SYSTEMIC BAILOUT AND THE WELFARE GAINS OF FINANCIAL LIBERALIZATION.

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Key questions

- Systemic Bailouts are part of the financial environment.
  - Commitment not to bailout are not time-consistent
- Financial Liberalization, Financial Deregulation allow agents to exploit systemic bailout.
  - Coordination on Risk-Taking→Systemic Risk.
- Key questions:
  - **Is there a case for financial liberalization in order to foster growth and efficiency, despite the fact that it causes lending booms that are punctuated by severe crises and costly bailouts?**
  - **What is the an optimal regulation in presence of systemic bailout guarantees?**

outline

- Empirical Facts.
- Theoretical Explanations.
- Conclusion/ Policy recommendation.

Empirical Evidence on Financial Liberalization, Crises and Growth

- Financial Liberalization typically leads to higher growth and to more frequent crises (Ranciere, Tornell, Westermann, 2008, Bonfiglioli 2008)
  - On the long run, the positive growth effect dominates the output cost of financial crises.
  - Growth effects > Volatility Effects (Levchenko, Ranciere, Thoenig, 2009)
- Is the 2008 US Financial Crisis Different? A financial black-hole? (Ranciere-Tornell, 2011)
  - Financial black-holes are characterized by the breaking-up of credit market discipline and the large-scale financing of negative net present values
  - Toxic Coktail of Financial Derivatives and Systemic Bailouts.

Evidence on Systemic Bailout

Expectations

- Key for a rational explanation.
- Emerging: Ranciere, Tornell, Vamvakidis (2001) on the pricing of foreign vs. domestic currency loans in Easter Europe.
  - Interest rate discount for borrowing in foreign currency is the same for firms in tradable and non tradable sector.
  - Currency mismatch is not priced in→bailout expectations.
- US: Kelly, Lustig and Niewerburgh (2011): The difference in costs of out-of-the-money put options for individual banks, and puts on the financial sector index.
  - The failure of individual bank is less likely to induce large bailout than a systemic banking crisis.

Financial liberalization, crisis and growth in Emerging Markets.

- The dual effect of financial liberalization.
- Panel of 83 coutries (1970-2000). Udated to 1970-2008
- Direct Estimation based on Crises Data (Ranciere, Tornell, Westermann, 2006)
  - System of two equations:
  - Results: Effect of FL (conditional on no-crisis):+0.8%; Output Cost of Crises (-0.19%): overall: +0.8% annual average growth
  - Crises are costly but rare.
  - Financial repression reduces growth in normal times.
- Indirect Estimation based on higher moment of credit growth distribution. (Ranciere, Tornell, Westermann, 2008)
  - Skewness of Credit Growth Distribution.
  - Crisis: abnormal downside risk.
  - Skewness: -1 to 0: +0.6%; +0.8% annual average growth

Aggregate and Sectoral Effects of Financial Liberalization

- Aggregate Growth Effects: TFP effects.
- Sectors more dependent on external finance invest and grow more but become more volatile after financial liberalization (Levchenko, Ranciere, Thoenig, 2009) and suffer more from crises (Dell'Ariccia et al., 2009).
- No sector-level TFP effects. ·
- How to reconcile Sector-level results and Aggregate TPF Results? Allocative Efficiency and Input-Output Linkages.
- Financial Liberalization benefit more to financial constrained sectors.
- Bailout is financed by all sectors of the economy.
- Bad? Not necessarily if increasing allocative efficiency. (Redistribution)
- Linkages are keys:
  - Housing boom vs. Dot-com Boom.

Empirical Evidence on Financial Black Hole: The US crisis of 2007-2008 (Ranciere, Tornell, 2011)

- US Crisis is a "new generation" of Crisis in Anything-goes-Regime .
- Toxic Coktail between perceived government guarantees and the ability to issue catastrophe-bond-like liabilities (CDS, CDOs..)
  - concentration of liabilities in bad state of the world.
- Large scale funding of negative NPV mortgages.
- Underpricing of Systemic Risk.

Table 1. Financial Black Hole Equilibrium: Key Facts.

Panel A. Catastrophe-Loan type Mortgages	2002	2006
Interest-Only +Option ARM Mortgage Loans (US$ Bn)	5	760
% of Mortgages Originated	*0%*	*26%*
Panel B. Private Label Securitization	2002	2006
MBS Issuance from Private Label Securitizers (US$ Bn.)	290	917
% of Mortgages Originated	*10%*	*31%*
% of MBS Issuances	*13%*	*46%*
Panel C. Negative NPV Mortgages	2002	2006
Loans with Zero Down payment (% of Mortgage Originated)	4%	31%
Loans with Zero Downpayment and Low Documentation (% of Mortgage Originated)	1%	15%
Non-Prime Mortgage Loans (% of Mortgage Originated)	14%	48%
Panel D. Default-Risk Pricing	2003	2006
BBB Tranches of Private Label MBS (Spread over US Treasury)	3.20%	1.30%

Source: Inside Mortgage Finances, Levitin-Wachter (2010), Mortage Banker Association

US vs. Emerging Markets? What is different?

- Emerging Market: External Finance through Debt Securities.
- US before the crisis: prevalence of catastrophic-bond like liabilities.
- Without Systemic Bailout Guarantees, it makes no difference.
  - Risk-adjusted Pricing.
- With Bailout Guarantee: it does?
  - Loading risk on the state of nature on which bailout occurs

Simple Analytics

- Good state and Bad State (bailout state): 95%/ 5%.
- In bailout, creditors are paid by bailout agency.
- Two financial instruments:
  - Standard Debt: Fixed Repayment in all period or default.
  - Catastrophe-Bond: Zero Payment in good state; Huge Repayment in bailout states.
  - Cost of funding (1+r)
- Menu of Securities Dramatically Change the extent of Moral Hazard.
- Project Choice
  - With Standard Debt. Projects might not be positive NPV but still need to deliver at least (1+r), 95% of the time
  - With Catastrophe Bond, any positive return in good state is enough→ break down of credit market discipline.
- Ranciere-Tornell (2012)

The Framework in a Nutshell

basic set-up

- Two-sector economy (N,T) growth model with input-output linkages.
- An intermediate good sector and a final good sector.
- Both sectors use inputs produced by Intermediate good sector (q_t)

$$\begin{array}{lll} \text{Intermediate good} & q_{t+1} = q(I_t), & I_t = q_t \cdot \phi_t \\ \text{Final good} & y_t = y(d_t), & d_t = q_t \cdot [1 - \phi_t] \end{array} \tag{1}$$

- Contract Enforceability Problems generate endogenous borrowing constraints.
- Key equation for production efficiency and growth: Investment share of the N-sector

$$\phi_t = \phi(\text{agency problems, financial regime, bailout expectations })$$

Preview of Results

- Financial Liberalization: agents coordinate on systemic risk-taking–and by doing so exploit systemic bailout guarantees
  - Safe Economy endogenously transformed in a Risky Economy.
  - Higher leverage, investment and growth
  - Vulnerability to costly financial crises
- Allocative Efficiency
  - Risk-taking reduces misallocation in the economy.
  - Key Role of Input-Output Linkages
  - Efficiency Gains vs. Crises Costs (Dynamic vs. Statics)
- The Disciplining Role of Standard Debt with Systemic Bailout Guarantees.
  - Catastrophe Bonds allow "game " systemic bailout.
  - Discpline Breaks Downs and large scale funding of negative NPV projects.

Credit Market Imperfections

Contract Enforceability Problems. Entrepreneurs cannot commit to repay their liabilities: if at time t the entrepreneur incurs a non-pecuniary cost $h[w_t + B_t]$, then at $t+1$ she will be able to divert all the returns provided the firm is solvent (i.e., $\pi(p_{t+1}) \geq 0$).

Systemic Bailout Guarantees. If a majority of firms become insolvent, a bailout agency pays lenders the outstanding liabilities of each defaulting firm. The guarantee applies to any type of financial liabilities.

Banrkuptcy Costs When a firm defaults, a share $1 - \mu - \mu_w$ of the insolvent firms' revenues is lost in bankruptcy procedures. In this case, the bailout agency can recoup only $\mu p_t q_t$, and the workers receive a wage of only $\mu_w p_t q_t$.

- **Fiscal Solvency:** Domestically Financed Bailouts via Lump Sum Taxes.

Credit Market Game Equilibrium

- Key Equations
  - No-diversion constraint: Incentive Compatibility Constraint (ICC)

$$E_t(L_{t+1}) \leq h(w_t + B_t)$$

  - Lender's Break-Even: Participation Constraint (PC):

$$E_t(L_{t+1}) \geq (1 + r)B_t$$

Production Efficiency

Bottleneck and Allocative Inefficiency

- Central planner maximizes the present discount value of consumption.

$$\max_{\{c_t, c_t^e, \phi_t\}_{t=0}^{\infty}} W^{PO} = \sum_{t=0}^{\infty} \delta^t \left[c_t^e + c_t\right], \quad \text{s.t.} \quad \sum_{t=0}^{\infty} \delta^t \left[c_t + c_t^e - y_t\right] \leq 0$$

$$y_t = \left[1 - \phi_t\right]^{\alpha} q_t^{\alpha}, \qquad q_{t+1} = \theta \phi_t q_t$$

- Pareto optimality implies efficient accumulation of N-inputs.
- **Dynamic input-output multiplier:** A marginal increase in the investment share $(\partial\phi)$ reduces today's T-output by $\alpha \left[(1-\phi) q_t\right]^{\alpha - 1} \partial\phi$,

Proposition (Bottleneck)

N-sector investment in a safe economy is below the Pareto optimal level (i.e., there is a 'bottleneck') if there is low contract enforceability:

$$h < \left(1 - (1-\beta)\theta \left(\theta\delta\right)^{-\frac{1}{1-\alpha}}\right)/\delta.$$

Present Value of Consumption in a Decentralized Economy

- The expected discounted value of workers' consumption and entrepreneurs' consumption in our decentralized economy is equal to:

$$W^d = E_0\left(\sum_{t=0}^{\infty}\delta^t(c_t + c_t^e)\right) = E_0\left(\sum_{t=0}^{\infty}\delta^t[[1-\alpha]y_t + \pi_t - T_t]\right) \tag{6}$$

- Closed Form Solution:

$$W^s = \frac{(1-\phi^s)^\alpha}{1-\delta(\theta\phi^s)^\alpha}q_o^\alpha \quad W^r = \frac{1+\delta(1-u)\left[\theta\phi^l\frac{1-\phi^c}{1-\phi^l}\right]^\alpha k^c}{1-\left[\theta\phi^l\right]^\alpha\delta u-\left[\theta^2\phi^l\phi^c\right]^\alpha\delta^2(1-u)}\left[(1-\phi^l)q_0\right]^\alpha$$

- Effect of a Marginal Increase in Crisis Risk.

$$\left.\frac{\partial W^r}{\delta u}\right|_{u=1} = \underbrace{\alpha\phi'\left(\left(\frac{\phi^{po}}{\phi}\right)^{1-\alpha}-1\right)}_{\text{Efficiency gains}} + \underbrace{(1-\delta(\theta\phi)^\alpha)(1-k_c(\frac{1-\phi^c}{1-\phi^l})(1-\phi}_{\text{Bankruptcy costs}}$$
$$+ \underbrace{(1-\phi)^\alpha\delta^2(\theta\phi)^\alpha(\theta)^\alpha((\phi)^\alpha-(\phi^c)^\alpha)}_{\text{Financial distress costs}}$$

Present Value of Consumption in a Decentralized Economy

Proposition

In an economy where crisis are rare events:

1. *Financial liberalization increases the present value of consumption only if the investment share in a repressed regime* (ϕ) *is less than the Pareto investment share* (ϕ^{po}).
2. *When* $\phi < \phi^{po}$, *financial liberalization increases the present value of consumption for any level of bankruptcy costs* μ, *if financial distress in the wake of crisis is not too high* $(\mu_w > \mu_w^*)$ *and the discount rate* δ *is not too low.*

Catastrophe Bonds.

- An alternative–inferior–technology to produce T-goods.

$$y_{t+1} = \varepsilon_{t+1} I_t^{\varepsilon}, \qquad \varepsilon_{t+1} = \begin{cases} \bar{\varepsilon} & \text{with probability } \lambda, \\ 0 & \text{with probability } 1-\lambda \end{cases} \qquad \bar{\varepsilon} \leq 1+r, \tag{8}$$

  where I_t^{ε} denotes the input of T-goods.

- Entrepreneurs can issue both standard and catastrophe bonds with the following repayment schedule

$$L_{t+1}^{c} = \begin{cases} 0 & \text{if } \varepsilon_{t+1} = \bar{\varepsilon} \text{ with } \lambda \\ 1+\rho_t^{c} & \text{if } \varepsilon_{t+1} = 0 \text{ with } (1-\lambda) \end{cases}$$

- Consider an situtation in which entrepreneurs with positive NPV play safe.$(\theta - \textit{entrepreneur})$

The Break-down of Financial Discipline.

- **Catastrophe bonds**: borrowers shift all their liability repayments to the default state.
  1. any positive return in the no-default state is enough to ensure positive profits in that state;
  2. the solution to the borrower–lender agency problem: no equity investment: the borrowing limit is determined by the expected generosity of the bailout rather than by internal funds $E(L) = 0 < h(\ B)$
  3. the ε-technology is funded under the anything-goes regime.
- **Standard debt contracts**:
  1. external finance only for projects that return at least the risk-free rate in the no-default state.
  2. borrowing more a multiple of their own equity to eliminate incentives to divert.
  3. Borrowers invest only in projects that have a private return (net of debt repayments) greater than the storage return $1 + r$.
  4. The ε-technology is not funded.

Financial Black Hole Equilibrium

Efficiciency Losses

- Welfare in Anything Goes Regime.

$$W^{agr} = E_0\left(\sum_{t=0}^{\infty}\delta^t(c_t + c_t^e + c_t^{\varepsilon})\right) = E_0\left(\sum_{t=0}^{\infty}\delta^t[[1-\alpha]y_t^t + \pi_t + \pi_t^{\varepsilon}\right. \tag{9}$$

$$W^{agr} = \underbrace{W^s}_{\text{Safe economy's PVC}} + \underbrace{\sum_{t=1}^{\infty}\delta^t b_{t-1}^c(\bar{\varepsilon} - \frac{1+r}{1-\lambda}))}_{\varepsilon\text{-expected PVC} \;-\; \text{Expected bailout}}, \tag{10}$$

- Since the ε-technology has negative net present value (i.e., $(1-\lambda)\bar{\varepsilon} < 1+r$), it follows that $W^{agr} < W^s$.
- The losses it incurs during crisis times more than offset private profits.
- Therefore, a financial black-hole equilibrium generates net consumption losses for the overall economy

Conclusions

- In a world were systemic bailout are part of the environment.
- Financial liberalization can help improve the allocation of resources–by increasing leverage in constrained sectors–but at the same time it can generate new states under which systemic insolvencies occur.
- Despite occurence of crisis, financial liberalization brings benefits to growth and increase allocative efficiency and the present value of consumption.
- However at the other extreme–a lack of financial regulation–might also be harmful.
- In an any-thing-goes regime where borrowers can issue catastrophe-like securities, the presence of systemic bailout guarantees might lead to excessive leverage and a lack of discipline in lending decisions.
- Regulation on the Liability Side.