



EUROPEAN CENTRAL BANK

EUROSYSTEM

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CBDC – financial system implications and control

**(Views expressed are my own, not necessarily
the ones of the ECB)**

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Discussions on CBDC have been overshadowed partially by (i) “idealistic”, (ii) “conservative” and “fearful” attitudes, and sometimes by (iii) technological confusion

Focusing on the case of CBDC offered to the general public (and presumably being offered as conventional deposit money), it will be argued that:

- one can take a pragmatic attitude towards CBDC, and does not need to link it to idealistic visions on transforming the monetary system
- from this pragmatic perspective CBDC could make sense, and in particular for economies in which banknote demand shrinks rapidly and in which people support it
- one can control the quantity of CBDC rather easily, while preserving convertibility (via a two tier system)
- the effects of CBDC on the banking system and the financial structure in general may be important, even if the total quantity of CBDC is well controlled at a moderate level

Three perceptions of CBDC

Idealistic views: CBDC

- to change the monetary order towards “sovereign money”
- to overcome the ZLB problem (if combined with end of banknotes)
- to enrich monetary policy toolkit with additional instrument: interest on CBDC

Fearful / conservative views: CBDC

- **destroys an efficient credit allocation system if it leads to a large increase of CB balance sheets at the expense of banks**
- **undermines financial stability as it facilitates runs**
- is further instrument of financial repression (if combined with end of banknotes)
- an Orwellian instrument of control of money flows

Pragmatic view (e.g. Sveriges Riksbank e-krona project): CBDC

- **is a more efficient form of central bank money accessible to all**
- **ensures role of state in crucial function in jurisdictions with shrinking banknote use; public involvement in retail payments makes sense because of systemic relevance and natural monopoly characteristics**

In blue: points seen as relevant risks and advantages by mainstream economists

Arguments in favor of CBDC mentioned in literature

Benefit of CBDC	Possible further factors or requirements
A. Efficient retail payments-	
A.1 Making available efficient, secure and modern central bank money to everyone	In particular in economies without high-quality electronic commercial bank money, and/or without a secure and efficient payment system
A.2 Strengthening the resilience, availability and contestability of retail payments	In particular in economies in which banknote demand vanishes and private electronic payments solutions lack competition
B. Overcome use of banknotes for illicit payment and store of value	
B. Better control of illicit payment and saving activities, money laundering, and terrorist financing	Requires (i) discontinuation of banknotes (or at least of larger denominations); (ii) CBDC to not take the form of anonymous token money
C. Strengthen monetary policy	
C.1 Allows overcoming the ZLB as negative interest rates can be applied to CBDC	Requires discontinuation of banknotes (or at least of larger denominations)
C.2 Interest rates on CBDC provide for additional monetary policy instruments, independently of ZLB	
C.3 Easier ability to provide helicopter money	Requires that each citizen has a CBDC account
D. Sovereign money related	
D.1 Improve financial stability and reduce moral hazard of banks by downscaling the role of the banking system in money creation	CBDC takes over to large or full extent sight deposit issuance by banks
D.2 Larger seignorage income to state (and citizens) as state takes back money creation from banks.	CBDC takes over to large or full extent sight deposit issuance by banks

Broad- access central bank accounts is not really new...

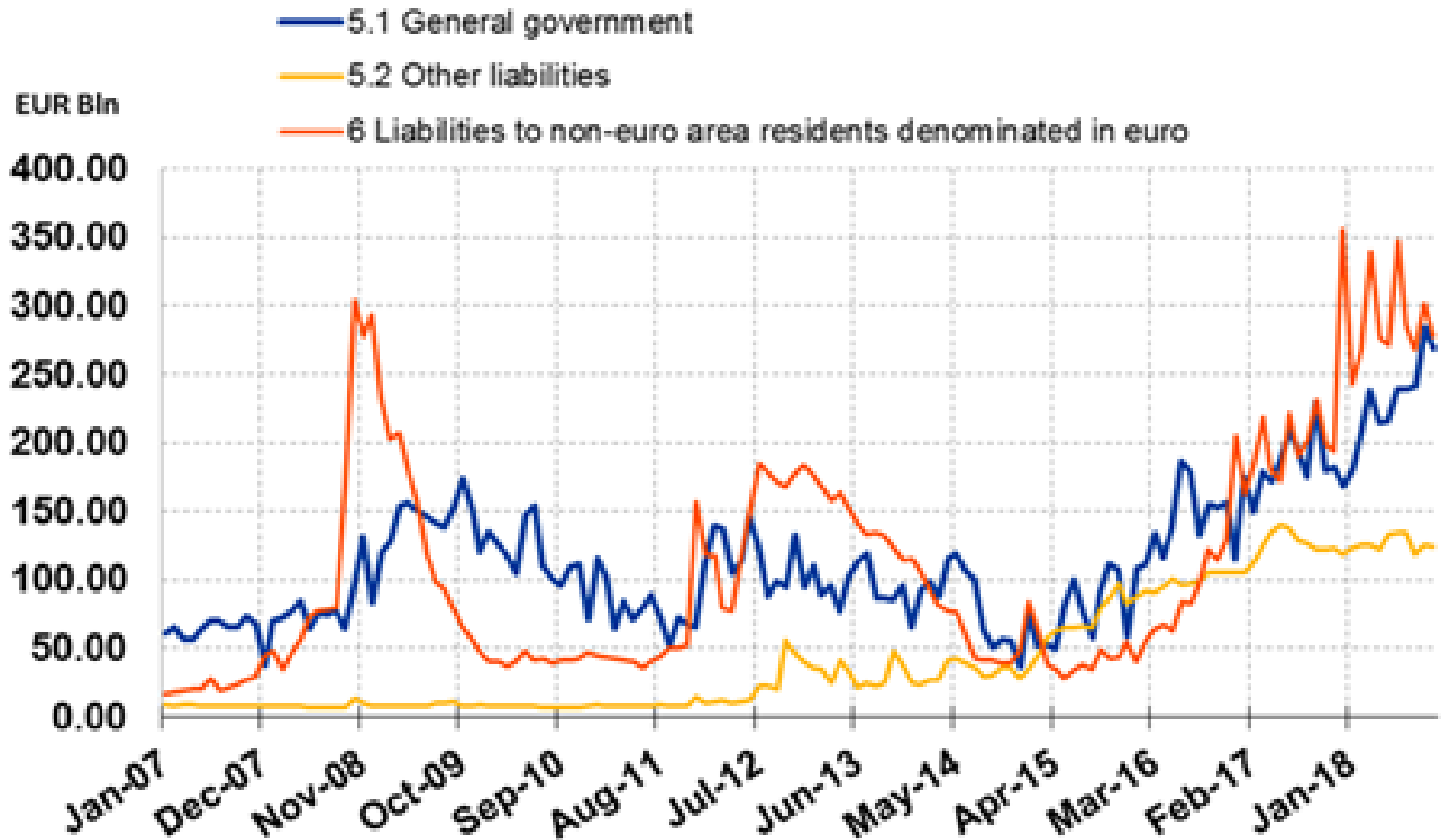
- Broad access to deposits was more the standard than the exception in central banking for centuries.
- The first central bank money was deposits, not banknotes
- Only in 20th century, NFC and household deposits phased out
- the OeNB phased out household deposit accounts only in the 1970s and the Banque de France in the 1990s.

Reichsbank / Bank Deutscher Länder/Bundesbank: share of different types of depositors in total CB deposits

	Banks	Non-bank private	Public
1914	39%	16%	45%
1925	16%	19%	65%
1938	53%	40%	7%
1948	50%	7%	43%
1960	81%	1%	18%
1970	79%	1%	20%

(Source: Reichsbank, 1925, Bundesbank, 1976)

Non-bank accounts still exist (eg: Eurosystem official sector deposits)



See Accounting and reporting Guideline (EU) 2016/2249 of the ECB of 3 November 2016 for precise definitions of the three items

Impact of CBDC on financial structure

Financial accounts & flow of funds representation to understand effects of CBDC on financial structure.

- Substitute banknotes (CBDC1) vs. bank deposits (CBDC2)
- How to avoid much larger reliance of banks on central bank credit to close the funding gap created by large CBDC2? CB could buy government bonds:
 - From households “S1” (assume that households substitute these with bank bonds – as banks may want to issue bonds)
 - From banks : “S2”
- Banks could also try to avoid larger dependence on CB credit by deleveraging: DL

CBDC in financial accounts (order of magnitude: euro area in trn EUR)

Households, pension and investment funds, insurance companies				
Real Assets	20		Household Equity	40
Sight deposits	5	-CBDC2	Bank loans	5
Savings + time deposits	4			
CBDC		+CBDC1 +CBDC2		
Banknotes	1	-CBDC1		
Bank bonds	4	+S1		
Corporate/Government bonds	7	-S1		
Equity	8			
Corporates				
Real assets	13		Bonds issued	3 +DL
Sight deposits	2		Loans	8 -DL
Savings deposits	1		Shares / equity	5
Government				
Real assets	11		Bonds issued	9
			Loans	2
Commercial Banks				
Loans to corporates	8	-DL	Sight deposits	7 -CBDC2
Loans to government	2		Savings + time deposits	5
Loans to HH	5		Bonds issued	4 +S1
Corp/state bonds	5	-S2	Equity	3
Central bank deposits	0		Central bank credit	1 +CBDC2 -S1-S2-DL
Central Bank				
Credit to banks	1	+CBDC2 -S1-S2 -DL	Banknotes issued	1 -CBDC1
Corp/Government bonds	0	+S1+S2 +DL	Deposits of banks	0
			CBDC	+CBDC1 +CBDC2

Impact on bank funding costs, and implication for CB policy rates

Table 4a: Euro area bank funding costs across different instruments, 2003 - 2008

	Share in bank funding	Average interest rate
Deposits (in M3)	44%	1.83%
Other deposits	13%	3.25%
Bonds issued	30%	4.10%
Equity issued	10%	8.47%
Central bank credit (MRO rate)	3%	2.79%

In normal times: **$i(\text{deposits}) < i(\text{CB funding}) < i(\text{bonds issued})$**

⇒ Bank funding costs will increase as a consequence of CBDC2

⇒ To keep financial conditions unchanged, central bank will have to compensate for **CBDC2** by lowering somewhat its policy rates. But only to partially compensate increase of bank funding costs (as bank funding is only one funding source of real economy). Bank intermediation loses some competitiveness

Bank runs into CBDC – 3 forms of bank runs

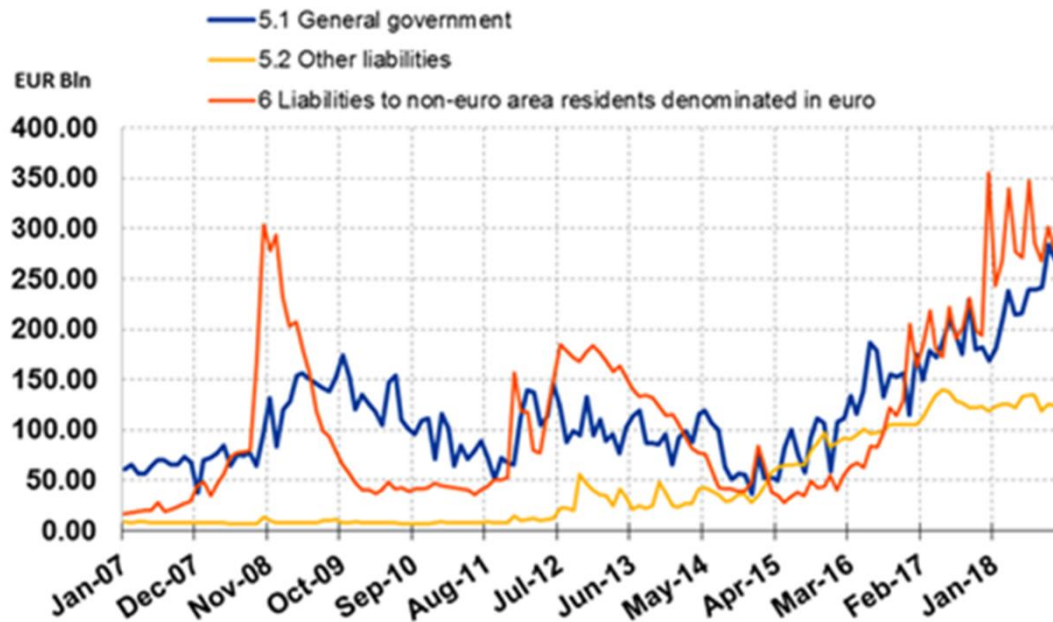
Figure 2: Financial accounts representation of bank run, distinguishing between three targets of flight

Households, pension and investment funds, insurance companies			
Real Assets	20		
Sight deposits bank 1	2.5	-R1	-R2/2 -R3/2
Sight deposits bank 2	2.5	+R1	-R2/2 -R3/2
Savings + time deposits	4		
Deposits with central bank			+R3
Banknotes	1	+R2	
Corporate/gvt bonds	7		
Bank bonds and Equity	12		
Household Equity 40			
Bank loans 5			
<p>R1: from weak to strong banks R2: into banknotes R3: into non-bank CB deposits</p>			
Commercial bank 1			
Loans to Corporates/Gvt/HH	7.5		
Corp/gvt bonds	2.5		
Central bank deposits	0		
Sight deposits	3.5	-R1	-R2/2 -R3/2
Savings + time deposits	2.5		
Bonds and equity issued	3.5		
Central bank credit	0.5	+R1	+R2/2 +R3/2
Commercial bank 2			
Loans to Corporates/Gvt/HH	7.5		
Corp/gvt bonds	2.5		
Central bank deposits	max(0, -(0.5	-R1	+R2/2 +R3/2))
Sight deposits	3.5	+R1	-R2/2 -R3/2
Savings + time deposits	2.5		
Bonds and equity issued	3.5		
Central bank credit	max(0, 0.5	-R1	+R2/2 +R3/2))
Central Bank			
Credit to banks	0.5	+R1+R2/2+R3/2	+max(0, 0.5 -R1+R2/2+R3/2)
Banknotes issued	1	+R2	
Deposits of banks	max(0, -(0.5	+R1+R2/2+R3/2))	
Corp/state bonds	0		
Non-bank deposits			R3

Bank runs into CBDC – 3 forms of bank runs

Table 5: Indicators of run on bank deposits, 2008 and 2011, Eurosystem

Comparison between December averages of:	Δ in % of stock at beginning of period			Δ in % of Eurosystem balance sheet at beginning of the period		
	Banknotes ("R2")	Excess reserves of banks	Excess reserves of non-bank depositors ("R3")	Banknotes ("R2")	Excess reserves of banks	Excess reserves of non-bank depositors ("R3")
2008 vs 2007	+13%	+3675%	+ 321%	+7%	+32%	+23%
2012 vs. 2010	+8%	+580%	+151%	+4%	+38%	+10%



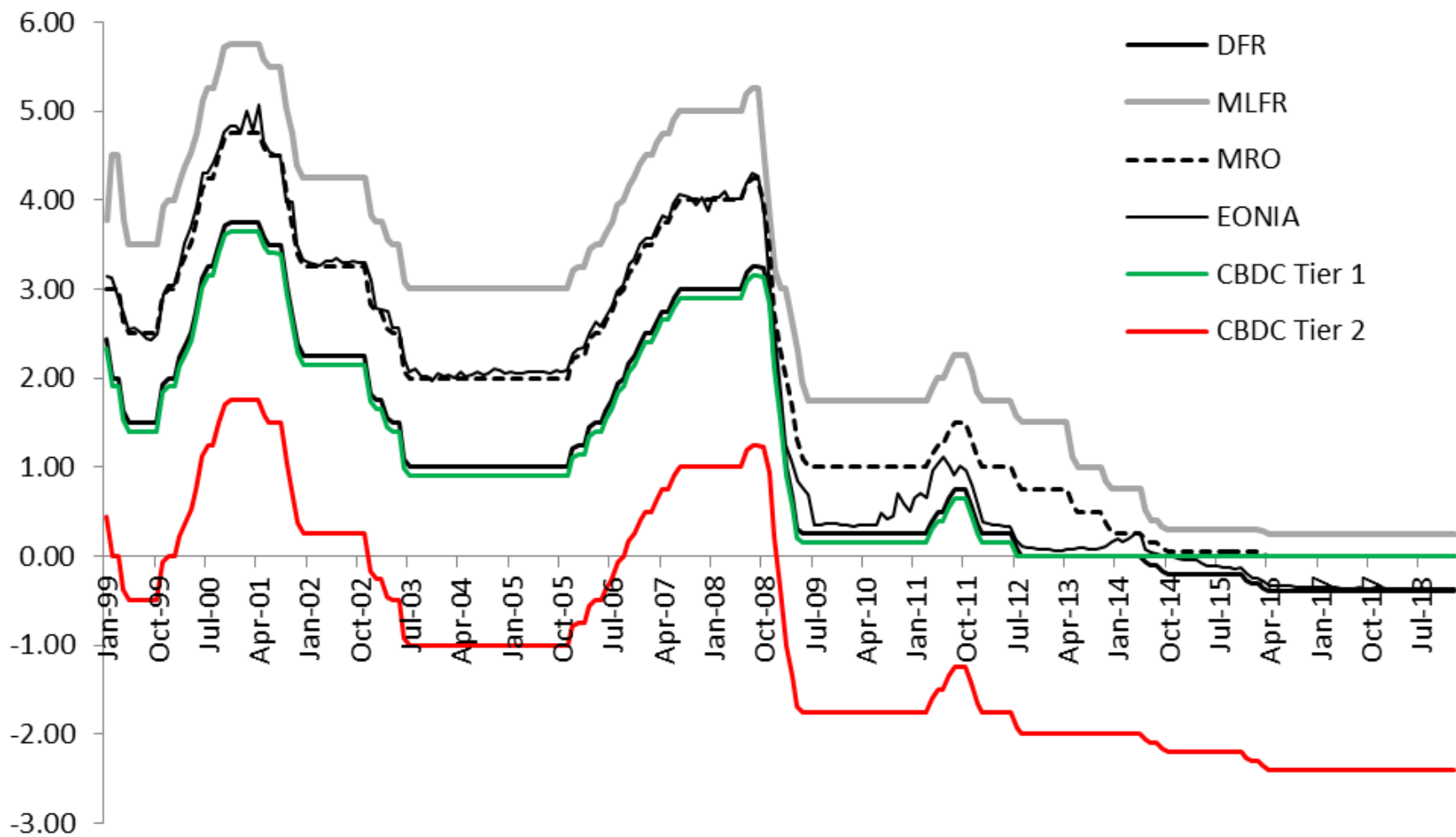
Controlling CBDC – Kumhof/Noone (2018) approach

- “We find that if the introduction of CBDC follows a set of core principles, bank funding is not necessarily reduced, credit and liquidity provision to the private sector need not contract, and the risk of a system-wide run from bank deposits to CBDC is addressed. The core principles are:
 - (i) CBDC pays an adjustable interest rate.
 - (ii) CBDC and reserves distinct; not convertible into each other.
 - (iii) No guaranteed, on-demand convertibility of bank deposits into CBDC at commercial banks (and therefore by implication at the central bank).
 - (iv) The central bank issues CBDC only against eligible securities (principally government securities).”

Controlling CBDC through tiered remuneration

- E-krona report and Kumhof/Noone refer to interest rate as tool to control quantity. But: “financial repression” constraints?
- However, full solution should probably foresee tiering system:
 - Every registered citizen could get an account
 - Tier 1 (“means of payment”): $< [1000]$ euro, remunerated at r_1
 - Tier 2 (“store of value”): $> [1000]$ euro, remunerated at r_2
 - $r_1 > r_2$
 - Example: $r_1 = \max(0, \text{DFR})$; $r_2 = \text{DFR} - 2\%$
 - r_2 could be lowered further in financial crisis, to prevent aggregate run on the entire banking system
- Tier 1 mitigates danger of outcry when Tier 2-interest rates need to be used to prevent an undue increase of CBDC
- Tier 2 remuneration should be seen as unrestricted
- Question: what Tier 1 quota to grant to natural persons, corporates, etc...

Controlling CBDC through tiered remuneration – fictitious example



But controlling CBDC quantity is not equivalent to control its impact on the financial structure

- If CBDC accounts offer convenient account services, then complementarity of banking services may be undermined
- CBDC account + non-bank financial service firms could become sufficient for households
- See **SUBST**itution effect on next slide (in which all CBDC is of type 1)
- Importance of banks relative to these non-bank financial firms would decline over time
 - Is it transition issue?
 - Or is it structural financial efficiency and stability problem?
- Is it different from the problem of long balance sheets because of large CBDC2, because it does not imply a centralisation of the credit provision process?

Households, pension and investment funds, insurance companies

Real Assets	20	Household Equity	40
Sight deposits	5 -SUBST		
Savings + time deposits	4	Bank loans	5
New non-bank intermediaries	+SUBST		
CBDC	+CBDC1		
Banknotes	1 -CBDC1		
Bank bonds	4 + S1		
Corporate/state bonds	7 - S1		
Equity	8		

New non-bank intermediaries

Loans to corporates	+Subst/2	Household investments	+Subst
Corp/gvt bonds	+Subst/2		

Commercial Banks

Loans to corporates	8 -Subst /2	Sight deposits	7 -Subst
Loans to government	2	Savings + time deposits	5
Loans to HH	5	Bonds issued	4
Corp/gvt bonds	5 -Subst /2	Equity	3
Central bank deposits	0	Central bank credit	1

Central Bank

Credit to banks	1	Banknotes issued	1 -CBDC1
Corp/gvt bonds	0	Deposits of banks	0
		ECBM	+CBDC1

Conclusion

1. CBDC justifiable for sake of efficiency and public involvement in retail payment systems, in particular in economies with quickly shrinking use of banknotes ... and if people support it.
2. Issues of possible impact of CBDC on financial structure and on financial stability should be taken seriously. Distinguish **CBDC1** and **CBDC2**
3. CBDC could become **means of payment** (-> tier 1), but should not become large-scale **store of value** (-> tier 2) - neither structurally, nor as safe haven investment in crisis times
4. Two tier remuneration is an effective solution to control the quantity of CBDC, i.e. to prevent it from becoming a large scale store of value
5. No need for questioning the principle of convertibility (in neither form)
6. But controlling the size of the CB balance sheet is not equivalent to controlling the impact of CBDC on the financial structure
7. Changing the financial structure is not per se wrong. It may cause problems if it goes too quickly, or if it centralises the credit allocation process