Dynamic Debt Runs and Financial Fragility: Evidence from the 2007 ABCP Crisis

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2012 ESSFM, Gerzensee

The Point of the Paper

- What is the quantitative importance of bank run determinants?
- We have models with limited quantitative predictions.
- For policy, we need to confront the model with the data more seriously.
- Estimate a model of bank runs. Do counterfactuals.

The Results are Interesting and Useful

- The model and the data get along in important dimensions.
- Counterfactuals tell us that runs depend most on
  - conduit leverage
  - asset liquidity
- Runs depend less on
  - degree of maturity mismatch
  - strength of credit guarantees
  - asset volatility

This Question Lends itself to Structural Estimation

- Banks runs are endogenous events.
- Many ABCP run determinants are difficult to observe.
  - Conduit leverage.
  - Asset holdings.
  - Asset liquidity.
  - *Perceived* strength of credit guarantees.

Outline

- Model Intuition
- Explanation of and Suggestions for Estimation

Let's Start with He Xiong (2012)

- Model of a conduit

- Five Ingredients

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  - Default
  - Externality

Let's Start with He Xiong (2012)

- Model of a conduit
  - Buys an asset worth \$1
  - Terminal asset value follows a diffusion
  - Asset matures with a Poisson arrival probability
  - Asset pays a constant return r

Maturity Mismatch in Financing the Asset

- Funds the asset with short-term debt that pays a constant yield r
- Unit continuum of investors
- Debt randomly matures
- Then investors decide (yes/no) whether to refinance.

The Conduit is Backed by a Credit Line

- Sometimes asset value falls too low to repay investors.
- A “bank” offers a credit guarantee.
- The credit guarantee kicks in with probability < 1.

The Conduit can Default

- If the credit line fails, the conduit defaults.
- Asset can be liquidated early at a discount.
- Pro rata distribution to creditors

Externality in Financing the Conduit

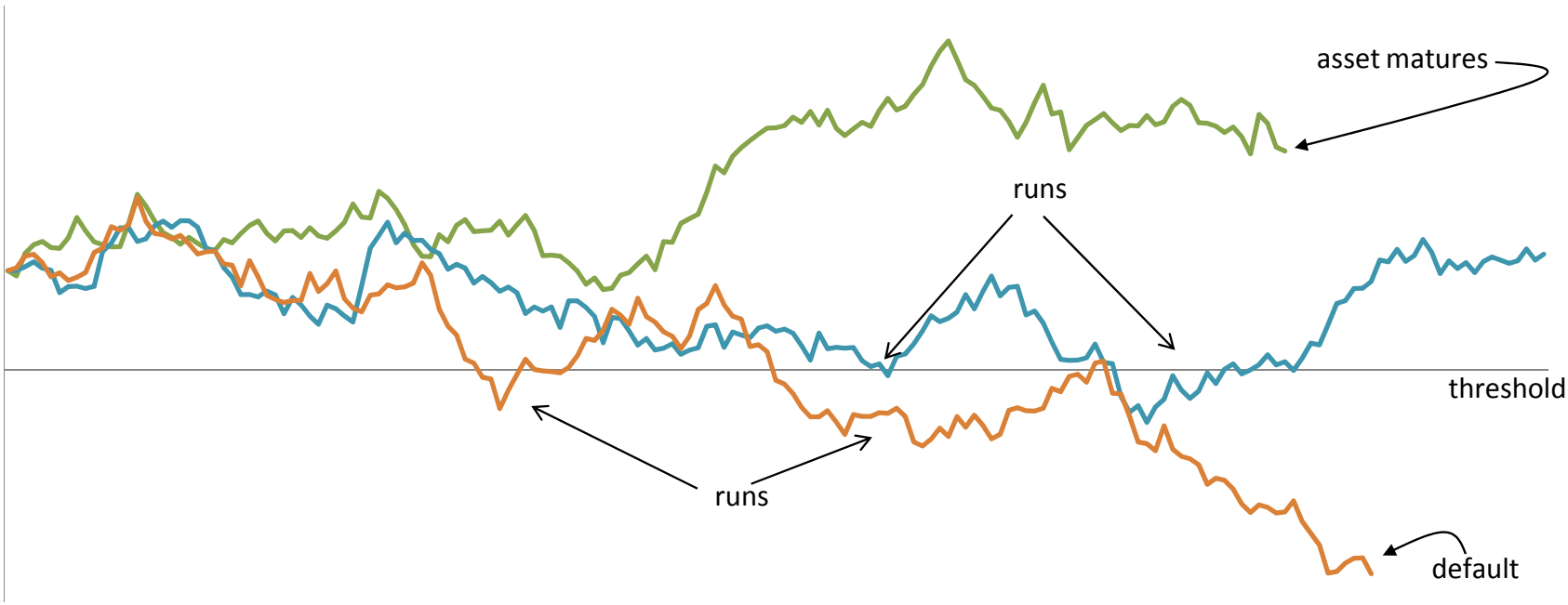
- If there were one investor, roll-over decision would be

$$\begin{aligned} \text{expected payoff from rolling over} &\geq \text{payoff from liquidating now} \\ \text{asset value} &\geq \text{threshold} \end{aligned}$$

- With many investors:
  - Those deciding to roll over now affect all other outstanding creditors
  - By changing default probabilities
  - But they do not care about the other investors.
  - Roll-over decision

$$\text{asset value} \geq \text{higher threshold}$$

Possible paths



The Comparative Statics are Surprising but Intuitive

- Asset volatility increases the probability of a run.
- Asset maturity $\longrightarrow$ ambiguous
  - low volatility: lowers the probability
  - high volatility: raises the probability
- Credit line $\longrightarrow$ ambiguous
  - low volatility: lowers the probability
  - high volatility: raises the probability

The Current Model Has One More Ingredient

- Zero-coupon debt
- Endogeneous yields: set so that the investor is indifferent between rolling and running.
- Exogenous cap on the yields: otherwise there are never runs.
- The threshold is now defined in terms of leverage.
- Runs more likely: bad fundamentals $\longrightarrow$ higher yields $\longrightarrow$ more leverage

You can quibble with assumptions, BUT

- The model is really well suited to the question!
- What is there to understand about runs:
  - Asset duration
  - Asset volatility
  - Asset returns
  - Debt yields
  - Debt maturity
  - Credit guarantees
  - “Recoverable” runs

THE MODEL HAS TO BE WELL IDENTIFIED

- To do SMM
- You need to pick moments that vary when the underlying parameters vary
- And you need to know why
- 4 parameters to estimate and 61 moments

What Identifies What?

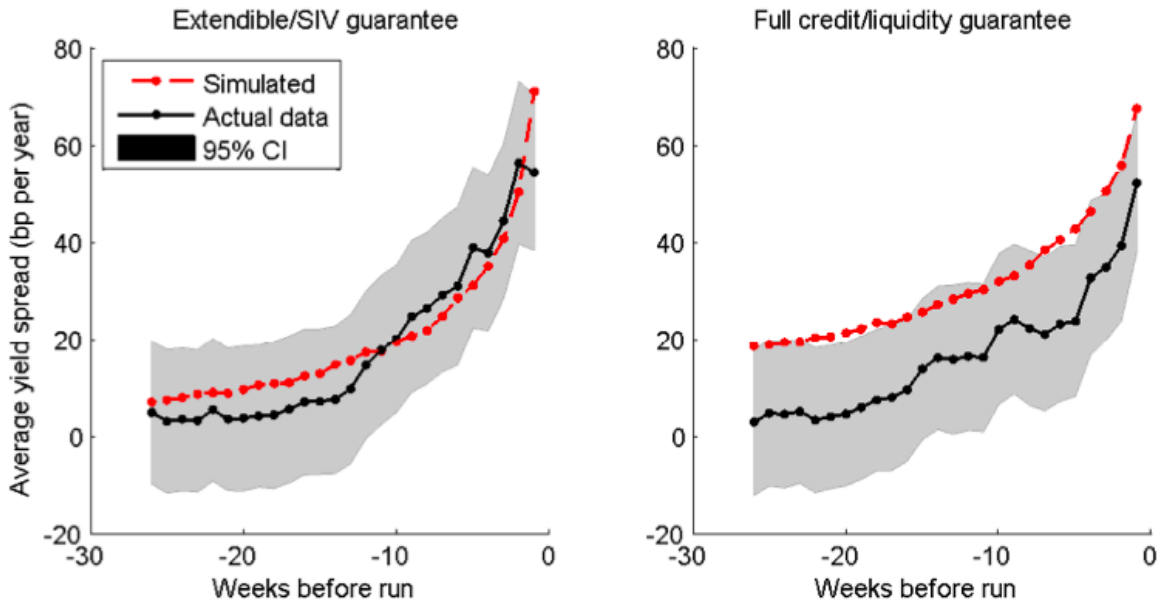
Credit guarantee strength	Fraction of runs followed by a recovery within $\tau = 1, \ldots, 8$ weeks
Cap on yields	Levels of yields in each of 26 weeks prior to a run
Asset volatility	Yield volatility conditional on high/medium/low yield
Asset liquidity	the probability of a run within weeks $1, \ldots, 8$, conditional on high/medium/low yield

More discussion about why these work!

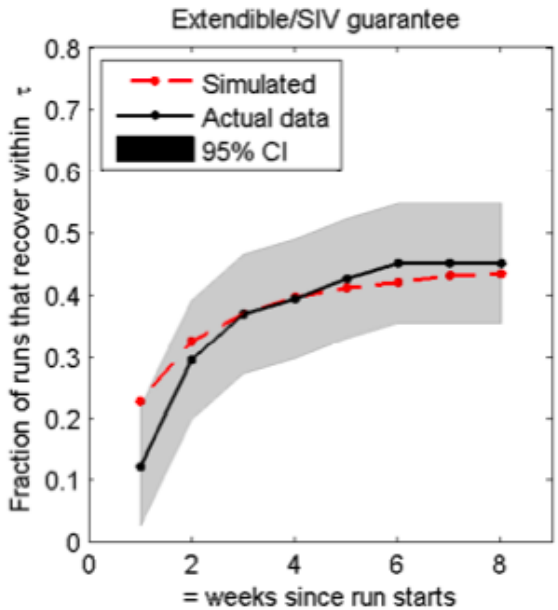
We Do Not Know What Is Rejecting the Model

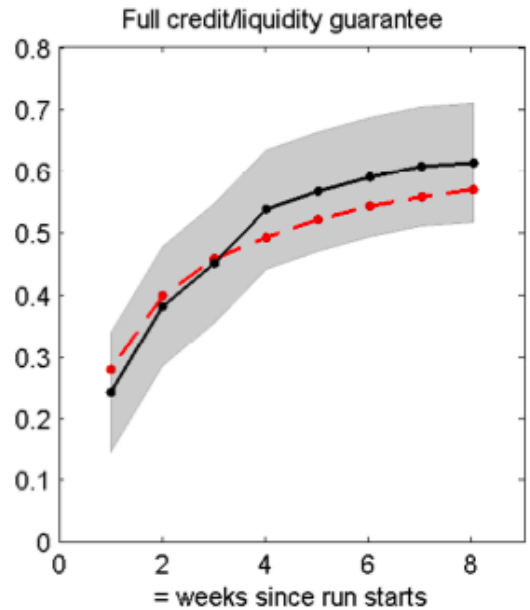
χ^2 J-test	P-value
98,708	0.000
70,209	0.000

We Know Yield Spreads are Fit Well



We Know Run Recovery Times are Fit Well





So the Rest Must not be Fitting Well at All

- This is important.
- We do not know if omitting the rogue moments would change the parameter estimates.
- Let's diagnose the problem!

The Credit Guarantee Strength is the Problem Parameter

- How did I tell?
- Large standard error relative to the rest of the parameters.
- He Xiong (2012) points out that the relation between run probabilities and credit guarantees is **nonmonotonic**

How to Improve the Identification/Intrepretation?

- Make the empirical model more parsimonious!
- Do you **need** yields in all 26 weeks prior to a run? Do comparative statics.
- Use flexible parametric duration models for the probability of exiting a run and the probability entering a run.
- Why not use default hazards to identify the credit strength guarantee.
- Can you estimate asset volatility directly?

Get the Standard Errors Right

- Two-step estimation procedure.
- Step one introduces sampling error into step two.
- Adjust the weight matrix for this.
- Could help with the five-digit J statistic.

The Counterfactuals are Really Interesting!

- A 1% change in almost 100% leverage might be a lot of debt.
- Try to understand magnitudes in terms of sizes of actual conduits.
- Actual dollar amounts also matter for policy.

Really Nice Paper

- Interesting topic!
- Relevant model!
- Actual important policy implications!
- No unfixable problems!