Optimal Capital Account Liberalization in China[1]

Zheng Liu[1] Mark M. Spiegel[1] Jingyi Zhang[2]

[1]Federal Reserve Bank of San Francisco

[2]Shanghai University of Finance and Economics

April 15, 2024

[1]The views expressed herein are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of San Francisco or the Federal Reserve System.

Domestic financial repression

- Government-favored firms (SOEs) can obtain *directed lending* at below-market rates (Brandt and Zhu, 2000; Lardy, 2014)
- Non-favored firms (POEs) can borrow only at higher market rates
- Preferential lending to SOEs impacts on bank profits
- Banks avoid loss by
  - raising market rates: hurt private firms
  - reducing deposit rates: hurt households

Strict capital account controls in China

- Domestic investors restricted from investing abroad (QDII very small)
- Foreign investors restricted from investing in China
  - FDI allowed, but share in total investment declined to $< 2\%$ since 2009
  - Financial investment more restrictive (B shares and QFII)
- Capital controls led to persistent deviations of domestic asset returns from (FX-adjusted) foreign returns: UIP wedge

What to liberalize first, capital account or financial repression?

- Literature: Benefits of capital account liberalization not clear under distorted domestic financial system
  - Opening capital account could increase leverage and prob of financial crisis (Eichengreen, et al. (2011); Enchengreen and Leblang (2003); Chinn and Ito (2006))
  - Countries with more developed financial system benefit more than those less developed (Ju and Wei, 2010)
  - Benefits work through "secondary improvements" or "discipline effects" for domestic financial institutions (Kose, et al., 2009; Wei and Tytell, 2004)

Abundant policy discussions, but few formal theories

- Plausible link: capital account liberalization can exacerbate misallocation under distorted domestic financial system
- However, "there is a lack of formal theories that articulate this link" (Wei, 2018)
- We present such a theory to study optimal capital account liberalization under financial repression in China

OLG model

- Households live for two periods: young and old
- The young consumes, works, and saves; and the old consumes accumulated assets
- Goods produced using labor and capital in two sectors: SOEs (monopolistic competition) and POEs (perfect competition)
- SOEs less productive than POEs
- All firms rely on external financing of working capital

Financial repression and capital controls

- Financial repression: domestic banks are required to lend minimum fraction γ of loans to SOEs at below-market rate
- Capital controls: capital inflows and outflows both taxed (two-way capital controls, τ_l and τ_d)

Financial repression raises tradeoffs in capital account liberalization

- Capital outflow liberalization
  - Access to foreign asset market raises returns to household savings $\rightarrow$ improved intertemporal allocations
  - Banks pass through higher deposit rate to market lending rates
  - POE funding costs higher $\rightarrow$ more misallocation and lower aggregate TFP
- Capital inflow liberalization
  - Competition from foreign investors reduces domestic market loan rate, benefiting POEs $\rightarrow$ aggregate TFP $\uparrow$
  - Banks cut deposit rate to remain solvent $\rightarrow$ reducing intertemporal allocation efficiency
- Tradeoff between intertemporal allocation and cross-sector allocation in both cases
  - Capital account and financial liberalization complementary

The Model

Households

- The utility function for household born in period t

$$\mathrm{E}\left\{\ln(C_t^y) - \Psi_h \frac{H_t^{1+\eta}}{1+\eta} + \beta \ln(C_{t+1}^o)\right\}$$

- Budget constraints

$$C_t^y + D_t + B_{ft}^d + q_t^k K_t^o + I_t + \frac{\Omega_k}{2}\left(\frac{I_t}{K_t^o} - \frac{\bar{I}}{\bar{K^o}}\right)^2 K_t^o = w_t H_t + T_t + \Gamma_t$$

$$C_{t+1}^o = R_t D_t + (1-\tau_d) R_t^* B_{ft}^d + d_{t+1} + [q_{t+1}^k(1-\delta) + r_{t+1}^k](K_t^o + I_t) - \Gamma_{t+1}$$

where Γ_{t+1} denotes bequest

- Capital stock law of motion

$$K_t = K_t^o + I_t = (1-\delta)K_{t-1} + I_t$$

- Capital outflow tax drives wedge b/n domestic deposit rate R and world rate R^*

$$R_t = (1-\tau_d)R_t^*$$

Firms

- Final goods production requires intermediate inputs from two sectors: SOE and POE

$$Y_t = \left[\phi_t Y_{st}^{\frac{\sigma_m - 1}{\sigma}} + (1 - \phi_t) Y_{pt}^{\frac{\sigma_m - 1}{\sigma}}\right]^{\frac{\sigma_m}{\sigma - 1}}$$

- Intermediate goods production requires labor and capital in each sector $j \in \{s, p\}$

$$Y_{jt} = A_{jt}(K_{jt})^{1-\alpha}(H_{jt})^{\alpha}$$

- Firms face working capital constraints

$$B_{jt} \geq (w_t H_{jt} + r_t^k K_{jt})$$

Financial intermediaries (banks)

- Competitive banks take deposits from HHs and lend to firms
- Directed lending: a fraction γ of loans lent to SOEs at below-market rates (normalized to 0), $1-\gamma$ fraction lent at market rate $R_{lt} > 1$

$$B_{gt} \geq \gamma(B_{gt} + B_t)$$

- Bank's break-even condition

$$R_t = \gamma + (1-\gamma)R_{lt}$$

- Financial repression creates interest rate wedges:

$$R_{lt} > R_t > 1$$

where interest on directed lending loans is 1.

Capital inflow wedges

- Two wedges on foreign inflows:
  - Capital inflow tax τ_{lt}: reduce returns for foreign investors
  - Risk premia $\Phi(\frac{B^l_{ft}}{Y_t})$: upward-sloping supply of foreign funds
- No arbitrage for capital inflows

$$(1-\tau_l)R_{lt} = R^*_t \Phi\left(\frac{B^l_{ft}}{Y_t}\right)$$

- Risk premium $\rightarrow$ spillover externality from foreign debt

Reallocation effect of market lending rate

- SOEs' and POEs' funding costs:
  - POEs' funding cost
$$R_{pt} = R_{lt}$$
  - SOEs' funding cost
$$R_{st} = \frac{B_{gt}}{B_{st}} \times 1 + \frac{B_{st} - B_{gt}}{B_{st}} R_{lt}$$
- SOEs' funding cost is less sensitive to changes in market lending rate than POEs'.
- An increase in market lending rate reallocates resources from POEs to SOEs.

Market clearing and equilibrium

- Final goods market clearing

$$NX_t = Y_t - C_t^y - C_t^o - I_t - \frac{\Omega_k}{2}\left(\frac{I_t}{K_t^o} - \frac{\bar{I}}{\bar{K_t^o}}\right)^2 K_t^o$$

- Labor market and capital market clearing

$$H_t = H_{st} + H_{pt} \quad K_{t-1} = K_{st} + K_{pt}$$

- Loanable funds market clearing

$$B_{st} + B_{pt} = B_{gt} + B_t + B_{ft}^l$$

- Balance of payments condition

$$\begin{aligned} NX_t \quad &+ \quad (R_{t-1}^* - 1)B_{f,t-1}^d - \left[R_{t-1}^* \Phi\left(\frac{B_{f,t-1}^l}{Y_{t-1}}\right) - 1\right] B_{f,t-1}^l \\ &= \quad (B_{ft}^d - B_{ft}^l) - (B_{f,t-1}^d - B_{f,t-1}^l) + \Delta_t \end{aligned}$$

Calibration

Calibrate to Chinese data where possible

- Productivity gap: $A_s = 1$ and $A_p = 1.42$ [Hsieh and Klenow (2009)]
- SOE share: ϕ declines from 0.5 to 0.3 (structural changes)
- Financial repression: $\gamma = 0.5$ to match SOE share in bank loans in 2000
- Capital control taxes: $\tau_d = 16.63\%$ and $\tau_l = 5.08\%$, to match ratios of privately held foreign assets and liabilities to output

Other calibrated parameters

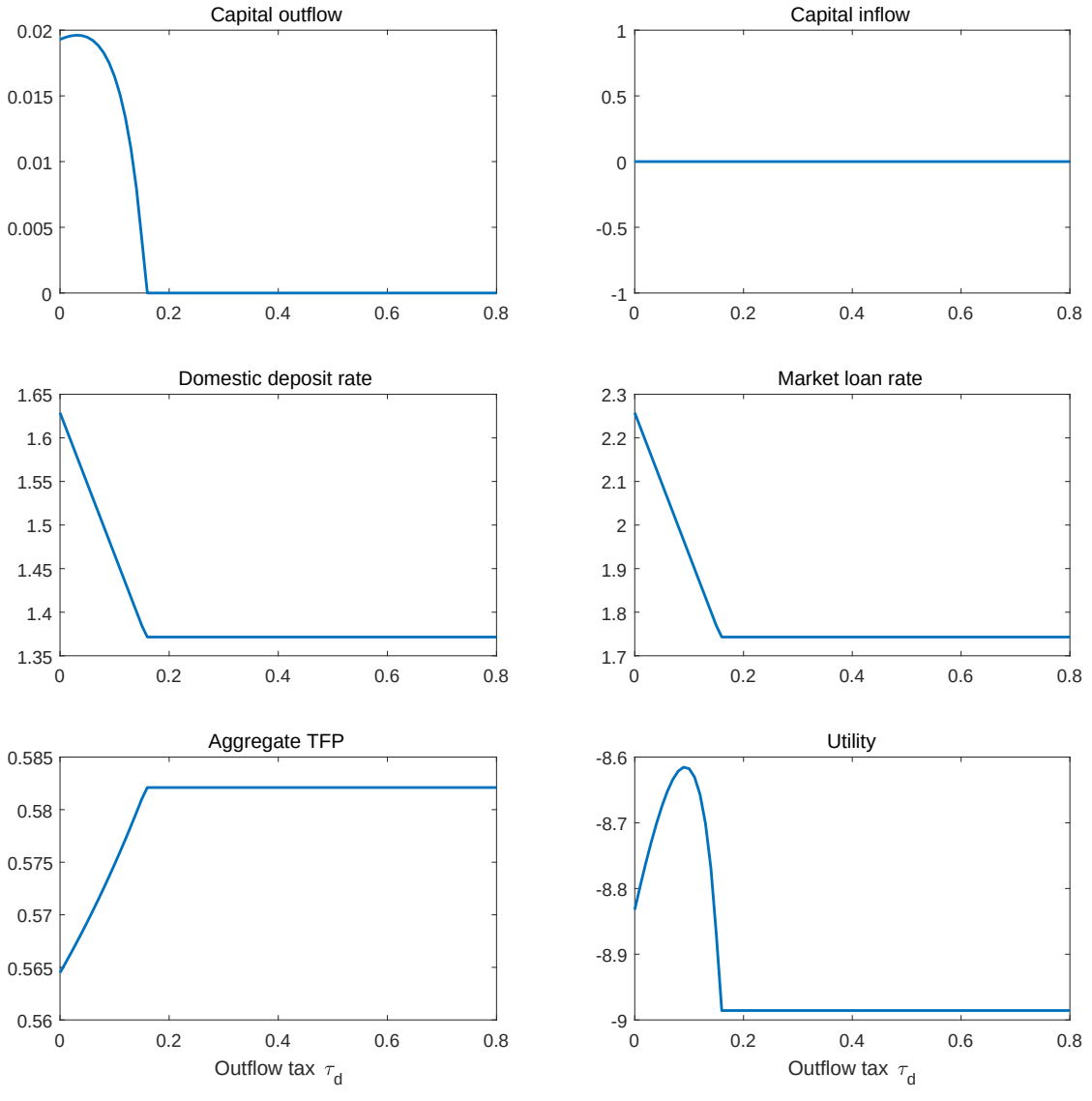
Parameter	Description	Value
β	Household discount rate	0.665
η	Inverse of labor supply elasticity	2
Ψ_h	Utility weight of labor	38
δ	Capital depreciation rate	0.651
Ω_k	Capital adjustment cost	5
r^*	Foreign interest rate	1.629
Γ	Transfer from old to young	0.75
α	Labor income share	0.5
Φ_b	Elasticity of risk preimum to external debt-to-GDP ratio	3

Steady State

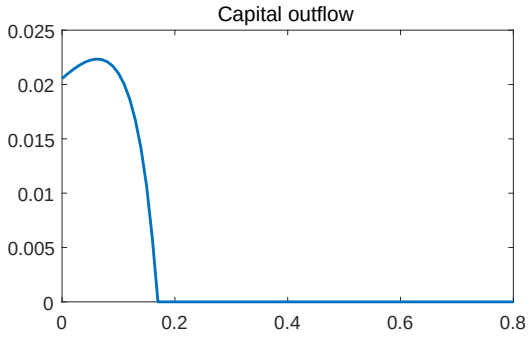
Steady state analysis

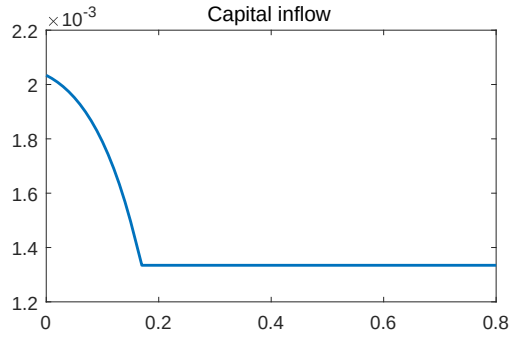
- First consider capital account liberalization, holding financial repression constant
  1. One-way capital outflow liberalization
  2. One way capital inflow liberalization
  3. Two-way liberalization
- Then consider joint liberalization of both capital controls and financial repression

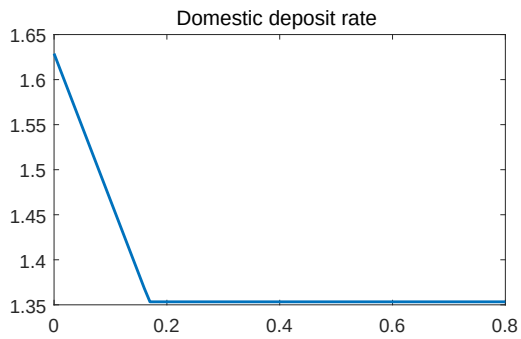
One-way liberalization of capital outflows (no inflows)

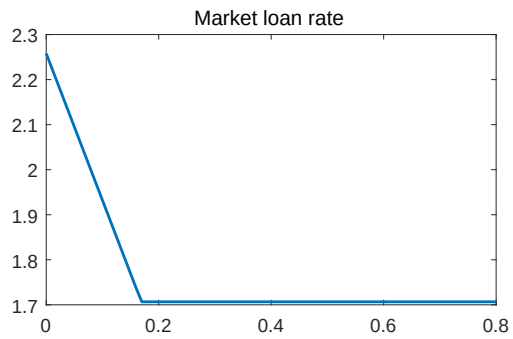


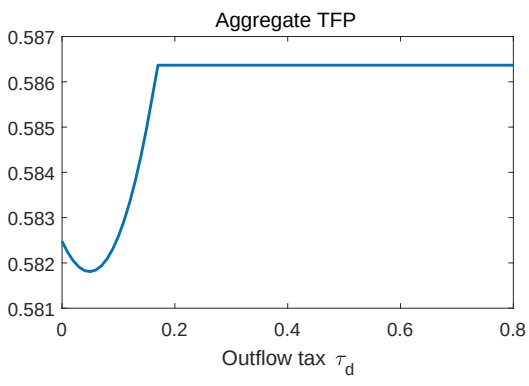
One-way liberalization of capital outflows (inflows allowed)

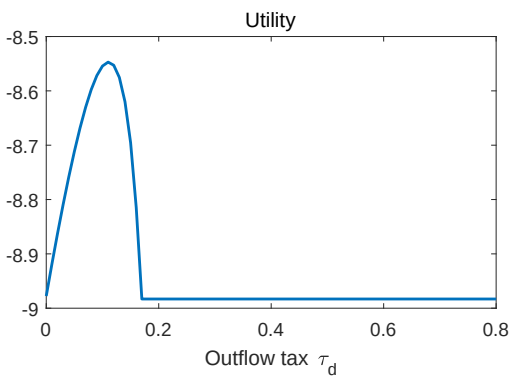








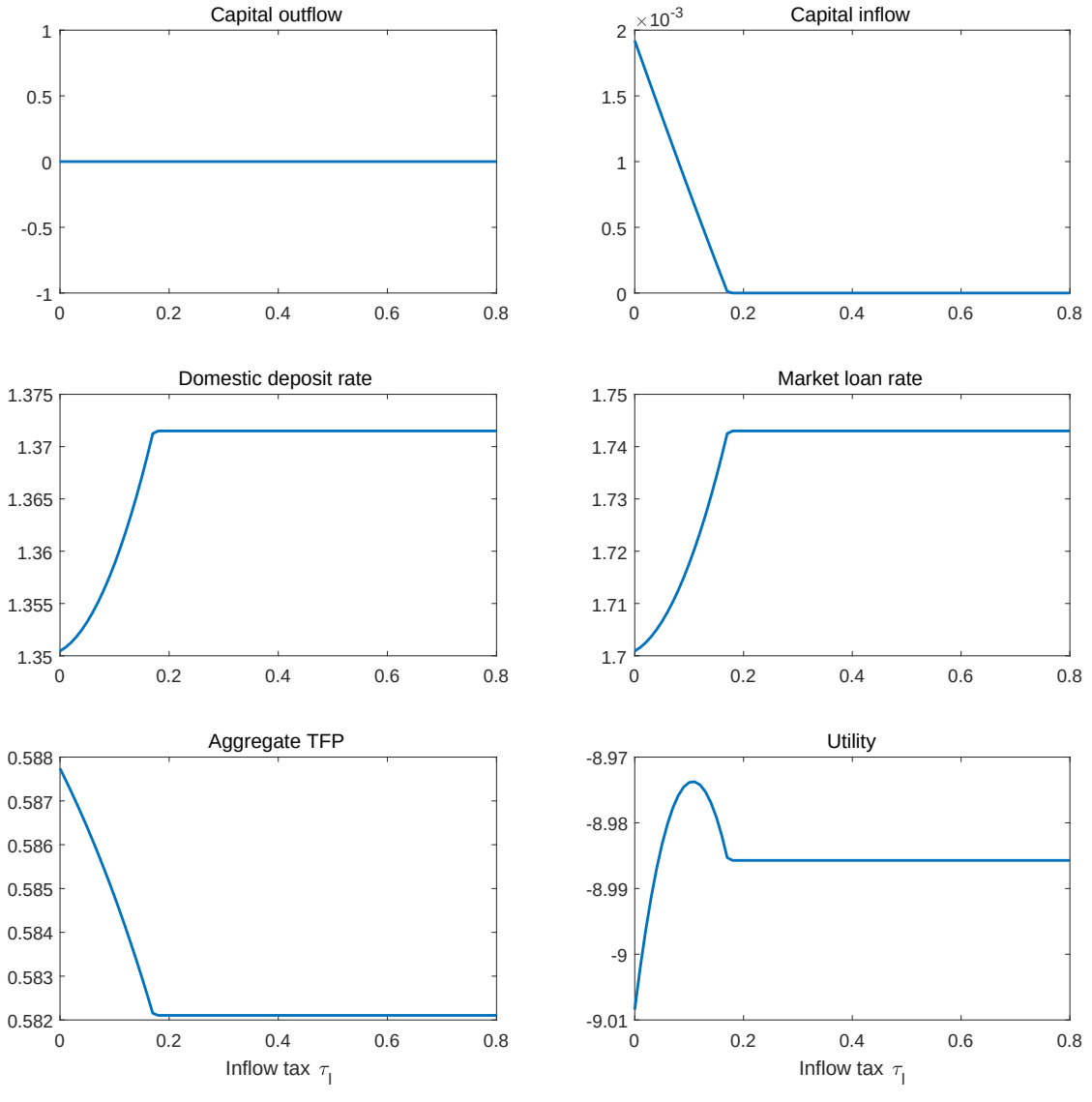




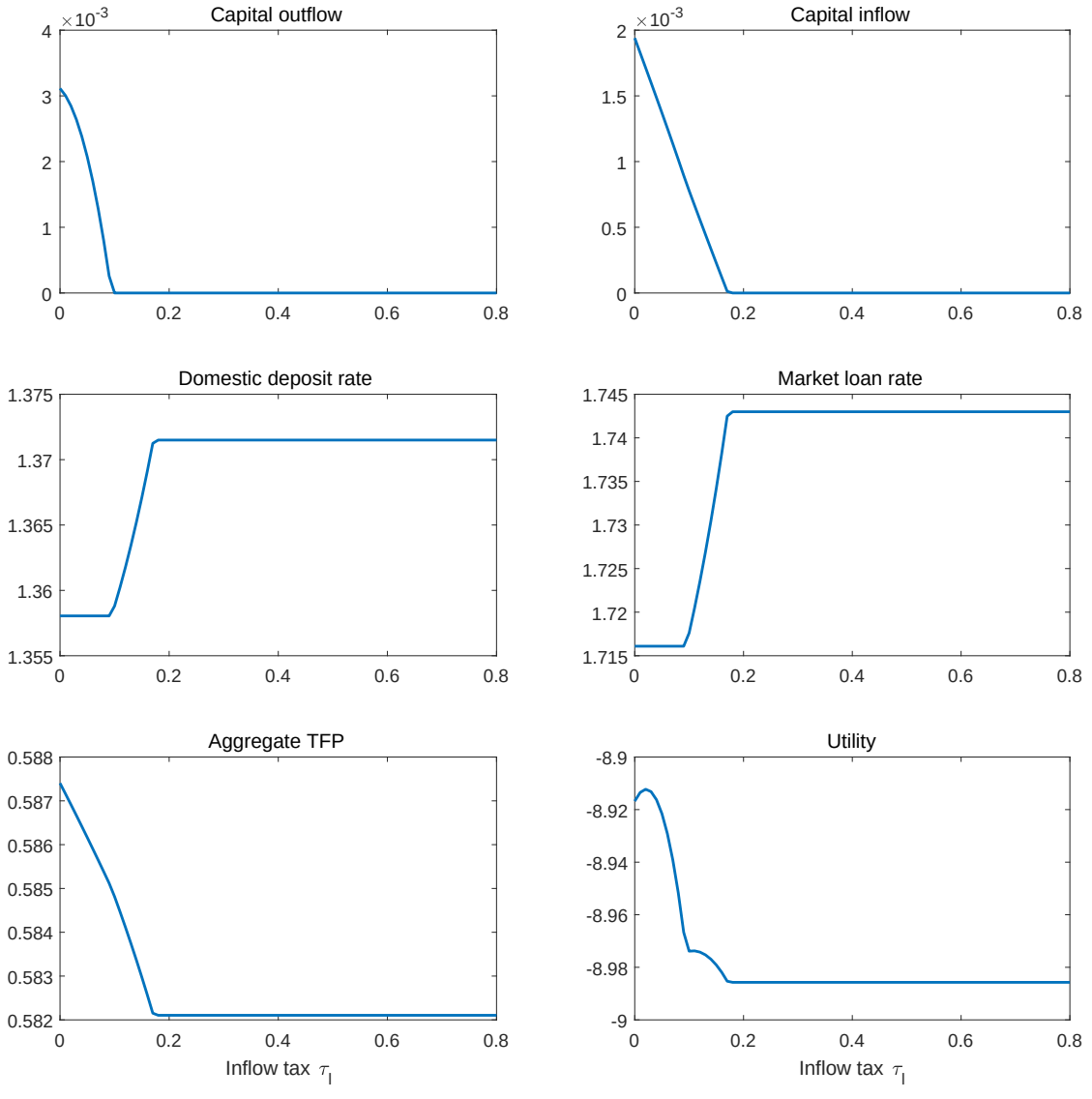
One-way outflow liberalization

- Sufficient reduction in τ_d leads to capital outflows
- No arbitrage raises deposit rate $\rightarrow$ HH returns on savings increased
- Financial repression $\rightarrow$ Banks $\uparrow$ market rate, hurting POEs
- Reallocation to SOEs reduces aggregate TFP
- Tradeoff between higher returns on HH savings and lower TFP $\rightarrow$ interior welfare optimum
- At very low capital outflow tax rates, further liberalization reverses the TFP decline.
  - Because high domestic rates make more foreign funds available to POEs, which mitigates the misallocation effect.

One-way liberalization of capital inflows (no outflows)



One-way liberalization of capital inflows (outflows allowed)



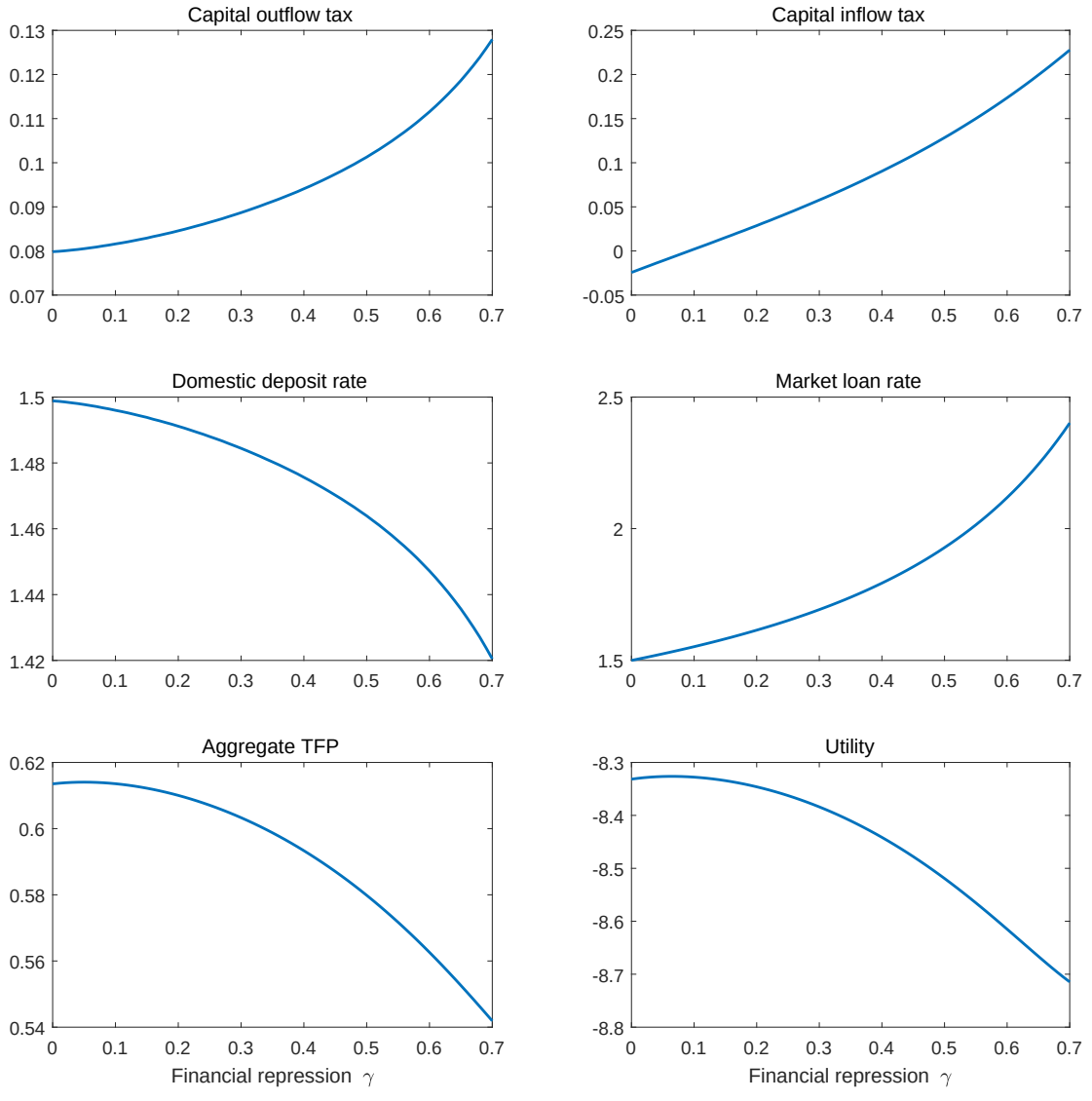
One-way liberalization of capital inflows

- Sufficient reduction in τ_I attracts foreign capital inflows
- Competition from foreign investors reduces market loan rate, benefiting POEs $\rightarrow \uparrow$ aggregate TFP
- Financial repression $\rightarrow$ banks lower deposit rate, reducing HH interest earnings
- Risk premium $\rightarrow$ exacerbate over-borrowing externality
- Tradeoff between higher TFP, lower HH asset returns and over-borrowing externality $\rightarrow$ interior optimum of capital inflow controls

Analytic results supporting numerical results

- We solve for SOE input share $S(\tau_d, \tau_l, \gamma) = K_s/K_p = L_s/L_p$
- Then show that
  - $S(\tau_d, \tau_l, \gamma)$ is increasing in τ_l
  - There exists $\bar{\tau}_d$ such that $S(\tau_d, \tau_l, \gamma)$ decreases (increases) with τ_d when $\tau_d \geq (<)\bar{\tau}_d$
- TFP $\downarrow$ with S ($\frac{\partial \tilde{A}}{\partial S} < 0$)

Optimal capital controls given financial repression (γ)



Liberalizations of capital controls and financial repression are complementary

- Higher γ implies higher optimal capital control taxes on both inflows and outflows
  - $\uparrow \gamma \rightarrow \uparrow$ market rate, $\uparrow$ misallocation and $\downarrow$ TFP
  - Planner $\uparrow \tau_d$ to lower deposit rate and to partly undo misallocation
  - $\uparrow \gamma$ raises market rate and attracts more capital inflows $\rightarrow$ more external borrowing
  - $\uparrow$ external borrowing excessive due to borrowing externality
  - To mitigate over-borrowing externality, planner raises capital inflow tax (τ_l)

Transition dynamics

- SOE share falls from initial steady state $\phi_0 = 0.5$ to new steady state $\phi_1 = 0.3$
- Examine optimal magnitude and speed of capital account liberalization along transition path
- Notation (Example for τ_d)
  - τ_{d0} initial SS value of τ_d
  - τ_{d1} final SS value of τ_d
  - $\alpha_d \in [0, 1]$ pace of liberalization of τ_d
  - $\tau_{dt} = \tau_{d0} + (\tau_{d1} - \tau_{d0})[1 - (1 - \alpha_d)^t]$ if $t \geq 1$
  - Larger values of $\alpha_d \rightarrow$ faster pace of liberalization
- Similar for τ_l and γ

Transition welfare

- Welfare at new steady-state

$$V_f(\tau_{d1}, \tau_{l1}, \gamma_1) = \frac{1}{1-\beta}\left[\ln(\bar{C}^y) - \Psi_h \frac{\bar{H}^{1+\eta}}{1+\eta} + \ln(\bar{C}^o)\right]$$

- Welfare along transition path (starting in period 1)

$$V_1(\tau_{d1}, \alpha_d, \tau_{l1}, \alpha_l, \gamma_1, \alpha_\gamma) = \sum_{t=1}^{\infty} \beta^t \left(\ln(C_t^y) - \Psi_h \frac{H_t^{1+\eta}}{1+\eta} + \ln(C_t^o)\right)$$

Full reforms along transition paths

	Benchmark	Inflow only	Outflow only	Full liberalization
Case	0	1	2	3
τ_d	16.63%	16.63%	−1.05%	−0.74%
α_d	-	-	46.42%	43.90%
τ_l	5.08%	−5.32%	5.08%	3.37%
α_l	-	20.68%	-	100.00%
γ	50.00%	0.82%	0.00%	0.78%
α_γ	-	100.00%	98.20%	100.00%
Welfare gains	0.00%	28.54%	31.27%	31.33%

Case 0: benchmark (initial SS); Case 1: optimal liberalization of inflow control and financial repression; Case 2: optimal liberalization of outflow control and financial repression; Case 3: optimal liberalization of both inflow control and outflow control, and financial repression.

- Liberalize financial repression at relatively fast pace
- Liberalize inflows faster than outflows to accelerate transition

Conclusion

- We present a OLG model to study implications of capital account liberalization under financial repression
- Liberalizing capital controls incurs tradeoff between production efficiency and intertemporal allocation efficiency
  - Easing capital inflows reduces funding costs for productive POEs and improves TFP, but lowers returns on HH savings
  - Easing capital outflows improves returns on HH savings, but raising funding costs for POEs and reduces TFP
- Along transition path, liberalizing financial repression and easing capital controls are complementary reforms
  - Second-best policy calls for gradual liberalization of both capital inflows and outflows ...
  - ... but fast liberalization of financial repression