



# CBDC AND BANKING

A thematic review of the research

WBS Gillmore Defi & Digital Currencies Policy Forum

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The views expressed are my own and do not necessarily  
represent those of the Bank's Governing Council.

# Objective of the Talk

Review the young economic literature on CBDC and banking

1. What can we learn from economic research?
2. In particular, what are the potential impacts of CBDC on banking?
3. And, what does this imply for financial sector policy?

# Defining a CBDC

# Many Motivations for Issuing CBDC

- Domestic payments efficiency
- Cross-border payments efficiency
- Payments safety/robustness
- Financial inclusion
- Monetary policy implementation
- Monetary policy sovereignty
- Data privacy
- Counteracting illicit activities

# Central Bank Digital Currency

- **Retail CBDC**

- A central bank liability issued to the general public for general payments

- **Key economic design options**

- Access technology
- Architecture
- Remuneration

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**user**

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**user**

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**Banks/PSP**



**user**

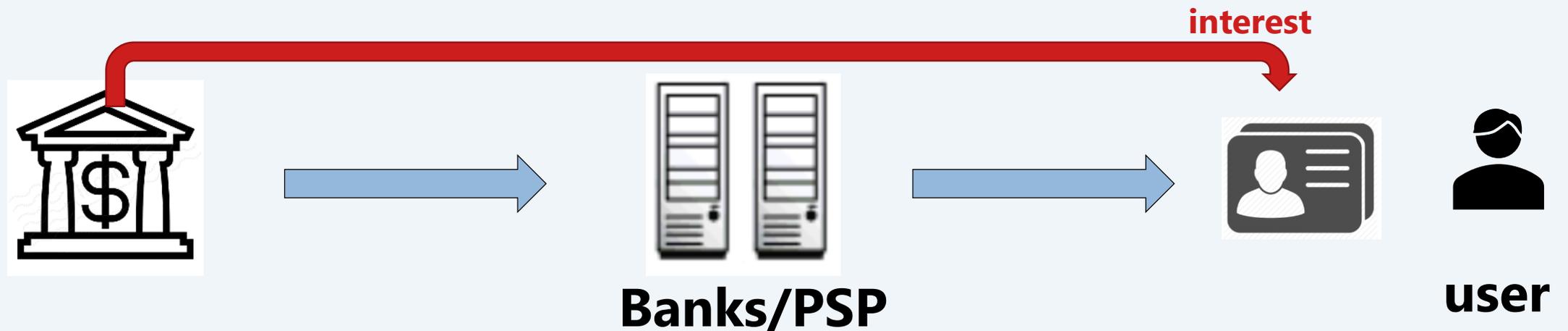
# Central Bank Digital Currency

## •Retail CBDC

- A central bank liability issued to the general public for general payments

## •Key economic design options

- Access technology
- Architecture
- Remuneration: **interest bearing** or not

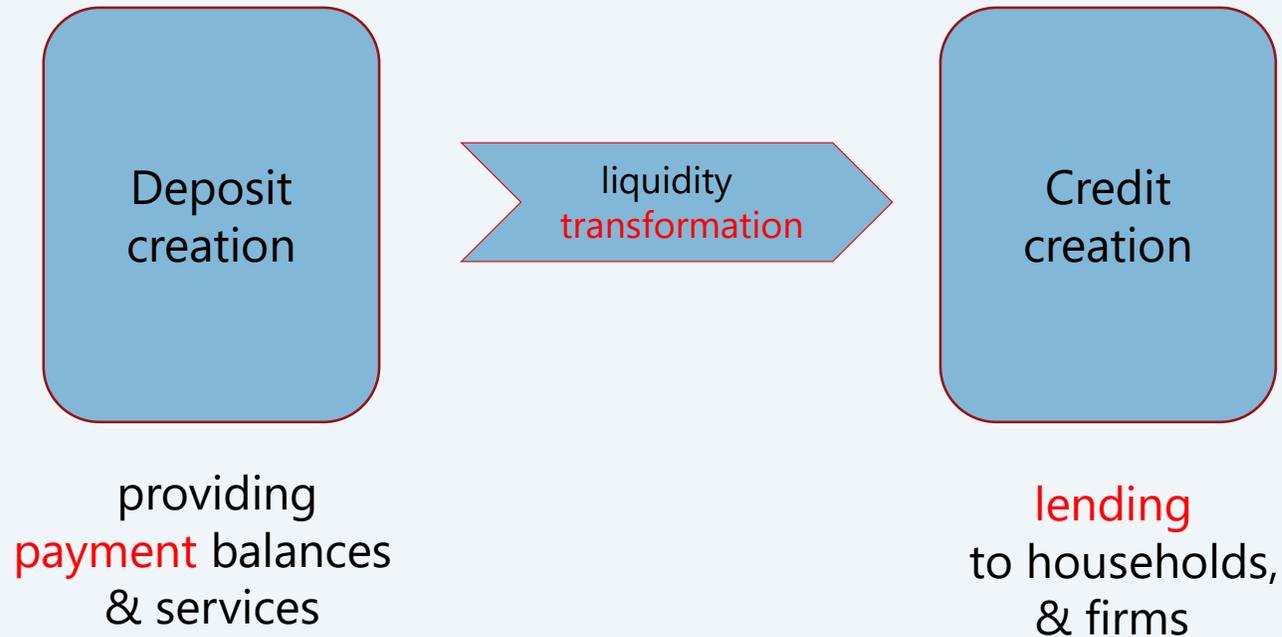


# **CBDC's Potential Effects on Banks**

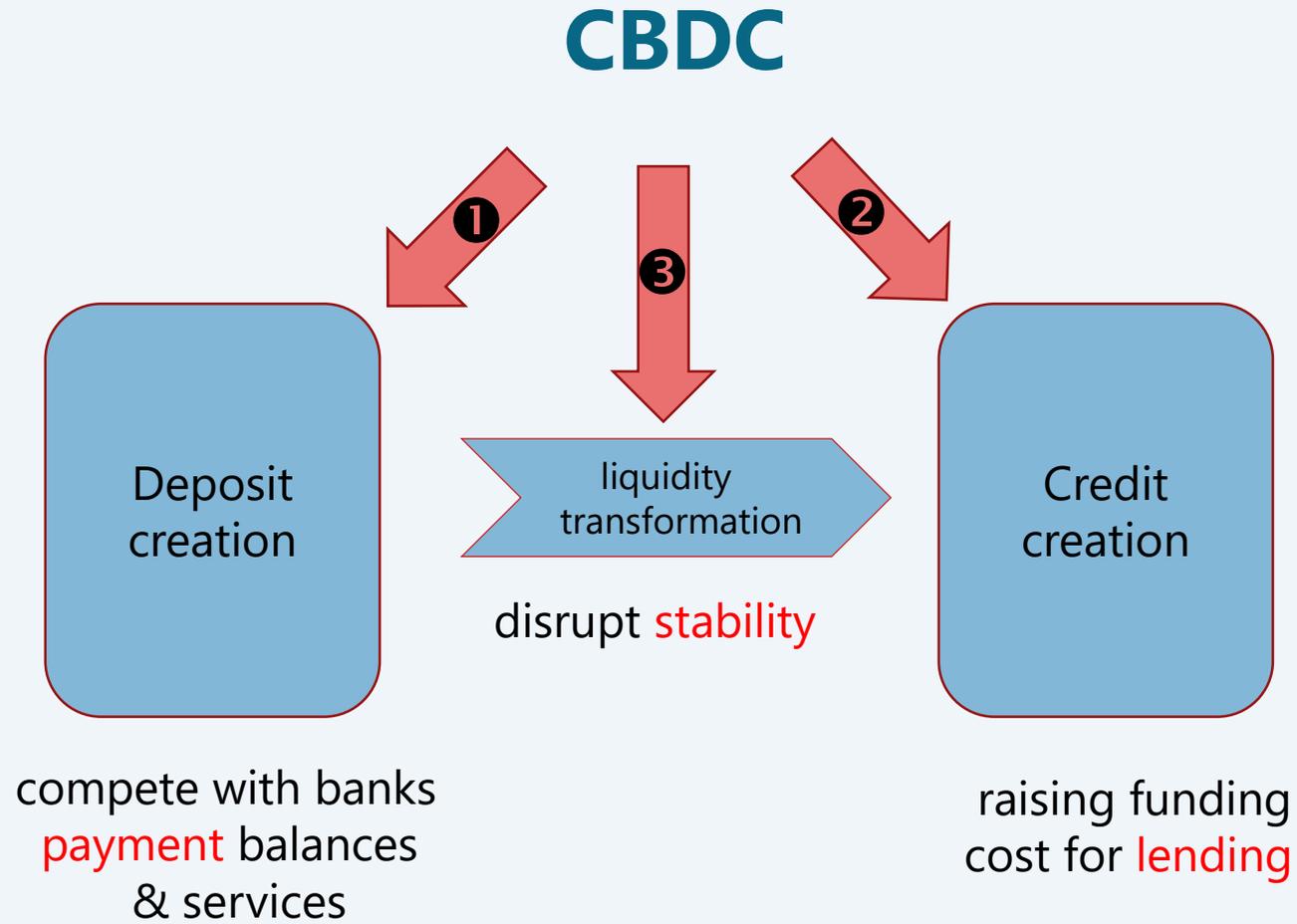
A Conceptual Framework

# What is a Bank?

Banks specialize in creating **short-term, liquid liabilities** to finance **long-term, illiquid** assets.



# How CBDC could affect Banks



# Takeaways from CBDC research

## Payments

- Design matters, with interest rate being a key factor controlling up-take

## Lending

- Disintermediation risk will likely be limited

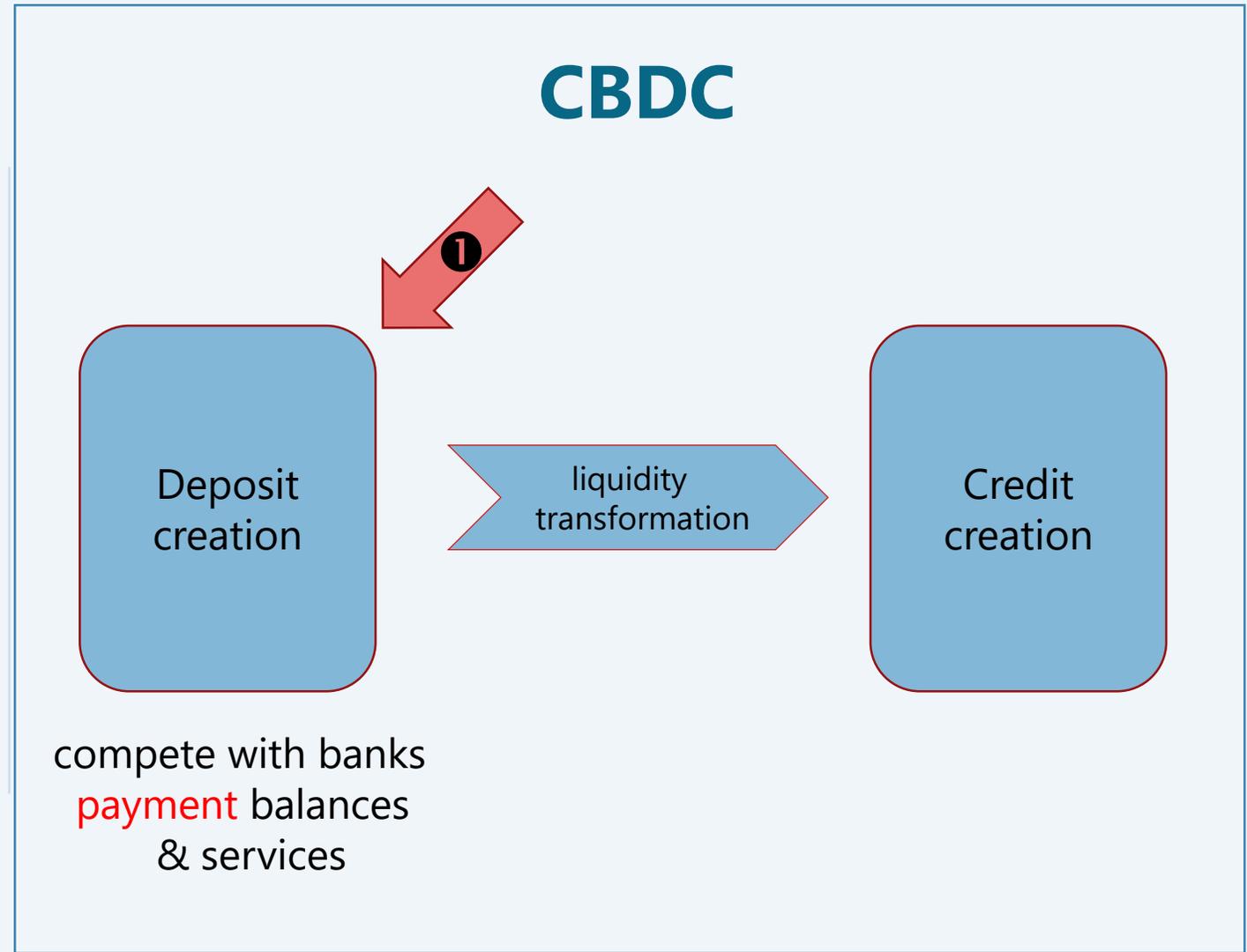
## Stability

- Run risk could go up but likely remain manageable

## More research is needed

- Better data, richer models and more quantitative work

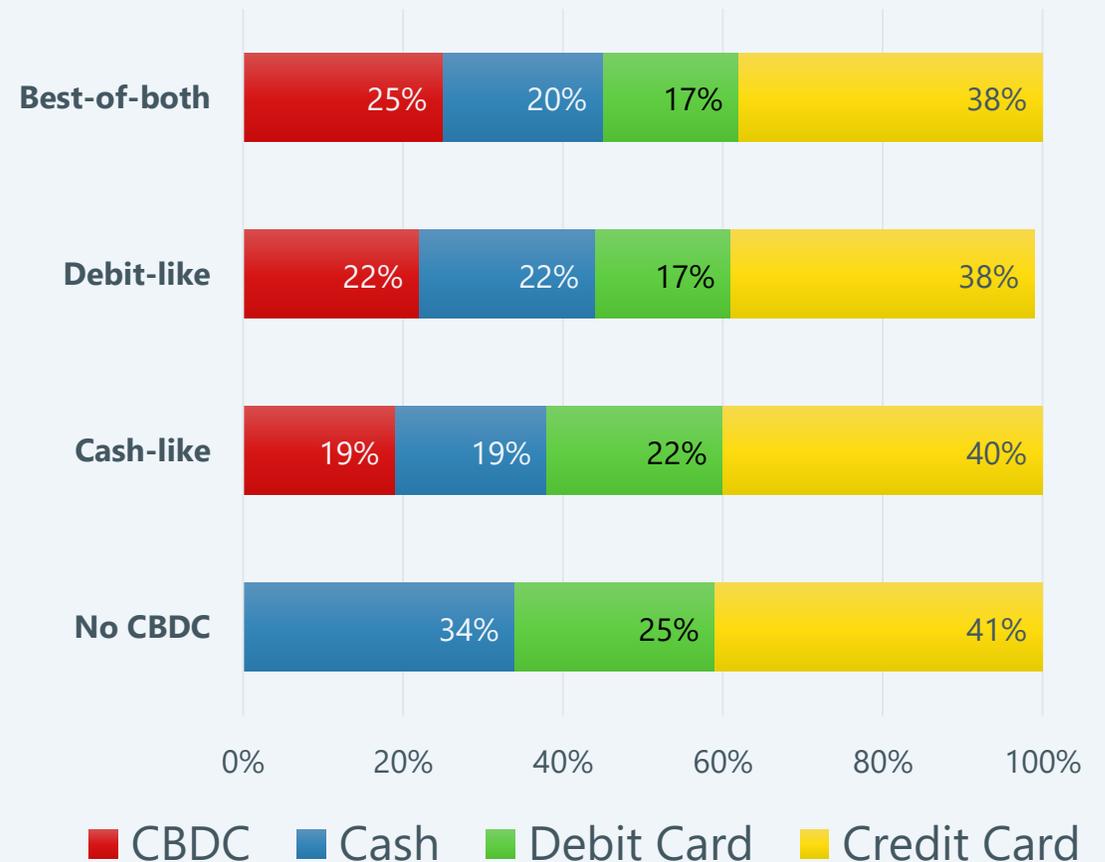
# Payments



# Usage in Payment

- [Huynh et al. \(2020\)](#): Impact of CBDC on Point-of-Sale usage in Canada
- What factors drive payment method usage
  - transaction cost
  - rewards
  - ease-of-use
  - affordability
  - security perceptions

Max Impact on Market Shares



# Payment Balances

- [Li \(2021\)](#): Features driving demand for CBDC balances:
  - rate of return
  - budgeting usefulness (~ 10 bp)
  - anonymity (~ 7 bp)
  - bundling of financial services (~ 4 bp)

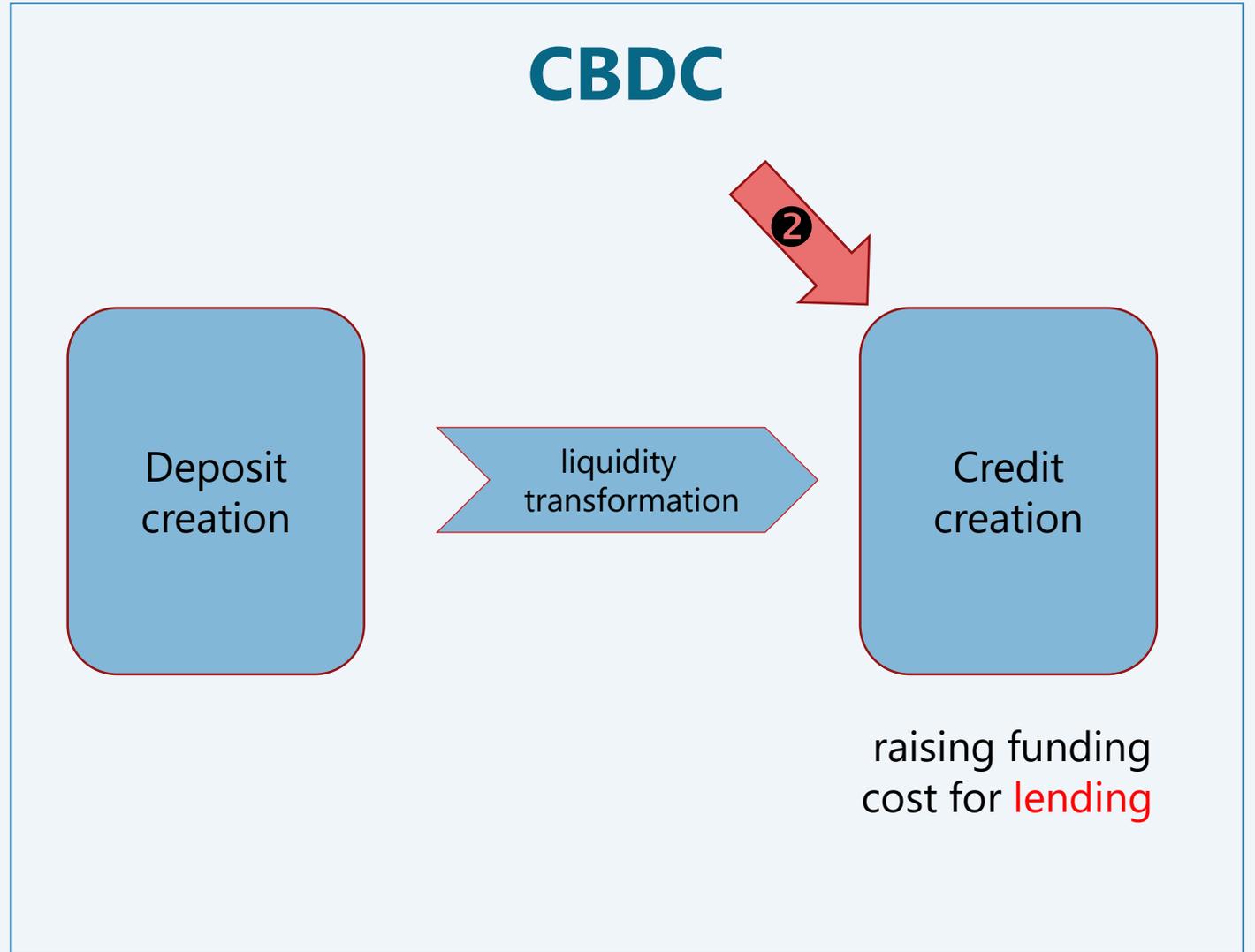
**Interest on CBDC is a key factor**

# Lessons for CBDC Design

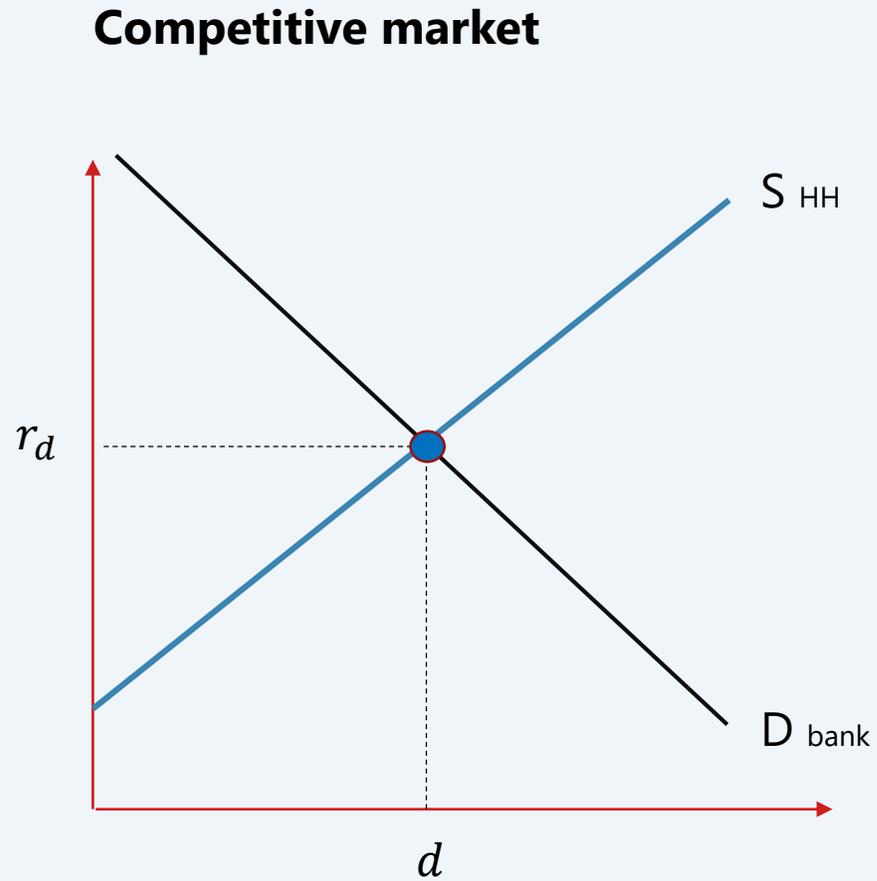
**CBDC up-take will be higher when it is**

- Interest bearing
- User unidentified (higher anonymity)
- Two-tiered and interoperable with FIs (bundling of financial services)

# Lending



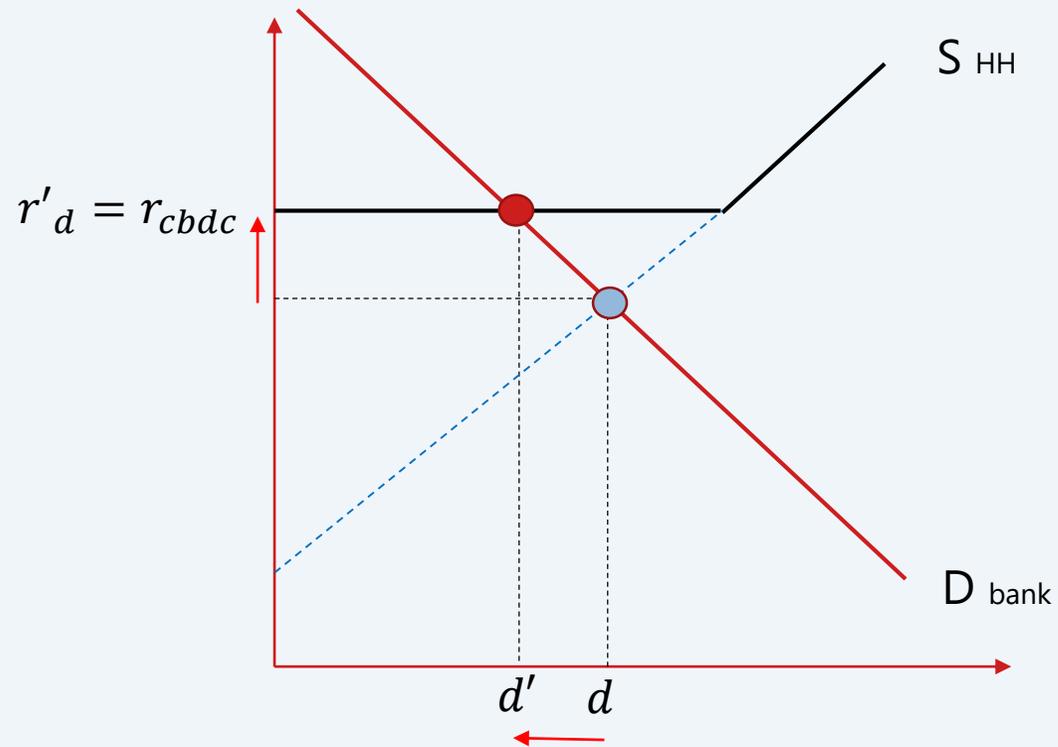
# Disintermediation Concern



Interest rate is determined by the intersection of the supply curve and the demand curve.

# Disintermediation Concern

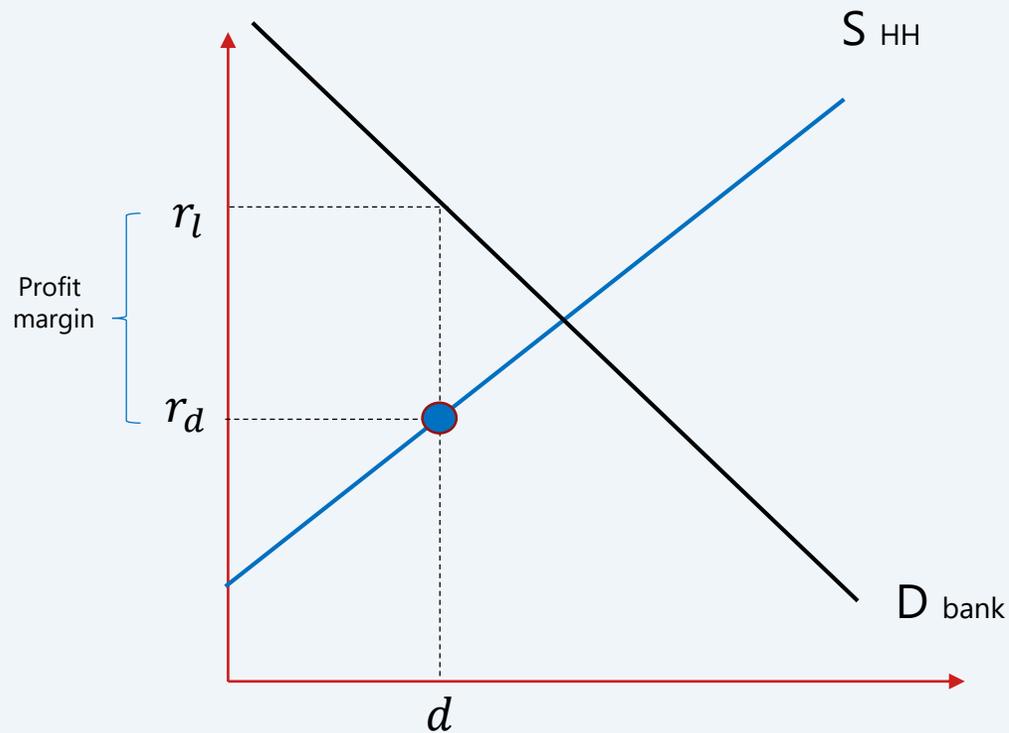
Competitive market **with CBDC**



CBDC raises banks' **funding costs**, reducing deposit and credit creations (Keister and Sanches, 2021)

# But market structure matters ...

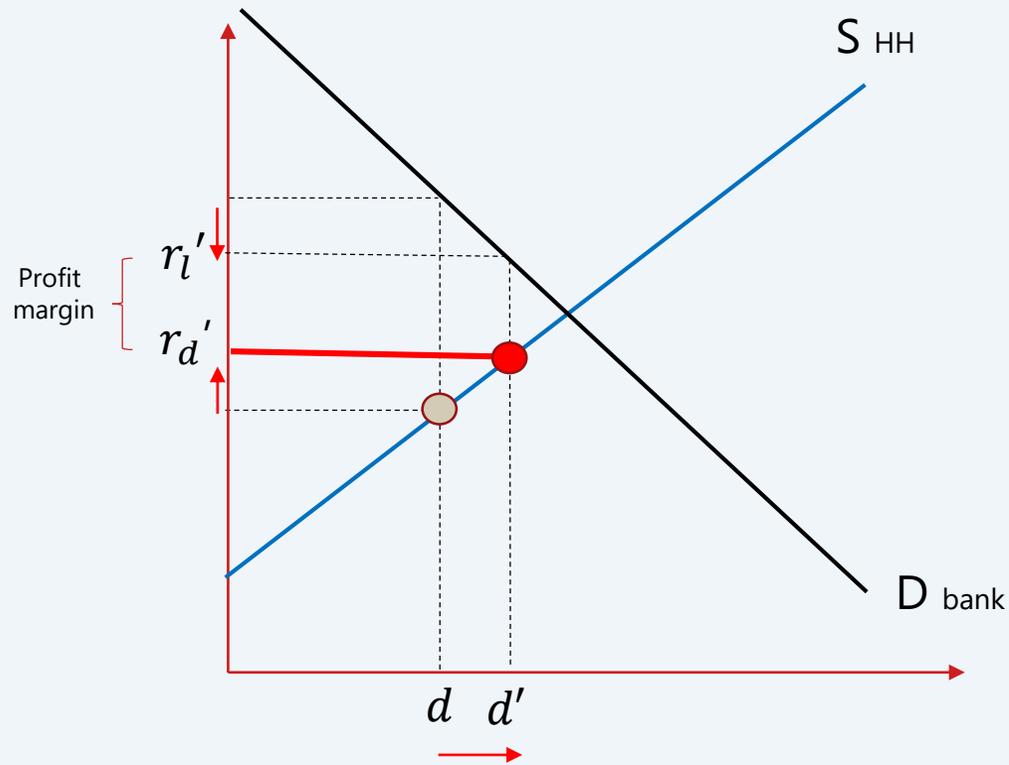
## Monopolistic market



Banks with **market power** offer a deposit interest rate below the competitive level, leading to too little deposits and loans.

# But market structure matters ...

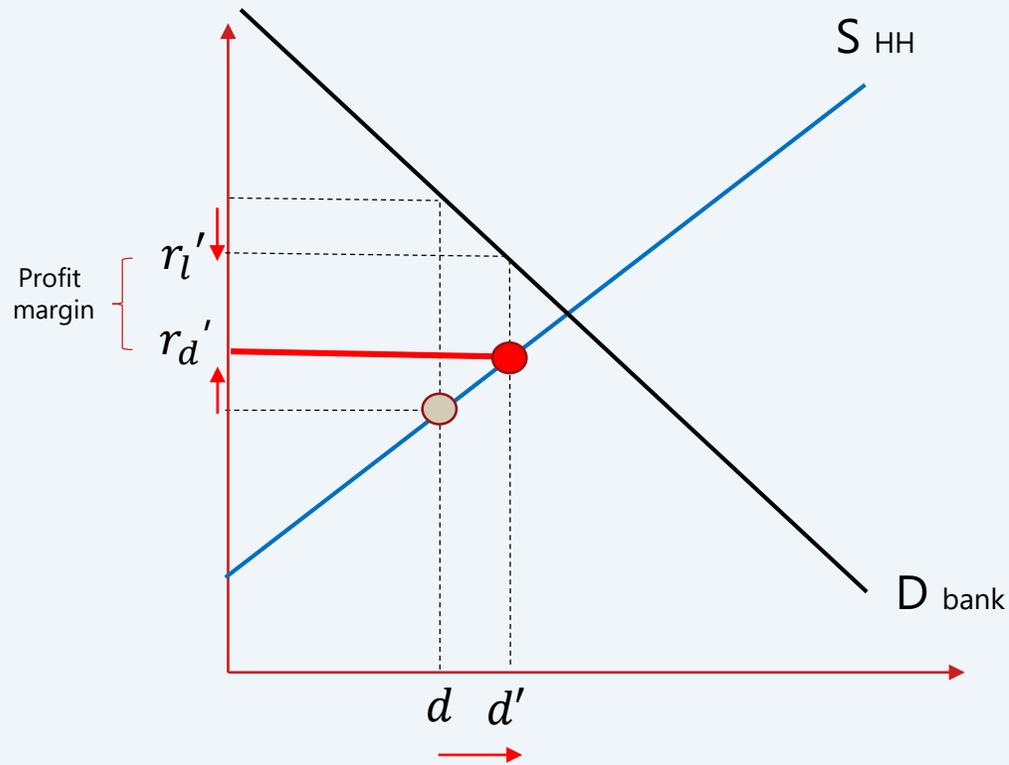
Monopolistic market **with CBDC**



CBDC forces banks to offer better terms and services, inducing **more intermediation** (Andolfatto, 2019; Chiu et al., 2020)

# But market structure matters ...

## Monopolistic market **with CBDC**



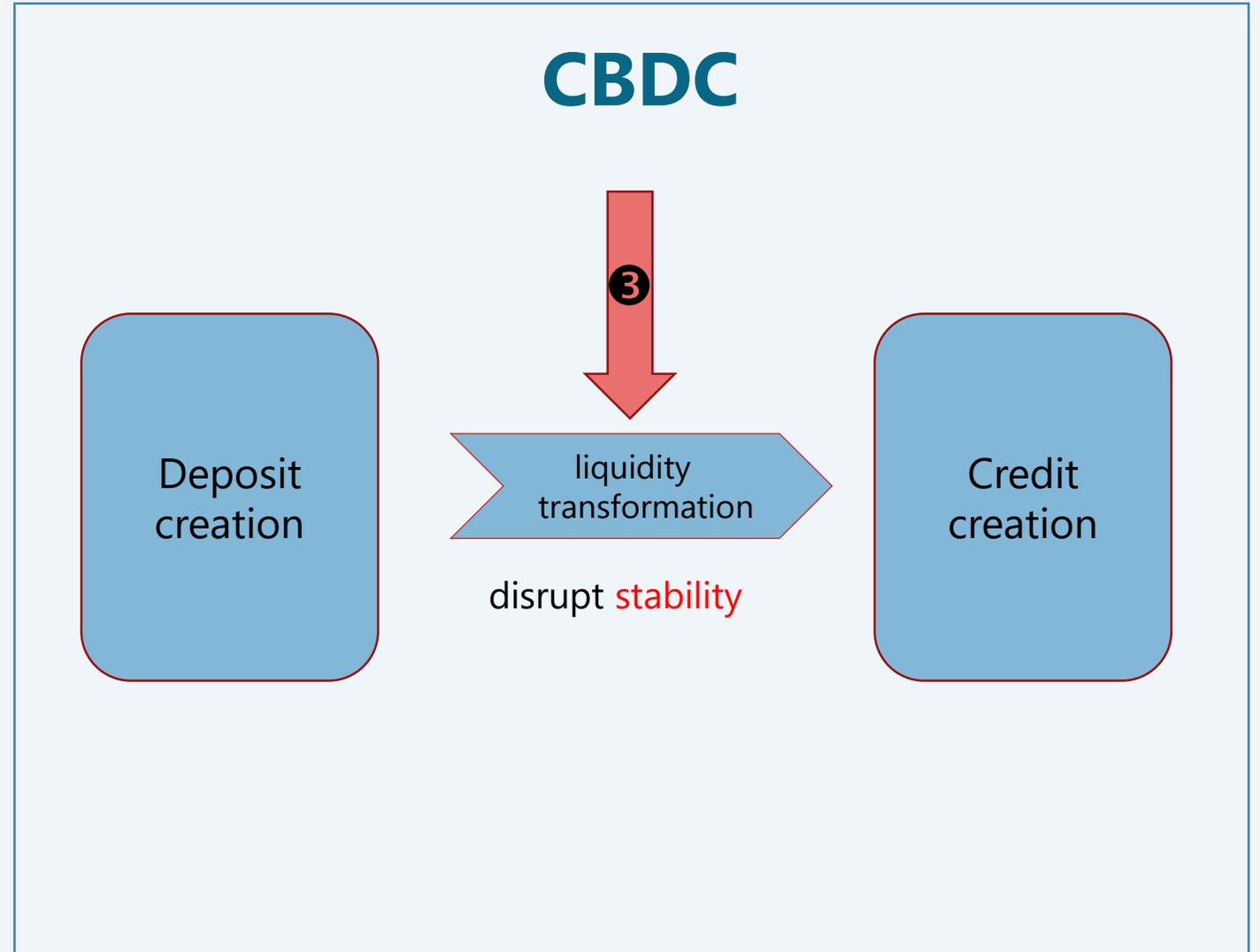
CBDC forces banks to offer better terms and services, inducing **more intermediation** (Andolfatto, 2019; Chiu et al., 2020)

A **non-interest-bearing** CBDC still help limit banks' market power as the use of cash declines

# Summary of Theoretical Literature

- CBDC disintermediates banks (reducing lending) if the **deposit** market is **perfectly competitive**
- CBDC could promote bank intermediation if the **deposit** market is **imperfectly competitive**
- CBDC could be a tool to **promote competition** in banking sector

# Bank Stability



# Runs out of the Banking System

Currently, depositors have an option to run from the banking system to cash

|    |                    | Other Depositors |                         |                        |
|----|--------------------|------------------|-------------------------|------------------------|
|    |                    | No run           | Some run to <b>Cash</b> | All run to <b>Cash</b> |
| Me | No Run             | 10               | 3                       | 0                      |
|    | Run to <b>Cash</b> | 4                | 2                       | 1                      |

**Banks are stable**

# CBDC could increase run risk

Being digital, risk-free and elastically supplied, CBDC can offer a more attractive option (Kumhof and Noone, 2018)

|    |                       | Other Depositors |                            |                           |
|----|-----------------------|------------------|----------------------------|---------------------------|
|    |                       | No run           | Some run to<br><b>CBDC</b> | All run<br>to <b>CBDC</b> |
| Me | No Run                | 10               | 3                          | 0                         |
|    | Run to<br><b>CBDC</b> | 5                | 4                          | 1                         |

**CBDC makes  
banks less stable**



# CBDC could reduce run disruption

The existence of CBDC may **reduce the disruption** to the retail payment system during bank runs (Tobin, 1985; Williamson, 2020).

|    |                       | Other Depositors |                            |                           |
|----|-----------------------|------------------|----------------------------|---------------------------|
|    |                       | No run           | Some run to<br><b>CBDC</b> | All run<br>to <b>CBDC</b> |
| Me | No Run                | 10               | 3                          | 0                         |
|    | Run to<br><b>CBDC</b> | 5                | 4                          | 2                         |

CBDC makes runs less costly

# Potential CBDC Design to Mitigate Run Risk

- Very little formal research studying CBDC **design options**:
  - cap on CBDC withdrawals from banks
  - cap on CBDC transfers/holdings
  - penalty fees/rates
- These options could, to different extents, help **reduce run risks**
- ... but also subject to different **trade-offs**:
  - Crisis time:
    - limit depositors' ability to protect their wealth
    - may induce pre-emptive runs
  - Normal time:
    - discourage adoption/usage of CBDC
    - affect uniformity of money

# CB could help coordinate depositors

If the CB becomes a major depositor, then runs could become less likely due to improved **coordination** (Brunnermeier & Niepelt, 2019).

|    |                | Other Depositors |                     |                    |
|----|----------------|------------------|---------------------|--------------------|
|    |                | No run           | Some run to<br>CBDC | All run<br>to CBDC |
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**CBDC helps coordination**

# Quantitative Analysis

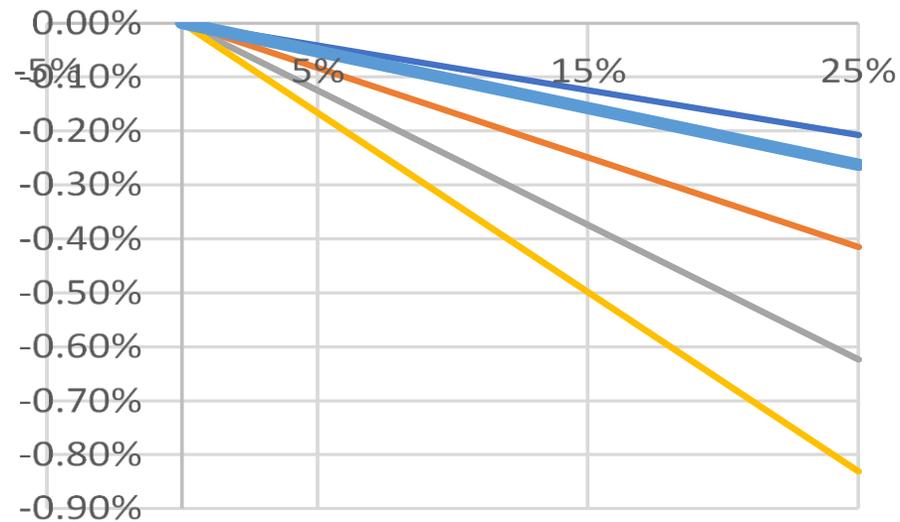
- Following introduction of a CBDC, banks may lose a fraction of deposits.
- Suppose banks seek to keep the regulatory liquidity ratios unchanged by issuing long-term wholesale (costlier but more stable) debt and buying HQLA.
- For a reasonable range of CBDC up-take:
  - what is the change in banks' profitability measures?
  - what is the change in the lending rate to keep profitability measures unchanged?
- Details of analysis can be found in the [BIS Innovation Hub financial stability report](#), Section 3. Can be **replicated for other countries**.

# Quantitative Analysis of Bank Profitability

**Chart 2: Change in banks' RoE resulting from outflow of deposits to CBDC**

**Chart 3: Change in banks' lending rate to maintain profitability measured by net interest income**

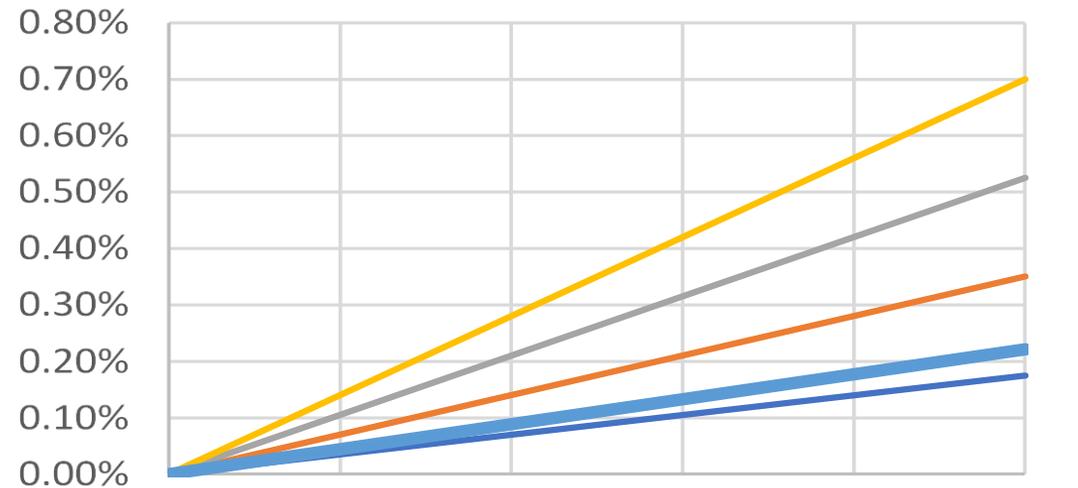
## Change in RoE



Deposit outflow to assets

0.5% 1.0% 1.5%  
2.0% 0.63%

## Change in Lending Rate



0% 5% 10% 15% 20% 25%

Deposit outflow to assets

0.5% 1.0% 1.5%  
2.0% 0.63%

Different colors correspond to different spreads between the wholesale funding rate and deposit rate.

Source: BIS Innovation Hub financial stability report.

# Conclusion

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CBDC need not lead to disintermediation. Even so, welfare may increase.

It can actually increase intermediation when banks have market power or we consider GE forces.

Also, CB lending can help prevent disintermediation.

Preliminary quantitative analysis shows changes in bank profits are likely manageable.

Bank runs might be more likely, but mitigation measures exist. They have to be investigated more though.