

# Gone with the Wind: Monetary Policy and the Global Financial Cycle

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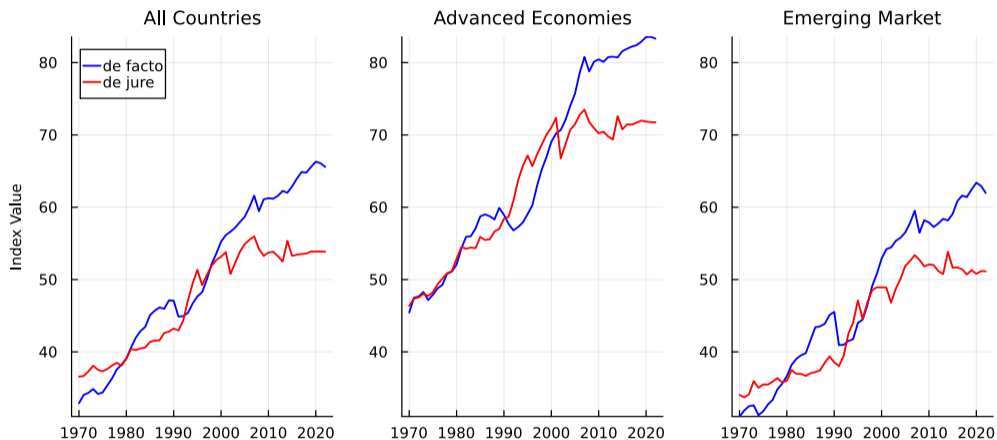
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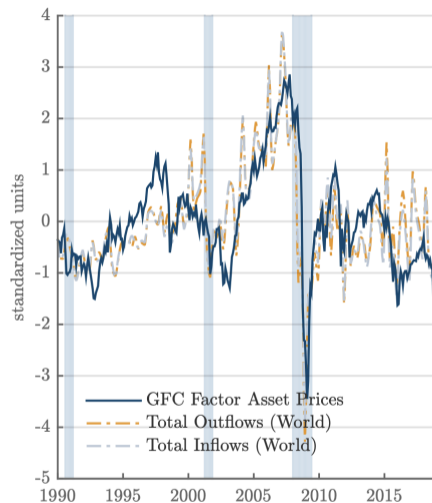
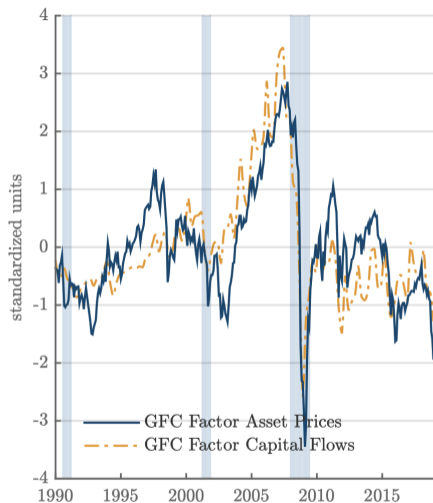
# Introduction

# International financial integration over time



NOTE. Financial integration indices based on the KOF Globalisation Index (Gygli et al., 2019).

# Global factors in asset prices and capital flows



NOTE. [Left] Global factor in risky asset prices against the first global factor in capital flows. [Right] Global factor in risky asset prices against total gross inflows and outflows (Miranda-Agrippino and Rey, 2022).

# Trilemma or Dilemma?

- ▶ How should monetary policy be set in a financially integrated world?
- ▶ Convention: **Mundellian Trilemma** (Obstfeld, Shambaugh, and Taylor, 2005; Obstfeld, 2015) – pick two:
  - (a) Independent monetary policy
  - (b) Exchange rate stability
  - (c) Free international capital mobility
- ▶ Challenge: **Dilemma** (Rey, 2015, 2016; Miranda-Agrippino and Rey, 2020)
  - \* Exchange rate regime is irrelevant
  - \* US monetary policy spills over regardless
- ▶ Pushback: Trilemma persists, but trade-offs worsen (Obstfeld, Ostry, and Qureshi, 2019)

# This paper

- ▶ Shows how global financial shocks (from US) affect a small open economy (SOE), and the role of exchange rate regime
- ▶ Test Rey vs. Obstfeld using Korean and US data
- ▶ SOE New Keynesian DSGE with:
  - \* Cross-border interbank borrowing in foreign currency
  - \* Banker moral hazard  $\Rightarrow$  occasionally binding incentive constraint
  - \* Banks holding central bank reserves
- ▶ Three contributions:
  - (i) **Methodological:** Bayesian estimation of an SOE DSGE with an occasionally binding constraint
  - (ii) Ties Rey (2015), Dedola, Rivolta, and Stracca (2017), and Degasperi, Hong, and Ricco (2023)'s evidence to SOE macro theory
  - (iii) Frequency of financial crises across FX regimes *with* precautionary savings

# Main findings

- ▶  $R^*$  ↑ (global financial shock) ⇒ Korean GDP ↓ despite Won depreciation
  - \* Empirical VAR-IV and estimated DSGE agree
  - \* Export channel is *not* a sufficient buffer
- ▶ Bank balance sheets are the binding transmission channel
  - \* ICC binds ⇒ financial accelerator amplifies the recession
- ▶ Exchange rate regime matters ⇒ Mundellian Trilemma persists
  - \* Crisis frequency: **10.55%** (peg) → **4.20%** (baseline managed float) → **1.75%** (float)
  - \* With precautionary savings: **7.23 / 3.82 / 1.68%**
- ▶ Float does not eliminate spillovers ⇒ role for macroprudential policy

# Related literature

## ▶ **Closest papers: NK DSGEs with international banking**

- \* Aoki, Benigno, and Kiyotaki (2020), Gourinchas (2018), Akinci and Queralto (2023), and Cesa-Bianchi, Ferrero, and Li (2023)

## ▶ **Spillovers of US monetary policy**

- \* “When the Fed sneezes...”
- \* Rey (2015, 2016), Dedola, Rivolta, and Stracca (2017), Cesa-Bianchi, Ferrero, and Rebucci (2018), Iacoviello and Navarro (2019), Miranda-Agrippino and Rey (2020), and Degasperis, Hong, and Ricco (2023)

## ▶ **Financial frictions and the real economy**

- \* Kiyotaki and Moore (1997), Bernanke, Gertler, and Gilchrist (1999), Gertler and Kiyotaki (2010), Gertler and Karadi (2011), Gertler and Kiyotaki (2015), Bocola (2016), Akinci et al. (2023), and Shchapov (2025)

## ▶ **Financial crises and the small open economy**

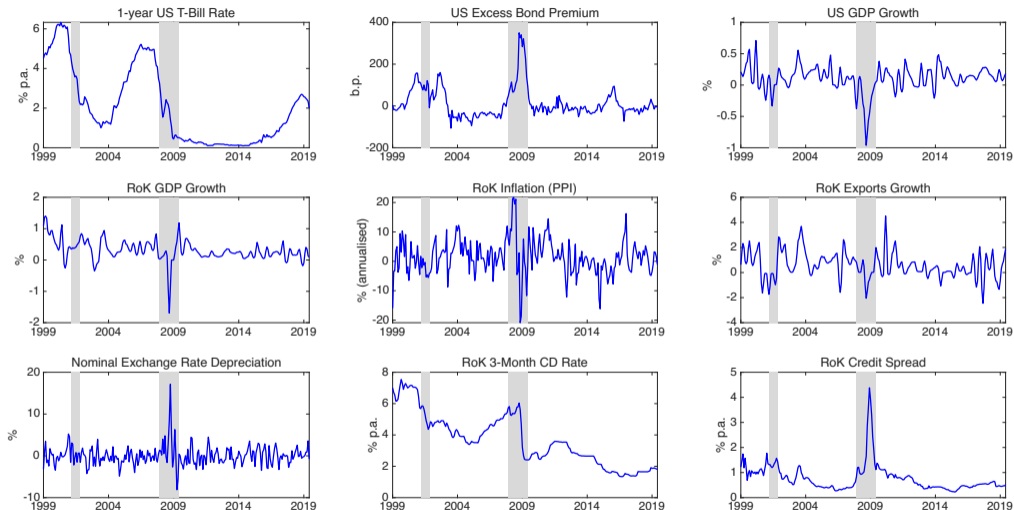
- \* Gertler, Gilchrist, and Natalucci (2007), Mendoza (2010), Christiano, Trabandt, and Walentin (2011), and Bianchi (2011)

## ▶ **Solving and estimating OBC models**

- \* Guerrieri and Iacoviello (2015), Holden (2019), Giovanni, Pfeiffer, and Ratto (2021), and Planas, Ratto, and Rossi (2015)

# Empirical Motivation

# Observables: Korean and US data (1999.01–2019.06)



NOTE. Monthly data. Korean policy rate proxied by the 3-month interbank rate; Korean corporate spread is the 3-year AA- corporate minus government yield. Won is on a direct quote basis.

# VAR setup and identification

- ▶ Estimate a VAR( $p$ ):

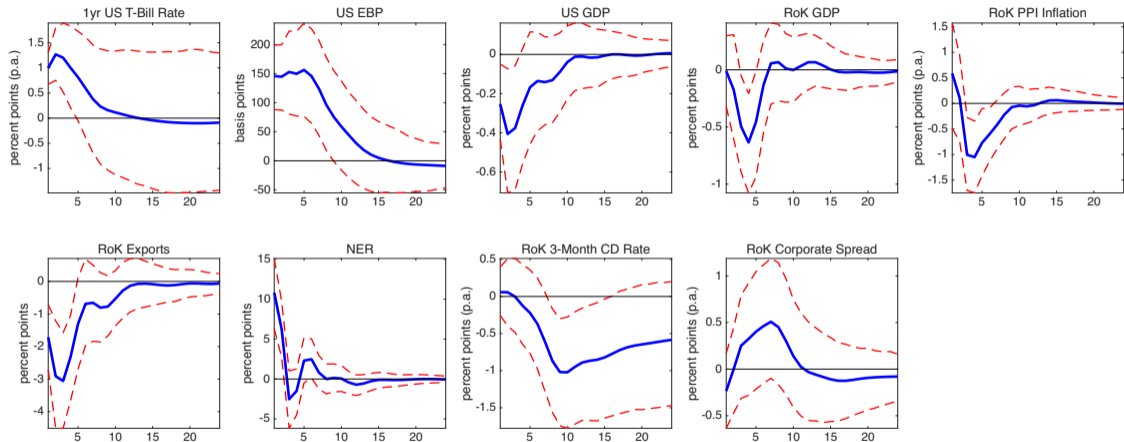
$$\mathbf{Y}_t = \boldsymbol{\alpha} + \sum_{j=1}^p \mathbf{Y}_{t-j} \boldsymbol{\Phi}_j + \mathbf{U}_t, \quad \mathbf{U}_t \stackrel{\text{IID}}{\sim} \mathcal{N}(\mathbf{o}, \boldsymbol{\Sigma}),$$

with

$$\mathbf{Y} = \left[ i^* \quad EBP^* \quad \Delta y^* \quad \Delta y \quad \pi \quad ex \quad \varepsilon \quad i \quad S \right]$$

- ▶ Identify a US monetary shock via the external instrument  $\varepsilon_{m,t}^*$  from Jarociński and Karadi (2020), two-stage as in Gertler and Karadi (2015)
- ▶ Include the excess bond premium (Gilchrist and Zakrajšek, 2012)
- ▶  $p = 3$

# VAR impulse responses: contractionary US monetary policy shock



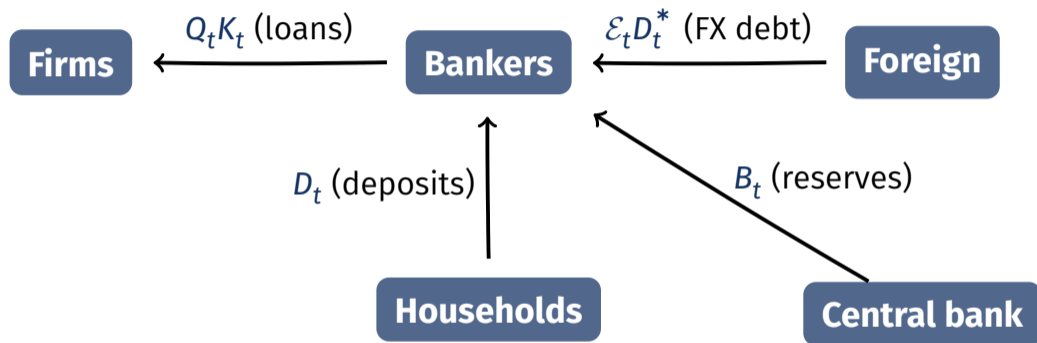
NOTE. IRFs to a surprise US monetary policy contraction. Responses are scaled to a 1% annual increase in the US 1-year T-Bill rate on impact. NER is on a direct quote basis. Blue line is the point estimate; dashed red lines are 90% credible intervals. [▶ Appendix: Cholesky vs IV](#)

# DSGE Model

# Model overview I

- ▶ Small open economy New Keynesian model with international banking
- ▶ Three optimising agents:
  - \* **Households:** consume, work, save in deposits; banker/worker split with full insurance
  - \* **Bankers:** intermediate domestic deposits, cross-border interbank borrowing ( $\mathcal{E}_t D_t^*$ ), and reserves ( $B_t$ ); face moral-hazard ICC (Gertler and Kiyotaki, 2010; Gertler and Karadi, 2011)
  - \* **Firms:** Monopolistically competitive with Rotemberg pricing, CRS in  $K, M, L$
- ▶ Policy:
  - \* Central bank: inertial Taylor rule with exchange-rate response  $\phi_E$
  - \* Government: balanced budget; reserves  $B_t = \Gamma(K_t)$
- ▶ Foreign block:  $3 \times 3$  VARX in  $\{Y^*, \pi^*, R^*\}$ ; debt-elasticity in  $R^*$

# Model overview II



# Households

- ▶ Rep. HH w/ workers and bankers; perfect within-household insurance
- ▶ **GHH+** preferences (Auclert, Bardóczy, and Rognlie, 2023)

$$\max_{(C_t, L_t, D_t)} \mathbb{E}_t \sum_{s=0}^{\infty} \beta^s u(C_{t+s}, L_{t+s}; \xi_{t+s}^h)$$

- ▶ Period budget constraint:

$$C_t + D_t = w_t L_t + \Pi_t^P + RR_t^d D_{t-1} + \tau_t$$

- ▶ All financial flows are intermediated by banks

▶ Functional forms

# Bankers I

- ▶ Continuum of bankers; survive each period w.p.  $\sigma_b$
- ▶ Startup capital: fraction  $\gamma$  of household assets
- ▶ Choose: loans  $Q_t K_{j,t}$ , reserves  $B_{j,t}$ , domestic deposits  $D_{j,t}$ , foreign deposits  $D_{j,t}^*$  to max franchise value:

$$V_{j,t}^b = \mathbb{E}_t \sum_{s=0}^{\infty} \sigma_b^s \left( \Lambda_{t,t+1+s} (1 - \sigma_b) N_{j,t+1+s} + \Lambda_{t,t+s} \zeta_{t+s} B_{j,t+s} \right)$$

- ▶  $\zeta_t$ : AR(1) safe-asset preference shock (Krishnamurthy and Vissing-Jorgensen, 2012; Akinci et al., 2023)
- ▶ FX risk:  $\mathcal{E}_t = E_t P_t^* / P_t$  (units of home currency per unit foreign)

# Bankers II

- ▶ Bank  $j$ 's balance sheet:

Assets	Liabilities + Equity
Loans $Q_t K_{j,t}$	Deposits $D_{j,t}$
Reserves $B_{j,t}$	Foreign debt $\mathcal{E}_t D_{j,t}^*$
	Net worth $N_{j,t}$

- ▶ Flow of funds:

$$N_{j,t} = R_t^k Q_{t-1} K_{j,t-1} + RR_t B_{j,t-1} - RR_t^d D_{j,t-1} - RR_t^* \mathcal{E}_t D_{j,t-1}^*$$

## Bankers III

- ▶ Moral hazard (Gertler and Kiyotaki, 2010; Gertler and Karadi, 2011):
- ▶ Each period a banker can abscond with fraction  $\Theta(\cdot)$ :

$$\Theta_j(x_{j,t}, x_{j,t}^b) = \theta_0 \left[ 1 + \frac{\theta}{2} x_{j,t}^2 - \frac{\theta_b}{2} (x_{j,t}^b)^2 \right]$$

- ▶  $\Rightarrow$  Incentive compatibility constraint (ICC):

$$V_{j,t}^b \geq \Theta_j(x_{j,t}, x_{j,t}^b) (Q_t K_{j,t} + B_{j,t})$$

# Rewriting the banker's problem

- ▶ Normalise by net worth and define

$$\psi_t \equiv \frac{V_t^b}{N_t}, \quad \phi_t = \frac{Q_t K_t + B_t}{N_t}, \quad x_t = \frac{\varepsilon_t D_t^*}{Q_t K_t + B_t}, \quad x_t^b = \frac{B_t}{Q_t K_t + B_t}$$

- ▶ Banker's problem:

$$\psi_t = \max_{\phi_t, x_t, x_t^b} \{ \tilde{\mu}_t \phi_t + v_t \}$$

subject to the incentive compatibility constraint

$$\psi_t \geq \Theta(x_t, x_t^b) \phi_t$$

- ▶ Total excess return  $\tilde{\mu}_t \equiv \mu_t(1 - x_t^b) + (\mu_t^b + \zeta_t)x_t^b + \mu_t^* x_t$

▶ Banker FOCs

# Rewriting the banker's problem

- ▶ Normalise by net worth and define

franchise value

$$\psi_t \equiv \frac{V_t^b}{N_t}, \quad \phi_t \equiv \frac{Q_t K_t + B_t}{N_t}, \quad x_t \equiv \frac{\varepsilon_t D_t^*}{Q_t K_t + B_t}, \quad x_t^b = \frac{B_t}{Q_t K_t + B_t}$$

leverage

- ▶ Banker's problem:

FX funding ratio

$$\psi_t = \max_{\phi_t, x_t, x_t^b} \{ \tilde{\mu}_t \phi_t + v_t \}$$

subject to the incentive compatibility constraint

$$\psi_t \geq \Theta(x_t, x_t^b) \phi_t$$

- ▶ Total excess return  $\tilde{\mu}_t \equiv \mu_t(1 - x_t^b) + (\mu_t^b + \zeta_t)x_t^b + \mu_t^* x_t$

▶ Banker FOCs

## Occasionally binding constraint and the slackness condition

- ▶ Define the leverage gap  $\tilde{\phi}_t \equiv \bar{\phi}_t - \phi_t$  with  $\bar{\phi}_t = u_t / [\Theta(x_t, x_t^b) - \tilde{\mu}_t]$
- ▶ Slackness:

$$o = \min \{ \tilde{\mu}_t, \tilde{\phi}_t \}$$

- ▶ **Slack** ( $\tilde{\phi}_t > o$ ): frictionless intermediation; spread driven by safe-asset preference

$$\mathbb{E}_t \Omega_{t,t+1} (R_{t+1}^k - RR_{t+1}) = \zeta_t$$

- ▶ **Binding** ( $\tilde{\mu}_t > o$ ): financial stress; spreads widen

$$\mathbb{E}_t \Omega_{t,t+1} (R_{t+1}^k - RR_{t+1}) > \zeta_t$$

- ▶ Estimation handled by piecewise-linear Kalman filter (Planas, Ratto, and Rossi, 2015; Giovanni, Pfeiffer, and Ratto, 2021) + OccBin (Guerrieri and Iacoviello, 2015)

# Firms, investment, and the Phillips curve

- ▶ Final good aggregator; intermediate firms produce CRS in  $\{K, M, L\}$
- ▶ Rotemberg pricing  $\Rightarrow$  NKPC:

$$(\pi_t - 1)\pi_t = \frac{1}{\kappa} [1 - \eta + (\eta - 1)\mathcal{M}_t MC_t] + \mathbb{E}_t \Lambda_{t,t+1} \frac{Y_{t+1}}{Y_t} (\pi_{t+1} - 1)\pi_{t+1}$$

- ▶ Standard LoM for capital  $K_t$
- ▶ Investment FOC (Tobin's  $Q$ ):

$$Q_t \xi_t^I = 1 + \Phi\left(\frac{l_t}{l_{t-1}}\right) + \frac{l_t}{l_{t-1}} \Phi'\left(\frac{l_t}{l_{t-1}}\right) - \mathbb{E}_t \Lambda_{t,t+1} \left(\frac{l_{t+1}}{l_t}\right)^2 \Phi'\left(\frac{l_{t+1}}{l_t}\right)$$

# Foreign block and exports

- ▶ Exports respond to RER and foreign demand:

$$EX_t = \varepsilon_t^{\eta_x} Y_t^*$$

- ▶ Foreign variables  $\{Y_t^*, \pi_t^*, R_t^*\}$ : VAR-X,

$$\begin{bmatrix} \ln(Y_t^*/Y^*) \\ \pi_t^* - \pi^* \\ R_t^* - R^* \end{bmatrix} = \mathbf{A} \begin{bmatrix} \ln(Y_{t-1}^*/Y^*) \\ \pi_{t-1}^* - \pi^* \\ R_{t-1}^* - R^* \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ \kappa_b (e^{x_t - x} - 1) \end{bmatrix} + \mathbf{C}\varepsilon_t, \quad \varepsilon_t \stackrel{iid}{\sim} \mathcal{N}(\mathbf{0}, \mathbf{I})$$

- ▶ Debt-elasticity term  $\kappa_b (e^{x_t - x} - 1)$  enforces stationarity
- ▶ Foreign shocks:  $\varepsilon_t^{Y^*}$ ,  $\varepsilon_t^{\pi^*}$ ,  $\varepsilon_t^{R^*}$ 
  - \*  $\varepsilon_t^{R^*}$  is a proxy for a *global financial cycle shock*

# Fiscal and monetary policy

- ▶ Balanced budget; reserves follow capital:

$$RR_t B_{t-1} = B_t + \tau_t$$

- ▶ Inertial Taylor rule with exchange-rate response (Galí and Monacelli, 2016; Akinci and Queralto, 2023):

$$\hat{i}_t = \rho_R \hat{i}_{t-1} + (1 - \rho_R) [\phi_\pi \hat{\pi}_t + \phi_y \hat{y}_t + \phi_E \Delta \hat{e}_t] + \varepsilon_t^R$$

- \*  $\phi_E \rightarrow 0$ : standard Taylor-type rule
- \*  $\phi_E \rightarrow \infty$ : exchange-rate peg

# Calibration and Estimation

# Calibrated parameters

Parameter	Value	Description
$\beta$	0.991	Discount rate (matches Korean 3-mo yield)
$\sigma$	2	Risk aversion
$\varphi$	1/3	Inverse-Frisch elasticity
$\varphi_o$	3	Labour disutility (targets $L = 1/3$ )
$\sigma_b$	0.94	Bank survival probability
$\theta_o$	0.1307	Absconding base ( $\phi \approx 7, \tilde{\phi} = 0.35$ )
$\gamma$	0.00956	New bankers' inherited share
$x$	0.25	SS foreign deposit-asset ratio
$x^b$	0.20	SS reserve-asset ratio
$\zeta$	0.002	SS discounted corporate spread (25% of mean)
$\alpha_K$	0.30	Cost share of capital
$\alpha_M$	0.18	Cost share of imports
$\alpha_L$	0.52	Cost share of labour
$\lambda$	0.98	$1 - \delta$
$\eta$	6	Elasticity of demand (matches Korean volatility)
$\omega$	0.75	Calvo parameter (matches Korean price rigidity)

# Estimation strategy and priors

- ▶ Bayesian likelihood (An and Schorfheide, 2007; Del Negro, 2012) on 9 observables (Korean PPI inflation, 90-day deposit rate, corporate spread,  $\Delta \ln Y$ ,  $\Delta \ln EX$ ; US deflator, 12-mo T-Bill,  $\Delta \ln Y^*$ ,  $\Delta \ln E$ ); 1999.Q1–2019.Q4
- ▶ **Key methodological contribution:** estimate the model with an *occasionally binding* ICC
  - \* Piecewise-linear Kalman filter (Giovanni, Pfeiffer, and Ratto, 2021)
  - \* Slice sampler (Planas, Ratto, and Rossi, 2015)
  - \* OccBin (Guerrieri and Iacoviello, 2015) integrated into Dynare 6/7 (Adjemian et al., 2024)
- ▶ Endogenous priors approach (Christiano, Trabandt, and Walentin, 2011): priors keyed to observed sample moments
- ▶ Estimate: 10 structural parameters + 12 foreign-VAR parameters + 5 AR(1) coefficients + 10 shock SDs [▶ Full table](#)

# Posterior summary (selected parameters)

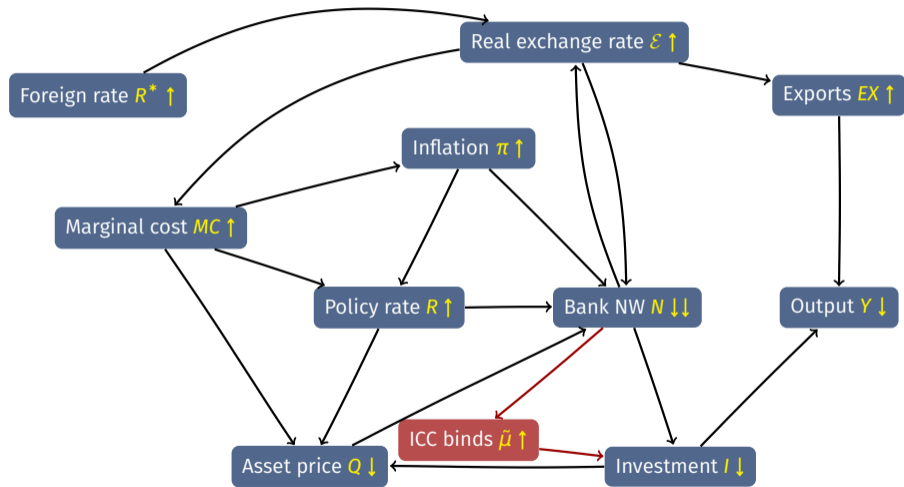
Parameter	Description	Prior			Posterior		
		Dist.	Mean	SD	Mean	HPD 5%	HPD 95%
$\chi$	GHH+ preference	$\mathcal{B}$	0.660	0.150	0.446	0.242	0.674
$\kappa_I$	Investment adj. cost	$\mathcal{N}$	1.500	0.500	2.879	2.223	3.440
$\eta_x$	Foreign demand elast.	$\mathcal{N}$	1.000	0.250	2.580	2.567	2.590
$\theta$	Bank moral hazard	$\mathcal{N}$	2.580	0.500	2.004	0.961	2.573
$\theta_b$	Reserve moral hazard	$\mathcal{N}$	2.000	0.500	2.133	1.554	3.022
$\kappa_b$	Foreign-debt elast.	$\mathcal{G}^{-1}$	0.025	Inf	0.004	0.003	0.004
$\phi_\pi$	Inflation sensitivity	$\mathcal{N}_{>1}$	2.000	0.500	1.250	1.006	1.472
$\phi_y$	Output sensitivity	$\mathcal{N}_{>0}$	0.200	0.100	0.118	0.083	0.139
$\phi_E$	FX sensitivity	$\mathcal{N}_{>0}$	1.000	0.500	2.127	1.763	2.516
$\rho_R$	Taylor rule inertia	$\mathcal{B}$	0.550	0.100	0.845	0.811	0.894

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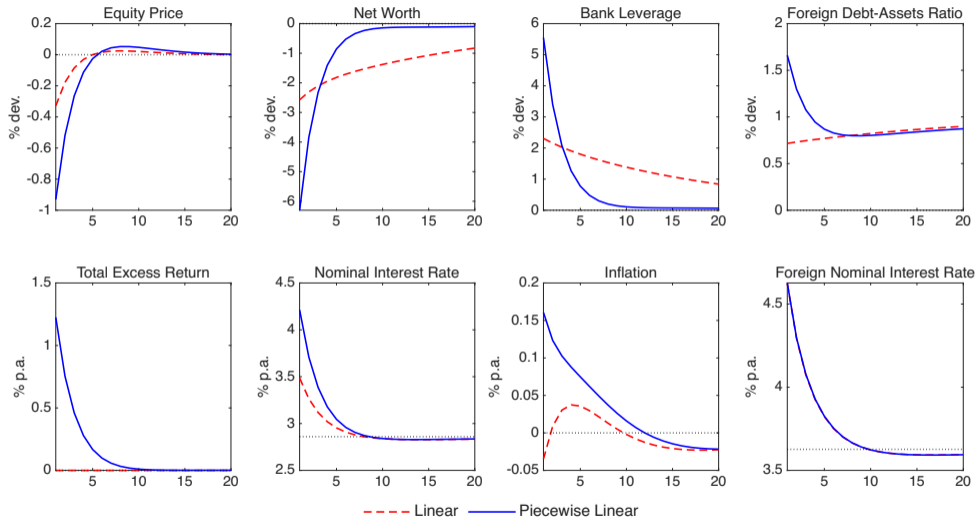
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# Quantitative Results

# Foreign rate shock: transmission channels

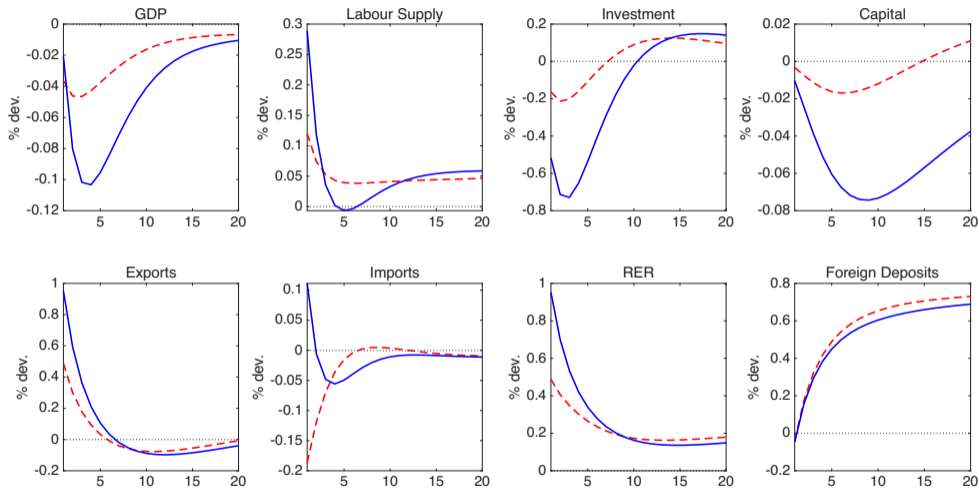


# Financial IRFs to $\varepsilon^{R^*}$ : Linear vs OBC



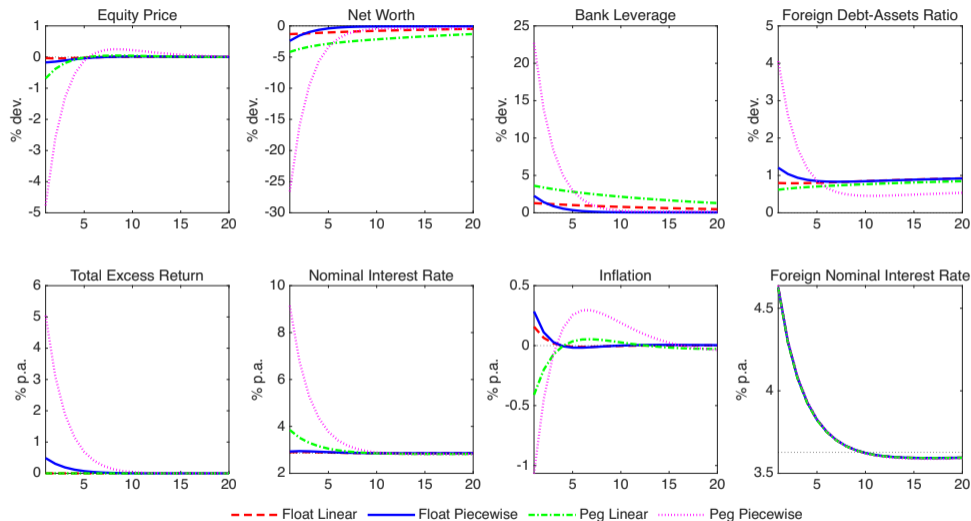
NOTE. Dashed red: fully linear solution. Solid blue: piecewise-linear. Scaled to a 1% p.a. rise in  $R^*$

# Real IRFs to $\varepsilon^{R^*}$ : Linear vs OBC



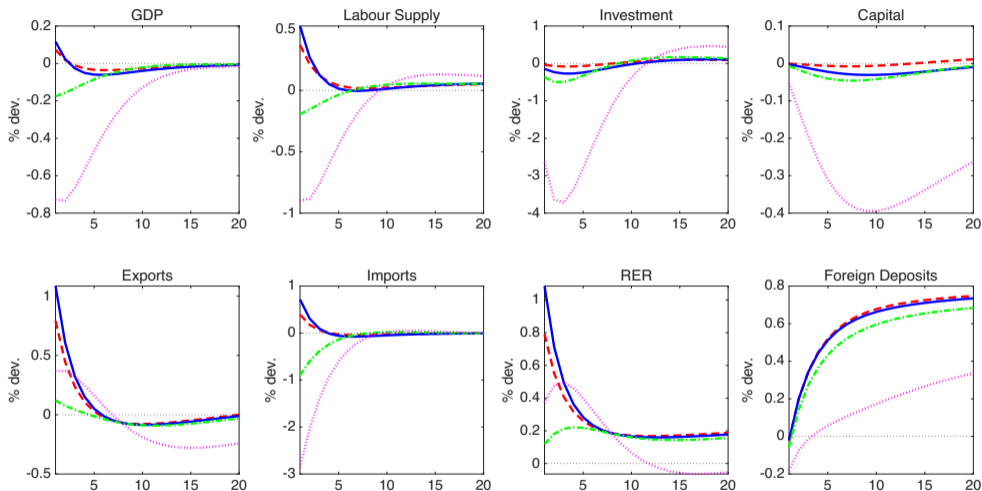
NOTE. Dashed red: fully linear solution. Solid blue: piecewise-linear. Scaled to a 1% p.a. rise in  $R^*$

# Financial IRFs by FX regime: Float vs peg



NOTE.  $\phi_E = 0$  float (red/blue);  $\phi_E = 100$  peg (green/magenta). Dashed/dash-dotted: linear; solid/dotted: piecewise-linear.

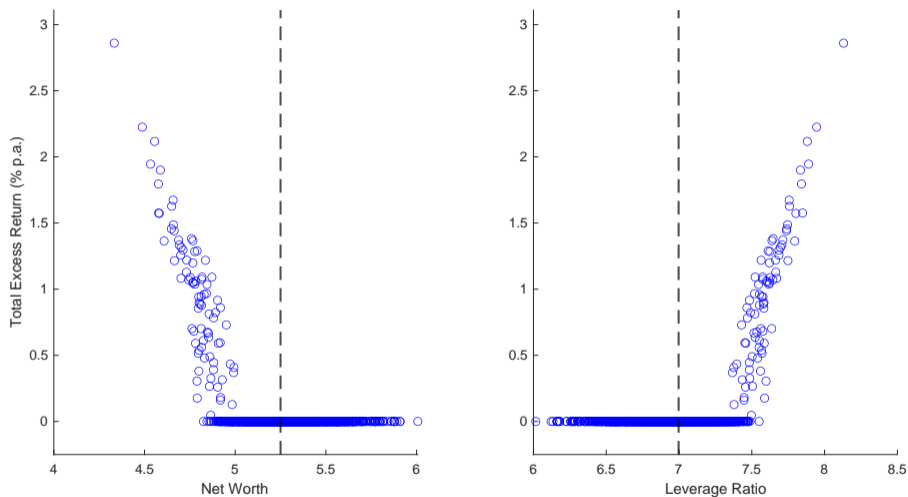
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NOTE.  $\phi_E = 0$  float (red/blue);  $\phi_E = 100$  peg (green/magenta). Dashed/dash-dotted: linear; solid/dotted: piecewise-linear.

# Frequency of Crises

# Crisis frequency: total excess returns vs. net worth and leverage

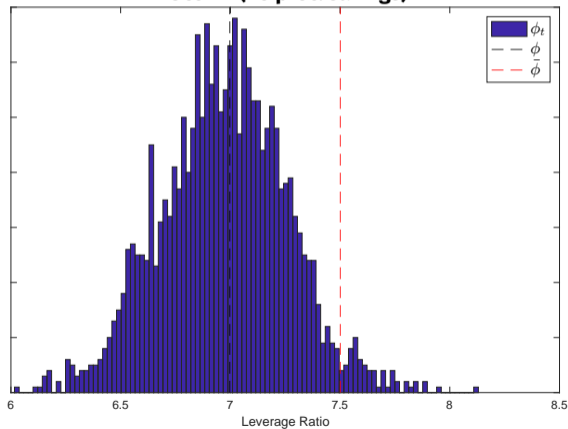


NOTE. 2,000-period simulation with only  $\varepsilon^{R^*}$  active. Vertical:  $\bar{\mu}_t$  (% p.a.); horizontal: net worth (left), leverage (right). Dashed lines: non-stochastic SS.

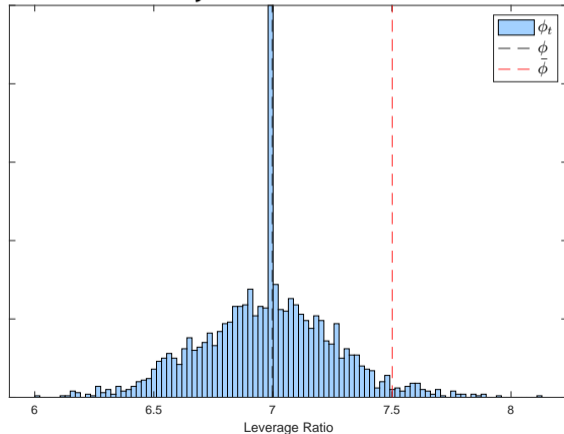
# Crises and precautionary savings

- OccBin (Guerrieri and Iacoviello, 2015) vs. DynareOBC (Holden, 2019)

OccBin (no prec. savings)



DynareOBC + cubature



# Frequency of financial crises by FX regime

Regime	$\phi_E$	<b>OccBin</b> (no prec. savings)	<b>DynareOBC</b> (cubature)
Baseline	2.127	4.20%	3.82%
Float	0	<b>1.75%</b>	<b>1.68%</b>
Peg	100	10.55%	7.23%

- ▶ Float reduces crisis frequency by 6× relative to peg
- ▶ Precautionary savings shave roughly 10–30% off each regime, but the regime ordering is unchanged
- ▶ Mundellian Trilemma persists, but float alone leaves residual tail risk

# Conclusion

- ▶  $R^* \uparrow$  – a proxy for the global financial cycle – contracts the Korean economy despite the Won depreciation
  - \* Confirmed in VAR-IV and in the estimated DSGE
- ▶ Transmission runs through bank balance sheets, not just trade flows
  - \* ICC binds in stress; financial accelerator amplifies the contraction
- ▶ Exchange rate regime matters: crisis frequency 10.6% → 1.7% moving peg → float
  - \* Mundellian Trilemma persists (Obstfeld, 2015)
  - \* But float is necessary, not sufficient – macroprudential complements likely needed (Rey, 2015; Blanchard, 2017; Adrian et al., 2020; Miranda-Agrippino and Rey, 2020)
- ▶ Future work:
  - \* Threshold local projections
  - \* Two-country model
  - \* Local currency pricing

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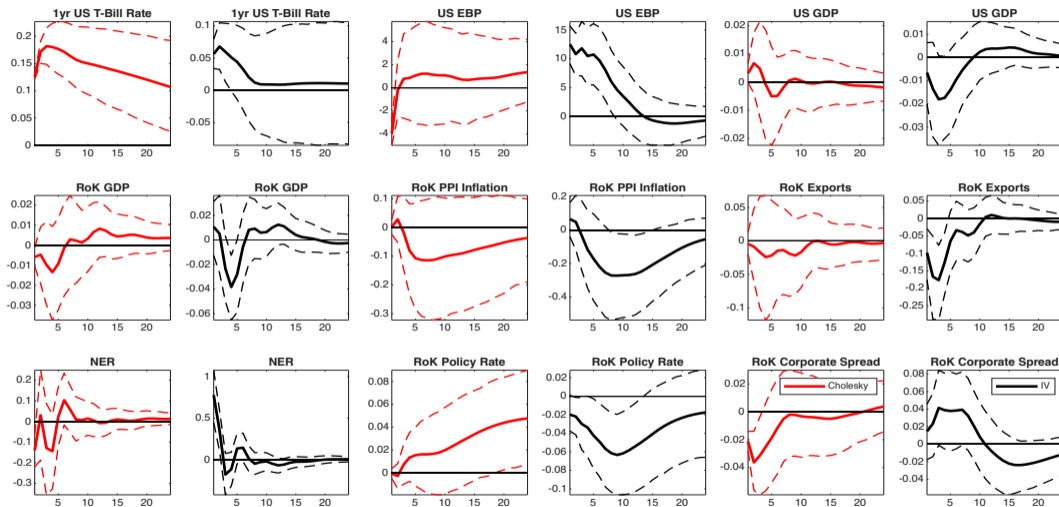
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# VAR identification: Cholesky vs. IV



NOTE. IRFs to a surprise US monetary policy contraction. NER is on a direct quote basis. Solid lines: point estimates; dashed lines: 90% credible intervals. [Return to VAR IRFs](#)

# Household: GHH+ preferences and Euler equation

- ▶ GHH+ utility (Auclert, Bardóczy, and Rognlie, 2023) nests CRRA ( $\chi = 0$ ) and GHH ( $\chi = 1$ ):

$$u(C_t, L_t; \xi_t^h) = \xi_t^h \left[ \frac{1}{1+\sigma} \left( C_t - \frac{\chi\varphi_0}{1+\varphi} L_t^{1+\varphi} \right)^{1+\sigma} - \frac{(1-\chi)\varphi_0}{1+\varphi} L_t^{1+\varphi} \right]$$

- ▶ Euler equation (deposits):

$$1 = \beta \mathbb{E}_t \left[ \frac{\xi_{t+1}^h}{\xi_t^h} \left( \frac{u'_{C,t+1}}{u'_{C,t}} \right) RR_{t+1}^d \right]$$

- ▶ Labour supply:  $w_t = \varphi_0 L_t^\varphi \left( 1 - \chi + \chi u'_{C,t} \left( C_t - \frac{\chi\varphi_0}{1+\varphi} L_t^{1+\varphi} \right)^{-\sigma} \right)$

◀ Return to Households

# Banker FOCs and the leverage bound

- ▶ Excess returns ( $\Omega_{t,t+1} \equiv \Lambda_{t,t+1}(1 - \sigma_b + \sigma_b \psi_{t+1})$ ):

$$\mu_t = \mathbb{E}_t \Omega_{t,t+1} (R_{t+1}^k - RR_{t+1}^d)$$

$$\mu_t^b = \mathbb{E}_t \Omega_{t,t+1} (RR_{t+1} - RR_{t+1}^d)$$

$$\mu_t^* = \mathbb{E}_t \Omega_{t,t+1} \left( RR_{t+1}^d - \frac{\varepsilon_{t+1}}{\varepsilon_t} RR_{t+1}^* \right)$$

$$u_t = \mathbb{E}_t \Omega_{t,t+1} RR_{t+1}^d$$

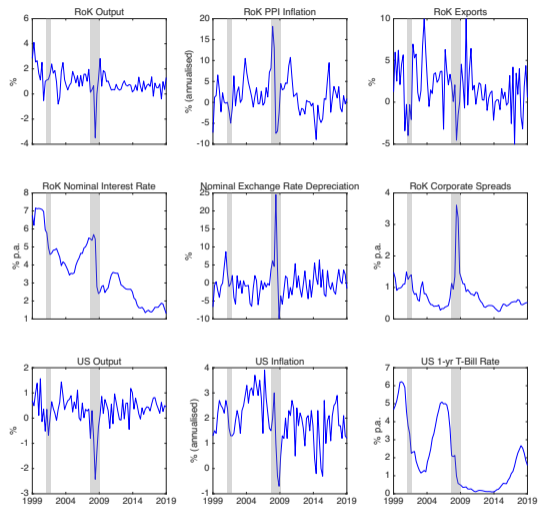
- ▶ Total excess return:  $\tilde{\mu}_t = \mu_t(1 - x_t^b) + (\mu_t^b + \zeta_t)x_t^b + \mu_t^* x_t$
- ▶ Maximum leverage (when ICC binds):

$$\bar{\phi}_t = \frac{u_t}{\Theta(x_t, x_t^b) - \tilde{\mu}_t}$$

- ▶ Slackness:  $o = \min\{\tilde{\mu}_t, \tilde{\phi}_t\}$  with  $\tilde{\phi}_t = \bar{\phi}_t - \phi_t$

◀ Return to Banker's Problem

# DSGE estimation: observables



NOTE. 1999.Q1–2019.Q4. Annualised %: PPI inflation, deposit rate, corporate spread, US deflator, US T-Bill. Log first differences: real GDP, real exports, US real GDP, Won-Dollar NER.

# Priors and posteriors: structural and policy parameters I

Parameter	Description	Prior			Posterior		
		Dist.	Mean	SD	Mean	HPD 5%	HPD 95%
$\chi$	GHH+ preference	$\mathcal{B}$	0.660	0.150	0.446	0.242	0.674
$\kappa_I$	Investment adj. cost	$\mathcal{N}$	1.500	0.500	2.879	2.223	3.440
$\eta_x$	Foreign demand elast.	$\mathcal{N}$	1.000	0.250	2.580	2.567	2.590
$\theta$	Bank moral hazard	$\mathcal{N}$	2.580	0.500	2.004	0.961	2.573
$\theta_b$	Reserve moral hazard	$\mathcal{N}$	2.000	0.500	2.133	1.554	3.022
$\kappa_b$	Foreign-debt elast.	$\mathcal{G}^{-1}$	0.025	Inf	0.004	0.003	0.004
$\phi_\pi$	Inflation sensitivity	$\mathcal{N}_{>1}$	2.000	0.500	1.250	1.006	1.472
$\phi_y$	Output sensitivity	$\mathcal{N}_{>0}$	0.200	0.100	0.118	0.083	0.139
$\phi_E$	FX sensitivity	$\mathcal{N}_{>0}$	1.000	0.500	2.127	1.763	2.516
$\rho_R$	Taylor rule inertia	$\mathcal{B}$	0.550	0.100	0.845	0.811	0.894
$\rho_A$	AR(1) TFP	$\mathcal{B}$	0.800	0.100	0.811	0.666	0.931
$\rho_h$	AR(1) HH preference	$\mathcal{B}$	0.500	0.100	0.499	0.342	0.640
$\rho_I$	AR(1) MEI	$\mathcal{B}$	0.800	0.100	0.965	0.949	0.987
$\rho_K$	AR(1) capital quality	$\mathcal{B}$	0.800	0.100	0.718	0.666	0.777
$\rho_{\mathcal{M}}$	AR(1) markups	$\mathcal{B}$	0.800	0.100	0.366	0.243	0.477

# Priors and posteriors: structural and policy parameters II

Parameter	Description	Prior			Posterior		
		Dist.	Mean	SD	Mean	HPD 5%	HPD 95%
$a_{11}$	Foreign VAR ( $Y^*, Y^*$ )	$\mathcal{N}$	0.500	0.500	0.978	0.956	0.993
$a_{12}$	Foreign VAR ( $Y^*, \pi^*$ )	$\mathcal{N}$	0.000	0.500	0.425	-0.021	0.881
$a_{13}$	Foreign VAR ( $Y^*, R^*$ )	$\mathcal{N}$	0.000	0.500	-0.428	-0.707	-0.085
$a_{21}$	Foreign VAR ( $\pi^*, Y^*$ )	$\mathcal{N}$	0.000	0.500	0.008	-0.002	0.018
$a_{22}$	Foreign VAR ( $\pi^*, \pi^*$ )	$\mathcal{N}$	0.000	0.500	0.407	0.215	0.576
$a_{23}$	Foreign VAR ( $\pi^*, R^*$ )	$\mathcal{N}$	0.000	0.500	0.053	-0.021	0.147
$a_{31}$	Foreign VAR ( $R^*, Y^*$ )	$\mathcal{N}$	0.000	0.500	0.014	0.008	0.021
$a_{32}$	Foreign VAR ( $R^*, \pi^*$ )	$\mathcal{N}$	0.000	0.500	0.163	0.073	0.228
$a_{33}$	Foreign VAR ( $R^*, R^*$ )	$\mathcal{N}$	0.500	0.500	0.665	0.619	0.702
$c_{21}$	FVAR ( $\varepsilon^{\pi^*}, \varepsilon^{Y^*}$ )	$\mathcal{N}$	0.000	0.500	0.044	0.014	0.078
$c_{31}$	FVAR ( $\varepsilon^{R^*}, \varepsilon^{Y^*}$ )	$\mathcal{N}$	0.000	0.500	0.069	0.044	0.085
$c_{32}$	FVAR ( $\varepsilon^{R^*}, \varepsilon^{\pi^*}$ )	$\mathcal{N}$	0.000	0.500	0.005	-0.020	0.027

[Return to Estimation](#)

# Estimated shock standard deviations

Shock	Description	Prior			Posterior		
		Dist.	Mean	SD	Mean	HPD 5%	HPD 95%
$100\sigma_A$	TFP	$\mathcal{G}^{-1}$	0.500	Inf	0.328	0.170	0.570
$100\sigma_h$	Household preference	$\mathcal{G}^{-1}$	0.150	Inf	0.112	0.042	0.202
$100\sigma_l$	MEI	$\mathcal{G}^{-1}$	0.100	Inf	5.102	4.237	5.569
$100\sigma_K$	Capital quality	$\mathcal{G}^{-1}$	0.100	Inf	2.347	1.663	2.719
$100\sigma_{\mathcal{M}}$	Markups	$\mathcal{G}^{-1}$	0.150	Inf	26.840	21.990	31.261
$100\sigma_R$	Monetary policy	$\mathcal{G}^{-1}$	0.250	Inf	1.481	0.931	1.856
$400\sigma_\zeta$	Safe-asset preference	$\mathcal{G}^{-1}$	0.192	Inf	0.532	0.483	0.603
$100\sigma_{Y^*}$	Foreign demand	$\mathcal{G}^{-1}$	0.500	Inf	0.617	0.510	0.687
$100\sigma_{\pi^*}$	Foreign inflation	$\mathcal{G}^{-1}$	0.250	Inf	0.193	0.179	0.216
$100\sigma_{R^*}$	<b>Foreign rate</b>	$\mathcal{G}^{-1}$	0.250	Inf	<b>0.107</b>	<b>0.092</b>	<b>0.124</b>