What are the macroeconomic effects of asset purchases?

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ECB conference on 'International Dimensions of Conventional and Unconventional Monetary Policy'
Frankfurt, Germany, April 30th 2014

Note: The views presented here are solely my own.

Introduction

- Following the 'Great Recession', central banks pursued unconventional monetary policies.

- But **do** they affect the real economy (output, prices)?

Overview

- All Current BVAR Studies of QE use restrictions on output and the price level to identify unconventional monetary policy shocks in their impulse response analysis.

- But whether QE actually affects output and prices is what we would actually like to test?

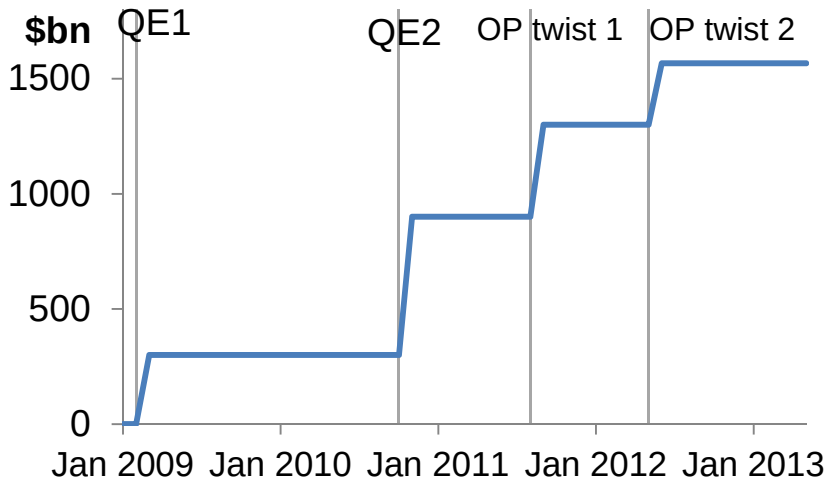
  - *In this paper we propose three different VAR identification schemes, all of which leave the response of output and prices unrestricted.*
  - *We use two different estimators (Litterman & Panel VAR prior) to examine robustness across estimation techniques*

Literature Review

Approach	Event (financial market Studies) of Large Scale Asset Purchases	Bayesian VAR studies
Studies	For the US: Gagnon et al (2011), D'amico and King (2010); Wright (2013) For the UK: Meier (2009); Joyce et al (2010)	US/UK: Baumeister et al (2012)/ Kapetanios et al (2012) ➔ **Use compression in spread shock as expansionary shock** For EA: Lenza et al (2010); Giannone et al (2012); Peersman (2011)
Overall Findings	QE announcements affect government bond yields/ corporate bond yields/ FX rates	Unconventional monetary policy (QE) has had an effect on output and prices
Short-comings/ Caveats	Difficult to infer real economy effect	Main hypothesis of interest: 'Does QE affect Output and Inflation?' *is imposed* in the impulse response analysis*, not tested*

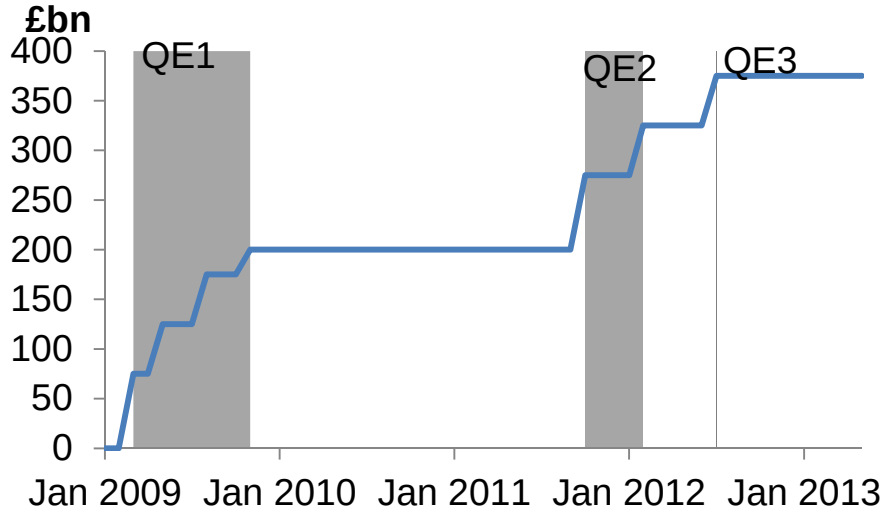
US and UK asset purchases

Chart 1: US Asset Purchase Announcements



Source: FOMC minutes.

Chart 2: UK Asset Purchase Announcements



Source: MPC minutes.

➔ For comparability, we focus on purchases of government debt only

➔ We focus on announcements, as oppose to actual purchases

➔ For the US, we treat OP Twist like QE (but results are robust to this assumption)

BVAR Model

- Estimate:

$$\boldsymbol{Y_{c,t} = \alpha_c + \sum_{k=1}^{L} A_{c,k} Y_{c,t-k} + e_{c,t}}$$

  - where $\boldsymbol{Y_{c,t}}$ is: the asset purchase announcement/GDP; the log of CPI; the log of real GDP; the yield on the 10-year government bond and the log of real equity prices
  - Use data from 2009m3 to 2013m5 (51 observations)

- Need to impose a prior to estimate on short sample:
  - Prior 1: Litterman ➔ Persistent variables are a random walk
  - Prior 2: Panel VAR ➔ Coefficients in US & UK have a common mean
  - Degree of shrinkage (extent to which prior is binding) is estimated from the data (Primiceri, Giannone & Lenza, 2013); (Jarocinski, 2010)

Identification (I)

- Use Choleski decomposition [Output/prices do not react contemporaneously to asset purchases] [Ident – I]
- Also use sign restrictions [rely on portfolio balance effect from event studies]. [Ident – II]

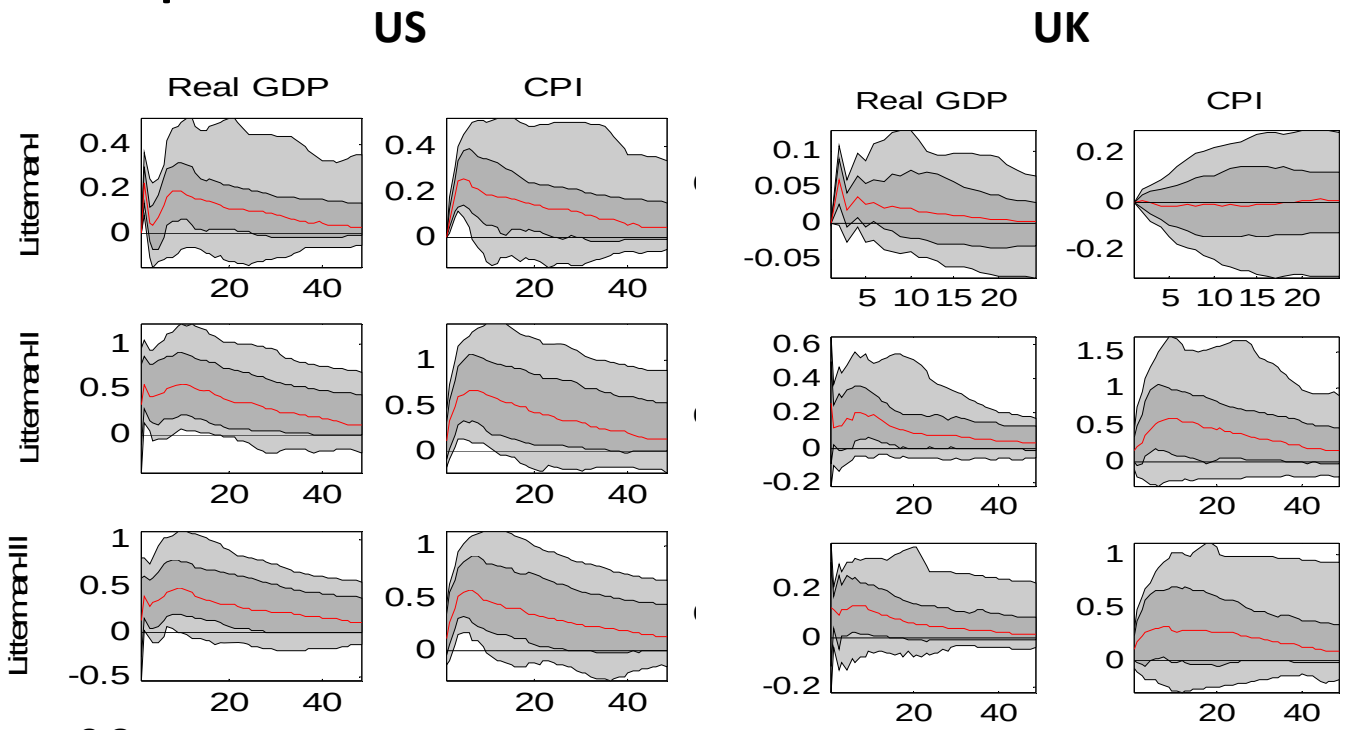
	Asset Purchase Anouncement	Log real GDP	Log CPI	Long interest rate	Real Stock Price
Supply Shock		≥ 0	$0 \leq$	≥ 0	≥ 0
Demand Shock		≥ 0	≥ 0	≥ 0	≥ 0
AP Shock	≥ 0	?	?	$0 \leq$	≥ 0

Identification (II)

- But MPC could have been reacting to rising uncertainty in the economy [Ident – III]
  - With help of zero restrictions, we can also identify an uncertainty shock

	Asset Purchase Anouncement	Log real GDP	Log CPI	Long interest rate	Real Stock Price
Supply Shock	0	≥ 0	$0 \leq$		
Demand Shock	0	≥ 0	≥ 0		
AP Shock	≥ 0				≥ 0
Uncertainty shock	≥ 0				$0 \leq$

Results - Output & price responses to 1% asset purchase announcement shock



Results with panel VAR prior are similar

The Quantitative estimates…

Model/ Variable	Litterman I	Litterman II	Litterman III	Panel I	Panel II	Panel III	Average across models
GDP (US)	0.23**	0.56**	0.47**	0.10*	0.49**	0.28*	.36
GDP (UK)	0.06*	0.26*	0.14*	0.08*	0.34**	0.21**	.18
CPI (US)	0.25**	0.67**	0.57**	0.02	0.45*	0.31*	.38
CPI (UK)	0.01	0.61*	0.31*	0.06*	0.45*	0.39**	.30
CPIexVAT (UK)	0.02	0.67**	0.41**	0.09*	0.43**	0.41**	0.34

Note: Individual cells show maximum response to an unexpected 1% rise in the asset purchase announcement/ GDP ratio. */** indicate significance at 68%/90% quantile bands

…are similar to previous work.

Study/ Variable	Baumeister and Benati (2013)	Kapetanios, Mumtaz, Stevens and Theodoris (2012)	Weale and Wieladek
Real GDP (US)	1.08		.72 (1.61@)
Real GDP (UK)	1.8	2.5	2.52
CPI (US)	.84		.76 (1.12@)
CPI (UK)	1.5	1.5	4.2

Note: Individual cells show maximum response in response to a 100 bps decline in the 10-year government bond yield. @ shows responses for model including announcements of purchases of mortgaged backed securities.

Robustness

- Result robust to including: Government budget balance; Public debt/GDP; Euro Area Spread; Real Oil Price; ECB Balance sheet as 6^{th} variable

- Using actual amount of assets purchased instead

- Putting smaller weight on operation Twist (.25); Including MBS and Openended QE anouncements

Include 6th variable to inspect transmission mechanism

Model/ Variable	Litterman I	Litterman II	Litterman III	Panel I	Panel II	Panel III
30 – Year GB Yield (US)	-*	-*	-*	-*	-*	-*
30 – Year GB Yield (UK)	-*		-*	-*		-*
OIS 24m ahead (US)	-*				-*	-*
OIS 24m ahead (UK)	-*	-*	-*	-*	-*	-*
MOVE (UK/US)	-*/	-*/	-*/	-*/-*	-*/-*	-*/-*
VIX (UK/US)	-*/-*	-*/-*	-*/-*	-*/-*	-*/-*	-*/-*

➔ Portfolio rebalancing channel (quantities matter) seems more relevant in the US

➔ Signalling channel (rates to stay lower for longer) more relevant in the UK

➔ QE reduces uncertainty in both countries (but only in UK for rate uncertainty)

Transmission to EMEs?

Model/ Variable	Litterman I	Litterman II	Litterman III	Panel I	Panel II	Panel III
EMBIG Spread (UK/US)	-*/	-*/-*	-*/	-*/	-*/-*	-*/-*
CEMBIG Spread (UK/US)	-*/-*	-*/-*	-*/-*	-*/	-*/-*	-*/-*
Real Stock Prices (UK/US)	+*/+*	/	/+*	+*/	+*/+*	+*/+*
EPFR Flows (UK/US)						
Capital Flows (UK/US)	/+*	/+*	/+*			
Industrial Production (UK/US)	/+*	+*/+*	+*/+*	+*/+*	+*/+*	+*/+*

➔ Sovereign (EMBIG)/Corporate (CEMBIG) spreads fall & Industrial production rises

➔ Usual story relies on push capital flows to EMEs, but is inconsistent with our results
➔ EME reaction may be due reduction in uncertainty in their target export markets

Conclusion

- The patient lives!
  - UK GDP Quantitative estimates similar to previous work, but CPI impact almost 3 times as large
- Transmission channels
  - Portfolio rebalancing more relevant for the US
  - Signalling more relevant for the UK
  - Reduction in uncertainty relevant for both countries
- Transmission to EMEs
  - Responses not consistent with push capital flows explanation ➔ alternative explanations for EME asset price reaction: Improvement in target market demand?

BVAR Technical Appendix

- Sample is short ➔ Use prior to adress that:
- Litterman (1986) prior:

$$E[(A_{ij,c,k})] = \begin{cases} \delta_i, & j = i\,, k = 1 \\ 0, & otherwise \end{cases} \qquad V[(A_{ij,c,k})] = \begin{cases} \frac{\lambda^2}{k^2}, & j = i\,, k = 1 \\ v\frac{\lambda^2}{k^2}\frac{\sigma_i^2}{\sigma_j^2}, & otherwise \end{cases}$$

Idea: non-stationary variables behave like a random walk

- Panel [Jarocinski, 2010] prior

$$E[(A_{ij,c,k})] = \{\bar{A}_{ij,k} \qquad V[(A_{ij,c,k})] = \{V$$

Idea: Country-specific coefficients are centred among common mean