Central Bank Digital Currencies and Bank Intermediation with Heterogeneous Bank Deposits

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Motivation

- Central Bank Digital Currency (CBDC) is a digital liability by the central bank held by the general public.

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- Central Bank Digital Currency (CBDC) is a digital liability by the central bank held by the general public.
- Effects of CBDC on bank intermediation.
  - Deposits cheap funding for banks.
  - CBDC could crowd out deposits.
  - Might reduce credit availability or increase credit costs.

Research Questions

Research Question 1

Does introduction of CBDC lead to disintermediation of banks?

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- Build tractable general equilibrium model based on a New Monetarist model in line of Lagos and Wright (2005) and an OLG environment in line of Wallace (1980).

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- CBDC used as payment or also as saving vehicle?

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- CBDC used as payment or also as saving vehicle?
- Substitute for transaction and/or saving deposits?

Research Questions

Research Question 2
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How does introduction of CBDC differ depending on whether it is held only as a payment vehicle or also as a saving vehicle?

- Qualitative results: Solve model analytically.
- Quantitative results: Calibrate model to US data.

Preview of Results

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Does introduction of CBDC lead to disintermediation of banks?

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- If no excess reserves, bank lending will decrease.

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Research Question 2

How does introduction of CBDC differ depending on whether it is held only as a payment vehicle or also as a saving vehicle?

- A preference shift such that 10% of agents switch from transaction deposits to CBDC decreases bank lending by 1.2%
- Effect almost three times stronger if CBDC also crowds out saving deposits: 3.0%.

Literature

CBDC and bank intermediation:

- Chiu et al. (2019), Andolfatto (2018), Keister and Sanches (2022), . . .

New monetarist models and banking:

- Berentsen, Camera and Waller (2007), Altermatt and Wang (2021), . . .

New monetarist models and OLG:

- Altermatt (2019), Zhu (2008), Jacquet and Tan (2011), Waller (2009), Hiraguchi (2017).

Overview

Model

- Entrepreneurs
  - Investment opportunity.
  - Cannot work, no endowment.
- Consumers
  - Work when young, consumer later.
  - Early consumers demand medium of exchange.
  - Late consumers demand saving vehicle.
  - Preference over public vs private money.

Model

- Banks
    - Intermediate between entrepreneurs and consumers.
    - Create loan for entrepreneur and credit account.
    - Entrepreneur use deposits to purchase goods from consumers.
    - Assumption: Perfectly competitive deposit market, imperfectly competitive loan market.

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  - Are subject to minimum reserve requirement on liquid deposits.
  - Profitable to offer two types of deposits: liquid transaction deposits, illiquid saving deposits.
  - Early consumers hold transaction deposits, late consumers hold saving deposits.

Overview

Introducing CBDC

- Introduction of non interest bearing CBDC:
- Preference shift from private to public money.
    - Eg people want to pay digitally with CB money.

Introducing CBDC

Constraint non-binding (voluntary reserves): **No** effect on bank lending.

- Banks hold optimal loan amount.
- Excess reserves adjust if deposits flow out/in.

Constraint binding (Outflow of bank deposits into CBDC):

	d (ext.)	τ (ext.)	i_d	i_τ	d (int.)	τ (int.)	ℓ	e
$\alpha_d \downarrow$	$\downarrow\downarrow$	—	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\downarrow$	$\uparrow\uparrow$
$\alpha \downarrow$	$\downarrow\downarrow$	$\downarrow\downarrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\downarrow$	$\uparrow\uparrow$

α_d: Fraction holding transaction deposits; α: Fraction holding deposits
d: Transaction deposits; τ: Saving deposits; ℓ: Loan amount
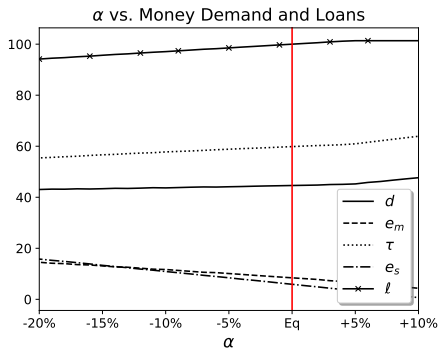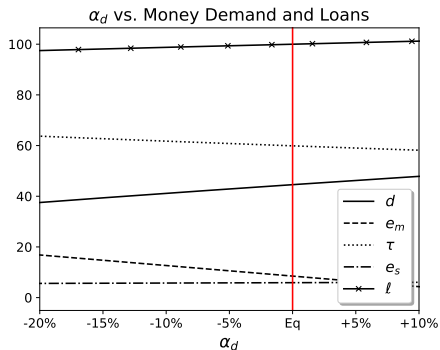
e: Central bank money held by public

Overview

Calibration
Setup

- Calibrate model to US economy from 1987-2006.
- Consider only cash held in the US (Use estimates from Judson (2017))
- Assume that $100 bills are used as savings and all smaller bills used as payment vehicle.
- Data: FDIC call report data and FRED.

Calibration - Assets

Overview

Conclusion

- Build general equilibrium model to analyze effect of CBDC on bank intermediation.
- Differentiate effect whether CBDC used only as payment or also as saving vehicle.

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Results

- No influence of CBDC on bank lending if banks hold voluntary reserves.
- If banks hold no excess reserves:
    - A 10% outflow of agents from transaction deposits to CBDC decreases bank lending by 1.2%
    - Effect almost three times stronger if CBDC also crowds out saving deposits: 3.0%.

Overview

1 Introduction

2 Model

3 Introducing CBDC

4 Calibration Results

5 Conclusion

6 Appendix

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