Discussion of:

A Macroeconomic Model of Central Bank Digital Currency

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Overview

- Optimal CBDC policy: an interesting and active policy question
- Paper develops a rich, quantitative model
  - delivers a clear policy prescription
  - nice contribution to a growing literature

My discussion:

- Think through a simpler model
  - illustrate: effect of CBDC here is different than the "standard" view
  - want to understand/evaluate the key mechanism
- Offer some comments and questions

A benchmark model

Consider a standard, non-stochastic growth model with:

- No nominal rigidities (real model)
- Competitive firms (capital producers and final goods producers)
- Households: save in bank deposits
  - have bank deposits in the utility function
- Banks: take deposits and lend to capital producers
  - have monopoly power in the deposit market
  - can also hold central bank reserves (positive or negative amounts)
- Central bank: sets the real interest rate on reserves $(1+r)$
  - budget balanced with lump-sum taxes/transfers

Focus on steady state

Bank's problem

market power

$$\max \ \left(1+r^{\ell}\right)L + (1+r)H \ - \left(1+r^{d}(D)\right)D$$

$$\text{s.t.} \qquad L \quad + \quad H \quad = \quad D \quad + \quad F$$

loans reserves deposits equity

note: $H \gtreqless 0$

FOC:

$$\left(1+r^{\ell}\right) = (1+r) \qquad \Rightarrow \qquad f'(k_{t+1}) = (1+r)$$

policy rate pins down investment, capital, output

$$\left(1+r^{d}\right) = \frac{\varepsilon}{\varepsilon+1}(1+r)$$

deposit rate is a mark-down from policy rate

- Key point: deposit-taking and lending decisions are decoupled
  - changes in demand for deposits have no effect on lending
  - reserve holdings adjust so balance sheet identity holds

Adding CBDC

- Now suppose households can also hold CBDC
  - a substitute (perfect or imperfect) for deposits in utility terms
  - real return is set by the central bank (like reserves, but for households)

Q: What is the optimal policy?

- When the CBDC rate is higher:
  - households hold more CBDC, fewer deposits
    - higher deposit rate ⇒ households are better off
  - fewer deposits ⇒ bank balance sheet shrinks
    - lending (and output) unchanged ⇒ bank just holds fewer reserves
  - bank profits decrease (assume rebated to households)
- Optimal policy: set $1 + r^{cbdc} = 1 + r \left(= \frac{1}{\beta}\right)$ ~ Friedman rule

- Key point: no tradeoff in this simplified model
  - similar in spirit to Andolfatto (2020)
- Introducing CBDC causes the banking sector to shrink …

loans reserves deposits equity

$$L + H = D + F$$

$(-)$ $(-)$

- … but productive lending is unchanged
  - this "disintermediation" has no social cost
  - ⇒ optimal to make CBDC as attractive as possible to households (pay the market interest rate)

However:

- In the policy discussion, disintermediating banks is a prominent concern. Why?

Funding channel

- Most of the discussion: reserves are not fully flexible
  - example: reserve requirements bind, or reserve holdings ≥ 0
  - or reserves are needed for liquidity requirements, resolution plans
- Then:

loans reserves deposits equity

$$\underset{(-)}{L} + H = \underset{(-)}{D} + F$$

  - when households shift out of deposits into CBDC …
  - lending decreases (roughly one-for-one) through a *funding channel*
- Does the optimal policy change? It depends.
  - in the absence of other frictions, the Friedman rule is still optimal
  - with frictions in lending/investment, a tradeoff arises
    - Chiu et al. (2023), Keister and Sanches (2023), Williamson (2022)

Profit channel

- This paper: bank has a target for loans/equity $H \gtreqless 0$
  - deviating from target is costly; like a (risk-weighted) capital requirement

$$\max \ \left(1+r^{\ell}\right)L + (1+r)H \ - \left(1+r^{d}(D)\right)D \ - \Psi\left(\frac{L}{F}\right)F$$

$$\text{s.t.} \quad L \ + \ H \ = \ D \ + \ F$$

- Extreme case: $\frac{L}{F}$ is fixed $(\equiv \rho)$

same as before

FOC: $L = \rho F$ $\qquad \left(1+r^{d}\right) = \frac{\varepsilon}{\varepsilon+1}(1+r)$

- Deposit-taking and lending decisions are still decoupled
  - reserve holdings again adjust so balance sheet identity holds
- What determines bank equity F?
  - assume: constant fraction of profits are retained each period

- When CBDC is introduced, everything is as before …
  - households hold more CBDC, fewer deposits
    - interest rate on deposits increases
  - banks hold fewer reserves, profits decrease
- … but now future bank equity is smaller ⇒ less future lending

Key point: CBDC decreases lending and investment …

- not through a *funding channel* (fewer deposits ⇒ fewer loans)
- but through a *profit channel* (smaller profits ⇒ fewer future loans)

  q: has this channel appeared elsewhere in the literature?

Takeaways

- There has been much work/discussion of the funding channel
  - one view: banks can easily replace lost deposits (Whited et al., 2023)
- Here: even in a setting where the funding channel is absent (by design) …
- … CBDC may still have a significant effect on bank lending
  - need to avoid making CBDC too attractive
- Optimal policy is similar to models based on the funding channel
  - here: CBDC should pay interest; rate = policy rate – 100bp
- I want to think a bit more about this profit channel …

Comments and questions

1. Dividend policy
2. Central bank lending
3. Leverage vs. capital requirements

1. Dividend policy

- Paper assumes: $\text{dividend}_t = (1 - \omega)\,\text{profit}_t$
- In principle, ω might respond to changes in the return on equity

Q: How does CBDC affect the marginal return on bank equity?

- when profits and equity ↓ , the marginal return on lending should ↑

  ⇒ incentive to retain more earnings (?)

- Sounds odd: banks are less profitable, but the RoE increases?
- Recall: deposit-taking and lending decisions are decoupled
  - Deposit-taking is less profitable, but
  - … an increase in equity would primarily fund more lending

loans		reserves		deposits		equity
L	+	H	=	D	+	F
(+)						(+)

In other words:

- Would a more endogenous dividend policy mitigate the profit channel?
  - and push the optimal CBDC interest rate higher?
    - that is, closer to my benchmark model
- More generally, I worry about saying:
  - "don't make CBDC too attractive; we need to protect bank profits"
- Perhaps it is true, given various frictions, …
- … but I would want to think more about incentives related to bank equity when the environment changes

2. Central bank lending

- One proposal to mitigate funding disintermediation:
  - central bank lends to banks; replaces the lost deposits

Brunnermeier and Niepelt (2019)

- Such lending is allowed in the model here … ($H < 0$)

  ⇒ no funding disintermediation for this reason

- … but at the policy rate $(1 + r)$
- CB could lend at a *lower* rate to boost bank profits
  - choose loan size/rate to keep profits unchanged → lending unchanged
- Such lending might raise political economy concerns
  - but so should paying a lower interest rate on CBDC than on reserves
  - and the lending policy leads to higher welfare (?)
- Point: there are multiple ways to protect bank profits if needed
  - is a paying a below-market interest rate on CBDC the best?

3. Regulating leverage vs. capital

- Paper assumes bank has a target for $\frac{L}{F}$
  - ~ risk-adjusted capital ratio (with zero risk weight for reserves)
- Suppose instead the target is for leverage: $\frac{L+H}{F}$
- If equity decreases:
  - return on lending is high
  - shedding reserves seems more attractive (?)

loans reserves deposits equity

$$L + H = D + F$$

(−) (−) ?

Two questions:

- Are the results very different under a leverage constraint?
- In practice, which type of constraint is more binding?

Conclusion

- Nice paper on an interesting and very topical issue!