CBDC Surveys

Digital Assets - Week 5 (Pre-record)

Rhys Bidder
rhys.m.bidder@kcl.ac.uk

KBS, QCGBF

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Introduction

Slow disintermediation

A widely available CBDC would serve as a close – or, in the case of an interest-bearing CBDC, near-perfect – substitute for commercial bank money. This substitution effect could reduce the aggregate amount of deposits in the banking system, which could in turn increase bank funding expenses, and reduce credit availability or raise credit costs for households and businesses.

- The U.S. Dollar in the Age of Digital Transformation, BoG, Jan. 2022

Fast disintermediation

The novelty with CBDCs is that they would provide access to a safe asset that - unlike cash - could potentially be held in large volumes, in the absence of safeguards, and at no cost, accelerating 'digital runs'. Such runs could even be self-fulfilling. . .

- Fabio Panetta, ECB, speech, Apr. 2022

What is success?

As public money, the digital euro will have to be universally accepted and widely accessible. It should be present everywhere. On the other hand, the Eurosystem may not want to evict private money issuers (the banks) or private payment providers. It may not want to gain a monopoly or dominant position in retail payments. The digital euro will thus be placed into a strange and paradoxical position. It should to be present everywhere but important nowhere. **It should be successful but not too successful.**

- Brunnermeier and Landau, European Parliament study, Jan. 2022

Roadmap

- Novel D€ household survey run with Bundesbank
  - Questions related to CBDC and prospective adoption
  - Focus on CBDC holdings in normal times and behavior in stress
  - Two waves (April 2023, February 2024)
- Macroeconomic model with CBDC, banks and runs
  - **Will not discuss in detail today**
  - 'Slow' and 'fast' disintermediation should be analyzed *jointly*
  - Examine implications for financial stability, policy and welfare
  - Look at reading list if interested...
- Novel D£ firm survey run with CBI
  - **Will only briefly mention**
  - Look at reading list if interested...

What we find - I

- BB survey ⇒ CBDC may induce 'slow' and 'fast' disintermediation
  - ≈ half of households want unremunerated D€ (higher if remunerated or in times of bank stress)
  - Reallocate from bank deposits to D€ in normal times
  - Among those wanting 'any', want *more than cash*, on average
  - Interest sensitive (over a range?)
  - Heavily dependent on trust in ECB (and govt more broadly?)
- Model ⇒ nuanced implications for financial stability
  - 'Slow disintermediation' shrinks (fragile) banking system → **improves** financial stability
  - 'Fast disintermediation' as CBDC is suitable asset to run to → **worsens** financial stability
  - Holding limits (€1.5k-3k) → **keep** the slow disintermediation, **without** the fast
  - **CBDC with limits can promote financial stability**

What we find - II

- BB survey evidence ⇒ adoption on extensive margin increases in 'wealth'
  - But on intensive margin, portfolio **share** declines with wealth
  - Similar to cash but somewhat in contrast to bank deposits
  - Akin to 'wealthy hand to mouth' intuition
- Holding limits detract from attractiveness of D€, but very limited effect
  - Limits are far from being biding for almost all respondents
  - Effect on popularity is very nonlinear
- UK firms pretty clueless about D£
  - If have opinion - likely negative, though possible cost benefits
  - Concerns with fraud/confusion and - like households - freedom
  - Perhaps more trusting of BoE than broader government

Survey - ‘Representative agent’

Survey - April 2023

We use the Bundesbank Online Panel (BOP-HH)

- Survey on Consumer Expectations - April 2023 (wave 40)
- $\approx$ 6000 German respondents
- We added questions focusing on:
  - Steady state holdings of (unremunerated) CBDC
  - Interest elasticity (allowing remunerated CBDC)
  - Run propensity (systemic bank stress)
- Contains many other useful characteristics

Survey introduction

Introduction (translated)

The introduction of the D€ is currently being investigated by the European Central Bank (ECB) and the national central banks of the euro area, such as the Bundesbank.
The D€ would be digital money that would be used like money on a current account. However, it would be issued and guaranteed by the ECB and the national central banks.
The D€ would exchangeable for euro in the form of cash at any time and also be used for payments at all times. By contrast, the availability of money on a current account with a private commercial bank depends to some extent on the stability of that commercial bank.
The D€ would not replace cash or accounts with commercial banks, but would be an additional offering alongside these. The D€ would enable everyday payments to be made digitally, quickly, easily, securely and free of charge throughout the euro area.

where the red section is included for a *random* subset of households as treatment

Steady state holdings

Steady state holdings (without CBDC)

> *Now imagine you had €1,000 available each month to allocate across different asset classes. In this context, please assume that* **the D€ does not yet exist**.
> *How much of the €1,000 per month would you hold as cash, deposit into your current account, or invest in other financial instruments?*

Steady state holdings (with CBDC)

> *Please now assume that the D€ were to be introduced. Please also assume that you have a D€ account that you can use to hold D€.* **You would receive no interest on this D€ account.**
> *How much of the €1,000 per month would you now deposit into your D€ account, hold as cash, deposit into your regular current account at your bank, or invest in other financial instruments?*

where they are reminded of their first answer when asked the second question (and they are forced to account for all €1000)

Interest elasticity

Interest elasticity

You stated that, if you received no interest on your D€ account, you would allocate the money as follows:

< **they are reminded of their previous answer** >

Please now assume that you would receive an interest on your D€ account that would be (50bp higher/equal/50bp/100bp lower) the interest rate on your regular current account at your bank.

How much of the €1,000 per month would you now deposit into your D€ account, hold as cash, deposit into your regular current account at your bank, or invest in other financial instruments?

Run propensity - I

Run behavior (without CBDC)

The next section is about **money that you already have on your regular current account** *at your bank. Imagine that you had €5,000 on your current account.*
In addition, please assume that according to credible news sources there are **doubts about the stability of the banking sector**. *This could* **lead to** *a banking crisis that could also affect your bank. If this were to happen,* **you might have problems accessing your current account at short notice to withdraw money or make credit transfers**.
In this situation, how much of the €5,000 would you **withdraw** *as cash from your regular current account or invest in other financial instruments?*

Run propensity - II

Run behavior (with CBDC)

> *Now please imagine that a D€ was available as an alternative to cash and other financial assets. Please also imagine that you would receive* **no interest** *on the D€.*
> *Please remember that the D€ would be able to be exchanged for euro in the form of cash at any time and also be used for payments at all times.*
> *In this situation, how much of the €5,000 would you transfer from your regular current account to your D€ account or invest in other financial instruments?*

where they are reminded of their first 'run' answer when asked the second 'run' question and the red second paragraph is only included for a random subset of households (and they are forced to account for all €5000)

Who wants (any) D€?

Households appear 'open' to D€

- Around half 'want' D€ if unremunerated
- Remuneration raises adoption substantially (of course)
- Note: In April '23 deposit rates were low (median $22bp$)

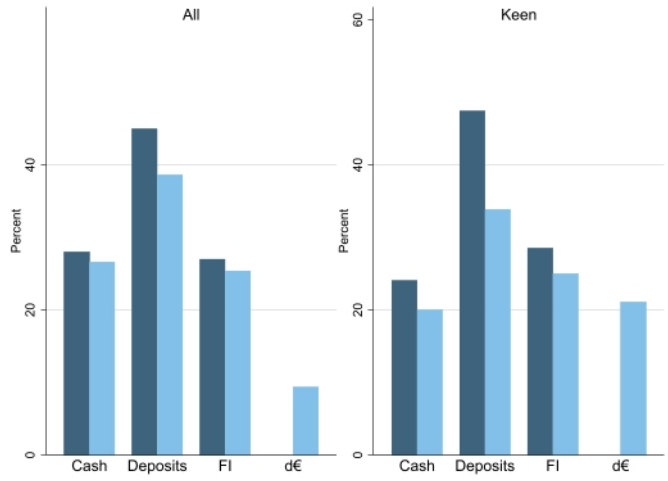
Rate	*1*	R_d*-50bp*	R_d	R_d*+50bp*
% with D€> 0	43	31	54	69

- **Interesting:** Adoption at R_d*-100bp* $\approx$ rate at R_d*-50bp*
  - Elastic local to return on deposits, but inelastic elsewhere?
  - Two components of demand (transactions and store-of-value)?

Portfolio decisions of households

Turning to the intensive margin. . .

- Average D€ portfolio share ≈ 10%
- D€ to cash ratio is ≈ 56%
- Approximately symmetric elasticity of substitution around bank deposit rate
- Conditional on positive D€ holdings ('keen') the average portfolio share surpasses that of cash



CBDC adoption and heterogeneity

Who is less / more likely to adopt CBDC (on extensive margin)?

Low trust in ECB (-22pp)

East German adult

High deposit ratio

Old

High trust in ECB (+10pp)

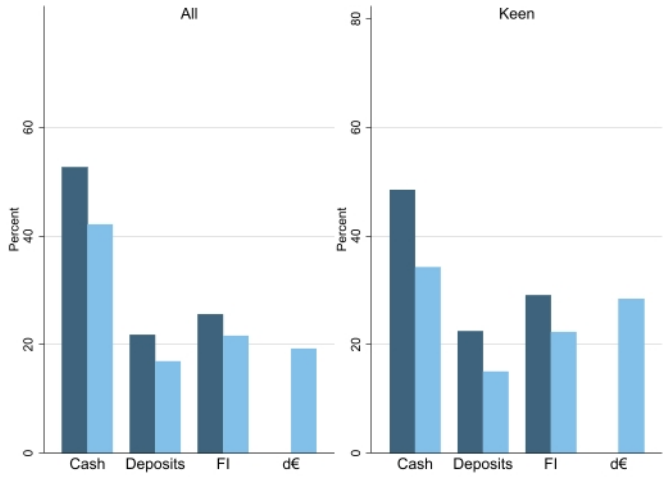
Low assets

Also, random treatment with extra info on CBDC backing (relative to deposits) is influential in times of stress (+9pp)

Withdrawals during banking stress

Greater openness to D€ in stress than in normal times

- 58% rate of positive withdrawals (vs 49% with D€> 0 in normal times)
- Cash is dominant but D€ reduces that
- Presence of D€ ⇒ greater deposit withdrawals overall (i.e. not just substituting for cash)



- Effect greater if treated with extra info on D€ backing by CB

Takeaways from survey for model

1. 'Slow' disintermediation
   - Substantial prospective reallocation from deposits to D€ in normal times

2. 'Fast' disintermediation
   - Willingness to shift to CBDC increases during banking stress
   - CBDC leads to increased withdrawals from banks under stress

Survey - ‘Heterogeneous agent’

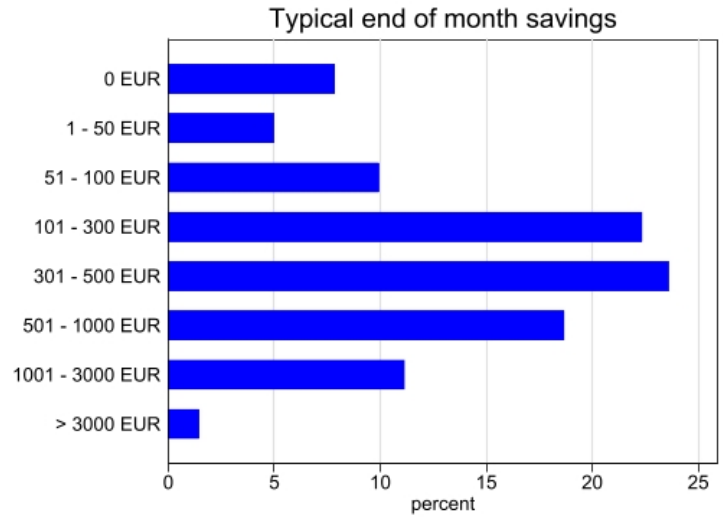
Survey - February 2024

We again use the Bundesbank Online Panel (BOP-HH)

- February 2024 (wave 50)
- ≈ 3800 German respondents
- We added question asking what are 'typical savings' each month
  - After spending on goods, services, rent etc.
  - Mapped to idiosyncratic amounts to invest in 'normal times' and bank stress
  - Wave 40 participants (panel) continue to be asked to allocate €1000/€5000
- Also asked if **holding limits** made them more/less likely to adopt D€
  - Randomly assigned limits of €2k, €3k, €4k and €6k

Typical savings - Distribution among respondents

Considerable heterogeneity among respondents. . .



Note: Didn't allow dissaving and some 'zero' savers likely 'wealthy' (retirees. . .)

Extensive margin - by savings bracket - SS

	Funds to allocate (€, monthly)							
	50	100	300	500	1000	3000	5000	Pooled
# with D€> 0	*60*	*88*	*231*	*260*	*315*	*188*	*21*	*1,163*
% with D€> 0	*14*	*26*	*31*	*37*	*43*	*50*	*43*	*35*

Number and percent of respondents projecting positive D€ holdings in normal times - by typical savings bracket.

- Lower overall rate than in April 2023 (reflecting higher interest rates?)
- Increasing with 'wealth' (over almost entire range)

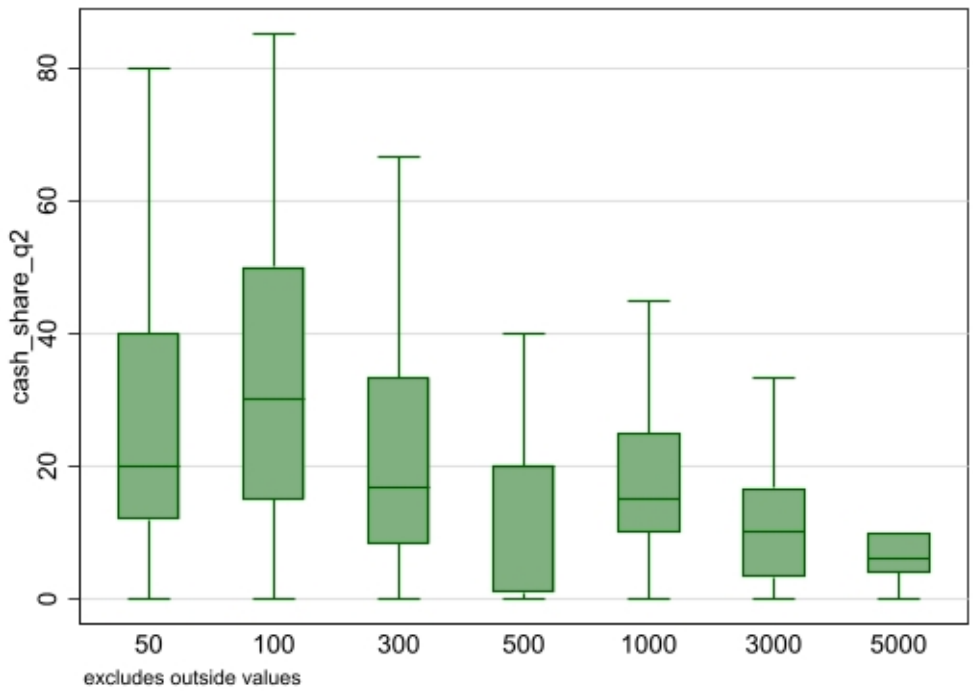
Extensive margin - by initial deposit - Bank stress

	Funds initially in bank account (€)				
	5000	10000	15000	20000	Pooled
# with D€> 0	*366*	*401*	*732*	*249*	*1,748*
% with D€> 0	*42*	*53*	*55*	*59*	*52*

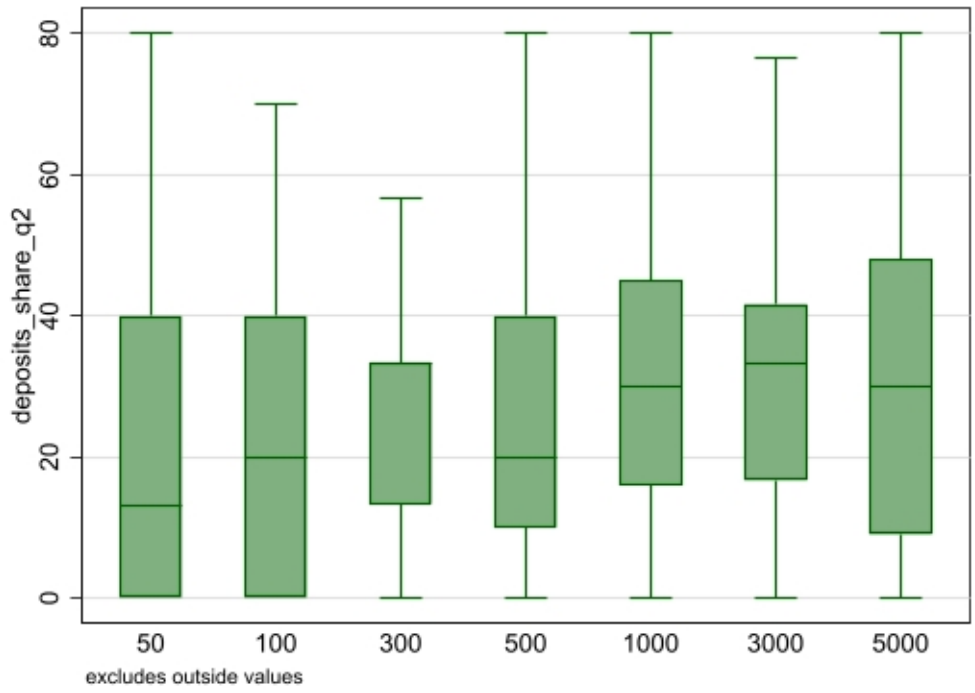
Number and percent of respondents projecting positive D€ holdings in times of banking stress - by initial level of bank deposits.

- As in previous wave, somewhat higher propensity in times of stress

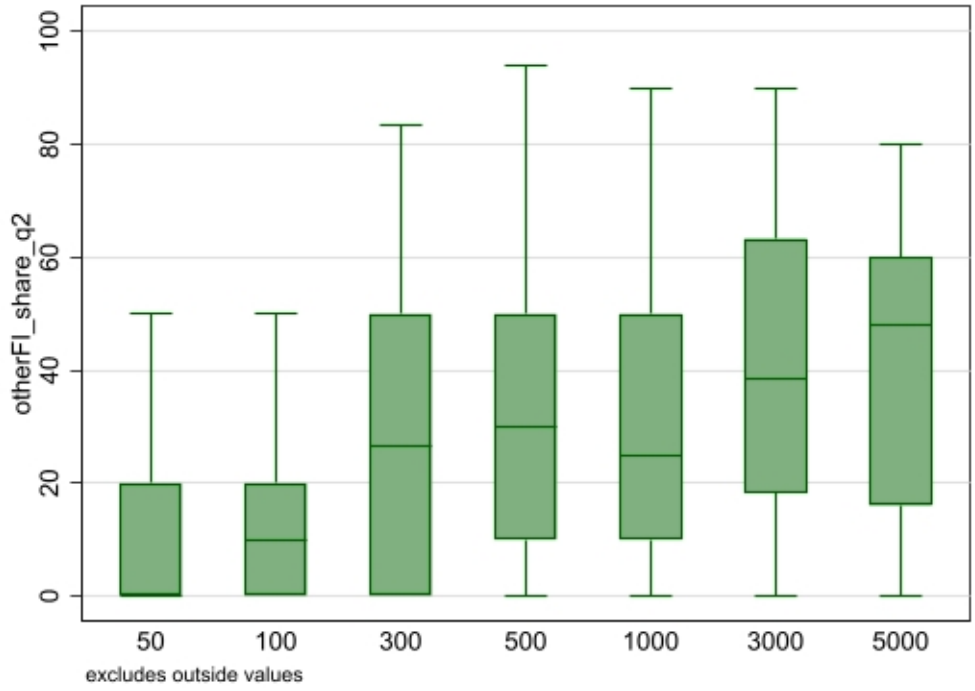
Portfolio shares (SS) - by wealth: Cash



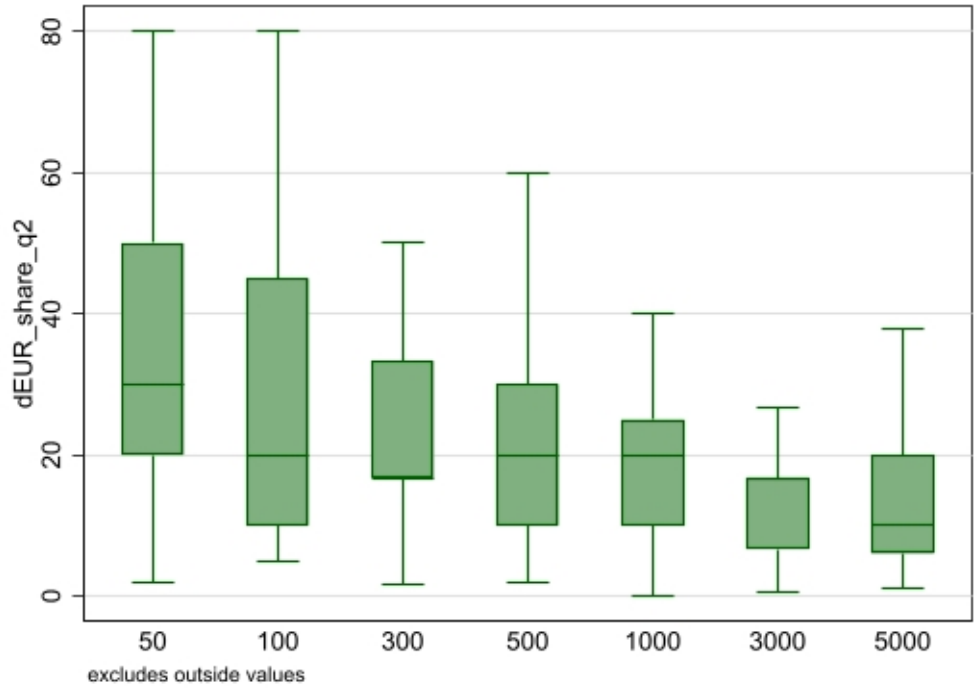
Portfolio shares (SS) - by wealth: Bank deposits



Portfolio shares (SS) - by wealth: Other FI



Portfolio shares (SS) - by wealth: D€



Mean portfolio shares (SS) - by wealth

Funds (Monthly, €)	Cash	Deposits	Other FI	D€
50	*28*	*18*	*14*	*40*
100	*33*	*24*	*13*	*30*
300	*20*	*27*	*27*	*26*
500	*18*	*26*	*32*	*24*
1000	*19*	*32*	*30*	*20*
3000	*12*	*31*	*41*	*17*
5000	*8*	*31*	*41*	*19*

Mean portfolio shares in 'normal times' - among those with positive projected D€ demand - conditioned on typical savings bracket (determining funds to allocate monthly).

- D€ and cash treated as unattractive low yield assets (WH2M)
- Interestingly, deposit share holds up (ancillary benefits from bank conditional on deposit amount?)
- As expected, 'other FI' share increases strongly

Effect of holding limits on D€ attractiveness - SS

	Randomly assigned holding limit (€)				
	2000	3000	4000	6000	Pooled
Less likely	*30*	*32*	*27*	*29*	*30*
No difference	*60*	*59*	*63*	*61*	*61*
More likely	*10*	*10*	*9*	*11*	*10*

Effect of limits on desire for D€

- Limits seem *somewhat* to reduce attractiveness of D€
  - A quarter to a third of respondents 'less likely'
- Unclear how to interpret the 'more likely' cases
  - Perhaps capturing attitude to D€ *framework*, rather than personal demand
- No obvious relationship with limit value
  - But should adjust for 'how binding'...

Effect of limit tightness on D€ attractiveness

	Quintile of D€/Limit					Pooled
	1	2	3	4	5	
% less likely	*21*	*20*	*20*	*23*	*28*	*23*

Percent who state they would be 'less likely' to want D€ were limits to be introduced - by quintile of how binding would the limit be (based on normal times projected D€ demand). Conditioning on positive demand (in normal times or stress).

- Little evidence of effect until the top quintile (most binding)
- Even among them, median D€/Limit $\approx$ 13% (quite loose)
- Conditioning on ratio $>$ 20%, 'less likely' rate jumps to 38%

Macro model with runs & CBDC

Macro model with runs

Agents in the model

- **Households:** consume, work, invest, (and run)
- **Banks:** intermediate between households and firms
- **Monetary authority:** sets policy rate, issues cash and CBDC
- **Non-financial firms:** produce output, issue securities
- **Government authority:** sets taxes, bonds in zero net supply

Households

- Access to three liquid assets: cash Ca_t, CBDC $D_{CB,t}$ and deposits D_t
  - *Cash:* unremunerated, faces increasing convex storage costs
  - *Deposits:* promise return $\bar{R}_t$, but pay only fraction in run case
  - *CBDC:* unremunerated in most of our analysis, no storage costs
- Liquid assets are aggregated to constitute money M_t

$$M_t = \left[Ca_t^{\frac{\eta_m - 1}{\eta_m}} + \mu_d D_t^{\frac{\eta_m - 1}{\eta_m}} + \mu_{\mathbf{cb}} D_{CB,t}^{\frac{\eta_m - 1}{\eta_m}} \right]^{\frac{\eta_m}{\eta_m - 1}}$$

- Can also invest in securities issued by non-financial firms
  - Earn stochastic return and can trade securities for price Q_t
  - **Less efficient investors than banks**

Banking sector

- Banks are more efficient than households in managing investments
  - Costly for hholds (and CB) to hold securities beyond some critical level
  - Wedge in hhold EE if required to hold larger amounts
- If the households (and CB) hold too much in aggregate, the 'effective price' they face is increased
  - **Requires a discount in the actual price, Q_t to clear, if banks sell to hholds/CB at scale**

Endogenous runs

State space is partitioned into two regions (determined endogenously by fundamentals)

1. Safe region: Banks can always pay back depositors $\Rightarrow$ No runs
2. Fragile region: Banks cannot repay if run occurs $\Rightarrow$ Runs are **possible**

Economy with and without CBDC

CBDC plays an important role for the risk of a bank run

- Households run to CBDC instead of cash
- Reflects 'storage at scale' vs convex costs of cash holdings
- Without CBDC, new banks can take some of the strain of absorbing securities
- But greater disintermediation with CBDC undermines that
- Price declines more severe - increasing fragility of economy

$\Rightarrow$ Run probability is larger with CBDC

Transmission channels

1. Liquidity premium
   - CBDC reduces demand for deposits, *all else equal*
   - Banks have to pay more for deposits
   - Positive aspect of 'slow' disintermediation
   - Smaller and less levered banks ⇒ Financial stability improves
2. Storage at scale
   - No technological barrier that prevents scaling up CBDC holdings
   - Cash has storage costs: second-order normally, but important during run
   - Worsens capability of (already weak/small) new banks to replace failed banks
   - Easier to run ⇒ Financial stability deteriorates

Financial stability and welfare implications

Unremunerated CBDC *alone* decreases financial stability and welfare

- 'Fast' disintermediation dominates!
- **BUT...**

Unremunerated CBDC **with holding limit** is superior to a no CBDC world

- Allows benefits of 'slow' disintermediation but limits 'fast'
- Active debate exists over the level of the holding limit
- Model implies values in a range between €1500 (baseline) & €3000 (keen)
- In line with €3000 mooted by ECB officials (BoE much higher?)

Survey - UK firms

Survey details

The CBI issues various surveys to its membership, on a monthly basis

- Added D£ questions into the April 2024 vintages
- Service Sector, Distributive Trades, and Industrial Trends
- Combined sample of 639 firms (*very* low response rate, likely not random)
- Compare with more elaborate survey run by BoE in 2022

Survey intro

The Bank of England is considering the introduction of a Central Bank Digital Currency – or 'Digital Pound'. This would be a new form of money available to households and companies, in addition to existing forms of money, such as physical cash and bank current accounts. It would be legal tender, issued and backed by the Bank of England, in contrast to private moneys such as bank current accounts or cryptocurrencies.

A Digital Pound would always have the same value (£1) as, and be exchangeable for, a physical Pound.

Survey questions - 1 & 2

What stage are you at in considering the implications of the Digital Pound for your business?

and

What stage are you at in considering digital currency **other than the Digital Pound** *for your business – i.e. stablecoins, cryptocurrency or tokenised bank deposits?*

Possible answers:

- No consideration
- Some discussion, but no planning
- Considerable discussion and have planned for how it might affect our business
- We are already making use of, or hold, such assets (not for D£)
- Other (please specify)

Survey question 3

How do you expect the Digital Pound to affect your business in terms of the following factors?

- *Speed of payments*
- *Cost of payments*
- *Record-keeping / reconciliation with counterparties*
- *Automation / programmability of payments*
- *Internal treasury / liquidity management*
- *Investment / portfolio management*
- *Fund raising / security issuance*
- *Core products / services for customers*

With options: 'Significant', 'Slight' or 'No' impact (plus N/A or 'Don't know')

Survey questions 4 & 5

What do you think would be the key advantage, if any, of a Digital Pound, for your business?

and

What would be your greatest concern or disadvantage, if any, arising from a Digital Pound, for your business?

Answers given as free text

Survey questions 6

Who would you prefer to manage your Digital Pound account, if your business were to have one?

- *The Bank of England*
- *A government institution*
- *A traditional high street bank*
- *A digital bank (eg Monzo, Starling)*
- *A non-bank payment or e-money provider (eg Paypal, Revolut)*
- *A digital wallet provider (eg Apple/Google/Amazon Pay)*
- *A credit card provider (eg Visa, Mastercard, Amex)*
- *A crypto exchange (eg Coinbase, Kraken)*
- *Other (please specify)*

Respondents were permitted to indicate up to three choices

- 'Bank of England' option perhaps counterfactual

Survey questions 6

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- *Other (please specify)*

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Lack of awareness

	Digital Pound	Other Digital Currencies
No consideration	90.21	93.38
Some discussion, no planning	7.11	5.05
Considerable discussion	0.32	0.63
Other	2.37	0.95

Distribution of responses (in percent) to questions on preparedness for the Digital Pound and preparedness or use of other Digital Currencies.

Effect on business

	Significant	Slight	None	NA	Don't know
Speed of payments	2.56	7.83	27.96	10.38	51.28
Cost of payments	2.56	7.37	27.24	10.26	52.56
Record-keeping	3.22	7.23	27.17	10.29	52.09
Automation/programmability	3.04	7.68	27.36	10.72	51.20
Treasury/liquidity	2.25	4.82	28.30	12.06	52.57
Investment/portfolio	1.13	4.35	26.73	17.07	50.72
Funding/security issuance	2.08	2.88	28.85	14.58	51.60
Products/services	1.60	4.97	31.89	10.58	50.96

Distribution of responses (in percent) to questions on extent to which aspects of business might be affected.

Advantages

Word cloud of perceived key advantages of the Digital Pound.

Disadvantages

Word cloud key concerns in relation to the Digital Pound.

Preferred institutions

	BoE	Govt	HS-Bank	D-Bank	E-Money	D-Wallet	CC	DEX
All	51	14	53	20	7	11	16	2
Single	40	4	38	11	1	4	1	1

Fraction of sample who indicated a preference for each institution type - among all respondents, and among respondents who only indicated a single institution.