t}$ targeted by monetary policy is

$$\pi_{r,t} = \lambda_{r,L} \pi_{r,L,t} + \lambda_{r,H} \pi_{r,H,t}$$

where $\lambda_{r,L}$ is the LIHHs population share, and $\pi_{r,L,t}$ and $\pi_{r,H,t}$ are inflation indices faced by LIHHs and HHHs, respectively.

Monetary policy. The monetary authority follows a Taylor rule focused on headline CPI inflation with weight on projected inflation (so the central bank partly looks through temporary commodity-price shocks):

$$\begin{aligned} \log i_{r,t} = & \rho_r \log i_{r,t-1} + (1 - \rho_r) \{ (1 - \varphi_r) \log \pi_{r,t} + \varphi_r \log \pi_{r,t+1} + \log R^n \} \\ & + (1 - \rho_r) \gamma_r \{ (1 - \varphi_r) \log \pi_{r,t} + \varphi_r \log \pi_{r,t+1} - \log \bar{\pi}_r \} \end{aligned}$$

where $i_{r,t}$ is the nominal policy rate, R^n is the neutral real rate, and $\bar{\pi}_r$ is the inflation target. The parameters ρ_r , φ_r , and γ_r denote interest-rate smoothing, the forward-looking inflation weight, and the inflation-response coefficient.

Government budget constraint. The government purchases goods, makes targeted and untargted transfers, pays consumer and producer subsidies, collects labor and consumption taxes, services outstanding debt, and issues new debt:

$$P_{r,t}^G G_{r,t} + T_{r,t} + SUBEXP_{r,t} + (1 + i_{r,t}^G) B_{r,t-1} = TAXREV_{r,t} + B_{r,t} ,$$

¹⁵ Alternative preferences with subsistence consumption, such as Stone-Geary, would increase the welfare costs for LIHHs when consumption is close to subsistence levels, thereby likely amplifying the results in this chapter.

where $P_{r,t}^G G_{r,t}$ denotes nominal government expenditure, $T_{r,t}$ denotes transfer amounts (both targeted and untargeted), $SUBEXP_{r,t}$ stands for subsidy expenditures, $TAXREV_{r,t}$ is tax revenue, and $B_{r,t}$ denotes government debt issuance.

Public debt and fiscal rule. In the baseline exercises, policies can be financed through a larger fiscal deficit. However, a fiscal rule raises lump-sum taxes (to all households) so that debt converges back to its pre-shock level over time. The deficit-to-GDP targeting rule can be summarized as

$$def_{r,t}^{tar} = def_{r,t}^{pol} + \psi_r (B_{r,t}/NGDP_{r,t} - b_r^*)$$

where $def_{r,t}^{tar}$ is the deficit-to-GDP target, $def_{r,t}^{pol}$ measures policy expenditure over GDP under fiscal space, and b_r^* is pre-shock debt-to-GDP ratio. The coefficient ψ_r is chosen to imply a debt half-life of approximately four to five years.

Welfare. Per-period utility is in constant relative risk aversion (CRRA) form over a Cobb-Douglas composite of consumption and leisure. For household h ,

$$U_{r,h,t} = \left(C_{r,h,t}^{\alpha_{r,h}} (\bar{L}_{r,h,t} - L_{r,h,t})^{1-\alpha_{r,h}} \right)^{1-1/\sigma_{r,h}}$$

where $L_{r,h,t}$ and $\bar{L}_{r,h,t}$ are labor supply and endowment, respectively. Lifetime welfare discounts the continuation value using the household-specific discount factor; for asset-holding households it also includes the survival probability implied by the overlapping-generations structure. The welfare effect of policies is evaluated relative to a counterfactual without fiscal intervention. Results are expressed as the permanent percentage change in the no-policy-lifetime consumption that would make the household indifferent between the policy and no-policy scenarios.

Mapping Household Expenditure to the Model's Sectoral Structure

This section describes the accounting bridge used to translate household expenditure patterns classified according to the Classification of Individual Consumption According to Purpose (COICOP) into the 12-sector structure of the two-region DSGE model. COICOP records purchases by consumption purpose, whereas the Global Resource Input–Output Assessment database (GLORIA) records production, final demand, and cross-border transactions by supplying industry.¹⁶ GLORIA therefore provides the sectoral household final-demand envelope and the production and trade structure, while household budget survey (HBS) data determine how household demand is distributed across lower- and higher-income groups. The procedure follows closely the HBS-to-GLORIA method of Merkle and Dolphin (2025) and produces the household-specific expenditure weights and sectoral trade positions used in the model's steady state.

Country blocs and household groups. Country-level COICOP budget shares are combined using 2023 current-US-dollar GDP weights, so larger economies receive a proportionately larger weight in the representative household basket. The advanced economy calibration uses 112 four-

¹⁶ See details of GLORIA database at <https://footprint.unep.org/gloria-mrio>.

digit COICOP categories and distinguishes the bottom 20 percent from the upper 80 percent of households. The emerging market economy and low-income country calibrations use the 12 one-digit COICOP divisions and distinguish the bottom 40 percent from the upper 60 percent, reflecting the coarser cross-country expenditure data available for those groups (Online Annex Table 2.5.1).

Allocation from COICOP to GLORIA. The GLORIA workbooks separately identify domestically supplied and imported household final demand. These components are summed up to obtain the sectoral expenditure envelope used in the household mapping. Let h_{ig} denote synthetic expenditure by household group g in COICOP category i , constructed from the group's normalized budget share and population mass; let $t_i = \sum_g h_{ig}$; let f_k denote GLORIA household final demand in sector k ; and let C_{ki} be a binary indicator equal to one when category i is linked to sector k . For a sector with at least one COICOP match, group-specific sectoral expenditure is

[Online Annex Table 2.5.1. Country Blocs, Household Groups, and Mapping Resolution](#)

Bloc	Countries in the Home Bloc	Household Groups	Data Treatment
AEs	France, Germany, Italy	Bottom 20 Percent/Upper 80 Percent	112 ECOICOP categories mapped to 60 GLORIA industries, then aggregated to 12 model sectors
EMs	Mexico, Peru, Philippines, Poland, South Africa	Bottom 40 Percent/Upper 60 Percent	12 COICOP divisions mapped directly to 12 model sectors
LIDCs	Kenya, Liberia, Madagascar, Sierra Leone, Zambia	Bottom 40 Percent/Upper 60 Percent	12 COICOP divisions mapped directly to 12 model sectors

Source: IMF staff compilation.

Note: Country-level household budget shares are aggregated before the sectoral mapping. AEs = advanced economies; COICOP = Classification of Individual Consumption According to Purpose; ECOICOP = European Classification of Individual Consumption According to Purpose; EMs = emerging market economies; GLORIA = Global Resource Input–Output Assessment; LIDCs = low-income developing countries.

$$r_{kg} = f_k \frac{\sum_i C_{ki} h_{ig}}{\sum_i C_{ki} t_i}, \quad t_i = \sum_g h_{ig}.$$

Thus, GLORIA fixes the total household final-demand envelope in each supplying sector, while the HBS data determine how that envelope is divided across household groups.

For the advanced economy calibration, the procedure first applies the detailed 112-by-60 concordance used in Merkle and Dolphin (2025), producing a 60-sector-by-two-household expenditure matrix. For use in the DSGE model, a 12-by-60 binary partition matrix A assigns every GLORIA industry to exactly one model sector. If f^{60} is the 60-sector final-demand vector and R^{60} is the corresponding household-specific expenditure matrix, the model-level objects are

$$f^{12} = A f^{60}, \quad R^{12} = A R^{60}.$$

The partition is applied identically to aggregate GLORIA final demand and to the mapped expenditure of each household group, preserving both aggregate consumption and household-group totals. Online Annex Table 2.5.2 reports the aggregation.¹⁷ EM and LIC expenditure profiles are available only at the 12-division level and are therefore mapped directly to the 12 sectors of the model.

¹⁷ As a resolution check, the advanced economy calibration is also constructed using the direct 12-by-12 concordance described below. The two routes yield similar household allocations at the model-sector level.

CHAPTER 2 NAVIGATING A SHOCK-PRONE WORLD: LESSONS FROM COST-OF-LIVING CRISES

Online Annex Table 2.5.2. Aggregation of 60 GLORIA Industries to the 12 Model Sectors

Model Sector	Number of GLORIA Industries	Constituent GLORIA Industries
S01 Primary activities: agriculture, forestry, and fishing	3	Agriculture; forestry; fishing
S02 Mining and quarrying	4	Coal extraction; petroleum extraction; gas extraction; other mining and quarrying
S03 Food, beverages, and tobacco manufacturing	9	Meat; fish; cereals; vegetables; fruit; other food; dairy; beverages; tobacco
S04 Textiles, wood, paper, printing, and publishing	4	Textiles and leather; sawmill, pulp, and paper; printing; publishing
S05 Petroleum, coke, and chemicals	7	Coke-oven products; refined petroleum products; fertilizers; other chemicals; pharmaceuticals; paints, glues, and detergents; rubber and plastics
S06 Non-metallic mineral products	2	Cement, lime, and plaster products; other non-metallic minerals
S07 Metals and fabricated metal products	2	Basic metals; fabricated metal products
S08 Machinery, vehicles, electronics, and other manufacturing	6	Machinery and equipment; motor vehicles and transport equipment; repair and installation of machinery; computers, electronics, and optical products; electrical equipment; furniture and other manufacturing
S09 Utilities and waste	4	Electric power; gas supply; water and sewage; waste and recycling
S10 Construction and real estate	2	Construction; property and real estate
S11 Trade, transport, postal services, and hospitality	9	Wholesale and retail trade and motor-vehicle repair; road transport; rail transport; pipeline transport; water transport; air transport; services to transport; postal and courier services; hospitality
S12 ICT, finance, government, education, health, arts, and other services	8	Telecommunications; information technology; finance and insurance; government, security, and public order; education; health and social work; arts and recreation; other services

Sources: Merkle and Dolphin 2025; and IMF staff calculations.

Note: The grouping follows the detailed 60-sector GLORIA classification used in the advanced economy mapping. GLORIA = Global Resource Input–Output Assessment; ICT = information and communications technology; S = sector.

One COICOP division can be associated with several supplying sectors, and one model sector can supply goods and services serving several consumption purposes. Online Annex Table 2.5.3 reports the binary links used in the direct mapping.

Online Annex Table 2.5.3. Division-Level COICOP–GLORIA Concordance Used in the Direct Mapping

COICOP Division	Linked Model Sectors
01 Food and Non-Alcoholic Beverages	S01 , S03, S11
02 Alcoholic Beverages, Tobacco, and Narcotics	S03, S11
03 Clothing and Footwear	S04, S11, S12
04 Housing, Water, Electricity, Gas, and Other Fuels	S01, S02, S04, S05, S06, S07, S08, S09, S10, S11, S12
05 Furnishings, Household Equipment, and Routine Household Maintenance	S04, S05, S06, S07, S08, S11, S12
06 Health	S05, S08, S11, S12
07 Transport	S05, S08, S11, S12
08 Communication	S08, S11, S12
09 Recreation and Culture	S01, S04, S05, S08, S11, S12
10 Education	S12
11 Restaurants and Hotels	S11
12 Miscellaneous Goods and Services	S05, S07, S08, S11, S12

Sources: Merkle and Dolphin 2025; and IMF staff calculations.

Note: Sector definitions are reported in Annex Table 2.5.2. The bold link is the chapter-specific modification to the concordance adapted from Merkle and Dolphin 2025. COICOP = Classification of Individual Consumption According to Purpose; GLORIA = Global Resource Input–Output Assessment; S = sector.

The consumption allocation across the 12 model sectors for the two household groups across country-group calibrations is shown in Online Annex Figure 2.5.1.

Net exports of food and energy products. GLORIA also provides the bilateral production

and trade flows used to calibrate the two-region model. The same 60-to-12 partition is applied separately to exports and imports,

$$x^{12} = Ax^{60}, \quad m^{12} = Am^{60},$$

where x and m denote Home's exports to and imports from its RoW counterpart. Online Annex Table 2.5.4 reports the resulting gross exports, gross imports, and net exports for food and energy in each calibration.

Baseline Scenario: Assumptions and Additional Results

Model assumptions and key parameters. The baseline calibration is designed to generate rapid pass-through of adverse commodity-supply shocks to the prices of food- and energy-related goods and services. The price-adjustment parameters—and therefore the implied sectoral Phillips-curve slopes—and the remaining substitution elasticities are in line with Ozhan and others (Forthcoming) and reaggregated consistently with the 12-sector calibration. Online Annex Table 2.5.5 summarizes key parameters.

Online Annex Table 2.5.4. Net Exports of Food and Energy Products in Model Economies
(Percent of home GDP)

	Advanced Economy	Emerging Market	Low-Income Developing Country
Food	−0.70	−0.03	5.19
Energy	−1.46	−1.94	−3.37

Sources: Global Resource Input–Output Assessment (GLORIA) and IMF staff calculations.

Note: Exports refer to trade between the composite Home economy and its RoW counterpart after aggregation to the 12 model sectors. Net exports equal exports minus imports. Food refers to models sectors S01 and S03. Energy refers to model sectors S02, S05, and S09. RoW = rest of the world; S = sector.

Online Annex Table 2.5.5. Selected Parameters

Sectors	Elasticities of Substitution ($e_{r,s}^z, e_{r,s}^{ic}, e_{r,s}^{tic}, e_{r,s}^c$)	Elasticities of Substitution ($\delta_{s,r}$)	Capital Use
Agriculture (S01)	(0.1, 0.1, 0.1, 0.5)	0.99	Agriculture Capital
Mining and Quarrying(S02)	(0.1, 0.1, 0.1, 0.5)	0.99	Mining Capital
Food Manufacturing (S03)	(0.1, 0.1, 0.8, 0.5)	0.99	Other Physical Capital
Energy-Related (S05, S09)	(0.1, 0.1, 0.8, 0.5)	0.99	Oil-Extraction Capital
Other Sectors	(0.1, 0.1, 0.8, 0.5)	[0.1, 0.4]	Other Physical Capital

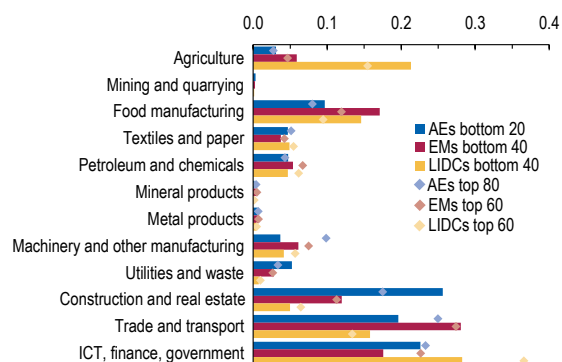
Source: IMF staff calculations.

Note: Lower values of elasticity of substitution imply stronger complementarity and less scope for short-run substitution.

The parameter ($\delta_{s,r}$) denotes the quarterly frequency of price adjustment; a value of 0.99 therefore implies nearly flexible prices. For sectors outside S01, S02, S03, S05, and S09, the price-adjustment frequency varies between 0.1 and 0.4. S = sector.

Shock process. Cost-of-living crises are represented by temporary negative TFP shocks in the sector supplying the relevant global commodity, both in the Home and the RoW economy

Online Annex Figure 2.5.1. Share of Sectoral Consumption, by Household Type, in Each Economy
(Share)



Source: IMF staff calculations.

Note: The figure reports the sectoral consumption shares by country groups and households' income quintiles. AEs = advanced economies; EMs = emerging markets; ICT = information and communications technology; LIDCs = low-income developing countries.

(representing a global supply disruption). The energy shock lowers productivity in mining and quarrying (S02), while the food shock lowers productivity in agriculture (S01). Log of the productivity path follows the AR(1) process

$$\log A_{r,s,t} = \rho_s \log A_{r,s,t-1} + \varepsilon_{r,s,t}.$$

where r and s denote the affected regions and sectors.

The innovation $\varepsilon_{r,s,t}$ is scaled separately for mining and quarrying and agriculture (Online Annex Table 2.5.6). The baseline energy shock is calibrated to raise the year-over-year global energy price by about 70 percent on impact, while the food shock raises the global food price by about 45 percent. These increases correspond to roughly 2 to 2¼ historical standard deviations of the relevant global price series. The baseline half-life is approximately two quarters. Additional exercises consider a more persistent shock with a half-life of about 13½ quarters.

Online Annex Table 2.5.6. Baseline Global Shock Assumptions

Scenario	Origin	Impact Target	Persistence (Half-Life)
Global Energy Supply Shock	Mining and Quarrying (S02), Home and RoW	About 70 Percent Increase in Global Energy Price	Baseline: 2 Quarters Persistent: 13.5 Quarters
Global Food Supply Shock	Agriculture (S01), Home and RoW	About 45 Percent Increase in Global Food Price	Baseline: 2 Quarters Persistent: 13.5 Quarters

Source: IMF staff calculations.

Note: The energy and agriculture shocks are calibrated so that the peak responses of the corresponding global energy and cereals price indices are approximately two standard deviations of their percentage changes over 1992–2025. RoW = rest of the world; S = sector.

Design of Policy Scenarios

The policy simulations compare four temporary fiscal instruments introduced one at a time: targeted transfers to low-income households (LIHHs), untargeted transfers to both household groups, consumer subsidies on downstream food or energy goods, and producer subsidies on intermediate inputs from the sector in which the shock originates.

The policy-relevant *food bundle* combines household purchases from agriculture (S01) and food manufacturing (S03), while the *energy bundle* combines petroleum and chemical products (S05) and utilities (S09).

To compare instruments on a common basis, the benchmark “equal-protection” exercise aims at containing the impact on households from higher consumer prices by one half. Transfers are set to cover one-half of the increase in the cost of purchasing pre-shock quantities of the relevant bundle. Subsidy rates are chosen endogenously so that the increase in the corresponding household bundle price is one-half of the increase under the no-policy baseline. Consumer and producer subsidies are assumed to be fully passed through to final purchasers and intermediate users, respectively.

Targeted transfers. For bundle k , the targeted transfers to the LIHHs are proportional to the increase in the cost of purchasing the pre-shock quantity of the LIHHs:

$$T_{r,L,t}^k = \chi^k \cdot \bar{C}_{r,L,t}^k \cdot (P_{r,L,t}^k - P_{r,L}^k),$$

with scale χ^k set to 0.5 so that the transfer compensates for one-half of the additional bill. The transfer is expressed in nominal units and enters the LIHHs' budget constraint directly.

Untargeted transfers. The same aggregate compensation is distributed across both household types. With the household share λ_h , the payments to household h are:

$$T_{r,h,t}^{\text{untargeted},k} = \lambda_h \cdot \chi^k \cdot \bar{C}_{r,t}^k \cdot (P_{r,t}^k - P_r^k)$$

Here, the relative-price term measures the increase in the energy-bundle price relative to the aggregate consumption deflator.

Consumer subsidies. Consumer subsidies lower the effective purchaser price of final food- or energy-related goods and services and are the model analogue of temporary reductions in VAT or excise taxes. For energy-related sectors e , the nominal price paid by households with consumer subsidy rate $\tau_{r,e,t}^{hh}$ is:

$$P_{r,e,t}^{hh} \equiv (1 - \tau_{r,e,t}^{hh})P_{r,e,t} + \tau_{r,e,t}^{hh}P_{r,e}$$

The government finances the difference between the market price and the subsidized price on actual household purchases, and the subsidy applies to both household groups.

Producer subsidies. For energy shocks, producer subsidies are also considered. These reduce the effective price paid by firms for inputs from the mining and quarrying sector (S02). For energy-related sectors e (S05 and S09), the effective intermediate-input price entering the firm pricing block is:

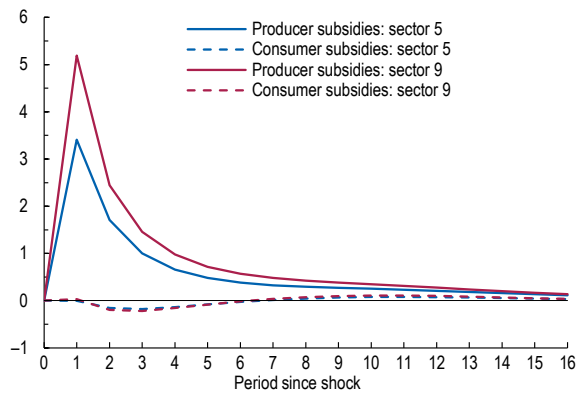
$$P_{r,e,t}^f \equiv (1 - \tau_{r,e,t}^f)P_{r,e,t} + \tau_{r,e,t}^fP_{r,e}$$

The fiscal cost equals the subsidy wedge multiplied by eligible intermediate-input use.

Additional Results

Producer-subsidy export channel. When producer subsidies are used, lower input costs propagate through production networks to domestic final prices, but also reduce export prices and stimulate foreign demand. Online Annex Figure 2.5.2 traces exports from the two energy-related downstream sectors shown in the figure, S05 and S09, after the global energy shock in the advanced economy calibration. Producer subsidies generate a sharp increase in exports from both sectors, whereas consumer subsidies, reported for comparability, leave those exports broadly unchanged or slightly lower. By reducing

Online Annex Figure 2.5.2. Impact of Subsidies on Exports of Energy-Related Sectors, Energy Shock, Advanced Economies
(Deviation from no-policy baseline, percentage points)



Source: IMF staff calculations.
Note: Sector 5 = Petroleum products; sector 9 = Utilities. See details in Annex Table 2.5.2.

downstream marginal costs and export prices, producer subsidies therefore direct part of the fiscal support to foreign purchasers. This export leakage is a central reason why producer subsidies require a substantially larger intervention than consumer subsidies to achieve the same reduction in the domestic retail-price increase.

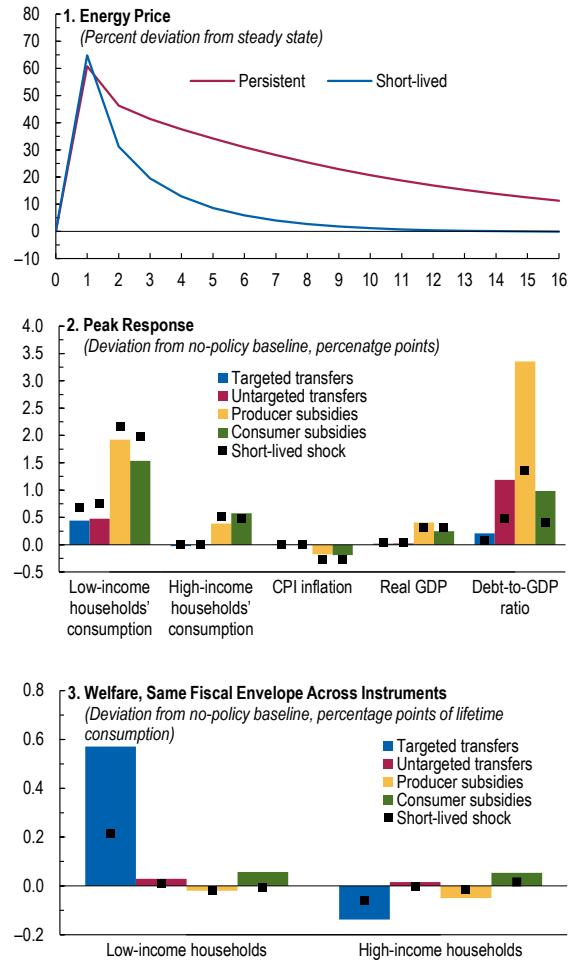
Persistent shocks. The fiscal cost depends not only on the size of the initial price increase but also on its persistence. Online Annex Figure 2.5.3 compares the short-lived baseline energy shock with the more persistent specification used in the main text. Panel 1 reports the global energy-price paths. Panel 2 shows the peak macroeconomic and fiscal effects under the persistent shock, with diamonds marking the corresponding outcomes under the short-lived shock. Panel 3 reports household welfare when the fiscal envelope is held constant across instruments, again using diamonds for the short-lived shock outcomes.

Greater persistence requires consumer and producer subsidy rates to remain elevated for longer, raising public debt and the taxes required during consolidation—especially under producer subsidies. Targeted transfers also become more costly, but their relative advantage increases because support remains concentrated on LIHHs. Under the common fiscal envelope, the persistent shock therefore widens the welfare advantage of targeted transfers for LIHHs.

De-anchored inflation expectations. The baseline assumes that inflation expectations remain anchored. The alternative specification allows unusually large increases in salient food and energy prices to affect the reference inflation entering sectoral price setting. The de-anchoring factor is

$$\pi_{r,s,t}^{deanchor} = (\pi_{r,t}^{food} / \bar{\pi}_r)^{v^{food}} (\pi_{r,t}^{energy} / \bar{\pi}_r)^{v^{energy}}.$$

Online Annex Figure 2.5.3. Impact of Fiscal Measures in Response to Energy Price Shock, Advanced Economies, Persistent versus Short-Lived Shock



Source: IMF staff calculations.

Note: Panel 1 shows the path of energy prices in deviation from steady state following a persistent versus a short-lived energy shock (Annex Table 2.5.6). Panel 2 reports peak deviations from the steady state when each policy is in place, minus the peak response under the no-policy baseline. Panel 3 reports the welfare impact of each fiscal instrument when the amount spent on each instrument is the same and equal to that of untargeted transfers in the exercise reported in panel 2.

The elasticities ν^{food} and ν^{energy} are calibrated so that, after the advanced economy energy shock, non-energy inflation rises by about 0.85 percentage point more than under anchored expectations.

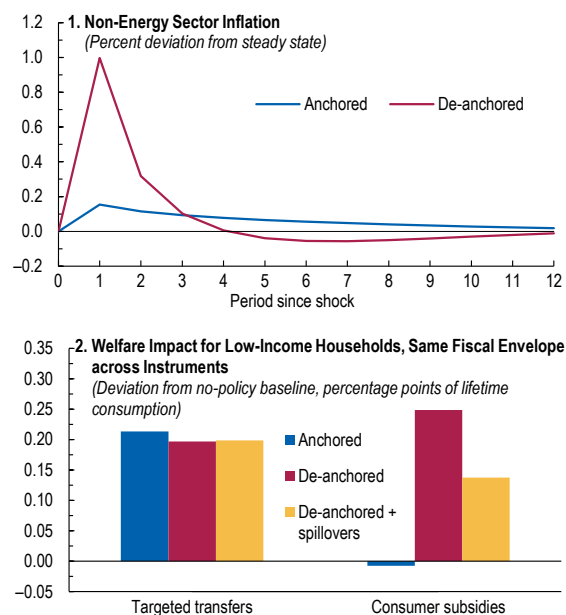
Online Annex Figure 2.5.4 illustrates this mechanism using inflation in S04 (textiles, wood, paper, printing, and publishing). De-anchoring produces a much larger and more front-loaded response than in the anchored baseline.

The additional inflation is endogenous to the bundle-price increase rather than an independent cost-push shock. By lowering the retail energy-price increase, consumer subsidies dampen the shift in inflation on impact and the associated second-round effects.

Simultaneous subsidies and spillovers to global prices. Online Annex Figure 2.5.5 instead assumes that both Home and RoW introduce consumer subsidies, with each region targeting one-half of the pass-through to its retail energy bundle. By weakening the demand contraction that would otherwise help clear the global market, simultaneous subsidies raise the global energy price relative to the no-policy baseline; in the calibration reported in the main text, the peak difference is about 3 percentage points. The higher global price partly offsets the domestic price relief and lowers the welfare gain from using the consumer subsidies to contain second-round inflation.

Additional exercises for advanced economies. Online Annex Figure 2.5.6 complements the equal-price-suppression exercise by reporting peak responses of consumption, inflation, real GDP, and the debt-to-GDP ratio, relative to the no-policy baseline, when each instrument is scaled so that its fiscal cost equals that of untargeted transfers in the benchmark advanced economy energy experiment (corresponding welfare results are reported in main-text Figure 2.9, panel 3).

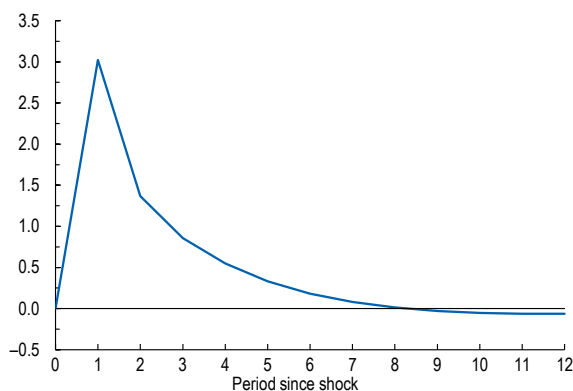
Online Annex Figure 2.5.4. Impact of Consumption Subsidies in Response to Energy Price Shock, Advanced Economies, Anchored versus De-anchored Inflation Expectations



Source: IMF staff calculations.

Note: Panel 1 shows the response of inflation in a non-energy sector (S04 in Annex Table 2.5.2) to a short-lived energy shock (Annex Table 2.5.6) when inflation expectations are well-anchored versus de-anchored. Panel 2 reports the welfare impact for low-income households of each fiscal instrument, relative to the no-policy baseline, when the amount spent on each instrument is the same. In the "De-anchored + spillovers" scenario, Home and RoW economy are assumed to implement consumption subsidies simultaneously. RoW = rest of the world.

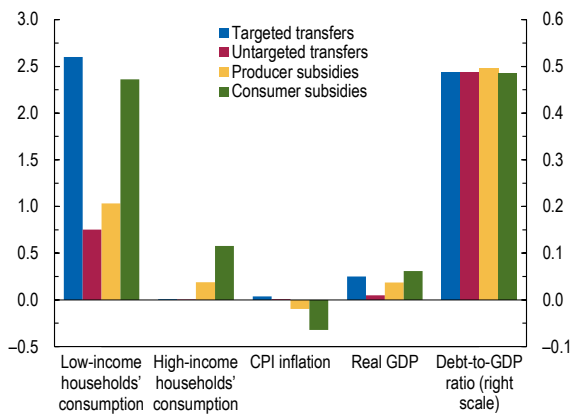
Online Annex Figure 2.5.5. Additional Impact on Global Energy Price from Simultaneous Use of Consumer Subsidies across Countries
(Percentage points deviation from no-policy baseline)



Source: IMF staff calculations.

Note: The figure shows the response of global energy prices, relative to the no-policy baseline, when both the Home and the Rest-of-the-World economy introduce consumer subsidies, with each region targeting one-half pass-through to its retail energy bundle.

Online Annex Figure 2.5.6. Impact of Fiscal Measures in Response to Energy Price Shock, Advanced Economies, Same Envelope across Instruments
(Deviation from no-policy baseline, percentage points)



Source: IMF staff calculations.
Note: The figure reports peak deviations from the steady state when each policy is in place, minus the peak response under the no-policy baseline, assuming the amount spent on each instrument is the same and equal to that of untargeted transfers.

Online Annex Figure 2.5.7 repeats the equal-price-suppression comparison for the global food shock in the advanced economy calibration. Transfers are indexed to the food bundle, consumer subsidies apply to final food purchases, and producer subsidies reduce the effective price of agricultural inputs. The figure shows that consumer subsidies cost almost 7 times as much as targeted transfers while providing a similar near-term improvement in LIHH consumption.

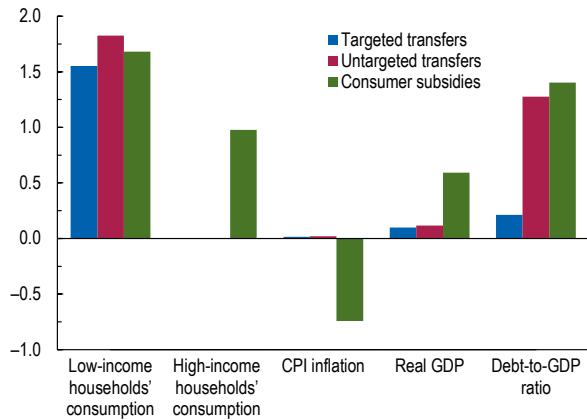
Energy shock in low-income countries.

Online Annex Figure 2.5.8 reports the energy-shock results for the low-income developing country's calibration. Panel 1 shows the peak macroeconomic and fiscal effects of the four instruments, and panel 2 reports household welfare; diamonds in the welfare panel denote the common-fiscal-envelope outcomes.

Producer subsidies generate by far the largest increase in public debt and a welfare loss for LIHHs under the equal-protection exercise.

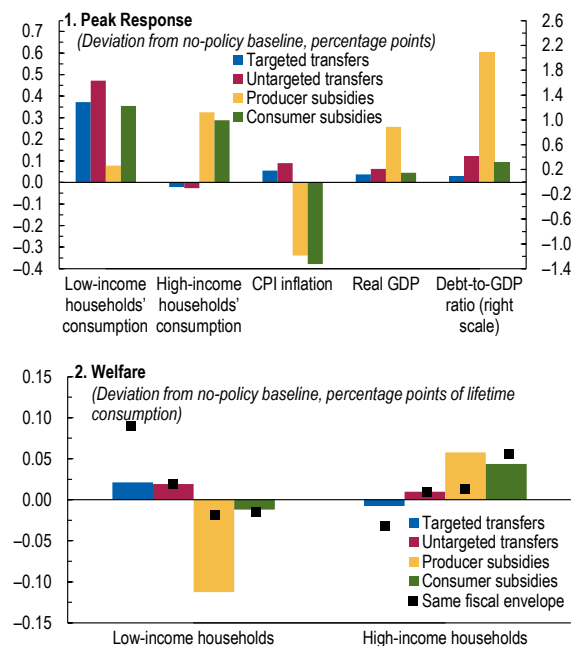
The debt responses imply that containing pass-through by one-half costs roughly 22 times more under producer subsidies than under

Online Annex Figure 2.5.7. Impact of Fiscal Measures in Response to Food Price Shock, Advanced Economies
(Deviation from no-policy baseline, percentage points)



Source: IMF staff calculations.
Note: The figure reports peak deviations from the steady state when each policy is in place, minus the peak response under the no-policy baseline, when policies aim at containing pass-through by half.

Online Annex Figure 2.5.8. Impact of Fiscal Measures in Response to Energy Price Shock, Low-Income Countries

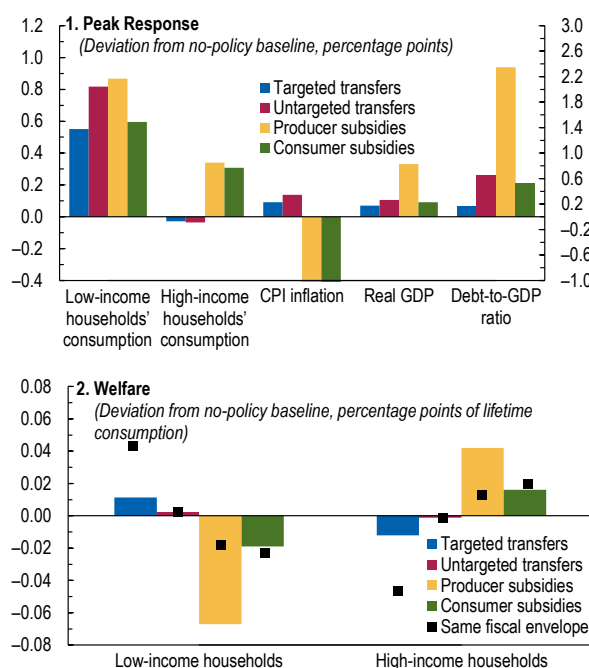


Source: IMF staff calculations.
Note: Panel 1 reports peak deviations from the steady state when each policy is in place, minus the peak response under the no-policy baseline. Panel 2 reports welfare impact (relative to the no-policy baseline) corresponding to the interventions in panel 1 (and, with squares, when the fiscal envelope is the same and equal to that of untargeted transfers).

targeted transfers in the low-income and developing country calibration, compared with about 16 times in advanced economies and 14 times in emerging markets.

Energy and food shocks in emerging markets. Online Annex Figures 2.5.9 and 2.5.10 apply the same policy definitions and scaling to the emerging market calibration. Online Annex Figure 2.5.9 reports the peak macroeconomic and fiscal effects and household welfare after the global energy shock; Figure 2.5.10 reports the corresponding food-shock results. In both figures, diamonds in the welfare panel denote the common-fiscal-envelope outcomes. Across both shocks, subsidies reduce inflation more sharply than transfers but require substantially more public borrowing. Under a common fiscal envelope, targeted transfers produce the largest welfare gains for LIHHs, while consumer subsidies provide weaker welfare support despite their near-term effect on consumption. The food-shock comparison across advanced economies, emerging markets, and low-income developing countries further shows that the fiscal cost of consumer subsidies rises markedly with the economy's exposure to food prices, whereas targeted transfers provide comparable protection to vulnerable households at a much lower fiscal cost.

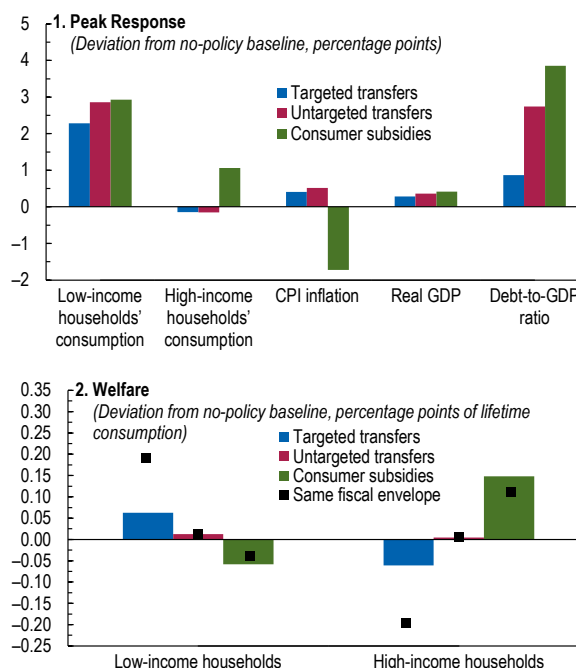
Online Annex Figure 2.5.9. Impact of Fiscal Measures in Response to Energy Price Shock, Emerging Market Economies



Source: IMF staff calculations.

Note: Panel 1 reports peak deviations from the steady state when each policy is in place, minus the peak response under the no-policy baseline. Panel 2 reports welfare impact (relative to the no-policy baseline) corresponding to the interventions in panel 1 (and, with squares, when the fiscal envelope is the same and equal to that of untargeted transfers).

Online Annex Figure 2.5.10. Impact of Fiscal Measures in Response to Food Price Shock, Emerging Market Economies



Source: IMF staff calculations.

Note: Panel 1 reports peak deviations from the steady state when each policy is in place, minus the peak response under the no-policy baseline. Panel 2 reports the welfare impact (relative to the no-policy baseline) corresponding to the interventions in panel 1 (and, with squares, when the fiscal envelope is the same and equal to that of untargeted transfers).

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