CBDC and Financial Stability

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Motivation and aim of the paper

- Central banks around the globe are exploring the costs and benefits of central bank digital currency (CBDC).

- Policy makers are concerned about its potentially adverse effects on financial stability (as well as credit provision).

- Unlike cash, CBDC can be remunerated, which could render it particularly attractive in crisis times and increase the risk of bank runs.

- The paper develops a ("global games") model of bank runs with a monopoly bank and remunerated CBDC.

Main results (1)

- An increase in CBDC remuneration has two effects in the model:
    1. It makes interim withdrawals more attractive by increasing the payoff from storing funds in CBDC for future consumption. This ***direct effect*** makes the bank more fragile, consistent with the line of argument underlying the ongoing policy debate.
    2. It induces the bank to offer more attractive deposit rates because consumers would otherwise not provide any funding. As a result, consumers have lower incentives to withdraw their funds. This ***indirect effect*** renders the bank more stable.

- The total effect of CBDC remuneration on bank fragility depends on the relative strengths of the two countervailing forces.
    - Under some parameter conditions (i.e., the bank's investment opportunity is sufficiently profitable and the CBDC remuneration is not too large), a U-shaped relationship arises between bank fragility and CBDC remuneration.

- Bank fragility is minimized (and welfare in the economy maximized) for a strictly positive level of CBDC remuneration.
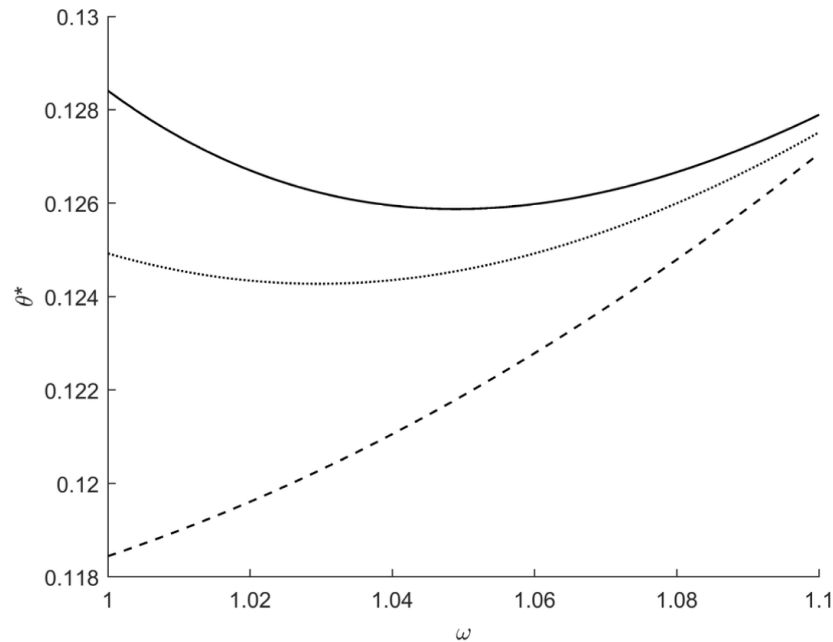
From monopoly to competition

Figure 5: Bank failure threshold θ^*, CBDC remuneration ω, and bargaining power in the deposit market β. The solid line is for monopoly, the dotted line for high market power of the bank, and the dashed line are for low market power of the bank in the deposit market. Parameters: $L = 0.9$, $R = 15$, $\beta \in \{1, 0.998, 0.9\}$.

- A decline in the bank's bargaining power dampens the impact of CBDC remuneration on deposit rates.

Main results (2)

- CBDC design:
  - When a CB faces no restrictions on setting the CBDC rate, *holding limits* do not lead to additional benefits because the CB can achieve the best outcome setting CBDC remuneration.
  - Otherwise, holding limits may help in implementing the optimal outcome.
  - *Contingent remuneration*: lower reduced remuneration during financial turmoil can lower bank fragility.
- With risk taking on asset side and a fixed deposit contract: increasing CBDC remuneration increases monitoring by the banker and may increase stability.

Evaluation

- Very interesting paper addressing a timely and relevant question: the effect of CBDC on financial stability
  - Lagarde said in Sintra that a decision on CBDC would be taken in October (for a experimental phase)
- Tractable theoretical contribution with plausible narrative
- Nice result about the indirect effect of CBDC on the interest rate offered by banks and thus the U-shaped relationship between the CBDC remuneration and financial stability under monopoly
- It would be nice to have a calibration of the model with realistic parameters to see what rates you have to promise to avoid a run depending on CBDC remuneration

The big picture

- What market failure is CBDC addressing? Is it a solution in search of a problem? (House of Lords in 2022)

- CBDC is mostly a defensive response to new private forms of digital payments (triggered by Facebook's libra)

- If the benefit of CBDC is to increase competition in payment systems or avoid monopoly positions, or facilitate cross-border payments: can the goal be achieved with other means (regulation and competition policy) more effectively?

  - In the 2022 Barcelona Banking Initiative report (IESE-CEPR, by Duffie, Foucault, Veldkamp and Vives) we urged caution in its development and recommended to support meanwhile wholesale CBDCs for settlement systems and cross-border payments.

- **What is the market failure that CBDC is addressing in the model in the paper?**

Observations

1. *Benchmark of comparison.* The case with CBDC is compared to the status quo, i.e., the world before CBDC. However, the alternative (as the paper admits) should be the world with *„challenges associated with the proliferation of new forms of private digital money (e.g., stablecoins)".*

2. In light of recent events (Silicon Valley Bank, Credit Suisse), the ease of withdrawing funds has an effect on the nature of bank runs: the role of private signals intermediated by social media and rumors increase. Arguably, CBDC makes withdrawing funds even easier.

Observations

3. The *vanishing noise* assumption might not be a good one (with large noise equilibrium multiplicity is reintroduced but we know how to characterize the equilibrium set and the properties of extremal equilibria, Vives, 2014).

4. Asset side. Results in the asset risk taking model cannot be robust since the deposit contract is actually endogenous: CBDC by inducing an increase in deposit rates will reduce margins, decrease monitoring, and increase risk-taking (e.g., Martinez-Miera and Repullo, 2019; Vives and Ye, 2023).
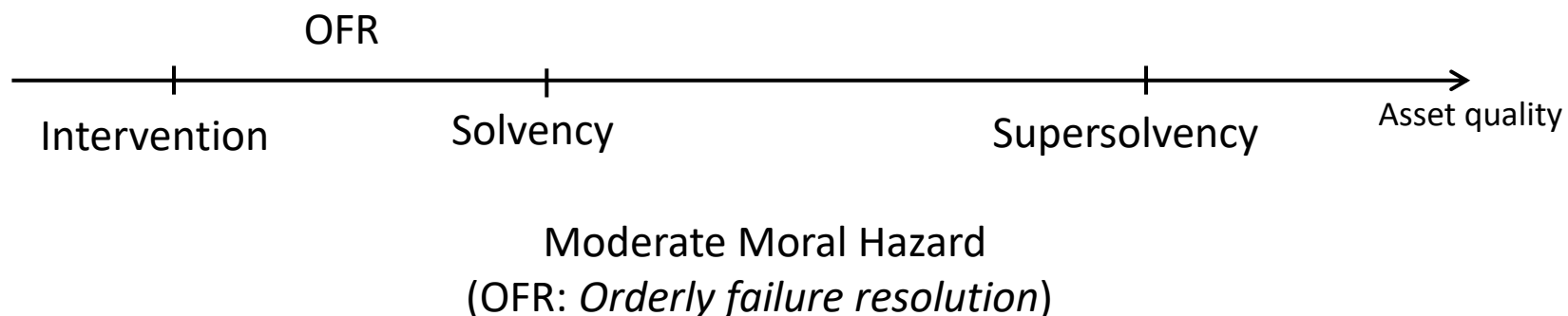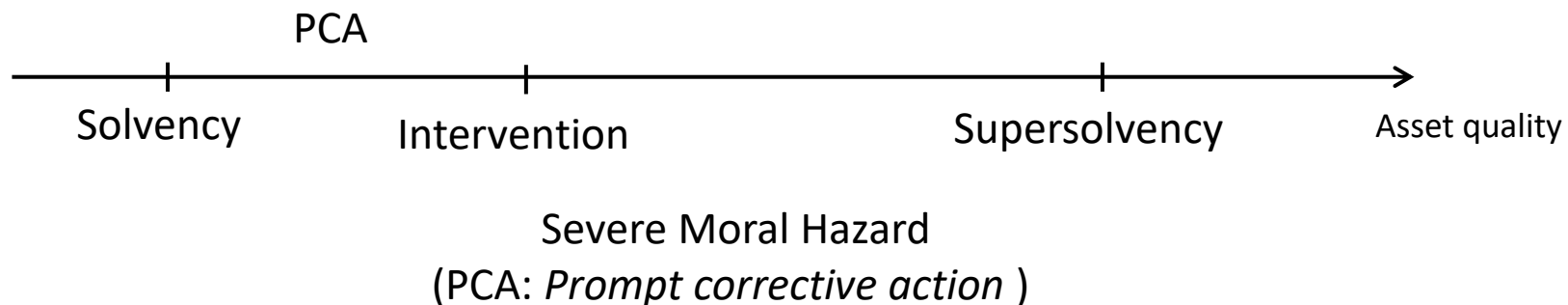
Other considerations and trade-offs (1)

- *Liability structure*. The analysis abstracts from changes in the type of funding banks raise and in the amount of bank deposits, both of which may have implications for financial stability: As retail deposits become more expensive following the introduction of CBDC, banks may have incentives to substitute retail deposits with less stable, but cheaper, sources of funding, like wholesale deposits, thus increasing bank fragility.
  - Furthermore, as pointed out by Liu (2023), the interim liquidation value of the assets of a bank depends on the tension in the wholesale interbank market, and this externality among banks may increase fragility (amplifying shocks).
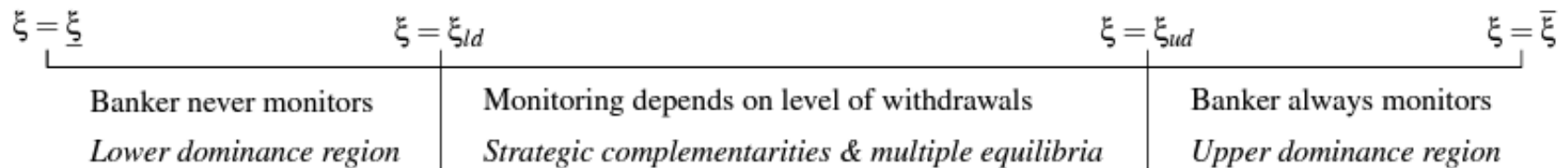
Other considerations and trade-offs (2)

- *General equilibrium effects*. Reduction in bank deposits induced by CBDC can also have negative implications for financial stability if the supply of private credit is reduced, then nominal interest rate rises and banking panics can occur for a larger set of parameters (Kim and Kwon, 2022).

- *Moral hazard in bank management*. CBDC by controlling run probability may discipline bank managers (CBDC could implement incentive-efficient cut-off point of continuation of bank manager, e.g., Rochet and Vives, 2004)

Modified Bagehotian LOLR

PCA

Solvency ⊢————————⊢———————————————⊢—————→ Asset quality
         Intervention   Supersolvency

Severe Moral Hazard
(PCA: *Prompt corrective action*)

OFR

Intervention ⊢————————⊢———————————————⊢—————→ Asset quality
             Solvency   Supersolvency

Moderate Moral Hazard
(OFR: *Orderly failure resolution*)

Technical comment

- The assumption of the upper dominance region $[\bar{\theta}, 1]$ is problematic.
  - Assume that when $\theta > \bar{\theta},$ liquidation value is high, $L = R,$ such that it is a dominant strategy not to withdraw.
  - Assume that $\bar{\theta} \to 1$

- Kayshap et al. (2023) do without it in a similar model introducing monitoring of loans and entrepreneur projects with uncertain interim liquidation value ξ

$\xi = \underline{\xi}$ | $\xi = \xi_{ld}$ | $\xi = \xi_{ud}$ | $\xi = \bar{\xi}$

| Banker never monitors | Monitoring depends on level of withdrawals | Banker always monitors |
| Lower dominance region | Strategic complementarities & multiple equilibria | Upper dominance region |

Further work

- More general balance structure including equity, wholesale deposits, liquid reserves, loans.

- Integrate monetary policy influence in CBDC rate and consider potential tradeoffs with financial stability.

- Examine the potential tradeoff of CBDC in credit provision/financial stability via disintermediation
  - With a competitive deposit market, CBDC raises funding costs and reduces lending (Keister and Sanches, 2022)
    - How changes in ω affect the amount of bank deposits in the model?
  - CBDC may induce banks to perform less maturity transformation and be less exposed to a run (Keister and Monnet, 2022).

- *LOLR and liquidity requirements*. CBDC may enable the policy maker/CB to acquire real-time information on banks' health by monitoring the flow of resources in and out the CBDC
  - However, the introduction of holding limits would limit also the information that can be obtained by the central bank.

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