



World Economic Outlook International Monetary Fund

GLOBAL DISINFLATION IN AN ERA OF CONSTRAINED MONETARY POLICY

MONETARY POLICY CHALLENGES FROM A SMALL COUNTRY PERSPECTIVE, BRATISLAVA, NOV. 23-24 2016

Samya Beidas-Strom, Sangyup Choi, Davide Furceri (lead author), Bertrand Gruss, Sinem Kılıç Çelik, Zsoka Koczan, Ksenia Koloskova, and Weicheng Lian, with contributions from Jaebin Ahn, Luis Catão, Juan Angel Garcia Morales, Keiko Honjo, Benjamin Hunt, Douglas Laxton, Niklas Westelius, and Fan Zhang and support from Hao Jiang and Olivia Ma.

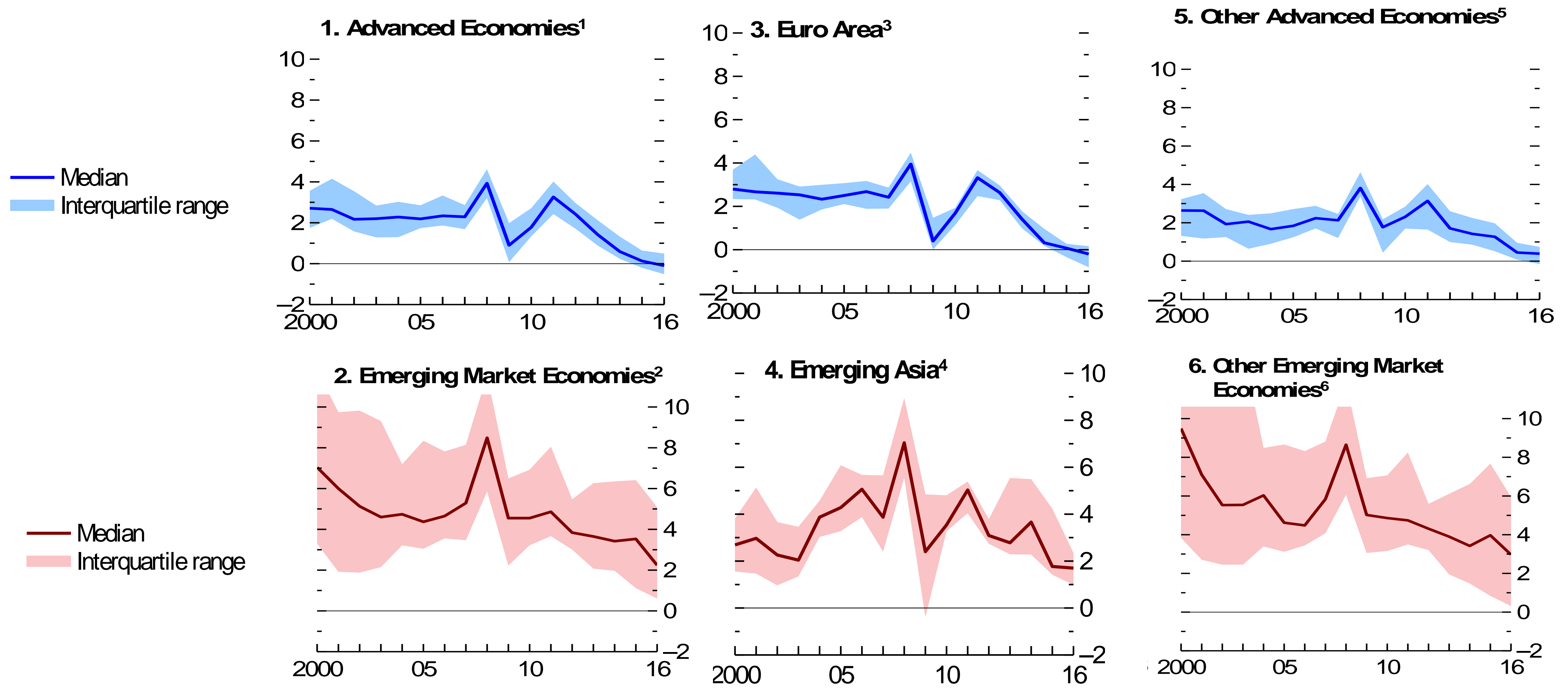
Questions

- **How widespread is the recent decline in inflation?** Do we observe a broad-based decline across countries, measures (headline, core, wages) and sectors?
- **What are the drivers of this recent decline?** Can weakening in commodity prices and economic slack explain recent inflation dynamics? What are the roles of other factors, including cross-border spillovers from industrial slack in large economies?
- **What risks does this carry?** Are inflation expectations also affected? Have they become more sensitive to inflation outturns in recent years, especially in countries where monetary policy is perceived as being constrained?

How widespread is the recent decline in inflation?

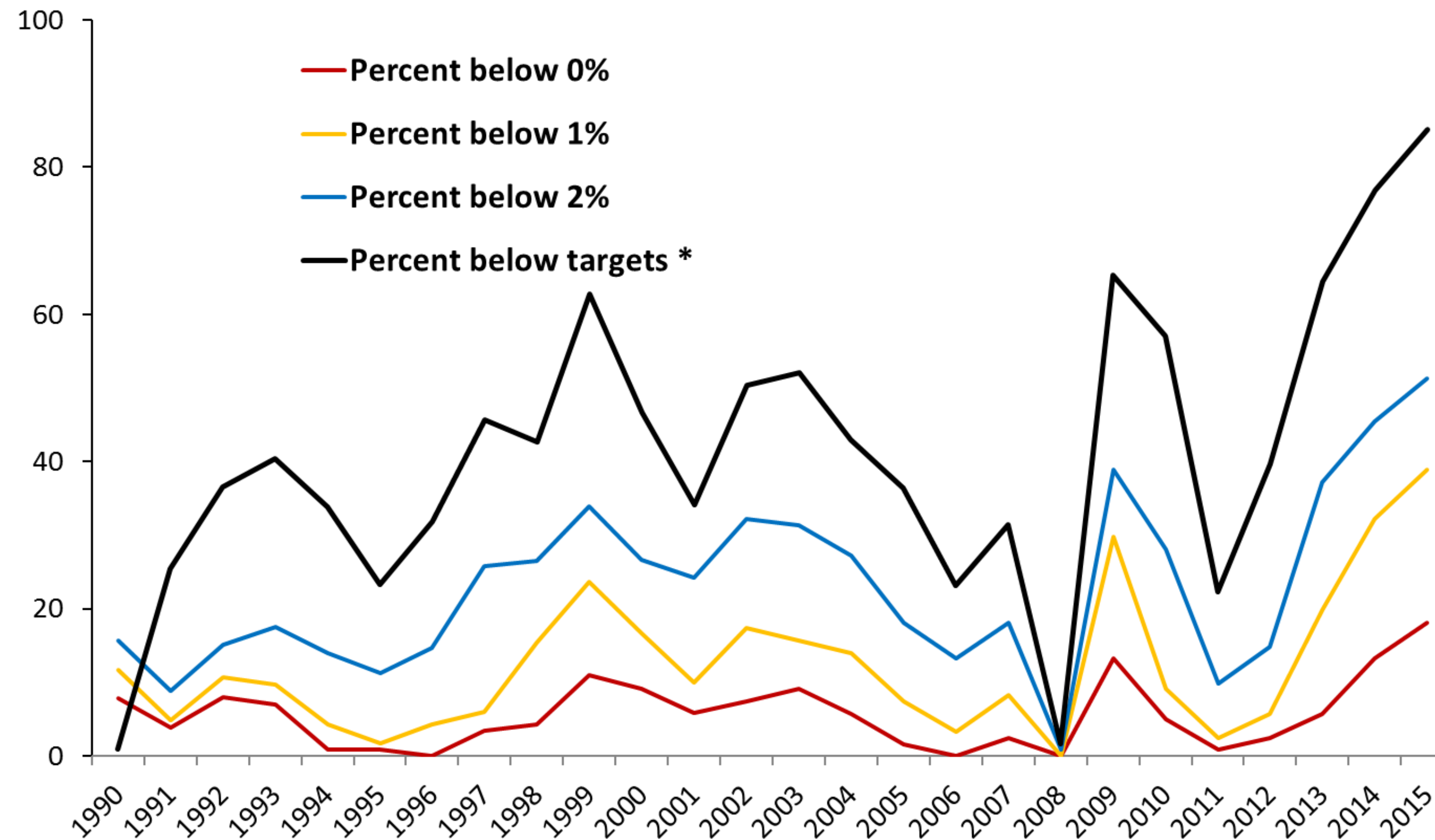
The slowdown in headline inflation is broad-based...

Headline Consumer Price Inflation



...with inflation rates now low in many countries.

Share of Countries with Low or Below Expectations Headline Inflation

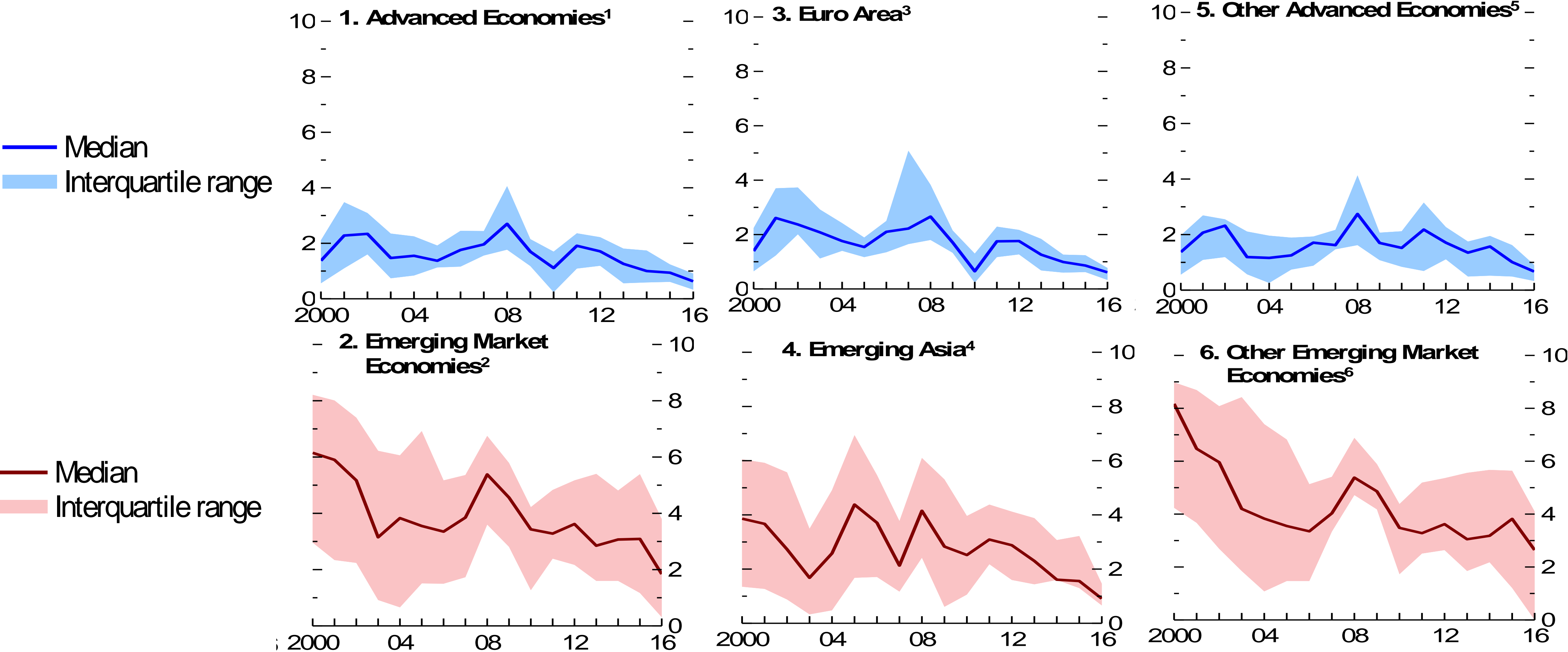


Source: IMF staff calculations.

Notes: Sample comprises 120 countries from 2000 onwards, with years slightly lower due to a few missing observations in the 1990s. Targets refer to long-term inflation expectations which are from the 10-year Consensus Economics or 5-year WEO inflation forecasts.

Core inflation also declined across the board.

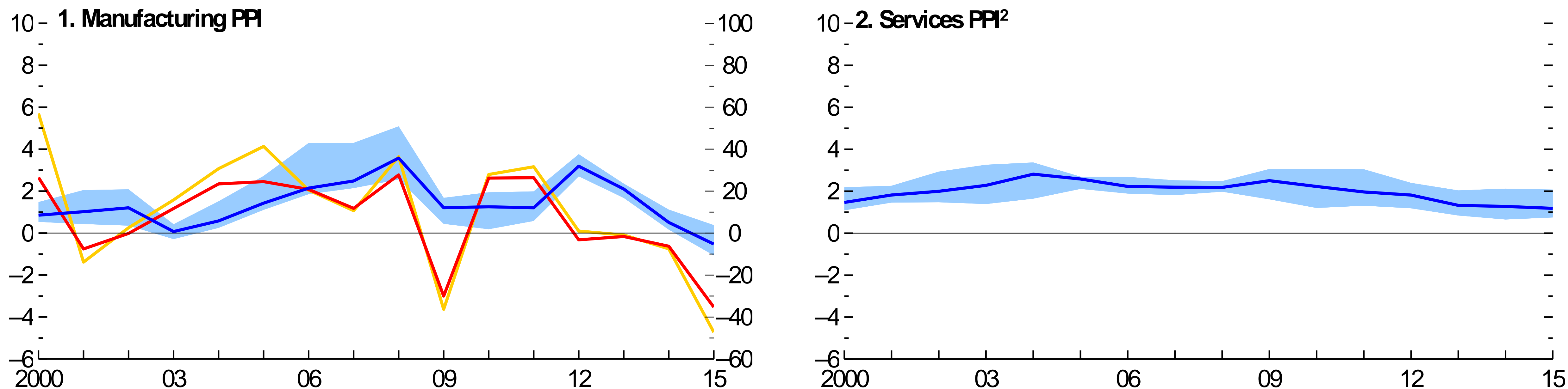
Core Consumer Price Inflation



Manufacturing producer prices declined much more than services.

Sectoral Producer Prices in Advanced Economies

— PPI, median
— Oil prices, right scale
— All commodity prices,¹ right scale
— Interquartile range



Sources: Haver Analytics; Organisation for Economic Co-operation and Development, Structural Analysis Database; and IMF staff calculations.

Note: The sample includes Australia, Austria, Canada, Denmark, Finland, France, Germany, Italy, Japan, Korea, Luxembourg, Norway, the United Kingdom, and the United States. PPI = producer price index.

¹ Price index using weights based on 2002–04 average world export earnings.

² Services comprise wholesale and retail trade; hotels and restaurants; transportation, storage, and communications; and finance, insurance, real estate, and business services.

What are the drivers of the recent decline in inflation?

Empirical framework

- Following the approach of IMF (2013) and Blanchard and others (2015):

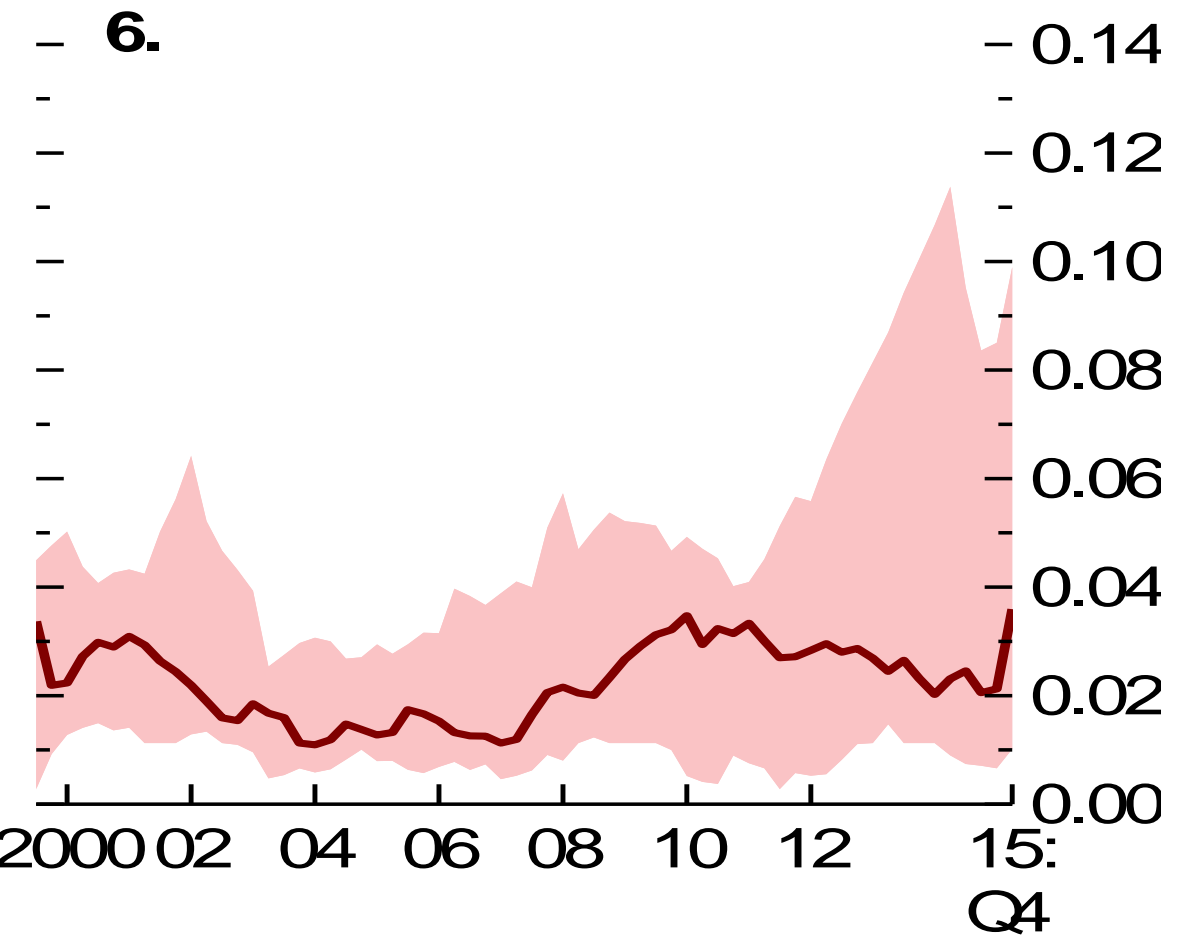
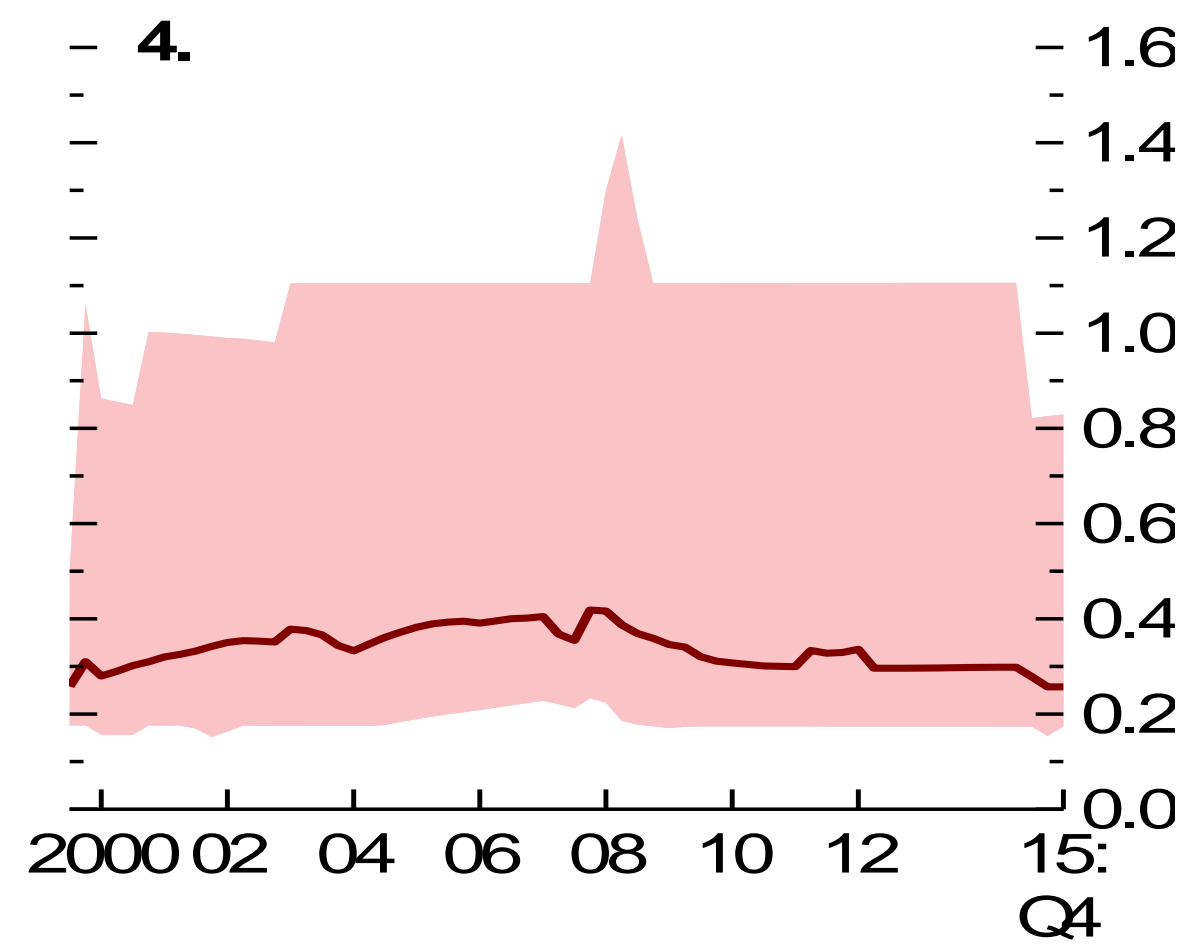
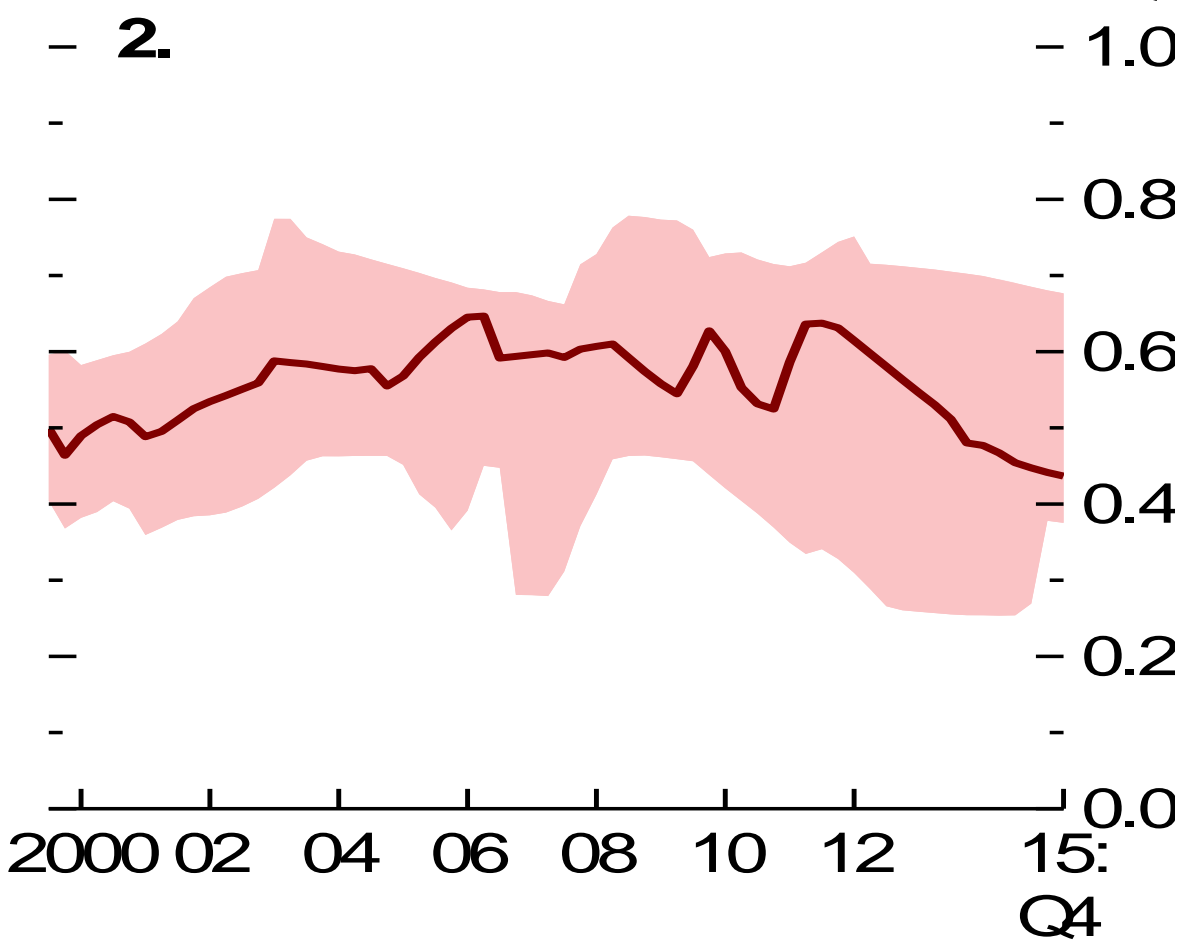
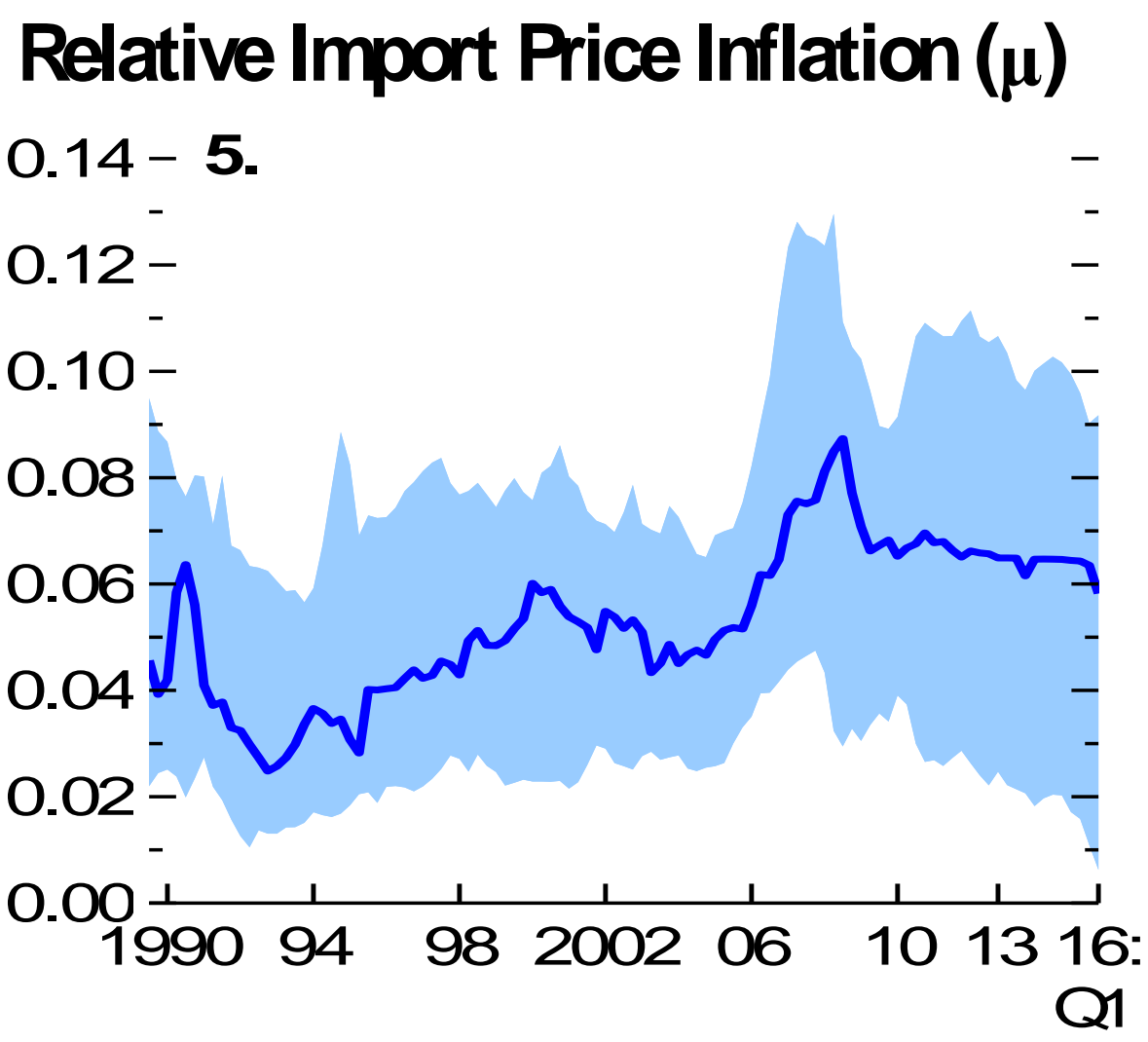
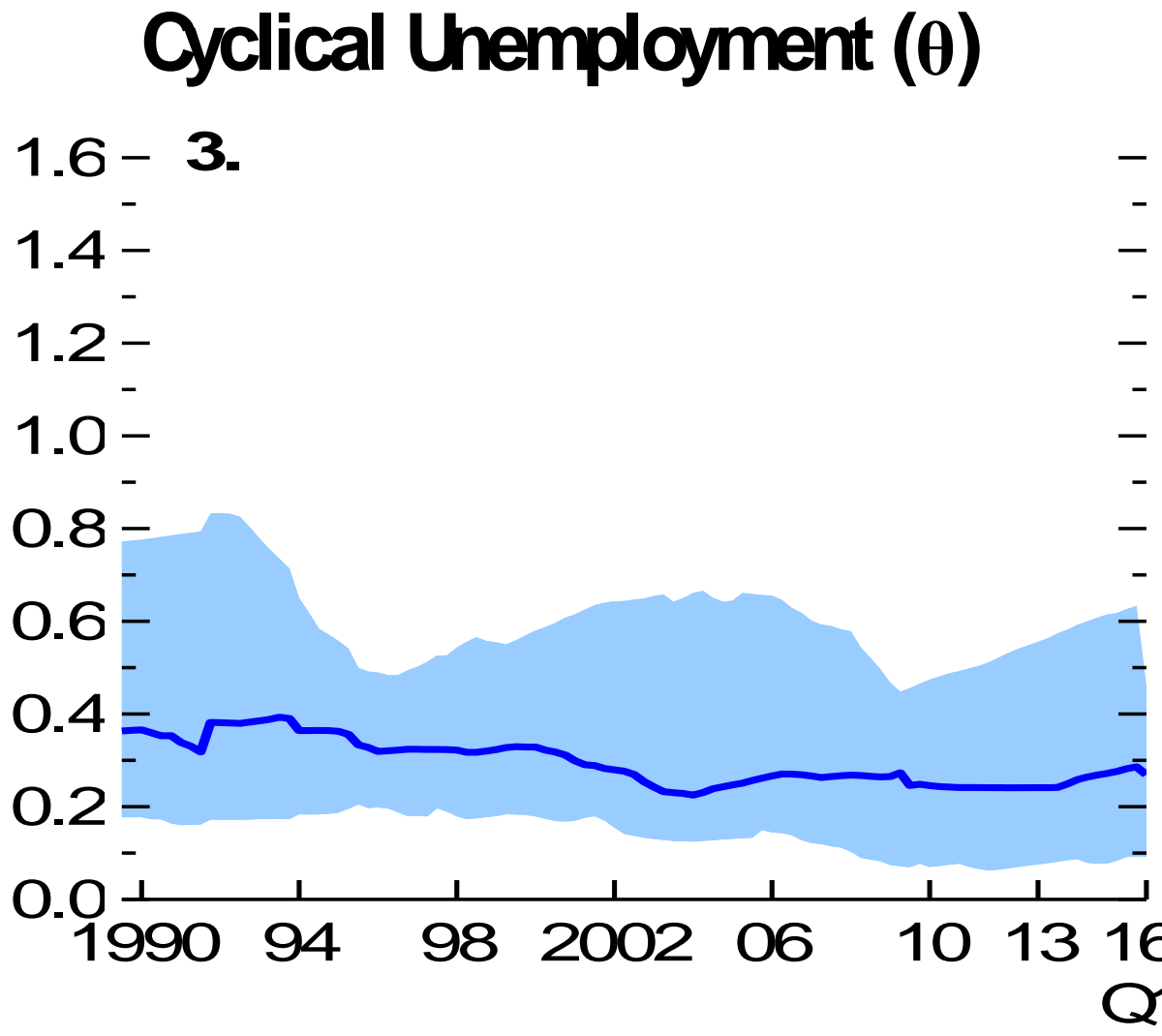
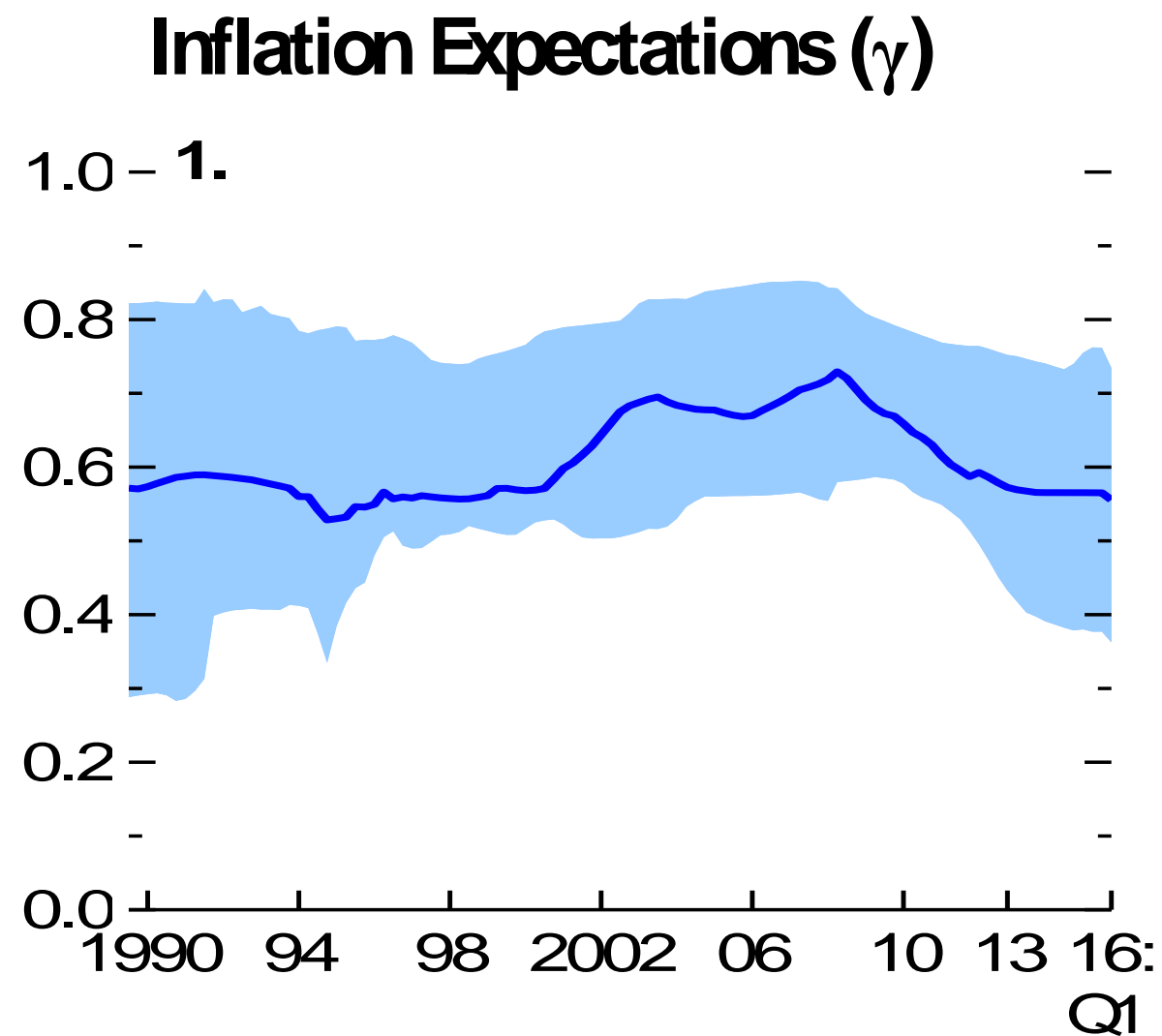
$$\pi_t = \gamma_t \pi_{t+h}^e + (1 - \gamma_t) \tilde{\pi}_{t-1} + \theta_t u_t^c + \mu_t \pi_t^m + \varepsilon_t$$

- π_t headline consumer price inflation
- π_{t+h}^e inflation expectations h years in the future (h = 10 as the baseline)
- u_t^c cyclical unemployment (deviation unemployment rate from NAIRU)
- π_t^m inflation in the relative price of imports (import-price deflator relative to GDP deflator)
- ε_t impact of other factors (temporary supply shocks, measurement errors...)

- Sample: 44 AEs and EMs; 1990Q1 – 2016Q1 (unbalanced)
- Country-by-country estimation allowing for time variation in all parameters

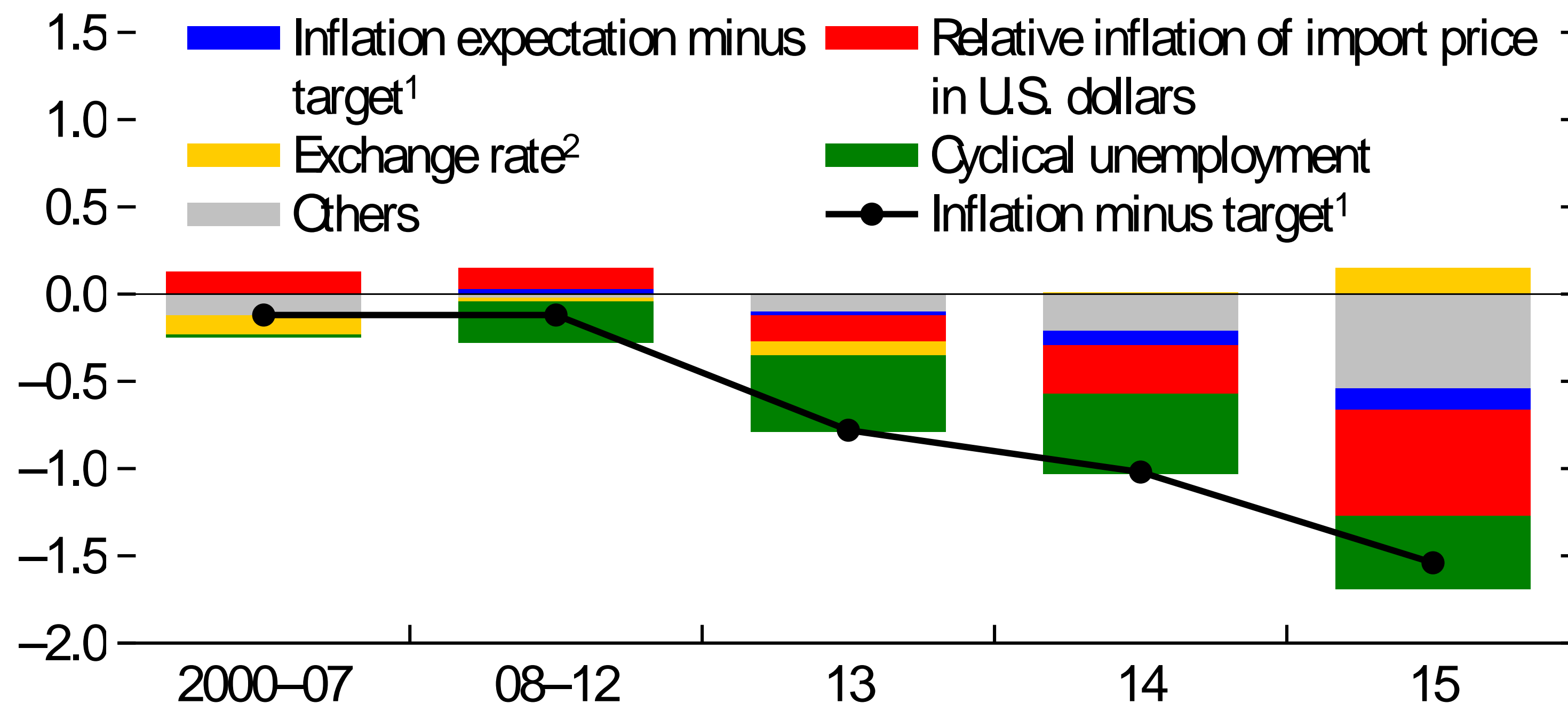
The Phillips curve is alive, but level anchoring has decreased recently.

Estimated Phillips Curve Parameters



Slack and import prices explain the bulk of inflation deviations in AEs.

Contribution to Inflation Deviations from Targets
Advanced Economies



Sources: Consensus Economics; Haver Analytics; Organisation for Economic Co-operation and Development; and IMF staff calculations.

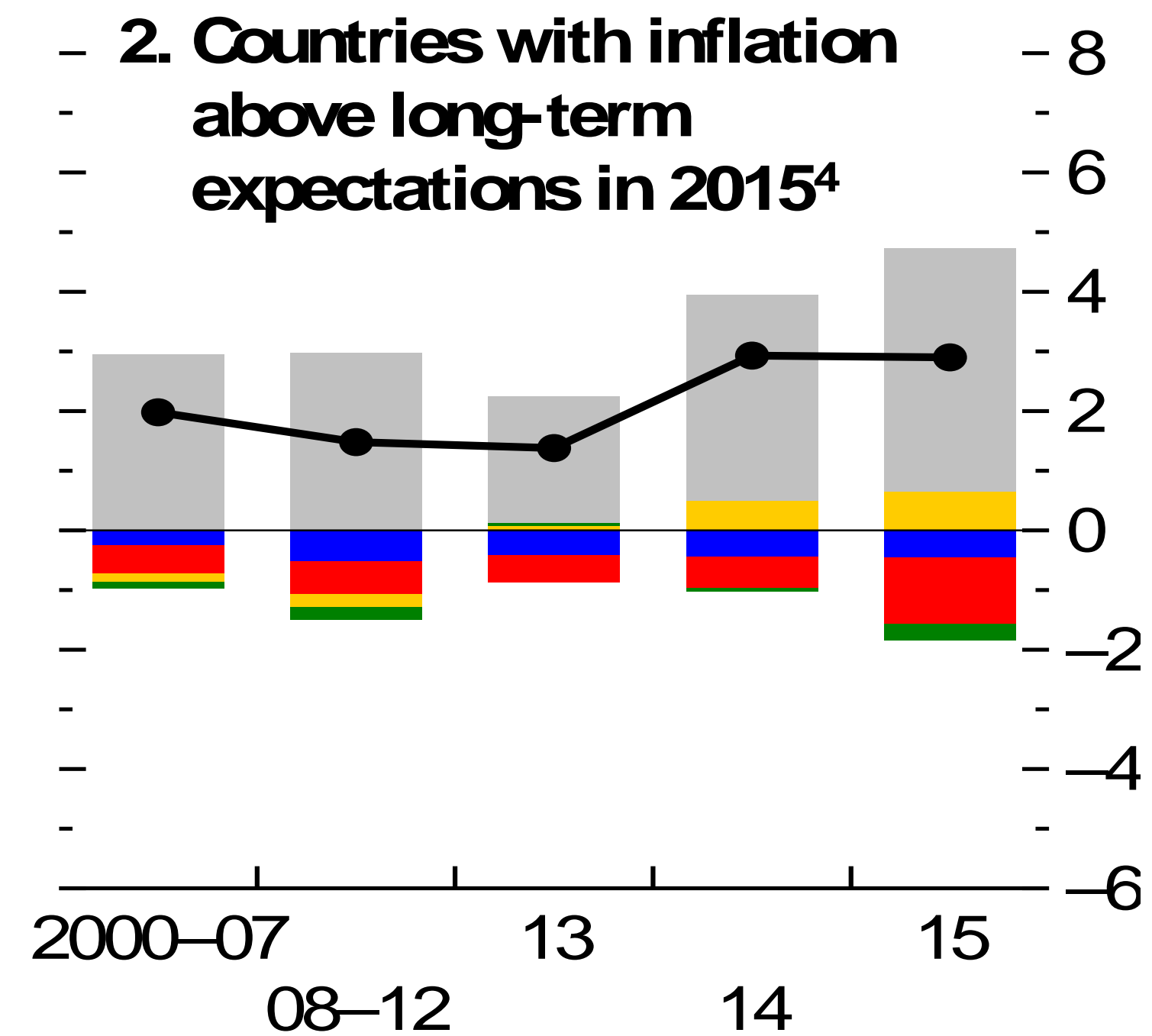
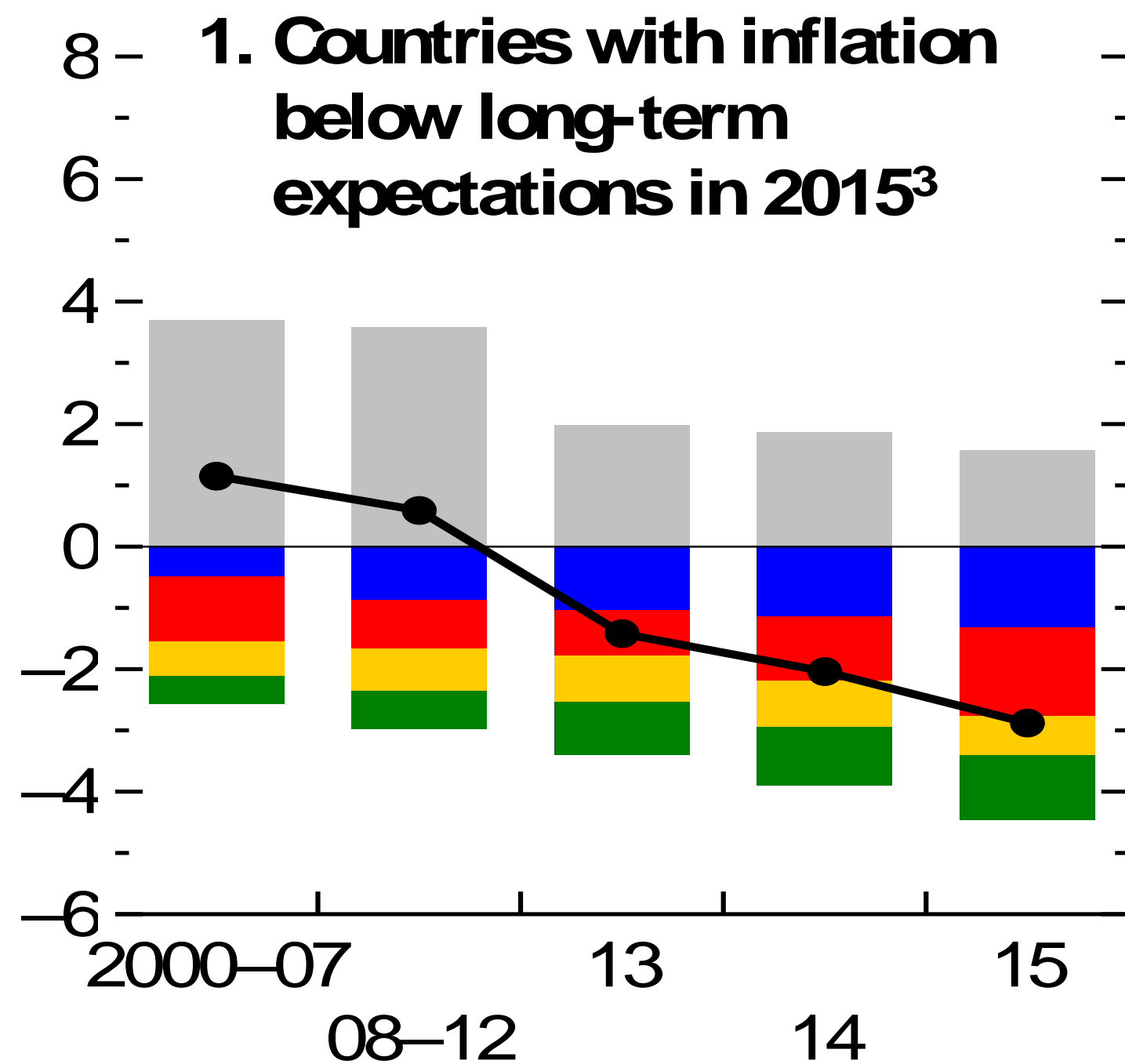
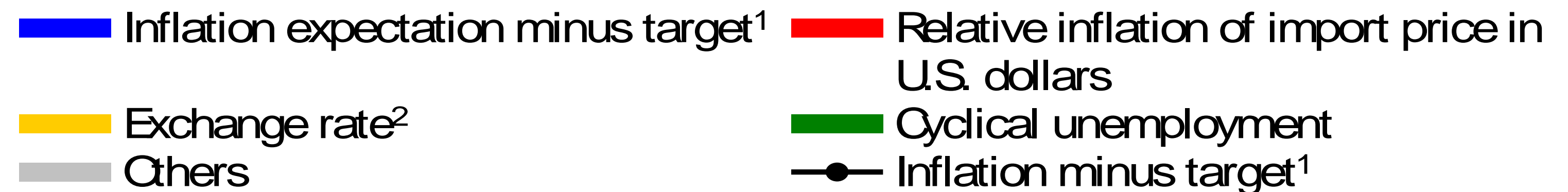
Note: Vertical lines in panel 2 denote interquartile ranges. The sample is defined in Annex Table 3.1.1.

¹ Target refers to the average of long-term inflation expectations in 2000-07, which are from Consensus Economics (10-year inflation expectations) or *World Economic Outlook* inflation forecasts (5-year inflation expectations).

² Exchange rate is defined as currency value per U.S. dollar.

...while there is significant heterogeneity among EMEs.

Contribution to Inflation Deviations from Targets Emerging Markets

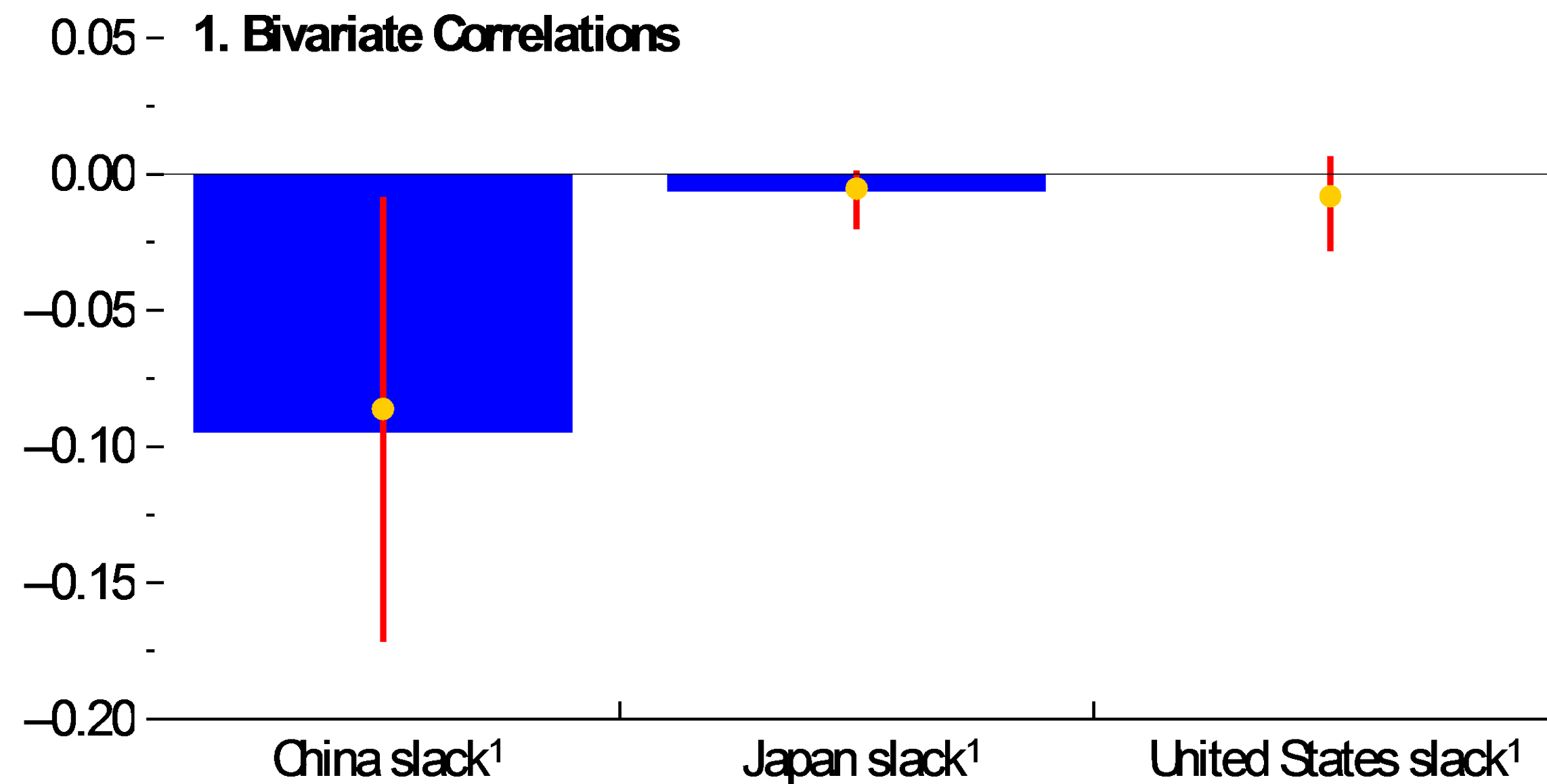


³ Bulgaria, China, Hungary, Malaysia, Mexico, Philippines, Poland, Romania, Thailand.

⁴ Argentina, Brazil, Chile, Columbia, India, Indonesia, Peru, Russia, Turkey.

Industrial slack in large economies is associated with disinflation pressures in other economies.

Correlation of Manufacturing Slack in China, Japan, and the United States with Import Price Contribution to Inflation in Other Economies



Sources: Consensus Economics; Haver Analytics; Organisation for Economic Co-operation and Development; and IMF staff calculations.

Note: Vertical lines denote interquartile ranges. The figure shows the means, medians, and interquartile ranges of coefficients of manufacturing slack from country-specific regressions. See Annex 3.4 for the regression specifications.

¹ No controls.

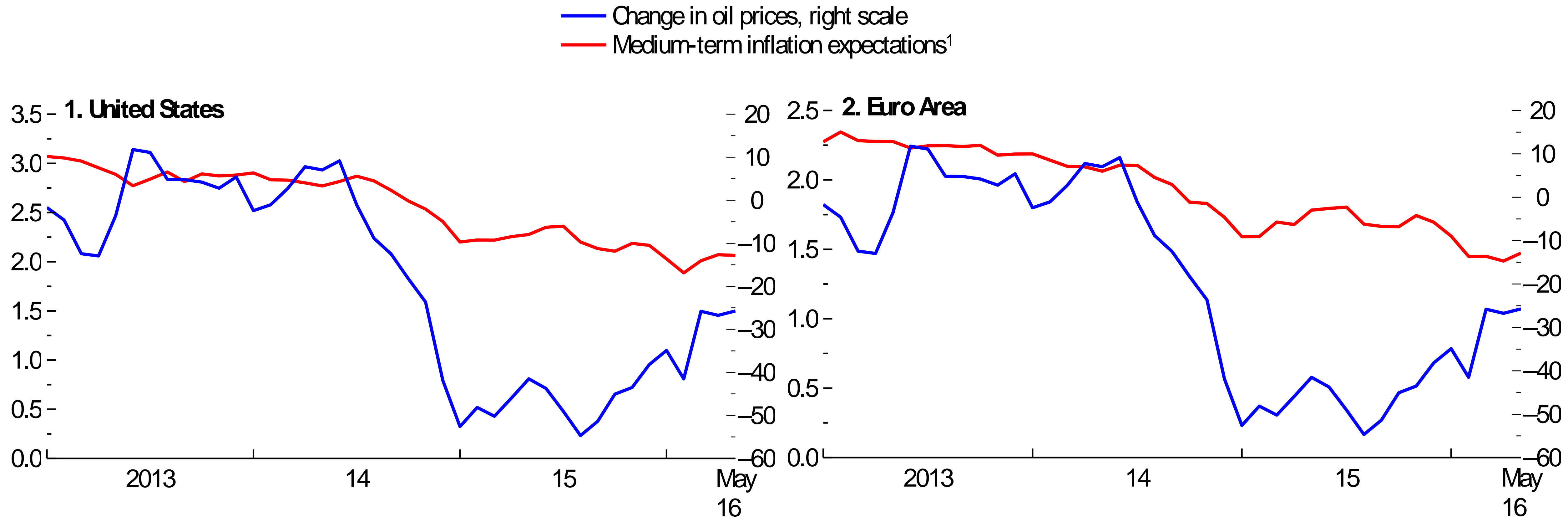
² Controlling for manufacturing slack in the other two economies, change in oil prices, and global output gap.

³ Controlling for global output gap and change in oil prices in current and previous four quarters.

What risks does this carry?

Accompanying decline in inflation expectations in recent years.

Medium-Term Inflation Expectation and Oil Prices



Sources: Bloomberg, L.P.; and IMF staff calculations.

¹ Medium-term inflation expectations are based on five-year/five-year inflation swaps.

Empirical framework

- Equation with time-varying parameters:

$$\Delta\pi_{t+h}^e = \beta_t \pi_t^{news} + \epsilon_{t+h}$$

$\Delta\pi_{t+h}^e$ first difference in inflation expectations (IE) h years in the future

π_t^{news} inflation shocks

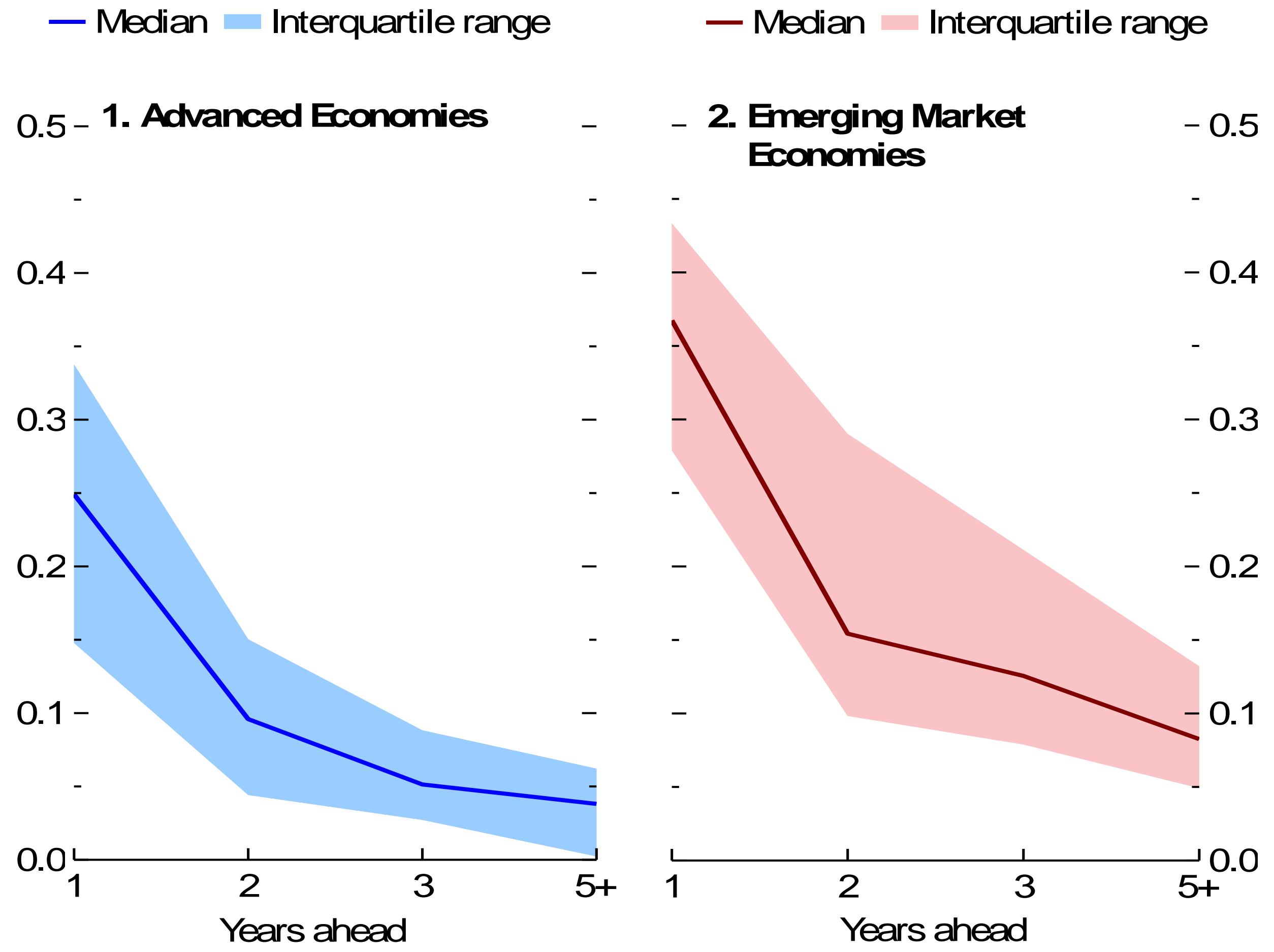
survey-based IE: quarterly forecast error of inflation

market-based IE: daily change in oil price futures;

- Sample: 44 AEs and EMs; 1990Q1 – 2016Q1 (unbalanced).
- Frequency: quarterly for survey -based IE, and daily for market-based IE.

Sensitivity is lower in AEs than in EMEs...

Sensitivity of Inflation Expectations to Inflation Surprises

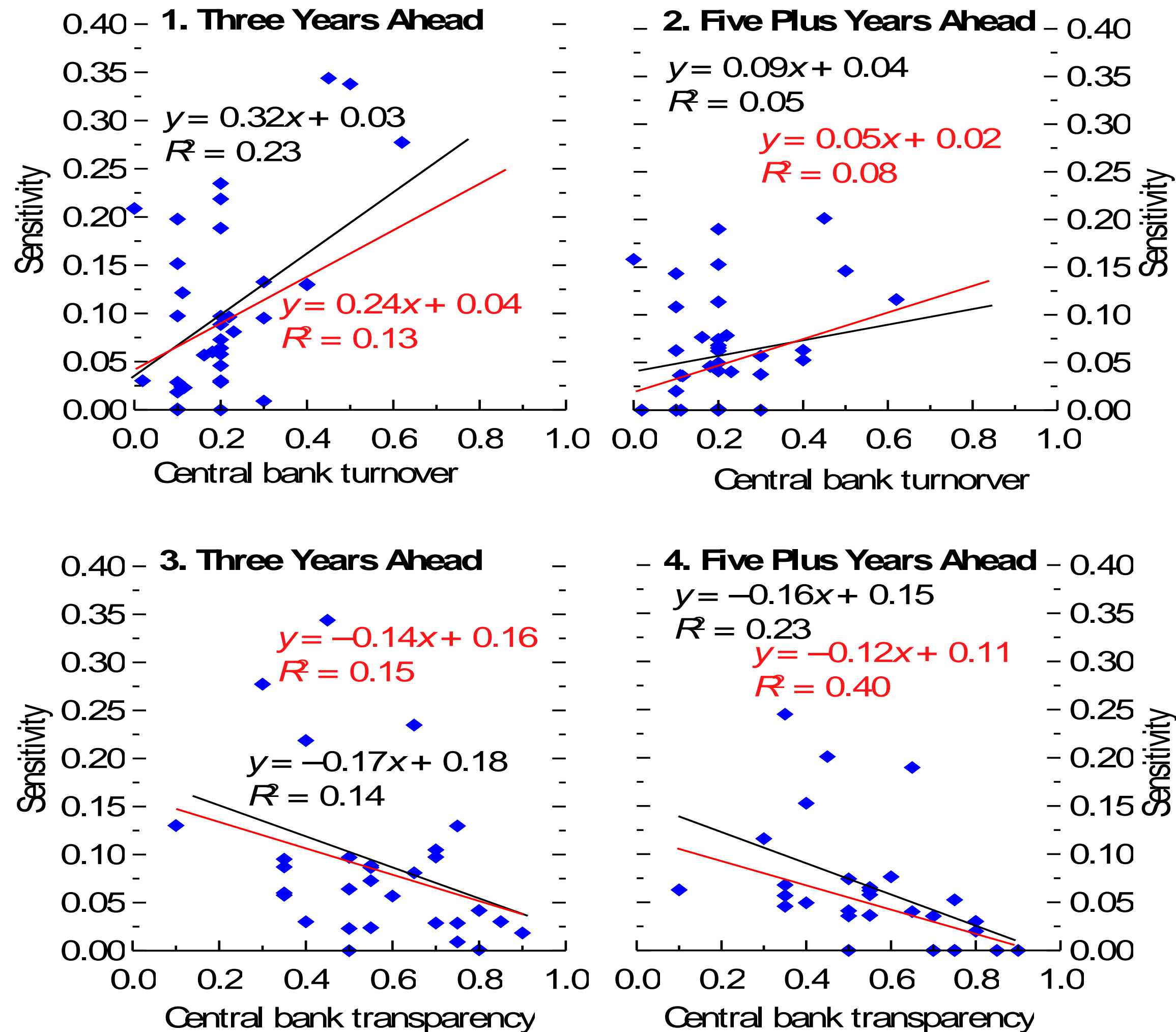


Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.

Note: The figure shows the response of inflation expectations at various horizons to a 1 percentage point unexpected increase in inflation based on coefficients from country-specific static regressions. The sensitivity for 5+ years corresponds to the average of estimations using 5- and 10-year-ahead inflation expectations.

...and lower in countries with more independent and transparent monetary policy frameworks...

Sensitivity of Inflation Expectations to Inflation Surprises and Monetary Policy Frameworks (MPF)

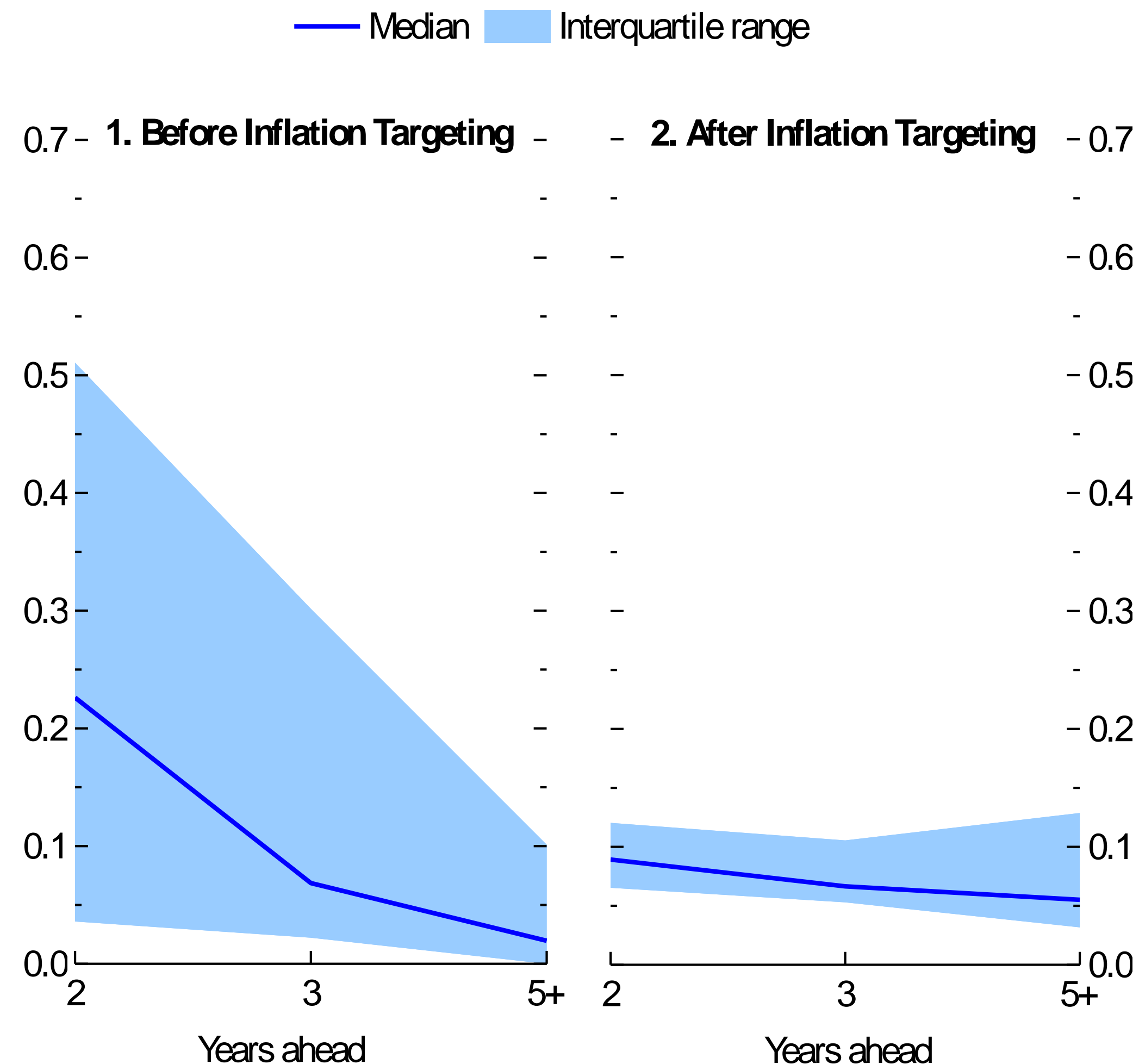


Sources: Consensus Economics; Crowe and Meade (2007) data set; Haver Analytics; and IMF staff calculations.

Note: The sensitivity is measured as the response of inflation expectations at various horizons to a 1 percentage point unexpected increase in inflation based on coefficients from country-specific static regressions. Black lines denote the fitted lines for the entire sample. Red lines denote the fitted lines excluding outliers.

...and lower after the adoption of inflation targeting.

Sensitivity of Inflation Expectations to Inflation Surprises before and after Adoption of Inflation Targeting

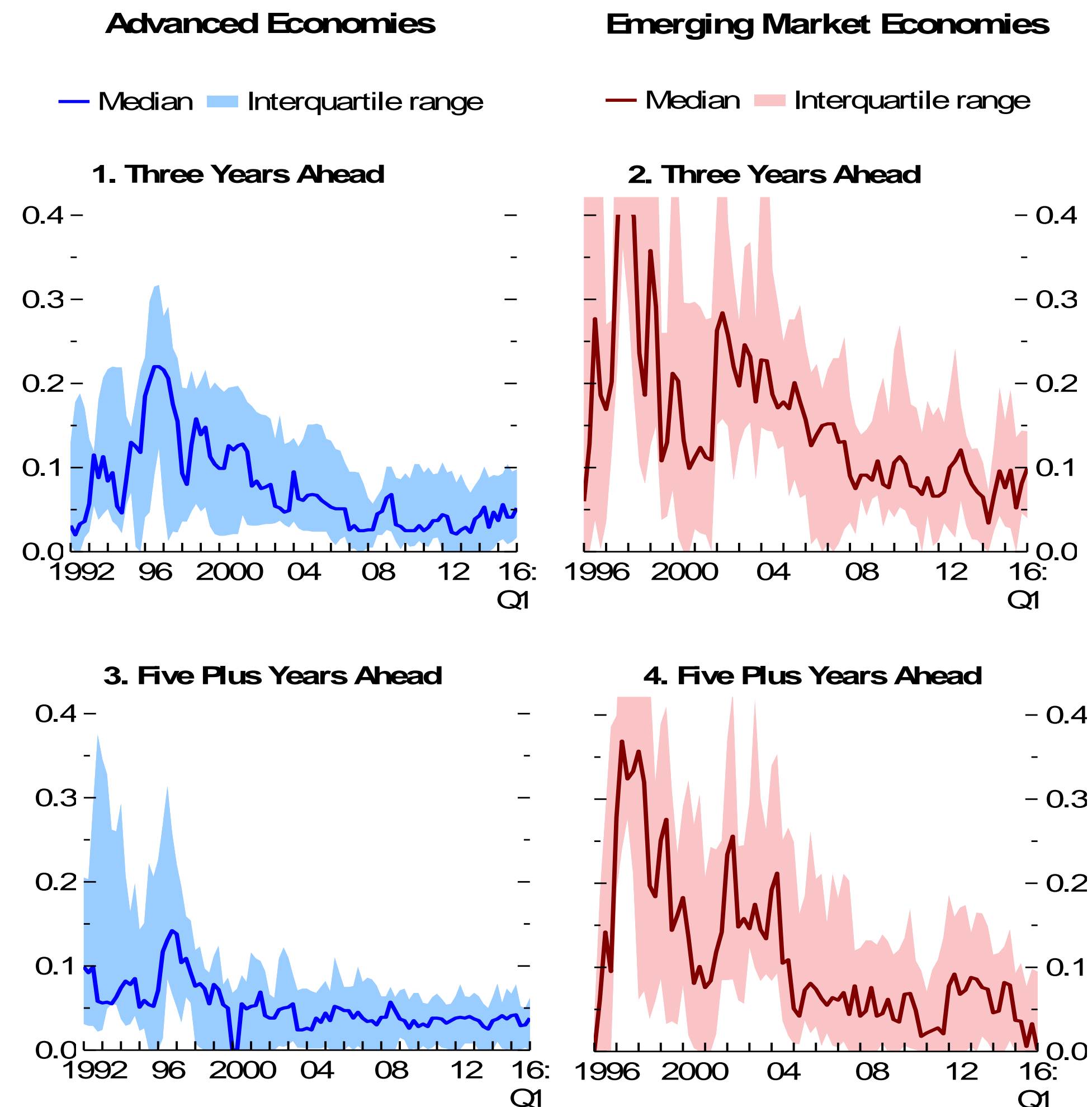


Sources: Consensus Economics; Haver Analytics; Chapter 3 of the September 2011 *World Economic Outlook*; and IMF staff calculations.

Note: The figure shows the response of inflation expectations at various horizons to a 1 percentage point unexpected increase in inflation based on coefficients from country-specific static regressions. The sensitivity for 5+ years corresponds to the average of estimations using 5- and 10-year-ahead inflation expectations.

Sensitivity has declined over time...

Sensitivity of Inflation Expectations to Inflation Surprises over Time

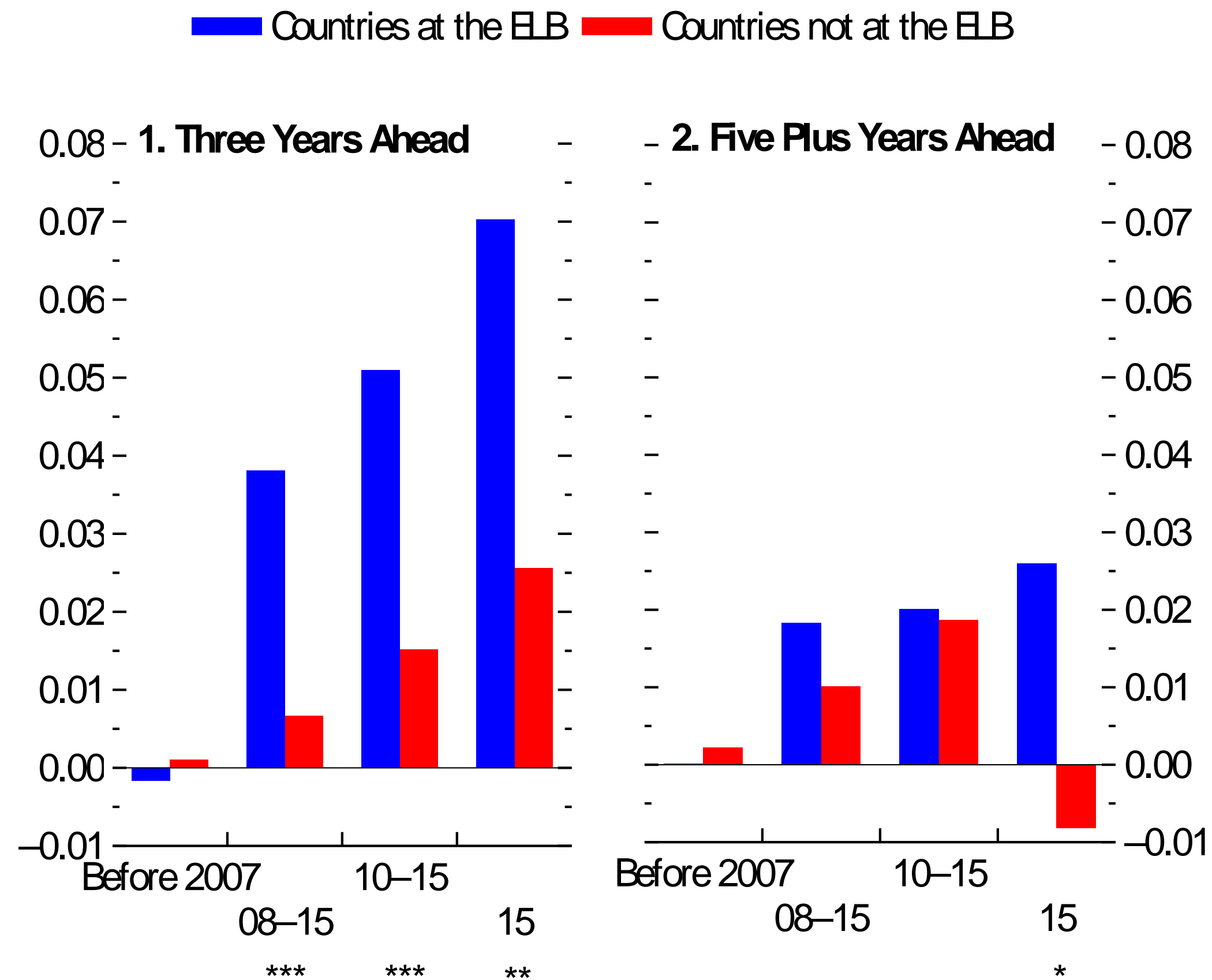


Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.

Note: The figure shows the response of inflation expectations at various horizons to a 1 percentage point unexpected increase in inflation based on time-varying coefficients from country-specific estimations using a Kalman filter.

...but increased recently in countries with constrained monetary policy...

Sensitivity of Inflation Expectations to Inflation Surprises and the Effective Lower Bound (ELB)

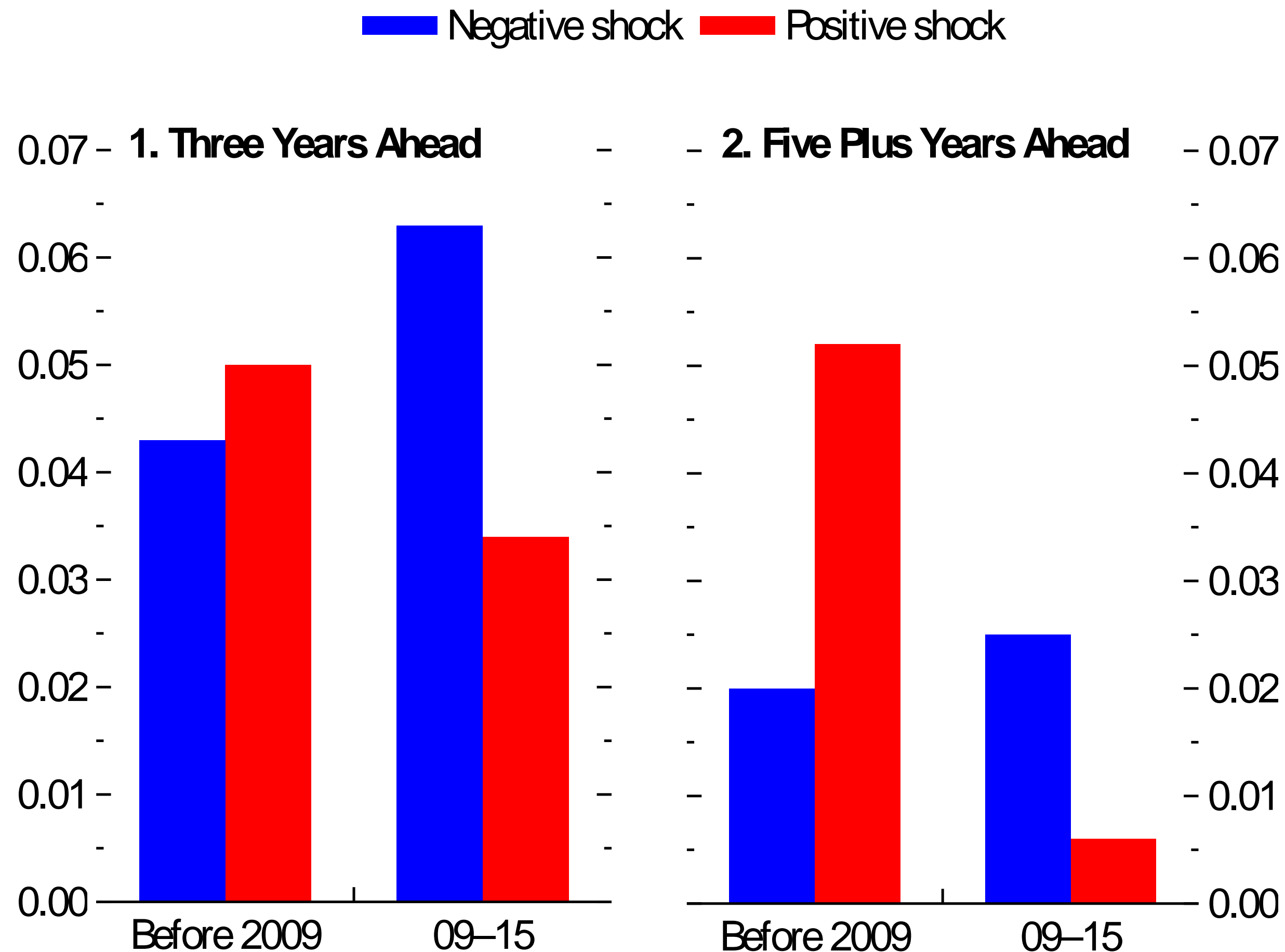


Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.

Note: ELB = effective lower bound. ***, **, * denote that the differences in the change in sensitivity of inflation expectations between countries at the ELB and the rest are significant at the 1, 5, and 10 percent confidence level, respectively, using Mood's median test. The sensitivity of inflation expectations corresponds to the response of inflation expectations to a 1 percentage point unexpected increase in inflation based on time-varying coefficients from country-specific estimations using a Kalman filter. The change in sensitivity is constructed as the average deviation of the median sensitivity across countries from a linear trend (an exponential trend) fitted over the period 1997–2007 for countries at the ELB (not at the ELB). Countries at the ELB are defined as those with policy rates or short-term nominal interest rates of 50 basis points or lower at some point during 2008–15 and include: Canada, the Czech Republic, Estonia, France, Germany, Hong Kong SAR, Italy, Japan, Latvia, Lithuania, the Netherlands, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

...and higher for negative than for positive shocks at the ELB.

Average Sensitivity of Inflation Expectations to Inflation Surprises in Countries at the Effective Lower Bound (ELB)

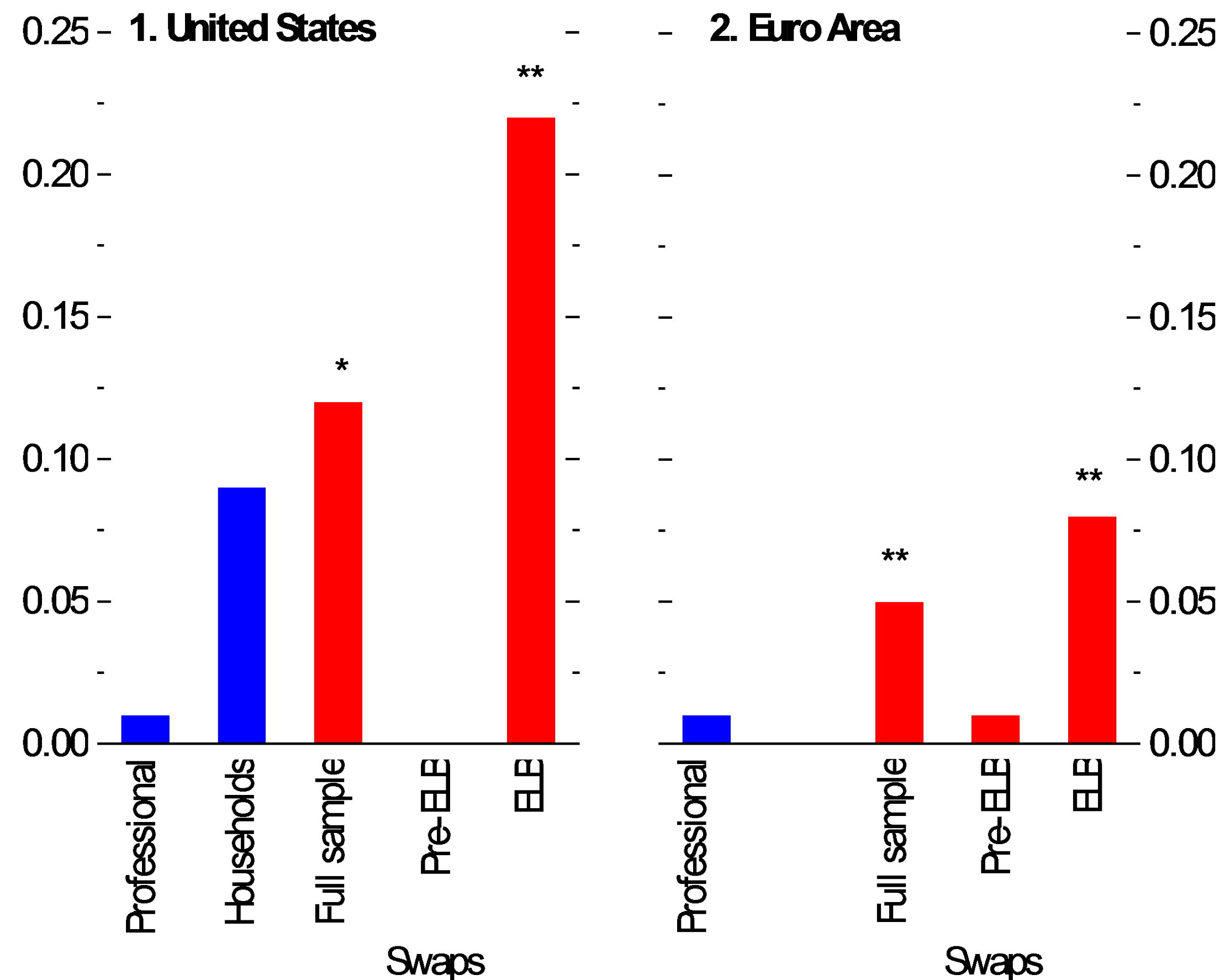


Sources: Consensus Economics; Haver Analytics; and IMF staff calculations.

Note: The figure shows the response of inflation expectations at various horizons to a 1 percentage point unexpected positive or negative change in inflation based on coefficients from country-specific time-varying estimation. Countries at the Effective Lower Bound (ELB) are defined as those with policy rates or short-term nominal interest rates of 50 basis points or lower at some point during 2008–15 and include: Canada, the Czech Republic, Estonia, France, Germany, Hong Kong SAR, Italy, Japan, Latvia, Lithuania, the Netherlands, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Japan is excluded from the analysis, because it reached the ELB much earlier than 2009.

High-frequency analysis confirms increased sensitivity.

Sensitivity of Longer-Term Inflation Expectations to Changes in Oil Prices



Sources: Bloomberg L.P.; Consensus Economics; University of Michigan Consumer Survey; and IMF staff calculations.

Note: **, * denote significance at the 5 and 10 percent confidence level, respectively. The figure shows coefficient estimates of inflation expectations on changes in oil price futures (simple average of 1-year-ahead Brent and West Texas Intermediate) controlling for changes in the Chicago Board Options Exchange Volatility Index and scaled by a 50 percent drop in oil price futures. Blue bars denote estimation results using survey-based inflation expectations: “Professional” denotes the results using 5-year-ahead inflation forecasts from Consensus Economics; while “Households” denotes results using inflation expectations (5–10 years) from the Michigan survey. Red bars denote results using market-based inflation expectations based on five year/five year inflation swaps. The effective lower bound (ELB) is defined as starting in 2009. The full sample refers to the period 2004–16.

Summary

- Decline in inflation widespread across countries and sectors; stronger for tradable goods.
- Driven by persistent labor market slack and weaker import price growth— associated with falling commodity prices and widening industrial slack in few key large economies, especially in China.
- Unexplained component also increased – survey-based measures could underestimate decline in expectations.
- Sensitivity of expectations declined over time with improvements in monetary policy frameworks, but increased recently in AEs with constrained monetary policy.

Policy implications

- Bold policy actions to avoid risk of chronically undershooting targets and eroding credibility of monetary policy, especially in AEs.
- Given limited policy space, need for comprehensive and coordinated approach exploiting complementarities among all available tools to boost demand, and amplifying individual policies through positive cross-border spillovers.
- Package including continued monetary policy accommodation, as well as more growth-friendly fiscal policies and demand-supporting structural reforms.