

Harvard Kennedy School – Study Group
October 2023

Digital Monies

Sessions:

Tuesday October 10, 4:15 – 5: 30 PM: **Money and technology through the ages**

Tuesday October 17, 4:15 – 5: 30 PM: **The digital revolution in money and payments**

Tuesday October 24, 4:15 – 5: 30 PM: **Central Bank Digital Currencies**

Tuesday October 31, 4:15 – 5: 30 PM: **Monetary institutions for the digital age**

Ignazio Angeloni
(European University Institute)

What are CBDCs



“Central Bank Digital Currencies”:
digital cash offered by central banks

A skeleton monetary system

A	Non-Financial Sector	L
Deposits	Loans	
Banknotes		

A	Banks	L
Loans	Deposits	
Liquidity	CB financing	

A	Central bank	L
CB financing	Banknotes	
	Liquidity	

The digital euro replaces banknotes

A	NF sector	L
Deposits	Loans	
Banknotes -		
CBDC +		

A	Banks	L
Loans	Deposits	
Liquidity	CB financing	

A	Central bank	L
CB financing	Banknotes -	
	Liquidity	
	CBDC +	

Why CBDCs?

The usual arguments one hears:

“Cash is used less and less; central banks must be ready for its disappearance”

“Everything turns digital these days, why not cash?”

IMF lists 7 reasons^(*):

1. financial inclusion
2. access to payments
3. making the payment system more efficient
4. payments resilience
5. reducing illicit use of money
6. monetary sovereignty
7. enhancing competition

Wikipedia, 10 reasons:

- See https://en.wikipedia.org/wiki/Central_bank_digital_currency for details

Source: “Behind the Scenes of Central Bank Digital Currency: Emerging Trends, Insights, and Policy Lessons”, IMF Fintech Note, February 9, 2022, available [here](#).

FAVOURABLE

ON THE FENCE

SKEPTICAL

China, Bahamas,
Nigeria

EU
Commission

ECB

Bank of England

White
House?

Fed

Experts, academics

German public
opinion

Central banks of:
Australia, Sweden,
Switzerland

“Cash is used less and less; central banks must be ready for its disappearance”

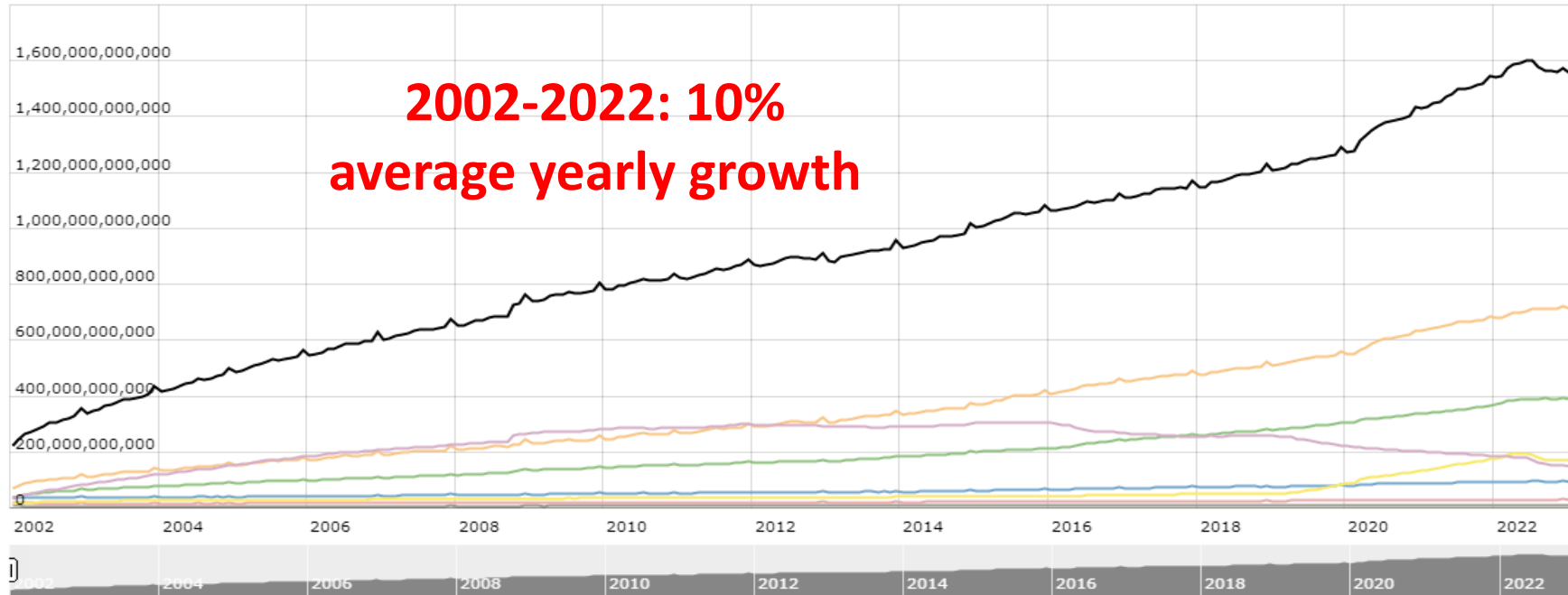
Euro banknotes (value)

Value | Quantity

Banknotes | Coins

From: 01-01-2002 to: 01-04-2023 Zoom: 3m 6m 1y 2y 5y 10y all

Chart | Table



Total

€5

First series

Europa series

€10

First series

Europa series

€20

First series

Europa series

€50

First series

Europa series

€100

First series

Europa series

€200

First series

Europa series

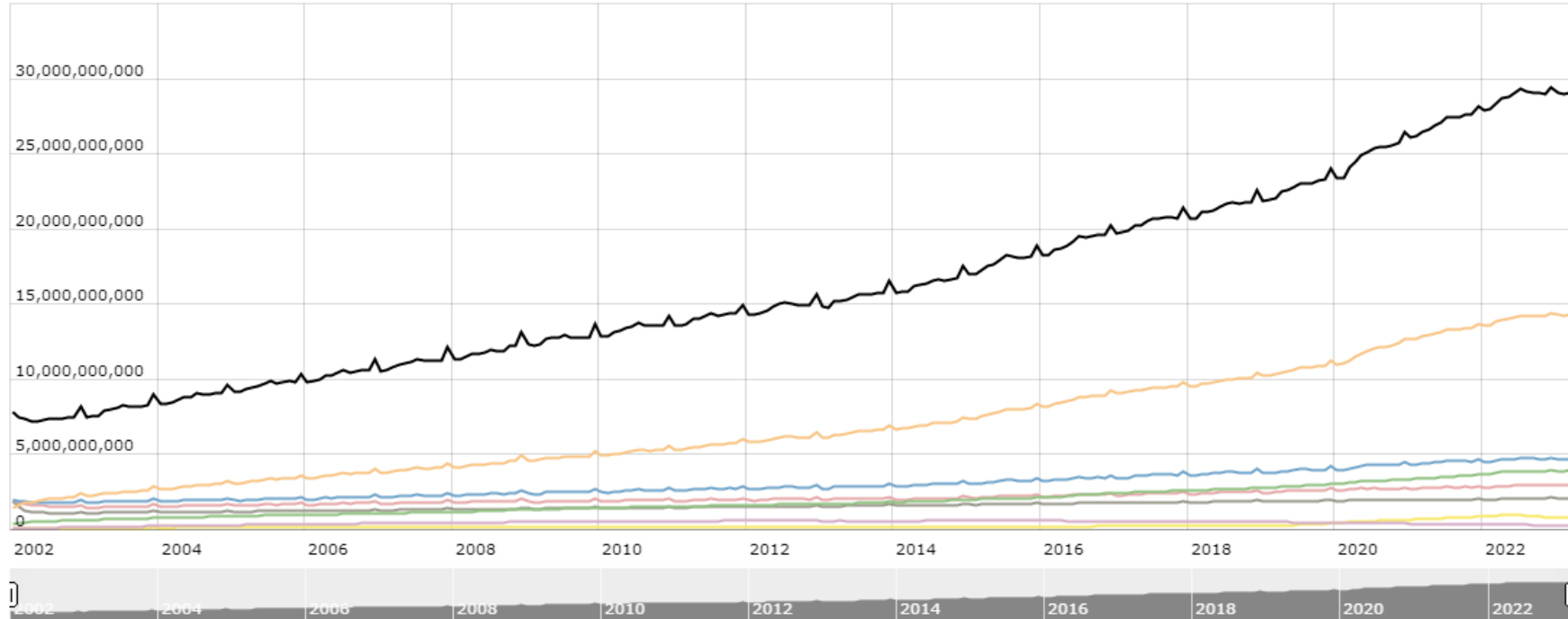
€500

Source: ECB

Euro banknotes (number)

Value | **Quantity** | Banknotes | Coins From: 01-01-2002 to: 01-04-2023 Zoom: 3m 6m 1y 2y 5y 10y all

Chart | Table



Total

€5

First series

Europa series

€10

First series

Europa series

€20

First series

Europa series

€50

First series

Europa series

€100

First series

Europa series

€200

First series

Europa series

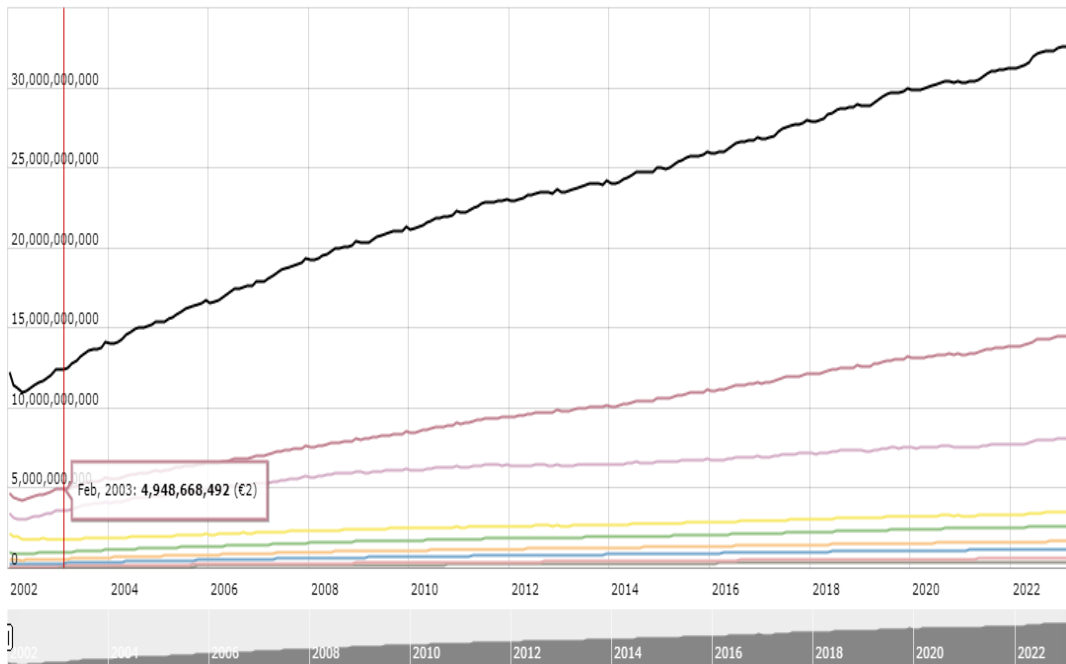
€500

Source: ECB

Euro coins

value

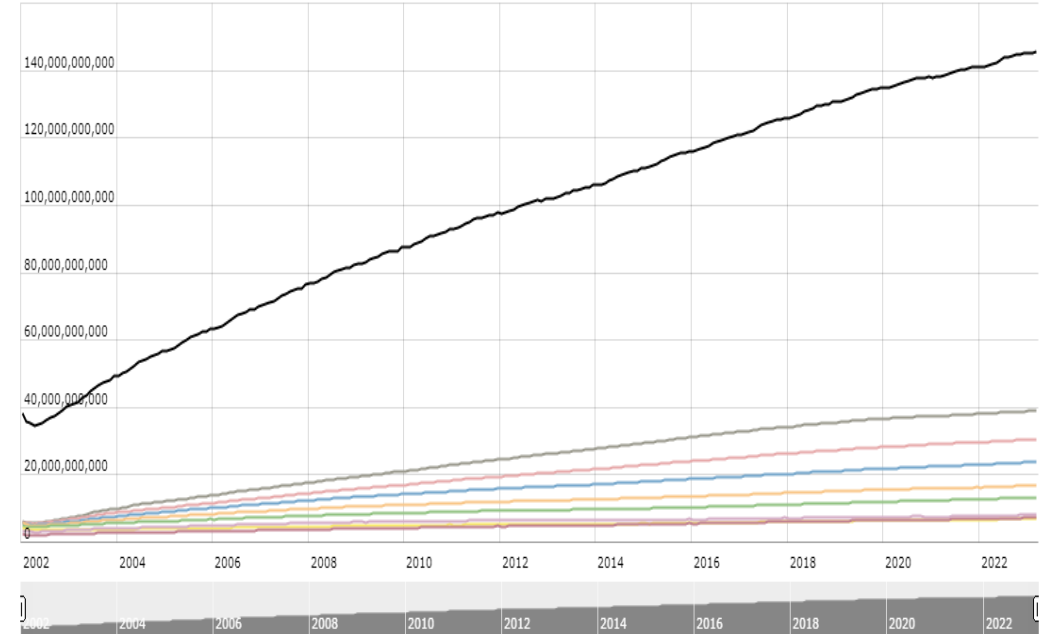
Value | Quantity | Banknotes | Coins From: 01-01-2002 to: 01-04-2023 Zoom: 3m 6m 1y 2y 5y 10y all Chart | Table



- Total
- 1 cent
- 2 cents
- 5 cents
- 10 cents
- 20 cents
- 50 cents
- €1
- €2

number

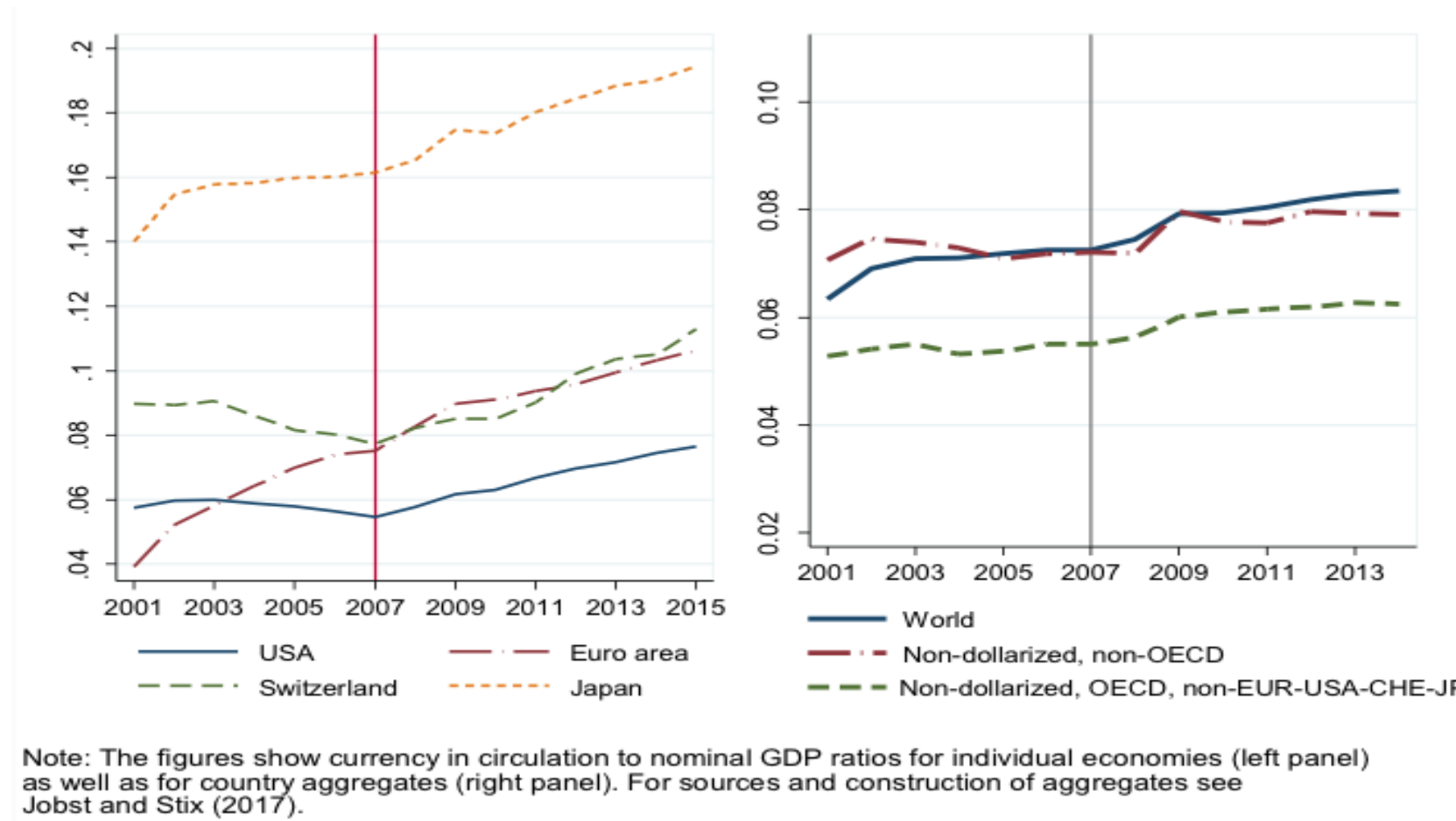
Value | Quantity | Banknotes | Coins From: 01-01-2002 to: 01-04-2023 Zoom: 3m 6m 1y 2y 5y 10y all Chart | Table



- Total
- 1 cent
- 2 cents
- 5 cents
- 10 cents
- 20 cents
- 50 cents
- €1
- €2

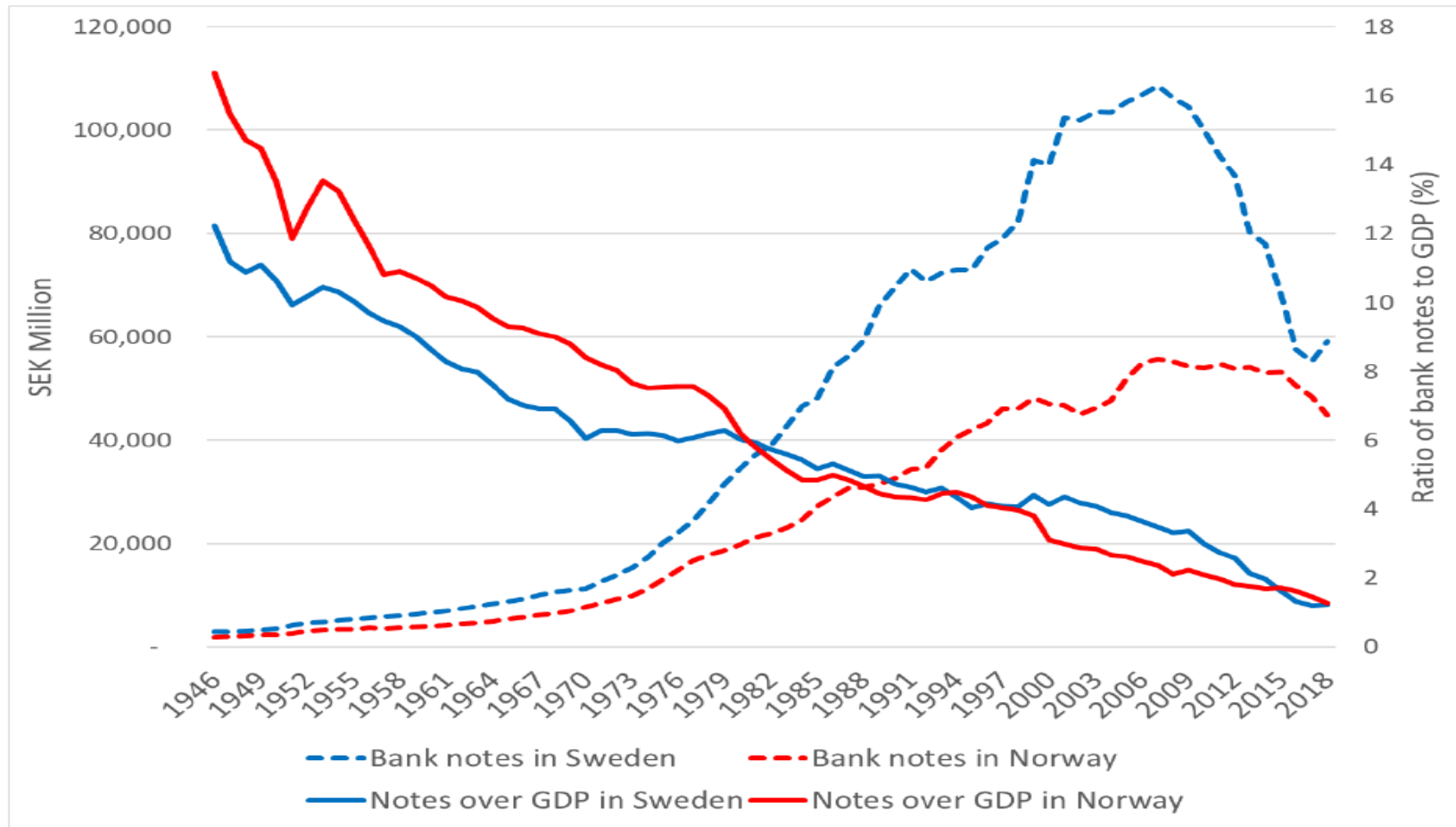
Source: ECB

Banknotes over nominal GDP (world)



Source: H. Stix and C. Jobst, "The cash comeback: Evidence and possible explanations"; VoxEU, November 2017

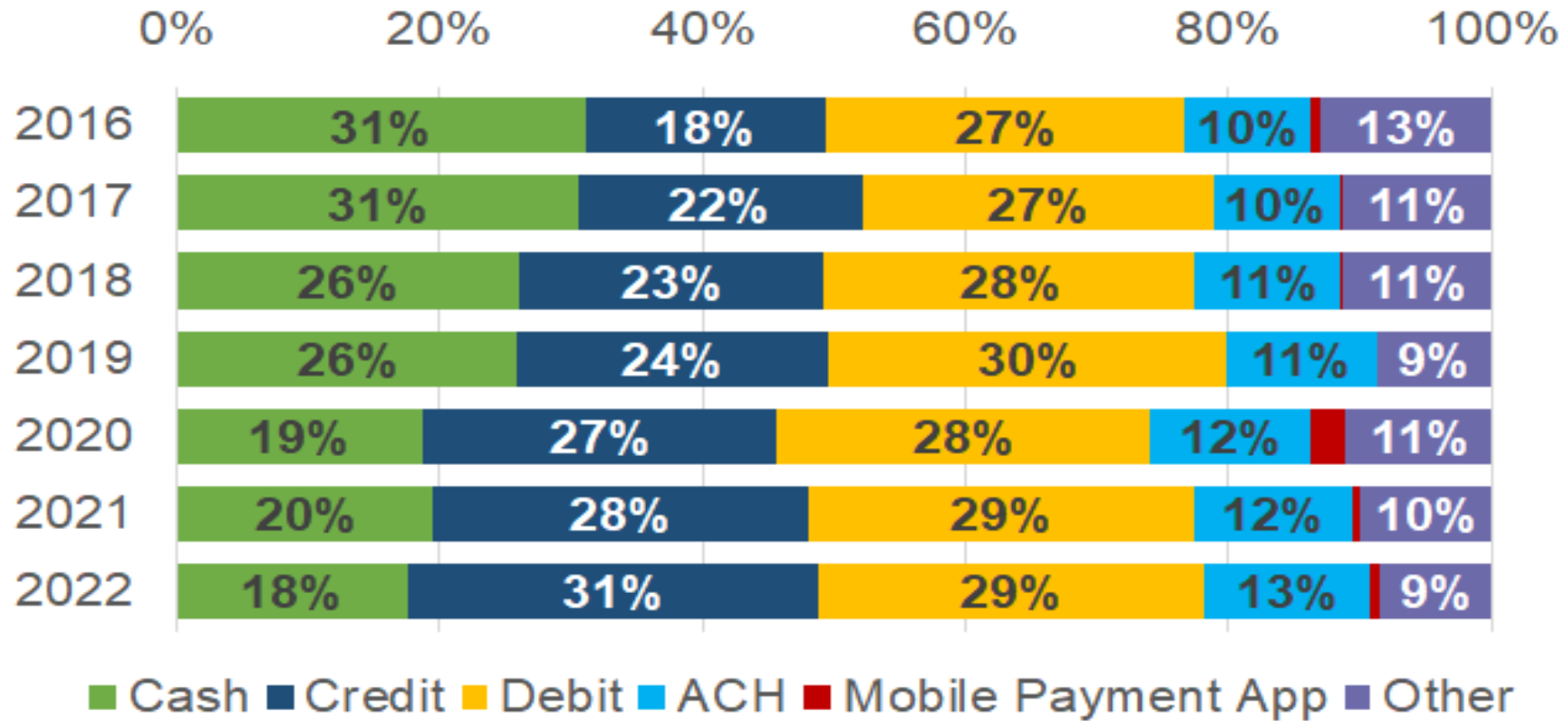
The exceptions: Sweden and Norway



Source: Engert, Walter; Fung, Ben; Segendorff, Björn, A tale of two countries: Cash demand in Canada and Sweden; Sveriges Riksbank Working Paper Series, No. 376

Payment habits in the US

Share of payment instrument use for all payments



Source: FRB of S. Francisco, Findings from the Diary of Consumer Payment Choice, 2023

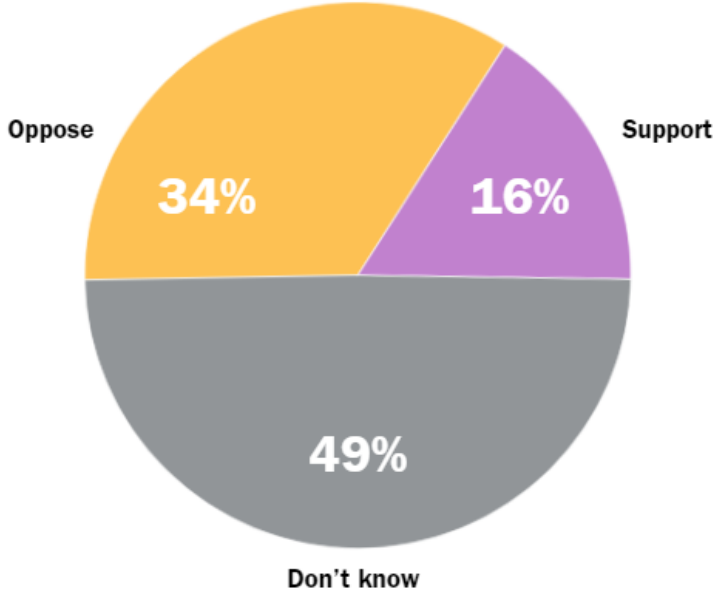
What do people think?

Eurozone

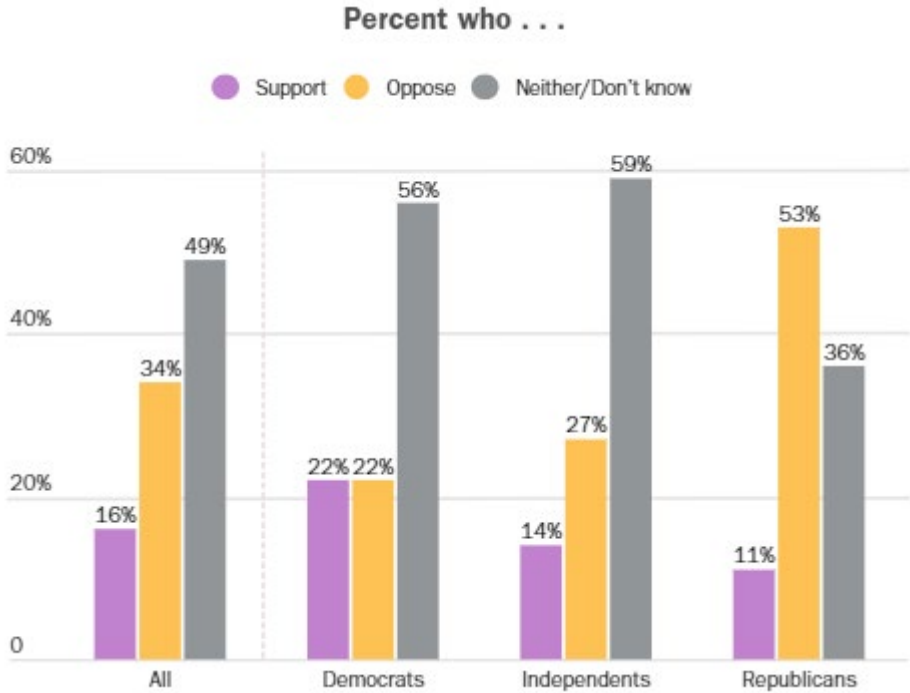
- People appreciate user-friendly, efficient digital payment means
- They see no difference between bank and central bank money
- They value privacy a lot
- They are concerned about the potential disappearance of cash
- They distrust banks as custodian of personal information

Source: Kantar Public, *Study on New Digital Payment Methods*, March 2022, available [here](#).

United States



Source: Cato Institute 2023 CBDC National Survey.



Source: CATO Institute, *Only 16% of Americans support the government issuing a central bank digital currency*; May 2023, available [here](#).

What are different countries doing?

The front-runners

China: ([MIT Technology Review August 2023](#))

- e-CNY Rolled out initially (2020) in a few regions
- Goal: centralize payments, defeating Alibaba's Alipay and Tencent's WeChat
- Retail model; individuals are offered alternative accounts with transaction limits and caps
- Front-end functions outsourced to banks and other private providers
- Private sector is pressured in various ways. Gov't employees are paid in e-CNY
- Yet, in 2022 : 220 m. downloads (15% of the population) and 360 m. transactions (compared to the billions of Alipay (54% market share) and WeChat (42% market share))

Bahamas:

- The Sand Dollar was the first CBDC introduced, in 2021
- At end-2022, there were 300,000 SD outstanding, 0.06% of the existing stock of Bahamian cash

Nigeria:

- eNaira downloads: about 1 m (0.5% of the population). Less than 2% is used every week
- Technology is not a barrier: the share of crypto traders among Nigerian adults is the world's highest

ECB

- The ECB is actively promoting the “digital euro”
- They just launched a “preparation phase”, lasting 2 years, to draft legislation and do tests
- “The launch of the preparation phase is not a decision on whether to issue a digital euro”
- “After two years, the Governing Council will decide whether to move to the next stage of preparations”
- “It could be used from person to person, at the point of sale, in e-commerce and in government transactions”

Source: “Eurosystem proceeds to next phase of digital euro project”, 18 October 2023, available [here](#).

Federal Reserve

- There seem to be different views among Fed Board governors
- “A solution in search of a problem” (C. Waller, 2021)
- M. Bowman (speech on April 2023, quotes):
 - ‘what current frictions exist or may emerge in the payment system that *only* a CBDC can solve, or that a CBDC can solve *most efficiently*?’
 - ‘it is important that the Federal Reserve is a part of the ongoing conversations around CBDCs, whether or not a CBDC is ultimately created in the United States.’
 - ‘there could be some promise for wholesale CBDCs in the future for settlement of certain financial market transactions and processing international payments.’
 - ‘it is difficult to imagine a world where the tradeoffs between benefits and unintended consequences could justify a direct access CBDC for uses beyond interbank and wholesale transactions.’

Are US currency denominations superseded?



Introduced in 1869

Worth about 4% of its original value

Coins are largely useless



Introduced in 2002

Worth about 67% of its original value



Introduced in 1983

Worth about 24% of its original value

“Digital Cash” already exists

- All licensed banks today have accounts at the central banks. This is economically equivalent to digital cash
- The novelty therefore is not that cash would become digital.
- It is that the facility would be extended to individuals (so-called retail CBDC) and/or corporates (wholesale CBDC)

Retail vs Wholesale CBDC

Retail CBDC:

- Millions of central bank accounts (as opposed to few hundreds)
- Many small payments, lots of back-office work
- Would facilitate financial inclusion? Workers' remittances?

Wholesale CBDC:

- Few (additional) hundreds of central bank accounts
- Few large-value payments
- No implication for financial inclusion.
- May facilitate corporate treasurers' operations, especially across borders

Prevailing design choices for retail CBDCs

- No remuneration
- Free-of charge
- Strict holding limits to limit use for non-transaction purpose and bank dis-intermediation
- Outsourcing all front-end functions to banks

Economic impact

A skeleton monetary system

A	NF sector	L
Deposits	Loans	
Banknotes		

A	Banks	L
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A	Central bank	L
CB financing	Banknotes	
	Liquidity	

1: The digital euro replaces banknotes

A	NF sector	L
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CBDC +		

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A	Central bank	L
CB financing	Banknotes -	
	Liquidity	
	CBDC +	

Substitution with bank deposits is more likely

- Banknotes are tangible, easy to use, and fully private; the digital euro would never have these characteristics
- A CBDC would be like a bank deposit. It would require the holder to:
 1. *Go to a bank, identify oneself*
 2. *Fill out the usual forms*
 3. *Open an online account, memorize Login and PIN codes*
 4. *Download a dedicated app in a digital wallet*
 5. *Transfer funds, etc.*

Implications for monetary policy

Skeleton monetary system

A	NF sector	L	A	Banks	L	A	Central bank	L
Deposits		Loans	Loans		Deposits	CB financing		Banknotes
Banknotes			Liquidity		CB financing			Liquidity

The digital euro replaces bank deposits

A	NF sector	L	A	Banks	L	A	Central bank	L
Deposits -		Loans	Loans		Deposits -	CB financing		Banknotes
Banknotes			Liquidity -		CB financing			Liquidity -
CBDC +								CBDC +

Monetary policy would be affected via the credit channel

Implications for financial stability

Managing a bank run

A	NF Sector	L
Dep. = 200		Loans=200
B.notes = 0		

A	Bank A	L
Loans=100		Dep.=100
Liq. = 10		CB fin. = 10

A	Bank B	L
Loans=100		Dep.=100
Liq.=10		CB fin.=10

A	C. Bank	L
CB fin. = 20		B.notes = 0
		Liquidity = 20

What “normally” happens in a bank run *(assume for simplicity cash=0)*

A	NF Sector	L
Dep. = 200		Loans=200
B.notes = 0		

A	Weak bank	L
Loans=100		Dep.=100
Liq.=10		CB fin. = 10
		ELA.= 90

A	Strong bank	L
Loans=100		Dep.=100
Liq.=10		CB fin.=10
Liq. = 100		Dep.=100

A	Central Bank	L
CB fin. = 20		B.notes = 0
ELA.= 90		Liq.=10
		Liq. = 100

The presence of a strong bank tends to mitigate the contractionary effect of the crisis

Managing a run with CBDCs

A run with CBDCs

A	NF Sector	L
Dep. = 200	Loans=200	
B.notes = 0		
Dep. = 100		
CBDC = 100		

A	Weak bank	L
Loans=100	Dep.=100	
Liq.=10	CB fin. = 10	
	ELA = 90	

A	Strong bank	L
Loans=100	Dep.=100	
Liq.=10	CB fin.=10	

A	Central Bank	L
CB fin. = 20	B.notes = 0	
ELA = 90	Liquidity = 10	
	CBDC = 100	

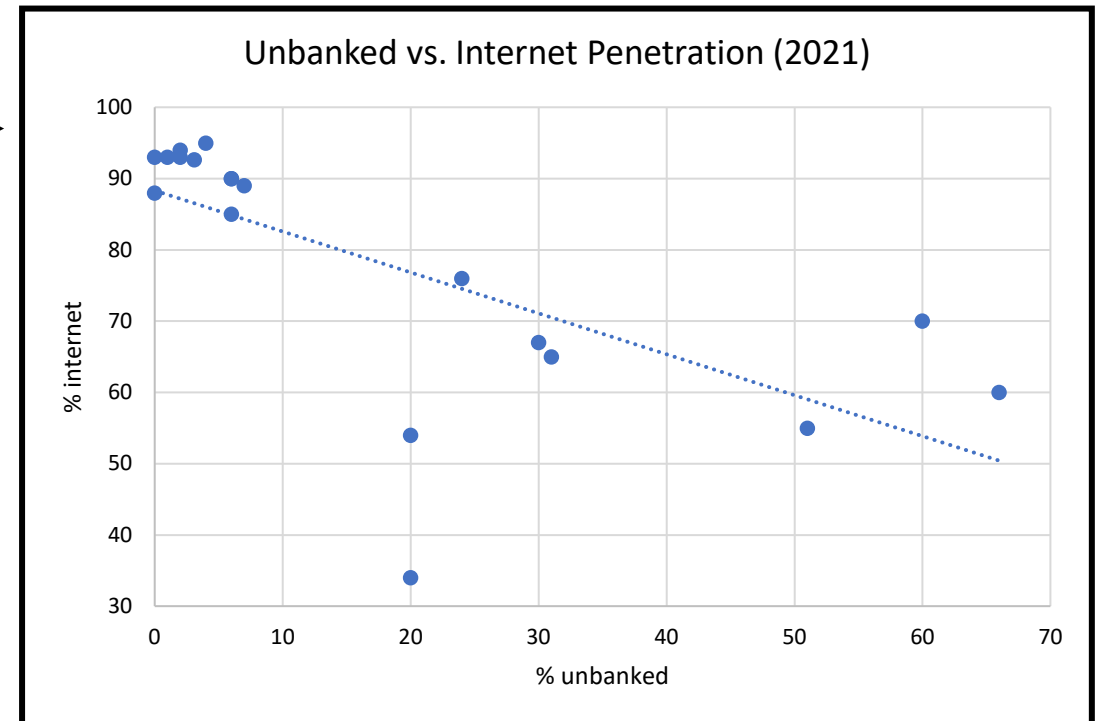
Without support from the strong bank, the contractionary effect of the banking crisis is stronger

Privacy

- Privacy is important for most people
- Not all demand for privacy is criminally motivated – though some of it is
- People tend to trust the central bank more than banks
- However, a CBDCs would not make a difference:
 - *Central banks would outsource all front-end functions to banks*
 - *All personal data would remain with the bank, responsible for KYC*

Financial inclusion

- Can CBDCs reduce the incidence of the “unbanked” (5% in the US)?
- Evidence on determinants of financial inclusion: income, gender, age, proximity, costs, other obstacles^(*)
- Digital education^(**) →
- The problem of remittances?



(*) F. Allen, A. Demirguc-Kunt, L. Klapper and M. Martinez Peria, World Bank Policy Report Working Paper 6290, 2012.

(**) Data source: Global Finance, available <https://www.gfmag.com/global-data/economic-data/worlds-most-unbanked-countries>

Cyprus 2013



Which circumstances may make CBDC necessary?

- Major private systems disruptions
- Security crises
- ?

Readings

“Behind the Scenes of Central Bank Digital Currency: Emerging Trends, Insights, and Policy Lessons”, IMF Fintech note, February 9, 2022, <https://www.imf.org/en/Publications/fintech-notes/Issues/2022/02/07/Behind-the-Scenes-of-Central-Bank-Digital-Currency-512174>

Federal Reserve Board CBDC page: <https://www.federalreserve.gov/central-bank-digital-currency.htm>

ECB Digital Euro page: https://www.ecb.europa.eu/paym/digital_euro/html/index.en.html

Ignazio Angeloni: “Digital Euro: When in Doubt, Abstain (But Be Prepared)”, paper prepared for the EU parliament, available at [https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/741507/IPOL_IDA\(2023\)741507_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/741507/IPOL_IDA(2023)741507_EN.pdf)