Monetary Policy in Emerging Economies: Understanding the effects and Implications of Relative Price Shocks

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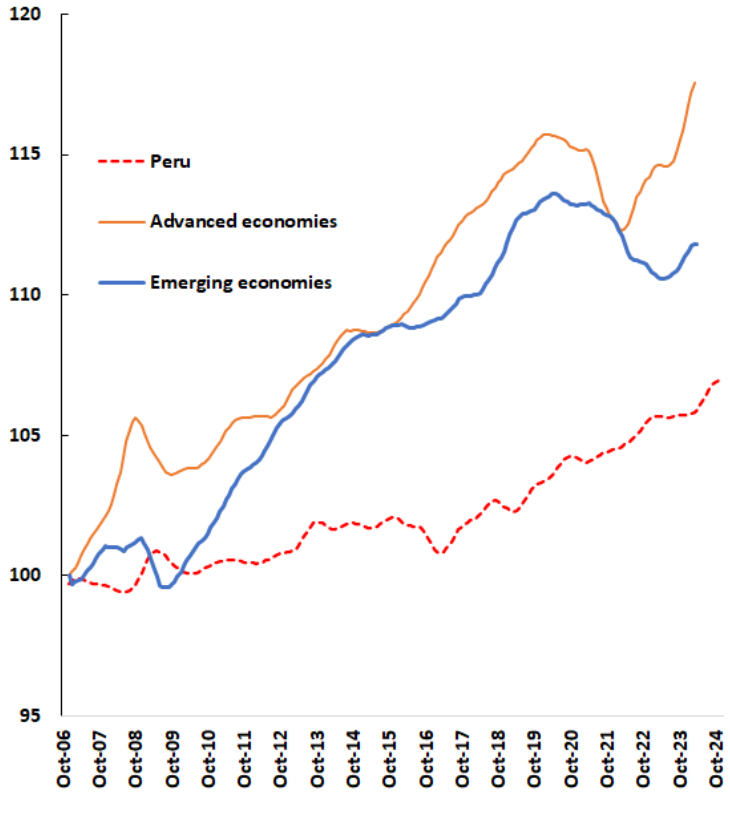
XLIII Encuentro de Economistas del Banco Central de Reserva del Perú

Content

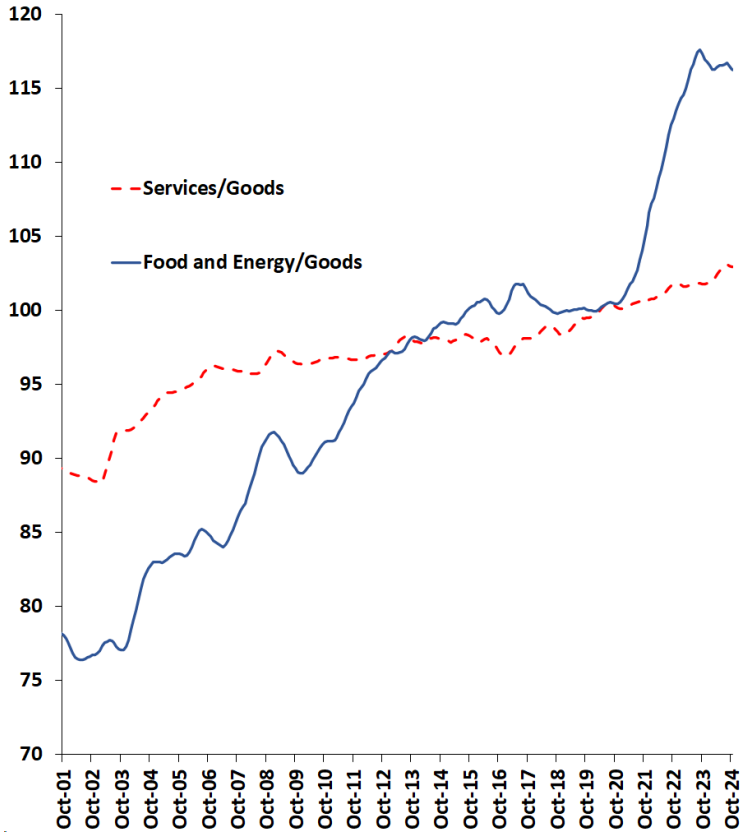
Motivation

The inflationary experience during 2021-2023 varied across countries

Relative Prices of Services to Goods in Peru, AE and EME
(December 2006=100)



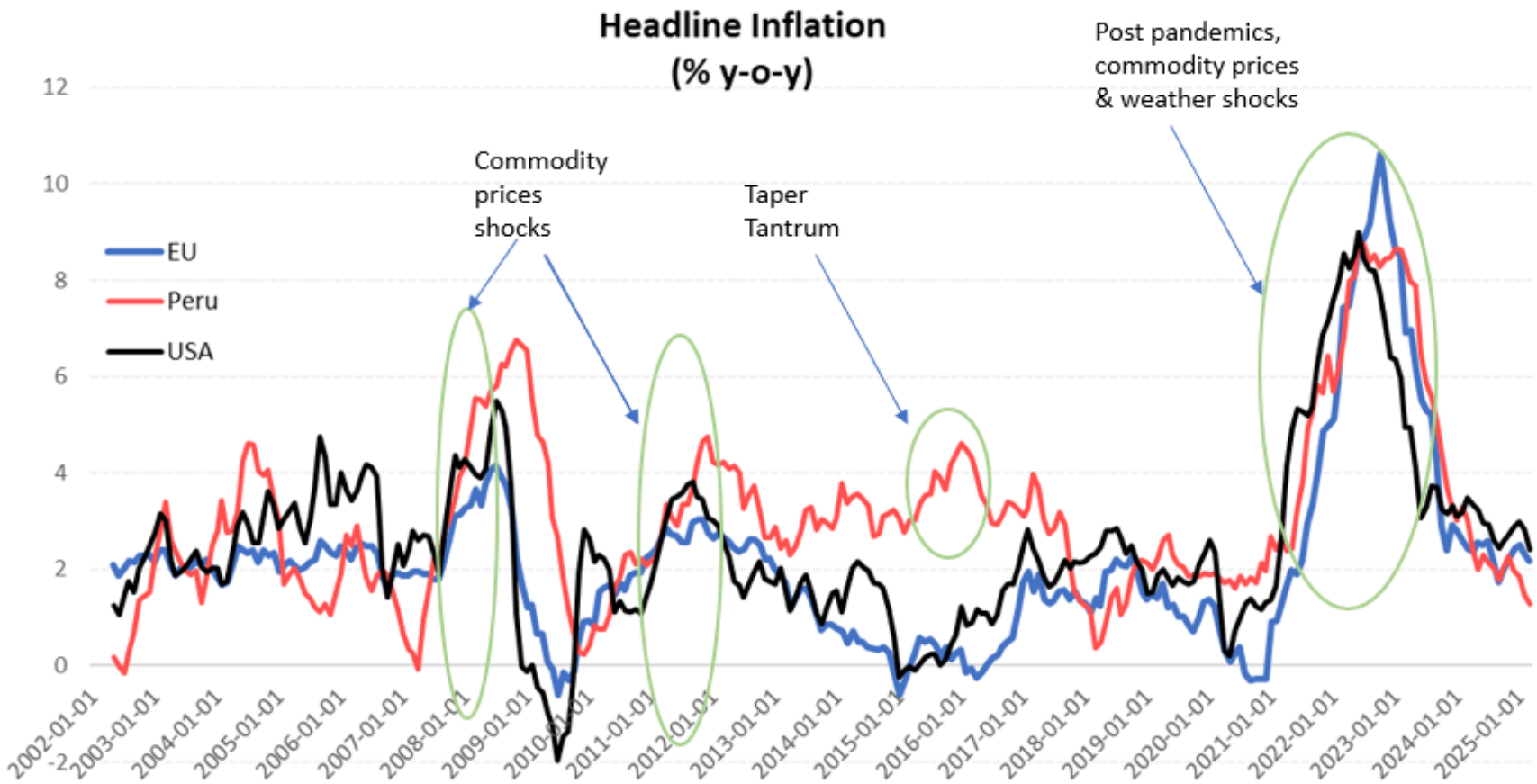
Relative prices to Goods in Peru
(December 2019=100)



- World: inflation due to a drop in relative prices of services to goods + other supply & demand shocks
- Peru exception: inflation manifested mainly from food and energy prices shocks History

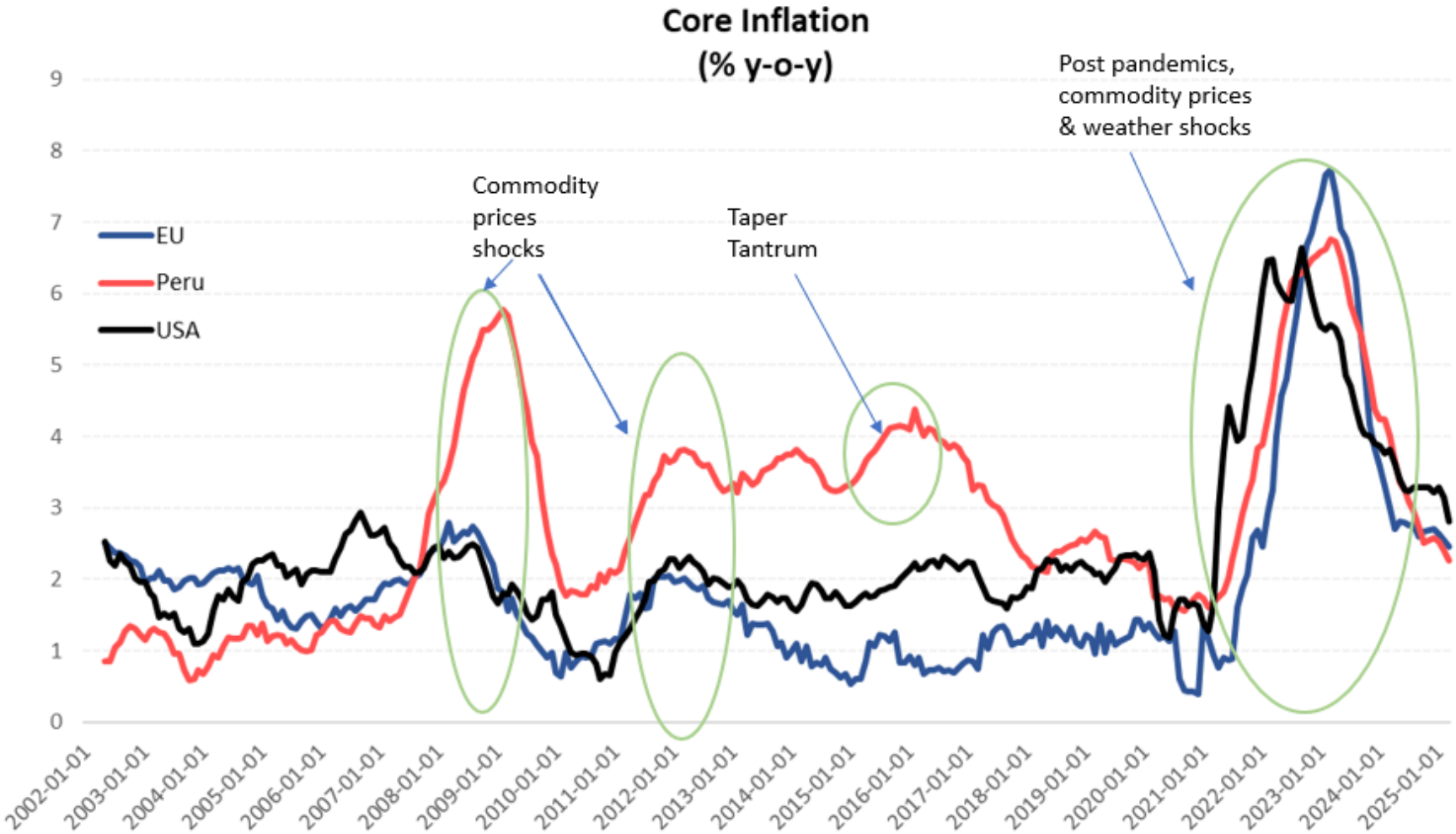
Motivation

Relative prices shocks matter for the evolution of total inflation



Motivation

Core inflation patterns exhibited variations, across countries, in response to the relative prices shocks



Summary of this project

Research Questions

- What has been the contribution of domestic versus global shocks to relative prices and inflation dynamics in the Advances Economies (USA, EU) and Latin American economies (Peru, Brazil, Colombia and Chile) during past inflationary episodes?

- What are the importance of the different relative price shocks for the conduct and effectiveness of monetary policy? In particular, what are the implications of the different relative prices shocks for inflation expectations and measure of trend inflation (core inflation and services inflation)?

Methodology

- Empirics: Bayesian-SVAR model - with sign Restrictions
  - 14 macro variables sample: 2002M2 - 2025M6 for EUR, USA, PER, BRA, CHL, COL.
  - Methodology: a la Korobilis 2022
  - Identification: a la Bańbura et al. 2023

Data

- Sample: 2002M2 - 2025M6 for EU, USA, PERU
- y_t is a vector of 14 macro variables for each country:
  1. Headline inflation
  2. Core inflation
  3. Services inflation
  4. Food Inflation
  5. Producer price index
  6. Energy producer price index
  7. Gas prices
  8. Oil prices
  9. Global Supply Chain Pressure Index (GSCPI)
  10. Domestic activity (industrial production)
  11. Foreign/global activity (trade volumes, global GDP proxies)
  12. Labor costs: wages or remunerations
  13. Foreign exchange rate
  14. Inflation Expectations
- Transformation: log*100.
- Large number of variables to capture better the difference between supply and demand shocks.

Methodology: Korobilis 2022

- The following reduced-form VAR is estimated

$$y_t = \Phi x_t + \varepsilon_t\,, \quad N \sim (0, \Sigma)$$

- Key assumption: the n VAR disturbances are driven by a few r common factors

$$\varepsilon_t = \Lambda f_t + v_t$$

where Λ is an $n \times r$ matrix of factor loadings, f_t is an $r \times 1$ vector of factors or structural shocks, and v_t is an $n \times 1$ vector of idiosyncratic shocks.

- The conditional covariance matrix of ε_t is now of the form:

$$\text{cov}(\varepsilon_t \,|\, \Lambda, \Sigma) = \Omega = \Lambda\Lambda' + \Sigma$$

- The reduced-rank SVAR representation of this model is:

$$A_1 y_t = B_1 x_t + f_t + (\Lambda'\Lambda)^{-1}\Lambda' v_t \quad \Rightarrow \quad f_t \approx A_1 y_t - B_1 x_t$$

where $A_1 = (\Lambda'\Lambda)^{-1}\Lambda$.

Methodology: Identification

- Korobilis (2022) method allows for structural identification restrictions can be incorporated in the loadings matrix Λ
  - Sign restrictions:

$$\Lambda_{ij} \sim \begin{cases} \mathcal{N}(0, h_{ij}) \cdot \mathbb{I}(\Lambda_{ij} > 0), & \text{if } S_{ij} = 1 \\ \mathcal{N}(0, h_{ij}) \cdot \mathbb{I}(\Lambda_{ij} < 0), & \text{if } S_{ij} = -1 \\ \delta_0(\Lambda_{ij}), & \text{if } S_{ij} = 0 \\ \mathcal{N}(0, h_{ij}), & \text{otherwise} \end{cases}$$

- In particular, we follow Bańbura et al. 2023 and reach shock identification via sign and zero restrictions on the factor loadings.

- We identify 6 shocks as drivers of inflation:
  - Supply shocks: global energy prices, global supply chains, domestic supply, food price shocks
  - Demand shocks: domestic demand and foreign demand shocks

Identification

Table 2: Identification of structural shocks

Variable/Shock	Supply				Demand	
	Global Energy Prices	Global Supply Chains	Domestic Supply	Food Price	Domestic Demand	Foreign Demand
CPI headline	+	+	+	+	+	
CPI core	+		+		+	
CPI services						
Oil price	+	0	0	0	0	
Gas Price	+	0	0	0	0	
IP	−	−	−		+	
Global ec. cond.	−		0	0	0	+
GSCPI		+	0	0	0	
PPI total	+	+	+		+	+
PPI energy	+				0	+
FX					−	+
Wages			−			
CPI food			0	+		
Inflation expect.	+		+		+	

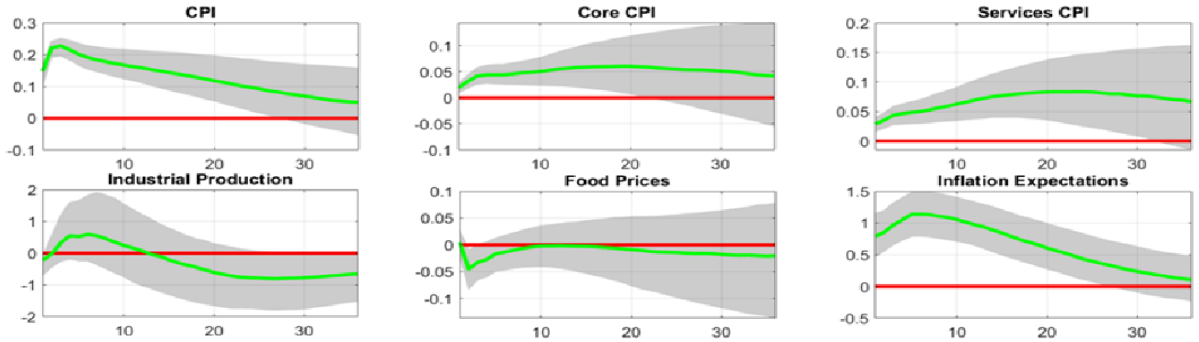
Note: An entry with +/− denotes a positive/negative contemporaneous response of the variable to the specific shock. A 0 indicates no contemporaneous response and an empty cell denotes an unrestricted response. The entries highlighted in red correspond to restrictions applied only for Peru; for the US and the Euro Area, no such restrictions are imposed.

Estimation Strategy : Korobilis 2022

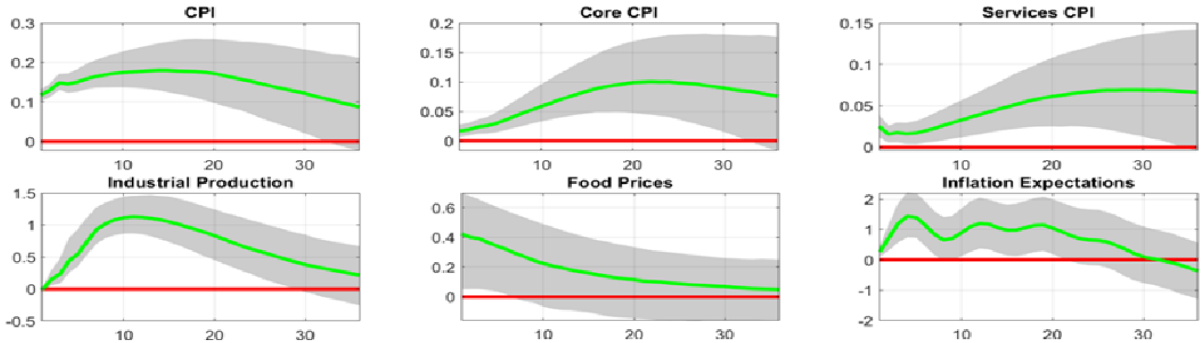
- Use Gibbs sampler with conditional posteriors.
- Sample Λ using truncated normal if signs are restricted (Botev, 2017).
- Estimate the VAR equation-by-equation (Carriero et al., 2019).
- Apply Horseshoe prior for shrinkage (Armagan et al., 2013; Ghosh et al., 2016).

Preeliminary Results: Global Energy Prices shocks

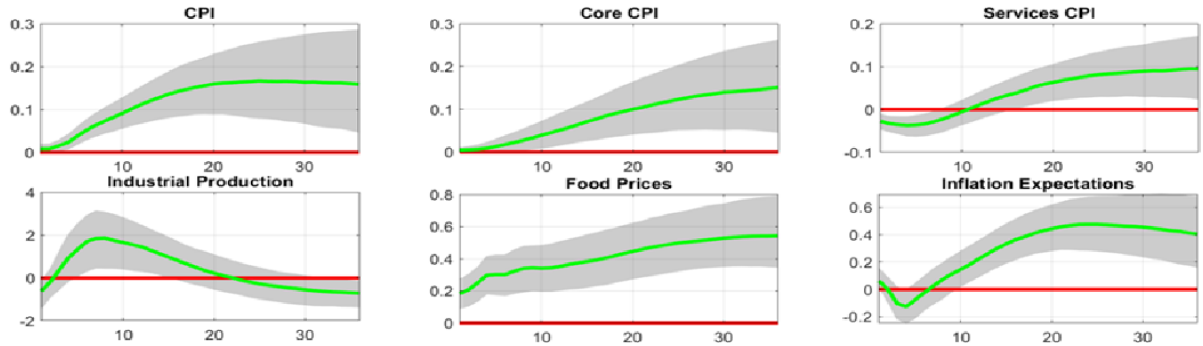
Panel A. USA



Panel B. Euro Area

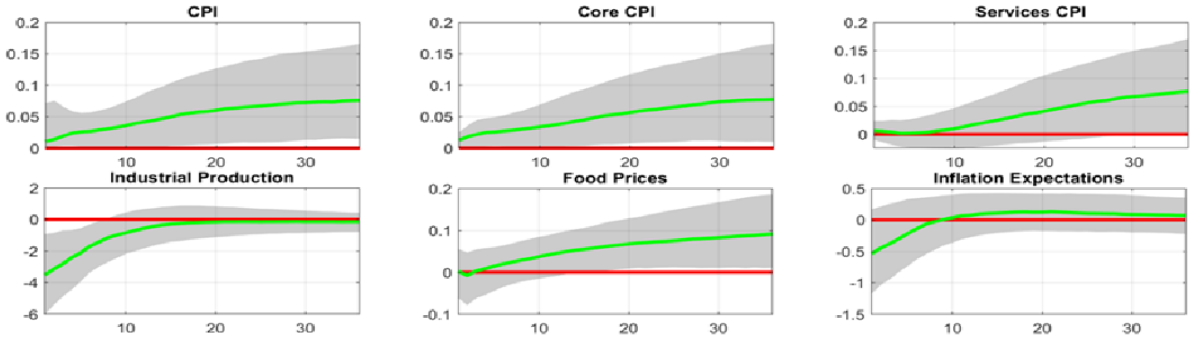


Panel C. Peru

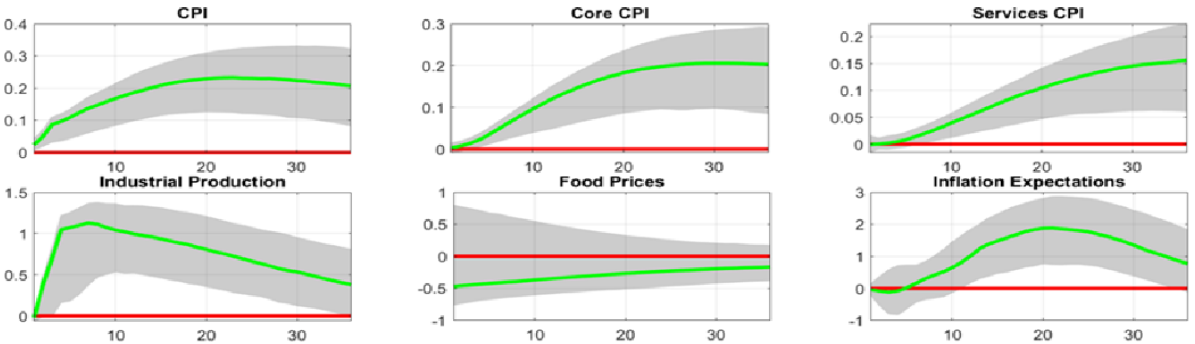


Preeliminary Results: Global Supply Chains shocks

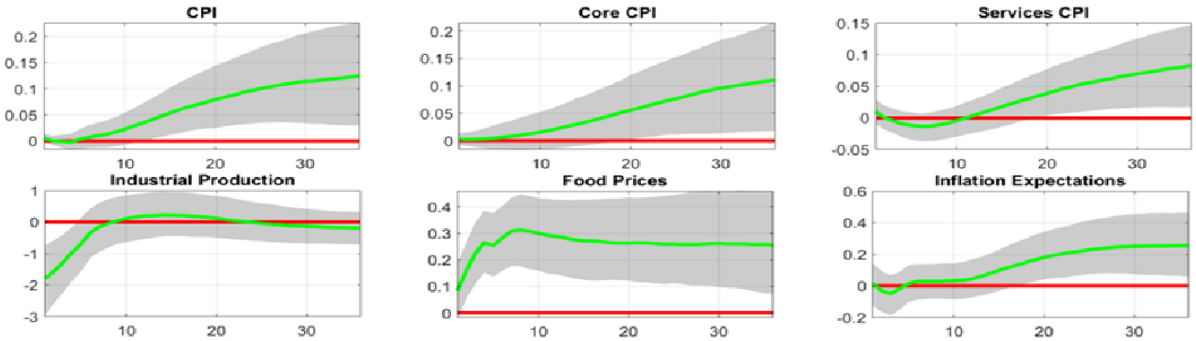
Panel A. USA



Panel B. Euro Area

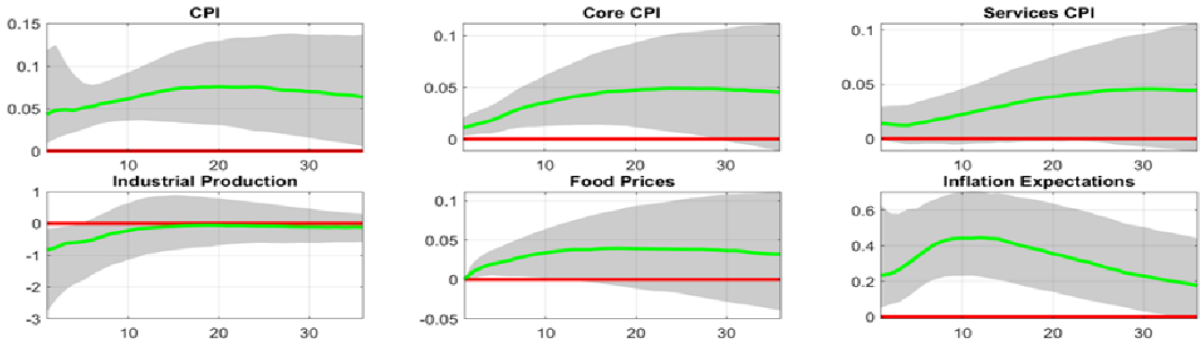


Panel C. Peru

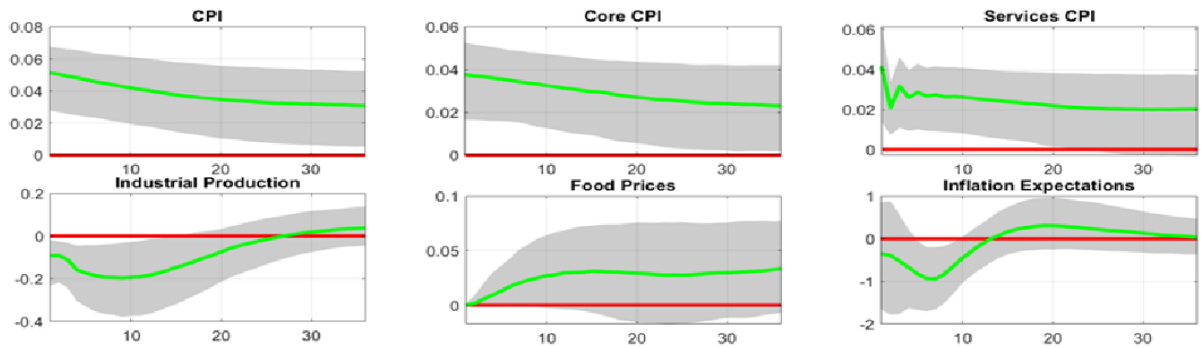


Preeliminary Results: Domestic Supply shocks

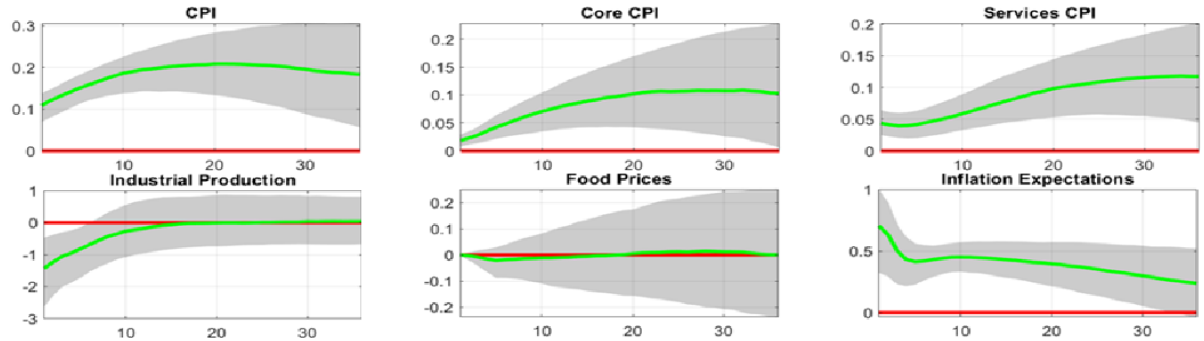
Panel A. USA



Panel B. Euro Area

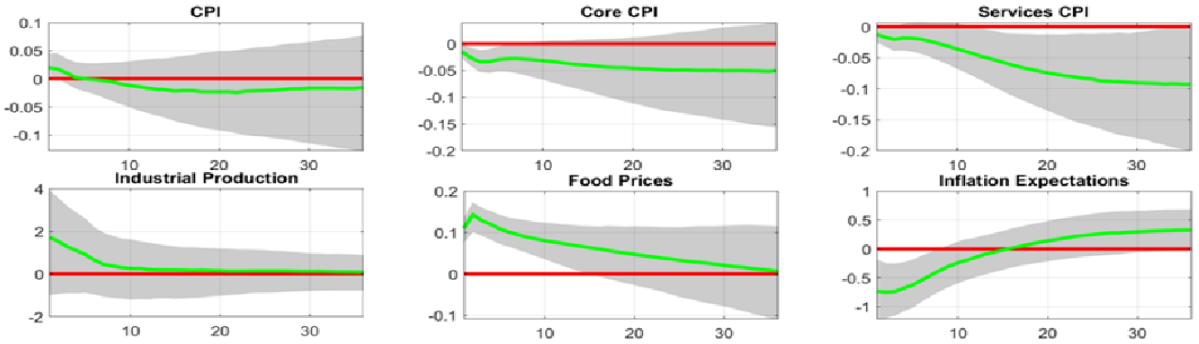


Panel C. Peru

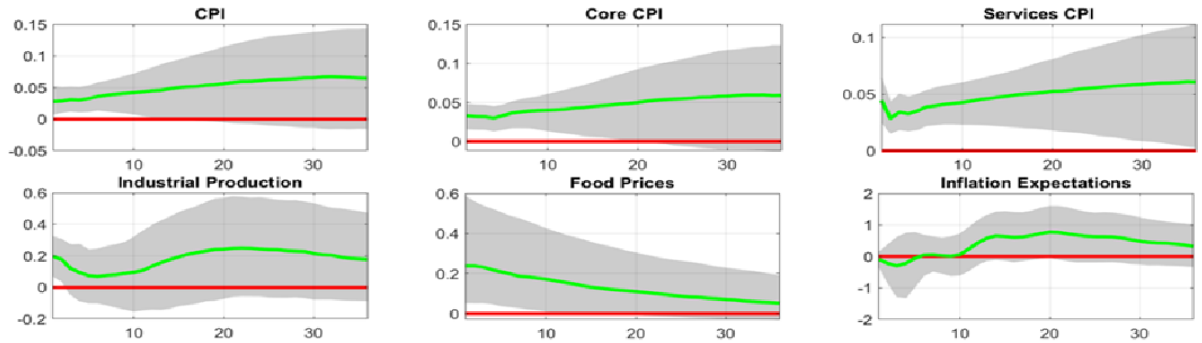


Preeliminary Results: Food Price shocks

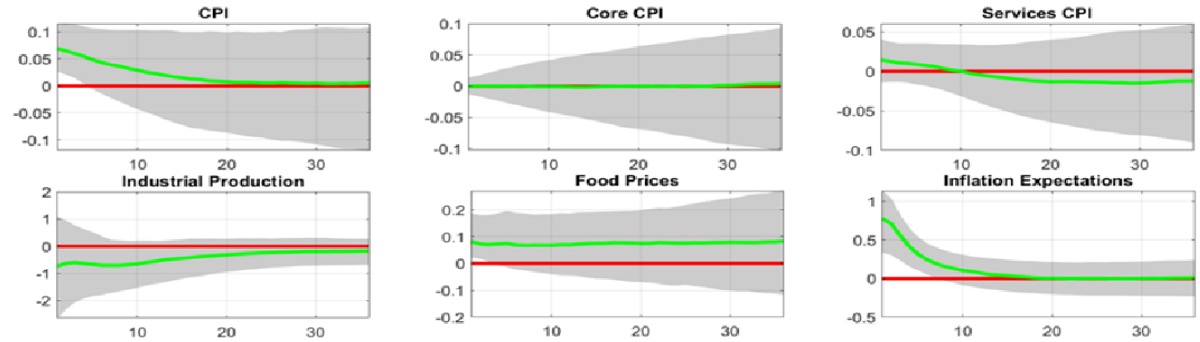
Panel A. USA



Panel B. Euro Area

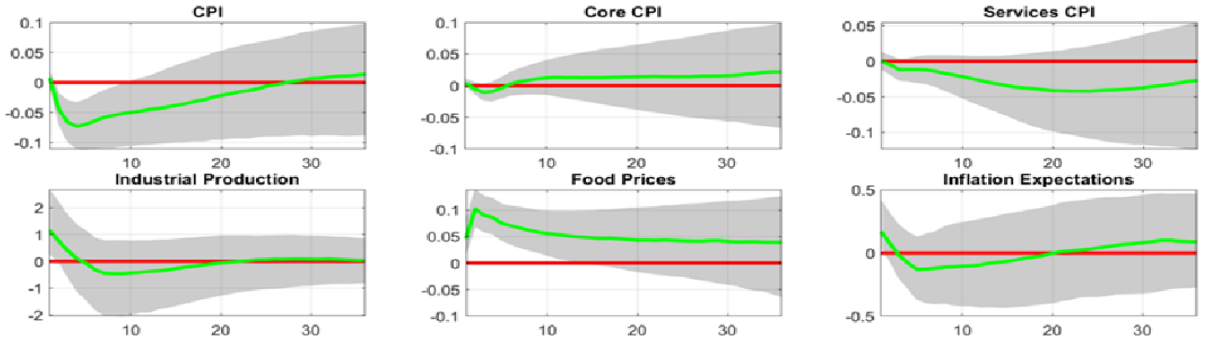


Panel C. Peru

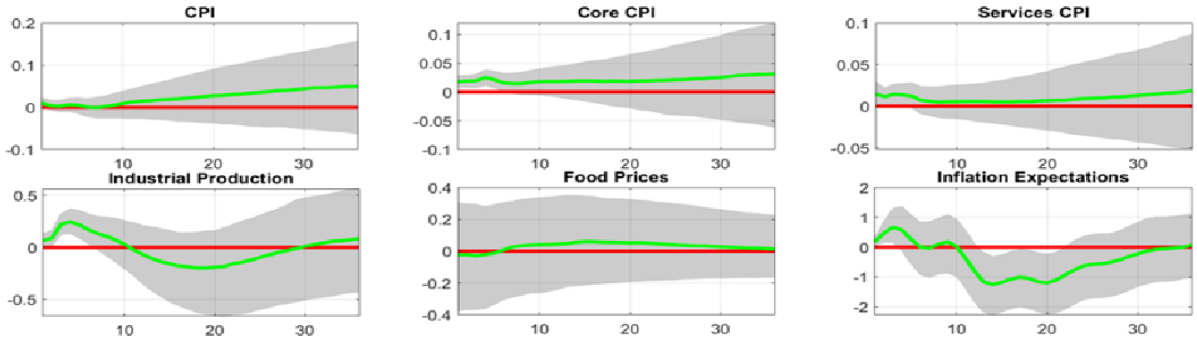


Preeliminary Results: Domestic Demand shocks

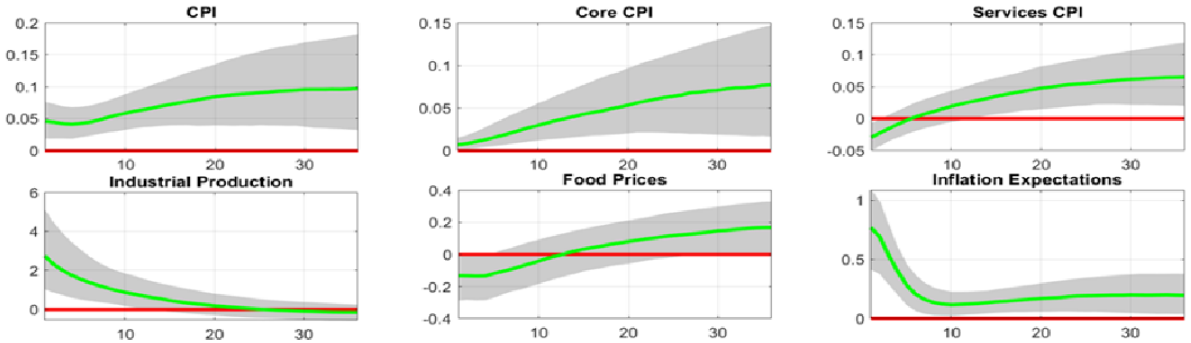
Panel A. USA



Panel B. Euro Area

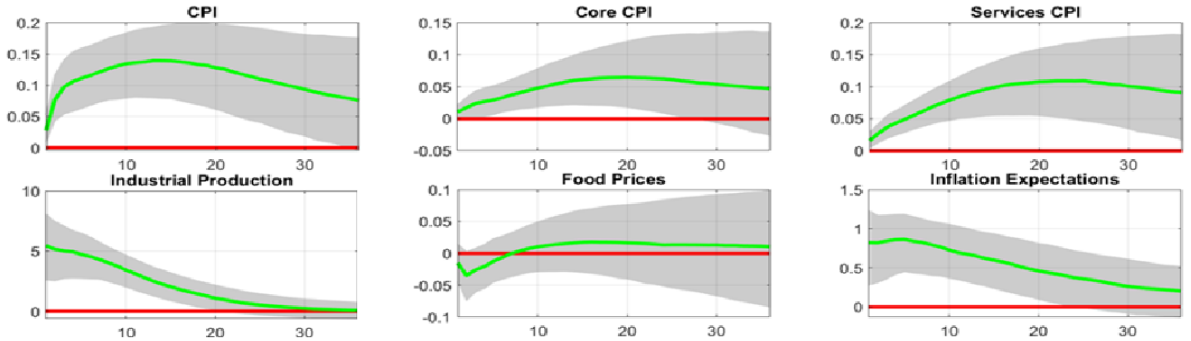


Panel C. Peru

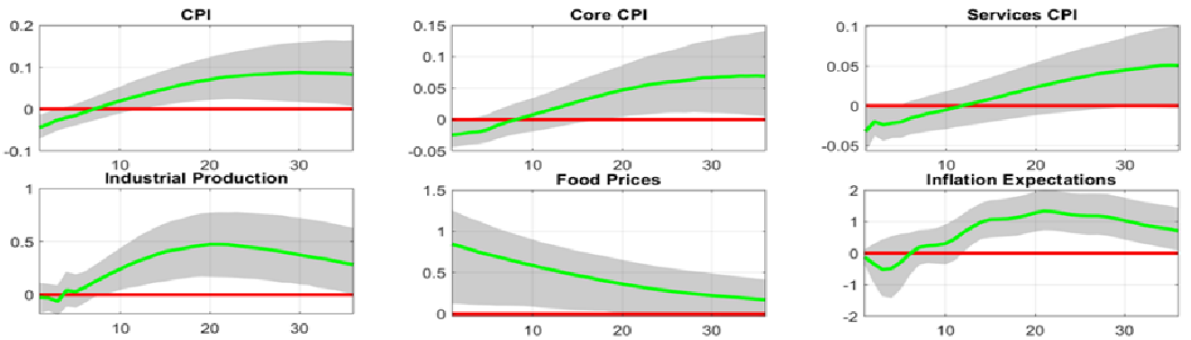


Preeliminary Results: Foreign Demand shocks

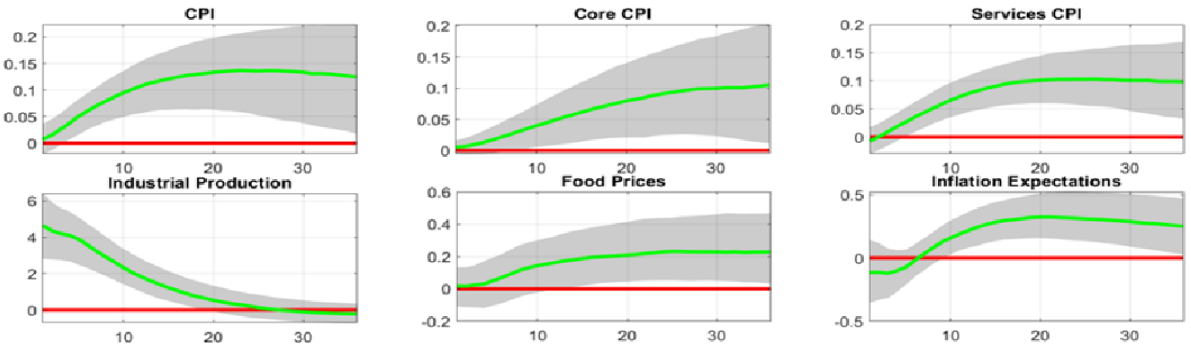
Panel A. USA



Panel B. Euro Area



Panel C. Peru



Preeliminary Results: Pass-through effects on inflation, t=12

USA

Variable/Shock	Supply				Demand	
	Energy Prices	Global supply chains	Domestic supply	Food Price	Domestic demand	Foreign demand
CPI headline	1,00	1,00	1,00	1,00	1,00	1,00
CPI core	0,35	0,91	0,58	2,14	-0,29	0,40
CPI services	0,44	0,41	0,39	2,69	0,61	0,65
IP	0,47	-13,54	-2,17	-12,80	8,46	20,49
CPI food	-0,01	1,10	0,55	-4,47	-1,16	0,10
Inflation expec.	6,12	1,74	6,68	8,72	2,11	4,92

EUR

Variable/Shock	Supply				Demand	
	Energy Prices	Global supply chains	Domestic supply	Food Price	Domestic demand	Foreign demand
CPI headline	1,00	1,00	1,00	1,00	1,00	1,00
CPI core	0,39	0,64	1,15	0,92	1,24	0,50
CPI services	0,22	0,28	1,28	1,01	0,38	0,02
IP	6,31	5,35	2,61	2,97	-4,59	10,15
CPI food	1,10	-1,86	-0,11	3,48	3,03	17,14
Inflation expec.	6,72	5,43	17,72	9,61	-56,11	21,10

PER

Variable/Shock	Supply				Demand	
	Energy Prices	Global supply chains	Domestic supply	Food Price	Domestic demand	Foreign demand
CPI headline	1,00	1,00	1,00	1,00	1,00	1,00
CPI core	0,46	0,65	0,41	-0,04	0,55	0,45
CPI services	0,11	0,13	0,35	-0,19	0,41	0,72
IP	13,06	5,64	-0,95	-24,39	10,84	16,75
CPI food	3,17	8,36	-0,05	3,03	-0,16	1,51
Inflation expec.	2,01	1,26	2,29	3,04	1,91	2,01

Note: Gray shaded areas represent elasticities that are not statisticall significant.

Conclusion

- The drivers of inflation vary considerably across countries.
- In Peru, all shocks significantly affect inflation indicators, except global supply chain and foreign demand shocks, whose effects on inflation expectations are negligible.
- In advanced economies, fluctuations in global energy prices, disruptions in global supply chains, and domestic supply shocks are key drivers of the dynamics of inflation indicators, with diverse impacts on inflation expectations.

Agenda

Next steps of the project

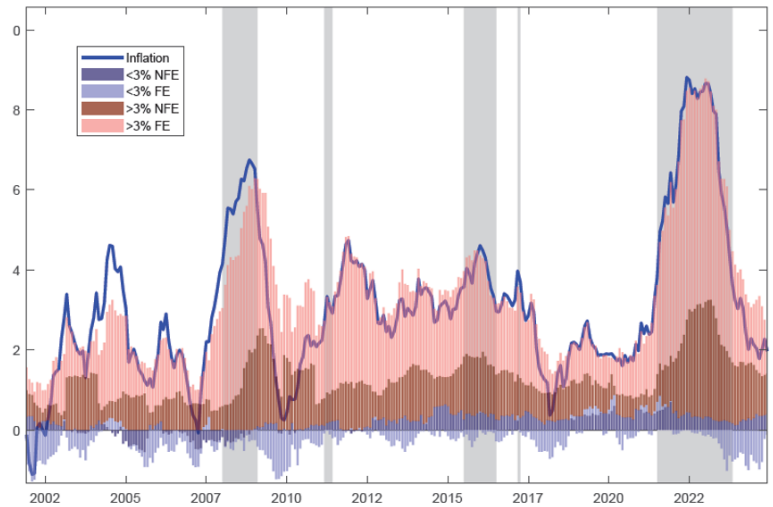
- To improve the identification and estimation of IRF.
- To include other relevant variables: MP shocks.
- To include Latam countries: BRA, CHL and COL.
- Importantly, include the Historical Decomposition to provide a narrative on how differences in relative price shocks are transmitted to the evolution of core inflation.

Appendix

Motivation: Importance of Relative price shocks in Peru

Past episodes of high inflation is typically driven by supply-side shocks affecting a limited number of key components of food and energy prices.

Inflation contribution by FE and NFE item groups with year-over-year variations above and below 3%



Note: The gray-shaded areas indicate periods when inflation expectations exceeded the Inflation Target Range. For the 12-month inflation contribution across groups, we calculate the weighted sum of each item's annual variation using its respective CPI basket weight.

Food and Energy prices (CPI-FE) typically lead inflation surges & the duration of inflationary episodes correlates strongly with the persistence of CPI-FE shocks.

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