The Effectiveness of Unconventional Monetary Policy at the Zero Lower Bound: A Cross-Country Analysis

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Motivation

- What are the macroeconomic effects of unconventional monetary policy during a crisis period when interest rates reach the zero lower bound?

  - Most empirical studies focus on financial market impact of unconventional policies, but do not address the macro effects (high frequency financial data)

  - Some studies assess macro effects, but based on models estimated over pre-crisis period

  - A few papers draw conclusions from the BoJ’s experience with QE, but it is not clear whether this can be generalized to a worldwide financial crisis
This paper

• Exploits cross-sectional dimension of unconventional monetary policies during the crisis

  – Derive effects of unconventional monetary policy shocks at the zero lower bound with a panel VAR estimated on monthly data from eight economies

  – Country coverage: United States, Euro Area, United Kingdom, Japan, Canada, Switzerland, Sweden and Norway

  – Sample period: 2008M1 – 2011M6
Crisis was an important common factor in all economies...

Some stylized facts
Some stylized facts

- ...and the conduct of monetary policy

- Note: design of unconventional monetary policies varied across and within economies
The case for a panel analysis

• Similarities across countries makes strong case for panel approach

• Enhances the power and efficiency of the empirical analysis given the relative short sample period

• Cross-country heterogeneity can be accommodated by appropriate choice of panel estimator
Panel VAR includes four variables

- (log) real GDP (interpolated)
- (log) consumer price index
- (log) central bank total assets
- Implied stock market volatility (VIX)
Central bank total assets represent the monetary policy instrument

- Interest rate rules implicitly replaced by quantitative reaction functions at ZLB
- Focus on unconventional monetary policy measures associated with expansion of liquidity supply
  - Captures bulk of unconventional measures
  - Should be seen as “stock effect” of central bank balance sheet policies
    - Use central bank total assets rather than monetary base as policy instrument (see Borio and Disyatat 2009)
    - Caveat: does not take into account possible composition effects of policies
Benchmark panel VAR

- Implied stock market volatility as a proxy for financial risk/uncertainty
  - Widely used indicator (“fear index”) and available for all countries
  - Reflects uncertainty/risk shocks as key driver of the crisis (e.g. Bloom 2009)
  - Important to disentangle exogenous innovations to central bank balance sheets from endogenous responses to financial market risk perceptions and uncertainty
Identification

<table>
<thead>
<tr>
<th>Output</th>
<th>Prices</th>
<th>CB total assets</th>
<th>VIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>&gt; 0</td>
<td>≤ 0</td>
</tr>
</tbody>
</table>

- Lagged impact of shocks to the balance sheet on output and prices
  - In line with VAR literature on conventional monetary policy
- Expansionary balance sheet shock does not increase stock market volatility
  - Complementary assumption that CB total assets increase in response to innovations to the VIX
Estimation of panel VAR

- Mean Group Estimator (MGE) proposed by Pesaran and Smith (1995)
  - Accommodates cross-country heterogeneities
  - Allowing for unobserved common factors across countries (Zellner’s Feasible GLS estimator for each variable)
  - Effectiveness of balance sheet shock assessed based on the mean impulse response and its distribution
Panel VAR – Dynamic effects of CB balance sheet shock

Output

Prices

VIX

Central bank total assets
Panel VAR – Dynamic effects of CB balance sheet shock

- Output and prices display a significant temporary increase
  - Response pattern of output is qualitatively very similar to conventional monetary policy shock (e.g. Christiano et al. 1999; Peersman and Smets 2003)

- Back-of-the-envelope calculation: exogenous doubling of balance sheet has similar effect as 300bp interest rate cut

- Impact on consumer prices less persistent compared to conventional shocks

- Peak effect of balance sheet shock about three times larger than peak effect on prices (for interest rate shock is this typically 1.5 times)

- Potentially due to convexity of AS-curve (e.g. Ball and Mankiw 1994)
Panel VAR – Variance decomposition of CB balance sheet
Panel VAR – Robustness checks

- Variations of the benchmark model
  - Fixed effects panel estimator versus MGE, monetary base versus central bank total assets and industrial production versus (interpolated) GDP

- Extensions of the benchmark model
  - Including the policy rate, public debt, equity prices or long-term interest rates

- Results are qualitatively always very similar
Fixed effects panel estimator

Output

Prices

VIX

Central bank total assets
Individual country results within panel VAR

Central bank total assets

- United States
- Euro area
- United Kingdom
- Japan
- Canada
- Switzerland
- Sweden
- Norway

Mean group panel VAR estimation
Individual country estimation
Individual country results within panel VAR

Output

- **United States**
- **Euro area**
- **United Kingdom**
- **Japan**
- **Canada**
- **Switzerland**
- **Sweden**
- **Norway**

*Mean group panel VAR estimation*

*Individual country estimation*
Individual country results within panel VAR

Prices

- United States
- Euro area
- United Kingdom
- Japan
- Canada
- Switzerland
- Sweden
- Norway

Mean group panel VAR estimation

Individual country estimation
Conclusions

• MGE panel VAR analysis covering eight advanced economies over the crisis period reveals that a positive CB balance sheet shock at the ZLB...

  – ... leads to a temporary significant rise in output and consumer prices

  – ... has qualitatively similar effects as an interest rate shock on output, but a less persistent and more subdued effect on the price level

• Individual country results suggest that there are no major differences of the effects across countries despite the heterogeneity of the measures that were taken