Monetary and Financial Policies in Emerging Markets

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Emerging market economies tend to be vulnerable to global financial cycle

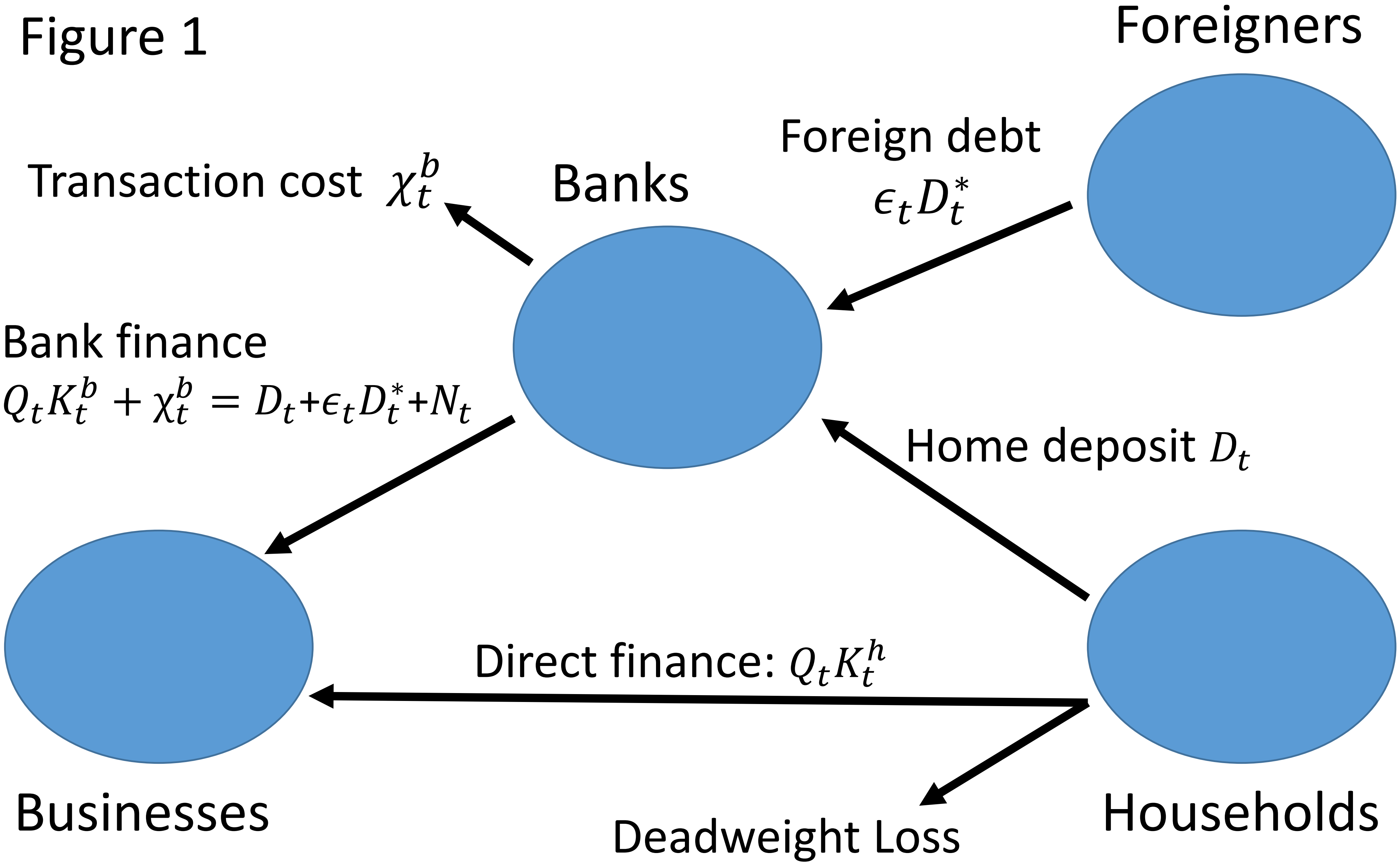
Why?

How to conduct monetary policy?

How to coordinate with macro-prudential policy?

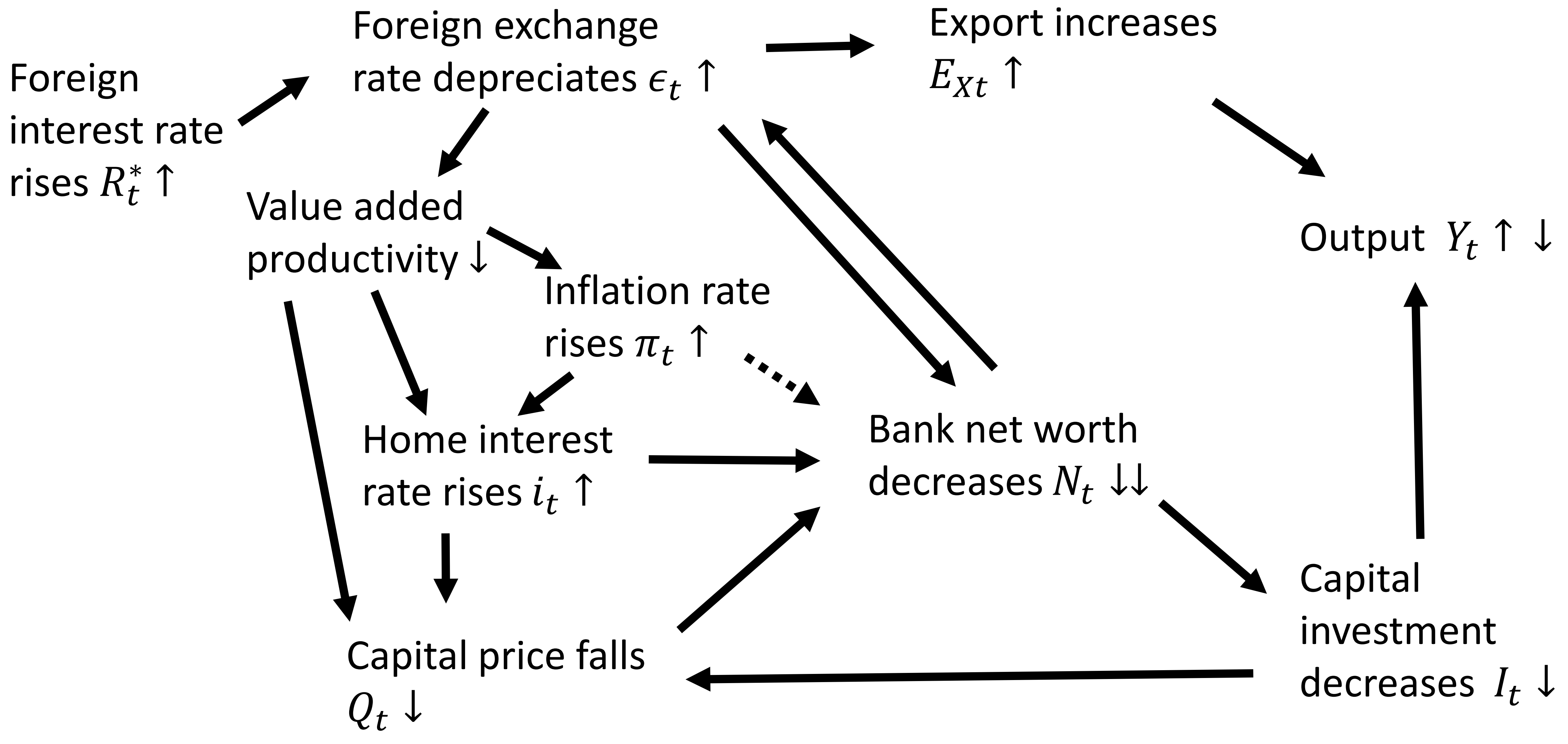
Approach: Open Economy New Keynesian + Banks

Figure 1



Foreigners
Foreign debt
$\epsilon_t D_t^*$
Transaction cost χ_t^b
Banks
Bank finance
$Q_t K_t^b + \chi_t^b = D_t + \epsilon_t D_t^* + N_t$
Home deposit D_t
Direct finance: $Q_t K_t^h$
Businesses
Deadweight Loss
Households

Transmission of external financial shocks



Model

$$Y_t = \left(\int_0^1 {y_{it}}^{\frac{\eta-1}{\eta}} di\right)^{\frac{\eta}{\eta-1}} \text{ : final goods}$$

$$y_{it} = A_t \left(\frac{k'_{it}}{\alpha_K}\right)^{\alpha_K} \left(\frac{m_{it}}{\alpha_M}\right)^{\alpha_M} \left(\frac{l_{it}}{1-\alpha_K-\alpha_M}\right)^{1-\alpha_K-\alpha_M}$$

$$m_t^C = \frac{1}{A_t} {Z_t}^{\alpha_K} {\epsilon_t}^{\alpha_M} {w_t}^{1-\alpha_K-\alpha_M}$$

$$\underset{p_{it},\, y_{it}}{Max}\ E_0 \left\{\sum_{t=0}^{\infty} \Lambda_{0,t} \left[\left(\frac{p_{it}}{P_t} - m_t^C\right) y_{it} - \frac{\kappa}{2}\left(\frac{p_{it}}{p_{it-1}} - 1\right)^2 Y_t\right]\right\}$$

$\longrightarrow$

$$\pi_t (\pi_t - 1) = \frac{\eta}{\kappa}\left(m_t^C - \frac{\eta\text{-}1}{\eta}\right) + E_t\left[\Lambda_{t,t+1}\frac{Y_{t+1}}{Y_t}\pi_{t+1}(\pi_{t+1}\text{-}1)\right]$$

$$\text{where } \pi_t = \frac{P_t}{P_{t-1}}$$

Capital accumulation

$$K_t = I_t + \lambda K_{t-1}$$

$$\text{Cost of Investment} = \left[1 + \frac{\kappa_I}{2}\left(\frac{I_t}{I} - 1\right)^2\right] I_t$$

Export

$$E_{Xt} = \left(\frac{P_t}{e_t P_t^*}\right)^{-\varphi} Y_t^* = {\epsilon_t}^{\varphi} Y_t^*, \text{ where } \epsilon_t = \frac{e_t P_t^*}{P_t}$$

$$P_t^* = P^* = 1$$

Household

Each household consists of a continuum of workers and bankers

Each banker manages a bank until retires with probability $1-\sigma$, and then brings back the net worth as dividend

Equal number of workers become new bankers with start-up funds given by the household

Household saves in home currency deposit and capital ownership. To own capital, household needs management cost $\frac{\varkappa^h}{2}\left(\frac{K_t^h}{K_t}\right)^2 K_t$

Household members consume together

Household's choice

$$E_t\left[\sum_{t=0}^{\infty}\beta^t \ln\left(C_t - \frac{\zeta_0}{1+\zeta}{L_t}^{1+\zeta}\right)\right]$$

$$1 = E_t\left(\Lambda_{t,t+1}\frac{Z_{t+1}+\lambda Q_{t+1}}{Q_t + \varkappa^h \frac{K_t^h}{K_t}}\right)$$

Bank's Flow-of-funds

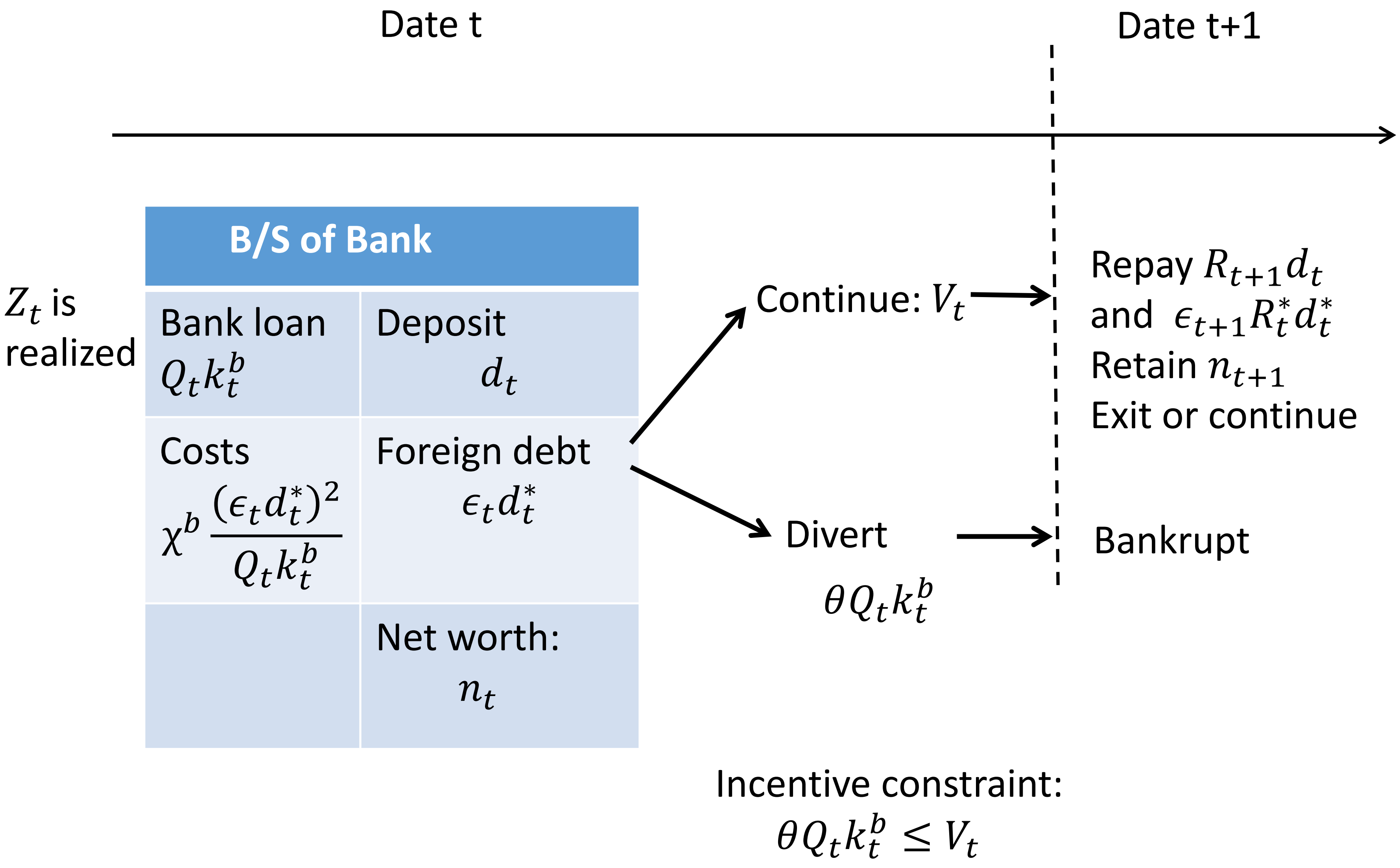
$$Q_t k_t^b + \frac{\varkappa^b}{2}\frac{(\epsilon_t d_t^*)^2}{Q_t k_t^b} = n_t + d_t + \epsilon_t d_t^*$$

$$n_t = (Z_t + \lambda Q_t)k_{t-1}^b - R_t d_{t-1} - \epsilon_t R_{t-1}^* d_{t-1}^*$$

Bank franchise value

$$V_t = E_t\{\Lambda_{t,t+1}[(1-\sigma)n_{t+j} + \sigma V_{t+1}]\}$$

Figure 2: Timing



The bank chooses the leverage multiple $\phi_t = \frac{Q_t k_t^b}{n_t}$ and the share of foreign borrowing $x_t = \frac{\epsilon_t d_t^*}{Q_t k_t^b}$ to maximize Tobin's Q

$$\frac{V_t}{n_t} = \psi_t = E_t\left[\Lambda_{t,t+1}(1-\sigma+\sigma\psi_{t+1})\frac{n_{t+1}}{n_t}\right],\ st.\ \psi_t \geq \theta\phi_t$$

$\longrightarrow$

$$\phi_t = \phi\left(\underset{+}{\frac{\mu_t}{\nu_t}}, \underset{+}{\frac{\mu_t^*}{\nu_t}}\right),\ x_t = x\left(\underset{+}{\frac{\mu_t^*}{\nu_t}}\right)$$

$$\begin{aligned}
\mu_t &= E_t\left[\Lambda_{t,t+1}(1-\sigma+\sigma\psi_{t+1})\left(\frac{Z_{t+1}+\lambda Q_{t+1}}{Q_t} - R_{t+1}\right)\right] \\
\mu_t^* &= E_t\left[\Lambda_{t,t+1}(1-\sigma+\sigma\psi_{t+1})\left(R_{t+1} - \frac{\epsilon_{t+1}}{\epsilon_t}R_t^*\right)\right] \\
\nu_t &= E_t\left[\Lambda_{t,t+1}(1-\sigma+\sigma\psi_{t+1})R_{t+1}\right]
\end{aligned}$$

Bank balance sheet

$$Q_t K_t^b \left(1 + \frac{\varkappa^b}{2} x_t^2\right) = \phi_t N_t \left(1 + \frac{\varkappa^b}{2} x_t^2\right) = N_t + D_t + \epsilon_t D_t^*$$

$$N_t = (\sigma + \xi)\left(Z_t + \lambda Q_t\right) K_{t-1}^b - \sigma R_t D_{t-1} - \sigma \epsilon_t R_{t-1}^* D_{t-1}^*$$

Capital market

$$K_t = K_t^b + K_t^h$$

Net foreign debt

$$\epsilon_t D_t^* = x_t Q_t K_t^b = x_t \phi_t N_t$$

$$D_t^* = R_{t-1}^* D_{t-1}^* + M_t - \frac{1}{\epsilon_t} E_{Xt}$$

Goods market equilibrium

$$Y_t = C_t + \left[1 + \frac{\kappa_I}{2}\left(\frac{I_t}{I} - 1\right)^2\right] I_t + E_{Xt}$$

$$+\frac{\kappa}{2}\left(\pi_t - 1\right)^2 Y_t + \frac{\varkappa^h}{2}\frac{\left(K_t^h\right)^2}{K_t} + \frac{\varkappa^b}{2} x_t^2 Q_t K_t^b$$

Net output

$$Y_t^n = Y_t - \epsilon_t M_t - \frac{\kappa}{2}\left(\pi_t - 1\right)^2 Y_t - \frac{\varkappa^h}{2}\frac{\left(K_t^h\right)^2}{K_t} - \frac{\varkappa^b}{2} x_t^2 Q_t K_t^b$$

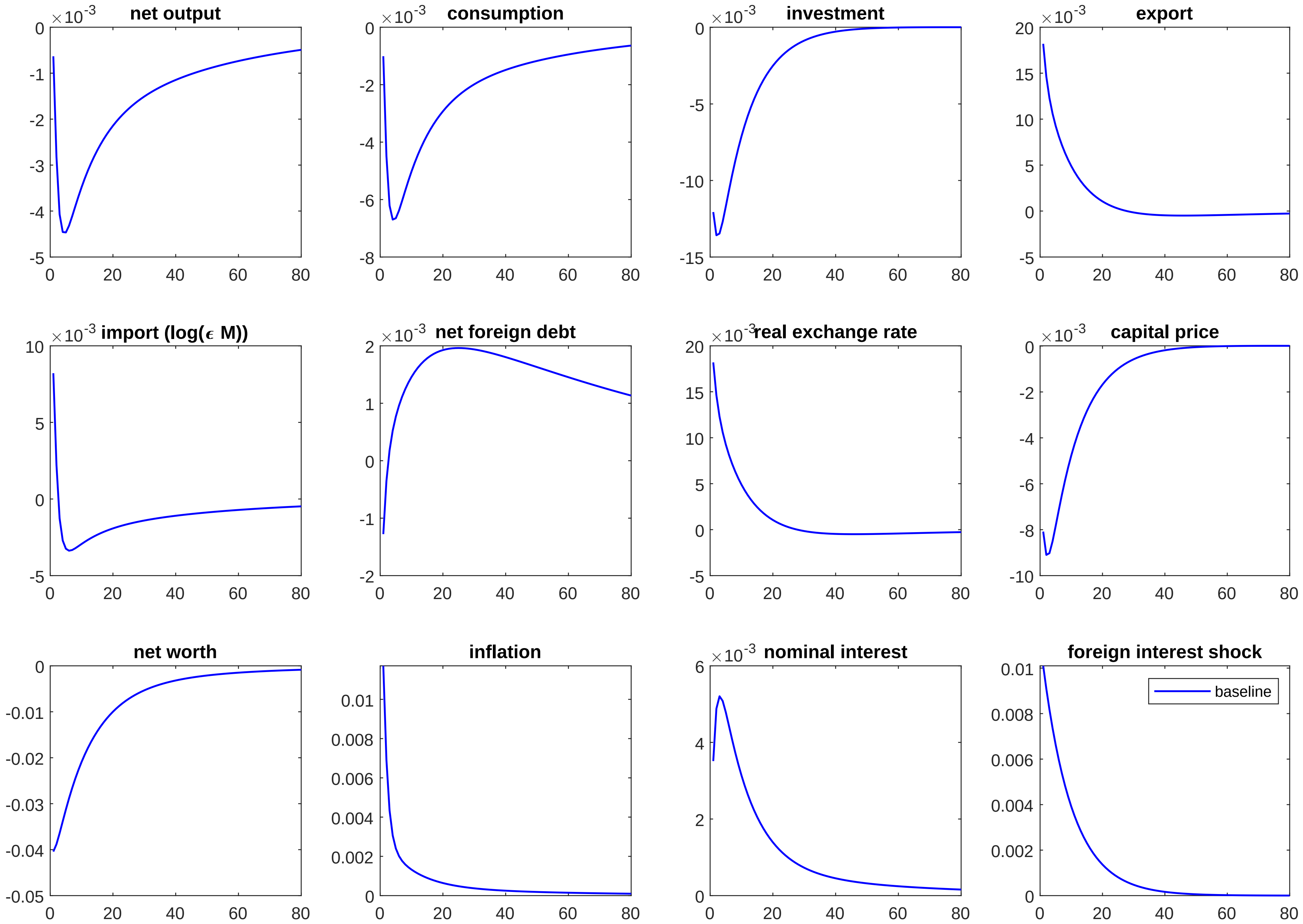
Monetary policy rule

$$i_t - i = (1 - \rho_i)\omega_\pi\left(\pi_t - 1\right) + \rho_i\left(i_{t-1} - i\right) + \xi_t^i$$

Baseline Parameters		
θ	divertable proportion of asset	0.401
σ	survival probability	0.94
ξ	fraction of assets brought by new banks	0.0045
$\varkappa^b$	managem't cost parameter of foreign borrowing	0.0197
β	discount rate	0.985
ζ	inverse of Frisch elasticity of labor supply	0.333
$\varkappa^h$	management cost parameter of direct finance	0.0197
α_M	cost share of imported intermediate goods	0.18
ω	fraction of non-adjusters $\kappa = \frac{(\eta-1)\omega}{(1-\omega)(1-\beta\omega)}$	0.66
φ	price elasticity of export demand	1

Table 2: Baseline Steady State (Annual)		
R^*	foreign interest rate	1.04
R	deposit interest rate	1.06
R_k	rate of return on capital for bank	1.08
ϕ	bank leverage multiple	4
x	foreign debt-to-bank asset ratio	0.25
$\frac{K}{Y-\epsilon M}$	capital-output ratio	1.98
K^b/K	share of capital financed by banks	0.75
$\frac{\epsilon D^*}{Y-\epsilon M}$	foreign debt-to-GDP ratio	0.37
$Y-\epsilon M$	GDP	10.1
$\chi^h \left(K^h\right)^2/K$	cost of direct finance	0.01

Impulse response to foreign interest rate shock



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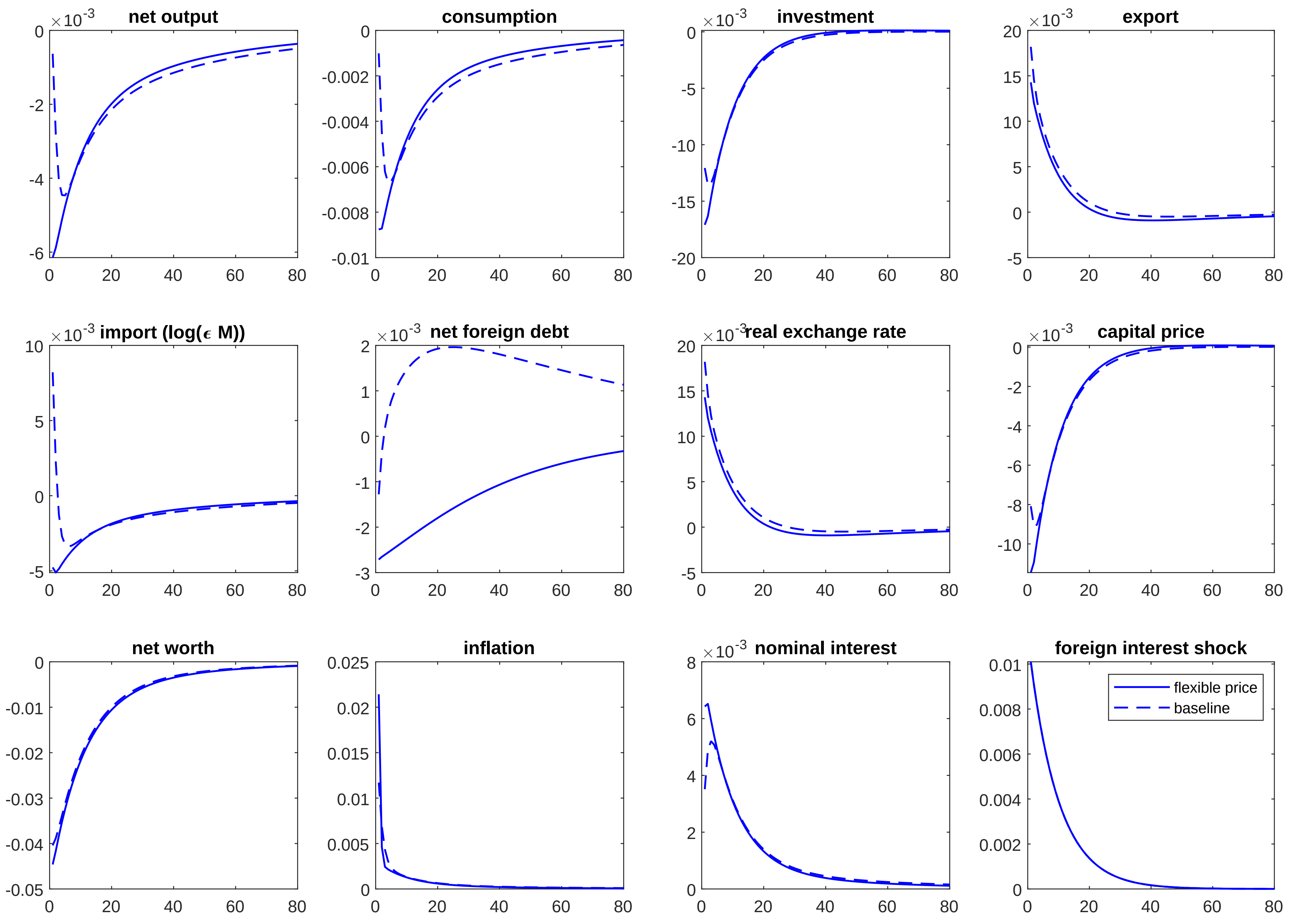


Macro-prudential policy:

Tax on foreign currency borrowing τ_t^{D*}

Subsidy on net worth τ_t^N to balance the budget

$$\tau_t^N N_t = \tau_t^{D*} \epsilon_t D_t^*$$

Cyclical macro-prudential policy

$$\tau_t^{D*} = \omega_{\tau^{D*}} \left(\ln K_{t-1}^b - \ln K^b \right)$$

Stand dev of $(\ln R_t^*, i_t, \ln A_t, \ln Y_t^*) = (2.0,\ 0.5,\ 1.3,\ 3.0)\%$

Fraction of non-price-adjusters is 0.1 in a quarter

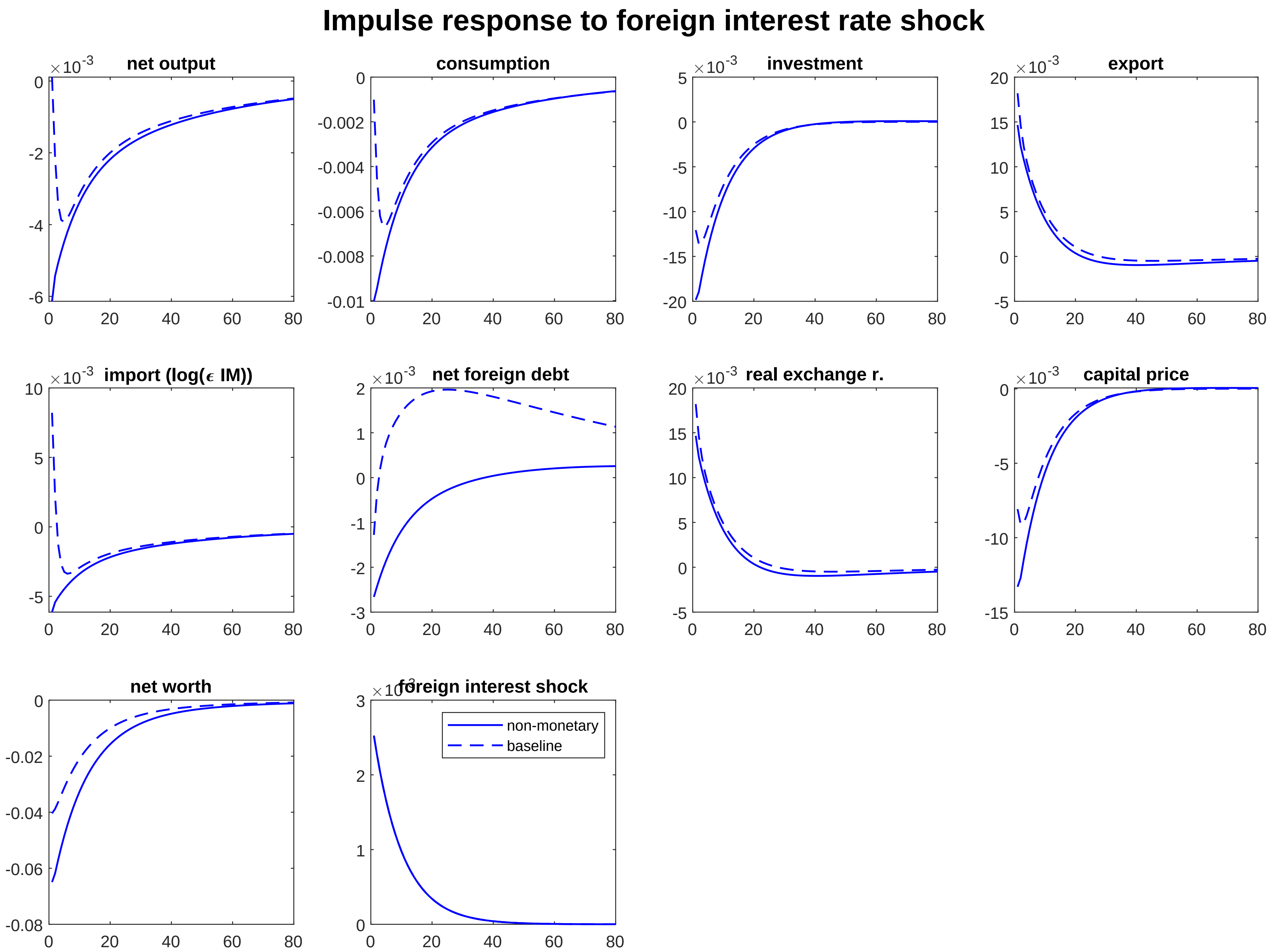
Welfare Effects: Flexible Price and Large $var(R_t^*)$			
$\omega_\pi \diagdown \omega_{\tau^{D*}}$	0	0.01	0.02
1.25	0.06%	0.13	0.19
1.5	0.00	0.10	0.18
2.0	-0.06	0.07	0.17

Remark on Policy

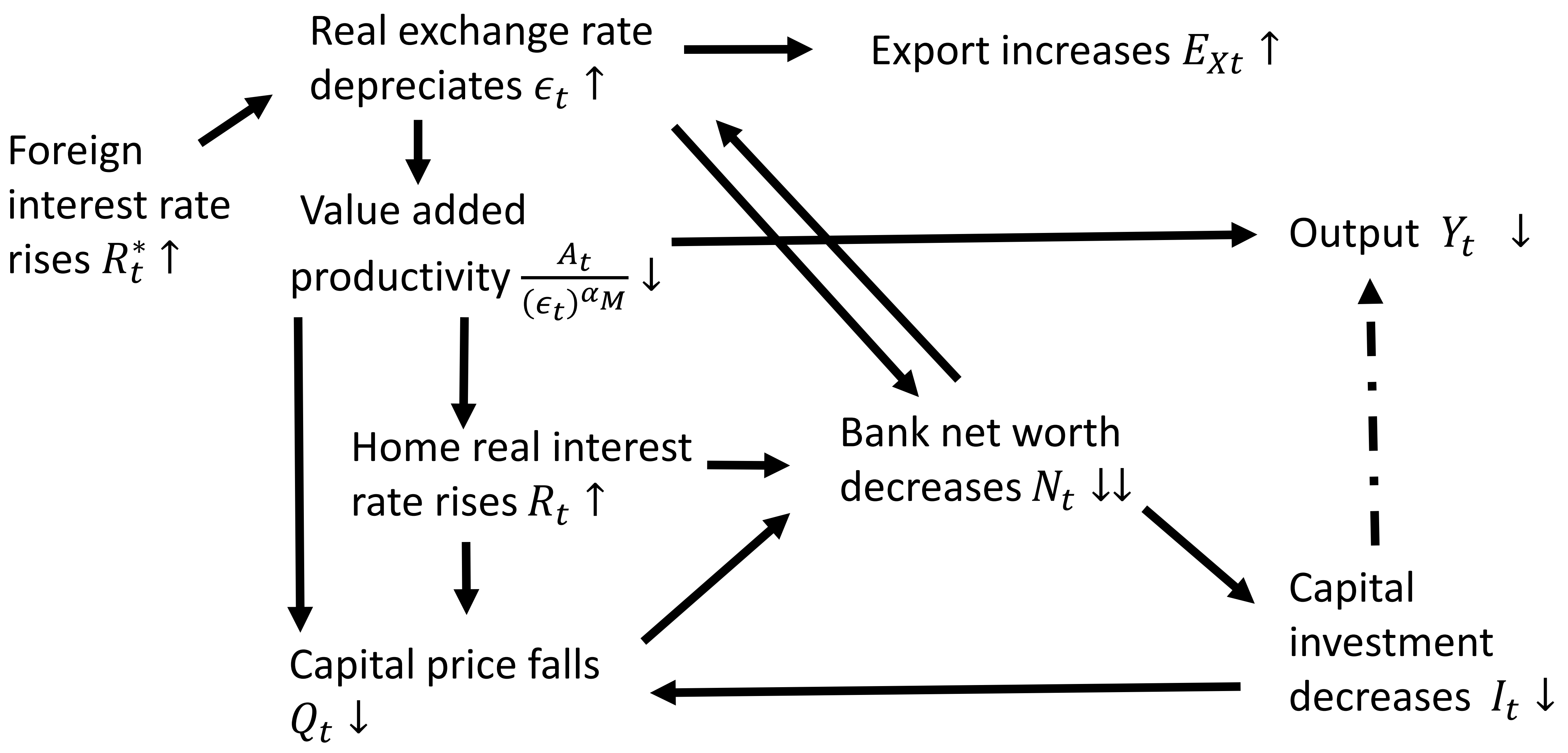
Procyclical tax on bank foreign borrowing significantly improves welfare if external financial shocks are important and prices are flexible

It allows monetary authority to pursue macroeconomic stability. Strict inflation targeting without macro-prudential policy can reduce welfare

Topics for future research: home-currency denominated debt, currency hedging, foreign exchange intervention, gross financial flows and foreign direct investment


Impulse response to foreign interest rate shock
net output
consumption
investment
export
import (log(ϵ IM))
net foreign debt
real exchange r.
capital price
net worth
foreign interest shock
non-monetary
baseline
×10^-3
0
-2
-4
-6
-0.002
-0.004
-0.006
-0.008
-0.01
5
-5
-10
-15
-20
20
15
10
1
2
3
-1
-2
-3
-0.02
-0.04
-0.06
-0.08
40
60
80

Transmission of External Financial Shocks in Real Model



Effect of macroprudential policy to foreign interest rate shock

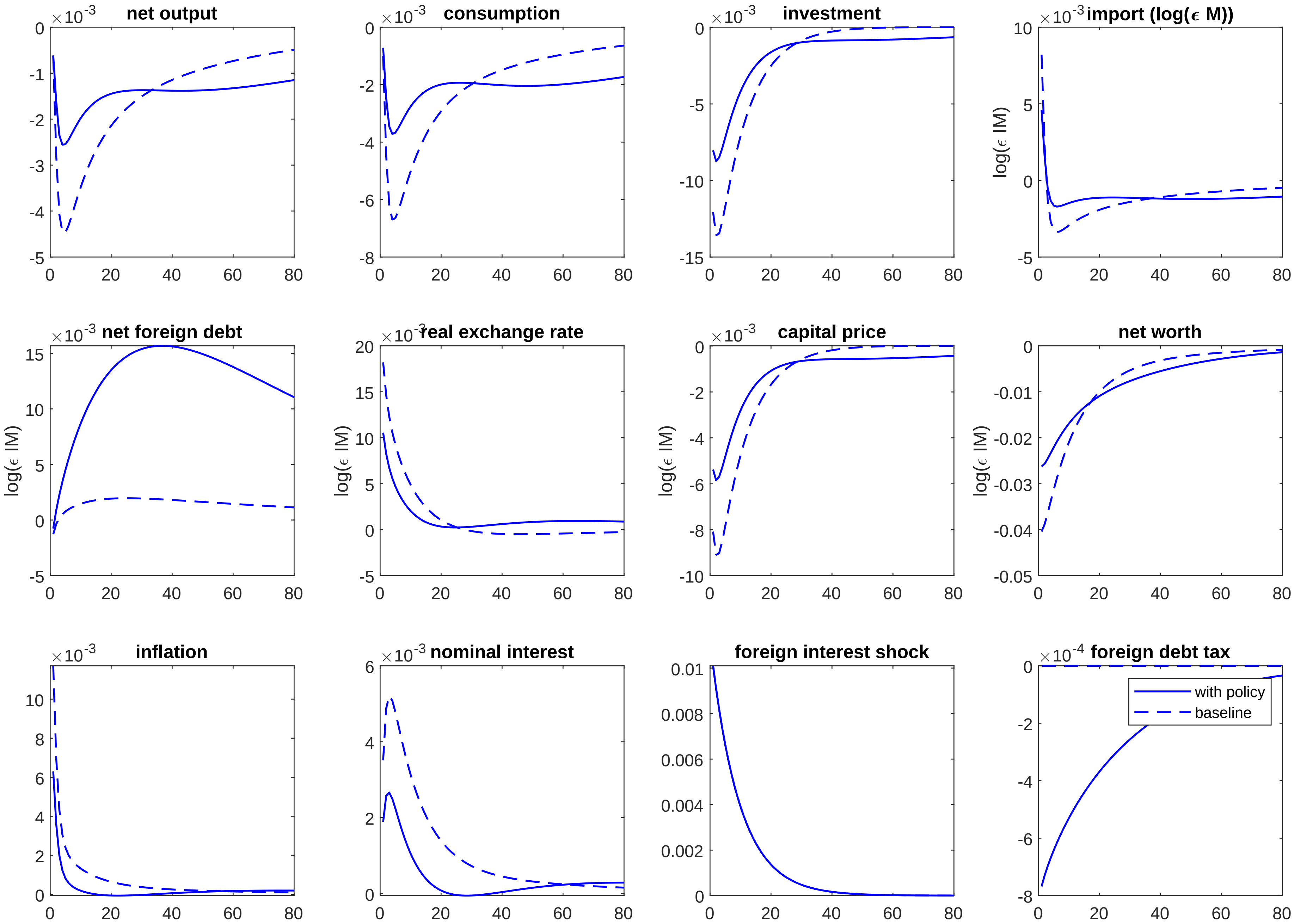
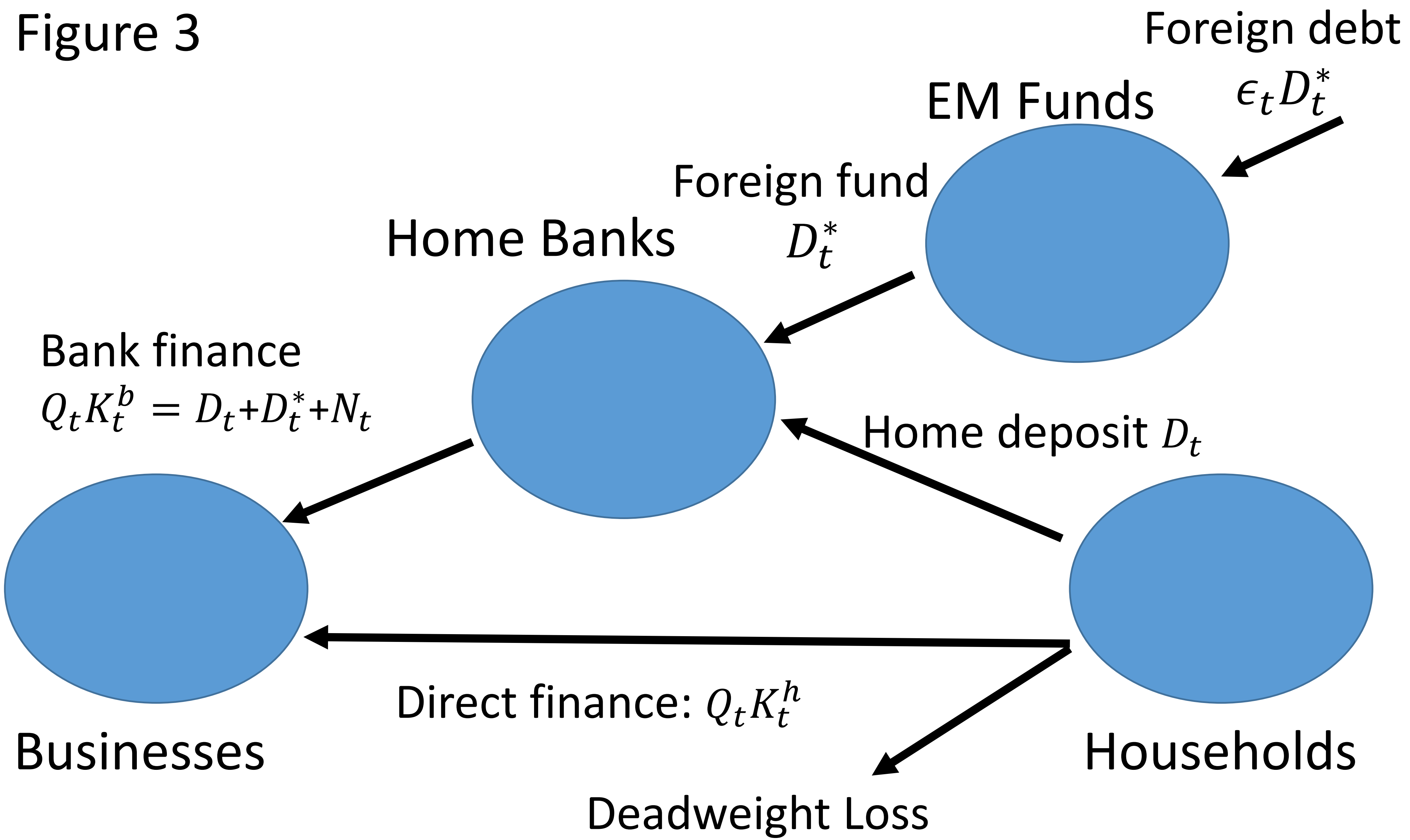


Figure 3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