Global Banks and Systemic Debt Crises

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Discussion by

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IFM Spring meeting

Boston, March 2019

INTRODUCTION

- Models of sovereign debt have two key players
  - Government: endowment y, chooses debt, $b'(b, y)$, and default $D(b, y)$
  - Lenders: Price debt issued by the government, $q(b', y)$
- In textbook version, lenders are risk-neutral

$$q(b', y) = \mathbb{E}_y\{\beta[1 - D(y', b')]\}$$

- Several empirical challenges for risk-neutral pricing
  - Risk-neutral default probabilities $>>$ actual default frequencies
  - Sovereign spreads in EM more correlated than their fundamentals

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- Natural progression of the literature: introduce risk-averse lenders

$$q(b', y, s) = \mathbb{E}_{y,s}\{\Lambda(s', s)[1 - D(b', y', s')]\}$$

- Can potentially address empirical challenges
  - Lenders demand a risk-premium if $\text{Cov}_{y,s}[\Lambda(s', s), D(b', y', s')] > 0$
  - Generate correlation because of shocks to lenders' discount factor

What model for $\Lambda(s', s)$? Empirical discipline?

Models of $\Lambda(s', s)$ in Macro-Finance

In macro-finance, there are several ways of modeling $\Lambda(s', s)$

- Factor models (E.g. Ang and Piazzesi, 2001)
- Consumption-based stochastic discount factors
  - CRRA preferences
  - Preferences with external habits (Campbell and Cochrane, 1999)
  - Epstein-Zin preferences (Bansal and Yaron, 2004)
- Intermediary-based stochastic discount factors
  - Aiyagari and Gertler (1998), He and Kryshnamurthy (2013)

Models of $\Lambda(s', s)$ in Sovereign Debt

In sovereign debt literature, there are several ways of modeling $\Lambda(s', s)$

- Factor models (Bocola and Dovis, 2018)
- Consumption-based stochastic discount factors
  - CRRA preferences (Arellano, Bai and Lizarazo, 2017)
  - Preferences with external habits (Borri and Verdelhan, 2011)
  - Epstein-Zin preferences (Hatchondo, Martinez and Sosa-Padilla, 2016; Bai, Kehoe and Perri, 2019)
- Intermediary-based stochastic discount factors
  - Morelli, Ottonello and Perez (2019)

Morelli, Ottonello and Perez (2019)

- Model of the world economy
  - EM governments issue defaultable debt
  - DM economies: save in risk-free bonds and issue claims on risky assets
- Financial intermediaries ("banks")
  - Borrow risk-free and purchase risky assets (DM equity and EM bonds)
  - Banks net-worth matters for EM bond prices because of financial frictions
  - Spillovers: shocks to DM equity $\rightarrow$ net-worth $\rightarrow$ EM bond prices
- Preliminary quantification
  - Based on interesting cross-sectional evidence
  - Spillovers quantitatively important

A SIMPLIFIED SMALL OPEN ECONOMY

- Government problem: standard, do not discuss here
- Lenders: based on Gertler and Karadi (2008) and Bocola (2016)
  - Issue bonds d' to DM households at gross rate $R = \beta^{-1}$
  - Use net-worth n and debt d' to purchase SOE bonds and risky DM assets

$$n + d' = q_b b' + q_a a'$$

  - a' has stochastic payout tomorrow, $y'_a = f(y_a)$
  - Financial friction 1: debt cannot exceed a proportion κ of net worth

$$d' \leq \kappa n$$

  - Financial friction 2: cannot issue equity. Accumulate capital until death

THE PROBLEM OF FINANCIAL INTERMEDIARIES

$$v(n;B',s) = \max_{a',b',d'} \beta \mathbb{E}_s \left\{ (1-\sigma)n' + \sigma v(n';B'',s') \right\}$$

$$n + d' = q_b(B',s)b' + q_a(s)a'$$

$$d' \leq \kappa n$$

$$n' = b'[1 - D(B',s')] + a'y'_a - Rd'$$

Optimality for government bonds

$$\frac{\partial v(n;B',s)}{\partial n} = \kappa\mu(n;B',s) + \left\{ (1-\sigma) + \sigma \mathbb{E}_s \left[\frac{\partial v(n';B'',s')}{\partial n'} \right] \right\} \equiv \alpha(B',s)$$

$$\begin{aligned} q_b(B',s) &= \frac{\mathbb{E}_s \left\{ \left[(1-\sigma) + \sigma\alpha(B'',s') \right] \left[1 - D(B',s') \right] \right\} - \mu(B',s)}{\mathbb{E}_s \left[(1-\sigma) + \sigma\alpha(B'',s') \right]} \\ &= \mathbb{E}_s \left[\Lambda(B',s',s)[1 - D(B',s')] \right] - \tilde{\mu}(B',s) \end{aligned}$$

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$$= \mathbb{E}_s \left[\Lambda(B',s',s)[1 - D(B',s')] \right] - \tilde{\mu}(B',s)$$

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PRICING RISKY SOVEREIGN DEBT

$$q_b(B', s) = \mathbb{E}_s \left[\Lambda(B', s', s)[1 - D(B', s')] \right] - \tilde{\mu}(B', s)$$

Two main modifications relative to risk-neutral pricing

- If financial constraint binds, not enough resources to arbitrage, price of bonds must fall (pure rent to intermediaries)
- Variation in the marginal value of wealth of intermediaries (risk premia)

Key economic mechanisms

- Spillovers: shocks to risky assets in DM affects banks' net-worth and affect pricing schedule
- Amplification: shocks to EM affect banks' net-worth and influence pricing schedule (more relevant with long term debt)

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QUANTIFICATION

- Want: assess importance of global intermediaries for spreads and debt-dynamics in EM
- Need: parametrize model
- Option 1: Calibrate/estimate model by fitting unconditional moments
  - Standard targets (mean spreads, debt-to-output, . . .)
  - Additional targets (volatility of net-worth, correlation between global stock prices, EM spreads and banks net-worth, . . .)
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CROSS-SECTIONAL REGRESSIONS

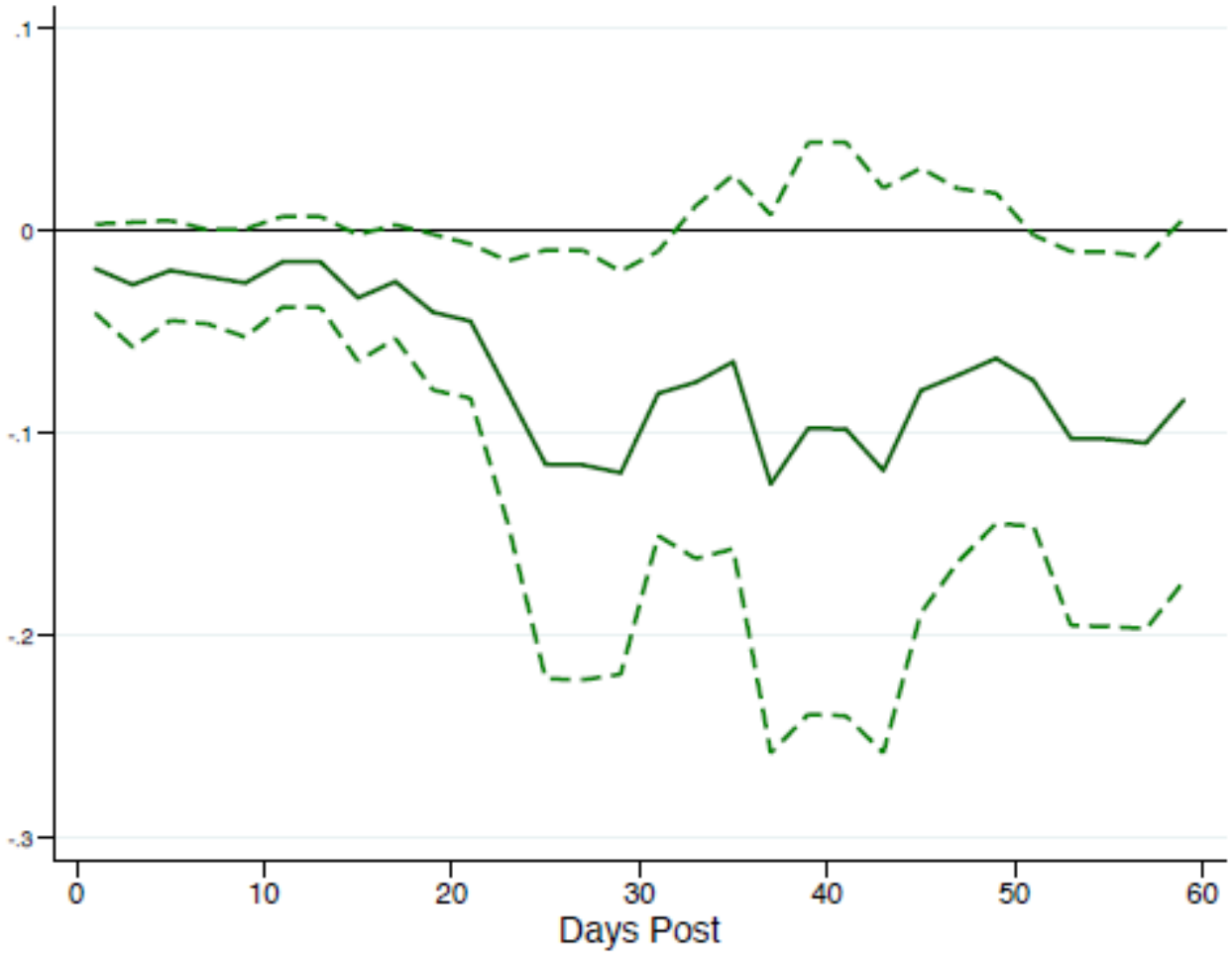
- Think about Lehman as an exogenous shift in y_a
- Certain banks suffered deeper net-worth declines
- Compare yields of the same country for bonds whose holders had different net-worth losses

$$\Delta_h y_{iks} = \alpha_{ks} + \beta_h \Delta n_i + \gamma' X_i + \epsilon_{iks}$$

- Idea: β_h represents the effects of shift in net-worth holding a country default risk constant
- Informative about parameters of financial friction (under assumption that markets are segmented bond by bond)

Estimation of β_h

(B) Only Sovereign Bonds



QUESTION 1: WHY THIS MOMENT AND NOT OTHERS?

Authors target β_h in model regression along other targets

TABLE 4. Model Calibration

Target	Data	Model
Debt service	5.7%	8.7%
Average default rate	2.6%	1.9%
Average spread	395bp	323bp
Spreads volatility	170bp	456bp
Correlation of spread and GDP	-31%	-20%
Portfolio weight on DM	90%	90%
Volatility of DM Spread	255bp	105bp
Autocorrelation of DM Spread	0.16	0.03

- No data on net-worth, key driving variable of $\Lambda(s', s)$ and $\tilde{\mu}(s)$

THE CASE FOR TARGETING β_h

Needs to be spelled out more clearly in the paper

One angle

- It could be an important moment to consider for model misspecification
- Shocks to DM might directly affect EM economies (say through trade) and bank net-worth
- Positive correlation (spurious) would lead the model to overstate importance of intermediaries' balance sheet

Is this why it is desirable to target conditional moment?

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THE CASE FOR NOT TARGETING (ONLY) β_h

- Is β_h really a causal effect? (selection, bonds with different characteristics, etc)
- Cross-sectional regressions use only data around Lehman experiment
- In finance, stylized facts about relation between banks' balance-sheet variables and cross-section of stock returns (Adrian, Etula and Muir, 2017). No similar evidence for EM sovereign bonds
- To reinforce, what is the correlation between Argentina spreads and global banks net-worth?

Paper would be stronger if it establishes set of facts about unconditional moments

QUESTION 2: SIMPLIFY MODEL?

Model has several ingredients whose role not clear

- Do you need explicit model of the DM assets held by bankers?
  - Structure not really used to discipline measurement
- Do you need the primary/secondary market distinction?
  - Makes sense of regressions, some other reasons?
- Do you need continuum of EM economies?
  - This is interesting if you study things like comovement of spreads across countries, relative importance of EM aggregate/idiosyncratic shocks, etc

Simpler framework allows room for interesting experiments

- Spread decompositions between risk-premia, default probabilities and pure rents, etc.

Conclusion

- Interesting and important paper
- Two suggestions
  - Refine quantitative strategy
  - Strip down the model of ingredients that are not first-order (or explain why you think these are first-order)
- Looking forward to learn more about it