Inflation at Risk

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Since global financial crisis, emergence of downside risks to inflation outlook increasing source of macroeconomic concern:

“Monetary policy responded first in the summer of 2012 by acting to defuse the sovereign debt crisis, which had evolved from a tail risk for inflation into a material threat to price stability.”

Mario Draghi, ECB President, Sintra, June 2019.
Yet, most of the analysis studied muted response of conditional mean of inflation to economic and financial conditions.

- Literature points to quivering Phillips curve linkages.

- Are some macroeconomic factors in “Phillips curve umbrella” still at work in the tails of the inflation distribution?
“Inflation Distribution”

Predictive Distribution of Inflation over the Next Year

- What is the probability that inflation will be above or below 2% over the next year?
What We Do and What We Find

• “Augmented” quantile Phillips curve – with financial conditions.

• Financial conditions carry substantial and persistent downside risks to inflation.

• Findings consistent with evidence from nonlinear DSGE model, survey data, inflation options and regime-switching model.

• Offer a new empirical perspective to existing macroeconomic models and to policymakers.
Inflation and Financial Conditions
Where the Macro-Financial Literature Stands

- In models with financial frictions as:
  - Christiano, Eichenbaum and Trabandt (2015)
  - Del Negro, Giannoni and Schorfheide (2015)
  - Christiano, Eichenbaum and Trabandt (2015)

**Financial conditions may help to explain inflation dynamics.**

- However, focus on explaining response of conditional mean.

- Implications for tails of inflation distribution fairly unexplored, with notable exceptions:
Characterizing Inflation-at-Risk
Quantile Regression

- Linear model for the conditional inflation quantiles:

\[ \hat{Q}_\tau(\bar{\pi}_{t,t+4}|x_t) = x_t \hat{\beta}_\tau, \]

- A determinant \( x_t \) may exert **non-linear effects** on inflation dynamics if it affects differently the median and the tails.

- Inflation quantiles \( \hat{Q}_\tau(\bar{\pi}_{t,t+4}|x_t) \) can be constructed for each point in time \( t \).

- We fit a flexible skewed-\( t \) distribution by Azzalini and Capitanio (2003) on the estimated quantiles.
Augmented Phillips-Curve Quantile Model

- Quantiles conditional on economic and financial conditions:

\[
\hat{Q}_\tau(\bar{\pi}_{t,t+4}|x_t) = (1 - \hat{\lambda}_\tau) \pi^*_{t-1} + \hat{\lambda}_\tau \pi^L_{LTE} + \hat{\theta}_\tau(u_t - u^*_t) + \hat{\gamma}_\tau(\pi^R_t - \pi_t) + \hat{\delta}_\tau F_t
\]

where

- \(\bar{\pi}_{t,t+4}\): average core CPI inflation between quarter \(t\) and \(t + 4\)
- \(\pi^*_{t-1}\): average inflation over the previous four quarters
- \(\pi^L_{LTE}\): long-term inflation expectations
- \((u_t - u^*_t)\): unemployment gap
- \((\pi^R_t - \pi_t)\): relative prices (import/oil)
- \(F_t\): financial conditions (credit spread)
The Time Varying Dynamics of Inflation-at-Risk
Quantile Regression Slopes Across Subsamples

![Graphs showing quantile regression slopes across subsamples for different periods.](image-url)
Rationalizing our Results I
A Macroeconomic Model with Financial Panics

- **Nonlinear DSGE model** of Gertler, Kiyotaki and Prestipino (2019).
  - Possibility of a severe financial crisis through a **bank run**.
  - There are **two equilibria**: One with and one without a financial panic.
  - **Asymmetry** in response of macro variables across two equilibria.

- We **simulate** the model and store the inflation rate, the credit spread, and the capital quality shock.

- **Estimate a QR using simulated data** of current inflation conditional on the credit spread and look at quantile slopes.
Rationalizing our Results II

A Macroeconomic Model with Financial Panics

Black squares are medians across simulations.
Shaded areas are 68% confidence bands.

Quantile Slopes from Gertler, Kiyotaki and Prestipino (2019).
Evidence from Financial Markets

Coefficients on Credit Spread

The left panel reports the slopes of separate regressions of inflation probabilities on the credit spread (at monthly frequency), along with their 95% confidence interval. The coefficient for the probability of future inflation being below 1% is rescaled to match the slope estimated on the lowest inflation quantile which arises from the quantile Phillips curve model (right panel). The coefficients are transformed from positive to negative for the probability of inflation being below 1% – as a positive correlation between the credit spread and this probability is equivalent to a negative relationship between the credit spread and the lowest inflation quantile.
Evidence from Regime-Switching Regressions

Regime Probabilities

Low Inflation Regime

Moderate Inflation Regime

High Inflation Regime
Evidence from Regime-Switching Regressions

Fitted Values - Comparison with Quantile Regression

Inflation at Risk

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Inflation-at-Risk During the Great Recession

United States vs. Euro Area
Euro Area vs. United States

Euro Area Core HICP

United States Core CPI

\[(u_t - u^*_t), \pi^*_{t-1}, (\pi^I_t - \pi_t), \pi^L_T, c_{st} \]

- \( (u_t - u^*_t), \pi^*_{t-1}, (\pi^I_t - \pi_t), \pi^L_T, c_{st} = 0 \)

Realized
Inflation—at–Risk During Covid–19 (U.S.)
Tracking Inflation Risks During Covid-19

Core PCE

Core CPI

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The Role of Credit Spreads

Predictive Densities of One-Year-Ahead Inflation in May 2021

Core PCE

Core CPI
Taking Stock

• Need to look beyond the *conditional mean* to **fully understand inflation dynamics**.

• **Ample variability in the tail risks to inflation**, even when focusing on the post-2000 period of stable and low mean inflation.

• **Financial conditions carry substantial and persistent downside risks to inflation**.

• **Offer new empirical perspective to macroeconomic models**: Credit conditions key to understand tail-risk inflation dynamics.

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Thank You For Your Time!
References


