Is Trend Inflation at Risk of Becoming Unanchored?

The Role of Inflation Expectations in a Model of Trend Inflation

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The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the view of the Board of Governors of the Federal Reserve System or of any other person associated with the Federal Reserve System.
• Evolution of aggregate consumer prices moved swiftly from concerns about deflation to fears about excessive inflation

• Hard to find a parallel in the history of U.S. economy–or global economy–to this rapid reversal of risks to inflation outlook

• Trend inflation: reflects the public confidence in the central bank’s commitment to price stability
Trend Inflation Model: Economic Intuition

- Underlying inflation trend informed by inflation expectation surveys:
  Affected by *beliefs* about the conduct of monetary policy

- Trend inflation:
  - “Stable" measure of inflation expectations over a period far enough in future
  - Dominated by the central bank’s commitment rather than cyclical factors
  - Takes signal from past inflation, trimmed-mean inflation, and short- and long-term survey expectations or forecasts

- First- and second-order anchoring:
  Allows quantification of “level de-anchoring" and “uncertainty" in long-term inflation expectations
Trend Inflation Model: Statistical Definition

- Monthly model for the United States, borrowed from Mertens (2016), and updated through March 2022

- **Definition** of trend inflation $\tau_t$:
  
  Infinite-horizon forecast of inflation $\pi_t$ conditional on information set $\Omega_t$

- **Formally**:
  
  - Trend is the infinite-horizon forecast: $\tau_t = \mathbb{E}(\pi_{t+\infty}|\Omega_t)$
  - Absorbs new information: $\mathbb{E}(\pi_{t+\infty}|\Omega_t) - \mathbb{E}(\pi_{t+\infty}|\Omega_{t-1}) = \tau_t - \tau_{t-1}$
  - Trend is a random walk: $\tau_t = \tau_{t-1} + \bar{\epsilon}_t$
  - Actual inflation is the trend + stationary component: $\pi_t = \tau_t + \tilde{\pi}_t$

- **Interpretation**:
  
  - Absence of shocks: $\bar{\epsilon}_t = 0$, trend in **stable**
  - Sizeable shocks: trend drifts away, risk of **de-anchoring**
The Set of Observable Variables

- **Past inflation:**
  Actual inflation rates, changes in CPI and PCE indexes, and GDP deflator

- **Trimmed-mean inflation:**
  Median and trimmed measures of CPI and PCE realized inflation

- **Surveys:**
  Forecasts of future inflation from Survey of Professional Forecasters (SPF), Blue Chip, and Livingston Survey

- **Baseline model for the period from January 2000 to March 2022** (period of stable inflation expectations), with robustness going back to January 1960
Results as of March 2022

**Figure:** Core PCE Trend Inflation and Uncertainty

**Takeaways:**

- Notable decline below post-2000 average during COVID-19
- Substantial rebound during the recovery, with high uncertainty
Counterfactual Exercise

“Stress” Scenario:
Inflation expectations deteriorate considerably (2 s.d. increase over six months)

Takeaway:
- Prolonged increase in trend inflation and the risk of de-anchoring
The Role of Inflation Expectations I

- “Horse race” over four models:
  1. **Past Inflation**: Only includes realized inflation rates (CPI, PCE, GDP deflator)
  2. **Trimmed**: Only includes trimmed-mean or median realized inflation
  3. **Surveys**: Only includes survey forecasts of future inflation
  4. **“All-in” (Baseline)**: Combination of realized inflation rates, trimmed-mean and median measures, and survey forecasts

- Three sample periods:
  1. Full sample (Jan/1960 to Mar/2022)
  2. Pre-2000s (Jan/1960 to Dec/1999)
  3. Recent periods (Jan/2000 to Mar/2022)
The Role of Inflation Expectations II

Root-Mean-Squared Errors (RMSE) and Ratios

<table>
<thead>
<tr>
<th>Trend measure</th>
<th>12-months ahead</th>
<th>36-months ahead</th>
<th>60-months ahead</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full sample (Jan/1960 – Jan/2022)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past inflation: average deviation</td>
<td>0.89 percent</td>
<td>1.13 percent</td>
<td>1.28 percent</td>
</tr>
<tr>
<td>Trimmed and median measures</td>
<td>0.92</td>
<td>0.88</td>
<td>0.81</td>
</tr>
<tr>
<td>Surveys</td>
<td>1.19</td>
<td>1.08</td>
<td>1.10</td>
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<tr>
<td>“All-in” (past, trimmed, and surveys)</td>
<td>1.23</td>
<td>1.11</td>
<td>1.12</td>
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<tr>
<td><strong>Pre-2000s (Jan/1960 – Dec/1999)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past inflation: average deviation</td>
<td>0.93 percent</td>
<td>1.35 percent</td>
<td>1.56 percent</td>
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<tr>
<td>Trimmed and median measures</td>
<td>0.86</td>
<td>0.84</td>
<td>0.80</td>
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<tr>
<td>Surveys</td>
<td>1.30</td>
<td>1.10</td>
<td>1.10</td>
</tr>
<tr>
<td>“All-in” (past, trimmed, and surveys)</td>
<td>1.19</td>
<td>1.06</td>
<td>1.05</td>
</tr>
<tr>
<td><strong>Recent periods (Jan/2000 – Jan/2022)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past inflation: average deviation</td>
<td>0.92 percent</td>
<td>0.58 percent</td>
<td>0.60 percent</td>
</tr>
<tr>
<td>Trimmed and median measures</td>
<td>0.70</td>
<td>0.77</td>
<td>0.67</td>
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<tr>
<td>Surveys</td>
<td>0.68</td>
<td>0.66</td>
<td>0.59</td>
</tr>
<tr>
<td>“All-in” (past, trimmed, and surveys)</td>
<td>0.67</td>
<td>0.59</td>
<td>0.47</td>
</tr>
</tbody>
</table>

Takeaway:

- Forecasting ability of all models improves in recent periods
- Survey measures are useful in recent periods
- Baseline over recent sample performs the best
Results as of November 2022

**Figure:** Core PCE Trend Inflation and Uncertainty

**Takeaway:**

- Trend inflation and uncertainty even higher than in our counterfactual
Conclusion

• The statistical model provides a useful framework to estimate and track underlying inflation (as perceived by economic agents and forecasters)

• Forward-looking elements coming from surveys’ forecasts bring important signals about trend inflation, especially during the current episode

• Trend inflation remains higher than its pre-pandemic low levels, and uncertainty around it is elevated
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