

# D€ scenarios and balance sheet impact

Olaf Sleijpen, 12 July 2021, Bank of England chief economist workshop

DeNederlandscheBank

EUROSYSTEEM

# Motivation & question

- Popular belief: the introduction of a D€ **extends the balance sheet of central banks** and **reduces credit provision**
  - Bank deposits move to central bank
- We investigate the balance sheet impact of a D€ for households, NFCs, credit institutions and the central bank
- Financial stability issues are outside the scope

# Methodology

## 1. Scenarios for D€

- Key assumptions: (1) D€ holdings; (2) substitution of D€ for cash or bank deposits; (3) asset side entries

## 2. Sectoral balance sheet mechanics

- Households, Non-financial corporations (NFC), credit institutions (CI), central bank (CB)
- With and without excess reserves

## 3. Behavioural responses & economic impact

- Balance sheet re-adjustment in response to D€ introduction
- If possible: use to estimate broader economic effects, economic model

**Disclaimer:** many uncertainties, e.g. D€ design, demand, future amount of excess reserves, behavioural responses

# Summary of findings

		Calculation	
		Current: excess reserves	Hypothetical: no excess reserves
D€ scenarios: holdings	Low	<p>CB: same balance sheet size. D€ replaces reserves and cash</p> <p>Banks: balance sheets shorten as deposits and excess reserves decline</p>	<p>CB: balance sheet longer, from lower starting level. D€ funded by CB loans to banks and D€ replaces cash</p> <p>Banks: same balance sheet size. CB funding replaces deposit outflow</p>
	Higher	<p>CB: same balance sheet size. D€ replaces reserves and cash</p> <p>Banks: balance sheets shorten as deposits and excess reserves decline</p>	<p>Same effects as above, but larger size</p> <p>Effect on funding costs depends on remuneration on CB versus market funding</p>

# Scenarios

## **Scenario 1: low D€ holdings**

- Average holdings for natural persons >15 years: €200
- No holdings for legal entities

## **Scenario 2: larger D€ holdings**

- Average holdings for natural persons > 15 years: €3000
- Average holdings for legal entities: € 8000, € 30.000 for large ones

## **Substitution: mostly from bank deposits, less from cash**

- See Annex for aggregate impact on households and non-financial corporations

# Balance sheet mechanics for credit institutions and central bank, with excess reserves (see Annex for details)

- The aggregate balance sheet of credit institutions shrinks, as they pay for the outflow of deposits to D€ with central bank reserves
- The central bank balance sheet only changes in composition: D€ replaces cash and reserves

<b>Credit institutions</b>		D€ scenario				D€ scenario	
Assets	Amounts	1	2	Liabilities	Amounts	1	2
CB reserves	3.489	-50	-1.253	Deposits of euro area residents	21.368	-50	-1.253
<b>Total assets</b>	<b>33.772</b>	<b>-50</b>	<b>-1.253</b>	<b>Total liabilities</b>	<b>33.772</b>	<b>-50</b>	<b>-1.253</b>
<b>Central bank</b>		D€ scenario				D€ scenario	
Assets	Amounts	1	2	Liabilities	Amounts	1	2
				Digital euro		57	1.421
				Banknotes in circulation	1.435	-7	-168
				Bank reserves, of which:	3.489	-50	-1.253
				<i>Excess reserves</i>	<i>2.817</i>	<i>-50</i>	<i>-1.253</i>
<b>Total assets</b>	<b>6.979</b>	<b>0</b>	<b>0</b>	<b>Total liabilities</b>	<b>6.979</b>	<b>0</b>	<b>0</b>

# Balance sheet mechanics for credit institutions and central bank, without excess reserves

- The aggregate balance sheet of credit institutions balance sheet does not change in size, but changes in composition
- The central bank balance sheet grows, but less than the amount of D€. Banks receive CB funding to create reserves, to match the outflow of deposits

<b>Credit institutions</b>		D€ scenario			D€ scenario		
Assets	Amounts	1	2	Liabilities	Amounts	1	2
				Deposits of euro area residents	21.368	-50	-1.253
				Loans from central bank	1.793	50	1.253
<b>Total assets</b>	30.955	0	0	<b>Total liabilities</b>	30.955	0	0
<b>Central bank</b>		D€ scenario			D€ scenario		
Assets	Amounts	1	2	Liabilities	Amounts	1	2
Loans to banks	1.793	50	1.253	Digital euro		57	1.421
				Banknotes in circulation	1.435	-7	-168
<b>Total assets</b>	4.162	50	1.253	<b>Total liabilities</b>	4.162	50	1.253

# Credit institutions balance sheet management

- Outflow of deposits: CI options
  - (1) Do nothing, the balance sheet shrinks
  - (2) Increase central bank funding
  - (3) Increase market funding
- Option (3) appears related to the remuneration on CB funding, relative to alternative sources of funding
  - Substitute deposit outflow for wholesale funding or deposits?
- Pass through to credit provision: different views
  - Increase in competition for deposits, small increase in credit provision as monopoly rents go down? (Andolfatto, FED, 2020)
  - Higher wholesale funding rates passed through to loan rates, small decrease in credit provision? (Bank of England, 2021, for crypto scenario and not CBDC)



# Credit institutions balance sheet management: role of regulatory constraints

- Aggregate results: Liquidity Coverage Ratios do not become binding
- Composition effects: results may differ for individual banks
- If LCR becomes binding: balance sheet adjustment needed
- Adjustment more through stable funding than liquid assets? (Duijm and Wierds, 2016, IJCB)

	Current: excess reserves	Hypothetical: no excess reserves
Current LCR (2020 data)	172%	102%
LCR in scenario 1: low D€ holdings	171%	102%
LCR in scenario 1: larger D€ holdings	145%	106%

# Conclusion

- Would the introduction of a D€ **extend the CB balance sheet?**
  - **No**, not necessarily in the current situation of excess reserves
  - **Yes**, in a hypothetical situation without excess reserves (but starting from a smaller balance sheet)
- Would the introduction of a D€ increase funding costs in the banking system? **It depends**
  - What is the rate of CB remuneration on (excess) reserves or funding relative to market rates?
  - Do LCRs or other balance sheet constraints become binding?
- The balance sheet effects of a well-designed D€ introduction appear manageable, in terms of size and possible behavioural responses

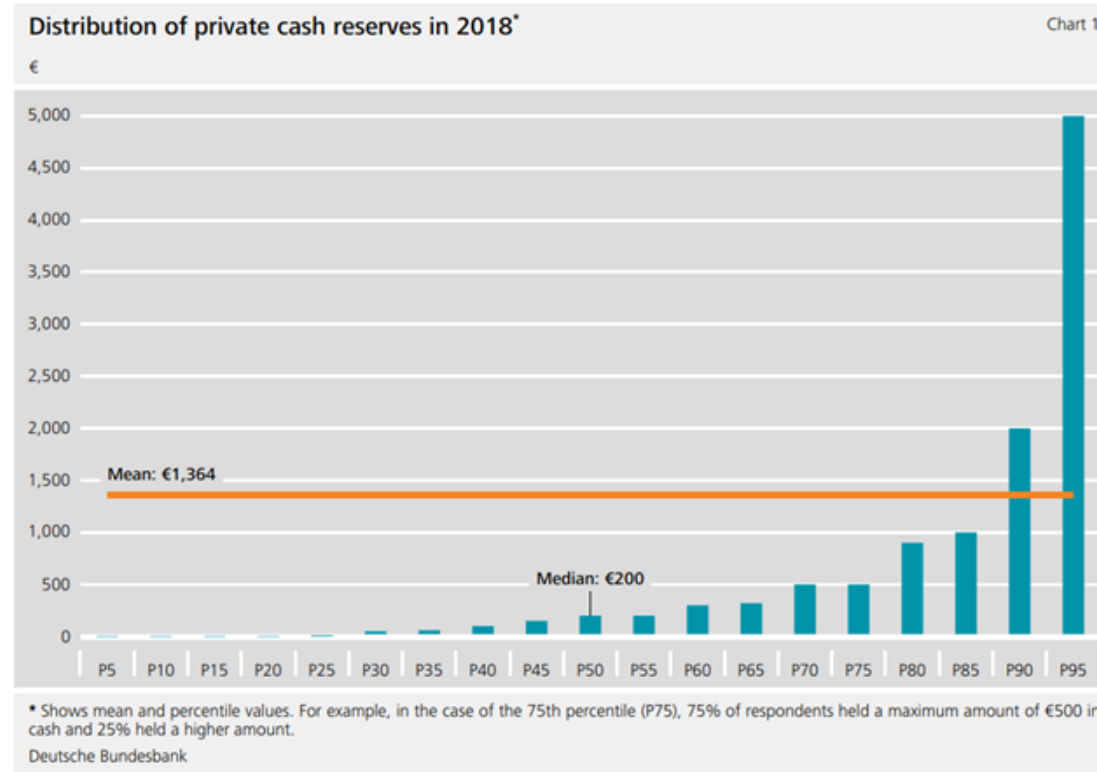
# ANNEX

# Overview of scenarios

Scenario's		Assumed average holdings	Euro area approximation
<b>1. Smaller holdings</b> (Based on Bijlsma et al., 2021)	Natural persons	€200	<b>€ 57 bn</b>
<b>2. Larger holdings</b> (based on Bindseil, 2020, for natural persons; based on own calculations for entities with legal status; overview for NL translated proportionally to euro area)	Natural persons	€ 3000	€ 860 bn
	Entities with legal status	€ 8000	€ 561 bn
		€ 30.000 large NFCs	
		Total	<b>€ 1.421 bn</b>

# Scenario's based on Tiering: low substitution from cash holdings to D€?

See also ECB SPACE (2020): one out of three respondents kept cash reserves at home in 2019, 75% of those had less than €500; 2% kept over €10.000



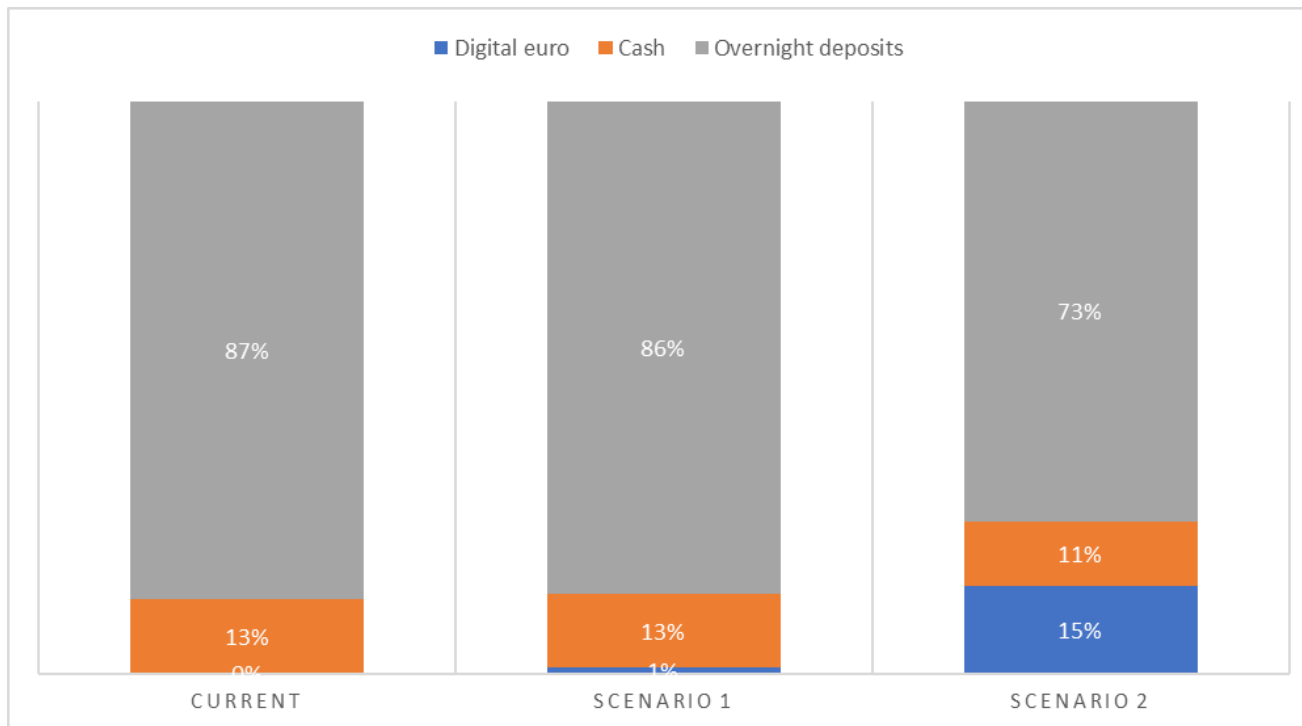
# Households, Euro area aggregate, in € bn

	Assets	D€ scenario		Liabilities	D€ scenario	
		1	2		1	2
Non financial assets, of which:	36.251			Liabilities, of which:	7.982	
<i>Housing</i>	34.450			<i>Loans, of which:</i>	7.095	0
				<i>Of which: from euro area credit institutions/banks</i>	6.133	0
Financial assets, of which:	27.292			<i>Trade credit</i>	208	
<i>Digital euro</i>		57	860	Net worth	55.561	
<i>Currency (cash)</i>	737	-7	-95			
<i>Deposits, of which:</i>	8.587	-50	-766			
<i>Overnight</i>	4.920	-50	-766			
<i>Debt securities</i>	514					
<i>Equity and investmen fund shares</i>	7.339					
<i>Life insurance</i>	5.071					
<i>Pension schemes</i>	3.745					
<b>Total assets</b>	<b>63.543</b>	<b>0</b>	<b>0</b>	<b>Total liabilities</b>	<b>63.543</b>	<b>0</b>

Source: calculations by authors based on SDW, euro area accounts, outstanding amounts 2020 end Q4, € bn.

Note: we use European format. A point (.) separates 1000 so that 'trillions' are easily identifiable. For example €8.587 bn of deposits as indicated in the table is €8.6 trillion in American format.

# Main impact of scenario's for households



Source: calculations by authors based on SDW, euro area accounts, data for 2020 end Q4, and scenarios

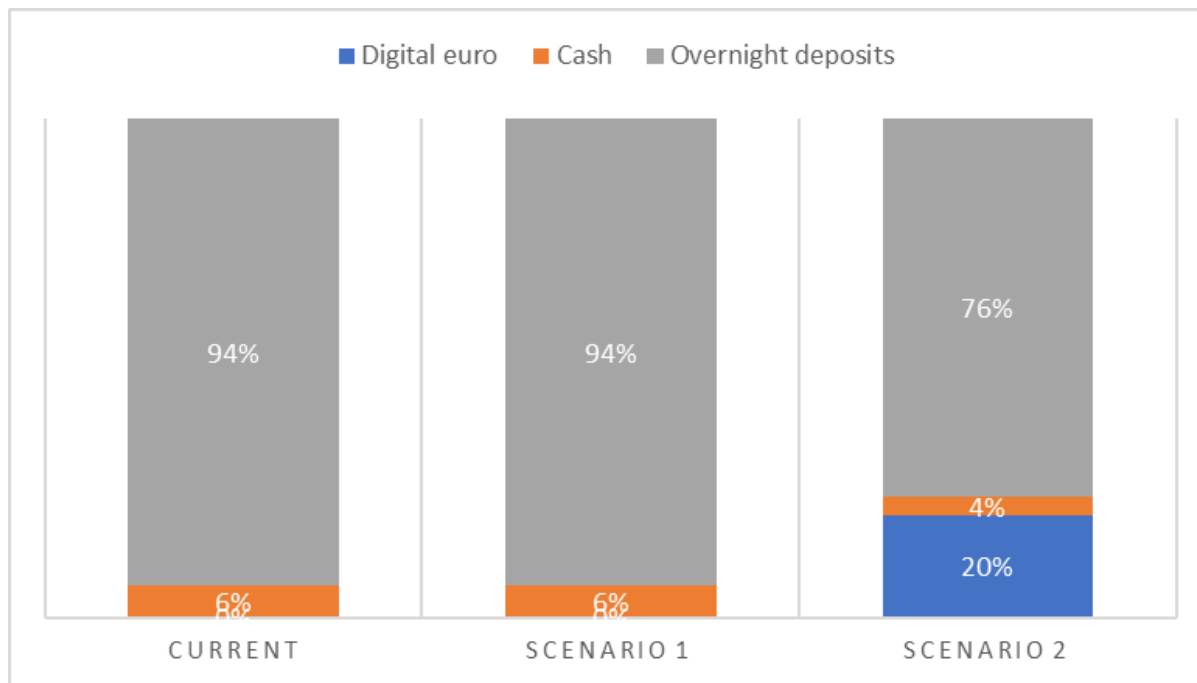
# Non-financial corporations

	Assets	D€ scenario		Liabilities	D€ scenario	
		1	2		1	2
Financial assets, of which:	28.559			Financial liabilities, of which:	40.260	
<i>Currency and deposits, of which:</i>	3.407			<i>Debt securities</i>	1.683	
<i>Digital euro</i>		0	561	<i>Loans, of which:</i>	11.336	0
				<i>from credit</i>		
<i>Bank deposits, of which:</i>	3.140	0	-488	<i>institutions/banks</i>	4.850	
<i>Overnight</i>	2.560	0	-488	<i>Shares and other equity</i>	21.970	
<i>Debt securities</i>	222			<i>Trade credits and advances</i>	3.288	
<i>Loans</i>	5.202			<i>Other liabilities</i>	1.984	
<i>Shares and other equity</i>	14.934					
<i>Other financial assets</i>	4.794					
<i>Cash</i>	177	0	-73			
Non financial assets	#N/A					
<b>Total assets</b>	28.559	0	0	<b>Total financial liabilities</b>	40.260	0

Source: calculations by authors based on SDW, euro area accounts, outstanding amounts 2020 end Q4, € bn



# Main impact for non-financial corporations



Source: calculations by authors based on SDW, euro area accounts, data for 2020 end Q4, and scenarios

# Credit institutions – 2020 Q4 data (pass through with excess reserves)

	D€ scenario			D€ scenario		
	Assets	1	2	Liabilities	1	2
Loans to euro area residents, of which:	21.460	0	0	Deposits of euro area residents, of which:	21.368,00	-50 -1.253
<i>General government</i>	980			<i>Central government</i>	147	
<i>Other euro area residents, of which:</i>	12.035			<i>Other general government/other euro area residents, of which:</i>	14.279	
<i>Households</i>	6.133			<i>Households, of which:</i>	8.340	-50 -766
<i>NFCs (corporates)</i>	4.850			<i>Overnight</i>	4.920	-50 -766
<i>MFI's</i>	8.443			<i>NFC's, of which:</i>	3.140	0 -488
Holdings of debt securities issued by euro area residents, of which:	3.432			<i>Overnight</i>	2.560	0 -488
<i>General government</i>	1.601			<i>MFI's</i>	6.941	
<i>Other euro area residents</i>	1.057			Debt securities issued	3.523,10	
<i>MFI's</i>	774			Loans from central bank	1.793	
<i>Cash</i>	90			Capital and reserves	2.565	
CB reserves	3.489	-50	-1.253	Other liabilities	4.523	
Other assets	5.391					
<b>Total assets</b>	<b>33.772</b>	<b>-50</b>	<b>-1.253</b>	<b>Total liabilities</b>	<b>33.772</b>	<b>-50 -1.253</b>

Source: calculations by authors based on SDW, aggregated balance sheet of euro area credit institutions, euro area accounts, outstanding amounts 2020 end Q4, € bn

# Central bank – 2020 Q4 data (pass through with excess reserves)

	D€ scenario			D€ scenario	
	1	2		1	2
<b>Assets</b>			<b>Liabilities</b>		
Loans to banks	1.793		Digital euro	57	1.421
Securities held for monetary purposes, of which:	3.695		Banknotes in circulation, of which:	1.435	-7
<i>Corporate bonds</i>	250		<i>EA Households</i>	737	-7
<i>Government bonds</i>	2.342		<i>EA NFCs</i>	177	0
<i>Bank bonds</i>	288		<i>EA Credit institutions</i>	90	
Other assets	1.491		<i>Rest of world</i>	430	
			Bank reserves, of which:	3.489	-50
			<i>Excess reserves</i>	2.817	-50
			Other liabilities	1.947	
			Capital and reserves	109	
<b>Total assets</b>	6.979	0	<b>Total liabilities</b>	6.979	0

Source: calculations by authors based on SDW, consolidated balance sheet of the Eurosystem at 31 December 2020, € bn

# Credit institutions – 2020 Q4 data but without excess reserves

	D€ scenario			D€ scenario			
	Assets	1	2	Liabilities	1	2	
Loans to euro area residents, of which:	21.460	0	0	Deposits of euro area residents, of which:	21.368,00	-50	-1.253
<i>General government</i>	980			<i>Central government</i>	147		
<i>Other euro area residents, of which:</i>	12.035			<i>Other general government/other euro area residents, of which:</i>	14.279		
<i>Households</i>	6.133			<i>Households, of which:</i>	8.340	-50	-766
<i>NFCs (corporates)</i>	4.850			<i>Overnight</i>	4.920	-50	-766
<i>MFI's</i>	8.443			<i>NFC's, of which:</i>	3.140	0	-488
Holdings of debt securities issued by euro area residents, of which:	3.432			<i>Overnight</i>	2.560	0	-488
<i>General government</i>	1.601			<i>MFI's</i>	6.941		
<i>Other euro area residents</i>	1.057			Debt securities issued	3.523,10		
<i>MFI's</i>	774			Loans from central bank	1.793	50	1253
<i>Cash</i>	90			Capital and reserves	2.565		
CB reserves	672	0	0	Other liabilities	1.706		
Other assets	5.391						
<b>Total assets</b>	<b>30.955</b>	<b>0</b>	<b>0</b>	<b>Total liabilities</b>	<b>30.955</b>	<b>0</b>	<b>0</b>

Source: calculations by authors based on SDW, aggregated balance sheet of euro area credit institutions, euro area accounts, outstanding amounts 2020 end Q4, € bn

# Central bank – 2020Q4 data but without excess reserves

	D€ scenario			D€ scenario		
		1	2	Liabilities	1	2
<b>Assets</b>						
Loans to banks	1.793	50	1.253	Digital euro	57	1.421
Securities held for monetary purposes, of which:	1.695			Banknotes in circulation, of which:	1.435	-7
<i>Corporate bonds</i>	250			<i>EA Households</i>	737	-7
<i>Government bonds</i>	342			<i>EA NFCs</i>	177	0
<i>Bank bonds</i>	288			<i>EA Credit institutions</i>	90	
Other assets	674			<i>Rest of world</i>	430	
				Bank reserves, of which:	672	0
				<i>Excess reserves</i>	0	0
				Other liabilities	1.947	
				Capital and reserves	109	
<b>Total assets</b>	4.162	50	1.253	<b>Total liabilities</b>	4.162	50

Source: calculations by authors based on SDW, consolidated balance sheet of the Eurosystem at 31 December 2020, € bn