Macroeconomics of Financial Markets

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Week 8 - Shadow Banking
Shadow Banking

- Based on Gorton and Metrick (2011)
- After the Great Depression, the US enjoyed no panic during 75 years.
- Deposit insurance was key for this stability,
- The crisis in 2007 was not generated in the traditional banking system,
  but in a set of lightly regulated institutions.
- Broadly defined, shadow banking includes:
  - Familiar institutions: Investment banks, money-market, mutual funds, and mortgage brokers
  - Some old contracts: Sale and repurchase agreements (repo)
  - Some esoteric instruments: Asset-backed securities (ABS), collateralized-debt obligations (CDOs), and asset-backed commercial paper (ABCP).
Traditional Banking Operations

- Depositor
- Bank
- Borrower

A: Insured Savings
B: Loans

$
Shadow Banking Operations

1. Shares
2. Collateral (including securitized bonds)
3. Loans
4. Securitized Bonds
5. Securitization

Retail Investors

MMMFs (and other institutional investors)

Bank

Securitization (See Figure 6)

Borrowers
Shadow Banking

- Step 1: Money market mutual funds (MMMFs)
- Step 2: Similar to step A with repo agreements.
- Step 3: Same as step B.
- Step 4: Securitization used as collateral.
- Step 5: Securitization bought by investors.
Securitization

Figure 5: The Securitization Process

- Originating Firm Creates Assets
  - Sells Cash Flows From Pool of Assets
  - Proceeds of Sale of Assets

- SPV: Master Trust Holds Pool of Assets
  - Tranching of Assets
    - AAA Senior Tranche
    - AA Tranche
    - A Tranche
    - BBB Tranche
    - Last Tranche: Retained by Originator

- Securitization Investors
Securitization

- Securitization distributes risk by aggregating assets in a pool (often by selling assets to a special purpose entity), then issuing new securities backed by the assets and their cash flows.
- The securities are sold to investors who share the risk and reward from those assets.
- Investors’ rights to receive cash flows are divided into ”tranches”.
- Not subject to bankruptcy (since assets are off-balance sheet)
Securitization

- Dramatic increase in loan sales. A challenge, both theoretically and empirically, to arguments concerning bank existence.
- The borrowing firm could have issued a security directly!!!
- Maybe bank keeps a portion of the cash flows that maintain incentives, as it would have had the entire loan been kept on its balance sheet. (Gorton and Pennacchi (95)).
- Market participants seem to rely on banks’ incentives to maintain their reputations for monitoring. (Ordonez (10))
- Banks hide information (Dang, Gorton, Holmstrom and Ordonez (13))
Securitization and SPVs

- SPV are "bankrupt remote" and cannot become legally bankrupt. Off-balance sheet.
- Why investors put their money in SPVs? Ordonez (11).
- Decline in charter values (due to deregulation) induces more risk-taking and less quality of securities.
- Banks exit the regulated sector via off-balance sheet securitization, which has no requirements for regulatory capital.
- Adverse selection on the origination of securities does not seem to have been a problem. Limited discretion on origination and the residual retained by the originator.
Securitization

- At the end of 2005 there were $2 trillion outstanding (10% of total outstanding bond market debt, 35% of mortgage-related debt and 40% of corporate debt in the United States).

- In nominal terms, from 1995 to 2004, ABS amount outstanding has grown about 19 percent annually (with mortgage-related debt and corporate debt each growing at about 10 percent).

- Largest sectors in this market: credit card BS (20%), home-equity BS (25%), automobile BS (10%), and CDOs (17%).
Growth of Securitization

Figure 1: U.S. Corporate Debt and Securitization Issuance ($ billions)

Source: Thomson Reuters

Gorton and Metrick (2009) label institutions that finance their portfolios of securitized bonds via repo as securitized banks, to distinguish them from the traditional depository institutions that are regulated. Securitized banks were largely the old investment banks. In order to conduct a repo business these firms had to hold portfolios of assets that could be used as collateral. As explained above, the collateral is like the loan in traditional banking.

We now turn to the question of the vulnerability of securitized banks to runs.

4. Repo Haircuts: Trying to Re-Create Information Insensitivity and Hence Liquidity

How could problems with subprime mortgages have caused a global financial crisis? Subprime mortgages were mostly securitized (about 80 percent were financed this way), but the amounts were not large enough to cause a systemic event. Gorton (2010) likens subprime to E-coli: there doesn't have to be a lot of it for everyone to fear eating certain foods and avoid those foods. The problem with subprime, as with E-coli, was that no one knew where the risks actually were, so there was no certainty about which counterparties would fail (and unlike food, subprime mortgages cannot be recalled). Unlike food the subprime mortgage-related assets could not be recalled. In the pre-Fed era, depositors knew that not all...
Why a Shadow Banking?

- Changes in the financial system in the last decades led to a decline of traditional banking
  - More competition from junk bonds and commercial paper
  - Pressures from MMMFs
  - Banks moved out of the traditional banking system.
Institutional Investors (MMMFs)

- They were a response to interest-rate ceilings on demand deposits (Regulation Q), in the seventies.
- MMMFs grew from $76.36 billion in 1980 to $1.85 trillion by 2000 and reached a peak of $3.8 trillion in 2008.
- Highly regulated, but does not have to pay for the implicit insurance that governments provide to the financial system.
Growth of Institutional Investors

Figure 4: Growth of Assets in Four Financial Sectors (March 1954=1)

- Broker-Dealer Assets
- Commercial Bank Assets
- Household Assets
- Non-financial Corporate Assets
Growth of Institutional Investors

Figure 7: Financial Assets of Institutional Investors as a Percent of GDP
Repo

- Growth of money under management by institutional investors. Want safe, liquid investments that pay interests.
- A repo contract is not a debtor in the bankruptcy proceedings.
- Repo collateral can be rehypothecated. Hence, money velocity associated with the collateral.
- The repo became the blood of the financial system.
Repo

- By using a repo a market participant can sell a security that he does not own by borrowing it from another party in the repo market. Short positions in securities markets.

- The Federal Reserve counted repo transactions as money in a monetary aggregate called M3. In 2006 discontinued.

- The repo market had an average daily trading volume of about $2.3 trillion in 2008, compared to the NYSE of around $80 billion in 2008.
Collapse of Shadow Banking

- Epicenter of the crisis. Run on repo.
- An increase in a repo haircut is like a withdrawal from banks.
- Run on special purpose vehicles (SPVs).
- Run on MMMFs for a flight to quality (MMMFs started investing in treasury bonds).

- The crisis was just another ”Bank Run”.
Haircuts

The figure confirms that haircuts were higher on subprime-related asset classes. In fact, the haircut eventually went to 100 percent, that is, these assets were not acceptable as collateral in repo. The non-subprime-related asset classes reached a maximum of a 20 percent haircut. To reiterate the argument, if these asset classes simply became riskier in the usual finance sense, then that would be reflected in their market prices – which are the basis for the collateral to start with. So, that cannot be an explanation for these haircuts. Instead, the haircuts are consistent with the idea that depositors want collateral that is “safe” in the very specific sense that it is immune to adverse selection, and is hence liquid.

The panic portrayed is the securitized-bank “run on repo.” Each “depositor” imposes a haircut to protect himself against the possible effects of adverse selection. But, for the system as a whole the implications are devastating. To understand the impact of this run on repo, take the estimate of the size of...
Haircuts

The figure also displays a loss of confidence in the sense that the Non-Subprime-Related Group faced very significant haircuts even though it has nothing to do with subprime. It is simply also securitized. It is similar to sales of bagged lettuce dropping when the Food and Drug Administration announces that there is E-coli in bagged spinach. To see this loss of confidence, let’s compare the average haircut on structured products to the haircut on corporate bonds. This is done in Figure 3.

Figure 3: The Average Haircut on Structured Products versus Haircuts on Corporate Bonds

All investment-grade corporate bonds were treated the same with regard to haircuts. Corporate bonds are clearly not claims on portfolios of loans like structured securitized bonds are, so in that sense maybe they are different.
A Back of the Envelope Calculation

- Repo Market: $10 trillion dollars.
- If average haircut grows by 40%, then $4 trillion has to be raised.
- How? Through assets sales, which reduce prices further.
- This generates a downward spiral such that assets cannot be used much as collateral.

- This is a large "Bank Run"
Message

- What we observed is not different that what we knew.

- Increases in repo haircuts are withdrawals from securitized banks, a standard bank run.

- Banks are forced to fire sell assets, which drive down asset prices.

- Assets become information sensitive. Liquidity dries up and the system becomes insolvent.
Need for Regulation

- The problem of demand deposit panics was only solved in 1934 with the passage of federal deposit insurance.

- MMMFs compete with depository banks, provide an implicit promise to investors that they will never lose money (made explicit by the government in the crisis), and do not have to pay for this promise.

- Repo and securitization should be regulated because they are new forms of banking, but with the same vulnerability as other forms of private bank-created money.
Dodd-Franks

- Many provisions relevant to shadow banking:
  - Hedge funds must now register with the SEC.
  - OTC derivatives trading will be moved to exchanges and clearing-houses.
  - All systemically important institutions will be regulated by the Federal Reserve.
  - Retail finance lenders subject to regulation from the Consumer Financial Protection Bureau.

- Almost silent on regulation for MMMFs, securitization and repo!!!
Gennaioli, Shleifer and Vishny (2011)

- Three periods, $t = 0, 1, 2$.
- Infinite risk averse investors.
  - Wealth $w$ at $t = 0$.
- Risk Neutral Intermediaries.
  - Wealth $w_I$ at $t = 0$. Access to projects that pay in $t = 2$.
    - Safe (H): Always pay $RI_H$ (in limited supply of 1).
    - Risky (L):
      \[
      R_L = \begin{cases} 
      A_{i_L} & \text{with prob. } \pi_i \\
      0 & \text{otherwise}
      \end{cases}
      \]
    - where $i \in \{b, g\}$, $Pr(g) = x$. Define $\bar{\pi} = x\pi_g + (1 - x)\pi_b$
    - where $R > \bar{\pi}A > 1$
Securitization

- Projects face both idiosyncratic and aggregate risks.
- Securities pool projects and only face aggregate risks.
  - Securities pay \( \pi_i A_l \) for sure in state \( i \).
- Securitization is irrelevant to risk neutral intermediaries, but allows to borrow more from risk averse investors.
Investment and Securitization

\[ R \]

\[ W_I \]

Risky investment and Securitization

Interest Rate
Investment and Securitization

\[ R > R(1 - w_I) \]
**Investment and Securitization**

\[ I_L = w + w_l - 1 \]
Investment and Securitization

\[ R + \pi_b I_L > \bar{\pi}A w \]

\[ I_L = w + w_I - 1 \]

\[ S_L = \frac{\pi}{\pi_b} w - \frac{R}{\pi_b A} \]
Investment and Securitization

\[ R + \pi_b I_L = r(w)w \]

\[ S_L = I_L \]
Investment and Securitization

\[ R = w + w_I - 1 \]

No more absorption

Risky investment and Securitization

Interest Rate

\[ R \]
\[ \bar{\pi} A \]
\[ 1 \]

\[ I_L = w + w_I - 1 \]

\[ S_L \]
Rational Expectations

- In worst case scenario (state $b$) at $t = 2$.
- A fraction $1 - \pi_b$ of intermediaries fail.

\[
[R + \pi_b AS_L + 0(I_L - S_L)] - [R + \pi_b AS_L] = 0
\]

- A fraction $\pi_b$ of intermediaries succeed.

\[
[R + \pi_b AS_L + A(I_L - S_L)] - [R + \pi_b AS_L] = A(I_L - S_L) > 0
\]
Neglected Risks

- In a worse scenario (neglected recession $r$, such that $\pi_r < \pi_b$)
  
- A fraction $1 - \pi_r$ of intermediaries fail.

\[
[R + \pi_r AS_L + 0(I_L - S_L)] - [R + \pi_b AS_L] = (\pi_r - \pi_b) AS_L < 0
\]

- A fraction $\pi_r$ of intermediaries succeed.

\[
[R + \pi_r AS_L + A(I_L - S_L)] - [R + \pi_b AS_L] = A(I_L - S_L) + (\pi_r - \pi_b) AS_L \leq 0
\]

- Successful intermediaries also default if:
  \[1 \leq \frac{I_L}{S_L} < 1 + (\pi_b - \pi_r)\]
Pessimism vs. Neglecting

- **Result:** With rational expectations there is no fragility. With neglected risks there is fragility.
- How about shocks on $x$?
  - Same investment ($w^{**}$ does not change).
  - Optimism (higher $x$) implies more fragility (higher $S/I$ at each $w$).
  - Since default probabilities rise with $x$. Shouldn’t this induce to investigate the possibility of neglected situations?
Optimism

\[ R_I = \omega + \omega I - 1 \]

\[ \pi' A \]

\[ 1 \]

\[ \text{No more absorption} \]

\[ I_L = w + w_I - 1 \]

\[ S_L = \frac{\pi'}{\pi_b} w - \frac{R}{\pi_b A} \]
Additional Comments

- Endogenous feedback effects between wealth and securitization. The system fragility grows over time.
- As in Gorton and Ordonez (2011), tail shocks may be endogenous.
- With neglected risks not clear policy implications.
- No empirical evidence that risk is neglected (Barro et al.)
Ordonez (2011)

- An unregulated banking system grew exponentially during a decade...
Ordonez (2011)

- An unregulated banking system grew exponentially during a decade......and suddenly disappeared in less than a year.

  "It’s all about confidence. Every financial system depends on trust. People have to believe that the institutions they deal with will perform as expected. We are in a full-blown crisis because investors and financial managers - the people who run banks, investment banks, hedge funds, insurance companies – have lost that trust. Banks recoil from lending to each other; investors retreat”. ”The Great Confidence Game”, R. Samuelson, Washington Post, 09/28/08.
Line of Argument

- What is confidence?
  - The belief a counterpart will not cheat, and do as it promises.
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- Where confidence comes from?
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- Why a system based on confidence spreads so much?
  - Confidence provides an alternative cheaper than regulation.

- How such a system can coordinately disappear so suddenly?
  - Reputation concerns generate multiple equilibria.
  - Natural assumptions in financial markets lead to a unique equilibrium, characterized by sudden collapses in confidence.
Confidence Banking

- **Demand deposits** *(traditional banking)*.
  - Are subject to bank runs because of collective actions.
  - Deposit insurance prevents these runs.

- **Repo markets** *(confidence banking)*.
  - Are similar to demand deposits.
  - Collateral and counterparty relations reduce the likelihood of a run.
  - Reputation concerns introduce fragility.
Main Message

- Reputation concerns sustain confidence.

- Confidence sustain a system that is cheap, but is fragile.

- A regulator can exploit reputation to maintain confidence banking but making it less fragile.
Our Approach

- An existing firm compares two financing possibilities for a new project.

- **Debt**
  - On-balance sheet:
    - **Costly bankruptcy.**
  - Good firms pay back even when the project fails.

- **Special Purpose Vehicles (SPVs)**
  - Off-balance sheet: **Securitization** (sell the project’s proceedings)
  - **Bankruptcy remoteness and privileged information.**
  - Even when not needed, good firms may decide to pay back even if the project fails, just to signal they are good firms.
Good and Bad Firms

- A firm seeks to finance a project that costs 1 and pays,

\[ \pi = \begin{cases} 
  y & \text{w/ prob. } p \\
  0 & \text{otherwise} 
\end{cases} \]

- Two types of firms:
  - Bad firms (B): Owns a tree that pays 0 always.
  - Good firms (G): Owns a tree that pays \( z \) with prob. \( p \) and 0 otherwise.

- Probability a firm is good is \( Pr(G) = \phi \)
Fundamentals and Lending

- Continuation values for all firms are summarized by $V(\phi, \theta)$, where $\theta$ is an aggregate fundamental. $V'_\phi > 0$ and $V'_\theta > 0$
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Assumptions

- Projects are efficient and solvent in case of success.
  - $py > 1$ and $y > R$

- Good firms can repay everything with a successful tree.
  - $z > R$
Timing

- Distribution of fundamentals $\theta \sim \mathcal{N}(\mu, \frac{1}{\gamma_\theta})$.
- The firm, with a reputation $\phi$, decides whether to finance the project with debt (at a rate $R_D(\phi)$) or SPV (at a rate $R_S(\phi)$).
- The project and tree produce. The firm observes the results.
- The fundamental is realized. Both the firm and the lender observe $\theta$.
- The firm pays back or not.
  - If paying back: The firm continues with a new $\phi'$, and gets $V(\phi', \theta)$.
  - In not paying back: The firm disappears and gets 0.
Debt Financing

- Costly state verification \( C \). Under standard debt contract,
  - Good firms pay back with probability \( \alpha_G = p + p(1 - p) \)
  - Bad firms pay back with probability \( \alpha_B = p \)
- Reputation updating.

\[
\phi'(\phi) = \frac{\alpha_G \phi}{\alpha_G \phi + \alpha_B (1 - \phi)} > \phi
\]

- Interest rate in equilibrium depends on \( \phi \) and not \( \theta \)

\[
R_D(\phi) = \frac{1 + [1 - \phi \alpha_G - (1 - \phi) \alpha_B] C}{\phi \alpha_G + (1 - \phi) \alpha_B}
\]
SPV Financing

- The firm sells the proceedings of the project to the investors. Then, firms pay when the project succeed.
- Since SPVs are bankrupt remote, good firms are not required to cover defaulting SPV with a successful tree.
SPV Financing

- The firm sells the proceeds of the project to the investors. Then, firms pay when the project succeed.

- Since SPVs are bankrupt remote, good firms are not required to cover defaulting SPV with a successful tree.

- However, they may decide to do it to build reputation. Confidence $\hat{\tau}(\phi, \theta)$ is the probability good firms cover SPVs in trouble.
  
  - Good firms are expected to pay with prob. $\hat{\alpha}_G(\hat{\tau}) = p + p(1 - p)\hat{\tau}$
  
  - Bad firms pay back with probability $\hat{\alpha}_B = p$

- Interest rates and reputation updating will depend on confidence.
SPV Financing - Reputation Updating

- Reputation updating depends on confidence $\hat{\tau}(\phi, \theta)$ at each $\theta$.

$$\phi'(\phi|\hat{\tau}) = \frac{\phi \alpha_G(\hat{\tau})}{\phi \alpha_G(\hat{\tau}) + (1 - \phi) \alpha_B} \geq \phi$$
SPV Financing - Interest Rates

- Cutoff strategies

\[ \tau(\phi, \theta) = \begin{cases} 
1 & \text{if } \theta > \theta^*(\phi) \\
0 & \text{if } \theta < \theta^*(\phi) 
\end{cases} \]

- Interest rates depend on expected cutoffs \( \hat{\theta}^* \)

\[ R_S(\phi|\hat{\theta}^*) = \frac{1}{\phi \hat{\alpha}_G(\hat{\theta}^*) + (1 - \phi)\alpha_B} \]

where \( \hat{\alpha}_G(\hat{\theta}^*) = p + p(1 - p)(1 - \mathcal{N}(\hat{\theta}^*)) \)
SPV Financing - Multiple Repayment Equilibria

- Firms $G$ cover (do not cover) SPVs in trouble if

$$\beta V(\phi'(\phi|\hat{\tau}), \theta) - R_S(\phi|\hat{\theta}^*) > (<)0$$
SPV Financing - A unique equilibrium

- Assume agents observe a signal $s_i = \theta + \epsilon_i$ where $\epsilon_i \sim N(0, \frac{1}{\gamma_s})$.
- Cutoff strategies

$$
\tau(\phi, s_i) = \begin{cases} 
1 & \text{if } s_i > s^*(\phi) \\
0 & \text{if } s_i < s^*(\phi)
\end{cases}
$$

Proposition

Provided that $\gamma_s$ is big enough, there is a unique $s^*(\phi)$, where

$$
\beta E_\theta [V(\theta, \phi'|\hat{\tau}(s^*))|s^*] = R(\phi|s^*)
$$

$$
\hat{\tau}(s^*) = 1 - \Phi(\sqrt{\gamma}(s^* - \mu)) \quad \text{and} \quad \gamma = \frac{\gamma_s \gamma_\theta^2}{(\gamma_\theta + \gamma_s)(\gamma_\theta + 2\gamma_s)}
$$
SPV Financing - Fragility

- Fraction of firms G with reputation $\phi$ covering defaulting securities

$$x^*(\theta) = Pr(s_i < s^* | \theta) = \Phi (\sqrt{\gamma_s (s^* - \theta)})$$
SPV Financing - Bad News

- Worse prospects (a decline in $\mu$) increase $s^*(\phi, \mu)$ and interest rates $R_S(\phi|s^*(\mu))$.

![Diagram showing SPV Financing - Bad News](attachment:image.png)
Even when worse prospects are just bad news, they still increase the probability of collapse.

$S^* (\phi | \mu_0) \rightarrow S^* (\phi | \mu_1)$

$f(\theta)$
Debt or SPV?

- Just focus on firms $G$, since firms $B$ pool financing.

- Expected profits if financing with Debt (where $\phi'$ is $\phi'(\phi|\hat{\tau} = 1)$)

  $$U^D_G(\phi, \mu) = p(y + z) + \alpha_G \left[ \beta E_{\theta|\mu} V(\phi', \theta) - R_D(\phi) \right]$$

- Expected profits if financing with SPV (assuming $\gamma_s \to \infty$).

  $$U^S_G(\phi, \mu) = p(y + z) + \mathcal{N}(s^*(\mu)) p \left[ \beta E_{\theta|\mu, \theta < s^*} V(\phi, \theta) - R_S(\phi|s^*(\mu)) \right] + (1 - \mathcal{N}(s^*(\mu))) \alpha_G \left[ \beta E_{\theta|\mu, \theta > s^*} V(\phi', \theta) - R_S(\phi|s^*(\mu)) \right]$$
Debt or SPV?
Numerical Example

- Assume the following parameters
  - Projects: \( p = 0.5, \ y = 10 \) and \( z = 10 \).
  - Future Profits: \( \beta = 0.99, \ V(\theta, \phi) = k\theta\phi \) and \( k = 0.3 \)
  - Bankruptcy Costs: \( C = 0.25 \)
  - Distribution of Fundamentals: \( \gamma_\theta = 0.5 \)
  - Uniform distribution of reputation.
Probability of "not bail out". The case of $\phi = 0.3$
Interest Rates. The case of $\phi = 0.3$
Debt or SPV? The case of $\phi = 0.3$

![Graph showing Value Functions $U_G^S(\phi=0.3,\mu)$ and $U_G^D(\phi=0.3,\mu)$]
Financing Decisions in the Aggregate

![Graph showing financing decisions in the aggregate](image-url)
Results Consistent with Gorton and Souleles’ findings

- \( R_S(\phi) \) decline with \( \phi \)
  - Use credit card ABS (1988-1999) and sponsors’ credit ratings.
  - Controlling for the quality of underlying assets, investors require higher yields for ABS issued by riskier sponsors (less credit ratings).

- Firms with intermediate reputation are less likely to securitize.
  - Non-monotonic effect on securitization decisions. Very risky and no risky firms are more likely to securitize.
Average Interest Rates
Average Default Probability

![Graph showing average default probability vs. μ]

- **SPV Average Probability of Default**
- **Average Probability of Default**
Learning

- Two possible distributions, $\mu_L = 4$ and $\mu_H = 10$, follow a Markovian process with persistence $\lambda_L = 0.7$ and $\lambda_H = 0.98$.

- Define $\eta_t = Pr(\mu_t = \mu_L)$

$$\hat{\eta}_t = Pr(\mu_t = \mu_L | \theta_t) = \frac{f(\theta_t | \mu_L)\eta_t}{f(\theta_t | \mu_L)\eta_t + f(\theta_t | \mu_H)(1 - \eta_t)}$$

$$\eta_{t+1} = Pr(\mu_{t+1} = \mu_L | \hat{\eta}_t) = \lambda_L \hat{\eta}_t + (1 - \lambda_H)(1 - \hat{\eta}_t)$$

$$\eta_{t+1} \mathcal{N}(\mu_L, \frac{1}{\gamma\theta}) + (1 - \eta_{t+1}) \mathcal{N}(\mu_H, \frac{1}{\gamma\theta}) = \mathcal{N}(\hat{\mu}_{t+1}, \sigma_{t+1})$$

$$\hat{\mu}_{t+1} = \eta_{t+1} \mu_L + (1 - \eta_{t+1}) \mu_H$$

$$\sigma_{t+1} = \left[ \eta_{t+1}^2 + (1 - \eta_{t+1})^2 \right] \frac{1}{\gamma\theta}$$
Simulations

The graph illustrates the simulation of the dynamics of financial fundamentals over time. The x-axis represents time, ranging from 0 to 100, while the y-axis represents the fundamentals, ranging from 0 to 16. The graph shows the expected fundamentals (\(\mu_t\)) in blue, the real fundamentals (\(\mu_t\)) in red, and a variable \(\theta_t\) that might represent a shock or externality affecting the fundamentals. The graph highlights the collapse of fundamentals around time 90, indicating a potential financial crisis or market downturn.
Simulations

- Fragile SPV
- Debt
- Expensive SPV

Time

Reputation

0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Simulations

Average SPV Rates

Interest Rate

Time
Simulations

High reputation firms that do not "bail out" ex-post

Fraction of Fragile SPV

Time

0 10 20 30 40 50 60 70 80 90 100
Reducing Regulation Costs to Traditional Banking

- Reducing bankruptcy costs $C$ gives less room for fragile Confidence Banking to spread out.
Reducing Bankruptcy Costs. The case of $\phi = 0.3$
Reducing Bankruptcy Costs. The aggregate

Graph showing relationships between various factors with labels for "Reputation", "Fragile SPV", "Debt", and "Expensive SPV".
Regulations that Reduce Fragility

- Trivially, get rid of the fundamental cycle by subsidizing and taxing each $\phi$ across $\theta$, constructing a $V(\phi)$ for all $\theta$.

- If not possible, subsidizing and taxing across $\phi$ at each $\theta$, maintaining budget balance, also helps to reduce fragility.
Regulations that Reduce Fragility

- Our example: \( V(\phi, \theta) = k\phi\theta \) and uniform distribution of \( \phi \).
- Reach \( \widehat{V}(\phi, \theta) = V(\phi, \theta) T(\phi) \), to balance budget, where

\[
T(\phi) = a\phi^b
\]

- Budget Balance: \( a = \frac{b}{2} + 1 \) (No regulation case: \( b = 0 \))
- There is a \( \bar{\phi} \) such that
  - For \( \phi < \bar{\phi} \), \( s^*(\phi) \) increases.
  - For \( \phi > \bar{\phi} \), \( s^*(\phi) \) decreases.
Financing Decisions, \( T(\phi) = 2\phi^2 \)
Confidence Thresholds when $\mu = 8$ and $T(\phi) = 2\phi^2$
Welfare Implications

- Assume $y$ follows a distribution $F(y)$.
- Projects are financed if $y < R(\phi)$.
- For $\mu = 8$ and uniform distribution of $\phi$
  - Without regulation average rate is 1.69.
  - With regulation average rate is 1.67.

- In this case, regulation is budget balance, reduces fragility and increases production.
Final Remarks

- Economic prospects affect the financing decision of firms
  - If **good times** are expected, there is confidence, reputable firms use cheap securitization and non reputable firms use debt. **Fragile system.**
  - If **intermediate times** are expected, most firms use debt. **Stable system.**
  - If **bad times** are expected, reputable firms use debt and non reputable firms use expensive securitization. **Stable system.**
Final Remarks

- Regulation should recognize the sources of "confidence banking".
  - More regulation to traditional banking spurs "confidence banking".

- Subsidizing good reputations when prospects are bad does not eliminate "confidence banking", but makes it less fragile.
Final Remarks

- Extensions.
  - Decision of which projects to securitize.
  - We empirically describe the evolution of confidence banking over time.
    First results are consistent with the model if $\theta$ is GDP forecasts.