Discussion of Gertler and Karadi, “Monetary Policy Surprises, Credit Costs, and Economic Activity”

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Federal Reserve Bank of San Francisco

NBER Conference on
Lessons from the Financial Crisis for Monetary Policy

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VAR Notation

Structural VAR:

\[ AY_t = \sum_{j=1}^{p} C_j Y_{t-j} + \varepsilon_t \]

Reduced-form VAR:

\[ Y_t = \sum_{j=1}^{p} B_j Y_{t-j} + u_t \]

where \( u_t = S\varepsilon_t \), \( S = A^{-1} \), \( B_j = A^{-1} C_j \).

Let \( s \) denote column of \( S \) corresponding to MP shock, \( \varepsilon^p_t \).

Compute impulse response to MP shock using

\[ Y_t = \sum_{j=1}^{p} B_j Y_{t-j} + s\varepsilon^p_t \]
How to Identify $s$

Compute impulse response to MP shock $\iff$ identify $s$
How to Identify s

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Cholesky identification is problematic for financial variables (e.g., credit spreads, exchange rates, commodity prices)
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GK use high-frequency fed funds futures changes around FOMC announcements as an instrument to estimate $s$
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GK use high-frequency fed funds futures changes around FOMC announcements as an instrument to estimate $s$

Idea:

- Surprise component of FOMC announcements plausibly exogenous to other variables in the VAR at time $t$
- Regress $u_t^{-p}$ on $u_t^p$ using IV to estimate $s$

Reduced-Form $u_t^p$ and High-Frequency Instrument
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Regress \( u_{t}^{-p} \) on \( u_{t}^{p} \) using IV to estimate \( s \)

First-stage regression results for \( u_{t}^{p} \):

<table>
<thead>
<tr>
<th>Coefficient</th>
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<td>1.10</td>
<td>6.91</td>
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Second-stage IV results for \( u_{t}^{-p} \):

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<tr>
<th>Residuals</th>
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<tbody>
<tr>
<td>CPI residuals</td>
<td>-0.01</td>
<td>(-0.03)</td>
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<td>IP residuals</td>
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Second-stage IV results for $u_t^{-p}$:

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Normalizing MP shock to 50 bp gives

$$\hat{s} = \begin{bmatrix} -0.00 \\ -0.18 \\ 0.16 \\ 0.50 \end{bmatrix}$$
Impulse Responses to Monetary Policy Shock

CPI

IP

GZ spread

fed funds rate

percent

percentage points

months

months

Eric Swanson (FRBSF)
Discussion of Gertler and Karadi
NBER Lessons from the Crisis
Starting Sample in Jan 1980 instead of Jun 1979

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NBER Lessons from the Crisis
Mortgage spread

First stage regression: F: 21.61 robust F: 17.26 R^2: 7.78% Adjusted R^2: 7.42%

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Impulse Response of Credit Spreads

Figure 2: 1 year rate shock with corporate and mortgage premia

Commercial Paper spread (3 months)

First stage regression: F: 21.61 robust F: 17.26 R2: 7.78% Adjusted R2: 7.42%
An Alternative High-Frequency Identification of s

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An Alternative High-Frequency Identification of $s$

- CPI
- IP
- GZ spread
- Fed funds rate

Discussion of Gertler and Karadi

NBER Lessons from the Crisis
High-frequency responses to FOMC announcements:

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Term premia could change at longer end, but signal-to-noise ratio in general very high

Piazzesi-Swanson (2008)
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Piazzesi-Swanson (2008)
High-frequency changes around FOMC announcements an indicator for Δ market expectations of future path of funds rate
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Recall that impulse response to MP shock is given by

$$s, Bs, B^2s, B^3s, B^4s, \ldots$$

(using first-order companion form for $B$)
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Recall that impulse response to MP shock is given by

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Identify $s$ by matching impulse response to high-freq. changes
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Identify $s$ by matching impulse response to high-freq. changes

Caveats:
- time-varying term premia
- high powers of $B$ are problematic
- collinearity of futures responses
Faust-Swanson-Wright Identification

Discussion of Gertler and Karadi

NBER Lessons from the Crisis
One-Dimensional Monetary Policy?

GK use 1-year Treasury yield as measure of monetary policy
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One motivation is the zero lower bound; another is “forward guidance”
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But GK characterization of monetary policy is still one-dimensional
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One motivation is the zero lower bound; another is “forward guidance”

But GK characterization of monetary policy is still one-dimensional

“Should we use the federal funds rate or the 1-year Treasury yield as the measure of monetary policy?”
Table 2. Tests of Number of Factors Characterizing Monetary Policy Announcements

<table>
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<th>H₀: Number of Factors Equals</th>
<th>Treasury Yields and Stock Prices</th>
<th>Futures Rates with ≤1 Year to Expiration</th>
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<tr>
<td></td>
<td>Wald Statistic</td>
<td>χ² Degrees of Freedom</td>
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<tr>
<td>0</td>
<td>46.72</td>
<td>15</td>
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<tr>
<td>1</td>
<td>21.41</td>
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<td>2</td>
<td>4.36</td>
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Note: Test is from Cragg and Donald (1997) and tests the null hypothesis of \(N_{H₀}\) factors against the alternative of \(N > N_{H₀}\) factors. Sample: January 1990–December 2004 (July 1991–December 2004 for Treasuries). Treasury yields comprise three-month, six-month, two-year, five-year, and ten-year yields, stock prices the S&P 500. Futures rates comprise one- and three-month-ahead federal funds futures rates (with scale adjustment for timing of FOMC meetings within the month) and two-, three-, and four-quarter-ahead eurodollar futures rates.
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<td>.011</td>
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<td>2</td>
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<td>4</td>
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<td>1</td>
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These two dimensions can be interpreted as:

- Changes in the federal funds rate
- Forward guidance: change in $ED4 \perp \Delta$ funds rate
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Since 2008, there is arguably a third dimension: QE
High-frequency responses to GSS forward guidance surprises:

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<td>0.27</td>
<td>(4.21)</td>
<td>0.02</td>
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<td>FF4</td>
<td>0.34</td>
<td>(4.95)</td>
<td>0.04</td>
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<tr>
<td>ED1</td>
<td>0.42</td>
<td>(6.16)</td>
<td>0.11</td>
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<td>0.69</td>
<td>(11.91)</td>
<td>0.35</td>
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<tr>
<td>ED3</td>
<td>0.87</td>
<td>(16.81)</td>
<td>0.53</td>
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<tr>
<td>ED4</td>
<td>1.00</td>
<td>(24.19)</td>
<td>0.71</td>
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Responses to Fed Funds Rate and Forward Guidance

- **Federal funds rate**
- **Forward guidance**

Graph showing the responses to Fed Funds Rate and Forward Guidance.
Figure 5: 1 year rate shock: Response of term premia and excess premia

First stage regression: F: 21.61 robust F: 17.26 R2: 7.78% Adjusted R2: 7.42%
Summary of Comments

1. GK analysis of credit spreads makes a lot of sense, is done very well
2. Could make even more use of high-frequency data
3. Assumption of unidimensional monetary policy is problematic
4. Term premium results driven by assumption that forward guidance is the only MP shock?
5. Technical quibbles:
   1. Use inflation, output factors (not CPI, IP)
   2. Start sample in 1984 (after reserves targeting)