



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

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Motivation

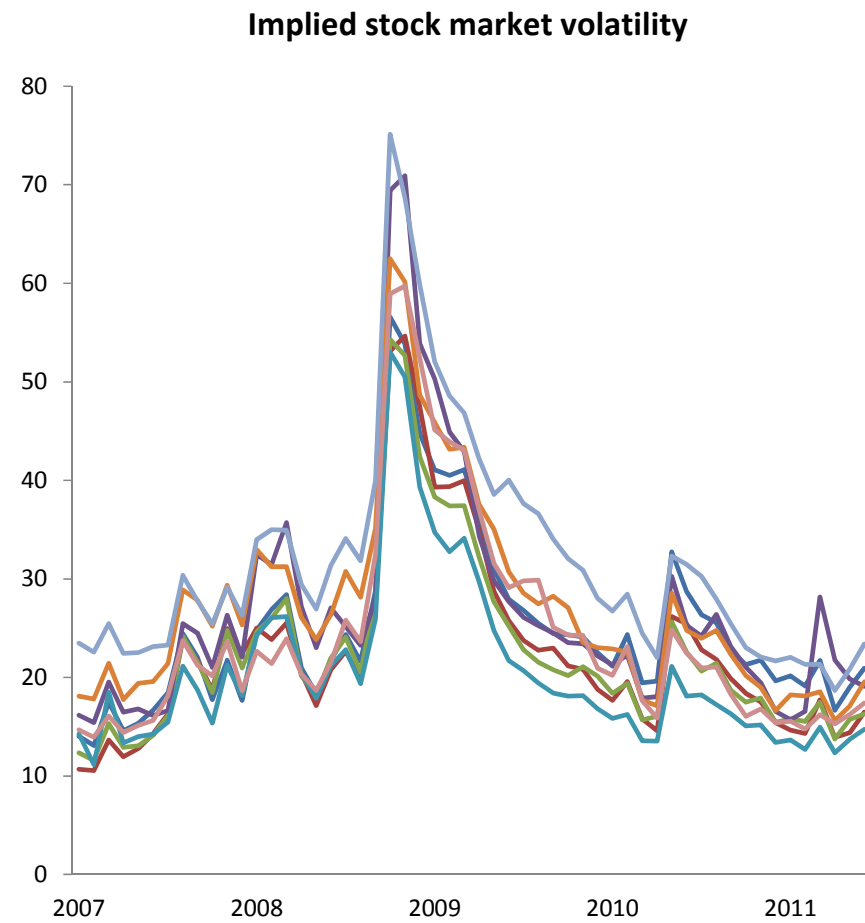
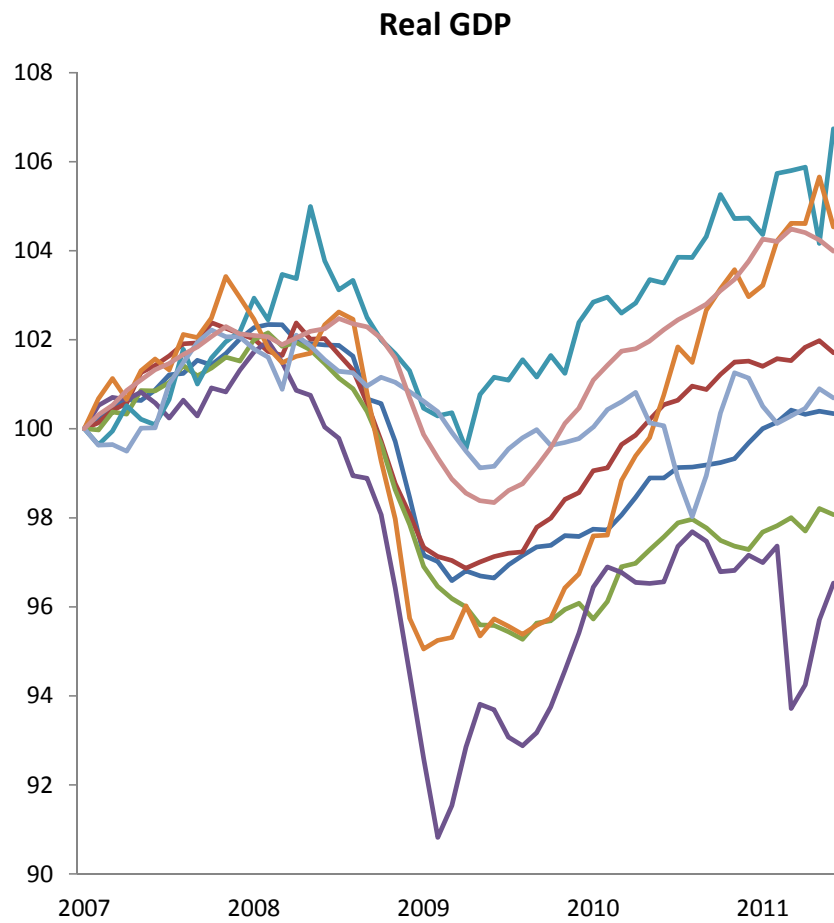
- What are the macroeconomic effects of unconventional monetary policy during a crisis period when interest rates reach the zero lower bound?
 - Most empirical studies focus on financial market impact of unconventional policies, but do not address the macro effects (high frequency financial data)
 - 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

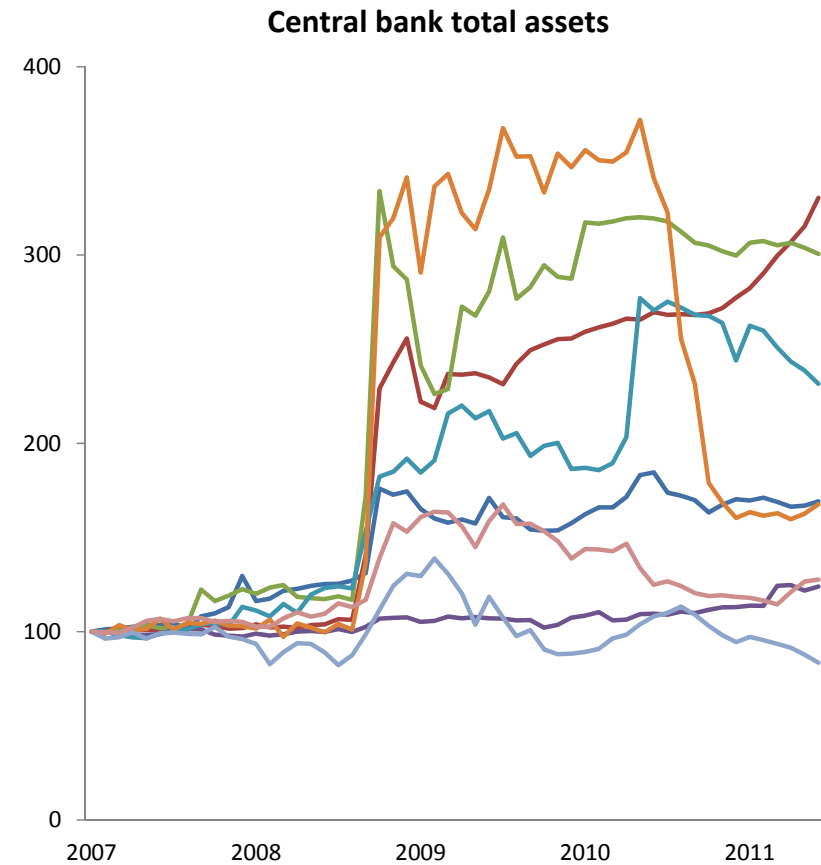
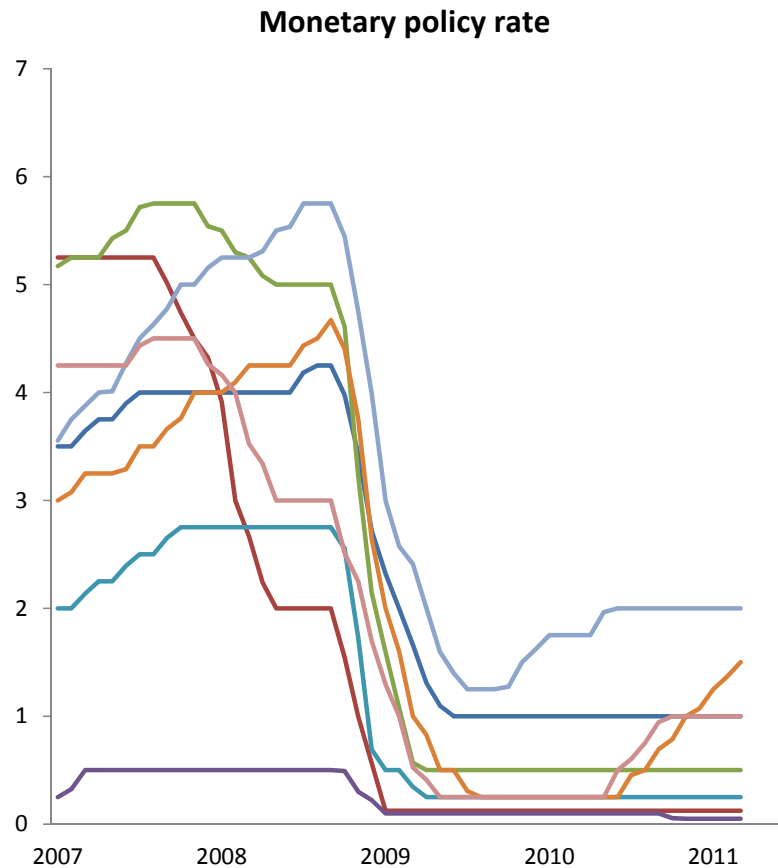
Some stylized facts

- Crisis was an important common factor in all economies...



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

Benchmark panel VAR

- Panel VAR includes four variables
 - (log) real GDP (interpolated)
 - (log) consumer price index
 - (log) central bank total assets
 - Implied stock market volatility (VIX)

Benchmark panel VAR

- 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

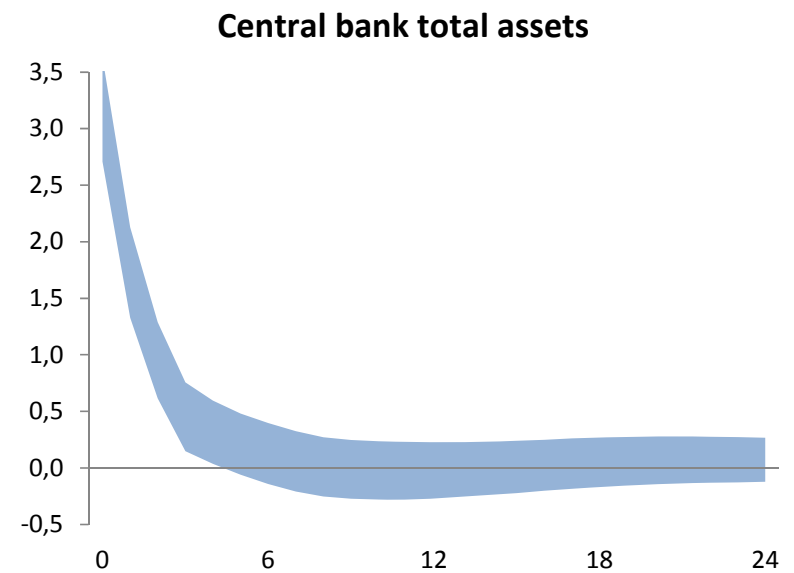
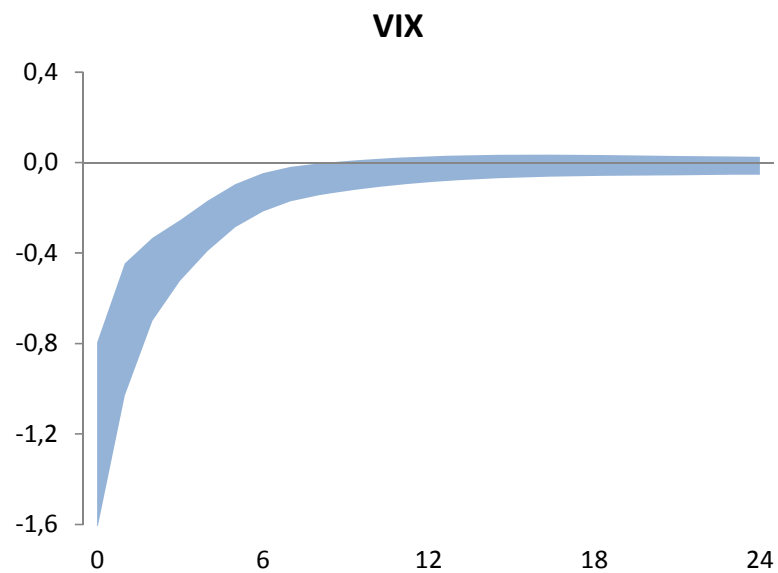
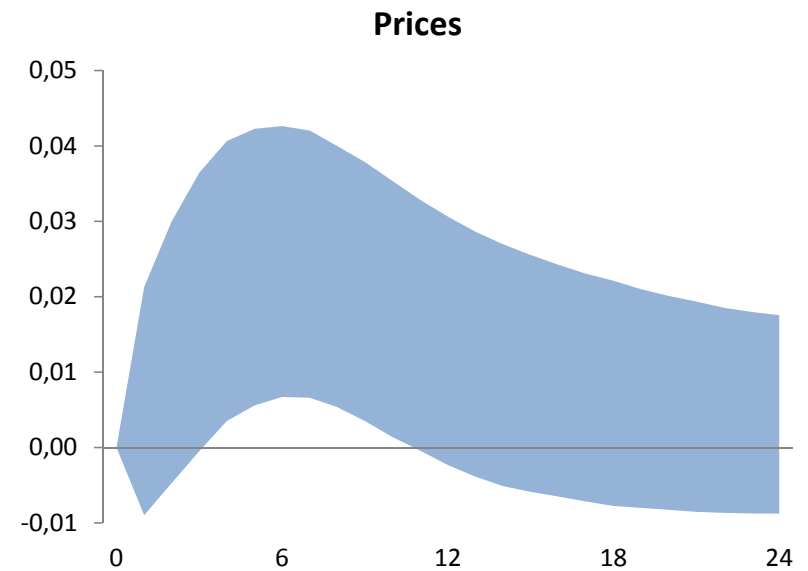
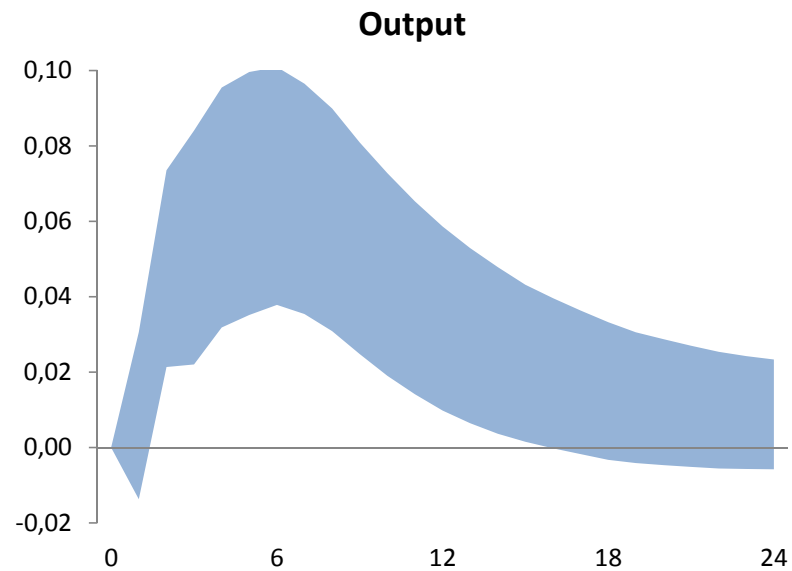
Output	Prices	CB total assets	VIX
0	0	> 0	≤ 0

- 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

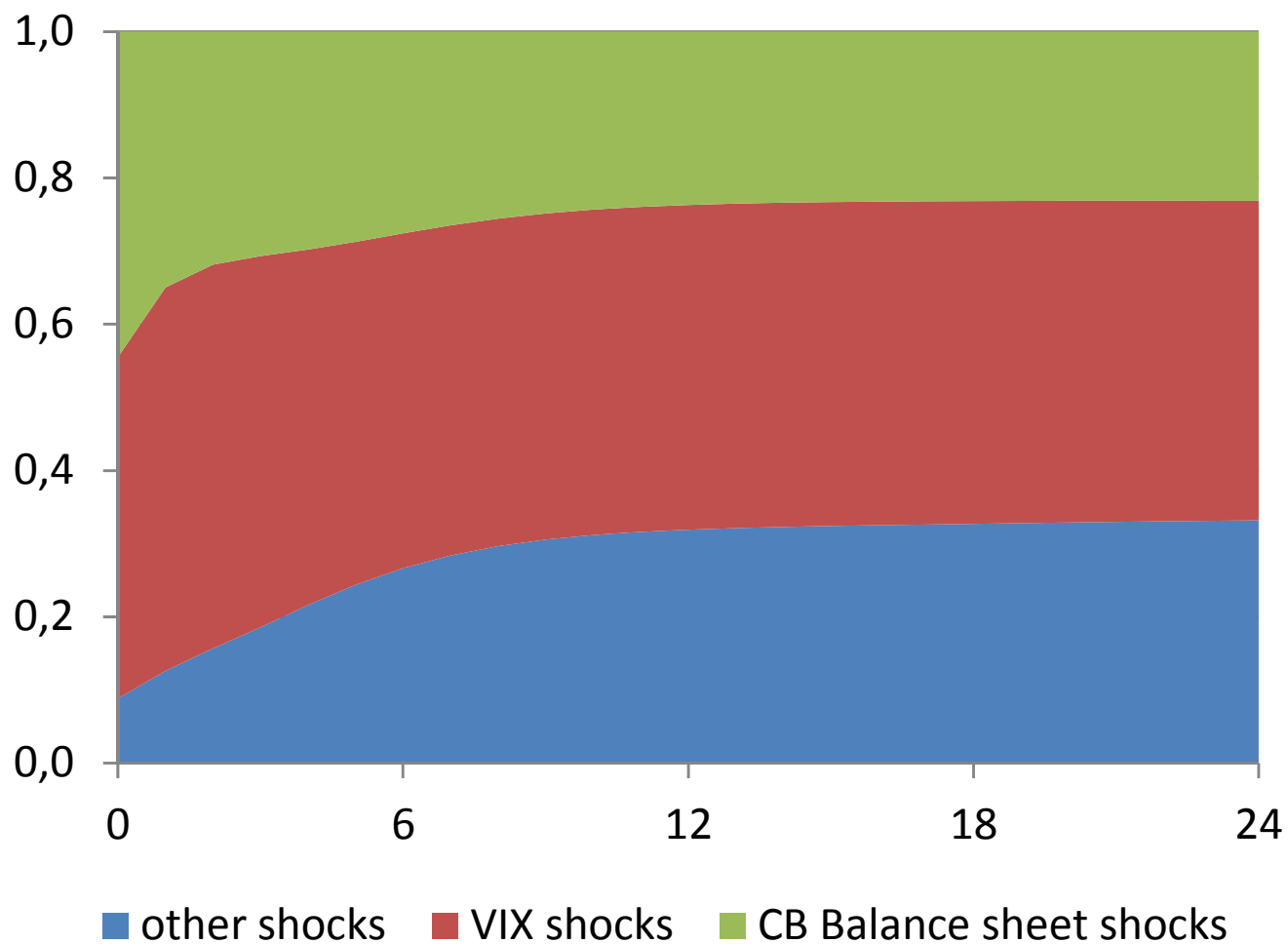
Panel VAR – Dynamic effects of CB balance sheet shock



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)

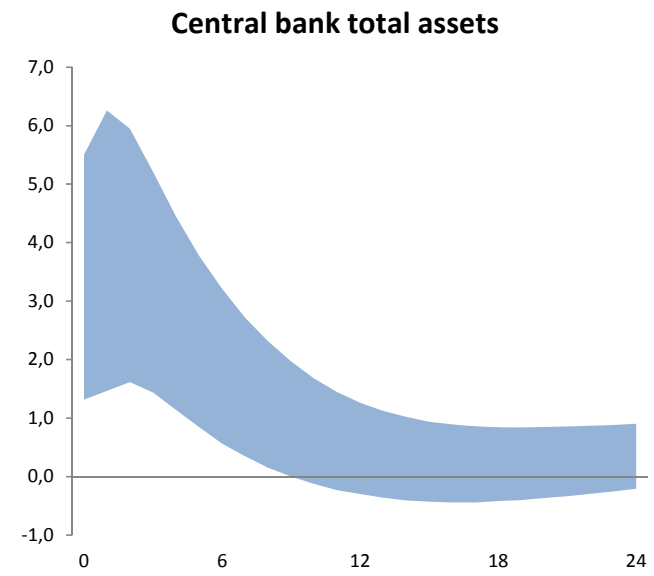
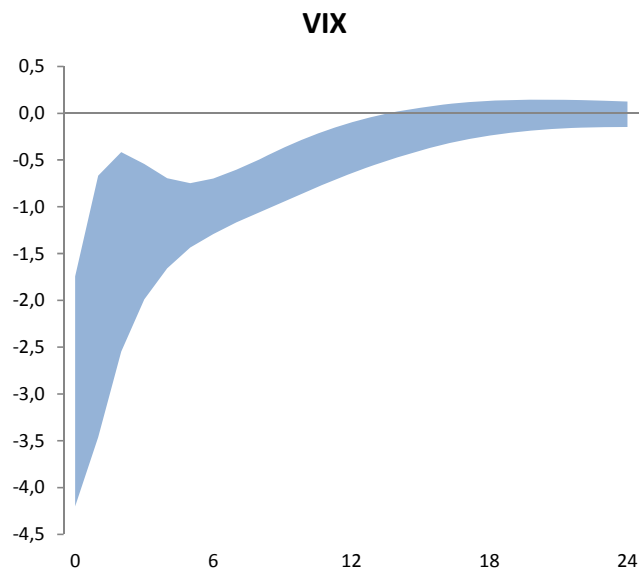
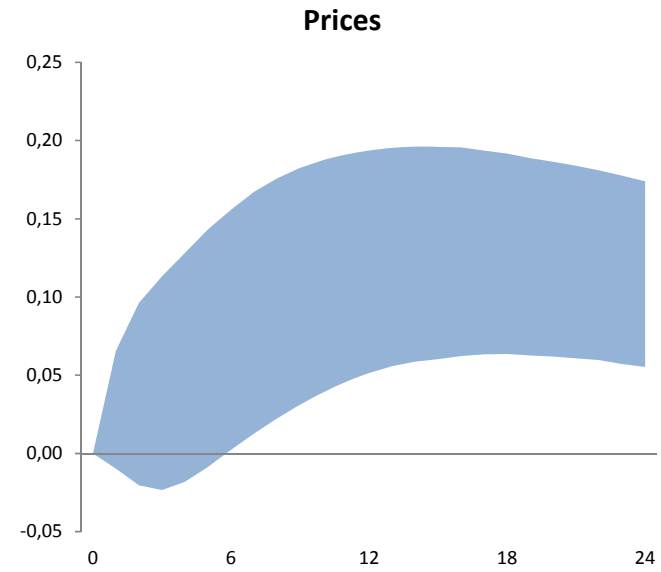
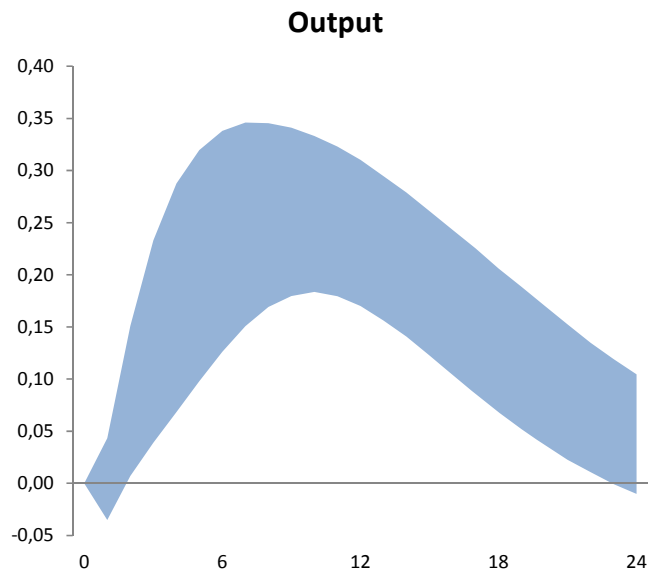
Panel VAR – Variance decomposition of CB balance sheet



Panel VAR – Robustness checks

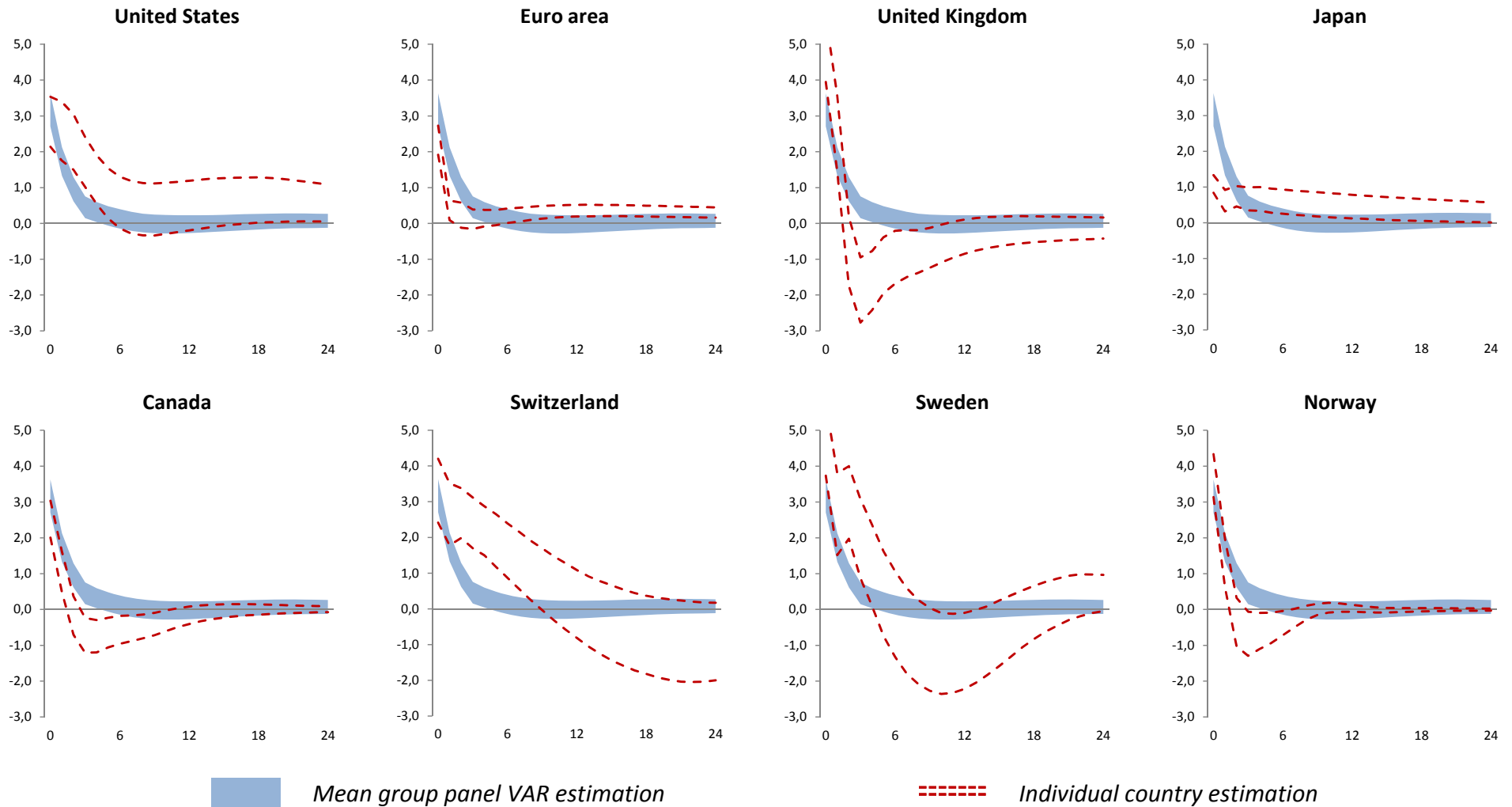
- Variations of the benchmark model
 - Fixed effects panel estimator versus MGE, monetary base versus central bank total assets and industrial production versus (interpolated) GDP
- Extensions of the benchmark model
 - Including the policy rate, public debt, equity prices or long-term interest rates
- Results are qualitatively always very similar

Fixed effects panel estimator



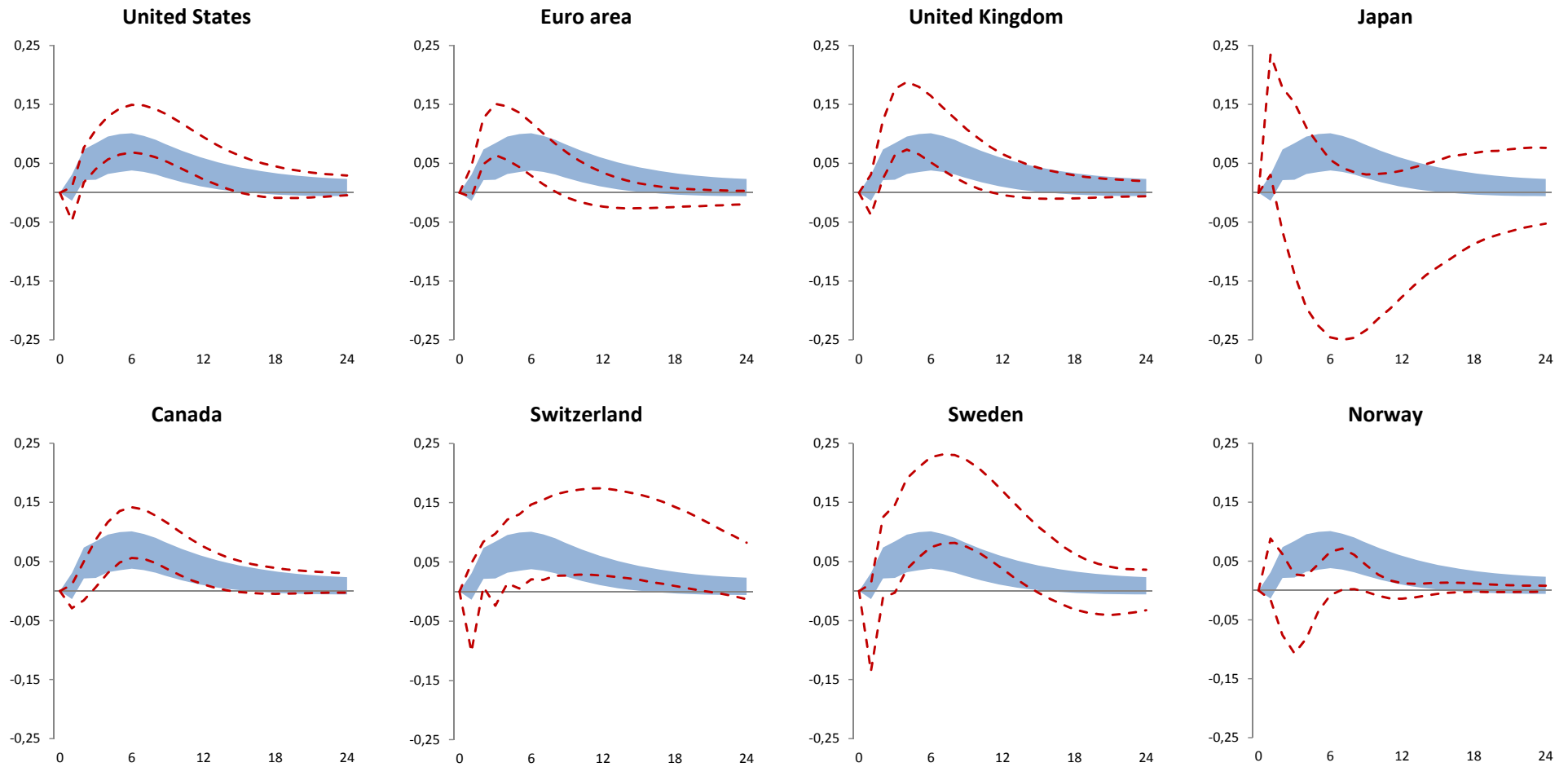
Individual country results within panel VAR

Central bank total assets



Individual country results within panel VAR

Output

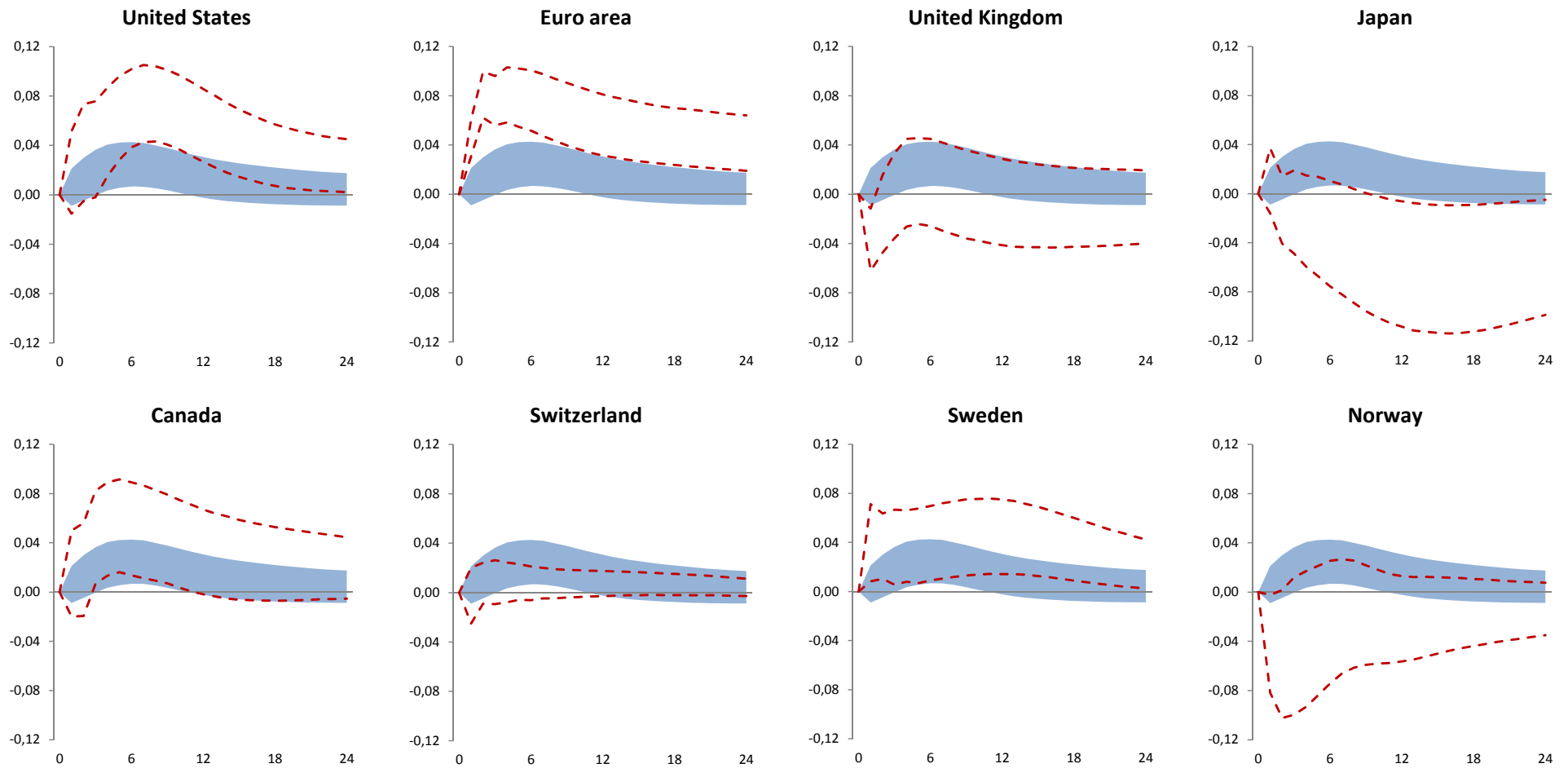



■ Mean group panel VAR estimation


----- Individual country estimation

Individual country results within panel VAR

Prices



 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