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 $\rightarrow$ 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?
Empirical Facts.

Theoretical Explanations.

Conclusion/ Policy recommendation.
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)

- 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.
- 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.

- US Crisis is a "new generation" of Crisis in Anything-goes-Regime.
- Toxic Cocktail 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.

<table>
<thead>
<tr>
<th>Panel A. Catastrophe-Loan type Mortgages</th>
<th>2002</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest-Only +Option ARM Mortgage Loans (US$ Bn)</td>
<td>5</td>
<td>760</td>
</tr>
<tr>
<td>% of Mortgages Originated</td>
<td>0%</td>
<td>26%</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Panel B. Private Label Securitization</th>
<th>2002</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBS Issuance from Private Label Securitizers (US$ Bn.)</td>
<td>290</td>
<td>917</td>
</tr>
<tr>
<td>% of Mortgages Originated</td>
<td>10%</td>
<td>31%</td>
</tr>
<tr>
<td>% of MBS Issuances</td>
<td>13%</td>
<td>46%</td>
</tr>
</tbody>
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<tr>
<th>Panel C. Negative NPV Mortgages</th>
<th>2002</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans with Zero Down payment (% of Mortgage Originated)</td>
<td>4%</td>
<td>31%</td>
</tr>
<tr>
<td>Loans with Zero Downpayment and Low Documentation (% of Mortgage Originated)</td>
<td>1%</td>
<td>15%</td>
</tr>
<tr>
<td>Non-Prime Mortgage Loans (% of Mortgage Originated)</td>
<td>14%</td>
<td>48%</td>
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</tbody>
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<tr>
<th>Panel D. Default-Risk Pricing</th>
<th>2003</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBB Tranches of Private Label MBS (Spread over US Treasury)</td>
<td>3.20%</td>
<td>1.30%</td>
</tr>
</tbody>
</table>

Source: Inside Mortgage Finances, Levitin-Wachter (2010), Mortgage Banker Association
US vs. Emerging Markets? What is different?

- 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 ($q_t$)

Intermediate good  \[ q_{t+1} = q(l_t), \quad l_t = q_t \cdot \phi_t \]

Final good  \[ y_t = y(d_t), \quad d_t = q_t \cdot [1 - \phi_t] \]  \hspace{1cm} (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.
  - Discipline 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.

**Bankruptcy 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):
    \[ E_t(L_{t+1}) \geq (1 + r)B_t \]
Central planner maximizes the present discount value of consumption.

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

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

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

$$\alpha [(1 - \phi) q_t]^\alpha - 1 \partial \phi,$$

**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:*

$$h < (1 - (1 - \beta) \theta (\theta \delta)^{-\frac{1}{1-\alpha}}) / \delta.$$
The expected discounted value of workers’ consumption and entrepreneurs’ consumption in our decentralized economy is equal to:

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

(6)

Closed Form Solution:

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

Effect of a Marginal Increase in Crisis Risk.

\[ \frac{\partial W^r}{\partial u} \bigg|_{u=1} = \underbrace{\alpha \phi' \left( \frac{(\phi^p_0)}{\phi} \right)^{1-\alpha} - 1}_{\text{Efficiency gains}} + \underbrace{(1 - \delta (\theta \phi)^{\alpha})(1 - k_c \left( \frac{1 - \phi^c}{1 - \phi^l} \right)(1 - \phi)}_{\text{Bankruptcy costs}} \]

\[ \underbrace{(1 - \phi)^{\alpha} \delta^2 (\theta \phi)^{\alpha} (\theta)^{\alpha} ((\phi)^{\alpha} - (\phi^c)^{\alpha})}_{\text{Financial distress costs}} \]
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 ($\phi$) is less than the Pareto investment share ($\phi^{po}$).

2. When $\phi < \phi^{po}$, financial liberalization increases the present value of consumption for any level of bankruptcy costs $\mu$, if financial distress in the wake of crisis is not too high ($\mu_w > \mu^*_w$) and the discount rate $\delta$ is not too low.
Catastrophe Bonds.

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

\[ y_{t+1} = \varepsilon_{t+1} l_t^\varepsilon, \quad \varepsilon_{t+1} = \begin{cases} \bar{\varepsilon} & \text{with probability } \lambda, \\ 0 & \text{with probability } 1 - \lambda \end{cases} \quad \bar{\varepsilon} \leq 1 + r, \quad (8) \]

where \( l_t^\varepsilon \) 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 situation in which entrepreneurs with positive NPV play safe. (\( \theta \) — 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

Efficiency Losses

- Welfare in Anything Goes Regime.

\[ W^{agr} = E_0 \left( \sum_{t=0}^{\infty} \delta^t (c_t + c^e_t + c^p_t) \right) = E_0 \left( \sum_{t=0}^{\infty} \delta^t \left[ (1 - \alpha) y_t + \pi_t + \pi^p_t \right] \right) \]

\[ W^{agr} = W^s + \frac{\sum_{t=1}^{\infty} \delta^t b^c_{t-1} (\bar{\epsilon} - \frac{1+r}{1-\lambda})}{\varepsilon-\text{expected PVC} - \text{Expected bailout costs}} \]

- Since the \( \varepsilon \)-technology has negative net present value (i.e., \( (1 - \lambda)\bar{\epsilon} < 1 + r \)), 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 occurrence 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 anything-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.