GLOBAL BANKS AND SYSTEMIC DEBT CRISES

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Discussion by
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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')]\}
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- Several empirical challenges for risk-neutral pricing
  - Risk-neutral default probabilities $\gg$ 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
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

  - 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 $\kappa$ of net worth
    \[ d' \leq \kappa n \]
  - Financial friction 2: cannot issue equity. Accumulate capital until death
**THE PROBLEM OF FINANCIAL INTERMEDIARIES**

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

\[ n + d' = q_b(B', s)b' + q_a(s)a' \]

\[ d' \leq \kappa n \]

\[ n' = b'[1 - D(B', s')] + a'y_a' - Rd' \]

**Optimality for government bonds**

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

\[ q_b(B', s) = \frac{\mathbb{E}_s \{ [(1 - \sigma) + \sigma \alpha(B'', s')] [1 - D(B', s')] \} - \mu(B', s)}{\mathbb{E}_s [(1 - \sigma) + \sigma \alpha(B'', s')] } \]

\[ = \mathbb{E}_s [\Lambda(B', s', s)[1 - D(B', s')]] - \tilde{\mu}(B', s) \]
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Pricing risky sovereign debt

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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)
Pricing risky sovereign 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, ...)

- **Option 2:** Calibrate/estimate model by fitting conditional and unconditional moments

Authors are following Option 2
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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: $\beta_h$ 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 $\beta_h$

(B) Only Sovereign Bonds
**Question 1: Why this moment and not others?**

Authors target $\beta_h$ in model regression along other targets

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

- No data on net-worth, key driving variable of $\Lambda(s^l, s)$ and $\tilde{\mu}(s)$
The case for targeting $\beta_h$

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

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THE CASE FOR NOT TARGETING (ONLY) $\beta_h$

- Is $\beta_h$ 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