Impact of Foreign Official Purchases of U.S. Treasuries on the Yield Curve

Erin L. Wolcott

Online Appendix

As in Hamilton and Wu (2012), the mapping between reduced-form and structural parameters follows:

$$
\begin{aligned}
&\phi^*_{mm} = [\rho_1\ \rho_2\ ...\ \rho_{12}] \\
&A^*_1 = A_1 - B_{1\ell}\rho_{\ell\ell}B^{-1}_{1\ell}A_1 \\
&\phi^*_{1m} = \begin{bmatrix} B^{(1)}_{1m} & 0 \end{bmatrix} - B_{1\ell}\rho_{\ell\ell}B^{-1}_{1\ell}\begin{bmatrix} B^{(0)}_{1m} & B^{(1)}_{1m} \end{bmatrix} \\
&\phi^*_{11} = B_{1\ell}\rho_{\ell\ell}B^{-1}_{1\ell} \\
&\psi^*_{1m} = B^{(0)}_{1m} \\
&A^*_2 = A_2 - B_{2\ell}B^{-1}_{1\ell}A_1 \\
&\phi^*_{2m} = B_{2m} - B_{2\ell}B^{-1}_{1\ell}B_{1m} \\
&\phi^*_{21} = B_{2\ell}B^{-1}_{1\ell} \\
&\text{Var}\begin{bmatrix} u^*_{mt} \\ u^*_{1t} \\ u^*_{2t} \end{bmatrix} = \begin{bmatrix} \Omega^*_m & 0 & 0 \\ 0 & \Omega^*_1 & 0 \\ 0 & 0 & \Omega^*_2 \end{bmatrix} = \begin{bmatrix} \Sigma_{mm}\Sigma'_{mm} & 0 & 0 \\ 0 & B_{1\ell}B'_{1\ell} & 0 \\ 0 & 0 & \Sigma_e\Sigma'_e \end{bmatrix},
\end{aligned}
$$

where $\hat{\Sigma}_{mm}$ is the Cholesky factorization of $\hat{\Omega^*_m}$ and $\hat{\Sigma}_e$ is the square root of the diagonal elements of $\hat{\Omega^*_2}$.[1] Additionally, A_1, A_2, B_1, B_2 are defined as:

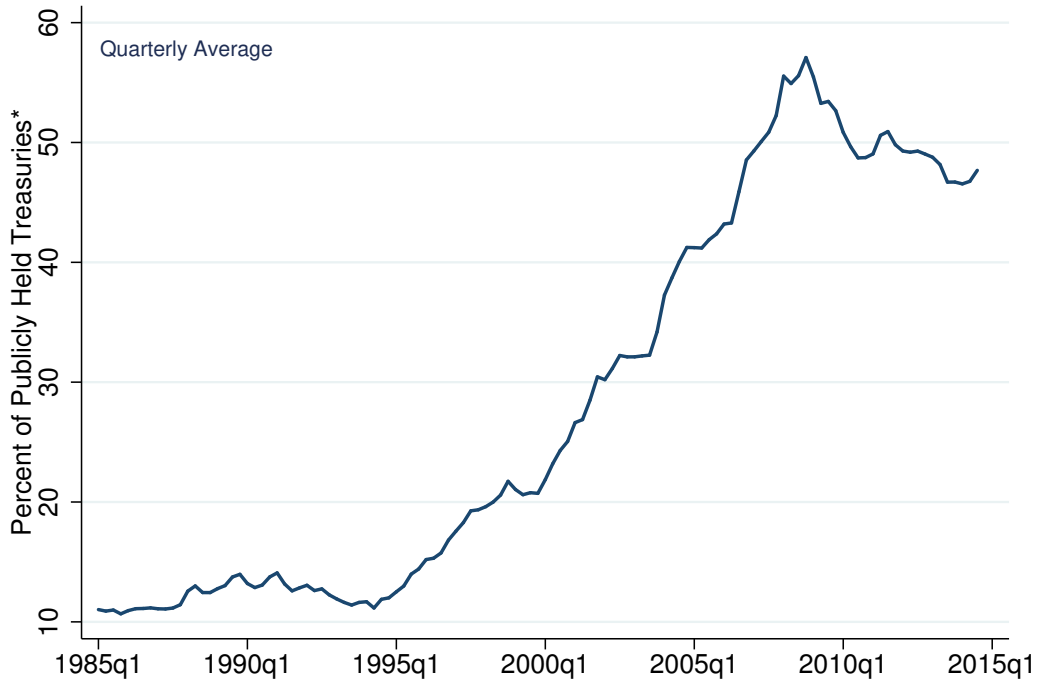
$$
\begin{bmatrix} A_1 \\ A_2 \end{bmatrix} = \begin{bmatrix} \alpha_{12} \\ \alpha_{36} \\ \alpha_{72} \\ \alpha_{24} \\ \alpha_{48} \\ \alpha_{60} \end{bmatrix},
$$

$$
\begin{bmatrix} B^{(0)}_{1m} & B^{(1)}_{1m} & B_{1\ell} \\ B^{(0)}_{2m} & B^{(1)}_{2m} & B_{2\ell} \end{bmatrix} = \begin{bmatrix} \beta'_{12} \\ \beta'_{36} \\ \beta'_{72} \\ \beta'_{24} \\ \beta'_{48} \\ \beta'_{60} \end{bmatrix},
$$

where for $i = 1, 2$, $B^{(0)}_{im}$ are (3×4) matrices relating the observed yields to the 4 contemporaneous macro factors. $B^{(1)}_{im}$ are (3×44) matrices relating the observed yields to 11 lags of the 4 macro factors. Lastly, $B_{i\ell}$ are (3×3) matrices relating the observed yields to the latent factors.

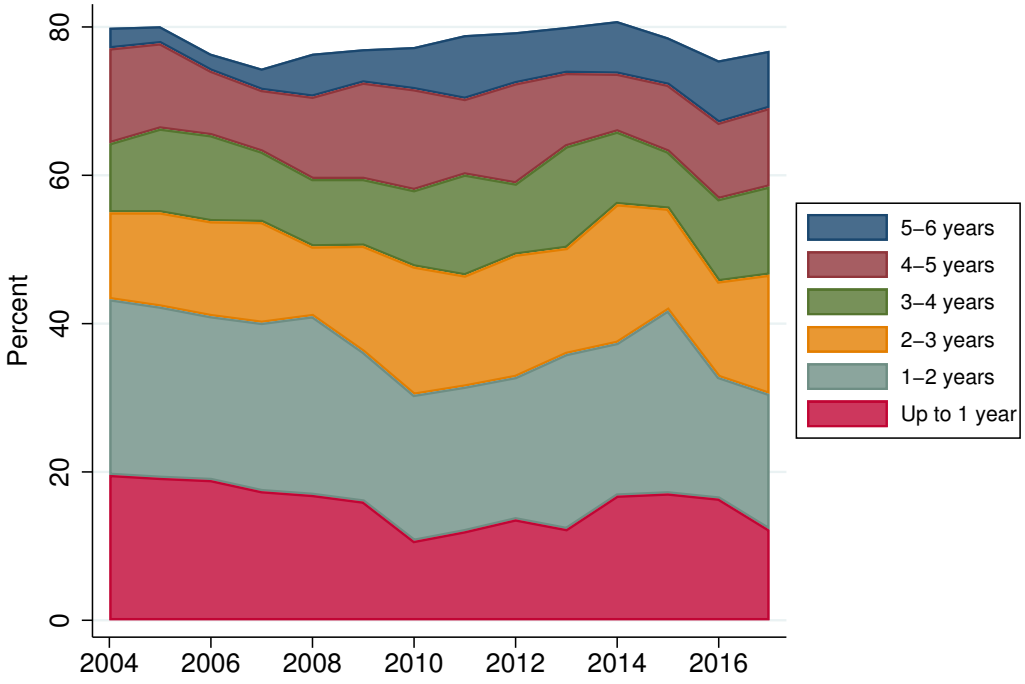
[1] Macro variables in f^m_t are ordered as follows: output growth, inflation, dollar appreciation, foreign official purchases scaled by publicly held Treasury notes and bonds outstanding.

Figure 1: Foreign Official Holdings of US Treasuries



*Excludes Treasury Bills. Sources: Bertaut and Tyron (2007), Bertaut and Judson (2014), CRSP.

Figure 2: Maturity Structure of Foreign Official Holdings of US Treasuries



Source: Treasury International Capital (TIC). Data reported as of June 30 that year.

Figure 3: Scaling Net Foreign Official Purchases by Treasuries Outstanding

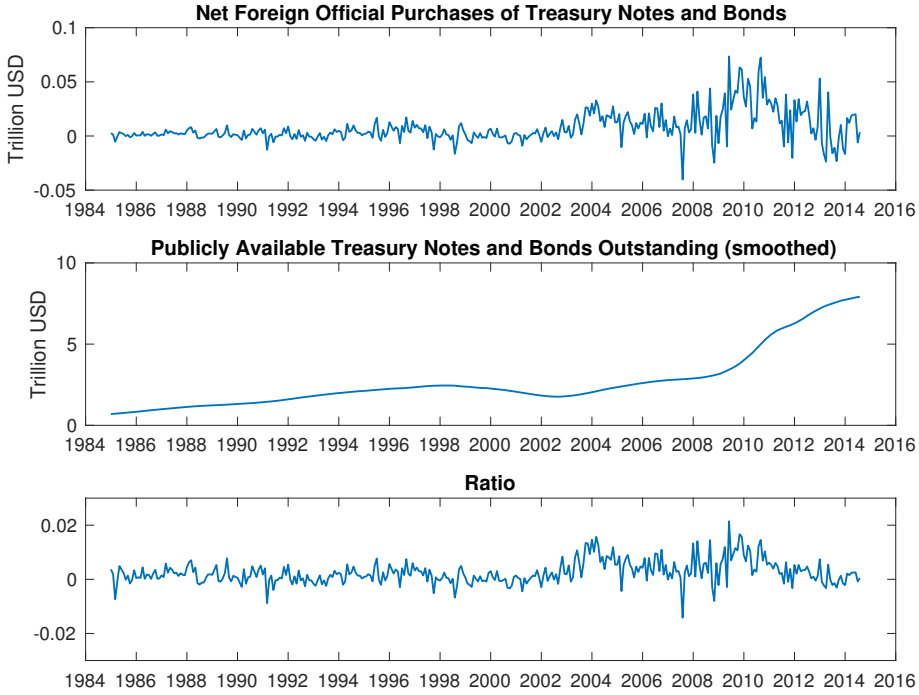
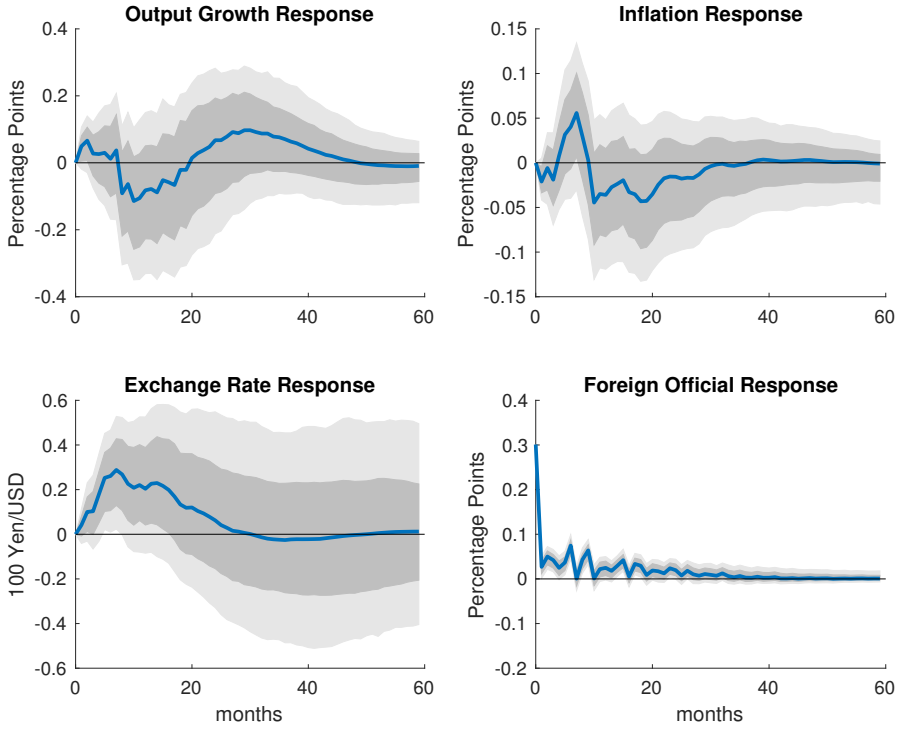


Figure 4: Response of Macro Variable SVAR to Foreign Official Purchase Shock*



*68% and 90% bootstrapped confidence intervals plotted

Figure 5: Impulse Response Functions with Total Foreign Purchases

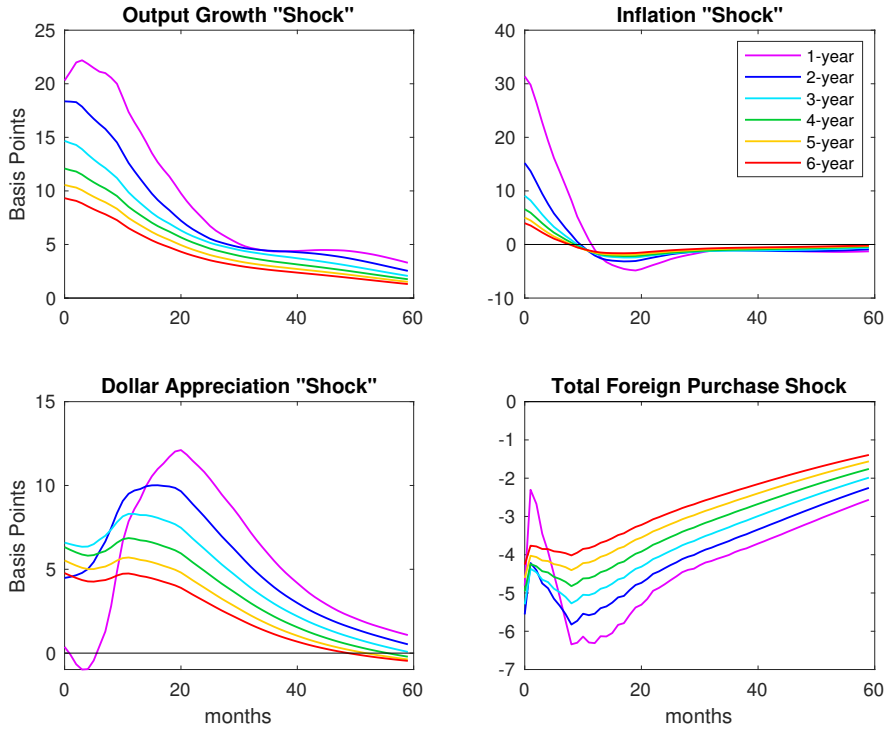
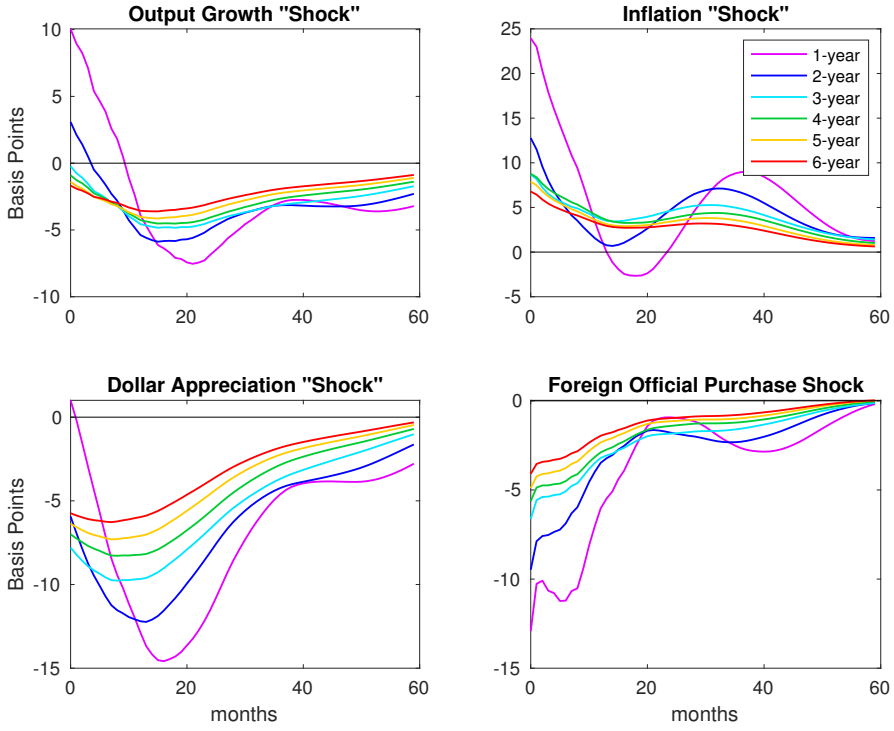


Figure 6: Impulse Response Functions Excluding the Great Recession*



*Sample period 1985m1-2007m11