Discussion of *Inflation and Professional Forecast Dynamics: An Evaluation of Stickiness, Persistence, and Volatility* by Elmar Mertens and James M. Nason

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Scope of the paper

- Extended Stock-Watson Unobserved Components (SW UC) model decomposing inflation into trend and gap, $\pi_t = \tau_t + \epsilon_t$
- Special: time-varying persistence of ϵ_t, stochastic volatility of trend and gap innovation
- Model for SPF forecasts based on Sticky Information (SI) idea: $F_t\pi_{t+h} = \lambda_{t-1}F_{t-1}\pi_{t+h} + (1 - \lambda_{t-1})E_t\pi_{t+h}$
- Time variation in update parameter λ
- Joint dynamics constitute non-linear state space model
- Estimation by Bayesian methods based on nonlinear filtering

Main findings

- 1974 inflation spike dominated by gap inflation, early-80s peak dominated by trend inflation
- Stickiness in inflation forecasts (high λ) higher since mid-80s than before
- Stickiness correlates negatively with inflation persistence and trend volatility

Overall assessment

- Interesting and stimulating reading
- Technical paper, yet fairly lucid treatment
- *Not* a paper on inflation forecasting, ...
- ... but on understanding inflation dynamics and interpreting SPF forecasts from an SI perspective ('inspecting the mechanism´)
- Could sharpen the economic interpretation
- Model with wide applicability (beyond questions in the paper)

1 Model mechanics and interpretation

2 Questions on results

3 Using the model 'out of paper'

SPF forecasters with sticky information updating?

- Interpretation of $F_t\pi_{t+h} = \lambda F_{t-1}\pi_{t+h} + (1 - \lambda)E_t\pi_{t+h}$?
- Original Mankiw and Reis (2002): λ = "fraction of firms obtaining new information about the state of the economy"
- At individual forecaster level: equation and interpretation does not make sense. If forecaster needs to compute RE $E_t\pi_{t+h}$ anyway, why not use it?
- At aggregate level: fraction of SPF forecasters that obtain new info and compute best (=RE) forecast?
- But should that activity not be part of every 'professional forecaster's' job description'?
- Other interpretation, like trust in forecasting technology (e.g. during great moderation)?

Feedback from SPF forecasts to inflation?

- Model with recursive structure, transition equation:

$$\begin{pmatrix} \mathcal{X}_t \\ F_t \mathcal{X}_t \end{pmatrix} = \begin{pmatrix} \Theta_t & \mathbf{0} \\ (1-\lambda_t)\Theta_t & \lambda_t \Theta_t \end{pmatrix} + \begin{pmatrix} \mathcal{X}_{t-1} \\ F_{t-1}\mathcal{X}_{t-1} \end{pmatrix} + w_t$$

  with $\mathcal{X}_t = (\tau_t, \epsilon_t, \epsilon_{t-1})$.

- Change in inflation expectations formation has no feedback on actual inflation outcome (like weather forecasts on weather)...

- ... but professional forecasters outcomes may indeed impact firms' price setting

- Can test for feedback, i.e. replace red zero by free parameter?

Relevance of anticipated utility model assumption

- Multistep forecast in TVP models non-trivial.
- Inflation gap process (for $K = 1$ lag):

$$
\begin{aligned}
\epsilon_t &= \theta_t \epsilon_{t-1} + v_t, \quad v_t \sim N(0, \sigma^2) \quad (1) \\
\theta_t &= \theta_{t-1} + w_t, \quad w_t \sim N(0, s^2) \quad (2)
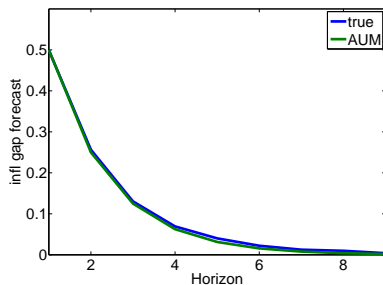\end{aligned}
$$

- For $\theta_t = \theta$, h-period conditional expectation is
  $E_t \epsilon_{t+h} = \theta^h \epsilon_t = E_t^{AUM} \epsilon_{t+h}$
- But with time variation, $E_t^{AUM} \epsilon_{t+h} = \theta_t^h \epsilon_t \neq E_t \epsilon_{t+h}$, for $h > 1$.
- For instance, for $h = 2$:

$$
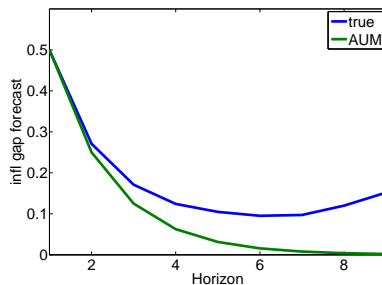E_t \epsilon_{t+2} = \theta_t^2 \epsilon_t + \epsilon_t \cdot s^2
$$

- Quantitatively relevant?

Relevance of (AUM) assumption: illustration

Innovation TVP =0.05

Innovation TVP = 0.15

SI-UC model appropriate for capturing SPF approach?

- Model explains SPF forecasts by combination of past forecasts and univariate time series model
- Real-world SPF panelists possibly use host of data and info.

[Placeholder: illustrative cartoon]

- How does that square?
  - Fit of SPF forecast (size of measurement error, time series fit)?
  - Measurement errors correlating with other variables?

Especially: term structure of SPF forecasts matched?

- Model implies *term structure* of SPF inflation expectations:

$$F_t \pi_{t+h} = \delta \Theta_{t|t}^h F_t \mathcal{X}_t, \quad h = 0, 1, 2, ...$$

- What shapes can the model (essentially a TVP two-factor term structure model) generate?
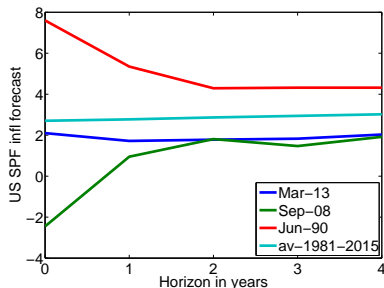
Usefulness for forecasting

- RE multistep forecast vs. actual/model-implied SPF forecast?
- Which of them fares better in forecasting actual inflation?
- Relation to literature on model combination, and on helping models with survey information.
- Here, simple forecast combination:

$$
\begin{aligned}
\hat{\pi}_{t+h} &= \alpha E_t^{SPF} \pi_{t+h} + (1 - \alpha) E_t^{UC} \pi_{t+h} \\
&= \alpha \left[\lambda E_{t-1}^{SPF} \pi_{t+h-1} + (1 - \lambda) E_t^{UC} \pi_{t+h} \right] + (1 - \alpha) E_t^{UC} \pi_{t+h} \\
&= \alpha \lambda E_{t-1}^{SPF} \pi_{t+h-1} + (1 - \alpha \lambda) E_t^{UC} \pi_{t+h}
\end{aligned}
$$

- Could lead to two-step approach:
    - Estimate/choose weight α between SPF and UC model in standard forecast combination exercise
    - Deploy the SPF formation model (i.e. estimated λ) to help forecast with last period's SPF, if current SPF not yet released.

Three policy questions (to which the model could probably give useful answers):

1. Does realized inflation impact on (longer-term) inflation expectation? Has this link become more pronounced recently?
   - → Exploit the SPF formation model to derive elasticities from current headline inflation on term structure of SPF - which would vary over time

2. How large is the probability of deflation over next Q quarters?
   - → Stochastic volatility would be relevant

3. What is the expected time for inflation to return to target and remain there in a given neighbourhood for some time?
   - → Important role of time variation in gap inflation and stochastic volatility