Nonbank Fragility in Credit Markets: Evidence from a Two-Layer Asset Demand System

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Nonbank fragility and asset prices in crises

Financial 'fragility' often at center of economic crises

- Amplification of fundamental shock through intermediaries
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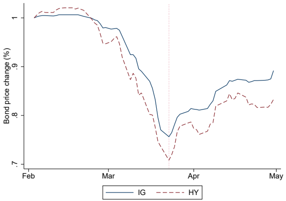
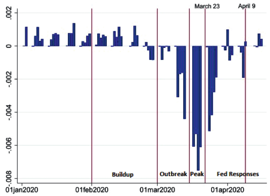
Financial 'fragility' often at center of economic crises

- Amplification of fundamental shock through intermediaries
- Typical focus on traditional banking sector
- However, Spring 2020 crisis features **nonbank fragility**
  - Historical outflows from **bond mutual funds**
  - Sharp drop in bond prices
  - Dry-up in firm debt issuance

→ Federal Reserve purchased corporate bonds for first time ever

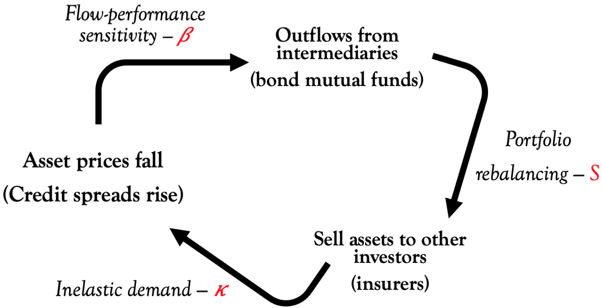


Bond prices



Daily bond mutual fund flows

Feedback loop between flows and asset prices



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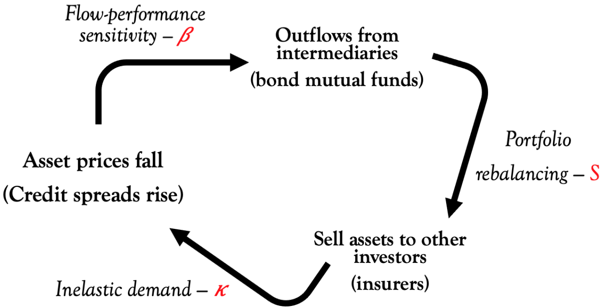

Question: How can we quantify equilibrium effects and assess policy interventions in crises?

- Two-layer asset demand system, extend Koijen Yogo 2019
- Estimable from micro-data on bond holdings, fund flows, and asset prices

Literature

Risks of non-bank intermediaries : Chen, Goldstein, and Jiang 2010; Chernenko and Sunderam 2016, 2020, Goldstein, Jiang, and Ng 2017, Falato, Goldstein, and Hortacsu 2021, Ellul, Jotikasthira, and Lundblad, 2011, Haddad, Moreira, and Muir 2021, Ma, Xiao, and Zeng 2022, Kundu 2023

- Measure effect of institutions' inelastic demand on fragility

Demand system asset pricing: Koijen and Yogo 2019, Koijen et al 2021, Bretscher et al 2022, Chaudhary, Fu, and Li 2023, Azarmsa and Davis 2023 Haddad, Huebner, Loualiche 2021

- Endogenize the dynamics of institution size via first layer

Role of intermediaries in crises, policy responses: Greenwood, Landier, Thesmar 2015, He and Krishnamurthy 2013, Brunnermeier and Sannikov 2014, Hanson, Kashyap and Stein 2011, Hanson, Scharfstein and Sunderam 2014, Haddad, Moreira, and Muir 2022, Buchak Matvos Piskorski and Seru 2024

- Focus on how unlevered intermediaries amplify shocks

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Second layer: Institutions' allocate wealth (AUM) across assets with different characteristics

- i.e bonds with different expected return, maturity, credit ratings, etc
- Change in asset demand driven by expected returns *and* flows:

$$q_t = K_t(\kappa) r_t^e + S_t^\top f_t$$

- K is demand sensitivity to return (determines price elasticity)
- S_t is asset shares across institutions, δ is bond yield; f_t is fund flows

Equilibrium asset prices

- Market clearing implies (iterating forward):

$$p_t = \sum_{\tau=t}^{\infty} \left(I + \delta \left(I - (K\delta)^{-1} S^\top B\theta\right)\right)^{-(\tau - t + 1)} \delta d_\tau$$

  - B is flow-to-performance sensitivity across institutions
  - K is sensitivity to expected return across assets
  - S is asset holding shares
  - θ is portfolio weights
  - d_τ is cash flow shock

Intuition: amplification

- Consider a one asset, one fund, and a permanent shock $d_\tau = d$, for $\tau \geq t$

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- In general: $B > 0$ and $K < \infty$

$$p_t = (1 - (K\delta)^{-1} B\theta)^{-1} d > d$$

Numerical illustration

Feed in 10 days of negative fundamental (permanent) shocks to HY bonds

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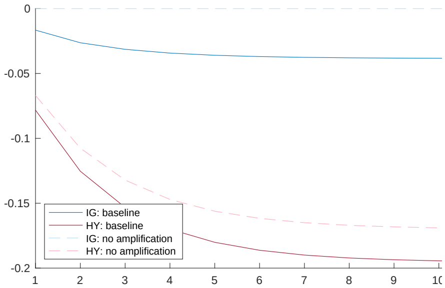
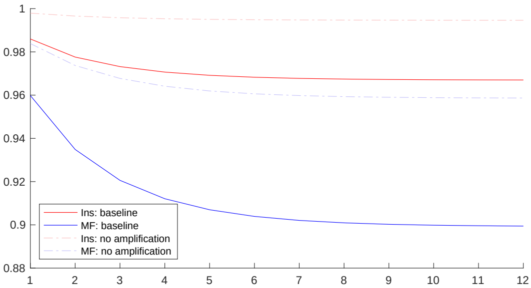


Bond prices



Institutions' AUM

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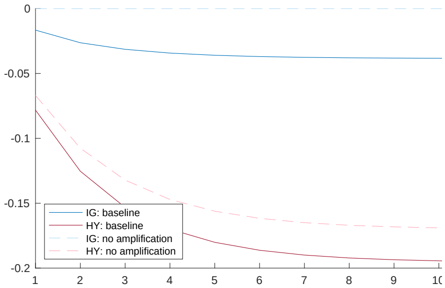

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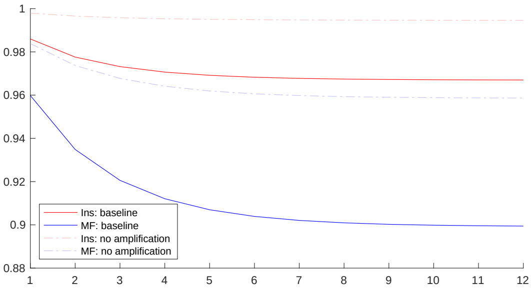

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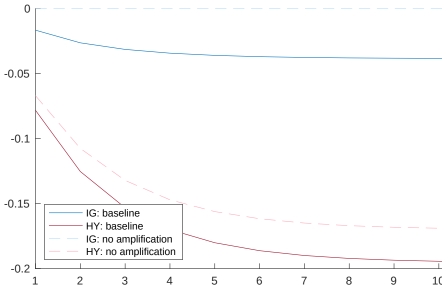

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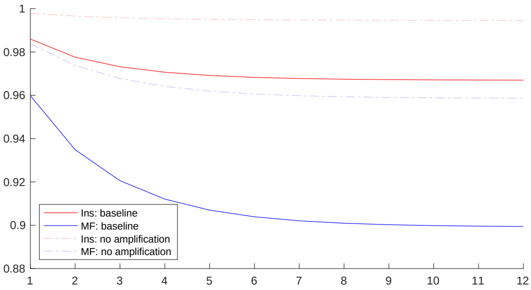


Institutions' AUM

- **Amplification**: cumulative effects are greater
- **Contagion**: both HY and IG bond prices fall, insurers are also affected

Estimation

1. **Layer 1**: Estimate flow sensitivities β across bond investors group
   - Data: CRSP Mutual Fund/ Morningstar and NAIC Insurer data
   - Classic FE regressions on panel of flows and returns (monthly)
2. **Layer 2**: Estimate demand elasticities κ
   - Data: Thomson Reuters eMAXX + CRSP Mutual Fund Data + Mergent FISD + TRACE
   - IV: price changes instrumented with residualized MF flows

Fund type	Beta (negative returns)	Beta (positive returns)	Demand elasticity
Life insurers	0.000	0.000	-1.945
PC insurers	0.000	0.000	-0.856
Index funds	0.203	0.250	0.008
Active mutual funds	0.342	0.128	-1.341
Residual fund	0.000	0.000	-1.198

How systemically important are different bonds?

- **Asset-level systemic importance**: Impact of 1% drop in bond value on aggregate market

$$\textbf{Asset systemic measure} \equiv \alpha'(I - (K\delta)^{-1} S^{\top} B\theta)^{-1} ./ \alpha'$$

Normalize by α (asset market share) $\implies$ measure is 1 if no amplification

	IG		HY	
	Long	Short	Long	Short
Asset systemic measure 2019	1.23	1.34	1.40	1.91

- Short bonds more systemic: held by MF with especially high flow sensitivity
- Even if they are more "liquid" (lower bid-ask spread)

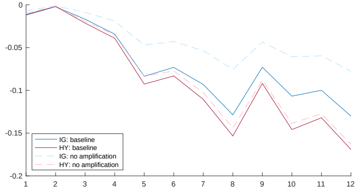
Matching the model to March 2020 turmoil

Model joint flows and bond prices dynamics of March 2020

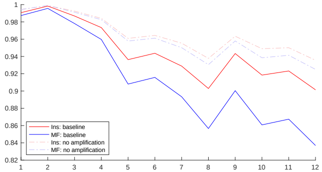
- Feed in CDS spreads as cash-flow shocks to bonds
- Feed in estimated flow sensitivity and demand elasticities + 2019Q4 portfolio shares
- Additional demand characteristic: preference to sell IG bonds first (Ma Xiao Zeng 2022)

Able to match key moments of crisis:

1. Large mutual fund outflows ≈ 5% of AUM (Falato, Goldstein, and Hortacsu 2021)
2. Large bond price decline ≈ -13-17%, even for safer IG bonds
3. Large share of IG price decline due to amplification, much lower for HY (Haddad, Moreira, Muir 2021)



Asset prices



AUM

Conventional monetary policy: 50bps rate cut

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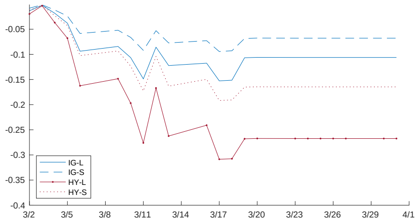
- Implemented $T = 14$
- Broad effects, but stronger for IG (higher duration)

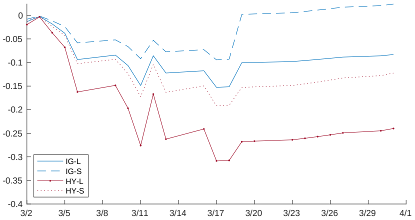


Asset prices

AUM

Expected asset purchases: Buy 5% of short-term IG in 20 days

- Price recovers somewhat upon announcement
- Continues to drift upwards until purchases occur



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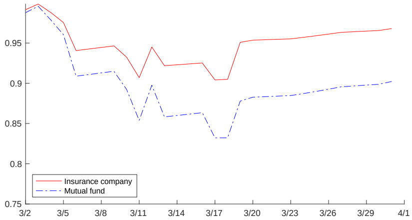
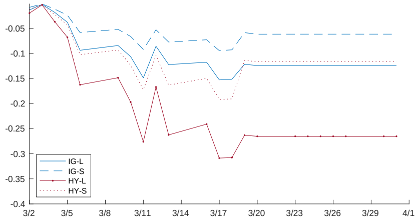


AUM

Direct lending to funds

- Suppose funds borrow from Fed at 10% of IG assets
- Insurers also benefit



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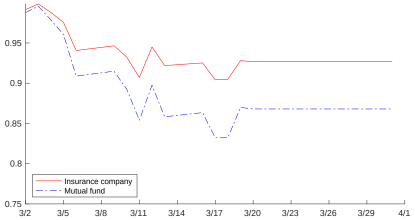
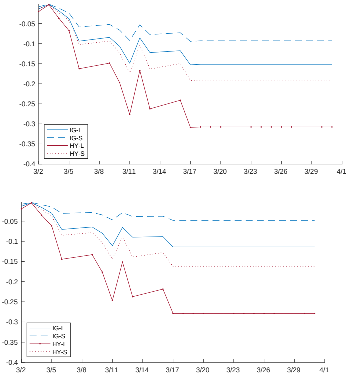
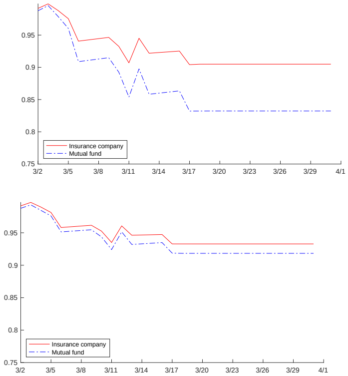


AUM

- Mitigates amplification effect: if implemented immediately



Asset prices ($T = 14$ vs $T = 2$)



AUM ($T = 14$ vs $T = 2$)

Conclusion

Develop two-layer asset demand framework to analyze fragility of corporate bond market

- Tractable joint dynamics of flows and asset values, even with heterogeneity
- Crisis dynamics: amplification + contagion across assets and institutions
- Dynamics characterized by simple statistics that can be estimated from micro-data

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Integrate asset pricing and intermediation to better understand credit markets

- Quantifiable models of fragility
- Lessons for policy design