Discussion of:

A Unified Framework for CBDC Design:

Remuneration, Collateral Haircuts and Quantity Constraints

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SNB-CIF Conference on Cryptoassets and Financial Innovation
May 20, 2021

Setup

- A model of money and banking …
  - entrepreneurs need capital to produce output
  - must pay capital suppliers up front
  - borrow from bank, use deposit to pay suppliers
    - supplier holds the deposit until the next period
  - entrepreneur produces, repays the loan; bank repays deposits
- … times <u>two</u>
  - entrepreneurs need two types of capital
    - some suppliers want payment in bank deposits
    - but other want payment in CBDC
  - entrepreneurs must borrow both deposits (from bank) and CBDC (from CB)
  - CB policy determines the costs associated with using CBDC

Modeling CBDC

- Paper is part of a growing literature on CBDC
- Objectives are quite fundamental (and important)
  - how does CBDC policy affect bank lending, investment, output, & welfare?
- A model of CBDC must take a stand on two issues

(1) What is CBDC?

- what can it be used for? (What is the "use case"?)

(2) How does CBDC enter the economy?

- what are the operating procedures by which it is created?

- One way to describe how the paper fits into the growing literature …
- … is to look at how it approaches these two issues

(1) What is CBDC?

- In some papers, CBDC is a (near) perfect substitute for an existing payment method
  - just like cash, for example, but interest bearing
  - or just like deposits, but issued by CB
    - or perhaps a perfect substitute for both in transactions
- Here: some agents only accept CBDC in payment
  - and these agents produce an essential input of production
- CBDC is technologically different from existing payment methods
  - that is, it provides something to users (privacy?) that bank deposits do not
- Focus of the paper is not on whether to introduce CBDC
  - by assumption, it will raise welfare here
- But rather on: <u>How</u> should the CB provide CBDC?

(2) How does CBDC enter the economy?

- Models tend to fall into one of two broad categories
- "Open Market Operations" view:
  - CB creates money by purchasing assets, primarily government bonds
  - introducing CBDC ⇒ more purchases of govt bonds by CB
    - Barrdear & Kumhof; Williamson; Keister and Sanches; others
- "Refinancing operations" view:
  - CB creates money by lending to the private sector
  - introducing CBDC ⇒ more CB lending, perhaps directly to non-bank firms
    - Brunnermeier and Niepelt; Niepelt; others; **this paper**
  - This approach brings more policy choices: the terms of CB lending
    - interest rate, collateral rules, quantity limits, counterparties, etc.
- These additional policies are the focus of this paper

Contribution

- Paper studies how the operating procedures for creating CBDC …
  - cost of borrowing; haircut on collateral; borrowing limits
- … affect equilibrium outcomes in a general-equilibrium model
- Some interesting interactions arise
  - CBDC policy affects output in the "CBDC sector" …
  - … which affects the marginal product of capital in the "deposits sector" …
  - … and therefore equilibrium bank lending, interest rates, etc.
- Optimal policy is a form of the Friedman rule
  - making CBDC expensive to use, or placing limits on use, lower welfare
- But moving toward the optimal policy may or may not decrease bank lending and deposits (i.e., "disintermediate" banks)

Four comments

(i) Disintermediation

- Does an attractive CBDC disintermediate banks? It depends …
  - on degree of substitutability between inputs financed by CBDC & deposits
- If these inputs are close substitutes:
  - disintermediation (as in other papers); firms change composition of inputs
- But the inputs can instead be *complements*
  - high use of "CBDC inputs" raises the marginal product of "deposit inputs"
    - similar to results based on market paper (Andolfatto; Chiu et al), but different
- Interesting point; I would like to understand it better
  - how can I think about the complementarity case in practice?
    - in the model, some agents have a strong preference for CBDC
    - and they happen to be the only producers of a key input in production
    - in practice: perhaps CBDC allows new arrangements (smart contracts?)

(ii) Tiering

- Here: central banks lend directly to private firms
  - some policy makers might not be comfortable with this approach
- Alternatively, could use a tiered system *with CBDC*
  - CB creates CBDC by lending to banks
  - banks lend to firms in either deposits or in CBDC

Q: Would equilibrium outcomes be different under a tiered system?

  - if the banking system were fully competitive, perhaps not
  - but with the bargaining approach used here, it seems they might

- Might be interesting to study:
  - how CBDC policy is transmitted through the banking system to firms
  - when the central bank is only willing to deal directly with banks

(iii) Policy tools

- Some of the policy tools studied here are not useful in the model
  - no benefit in this setting to putting quantity limits on CBDC loans
  - nor to setting larger haircuts
- Yet these seem like natural tools for policy makers to consider
  - and decisions that will need to be made if the CB creates CBDC by lending

Q: Are there (tractable) changes that would give these tools a benefit?

  - collateral could be risky, for example
  - or entrepreneurs might have private information about their productivity
- Such features would complicate the model, of course
  - … but could offer important new policy insights
  - existing papers on haircut policy might help (Chapman et al.; others)

(iv) Alternative take on the model

- Setup here could be interpreted as a model of cash and deposits
  - production requires a combination of cash inputs and deposit inputs
  - interest rate on cash is zero
  - think of lending rate on cash as being set by monetary policy concerns
  - perhaps could infer substitutability parameter ρ by looking at ratio of cash to deposits in the data
- Now, introduce CBDC into that environment
  - replaces cash, and competes with deposits on the margin (as in paper)
  - CB gains new policy tools: interest rate, haircut, quantity limit
  - CBDC may also increase ρ (better substitute for deposits than cash)
- Might this alternative approach be worth thinking about?
  - the model seems easier to interpret (to me, at least)