

# Portfolio Dynamics and the Supply of Safe Securities

**David Xiaoyu Xu**

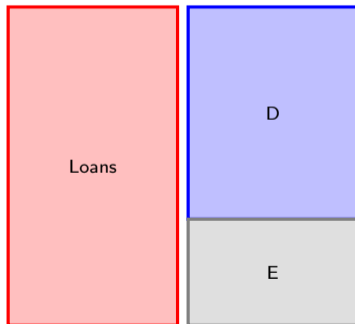
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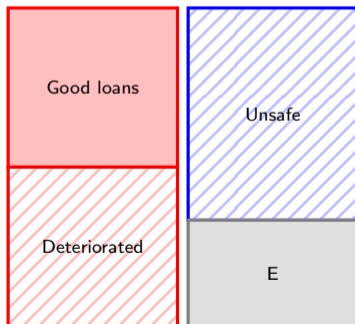
## Dynamic Portfolio and Safe Debt Capacity

- ▶ Financial intermediaries transform risky assets into safe liabilities.
- ▶ This paper's context: securitization backed by loan portfolios.
- ▶ New idea: dynamic collateral management helps create *larger* safe tranches.



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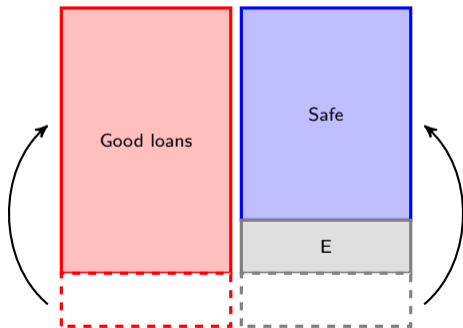
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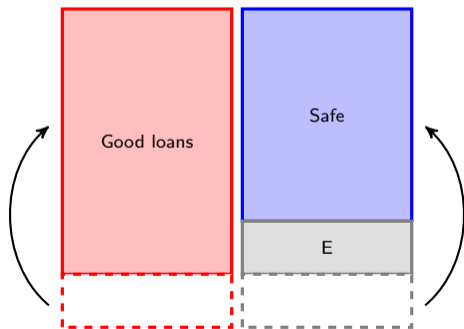
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  - ★ Portfolio's cash flow uncertainty ↓

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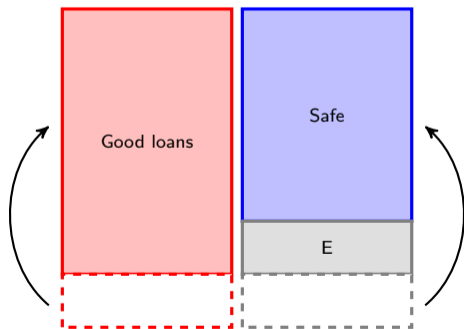
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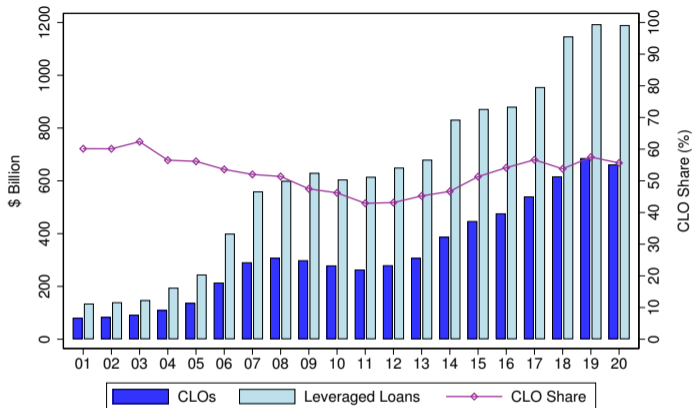
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- ◇ Ex ante: commitment  $\Rightarrow$  a bigger safe tranche
- ◇ Equity holders enjoy a lower cost of capital

## The Idea in Practice



- ▶ Leveraged loans: junk-rated, syndicated corporate loans
- ▶ Collateralized loan obligations (CLOs):
  - Create AAA securities (65%) backed by dynamic loan portfolios.
  - Trade loans with loan funds (mutual and hedge funds) that also hold loans.

## Research Questions

1. **Size of safe tranches backed by dynamic portfolios?**
2. **Why do institutions have similar loans but distinct financing?**
3. **Does trading matter for the total supply of safe debt?**
4. **Is the market equilibrium efficient?**



## Main Findings

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  - ◇ Jointly determined with endogenous loan prices.
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- ◇ Coexistence of CLOs and loan funds arises in equilibrium.

### 3. Does trading matter for the total supply of safe debt?

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- ◇ Price pressure from CLOs induces loan funds to invest more, increasing total collateral and safe debt.

### 4. Is the market equilibrium efficient?

- ◇ There can be an underproduction of safe debt.

# Stylized Facts

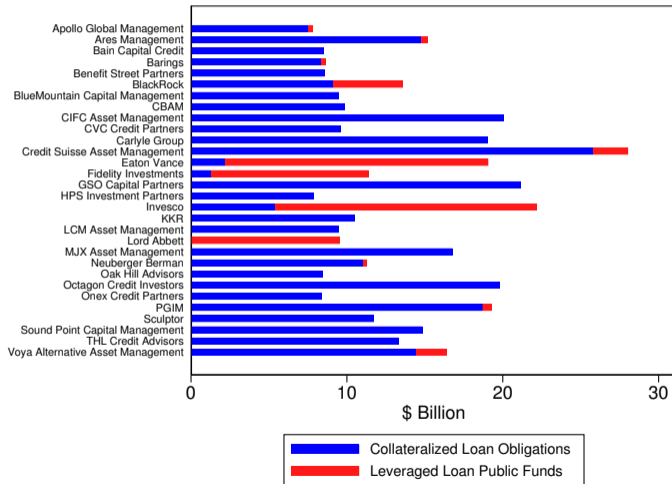
Model

Equilibrium

Efficiency and Policy Implications

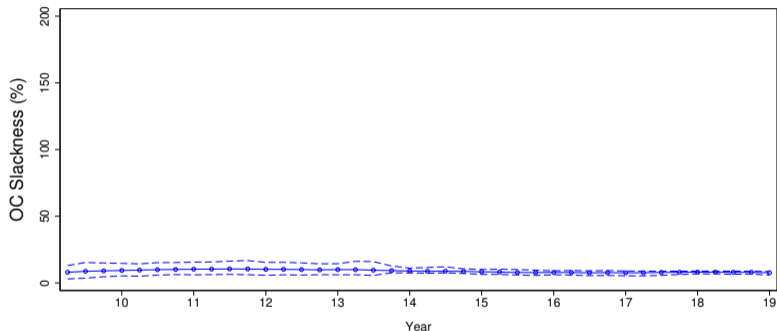
## Fact 1: CLOs and Loan Funds Coexist

Top 30 leveraged loan asset managers by AUM:



## Fact 2: CLOs Face Binding Collateral Constraints

Empirical distribution: the slackness of senior tranche over-collateralization constraint:

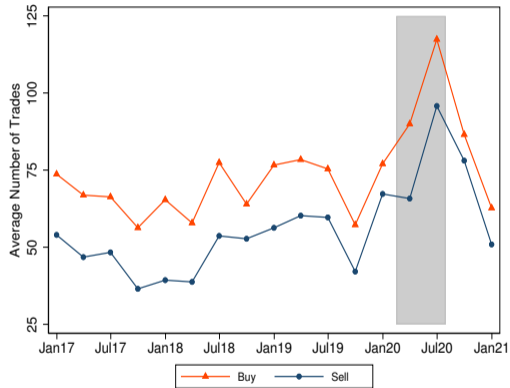


Persistently binding collateral constraints: CLOs fully use safe debt capacity.

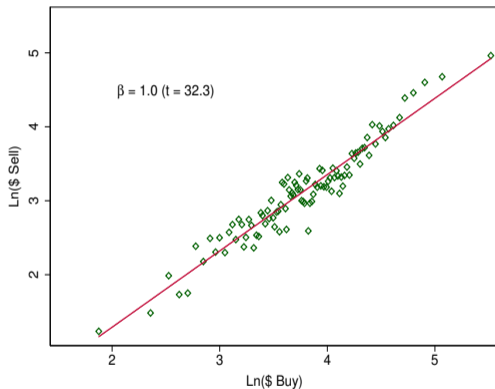


## Fact 3: Binding Constraints Force CLOs to Replace Loans

CLOs' secondary market trades around the onset of COVID-19:



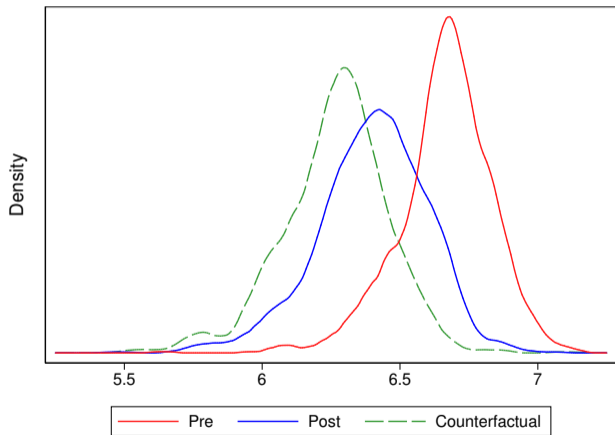
(a) Quarterly Loan Trades



(b) Purchases and Sales within CLOs

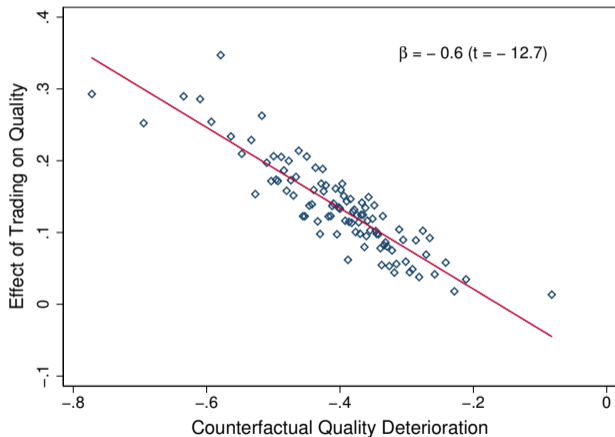
## Fact 4: Portfolio Substitution Improves Collateral Quality

Compare with counterfactual portfolio quality:



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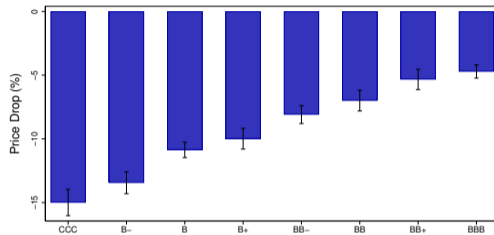
Compare with counterfactual portfolio quality:



- ▶ Trading offsets 60% of quality deterioration.

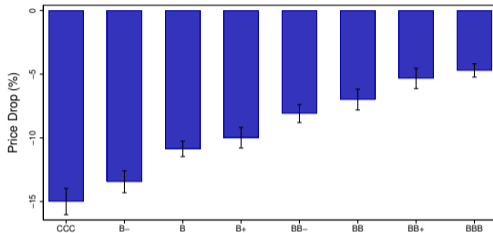
## Fact 5: Price Pressure from CLOs

### (a) Leveraged Loans

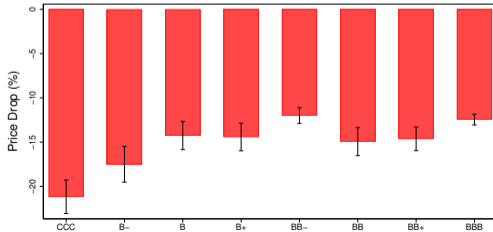


## Fact 5: Price Pressure from CLOs

(a) Leveraged Loans



(b) High-Yield Bonds



Stylized Facts

**Model**

Equilibrium

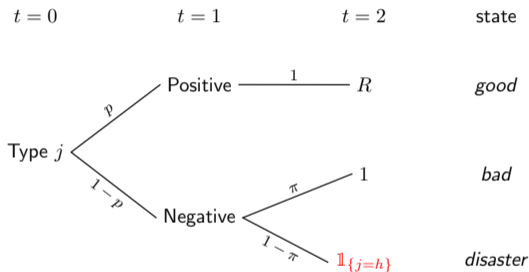
Efficiency and Policy Implications

## Investors and Financial Institutions

- ▶  $t \in \{0, 1, 2\}$ , state  $\omega \in \Omega = \{good, bad, disaster\}$  at  $t = 2$
- ▶ Investor utility:  $U = C_0 + \mathbb{E}_0[C_1 + C_2] + \gamma A$ 
  - $A$ : safe debt, which pays face value at  $t = 2$  with certainty
  - $\gamma$ : non-pecuniary benefit from holding safe debt (e.g., regulatory advantage)
  - Endowed with perishable goods at  $t = 0$ , but cannot make loans
- ▶ A continuum of risk-neutral institutions:  $\mathcal{I} = [0, 1]$ 
  - Can make loans for a risky payoff at  $t = 2$
  - Need external financing at  $t = 0$ 
    - ◇ Flexible capital structure: can issue any equity and debt securities
  - Ex-ante identical except for safe debt issuance cost  $\xi_i$
- ▶ Investors take securities prices as given
  - Issuing safe debt lowers funding costs because  $\gamma > 0$

## Investment Technology

- ▶ Institution  $i$  makes  $x_i$  loans at a convex effort cost  $c(x_i) - x_i$  at  $t = 0$
- ▶ Two loan quality types  $j \in \{h, l\}$

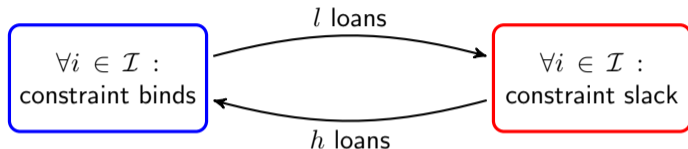


- ▶ Loan quality:  $\tilde{x}_{i,l}$  become type  $l$ , iid drawn from  $[0, \bar{x}_l]$ 
  - Key concern: which loans are low-quality is unknown before negative news
- ▶ Institutions can credibly promise  $a_i \leq \min \{\text{portfolio payoff}\}$  by trading at  $t = 1$ 
  - Endogenous loan prices  $q_l, q_h$  affect collateral constraints



## Secondary Market Trades

- ▶ Negative news: binding constraints trigger trades to increase  $\min \{\text{payoff}\}$



### Lemma 1

$\frac{q_l}{q_h} < \text{the ratio of fundamentals.}$

- ▶ Replacing low-quality loans generates price pressure
- ▶ Pecuniary externality: issuing safe debt
  - Makes selling  $l$  and buying  $h$  **costly**, and the opposite **profitable** (ex post)
  - Tightens collateral constraints: everyone's safe debt capacity drops (ex ante)

Stylized Facts

Model

**Equilibrium**

Efficiency and Policy Implications

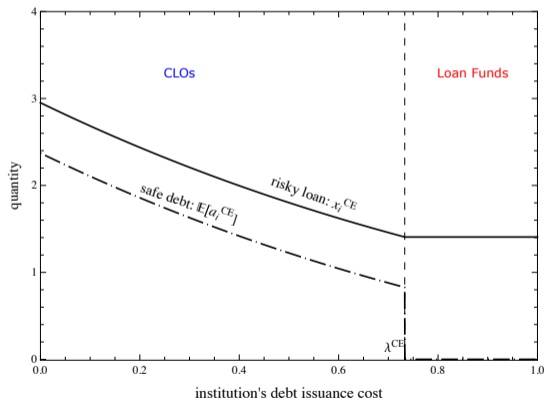
## Equilibrium Definition

- ▶ Institutions, as internal equity holders, choose lending, financing, and trading to maximize their own payoffs.
  - Can credibly commit to portfolio choices at  $t = 1$ .
  - Rationally anticipate future trades at  $t = 0$ .
- ▶ Market clears: balance sheets and loan prices jointly determined.

# Market Equilibrium of Financial Institutions

## Proposition 1

There is a unique equilibrium with cutoff  $\lambda^{CE} \in (0, 1)$  such that:  $i < \lambda^{CE}$  fully use safe debt capacity, and  $i > \lambda^{CE}$  issue no safe debt.

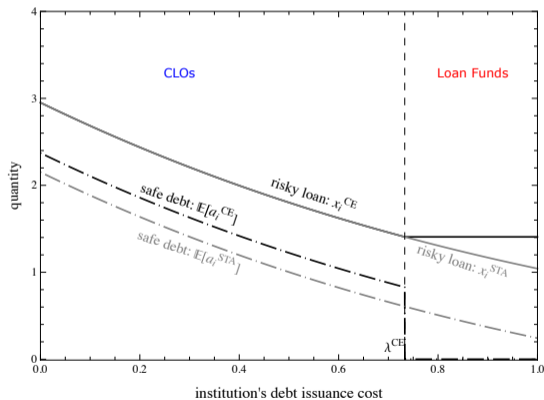


Safe debt supply is endogenous at both the intensive and extensive margins.

# Market Equilibrium of Financial Institutions

## Corollary 1.1

Dynamic collateral management increases the total supply of safe debt beyond the static benchmark:  $A^{CE} > A^{STA}$ .



Lending channel: CLOs' price pressure  $\Rightarrow$  profitable liquidity provision  $\Rightarrow$  loan funds lend more.

Stylized Facts

Model

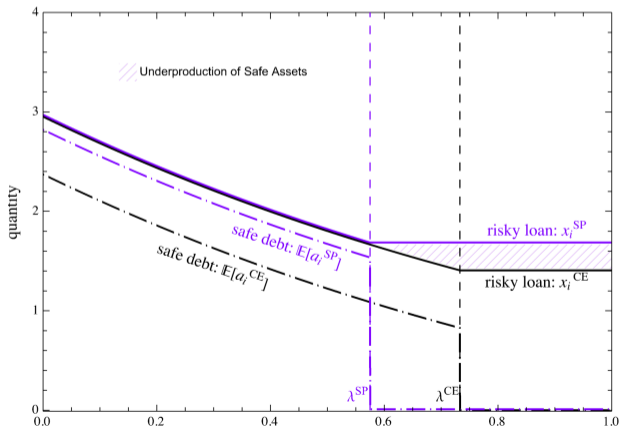
Equilibrium

Efficiency and Policy Implications

## Compare with Social Planner's Allocation

### Proposition 2 (Constrained Inefficiency)

*There market has excessive entry into operating CLOs, underinvestment by loan funds, and an underproduction of safe debt.*



## A Regulation that Reduced CLOs

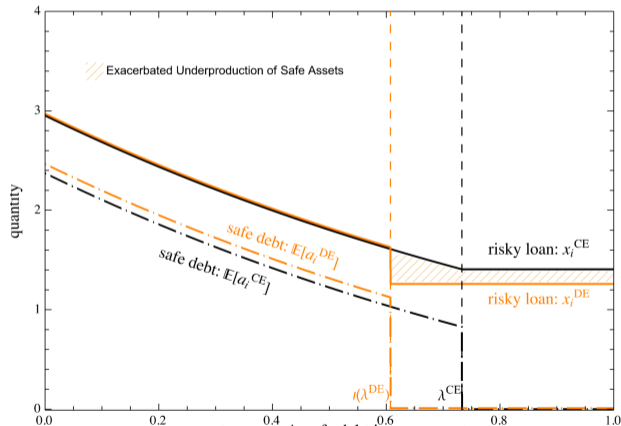
- ▶ Credit Risk Retention Rule (2014)
  - Requires CLO managers to contribute 5% of capital to the CLOs they operate.
- ▶ Resistance from asset managers
  - Main complaint: imposes a large cost on CLO managers.
- ▶ Practitioners won a lawsuit against the Fed and SEC
  - And they won in 2018: CLO managers got exempted from the rule.
  - Still unclear how such a policy affects the market equilibrium.



# Unintended Consequence of Policy Intervention

## Proposition 3

*Imposing an entry cost on issuing safe debt exacerbates the underproduction of safe debt.*



Channel: less price pressure  $\Rightarrow$  providing liquidity less profitable  $\Rightarrow$  loan funds lend even less.

## Takeaways

- ▶ Dynamic collateral management helps individual institutions create more safe debt.
  - Tradeoff: cheaper funding v.s. replacing deteriorated assets.
- ▶ The resulting price pressure drives the market equilibrium.
  - “CLOs” and “loan funds” coexist and trade as counterparties.
  - Trading can raise total lending and safe debt supply.
- ▶ Competitive market tends to be socially inefficient.
  - Excessive entry into operating CLOs, but the market underproduces AAA securities.
  - Simple policy intervention can make things even worse.
- ▶ The idea goes beyond the corporate loan market.
  - Commercial real estate loans, crypto-backed lending platforms, etc.