Motivation:
1. Euro area afflicted by low (and below-target) inflation since 2013: how has trend inflation evolved?
2. Do market and survey expectations reflect the same long-term inflation level? Why do they look so different then?

Main goals of the paper:
1. Estimate trend inflation consistent with market-based inflation expectations along the lines of Chan, Clark and Koop (2017).
2. Assess whether the protracted period of below-target inflation has weakened the anchoring of euro area inflation expectations.

Two important contributions to related literature:
1. We incorporate market-based inflation expectations into the estimation of trend inflation using UCSV models.
2. We provide a decomposition of the observed long-term inflation compensation into inflation expectations and inflation risk premium (and other premia) along the lines of the term structure literature.

Key Findings
1. EA inflation expectations were well-anchored between 2004-2012.
   • But the anchoring has weakened significantly since 2012.
   • Trend inflation remains significantly below the 2% mark.
   • These findings hold for both the market or survey inflation expectations.
2. Decline in long-term inflation compensation since 2013 reflects both lower premia and also lower inflation expectations.
3. EA survey long-term inflation expectations strongly biased.

Econometric Model
\[
\pi_t - \pi_t^* = b_1(\pi_{t-1}^* - \pi_{t-1}) + \xi_t, \quad \xi_t \sim N(0, \sigma_{\xi_t}^2),
\]
\[
\eta_{t1} = \theta_{01} + d_{t1}\pi_{t1}^* + \epsilon_{t1}, \quad \epsilon_{t1} \sim N(0, \sigma_{\epsilon_{t1}}^2),
\]
\[
\pi_t^* = \pi_{t-1}^* + n_t, \quad n_t \sim N(0, \sigma_{n_t}^2),
\]
\[
b_{t1} = b_{t-1} + r_{01}, \quad r_{01} \sim TN(0, \sigma_{r_{01}}^2),
\]
\[
d_{t1} - \mu_{d_{t1}} = \rho_{d_{t1}}(d_{t-1} - \mu_{d_{t-1}}) + \epsilon_{d_{t1}}, \quad \epsilon_{d_{t1}} \sim N(0, \sigma_{\epsilon_{d_{t1}}}^2), \quad i = 0, 1,
\]
\[
h_{t1} = h_{t-1} + \eta_t, \quad \eta_t \sim N(0, \sigma_{\eta_t}^2), \quad i = \xi_t, n_t.
\]

• Equation (2) provides a decomposition of inflation compensation (ILS).
• Once trend inflation part is estimated \(d_{t1}\pi_{t1}^*\), the remaining part of the observed inflation compensation reflects premia: broadly speaking, \(d_{t1}\pi_{t1}^*\) estimates can be used to gauge the inflation risk premium.
• MA(1) error terms can be attributed to liquidity premia or other temporary market disturbances.

Conclusions and policy implications
• This paper incorporates market-based inflation expectations into the estimation of trend inflation in the euro area.
• Trend inflation provides evidence of a significant deterioration in the anchoring of EA long-term inflation expectations since 2013.
• These findings provide strong support for the PSPP by the ECB since early 2015.
• Trend inflation significantly below 2% calls for a continuation of policy stimulus for a sustained adjustment in the path of inflation towards 2%.

Key References