Near-Rationality and Inflation in Two Monetary Regimes

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Overview

• This paper addresses **A Big Question** for macro today: What puts the persistence in inflation?

• A few candidates:
  
  – Wage and price-setting “machinery” (e.g. contracts)
  
  – Sluggish expectations
  
  – Monetary policy shifts, imperfect credibility
  
  – Learning?
  
  – Some interaction among these

• This paper makes a contribution to this debate, focusing on expectations (or the interaction of expectations and monetary regime)

• **Ball’s paper boiled down:** use the lags of inflation as expectations in an expectations-augmented Phillips curve → it fits!
Nits on Terminology

- Distinguish “Backward-Looking” (BL) from “Naive” ($\pi_t^c = \pi_{t-1}$) from “Random Walk” ($\pi_t = \pi_{t-1} + \epsilon_t$) from “Multivariate Backward-Looking” (as in VARs) from “Restricted Multivariate Backward-Looking” (i.e. restricted linear structural models, RE or otherwise).

- Ball: if Fed adopts price-level targeting, inflation has negative serial correlation, so “firms with BL expectations” would make big errors $\rightarrow$ BL not “near-rational”.

- Looking backwards in that case could still be OK, but it would depend on how you look backwards. Wouldn’t want to use the AR coefficients from the inflation-targeting regime.

- Similar argument for early vs. late period.
Stationarity of inflation and nominal interest rates

- Post-1960 period: “policy has accommodated shocks to inflation, leading the shocks to have permanent effects.”

- Really? Inflation today is ≈ 2%. Inflation in 1980 averaged almost 14%; by 1984 it averaged 4%. This doesn’t look permanent.

- If inflation stationary, then nominal rates also stationary (barring permanent and large shifts in equilibrium real rate).
How Representative is the Early Period?
(Persistence is common)

- Look at longer stretch of price series (chart 1)
- 1879-1914 is a very quiet period for prices–more of an aberration?
- Inflation persistence is a feature for many periods of history that differ with regard to M-policy—not just post-1945.
- If I estimate simple univariate models on earlier or later periods, I get:

<table>
<thead>
<tr>
<th>Period</th>
<th>Sum of AR Coeffs. (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1846-1960</td>
<td>.51 (.000)</td>
</tr>
<tr>
<td>1918-1940</td>
<td>.54 (.004)</td>
</tr>
<tr>
<td>1860-1879</td>
<td>.58 (.008)</td>
</tr>
<tr>
<td>1810-1840</td>
<td>.31 (.09)</td>
</tr>
</tbody>
</table>

- Need to explain why persistence is so common, across other monetary regimes, wars, Great Depression, etc.
Testing and Impulse Responses

- Take the model that comprises equations (7) and the output equation (ignore constants)

\[
\pi_t = b_1 \pi_{t-1} + b_2 \pi_{t-2} + (1 - w) v/w y_t + v d_1 y_{t-1} + v d_2 y_{t-2} \\
y_t = d_1 y_{t-1} + d_2 y_{t-2}
\]

- The restricted reduced-form is

\[
\pi_t = b_1 \pi_{t-1} + b_2 \pi_{t-2} + (v/w) d_1 y_{t-1} + (v/w) d_2 y_{t-2} \\
y_t = d_1 y_{t-1} + d_2 y_{t-2}
\]

- Compared to the VAR, this equation imposes 7 constraints: the VAR has 12 free parameters, the structural model has 5 \((v/w, b_1, b_2, d_1, d_2)\).

- Ball tests only the inflation equation, taking OLS estimates of b’s and d’s as given.

- Should estimate these jointly (à la Sargent, Flavin).

- Why is the interest rate in the VAR? No role for it anywhere in the structural model, so falsely adds “restrictions” to the structural model.
• My tests of the restrictions imposed by Ball’s model show (for post 1960 quarterly data only):

  – **With funds rate in RF equations**: $p$-value = $3.6 \times 10^{-5}$.

  – **Imposing OLS estimates of lag coefficients**: $p$-value = $1.4 \times 10^{-5}$ (matters little)

  – **Excluding funds rate from RF**: No rejections at 10% level or worse.

• So test results depend on method you use, and whether you include the funds rate in the VAR.

• **Impulse responses**: to compare with VAR, should use the restricted reduced-form above, ordered, orthogonalized, and shocked to put on comparable grounds with VAR.
How Important is Multivariate Information?

- Ball’s result is interesting: forecast errors reduced, but not greatly, by inclusion of information other than lagged inflation. (This has been observed in traditional Phillips curves for decades.)

- Still, effect of output (or unemployment) on inflation is statistically very strong: for quarterly data, 1960-1999, (controlling for lagged inflation and oil prices), $p-$value for output gap is $1 \times 10^{-5}$, unemp. $5 \times 10^{-10}$. Stock and Watson also document this correlation. (Chart 2) *Something* important there.

- Are errors in univariate equations relatively larger during, say “Great Disinflation” or the “Great Inflation” period, as compared with tranquil mid-1980s through 1990s?

- Some evidence bearing on this question might be a nice addition to the paper.
Unemployment Drives Inflation in Phillips Curve
Dynamic Simulations
Haven’t We Been Here Before?
and, The Lucas Critique

- MANY models used to use these simple univariate expectations proxies.

- We abandoned them, as Larry points out, because of fear of the Lucas critique. They always “fit” fairly well. Stability?

- But since the RE models haven’t worked so well of late, we go back to them.

- Larry’s results support Lucas critique: using the same univariate expectations model across different regimes would lead to breakdown of model.

- Paper should test stability of the “near-rational” models, to see if they are subject to the LC.

What Hath Ball Wrought?

- In different historical episodes, the univariate process for inflation can be quite different.

- But the question is why? Ball’s results don’t allow us to discriminate among explanations. A model with RE would imply a different univariate process for inflation under different monetary regimes, such as gold standard versus modern policy.

- If we plug a good univariate time-series model for inflation into an inflation equation like

\[ \pi_t = \pi^e_t + \gamma y_t \]


- **So what does this tell us about expectations formation?** Or the source of inflation persistence?
To Sum Up: What have we learned?

- Univariate models of inflation forecast pretty well.
- Univariate models of inflation differ across periods.
- **But this doesn’t explain why inflation behaves differently in different periods.** Or why it’s persistent or not in any period.
- Persistence (or lack of) could arise because: inflation expectations differ, monetary policy regimes differ, mix of shocks differs, fiscal policy regimes differ, or all of these and more (all are consistent with Larry’s results).
- If differences arise because of differences in monetary policy regime, then **The Lucas critique applies in full force.**
- In fact, Ball’s paper provides a great demonstration of the LC: you’d do very poorly to use the same univariate process for inflation expectations across different monetary regimes.
• If agents **knew** the best univariate model in each era, they might form reasonable expectations.

• But apparently the best model shifts over time.

• How do they get to know the new best model? Sounds like **LEARNING**.

• Maybe learning is a key avenue for this research.

• **Identification:** Ball’s exercises are a promising start, but haven’t yet identified anything about expectations behavior, or sources of persistence.