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
High-Frequency Monetary Policy Surprises

However, there are two growing concerns:

- **Exogeneity**: monetary policy surprises are *correlated* with macroeconomic and financial data that *pre-dates* the FOMC announcement:
However, there are two growing concerns:

- **exogeneity**: monetary policy surprises are *correlated* 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  \( mps_t = \alpha + \beta' X_{t-} + \varepsilon_t \)

- Nonfarm payrolls surp.  \( 0.094^{**} \) (2.442)
- Empl. growth (12m)  \( 0.005^{**} \) (2.108)
- \( \Delta \log \) S&P 500 (3m)  \( 0.084 \) (1.433)
- \( \Delta \) Slope (3m)  \( -0.010 \) (-1.406)
- \( \Delta \log \) Comm. price (3m)  \( 0.120^{**} \) (2.392)
- Treasury skewness  \( 0.032^{***} \) (3.006)

\( R^2 \)  \( 0.161 \)
Sample 1988:1–2019:12
\( N \) 322
What We Do

- Present a simple model that explains this correlation 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

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- 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 monetary policy 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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Then:

$$mps_t \equiv i_t - E[i_t | x_t, \mathcal{H}_{t-1}]$$

$$= (\alpha_t - a_t) x_t + \varepsilon_t$$
Implications of the Simple Model

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- So \( E[mps_t | x_t, H_{t-1}] = 0 \)
- i.e., \( mps_t \) is unpredictable \textit{ex ante}
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- Nevertheless, \( mps_t \) can be correlated with \( x_t \) \textit{ex post}
- For a procyclical variable \( x_t \), this correlation is positive when \( a_t < \alpha_t \)
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Note that \( a_t \) can be \( < \alpha_t \) for several periods if there is an increase in \( \alpha_t \) and it takes time for the private sector to learn about the increase
Evidence that $a_t < \alpha_t$

Rolling-window Taylor Rule regressions:

- Greenspan: “The Federal Reserve has seen the need to respond more aggressively than had been our wont in earlier decades” (March 2001)
- Bernanke: “By way of historical comparison, this policy response stands out as exceptionally rapid and proactive” (December 2008)
Additional Implications of the Simple Model

- Changes in interest rates affect asset prices entirely through $mps_t$ (no separate role for $\varepsilon_t$)
- High-frequency OLS regressions of asset price changes on $mps_t$ remain valid
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- High-frequency OLS regressions of asset price changes on $mps_t$ remain valid

- But *ex post* 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 $mpst\perp \equiv mps_t - \hat{\alpha} - \hat{\beta}X_t$
High-Frequency Asset Price Regressions

\[ \Delta y_t = \gamma + \delta mps_t + \varepsilon_t, \]

<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>
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<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>
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Observations 322 322
High-Frequency Identification of SVARs, LPs

Reduced-form VAR:

\[ Y_t = \alpha + B(L) Y_{t-1} + u_t, \]

Reduced-form residuals related to structural shocks:

\[ u_t = S\varepsilon_t, \]
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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.

- **Instrument relevance:** \( E[mps_t \varepsilon_{t}^{mp}] \neq 0, \)
- **Instrument exogeneity:** \( E[mps_t \varepsilon_{t}^{-mp}] = 0, \)
Revisiting Gertler-Karadi (2015)

MPS instrument

orthogonalized MPS instrument

IP
CPI
EBP
2Y Treas

months

months
Revisiting Gertler-Karadi (2015)

- 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
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- 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:

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<td>30.44</td>
</tr>
<tr>
<td>orthogonalized FOMC annncmts. only</td>
<td>1.83</td>
</tr>
<tr>
<td>orthogonalized FOMC + Chair Speeches</td>
<td>12.37</td>
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Revisiting Gertler-Karadi (2015), incl. Chair Speeches
Conclusions

- HF monetary policy surprises are correlated with macro and financial data that pre-date the announcements.
- This correlation is consistent with private sector underestimating Fed’s responsiveness to the economy, with learning.
- High-frequency OLS regressions of asset price changes on $mps_t$ remain valid.
- But *ex post* correlation of $mps_t$ with $x_t$ violates exogeneity assumption of high-frequency IV regressions in SVARs, LPs.
- 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.