A Reassessment of Monetary Policy Surprises and High-Frequency Identification

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High-frequency monetary policy surprises are an important tool for estimating effects of monetary policy on asset prices and macroeconomic variables:

- **asset prices**: high-frequency OLS regressions
- **macro variables**: monetary policy surprises used as external instrument in structural VAR or LP
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Measure interest rate changes in narrow window (typically 30 min.)

**FOMC announcement**
However, there are two growing concerns:

- **exogeneity**: monetary policy surprises are *predictable* with macroeconomic and financial data that *pre-dates* the FOMC announcement:

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High-Frequency Monetary Policy Surprises
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However, there are two growing concerns:

- **exogeneity**: monetary policy surprises are *predictable* with macroeconomic and financial data that *pre-dates* the FOMC announcement:

- **relevance**: monetary policy surprises are a small fraction of interest rate changes each month
  - Ramey (2016), Bauer-Swanson (2021)
Monetary Policy Surprises Are Predictable

Predictive Regressions  \( mps_t = \alpha + \beta' X_{t-} + \varepsilon_t \)

\[
\begin{align*}
\text{Nonfarm payrolls surp.} & \quad 0.094^{**} \\
& \quad (2.442) \\
\text{Empl. growth (12m)} & \quad 0.005^{**} \\
& \quad (2.108) \\
\Delta \log \text{S&P 500 (3m)} & \quad 0.084 \\
& \quad (1.433) \\
\Delta \text{Slope (3m)} & \quad -0.010 \\
& \quad (-1.406) \\
\Delta \log \text{Comm. price (3m)} & \quad 0.120^{**} \\
& \quad (2.392) \\
\text{Treasury skewness} & \quad 0.032^{***} \\
& \quad (3.006) \\
R^2 & \quad 0.161 \\
\text{Sample} & \quad 1988:1–2019:12 \\
N & \quad 322
\end{align*}
\]
What We Do

- Present a simple model that explains the predictability in terms of imperfect information: the “Fed response to news” channel of Bauer-Swanson (2021)

- Address the **exogeneity** concern by projecting out the correlation with the publicly observed data $X_t$.

- Address the **relevance** concern by including speeches by the Fed Chair in the set of monetary policy announcements.
What We Do

- Present a simple model that explains the predictability in terms of imperfect information: the “Fed response to news” channel of Bauer-Swanson (2021)
- Address the **exogeneity** concern by projecting out the correlation with the publicly observed data $X_t$.
- Address the **relevance** concern by including speeches by the Fed Chair in the set of monetary policy announcements.
- Revisit high-frequency asset price regressions and macroeconomic SVARs, LPs to assess effects of these changes.
A Simple Model with Imperfect Information

Short-term interest rate $i_t$:

$$i_t = \alpha_t x_t + \varepsilon_t$$
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Fed’s response coefficient $\alpha_t$ is not known by private sector

Private sector has optimal estimate $a_t \equiv E[\alpha_t|\mathcal{H}_{t-1}]$
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Then:

$$mps_t \equiv i_t - E[i_t | x_t, H_{t-1}] = (\alpha_t - a_t)x_t + \varepsilon_t$$
Implications of the Simple Model

- $mps_t$ can be correlated with $x_t$ \textit{ex post} even though it was unpredictable \textit{ex ante}

- For a procyclical variable $x_t$, this correlation is positive when $\alpha_t > a_t$
**Implications of the Simple Model**

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- Changes in interest rates affect asset prices entirely through $mps_t$

- High-frequency OLS regressions of asset price changes on $mps_t$ remain valid

- But correlation of $mps_t$ with $x_t$ violates exogeneity assumption of high-frequency IV regressions in macro SVARs and LPs
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- But correlation of \( mps_t \) with \( x_t \) violates exogeneity assumption of high-frequency IV regressions in macro SVARs and LPs.

- To eliminate this correlation, we recommend using orthogonalized \( mps_t^\perp \equiv mps_t - \hat{\alpha} - \hat{\beta}X_t \).
### High-Frequency Asset Price Regressions

\[ \Delta y_t = \alpha + \beta mps_t + \varepsilon_t, \]

<table>
<thead>
<tr>
<th></th>
<th>( mps_t )</th>
<th>( mps_t^\perp )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-year yield</td>
<td>0.73</td>
<td>0.74</td>
</tr>
<tr>
<td>( t )-stat.</td>
<td>(18.6)</td>
<td>(16.7)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.784</td>
<td>0.689</td>
</tr>
<tr>
<td>Five-year yield</td>
<td>0.63</td>
<td>0.64</td>
</tr>
<tr>
<td>( t )-stat.</td>
<td>(14.4)</td>
<td>(13.8)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.626</td>
<td>0.550</td>
</tr>
<tr>
<td>Ten-year yield</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td>( t )-stat.</td>
<td>(9.5)</td>
<td>(9.9)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.435</td>
<td>0.363</td>
</tr>
<tr>
<td>30-year yield</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>( t )-stat.</td>
<td>(6.3)</td>
<td>(6.7)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.206</td>
<td>0.173</td>
</tr>
<tr>
<td>S&amp;P500</td>
<td>-5.39</td>
<td>-5.50</td>
</tr>
<tr>
<td>( t )-stat.</td>
<td>(-7.7)</td>
<td>(-6.6)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.304</td>
<td>0.266</td>
</tr>
</tbody>
</table>

Observations 322 322
High-Frequency Identification of SVARs, LPs

Reduced-form VAR:

\[ Y_t = \alpha + B(L) Y_{t-1} + u_t, \]
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Identify impact effect of $\varepsilon_{t}^{mp}$ on $u_t$ by regressing $u_t$ on $u_{t}^{mp}$ by 2SLS using $mps_t$ as an external instrument.
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**instrument relevance:** \( E[mps_t \varepsilon_t^{mp}] \neq 0, \)

**instrument exogeneity:** \( E[mps_t \varepsilon_t^{-mp}] = 0, \)
Revisiting Gertler-Karadi (2015)
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- unadjusted *mps* instrument is correlated with output, inflation
- estimated effects of monetary policy are attenuated or can even have opposite, puzzling sign if *mps* is unadjusted
- orthogonalized *mps* reduces this bias—IRFs about 4 times larger
- including Fed Chair speeches in *mps* instrument leads to similar IRFs but much larger first-stage *F*-statistics
- results are similar using Plagborg-Møller-Wolf (2021) or LP approaches
- but LP results are imprecisely estimated
Revisiting Plagborg-Møller-Wolf (2021)
Revisiting Ramey’s (2016) Local Projections
Lessons Learned and Best Practices

- HF monetary policy surprises need to be orthogonalized wrt macro and financial data to avoid biased SVAR, LP estimates.
- Including additional MP announcements such as Chair speeches improves instrument relevance and IRF precision.
- Estimated IRFs from SVARs tend to be more precise and less erratic than LPs, but the two are qualitatively similar.
- Using a longer sample period for reduced-form VAR improves precision of estimates, but results are qualitatively similar.
- Including the instrument in a recursive SVAR does not fix the endogeneity bias problem.
- Including additional variables in the VAR (e.g., unemployment, commodity prices) makes little difference for the IRFs of other variables, but the effect of monetary policy on these additional variables may be interesting for their own sakes.