

# What Can Probabilistic Forecasts Tell Us About Inflation Risks?

Juan Angel Garcia and Andres Manzanares, ECB

Discussed by – Alina Carare,  
International Monetary Fund

This discussion does not represent  
IMF views, nor IMF policy

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# Roadmap

- Summary paper
  - What
  - How
    - Method
  - Results
- Discussion
  - Why
  - How
  - Results

## Summary paper What?

- Presents a new methodology to extract measures of inflation risks
  - from probability distributions of Survey of Professional Forecasters
- Illustrates movements in *all* three first moments of inflation expectations
  - may shed new light on US bond market episodes

# Summary paper Method

- Recover unknown underlying distribution
  - by interpreting observed SPF histograms as a parametric multinomial framework
  - by finding parameter vector characterizing density function
    - using power divergence estimators
    - assuming skew normal distribution
  - show accuracy gains of using this method
    - Monte Carlo simulations

# Summary paper Method

- To calculate inflation risks
  - Simple: mean-mode
  - Skewness: third moment
    - used further when analyze inflation scares and bond episodes
  - Balance of risks - non-normalized central third moment, skewness, decomposed in
    - average individual skewness
    - skewness of distribution of individual means
    - covariance between distance of the individual forecaster's mean to the consensus mean and variance of that forecaster

# Summary paper

## Results

- More challenging to pin down skewness than first two moments
  - Estimation errors, albeit small, increase with degree of asymmetry
  - But adding a third parameter improves estimation of first two
- Inferring sources of balance of risk embodied in aggregate distribution is challenging and changes over time
  - Decomposing skewness highlights importance of understanding cross-sectional distributions of key moments of individual probability distributions to understand the consensus one
- Movements in long term rates around 1984 could have been triggered by changes in perceived inflation risks, most likely affecting risk premia

# Discussion

- Why
  - Inflation expectations measures
- How
  - Method
    - Estimation
    - Distribution choice
    - Risk and uncertainty measures
- Results
  - Compare with others
  - Interpreting bond premia movements

## Discussion

# Inflation expectations measures

- Central banks interested in assessing private sector inflation expectations
  - to obtain information how agents perceive shocks
    - persisting or temporary
  - see if they are in line with the central bank specified (or implied) target
  - to compare with the central bank inflation forecasts
  - Bowles and others (2007)

## Discussion

# Inflation expectations measures

- Could be calculated from
  - financial market information
    - term structure
    - inflation indexed bonds
  - survey data
    - consumer surveys
    - Survey of Professional Forecasters
  - various forecasting models – “fan charts”

## Discussion

# Survey inflation risks measures

- This paper makes a significant step forward in extracting inflation risks measures
  - From survey data on inflation expectations

## Discussion

# Why parametric estimation?

- See Engelberg and others (2006) motivation
  - **SPF probabilistic prediction data do not completely identify the subjective distributions respondents hold**, but imply fairly tight bounds on means, medians and modes of these distributions
  - they start with non-parametric analysis, then fits Beta distribution
  - compare point forecasts with subjective probability distribution
- See also D'Amico and Orphanides (2006)
  - parameter-free analysis at first, then fits Gamma distribution
  - for various measures of uncertainty and disagreement
- Each paper uses different method, asks different question

## Discussion

### Why skewnormal family of distributions?

- Statistical evidence rejects assumption of normality for aggregate probability distributions for inflation
- Estimated moments of a distribution using normal approximation differ markedly from those based on other approaches
- See Rich and Tracy (2006)

## Discussion

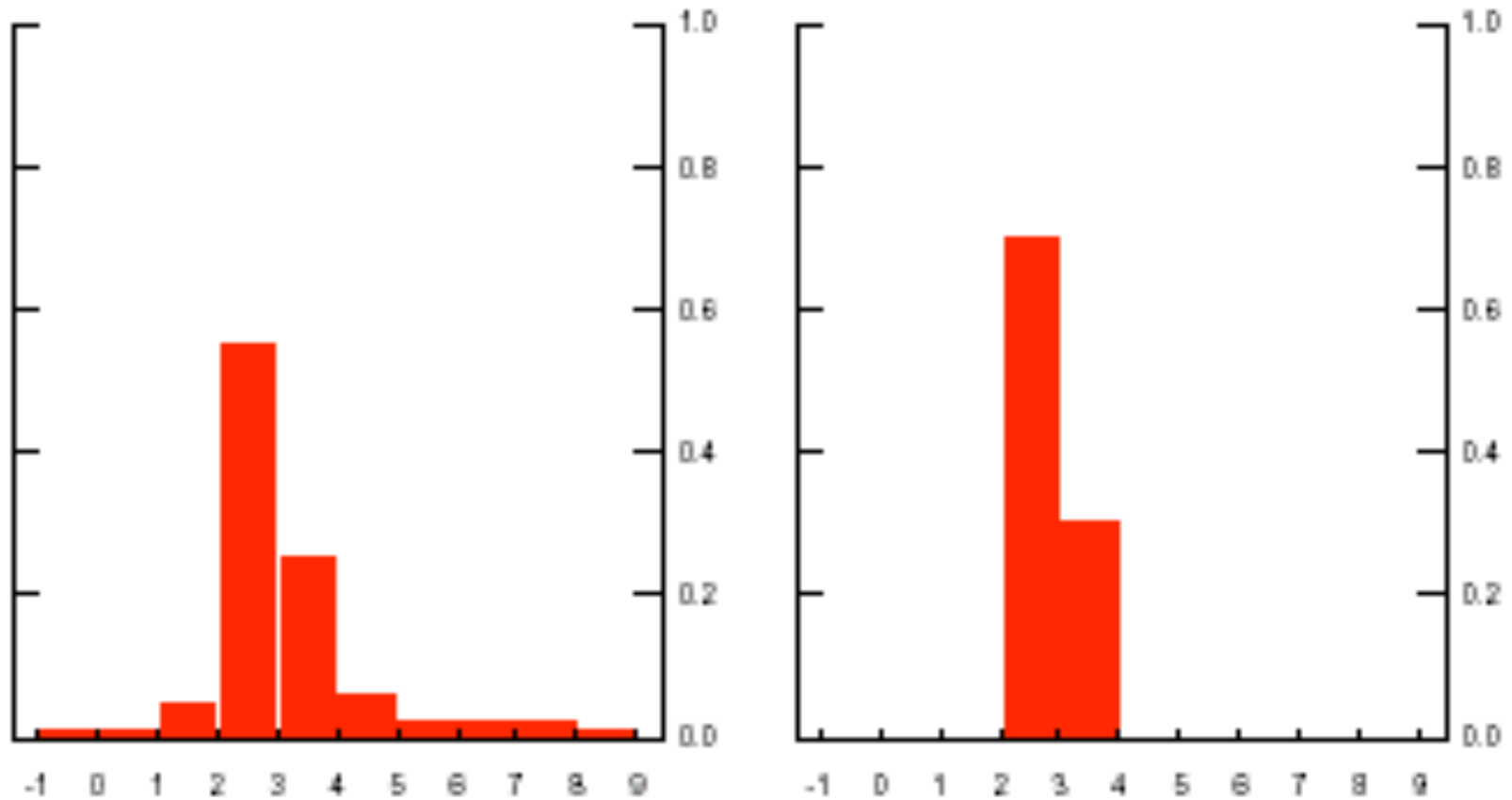
### Why skewnormal family of distributions?

- See Rich and Tracy (2006) - data exhibits properties of **leptokurtic** distributions
  - consistent with Lahiri and Teigland (1987)
  - “While the distributions are characterized by **occasional episodes of skewness** (19 out of 133 distributions), the deviation from normality is principally due to the distributions being leptokurtic (68 out of 133 distributions)”
- Many papers also mention **truncated** distributions
- A couple mention **two-piece** normal distributions

## Discussion

### D'Amico and Orphanides (2006)

Two Examples of Individual Density Forecasts



## Discussion How?

- Measure of skewness difficult to pin down, although very important
  - have information only on the probability attached to the outcome being in a specific range, and not on how the probability is distributed within that range
- Why not fit the skew-normal and then optimize over parameters?

## Discussion

### Why unconditional forecasts?

- In the eighties assumptions made regarding fiscal policy stance were important
- Since then assumptions on monetary policy stance are also important
- However, this point is for the whole audience

# Discussion

## Inflation risks measures

- See skewness in Lahiri and others (1987), Rich and Tracy (2006)
  - For presentation purposes
  - See how they compare
- Mean-mode
  - simple measure of asymmetry in expectations
  - stays almost constant, while skewness measure increases sharply in early '80s
  - Lahiri and others (1987) have small skew measures

## Discussion

### Inflation risks analysis

- Magnitude of risk, not only direction, is important
  - Hence this paper contributes greatly to literature, because it shows magnitude, direction, and sources of risks
- Further work in other papers
  - How they evolve with forecasting horizon?
    - Challenging, yet informative when one compares with “fan charts”
  - Compare risks and balance of risks as coming from the actual data, and from fitted distribution

## Discussion

# Inflation uncertainty analysis

- Mankiw, Reis and Wolfers (2003) – disagreement between professional respondents due to sticky information, search costs
- Rich and Tracy (2006), D'Amico and Orphanides (2006), Lahiri and others (1987)
  - Using different methods ones gets different impression on why inflation uncertainty changed
  - Results this paper consistent with some, but depends on horizon used
- Other methods

## Discussion Sample?

- Several authors mention problems with the SPF data not being consistent across the length of the sample due to several issues
  - See Engelberg and others (2006) and D'Amico and Orphanides (2006)

# Discussion

## Bond yields

- Risk premia bonds affected by other macroeconomic variables, not just risks of inflation
  - 1983-1984 episode, all moments of inflation expectations important, but also other macro variables behavior
    - Until 1983 deficit increased
    - Starting with 1983 the current account balance deteriorated, while the government deficit decreased

## Bottom line discussion:

- Interesting paper
  - Excellent idea
  - Rich analysis
  - Contributes to literature
- Would like to see
  - More explanation upfront on method (estimation and distribution)
  - Compare results



Thank you