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:

\[
\phi_{mm}^* = [\rho_1 \rho_2 \ldots \rho_{12}]
\]

\[
A_1^* = A_1 - B_1 t \rho_{tt} B_{1t}^{-1} A_1
\]

\[
\phi_{1m}^* = \begin{bmatrix} B_{1m}^{(1)} & 0 \end{bmatrix} - B_1 t \rho_{tt} B_{1t}^{-1} \begin{bmatrix} B_{1m}^{(0)} & B_{1m}^{(1)} \end{bmatrix}
\]

\[
\phi_{11}^* = B_1 t \rho_{tt} B_{1t}^{-1}
\]

\[
\psi_{1m} = B_{1m}^{(0)}
\]

\[
A_2^* = A_2 - B_2 t B_{2t}^{-1} A_1
\]

\[
\phi_{2m}^* = B_{2m} - B_2 t B_{1t}^{-1} B_{2m}
\]

\[
\phi_{21}^* = B_{2t} B_{2t}^{-1}
\]

\[
\text{Var} \begin{bmatrix} u_{mt}^* \\ u_{tt}^* \\ u_{2t}^* \end{bmatrix} = \begin{bmatrix} \Omega_m^* & 0 & 0 \\ 0 & \Omega_t^* & 0 \\ 0 & 0 & \Omega_2^* \end{bmatrix} = \begin{bmatrix} \Sigma_{mm} \Sigma_{mt}^t & 0 & 0 \\ 0 & B_{1t} B_{1t}^t & 0 \\ 0 & 0 & \Sigma_e \Sigma_e^t \end{bmatrix},
\]

where \( \hat{\Sigma}_{mm} \) is the Cholesky factorization of \( \Omega_m^* \) and \( \hat{\Sigma}_e \) is the square root of the diagonal elements of \( \Omega_2^* \).

Additionally, \( A_1, A_2, B_1, B_2 \) are defined as:

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

\[
\begin{bmatrix} B_{1m}^{(0)} & B_{1m}^{(1)} & B_{1t} \\ B_{2m}^{(0)} & B_{2m}^{(1)} & B_{2t} \end{bmatrix} = \begin{bmatrix} \beta_{12}^t \\ \beta_{36}^t \\ \beta_{72}^t \\ \beta_{24}^t \\ \beta_{48}^t \\ \beta_{60}^t \end{bmatrix},
\]

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

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1 Macro variables in \( f_m \) 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.

Quarterly Average

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*
Figure 5: Impulse Response Functions with Total Foreign Purchases

Figure 6: Impulse Response Functions Excluding the Great Recession*

*Sample period 1985m1-2007m11