Financial Globalization, Financial Crises and Contagion

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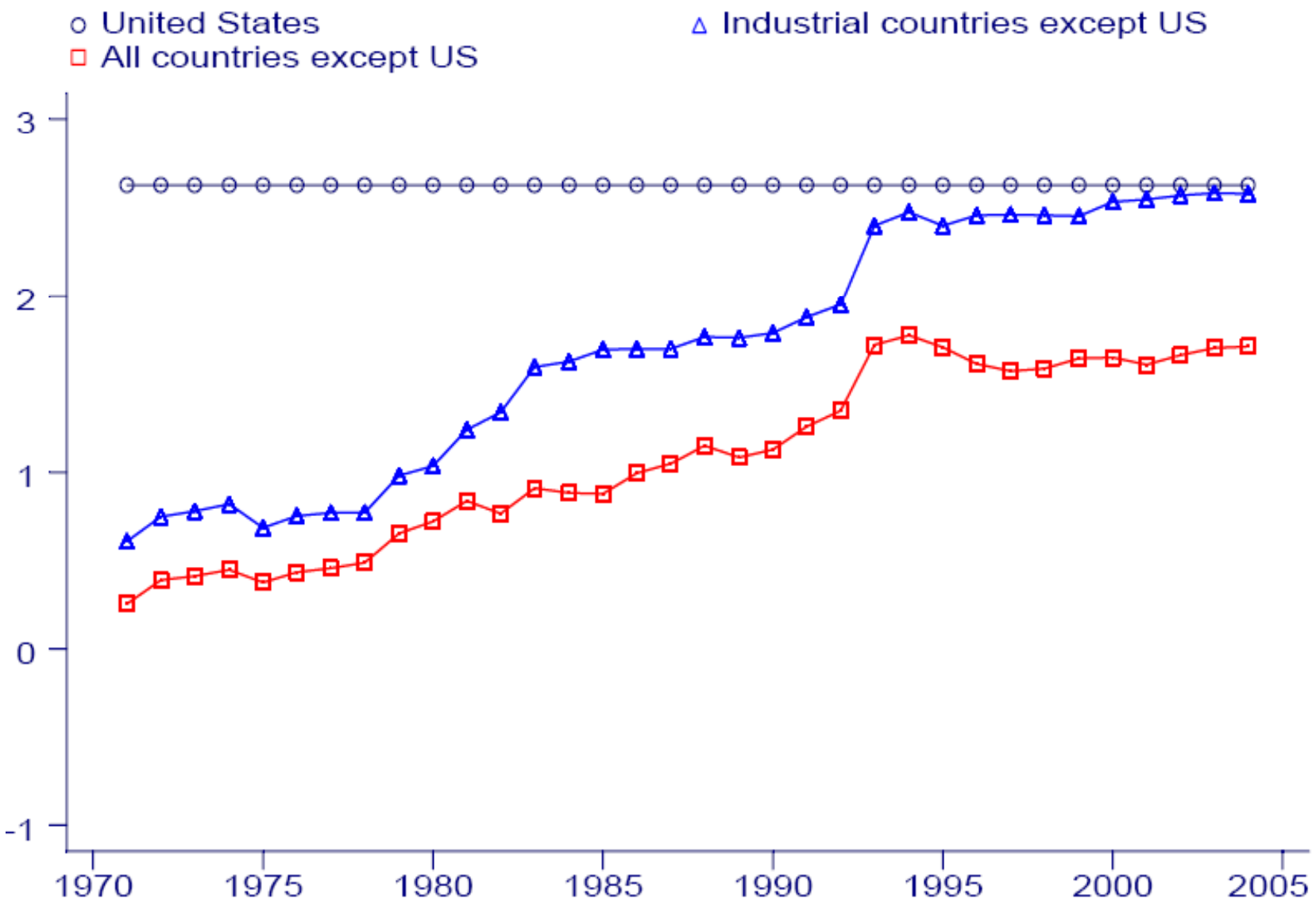
Facts and questions

- Facts:
  1. At least ½ of the of surge in U.S. debt since 1980s was financed by foreign inflows
  2. U.S. crisis led to global capital markets crisis
  3. Asset price deflation linked to MtoM requirements, VaR collateralization, margin calls
  4. Securitization fueled credit growth and allowed banks to circumvent traditional banking regulation (SIVs)
- Questions:
  1. Was the surge in U.S. debt *caused* by FG?
  2. Did FG, MtoM and SIVs worsen crash in asset prices and strengthen spillovers?
  3. Did financial heterogeneity contribute to the crisis?

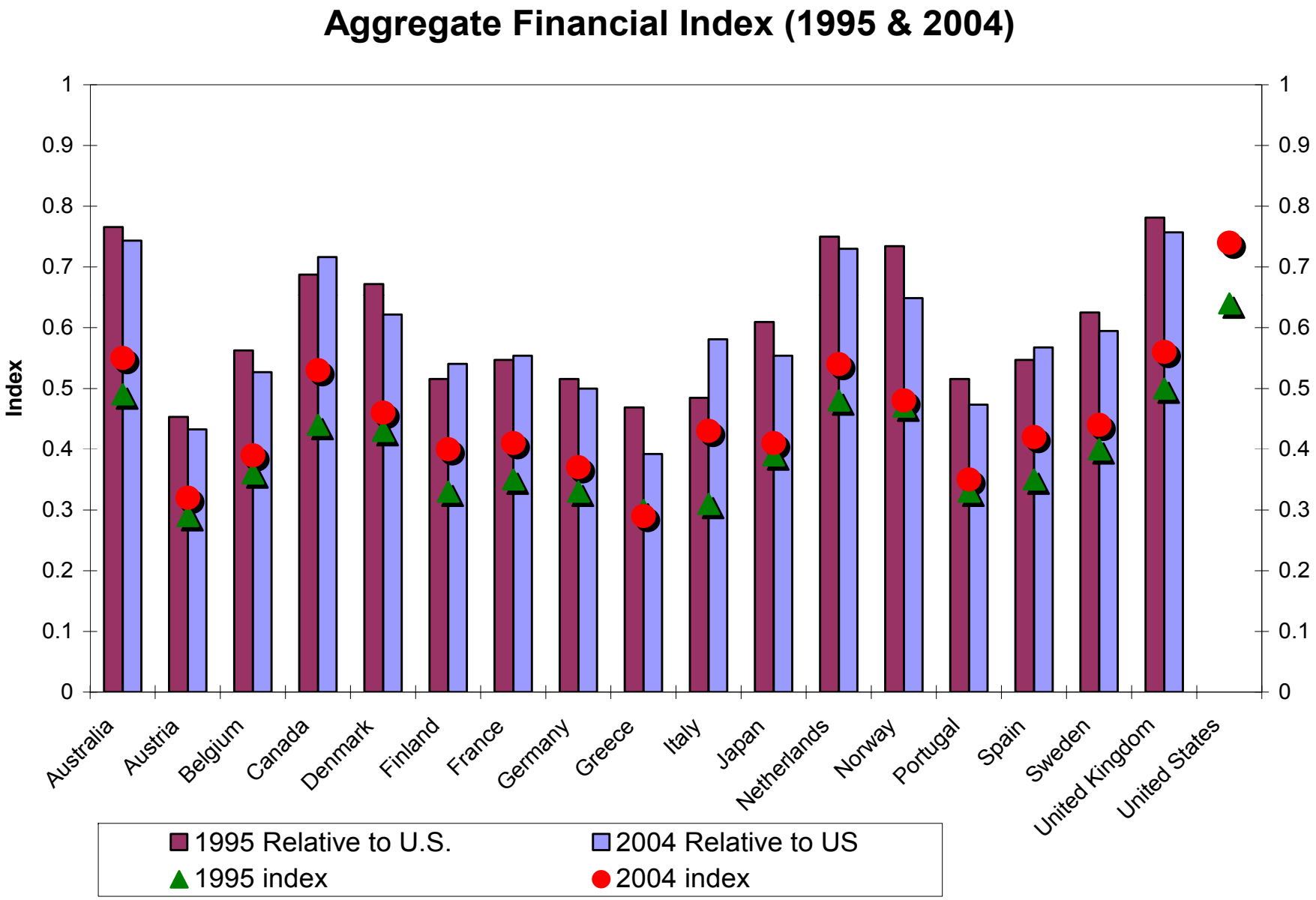
Strategy and findings

- Propose a model in which FG without domestic FD causes surge in U.S. credit (MQRR, *JPE* 09)
- Introduce financial intermediation with MtoM capital requirements and "securitization"
- Study implications of a "small shock" to FI's capital in one country
  1. Fisherian deflation with large amplification
  2. Global spillovers
  3. Financial heterogeneity matters for amplification
  4. Relaxing MtoM weakens the crash

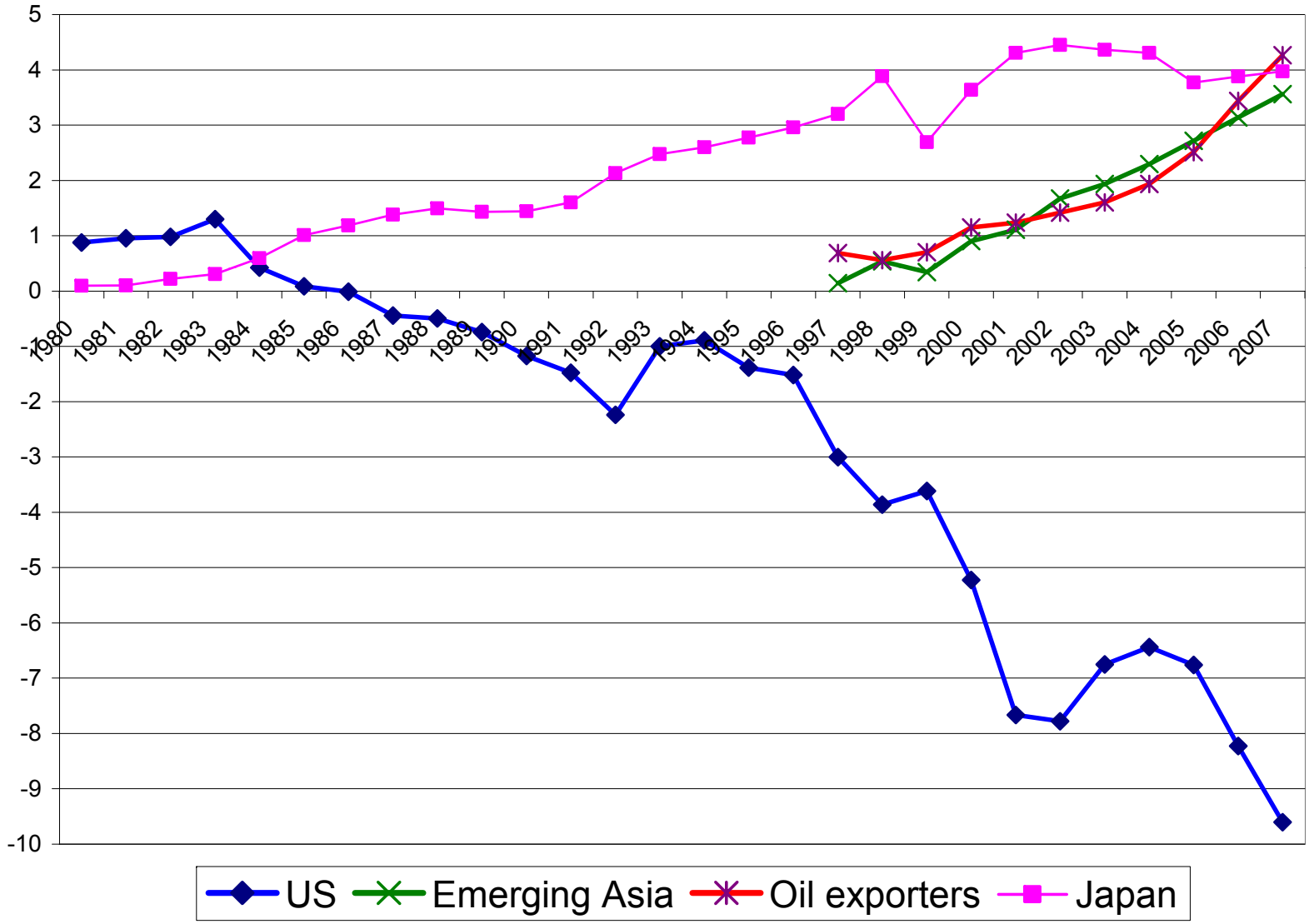
Chinn-Ito financial integration index



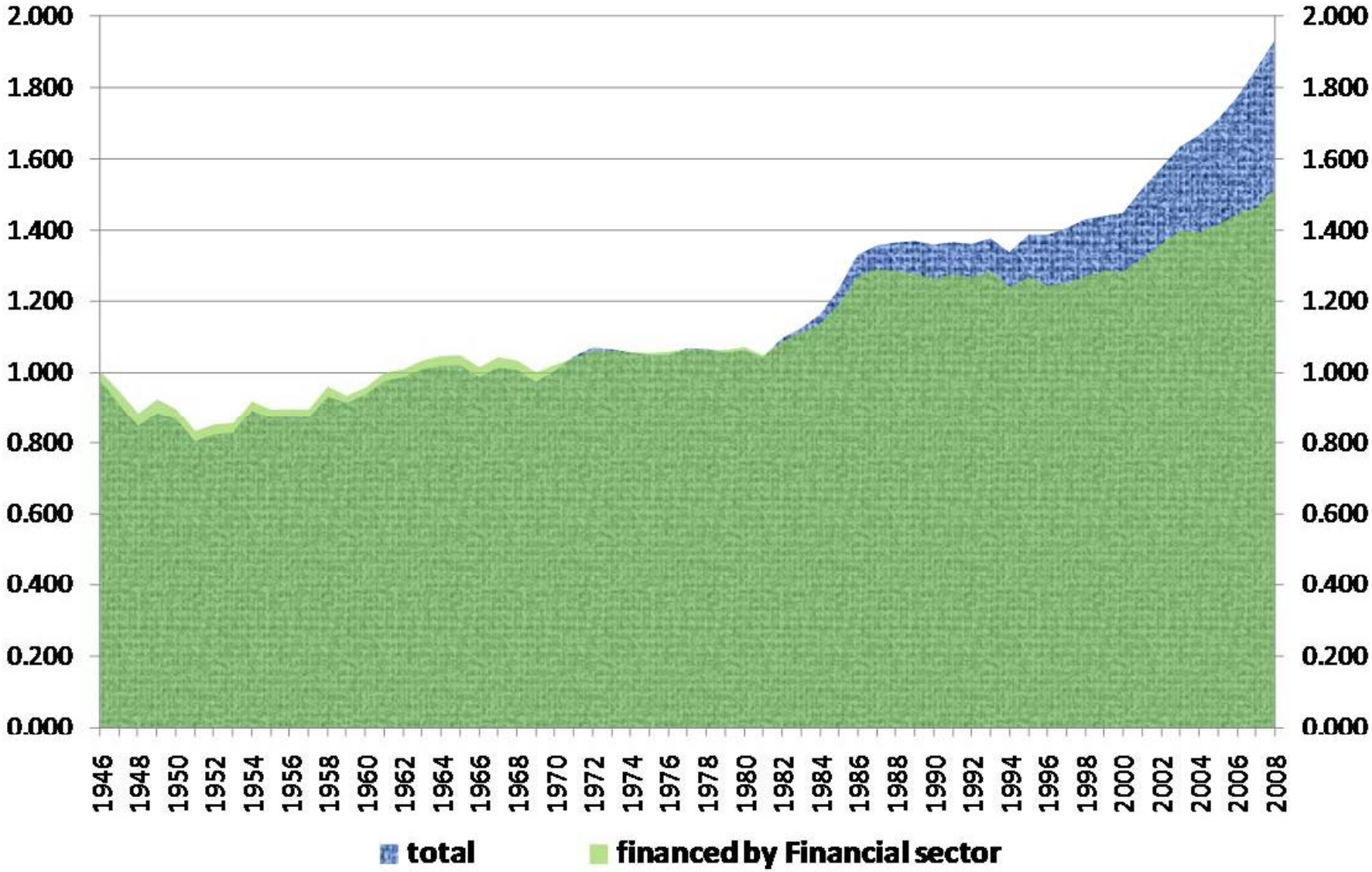
FD differences across industrial countries



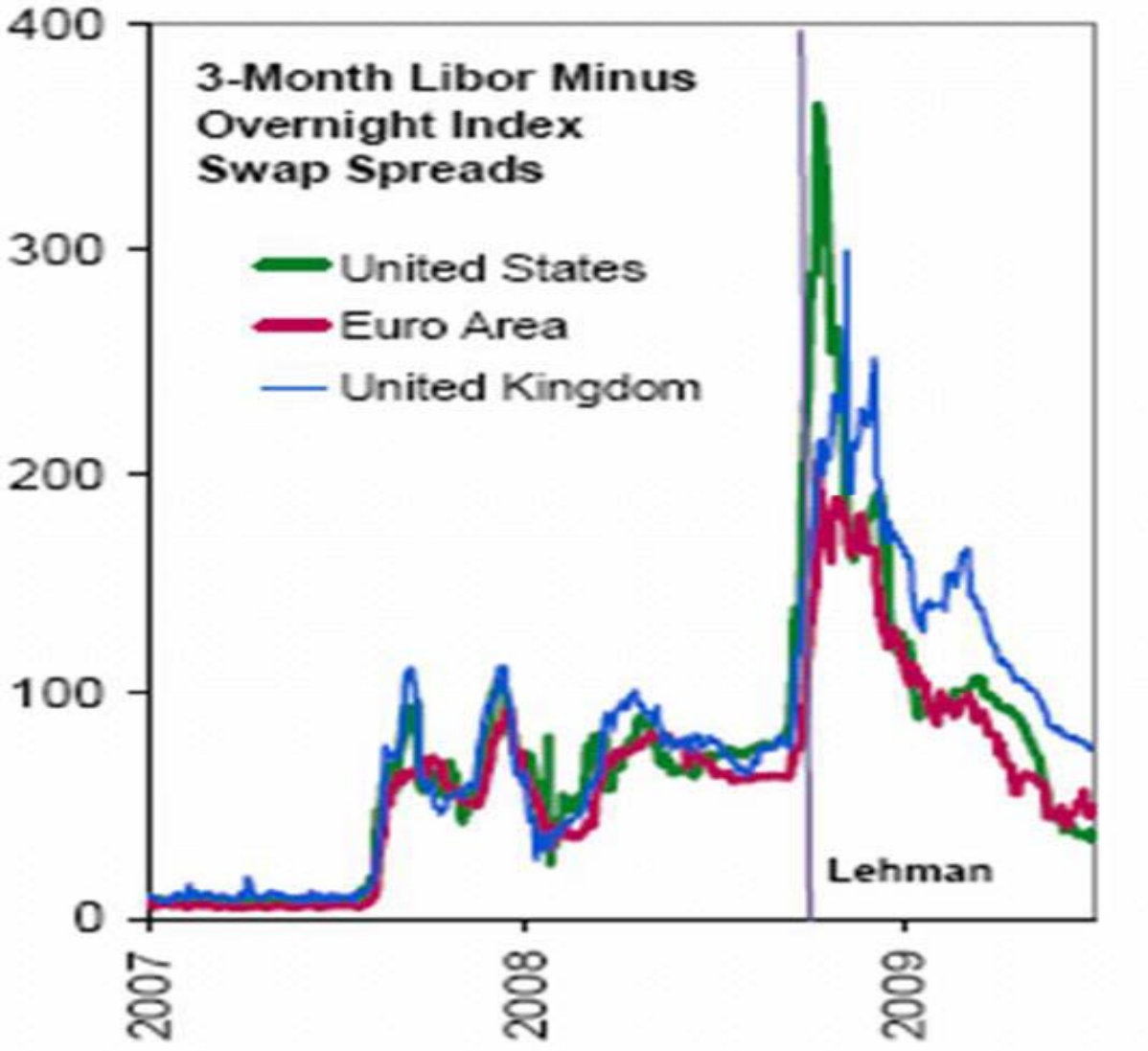
NFA positions as a share of world GDP



Net Credit Liabilities of U.S. Domestic Nonfinancial Sectors in percent of GDP



Bank spreads surged globally



Analytical framework

- Two-country model with heterogeneous agents
- In each country:
  1. Mass μ of agents, ½ savers, ½ producers, CRRA
  2. Fixed per-capita supply of capital $\bar{k}$
  3. Savers face limited enforcement & limited liability
  4. Producers face limited enforcement
  5. Banks face MtoM requirements, but can circumvent them at a cost (“special investment vehicle”)

Contracts with limited enforcement

- Savers can divert $1\text{-}\phi^{\,i}$ of income. Incomes and consumption observable, not "legally" verifiable
- Value of diverting income $V_t\Big(w_j\,,\,b(s_1)-\phi\cdot(w_j-w_1)\Big)$
- Incentive compatibility constraint:

$$V_t\Big(w_j\,,\,b(w_j)\Big)\geq V_t\Big(w_j\,,\,b(w_1)-\phi\cdot(w_j-w_1)\Big)$$

so strict monotonicity of *V* implies:

$$b(w_j)\geq b(w_1)-\phi\cdot(w_j-w_1)$$

Country i's individual saver's problem

$$V_t^i(w,b) \quad = \quad \max_{c,b(w')} \left\{ U(c) + \beta \sum_{w'} V_{t+1}^i\Big(w', b(w')\Big) g(w,w') \right\}$$

subject to:

(a) Budget constraint:

$$d_t + w_t + b(w_t) = c_t + \sum_{w_{t+1}} b(w_{t+1}) q_t^i(w_t, w_{t+1})$$

(b) Limited enforcement constraint

$$b(w_1) - b(w_j) \leq \phi^i \cdot \Big(w_j - w_1\Big)$$

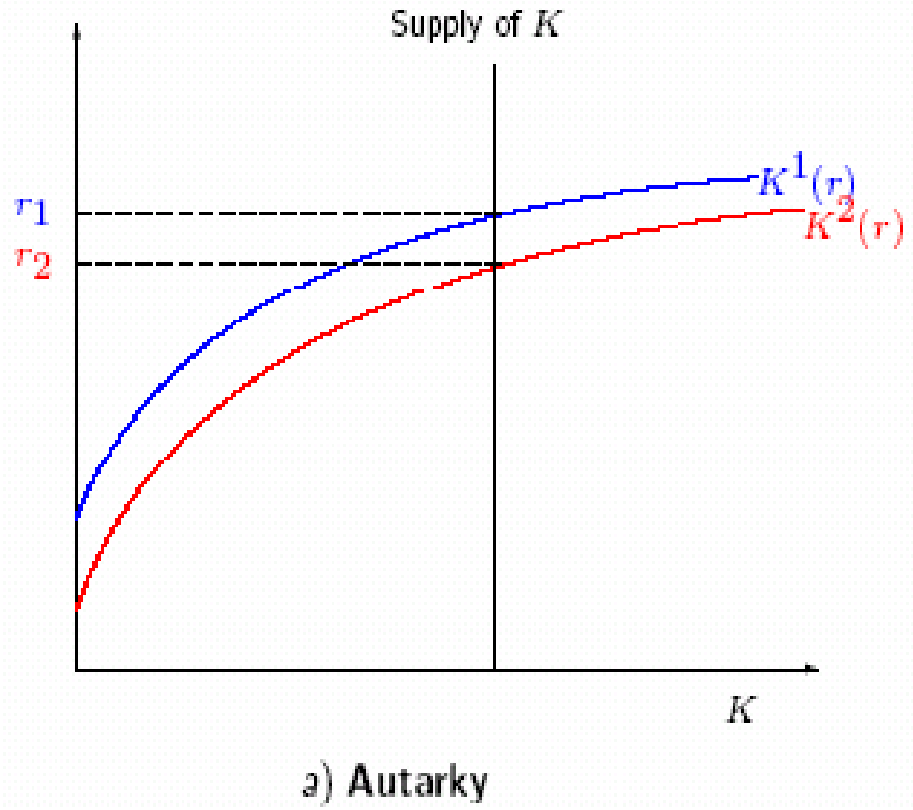
(c) Limited liability constraint

$$w_j + b(w_j) \geq 0$$

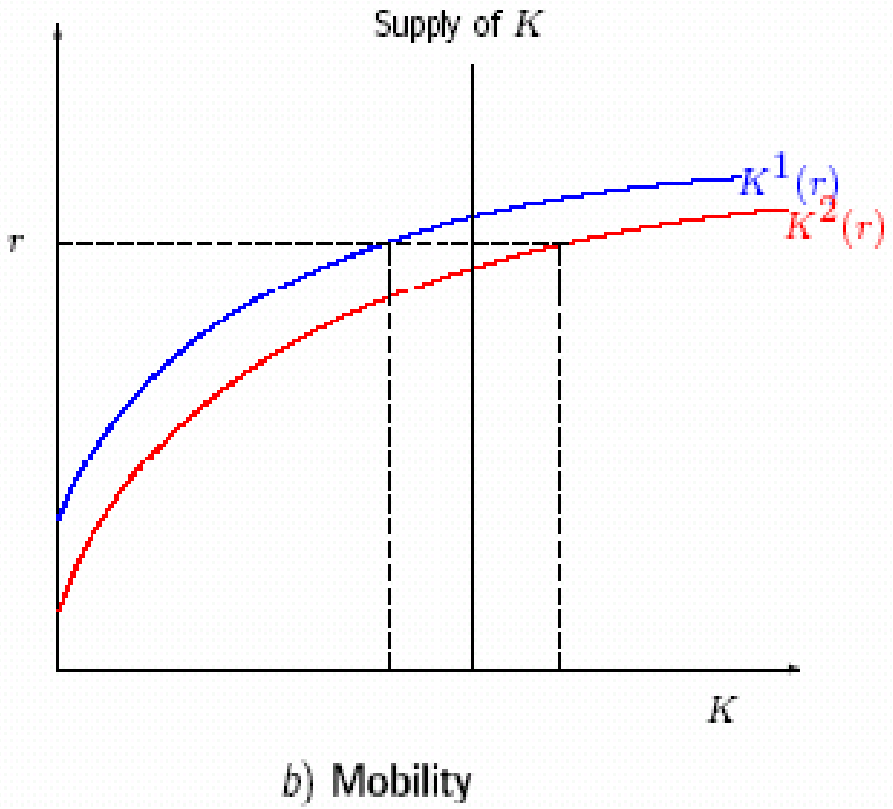
Since shocks are purely idiosyncratic, contingent claims prices satisfy:

$$q_t^i(w_t, w_{t+1}) = g(w_t, w_{t+1})/(1 + r_t^i)$$

Financial autarky v. financial globalization



a) Autarky



b) Mobility

Country i's representative producer's problem

$$W_t^i(k,l) \quad = \quad \max_{c,k',l'} \left\{ U(c) + \beta W_{t+1}^i\left(k',l'\right) \right\}$$

Subject to:

(a) Budget constraint

$$w^p + kP_t^i + F(k) + \frac{l' - \varphi_t^i(l')}{1 + r_t^i} = c + l + k'$$

$$F(k_{t+1}) = Ak_{t+1}^{\nu}$$

(b) Limited enforcement constraint

$$l' \leq \psi^i \left[k' P_{t+1}^i - F(k') \right]$$

Financial intermediaries

- Deposit liabilities

$$B_t = \int_{w_{-1},b_{-1},w} \sum_{w} b^i_{t-1}(w_{-1}, b_{-1}, w)\, g(w_{-1}, w)\, M_t(w_{-1}, b_{-1})$$

- Beginning-of-period equity:

$$e_t = \bar{k}^f P^i_t + L_t - B_t$$

- Budget constraint:

$$e_t + \frac{B_{t+1}}{1 + r^i_t} = \bar{k}^f P^i_t + \frac{L_{t+1}}{1 + r^i_t} + d_t$$

- Non-negativity constraint on dividends: $d_t \geq 0.$

Capital requirements

- Subset of loans $\overline{L}_{t+1}$ subject to MtoM capital req.

$$\overline{L}_{t+1} \leq \alpha(e_t - d_t)$$

- Individual bank incurs cost for loans larger than a "threshold "price:"

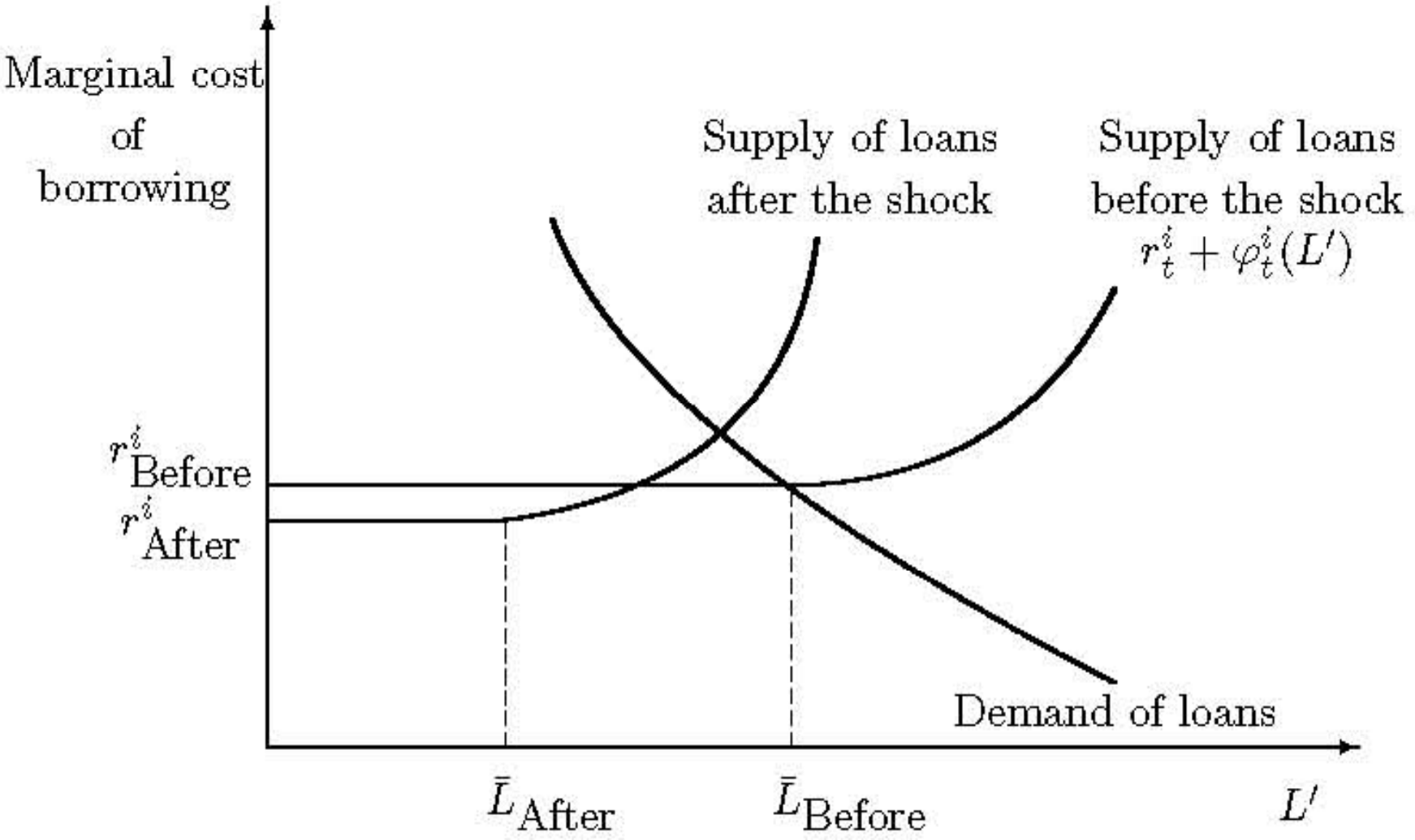
$$\varphi_t(l_{t+1}) = \begin{cases} \kappa(l_{t+1} - \chi_t^i)^2 & \text{if } l_{t+1} \geq \chi_t^i \\ 0 & \text{otherwise} \end{cases}$$

- Competitive banks minimize costs by choosing highest threshold that keeps dividends non-negative .

$$\chi_t = \alpha(\bar{k}^f P_t + L_t - B_t) = \alpha e_t$$

- Loans at/below this threshold are offered at r and subject to MtoM constraint, and above they have increasing cost

Credit shocks in the loan market



Quantitative experiments

- Compare FA v. FG steady-state equilibria
  - Show how much FG contributed to credit surge
- Hit with unanticipated, once-and-for all "credit shock" (one-time drop in FI's equity—e.g. unexpected loss in a small fraction of loans)
  - Show Fisherian amplification and contagion
  - Examine differential effects under FA v. FG
  - Examine importance of financial heterogeneity

Calibration

- $\beta = 0.94, \ \sigma = 1$
- C1 is U.S., 30% of world GDP, μ^1=0.3
- Financial structure parameters:

$$\phi^1 = 0.21, \ \ \phi^2 = 0, \ \ \psi^1 = 0.62, \ \ \psi^2 = 0.45, \ \kappa = 0.1, \ \ \alpha = 10$$

- Individual earnings process set to U.S. estimates:

$$w = \overline{w}(1 \pm \Delta_w) \quad \overline{w} = w^p = 0.4 \quad \Delta_w = 0.6, \quad g(w, w') = 0.95$$

- Production:

$$y = A\,k^{\nu}, \quad \nu = 0.75, \quad A = 0.2, \quad k = 1$$

- Capital stocks:

$$k = 1, \quad \overline{k} = 1.05, \quad k^f = 0.05$$

Credit ratios in steady states before and after FG
(shares of output)

	Before FG	After FG 1/
Country 1	169%	195%
Country 2	126%	119%

1/ Calibrated to match 2005 observed shares of credit to GDP from World Bank *World Development Indicators*.

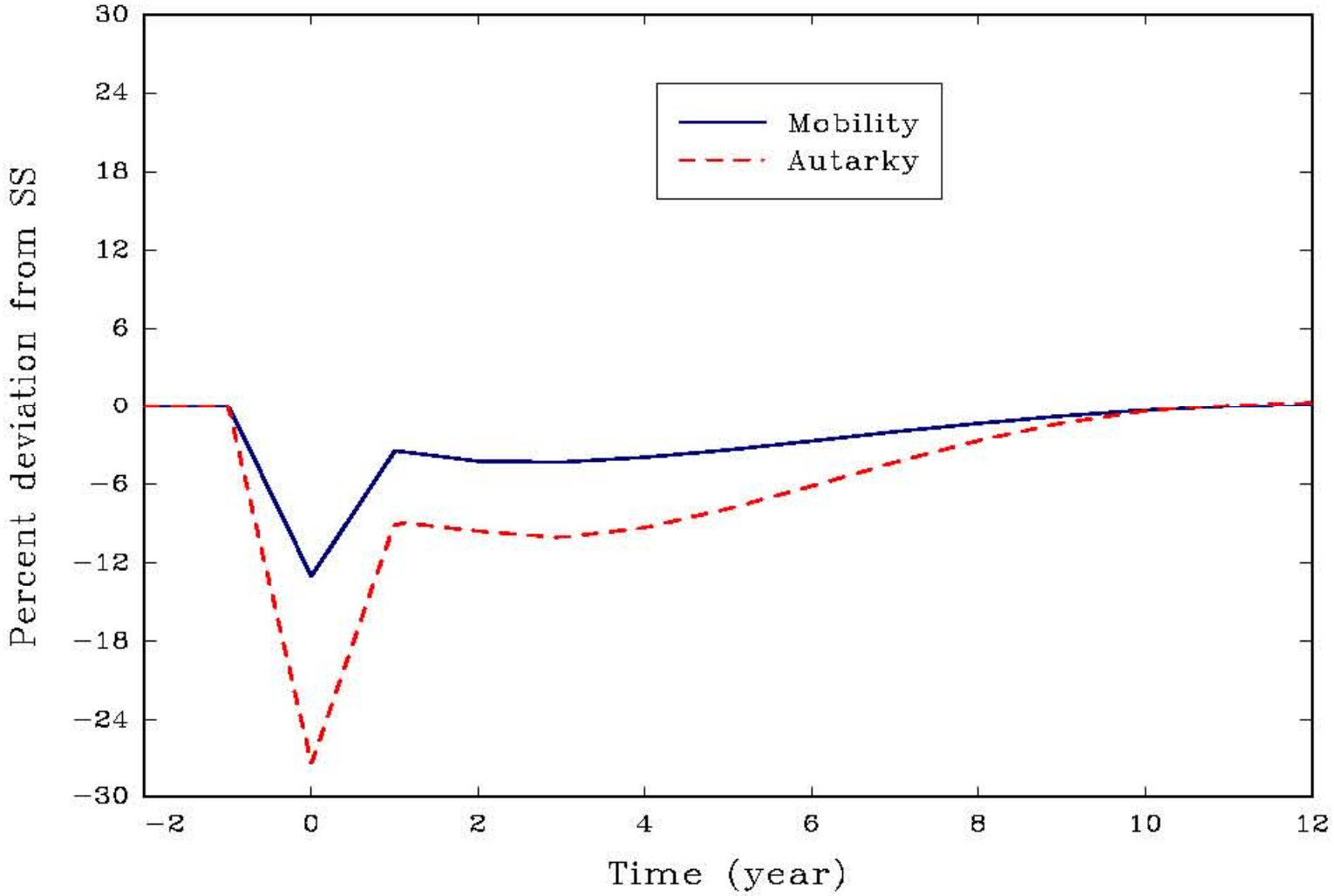
Foreign asset positions in steady state after FG
(shares of output)

	Country 1	Country 2
Net foreign assets 1/	-30%	12%
Net prod. assets	34%	-15%
Foreign borrowing	64%	-27%

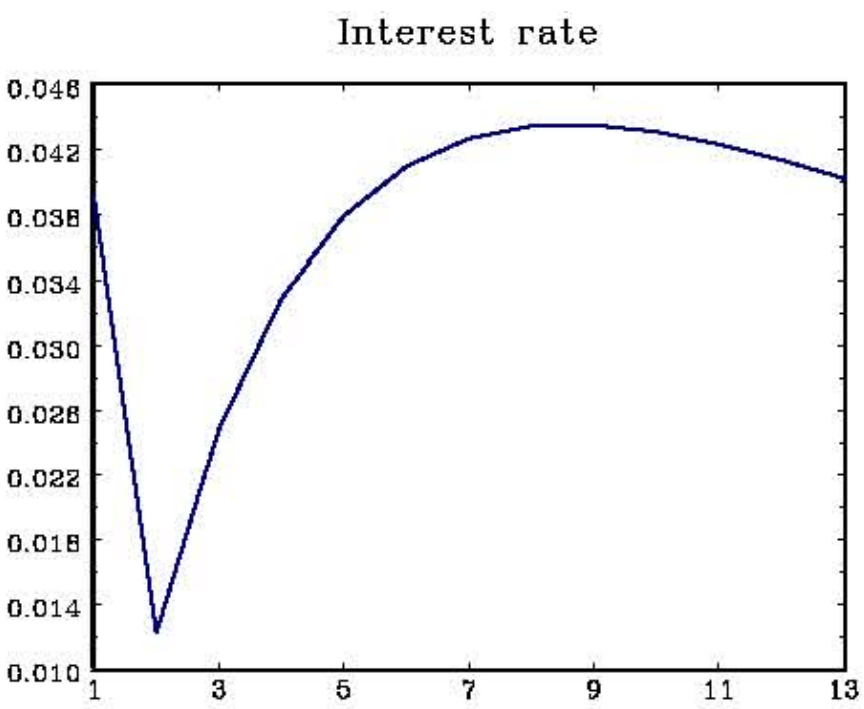
1/ Calibrated to match 2006 NFA positions in Lane-Milesi database.

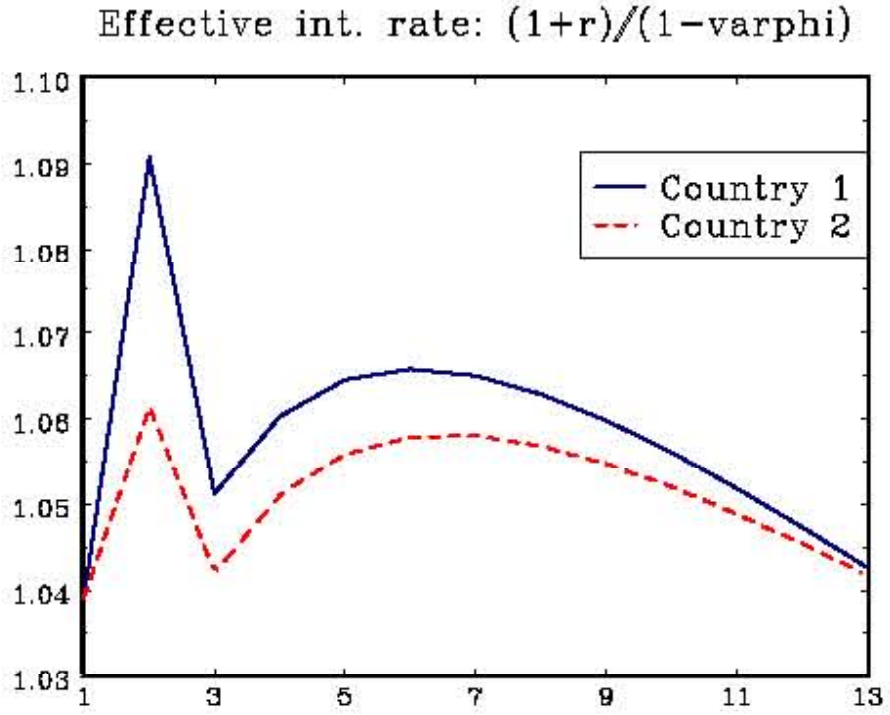
Unexpected credit shock

- "Small shock" to C1's banks (1.5% of loans)

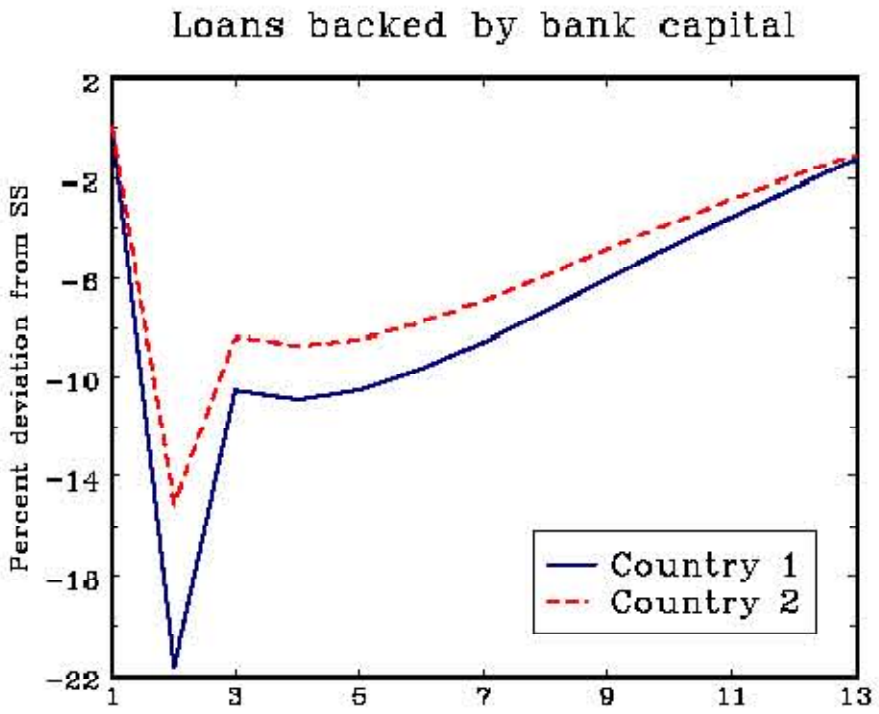


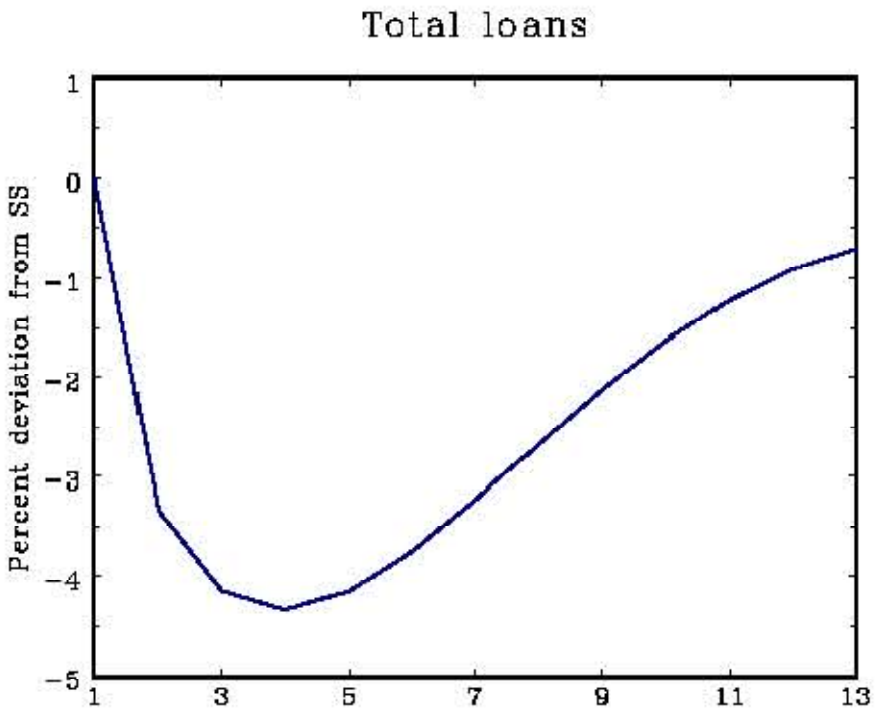
Macro dynamics



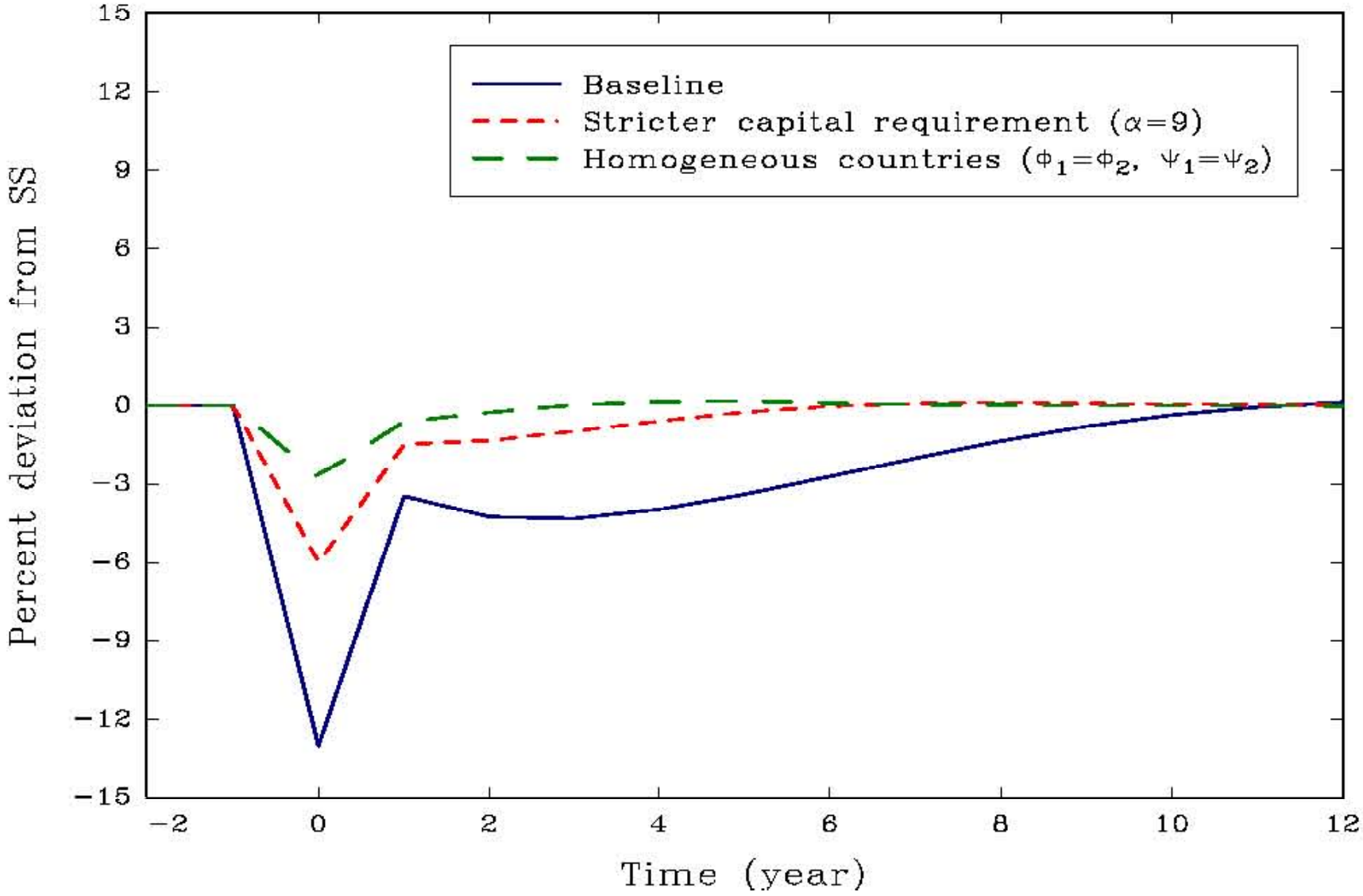


Macro dynamics

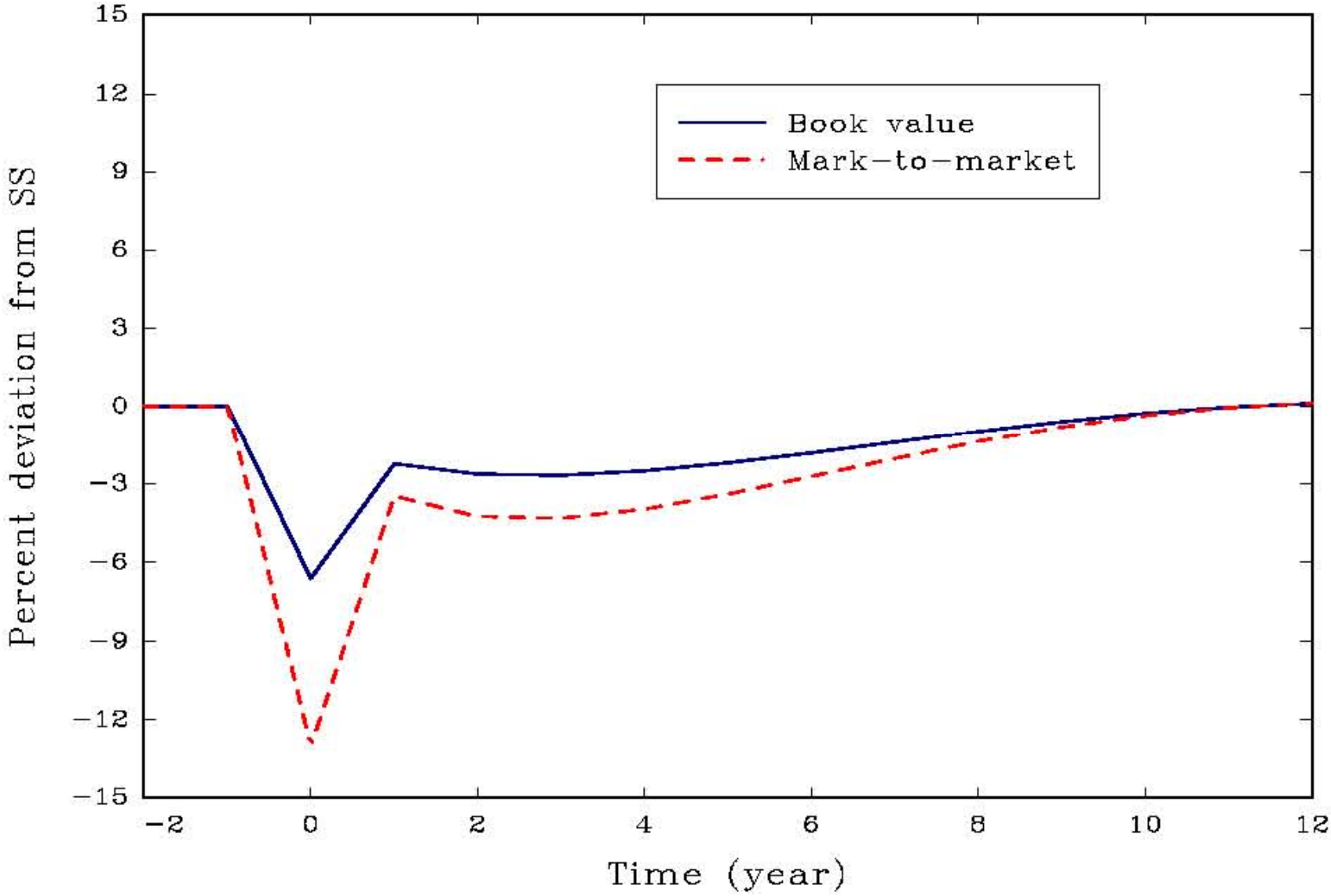




Sensitivity experiments



Marking to steady-state price



Conclusions

- FG without FD is very risky
  - Induces large buildup of debt
  - Large, global amplification effects of credit shocks
  - Larger effects with more financial heterogeneity
- MtoM accounting induces significant amplification in response to credit shocks, but MtoM aims to address other distortions (e.g. moral hazard)
- Consider Shiller's cyclical capital requirements, temporary relief from MtoM,
- Credit externality favors use of macro-prudential regulation