International Macroeconomics

Cross-country Financial Linkages and the 2007 Crisis

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Last session

1. Financial Crises: The big picture - Reinhart and Rogoff
2. "Generations of crisis models:
   - 2.1 The 80s: currency crises as bad policy
   - 2.2 The early 1990s: Policymakers, George Sorow and multiple equilibria
   - 2.3 The late 1990s: Pangloss investments, rotten incentives and the asian crisis

Roadmap

1. Kollmann et al (2010): "Global Banking and International Business Cycles", EER.
2. van Wincoop, Eric. "International Contagion through Leveraged Financial Institutions", NBER WP.

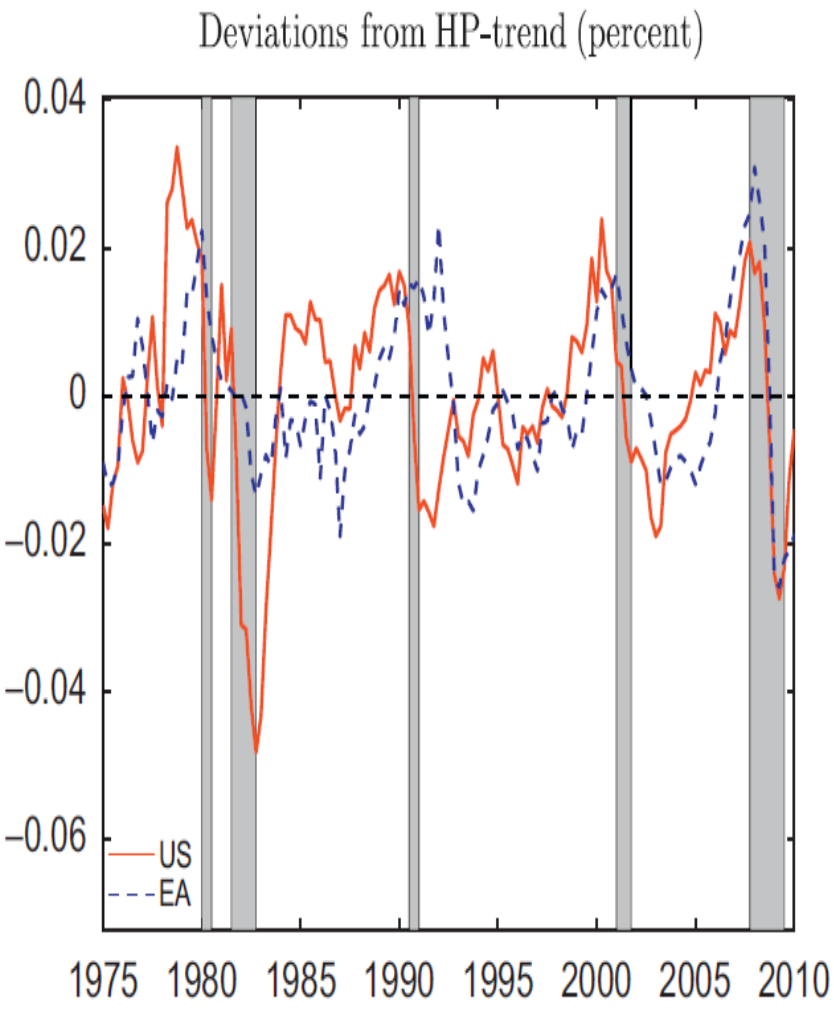
The post-2007 crisis

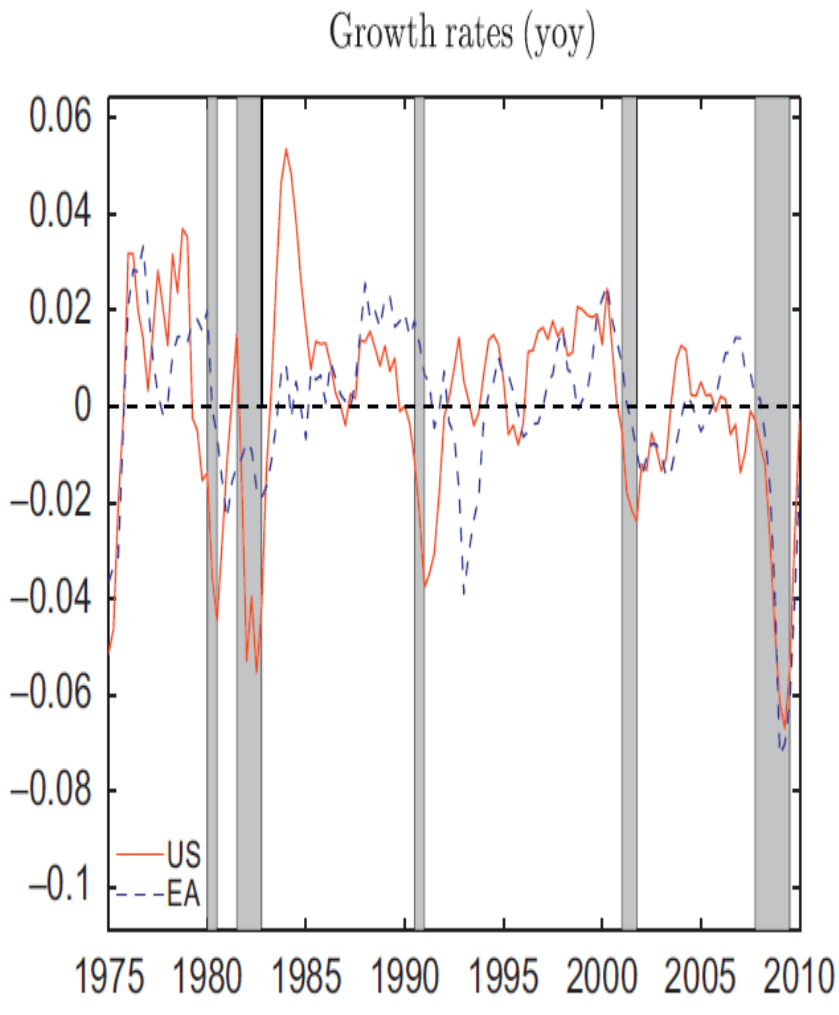
The post-2007 crisis - key elements

- Originates in US housing / financial sector after years of low interest rates and capital inflows
- Benign pre-Lehman period vs. post-Lehman collapse in interbank market
- Spreads quickly across globe, with currency stress in SOEs, and deep synchronised recessions
- Policy reaction: Recapitalisation of many banks by governments, non-standard MP ("Quantitative easing"), fiscal stimulus
- Fiscal liabilities rise and revenue falls, leads to sovereign debt crisis in GR, IRL

Kollmann, Enders and Mller (2010). Global Banking and International Business Cycles, EER.

Facts


Deviations from HP-trend (percent)
0.04
0.02
0
−0.02
−0.04
−0.06
US
EA
1975 1980 1985 1990 1995 2000 2005 2010


Growth rates (yoy)
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
−0.08
−0.1
US
EA
1975 1980 1985 1990 1995 2000 2005 2010

Facts

- Post-2007 recession more synchronised between US and EA
- Accompanied by large domestic (US) and foreign (EA) loan losses by banks.

Kollmann, Enders and Mller (2010). Global Banking and International Business Cycles, mimeo.

Model

- 2 country (H,F) IRBC model.
- Representative Worker and Entrepreneur in H,F; global bank
- Single good for C and I
- H worker

$max_{\{C,D,N\}} \sum_{t=0}^{\infty} \beta^t [\frac{C_t^{1-\sigma}}{1-\sigma} + \Psi^D u(D_t) - \Psi^N N_t$

$C_t + D_{t+1} = WN_t + D_t \; R_t^D$

Model

- H entrepeneur:

  Accumulates K, hires N and takes loans L, consumes d^E
- FOC
  - $W_t = (1-\alpha)\theta K_t^{\alpha} N_t^{1-\alpha}$
  - $1 = R_t^L \; E[(1-\delta_t^L)\frac{\beta v'(d_{t+1}^E)}{v'(d_t^E)}]$
  - $1 = E[\frac{\beta v'(d_{t+1}^E)}{v'(d_t^E)}(\theta\alpha K_t^{\alpha-1} N_t^{1-\alpha} + q_{t+1}(1-\delta))]$

Model

- Global Bank: convex cost ϕ when capital below requirement $L^W - D^W < \gamma L^W$
- FOC
  - $W_t = (1-\alpha)\theta K_t^{\alpha} N_t^{1-\alpha}$
  - $1 + \Gamma_L + (1-\gamma)\phi' = R_t^L \; E[(1-\delta_t^L)\frac{\beta u'(d_{t+1}^B)}{u'(d_t^B)}]$ for H,F
  - $1 - \Gamma_D + \phi' = E[R_t^D \frac{\beta u'(d_{t+1}^B)}{u'(d_t^B)}]$

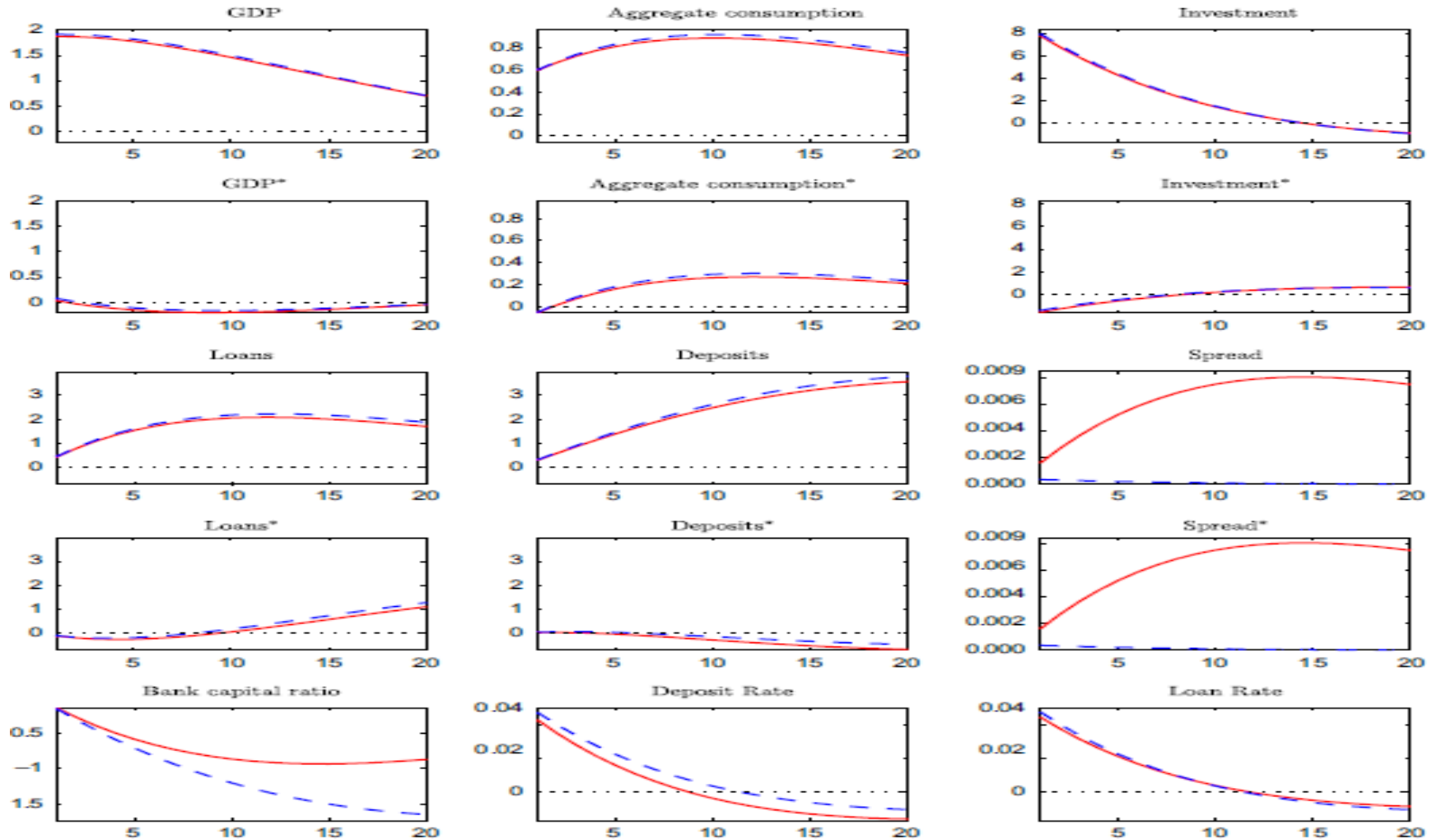
Equilibrium

- Arbitrage
  $R_t^L \; E(1-\delta_t^L) - R_t^D = \Gamma_D + \Gamma_L + \gamma(\phi'(0) + \phi''(0)x_t)$
- Anticipated loan losses only change conctractual loan rate, nothing else
- Unanticipated loan losses transfer wealth from B to E, lower bank excess capital $x_t = (1-\gamma L_t) - D_t$ and increase effective loan rate when $\phi'' > 0$
- TFP shocks do not affect loan rates directly, only via increase in loan demand and deposit supply

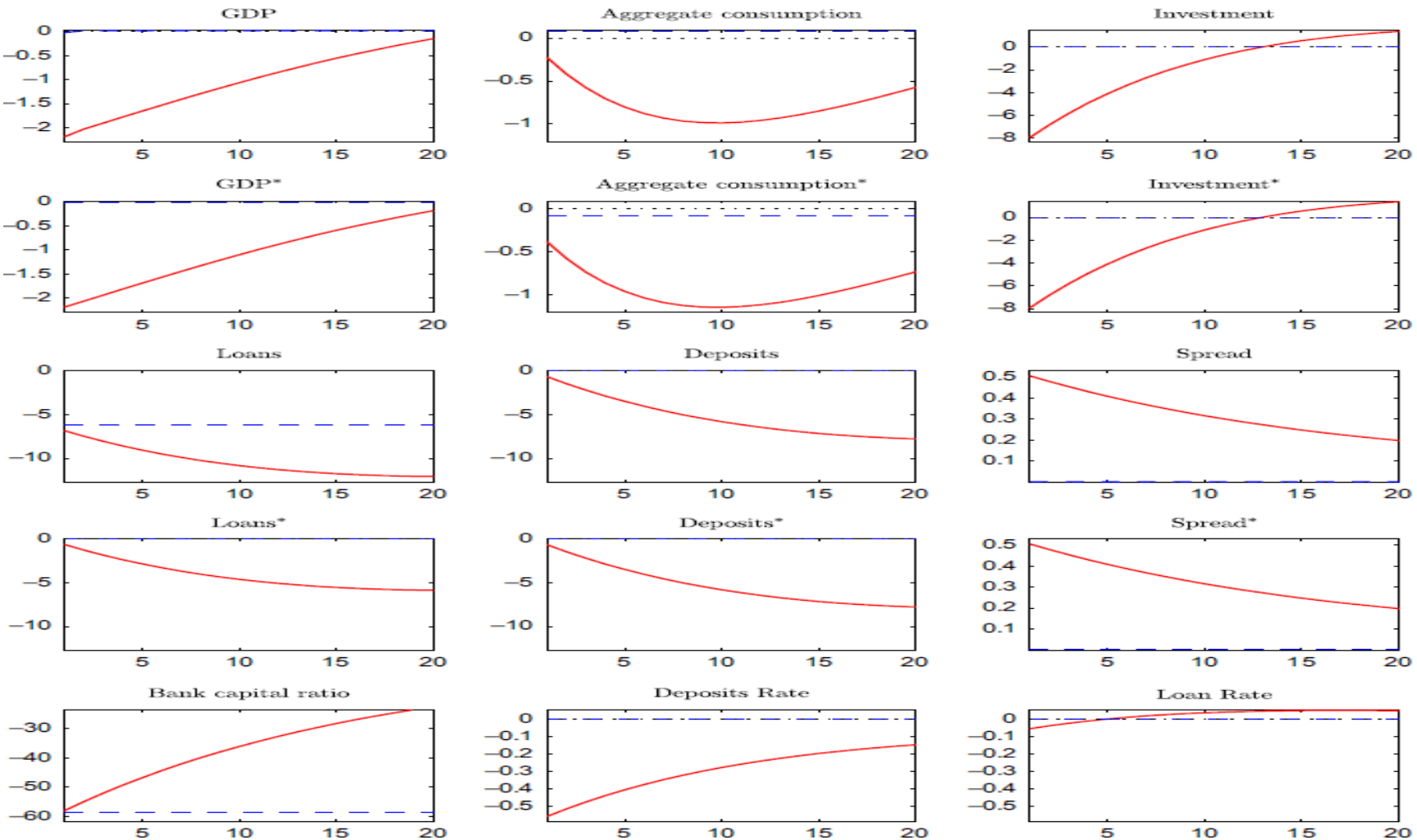
Calibration

- Entrepreneurs $\sigma = 0.01$, Workers and banks $\sigma = 1$
- $\gamma = 0.05$

Impulse Response to TFP shock



Impulse Response to δ^L shock



Simulations

- "Normal" loan default shocks matter little for quantities, but needed to account for countercyclical loan rate spread
- Sizeable loan default shocks imply global recession

van Wincoop, Eric. "International Contagion through Leveraged Financial Institutions",NBER WP 17686

- "Simple" 2 period 2 country model
- Leveraged and non-leveraged investors
- Focus on asset prices, and effect of H loan loss δ

H leveraged institutions

- Assets
  - Borrowing B_0
  - Short-term assets paying $(1+R)(1-\alpha\delta)L_0$ to H in $t=1$
  - L-T H and F assets w. price Q_0 in $t=0$ Q_H, Q_R in $t=1$
- Home bias: holding $\alpha > 0.5$ share of H assets
- **Net worth** of H institution in $t=1$
  $W_H = \frac{W_0+B_0-L_0}{Q_0}(\alpha Q_H+(1-\alpha)Q_F)+(1+R)((1-\alpha\delta)L_0-B_0)$
- Asymmetric information: L-T asset payoffs D_H, D_F have common mean D but H investors perceive
  $Var_H = \sigma^2 m, Var_F = \frac{\sigma^2}{1-\tau}$

H leveraged institutions' problem in $t = 1$

- Invest K_{HH}, K_{HF}, borrow $K_{HH}Q_H + K_{HF}Q_F - W_H$
- Portf Return

  $$R_H^p = 1 + R + \frac{K_{HH}}{W_H}(D_H - (1+R)Q_H) + \frac{K_{HF}}{W_H}(D_F - (1+R)Q_F)$$
- Max $ER_H^p - \gamma var(R_H^p)$

Non-leveraged institutions

- Given wealth W_{NL}
- higher risk aversion γ_{NL}

Optimal Portfolios

- $K_{HH} = \frac{(D_H - (1+R)Q_H)}{\gamma\sigma^2} W_H$
- $K_{HF} = (1-\tau)\frac{(D_F - (1+R)Q_F)}{\gamma\sigma^2} W_H$

Equilibrium w/o constraints

- $\frac{(D-(1+R)Q_H)}{\gamma\sigma^2}[\frac{1}{\gamma}(W_H+(1-\tau)W_F)+\frac{1}{\gamma_{NL}}(2-\tau)W_{NL}]=K$
- similar for F assets

Leverage and Margin constraints

- LC: Asset value no smaller than fraction κ of net worth
  $Q_H K_{HH} + Q_F K_{HF} \leq \kappa W_H$
  $B_H \leq \frac{\kappa - 1}{\kappa}(Q_H K_{HH} + Q_F K_{HF})$
- MC: $Prob(K_{HH} D_H + K_{HF} D_F \leq$
  $(1 + R)(K_{HH} Q_H + K_{HF} Q_F - W_H)) \leq \pi$
- Lag Mult.s of binding constraints increase borrowing rate to $R_H, R + F > R$ (LC), or effective risk-aversion to $\gamma_H, \gamma_F > \gamma$ (MC)

Symmetric Equilibrium

- period 0 leverage $Lev = \frac{W_0 + B_0 - L_0}{W_0}$
- Def 'risk-adjusted' NL wealth as $\overline{W} = W_{NL} \frac{\gamma}{\gamma_{NL}}$
- Equi premium $Prem = D - (1 + R) = \frac{\gamma \sigma^2}{2 - \tau} \frac{K}{W + \overline{W}}$
- $t = 1$ leverage $Lev = \frac{2 - \tau}{\gamma \sigma^2} Prem = \frac{K}{W + \overline{W}}$

Effect of H loan loss on F prices: Channels

- Direct Exposure to $t = 1$ losses
- Balance Sheet Valuation Channel through fall in value of F institution's H assets
- Portfolio Growth / lending channel
- Balance sheet constrain channel

Effect of H loan loss on F prices

- Small in absolute and relative magnitude
- Reason is arbitrage: Fall in prices attracts investments by non-leveraged investors

van Wincoop "International Contagion ..."

"Future research most productively can go in two directions. First, one could consider additional transmission channels. [...] A substantial limitation of our model (shared with the related literature) is that we do not consider unsecured lending in the context of the possibility of default of leveraged institutions [...] especially [...] when lenders have imperfect information about the assets on the balance sheet of the borrower. Second, we need to consider other types of explanations for the global nature of the crisis. An example is the risk panic explanation discussed at the end of Section 4. A good model should connect to a variety of key stylized facts, such as the absence of a decline in bank credit, a common large spike in risk all around the world and the absence of a relationship between financial linkages and transmission." (35)

Other papers on the post-2007 crisis

- Perri et al "Intntl. Recessions", mimeo 2011.
- Devereux and Yetman (2010). *Leverage Constraints and the International Transmission of Shocks*, Dallas Fed WP No. 45.
- Dedola, Luca and Giovanni Lombardo (2010) "Financial Frictions, Financial Integration and the International Propagation of Shocks",mimeo.

Perri et al "Intntl. Recessions" - motivation

- High correlation of outpout across countries, and negative correlation of productivity with output inconsistent with productivity shocks
- "Credit shocks" can explain this

Credit shocks

- 2 countries, fixed capital $\overline{k}$
- "Investors" hire labour h_t, borrow d_t from "workers", to run $F(z_t, h_t) = z_t \overline{k} h_t^{\nu}$, whose dividends d_t gives them utility
- Dividends, wages and net borrowing $\frac{b_{t+1}}{R_t} - b_t$ paid before production as "inter-day" liquidity l_t $l_t = w_t h_t + d_t + b_t - \frac{b_{t+1}}{R_t}$
- Limited enforcement: only $\xi_t \overline{k}$ recovered if firm defaults $\xi_t \overline{k} \leq l_t + \frac{b_{t+1}}{R_t}$ for credit shock ξ_t.
- When LE is binding, tradeoff between d_t and h_t
- Diversified "Investors": constraint binds in both countries
- So credit shocks lower labour and output in both countries, leading to comovement of Y, $Y^{\star}$, and, since F is concave in h, negative correlation of Y,F_h
- Multiple Equilibria: expected low asset prices self-fulfilling

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- Perri et al "Intntl. Recessions", mimeo 2011.
- Devereux and Yetman (2010). *Leverage Constraints and the International Transmission of Shocks*, Dallas Fed WP No. 45.
  - Leverage constraints for investors with diversified international portfolios
  - Leads to additional financial transmission mechanism of shocks across countries when constraint binds
  - Transmission depends on wether investors hold international equity or bonds, or both:
    - With bond trade, NEGATIVE transimission via interest rates
    - With equity trade, POSITIVE transimission via balance sheets

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- Dedola, Luca and Giovanni Lombardo (2010) "Financial Frictions, Financial Integration and the International Propagation of Shocks",mimeo.
  - Bernanke, Gertler and Gilchrist-type external finance premium
  - Leads to propagation of shocks across countries when constraint binds

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