

Discussion of Three Papers:

Network Risk and Key Players: A Structural Analysis
of Interbank Liquidity

Contagious Bank Runs and Dealer of Last Resort
and

Reciprocal Lending Relationships in Shadow Banking

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Standard Disclaimer:

The views of this discussion are mine alone, and not necessarily those of the Federal Reserve Bank of Cleveland nor the Board of Governors of the Federal Reserve System

Usually three papers with one discussant have a theme.

- The job of the discussant is then to tie things together into this theme and comment on the papers as a group.
- I must confess that the theme here eludes me.
 - They are very different in terms of topic, in terms of method, and indeed very different in terms of approach.
- The topic is “Liquidity” (actually Networks and Liquidity, but one of the three papers does not involve networks).
 - Liquidity is a very large topic and these papers do not really span it.
- But I will try...

I. Network Risk and Key Players: A Structural Analysis of Interbank Liquidity

by

Julliard, Li, Denbee, and Yuan

This paper matches most closely what I try to do:

- It is a structural model with actual policy interpretations of the parameters
 - Extremely difficult to do with larger networks.
 - There is a reason that many network theories are simulated with a network of 5 nodes or less
 - Network strategy spaces expand explosively (in one simple example with 3 strategies for each node, the number of branches is of the order of 5^{3*N*N})
 - So any network with more than 5 nodes is impossible to analyze by brute force methods.
 - Not just a matter of pruning branches

This paper uses a framework developed by Ballester, et al (2006)

- And developed in many forms and for many situations by Zenou and many combinations of coauthors, although the equilibrium idea dated from the 1990's
- Additional Zenou articles to include in the references: Cohen-Coles, Patacchini, and Zenou (2015) and (2016)
 - some minor irritation “Here is an empirical strategy that could be applied to real data on the financial sector...” of one of these papers (2016) where the authors should have known better.

Not to go into all the detail but to get the essential highlights

- Perhaps by stating the 2006 model by Balester, Calvo-Armengal, and Zenou. Ingredients include:
 - The players are aware of their immediate network connections.
 - The players have a linear quadratic utility.
 - They choose (in this social context) the amount of effort to apply to the relationship.
 - There are strategic complementarities in the outcomes of the agents' effort.
- This gives a unique Nash equilibrium where the effort applied is equal to the *Bonacich* (or Katz-Bonancich) centrality of the agent.

So you can see how this might be applied to the problem of interbank allocation of liquidity.

For example, the cost function of the various links are the linear quadratic in z_{ijt} , the amount of liquidity accessible to bank i from each link, j , in the interbank market:

$$u_i(z_{i,t}, \{z_{j,t} : j \neq i\} | \mathbf{G}_t) = \underbrace{\tilde{\mu}_{i,t}}_{\text{Unit Value}} \underbrace{\left(z_{i,t} + \psi \sum_{j \neq i} g_{ij,t} z_{j,t} \right)}_{\text{Accesible Liquidity}} - \frac{1}{2} \gamma \left(z_{i,t} + \psi \sum_{j \neq i} g_{ij,t} z_{j,t} \right)^2, \quad (2)$$

Is this the best functional form?

To continue the setup

- Whether or not the links are strategic complements or substitutes matters more than it might seem (and the paper devotes a lot of space in its discussion) because unless the links are strategic complement enough, (or perhaps better to say, not too much of strategic substitutes) there is no equilibrium.

Note that this “dynamic game”

- is really dynamic in a very special sense.
- At each point in time the static game is recalculated without regard to the strategies in the next point in time (except that z_{it} is a function of past strategies.)
- This is somewhat of a cheap shot in that dynamic games of networks are really hard.

For me the most impressive part of the paper was ...

- The link of the structural with the SEM estimator.
 - Perhaps it is easiest to see in a Bayesian context, but a standard spatial model has terms that look a lot like the Bonacich centrality formula with a free parameter.
 - This paper formulates the SEM in terms of that free parameter, ϕ , and estimates it.
 - I am glad that someone has done this so elegantly.

The paper actually estimates the model with network data...

- Chaps large payments system.
- Perhaps a bit rosy a description of the usefulness of a Furfine based data algorithm for some of the members here.
 - My experience with the best case scenario of ECB target data is less sanguine, but often it is the best you can do.
- Network effects are important and very large.
 - This is consistent with what I found.

I would have liked to have seen more work done in reporting the results.

In particular, the paper could be sold with more counter-factuals.

II. Contagious Bank Runs and Dealer of Last Resort

by Ma and Li

We move from above to a different assumed information structure...

- Where the previous paper had agents who knew the structure of their links, this paper requires its agents to know very little about their network environment. It uses the symmetry of the banks to allow them to make inferences about the behavior of the others (each of whom differs from the others by a small, unknown ε_i).

- Note: In the spectrum

[pure theory.....pure data work]

where the previous paper did both, this paper is on the far left.

- Where the previous paper had a range of strategic substitutes allowed, this one assumes strategic complementarity among all banks.

Pet irritation number two...

No need to go into great detail of the definition and solution of a global game.

The key to this paper is a fire-sale-like market where the central bank can become a dealer of last resort and shut down the information channel that might cause more wholesalers to remove their funding from the banks in the global game.

General Idea of the Paper

- Banks can lose assets according to a global games equilibrium.
- They then can sell assets which are subject to firesale prices.
- The firesale prices are bought by a third party with deep pockets that can use knowledge about the asset firesales about the banks' state of the world.
- The central bank can be a “dealer of last resort” (DoLR) and prop up the asset prices. By shutting down the information channel of the asset sales they prevent further bank runs.

Some quick comments

- The paper is a very clean and “simple” model in what it abstracts away. It is a simple return to a message in the finance literature that in markets with incomplete contracts, less information can be welfare improving.
- It seems to model the long run asset purchases of both the European and US crisis, and the trade off between DoLR and Lender of Last Resort.

But is this true in the sense of matching the policy debates?

Table 1: Comparison between DoLR policies and classic LoLR policies

	Lender of Last Resort (LoLR)	Dealer of Last Resort (DoLR)
Direct target	Individual financial institutions	(Strategic) bank assets
Policy channels	Funding liquidity	Market liquidity
Eligible collateral	'Good' collateral	A wide range of collateral
Duration	Term of loan typically overnight, up to a few weeks	Up to years, indefinite in the case of asset purchase
Information required	Info on individual FIs' solvency	Valuation of securities to purchase
Timing	Ex-ante/ex-post intervention	Ex-ante intervention
Policy objective	Avoiding inefficient liquidation of individual FIs	Preventing systemic meltdowns

- Some caveats about my criticisms—this type of theory is subject to an important aesthetic of which I am less than educated in. The aesthetic has been developed for good reasons over a long time, and these comments may represent my tone deafness toward that aesthetic.
- But some aspects of the model seem to abstract away some essential parts of the DoLR debate.

In some cases it helps the message:

- For example, firesales are often described as welfare destructive. The low prices of the quick sale induce an unpriced negative externality and misallocation of resources. DoLR can prevent some of this.
- However...

In some cases not...

- When I think of the tradeoffs with respect to DoLR, it is not clear to me that the Central Bank can price the asset better than the run induced sales. Often these are politically motivated (no haircut on Italian debt).
- It is not clear that the tradeoff in the pricing of the assets is well represented. Suppose banks hold two assets, one of which is supported and one not. (I think that this is actually more likely.) Won't the DoLR induce a welfare loss through this mispricing.
- Won't the DoLR pricing of only one assets cause a misallocation as the bank chooses its portfolio in period -1 of the model?
 - This is related to the “Doom Loop” that is in the thoughts of European bank regulators.

III. Reciprocal Lending Relationships in Shadow Banking

by Li

A very reduced form model

- This is classical of a lot of the empirical banking literature currently. The literature is often of the form:
- We have found a unique and unexplored data set in banking. (Minor irritation number 3.)
- This unique data set allows us to answer a question in the theory literature through simple regressions.
 - $\beta > 0$!!!!!
 - the right hand side might be exogenous. Here are some possible instruments in a robustness section.
 - $\beta > 0$!!!!!

- This is not entirely fair to this paper. However, with network data, often the reduced form regression is about “relationships.” This model is about reciprocal relationships.
- Note: In the spectrum
[pure theory.....pure data work]
this paper is nearly on the right frontier.

First of all, let's look at the novel data set

- Some have very much looked at the data before, but perhaps in a different way.
- Here at the OFR they showed evidence of window dressing in this very novel data set.
 - So one should acknowledge some of the limitations found in previous work.
 - It is a bipartite network, which has advantages and disadvantages.
- In my own work with these data, I found some large differences between the Fed data set and the one I made through web scraping the actual forms. (The Fed data set is smaller.)
 - Terrible note: Since 2017, web scraping the public forms is no longer available as an action.

And to confess...

- I have done this as well.
- So the literature looks at multiple relationship ties within a network:
 - Fecht and Brauning—payments are tied to lending.
 - Craig, Fecht, Tumer-Alken—liquidity relationships affect longer term lending and so forth.
 - And many other papers.

This paper is very much work in progress (and this version shows much more progress than the one I downloaded a month ago.)

It is fairly clean work.

And I am very much appreciative of all the important work that goes into cleaning and making a new data set operational.

Further, I think that the regressions
are often well thought out.

But...

I believe that this is only a first step.

This can be taken so much further

- What is a relationship?
- Specifically, can we derive a model of bargaining structure and incomplete information that gives a precise meaning to the estimated parameters?
- This can be especially important when you describe the effect of the crisis on bundling.
 - Why should we care? How can we convincingly describe the effect of the crisis? What part of the crisis caused the effect? What we have in this paper right now is a diff-in-diff of the crisis on outcomes (ie. bundling.) However, the crisis did so many (endogenous) things to these markets? How to we identify specifically the effect of one aspect of the crisis on bundling in a way that we care about for welfare or for policy.

Summary of Suggestions

- I. Great Job but focus on the counter-factuals and make them sing.
- II. Great Job but make sure your model lines up with the policy debate.
- III. Great Job but do not stop here. Give us an ability to interpret your coefficients in light of a model.

Thank you for letting me study these three papers. They certainly were worth my time in reading them and I learned a lot.