“The return of inflation and inflation risks”

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Outline

1. Motivation
2. Main takeaways
3. Inflation RNDs: Empirical approach
4. Inflation risks in the euro area and the U.S.
5. Robustness checks and additional considerations
6. Concluding remarks
Motivation

- Inflation has fluctuated significantly off target over recent years

- Standard measures of inflation expectations provide information on central scenarios for the inflation outlook...

- ...but economic decisions would benefit from additional information about probabilities for alternative outcomes surrounding central scenarios

  ➔ evidence on inflation risks across horizons can help assess
     (i) how persistent inflation shocks will be
     (ii) challenges to price stability over the medium term
Inflation and inflation expectations: overview

Euro area

U.S.

Garcia et al. (2024), Inflation risks
This paper

Goal: explore the information content of the term structure of inflation risks
(based on inflation options market, risk-neutral measures)

What we do:

• use a robust methodology for estimating inflation RNDs
• gauge inflation risks at short (2y), medium (5y) and long-term (5y5y) horizons
• explore the dynamics of inflation risks in the euro area and the U.S. since 2009
• assess risks to price stability posed by the 2022-24 inflation overshooting episode

Part of a still limited but growing literature using the inflation options market data
(Kitsul and Wright, JFE 2013; Gimeno and Ibanez, JIMF 2018, Hilscher et al. 2022, among others)
Main takeaways

Inflation RNDs provide important insights

- monitoring risks at different horizons
- persistence of inflation shocks
- novel information about inflation expectations formation

Significant differences between euro area and US inflation risks

- distinct challenges to price stability
- different dynamics of inflation risks since GFC

Challenges to price stability over the recent inflation surge appear contained

- receding fast in the euro area, somewhat less so in the U.S.
- but close monitoring warranted

Garcia et al. (2024), Inflation risks
Gauging inflation risks: estimation approach

- **Data**
  - Strike prices of inflation caps (0.5%, 1.0%, ..., 6.0% strikes) **and floors** (-3.0%, -2.5%, ..., 3.0%)
  - Cleaned considering market activity and regularity conditions (e.g. price monotonicity)
  - ILS rates and OIS rates

- **Spot inflation RNDs** (for traded horizons, e.g. 2y, 5y, 10y)
  - Spline interpolation and extrapolation in volatility space (satisfying no-arbitrage)
  - Non-parametric approach (allowing for asymmetry and fat tails)

- **Forward inflation RNDs** (for non-traded horizons of interest, e.g. 3y2y, 5y5y RND)
  - Student t-copula to model relationship between spot RNDs
  - 2-parameter for more flexibility (tail dependence) and good data fitting
Term structure of inflation risks: euro area RNDs

Garcia et al. (2024), Inflation risks
Term structure of inflation risks: euro area tail risks and BoR

Risks to price stability across horizons
BoR = Prob (\(\pi > 2\%\)) - Prob (\(\pi < 2\%\))
Term structure of inflation risks: **US RNDs**

Garcia et al. (2024), Inflation risks
Term structure of inflation risks: US tail risks and BoR

Risks to price stability across horizons

\[ \text{BoR} = \text{Prob} (\pi > 2\%) - \text{Prob} (\pi < 2\%) \]

Garcia et al. (2023), Inflation risks
The dynamics of inflation risks

Metric: evolution of pass-through $\beta_t$

from (i) inflation
(ii) short-term inflation expectations
(iii) short/medium term inflation risks
to medium/long-term inflation risks

Formally

$$\Delta risk_t^{LT} = \alpha + \beta_t \Delta \pi_t^{e(ST)} + \nu_t$$

$$\beta_t = \beta_{t-1} + \eta_t$$

$$\nu_t \sim N(0, e^{h_t})$$
$$h_t = h_{t-1} + \eta_h$$
$$\eta_h \sim N(0, \sigma_{h_i}^2)$$

(following e.g. Jochmann, Koop and Potter (2010) and Chan (2013))
A closer look at inflation dynamics and pass-through: **EA risks (MT and LT)**

UCSV inflation decomposition: $\pi_t = \pi^*_t + c_t$

Garcia et al. (2024), Inflation risks
A closer look at inflation dynamics and pass-through: **US risks (MT and LT)**

UCSV inflation decomposition: $\pi_t = \pi_t^* + c_t$

Garcia et al. (2024), Inflation risks
Short-term expectations pass-through on inflation risks (MT and LT): EA/US

Garcia et al. (2024), Inflation risks
Entrenchment of inflation risks: short-term pass-through (MT and LT): EA / US

Garcia et al. (2024), Inflation risks
Robustness checks and additional remarks

on past-through windows

• key findings robust to alternative windows (6 months vs 3m & 12m)

on forward RNDs (T-copula for long-term forward RND, 5y5y)

• stylised facts robust to alternative calibration windows (100 days vs 45d &150d)
• T-copula provides better fitting than Gaussian and Grouped T-copula

on risk-neutral vs “objective” inflation probabilities

• inflation risk premium also relevant for monetary policy (e.g. Kocherlakota, 2013)
• model-free objective densities very limited, model-based needed for long-term
• joint modelling potentially more promising
Concluding remarks

- inflation RNDs offer important insights on the inflation outlook

- traded inflation options can be used to gauge inflation risks across horizons (short, medium and long horizons)

- there are significant differences between EA and US inflation risks in the 2010s

- More recently, the pass-through from short-term expectations and risks suggests
  - risks to price stability seem to be relatively contained on both sides of the Atlantic
  - but close monitoring is warranted
Thanks for your attention!