Discussion of “Liquidity Requirements and the Interbank Loan Market: An Experimental Study”

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ROADMAP FOR THE NEXT 10-15 MINUTES

1. Contribution of this paper

2. Methodology: experimental eye for the monetary guy
CONTRIBUTION OF THIS PAPER
A REASON FOR LIQUIDITY REGULATION

A bank's liquidity has a private and a social value:

- **Private**: obvious risk-return tradeoff (bankruptcy or profit?).
- **Social**: my excess liquidity can become your lifeline on an interbank market.

**Concern**: if externality not fully internalized, liquidity is undersupplied.

**Cure**: impose minimum liquidity requirement to boost overall liquidity.

Study skillfully conducts an intriguing exploratory analysis of interbank markets.

(no specific H0)
REFERENCE THEORY

A coordination task based on a hybrid version of Gale and Yorulmazer (2013).

There is bankruptcy risk, and two strategies can dissipate it:

- **Self-insurance:** invest little, and hold lots of cash under the mattress.
- **Mutual insurance:** invest lots, hold some cash, and trade it on interbank market.

Assume: rational players, payoff-maximizing, risk-neutral, introspection abilities.

Many equilibria. So: strategic uncertainty & likely inefficiency.

Game finitely repeated but theory is one-shot (why?).
EXPERIMENTAL DESIGN

Framed experiment: 8 subjects (banks) must choose a portfolio.

Portfolio choice is a dynamic stochastic optimization problem:
- Fully anticipate a liquidity decline that will affect half of us.
- Additional liquidity decline possible that will affect two of the remaining four.

Treatments: liquidity requirement (yes/no) $\times$ shocks (one/two)

Trouble ahead: humans do not shine for their backward induction skills.
DATA ANALYSIS: MAIN TAKE-AWAYS

One-shock case – we expect NO insolvent bank

- Banks underinvest (too liquid) but bankruptcies happen (undersupply cash).
- Liquidity requirement drives down investment and bankruptcies—maybe good.

Two-shock case – expect either 0 or some insolvent bank, but hard to tell

- Banks overinvest (too illiquid) and bankruptcies too frequent (undersupply cash).
- Liquidity requirement drives down investment but more insolvencies

Message: Frictions get in the way of socially optimal liquidity (re)allocation.

These same frictions may cause liquidity regulation to backfire.
FRICTIONS: TRIPLE WHAMMY

• Inability to communicate to coordinate strategy (Cooper et al.)
• Dynamic problem solved in isolation w/out market price guidance (Noussair-Lei)
• No dynamic incentives via reputation or relational contracting (Camera-Casari)

Are these relevant characteristics of interbank markets?
Would be interesting to build on this work to explore these aspects.

Indeed: tacit coordination is tricky even in more mundane settings . . .
**SHOULD I STAY OR SHOULD I GO?**

Players’ interest are *perfectly aligned* here . . .

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. . . and here too, but an action is “safe.”

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A coordination institution (public?) seems valuable in case 2, not so in 1.
METHODOLOGY:

EXPERIMENTAL EYE FOR THE MONETARY GUY
WHY IS THIS METHODOLOGY VALUABLE?

No justification really needed here (Vernon Smith and ESI)

A useful, complementary approach to identify or test operating principles:

- *construct* economies with desired features & complexity
- *minimize* confounding factors & spillover effects
- *observe* variables that are unobservable in the field
- *measure* how shocks or policy changes affect endogenous variables
- *perform* counterfactual tests
- *develop* insight when field experience is limited/non-existent

In the next 5 mins. I’d like to give you an example about this last point.
HOW TO DESIGN A CBDC

1. Nowadays outside money has a marginal role

2. But talk of interest-paying CBDC makes for an interesting future
   (back to the future: Tobin’s idea of deposited currency dates back to 1985)

How should a CBDC look like? Theory suggests desirable traits:

- interest-bearing, with rate unconstrained by any effective lower bound.
  (Bordo and Levin 2017)

Let’s bring it to the lab: barren tokens versus tokens w/ penalties or premia.
A LAB SOCIETY THAT NEEDS MONEY TO FUNCTION

Experimental design with 8 players — producers and consumers.

- Game: uncertain number of rounds (16+) with alternating roles.
- Mix participants into producer-consumer pairs in each round.
  ⇒ Planner wants consumers to eat, but producers suffer.
- Consumer has no goods to offer, but may have a token (visible).
  ⇒ Options: exchange a token, rely on implicit contract, or do nothing.

Efficient outcome is an equilibrium: no consumer ever goes hungry.
Producer light, consumer dark. Points below figurines are representative for utility.
EXPERIMENT 1: WILL A MONETARY SYSTEM DEVELOP?

SUPPLY INITIAL CONSUMERS WITH ONE FIAT TOKEN
EFFICIENCY IMPROVES WITH EXPERIENCE
A MONETARY SYSTEM DEVELOPS OVER TIME

Supergame (Baseline)

- Offers token
- Demands token (when trade is possible)
BELIEFS ABOUT FUTURE CIRCULATION/ACCEPTABILITY MATTER!
LET'S IMPROVE TOKENS:

HOLDING A TOKEN HAS A SMALL BENEFIT
1 PT. BENEFIT (IN MONETARY EQ’M TOKENS SHOULD GAIN VALUE)

Supergame (1-token treatments)

Fiat token
1 PT. BENEFIT (IN MONETARY EQ’M TOKENS SHOULD GAIN VALUE)
Supergame (1-token treatments)

Fiat token

- $d=1$
- $d=2$

Efficiency

2 PT. BENEFIT
WHAT HAPPENED? HERE ARE BARREN TOKENS
WITH A BENEFIT: DECLINE IN LIQUIDITY PROVISION

![Graph showing relative frequency of treatments (trade is possible data)]
IMPOSING A 1 PT. PENALTY? NOT A SOLUTION

![Graph showing efficiency across different treatments in a supergame setting. The x-axis represents the supergame (1-token treatments), and the y-axis represents efficiency. Different colored markers indicate various token treatments (d=1, d=2, d=-1).]
WITH PENALTIES, ACCEPTABILITY DECLINES
MY BAD: A CBDC WILL BE COMPLEMENTARY

INTRODUCE IT ALONGSIDE BARREN TOKENS
CONTROL: DOUBLE SUPPLY OF FIAT (LESS ILLIQUIDITY)

Efficiency

Supergame (1– and 2–token treatments)

1 fiat 2 fiat
TREATMENT: FIAT + CBDC IN EQUAL SUPPLY

Efficiency

1 fiat  2 fiat  Fiat + d=2

Supergame (1− and 2−token treatments)
OK THEN: CBDC WILL SUBSTITUTE FOR FIAT

INTRODUCE IT AFTER LEARN TO USE FIAT
TREATMENT: CBDC REPLACES FIAT IN GAME 3

Supergame
Fiat Fiat replaced in game 3 with $E[d]=1$
TREATMENT: CBDC REPLACES FIAT IN GAME 3

- **Fiat**
- **Fiat replaced in game 3 with E[d]=1**

![Graph](Image)
WHAT HAVE WE LEARNED?
LESSON 1

Money is a social convention, which emerges endogenously based on beliefs.

Self-enforcing: instrument traded now if anticipate large-scale circulation tomorrow.

Insight: anything that affects these beliefs may disturb system’s performance.
LESSON 2

Short-sighted conduct less likely with “barren” instruments.

A barren token focuses participants on long-term gains from exchange.

**Insight:** hoarding incentives if premia; acceptability frictions if penalties.