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Week 2, Session 3

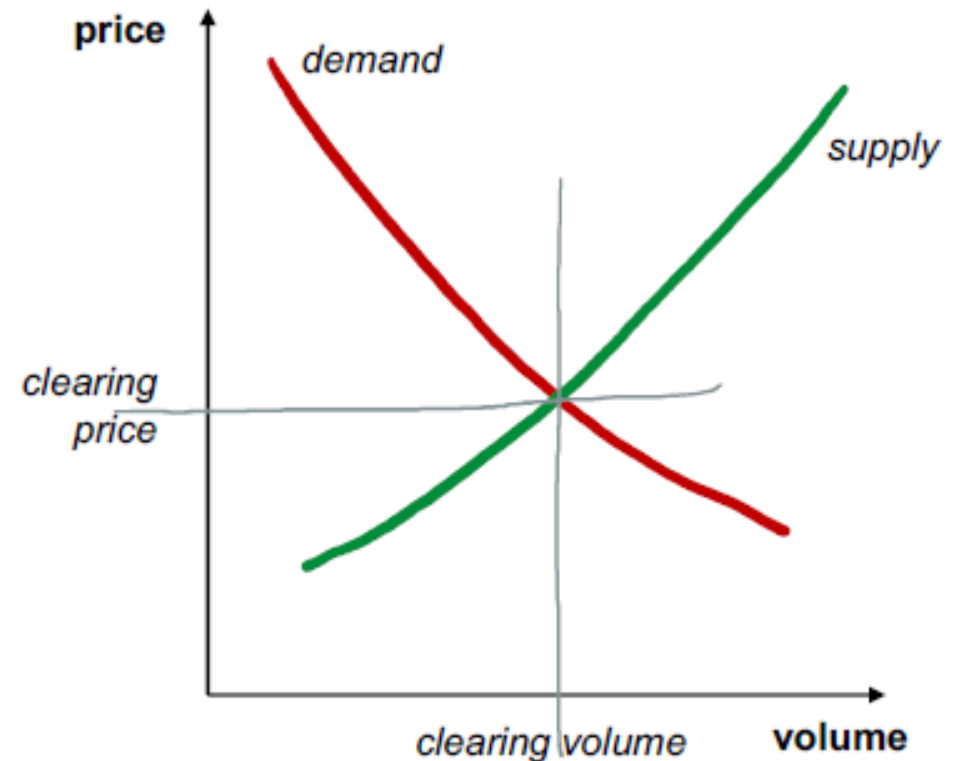
# Supply and Demand Framework

BLOC 528: Token Economics

# Supply and Demand Curves

The concept of supply and demand helps us think about how goods and services are provided and consumed.

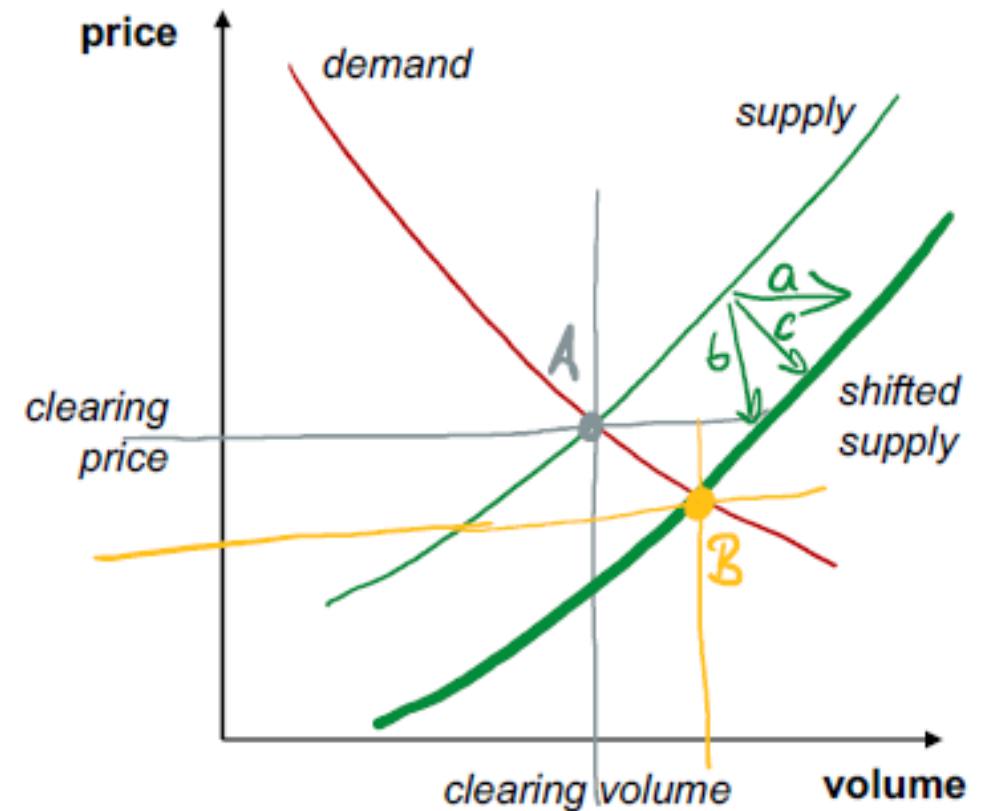
- Price behaves as a forcing function to equalize demand and supply – not necessarily quickly.
- The economy might not be in an “equilibrium,” but these forces are at play driving towards one.
- Green curve: the higher the price, the more the supplier wants to supply the product/service.
- Red curve: the lower the price, the more volume that a consumer will demand.



# Shifts in Supply

Factors that can shift the supply curve for goods and services, causing a different quantity to be supplied at any given price, include:

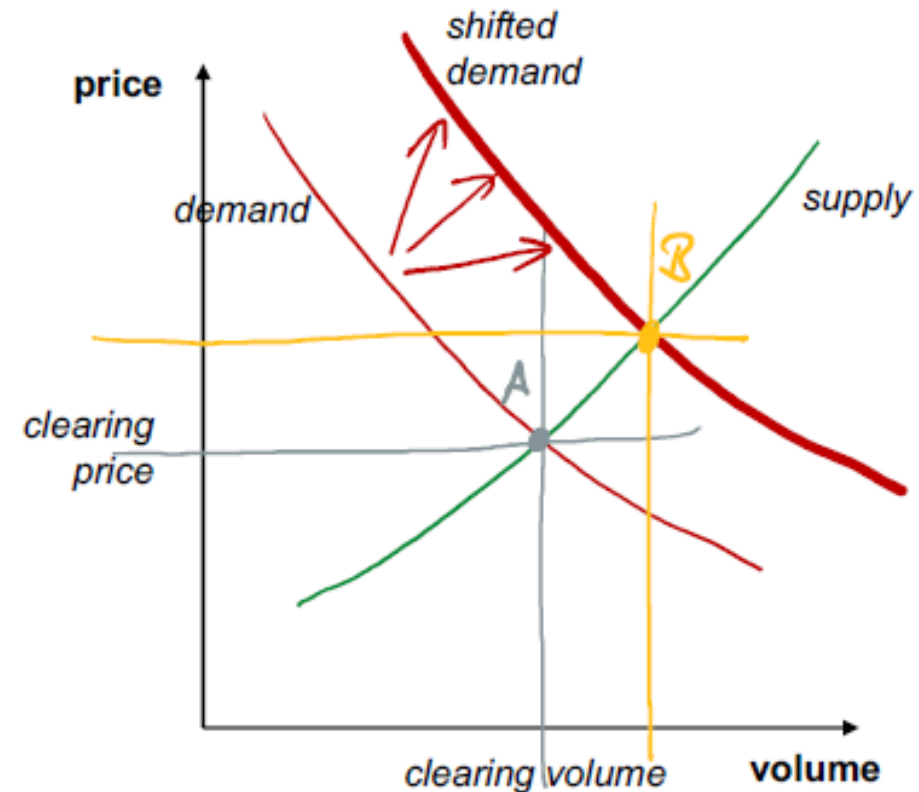
- Input prices
- Natural conditions
- Technology
- Government taxes
- Regulations
- Subsidies



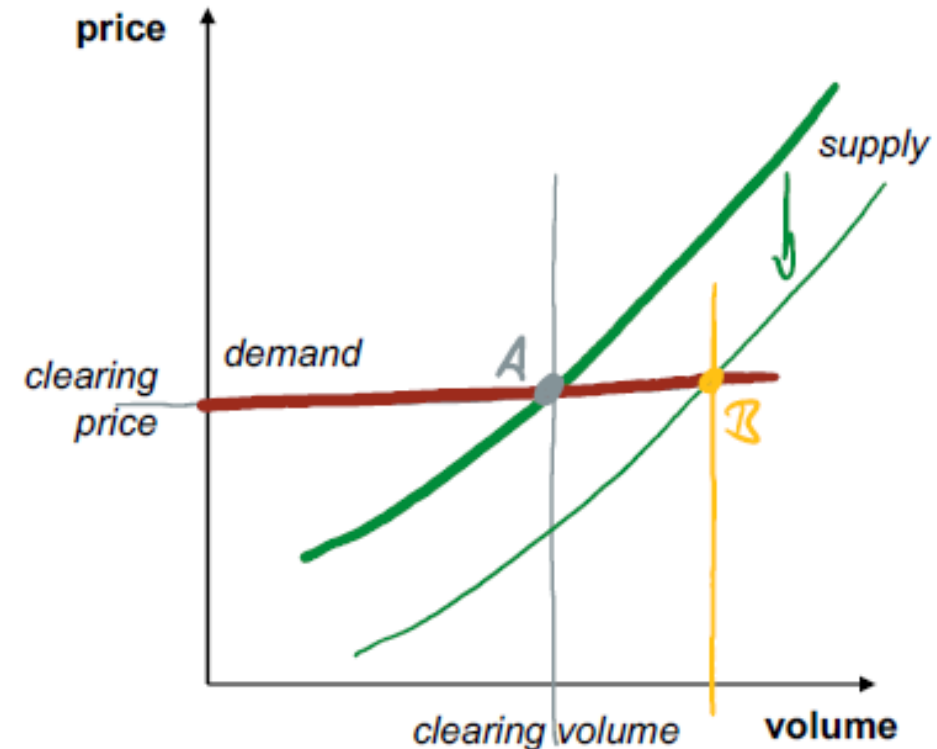
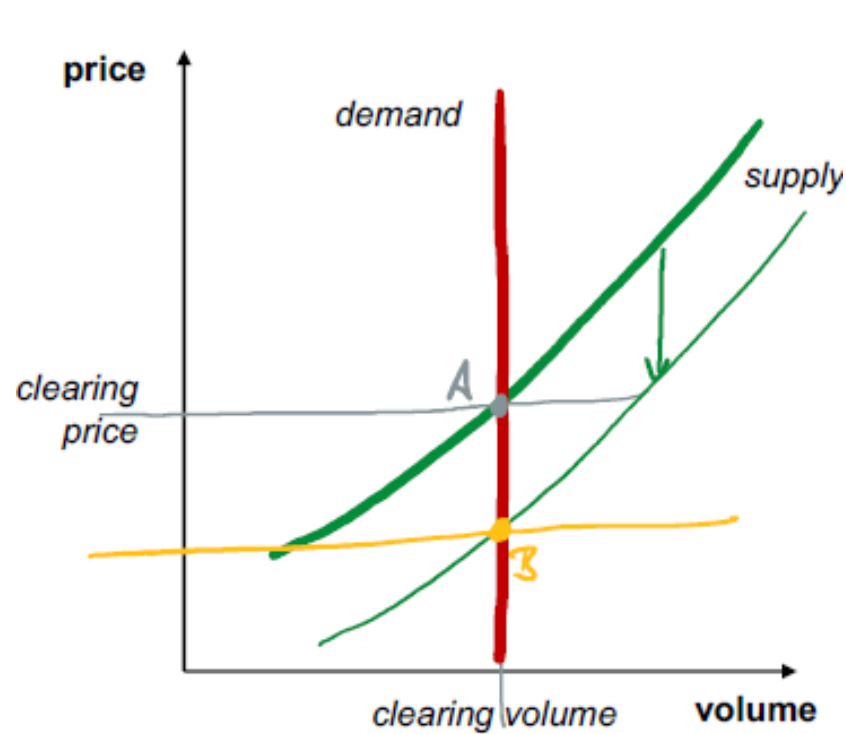
# Shifts in Demand

Factors that can shift the demand curve for goods and services, causing a different quantity to be demanded at any given price, include:

- Tastes
- Population
- Income
- Prices of substitute or complement goods
- Expectations about future conditions and prices



# Examples of Inelasticity and Fixed Supply or Demand



- Under inelastic demand, only the price can adjust and there is no compensatory volume effect.
- Under fixed price, there is infinite demand, but only at a given price and volume adjusts to what can be done

# Key Terms

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A stable coin is a token that is pegged to a sovereign currency. Tether, for example, is a common stable coin that is a one to one peg against the dollar, meaning that for every USDT in circulation, one USD is added to a centrally managed savings account as collateral.

There is cash and Central Bank Money, the latter being deposits directly at the Central Bank which usually is only possible for financial institutions. Bank deposits are promises by a bank to send central bank money to another bank on your behalf when requested. The money supply is the aggregate of all money in circulation.

Most exchanges today are centralized and they constitute the bulk of the volume in transactions. They function as the custodian of the users' tokens. That means hacks, mismanagement, volatility, and censorship are all possible under them, just like a centralized traditional financial institution.

An alternative are atomic swaps that use a hash time locked contract to ensure that a token transaction is secure. Here, users are in full control of their private keys and tokens in a trade.

Decentralized exchanges allow users to maintain their own digital ledger and trade tokens without a centralized institution clearing settlements. The downside is that the responsibility is all on the individual.

# Money

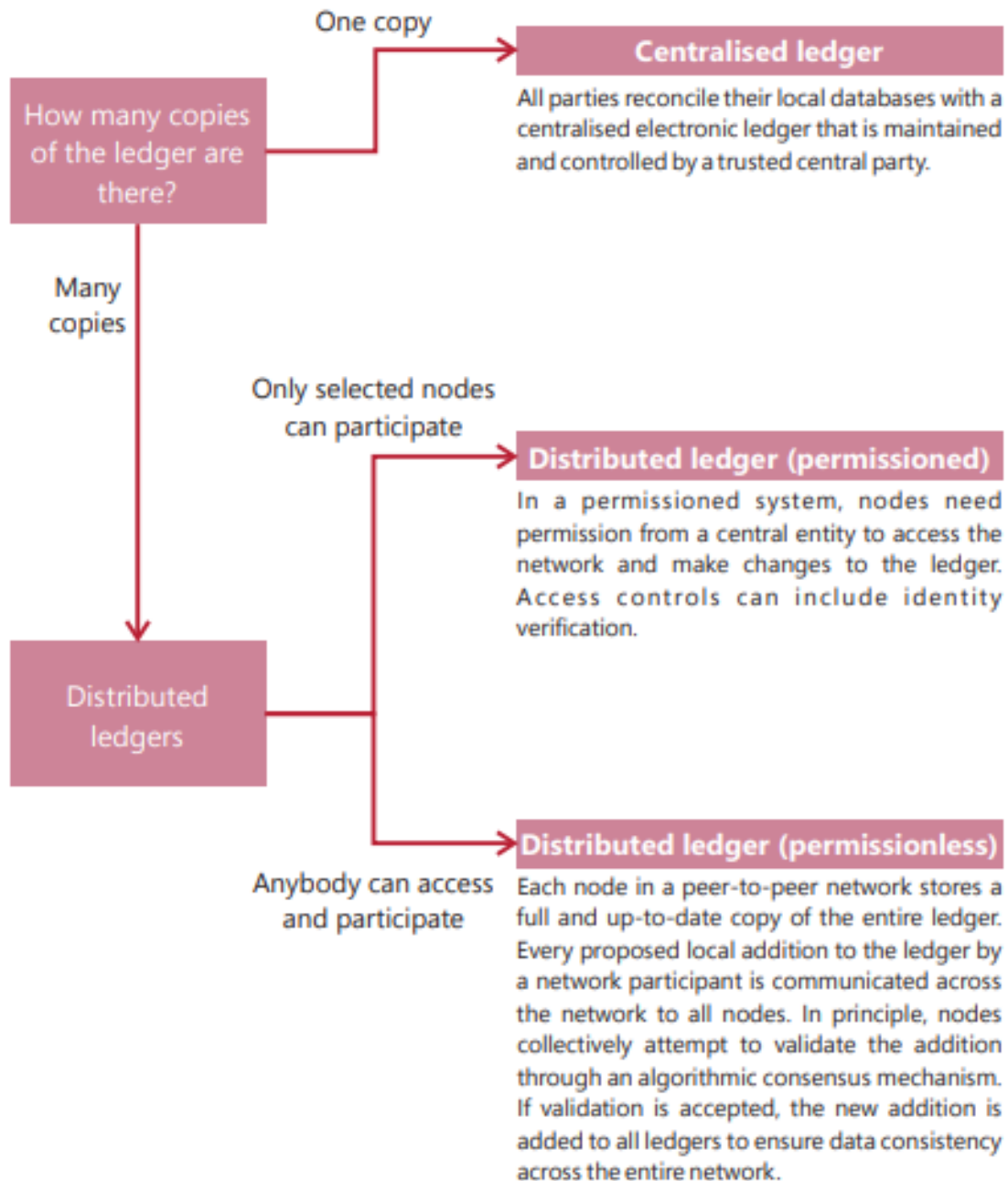
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Money has three primary goals:

- Unit of account
- Medium of exchange
- Store of value

That means money has to have the same value in different places and that value needs to remain stable value over time to enable investment. Often centralized entities have (tried to) provided such guarantees.

Cryptocurrencies differ fundamentally in their incorporation of distributed ledger technologies.



Permissioned versus permissionless DLTs come down to whether nodes in the network need approval.

Adapted from Natarajan et al. (2017) BIS and “cryptocurrencies beyond the hype”



# Central Banks

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Central banks are financial entities that function in countries or currency zones to support a monetary system and their responsibilities generally cover:

- Creating rules and regulations for private commercial banking to operate within
- Monitoring financial stability
- Mitigating inflation and promoting employment (“dual mandate”)
- Functioning as a “lender of last resort” during times of crisis

In 1993, John Taylor wrote a seminal paper “Discretion versus policy rules in practice” that asks how central bankers can adhere to simple policy rules that adjust interest rates as a function of inflation and real GDP.

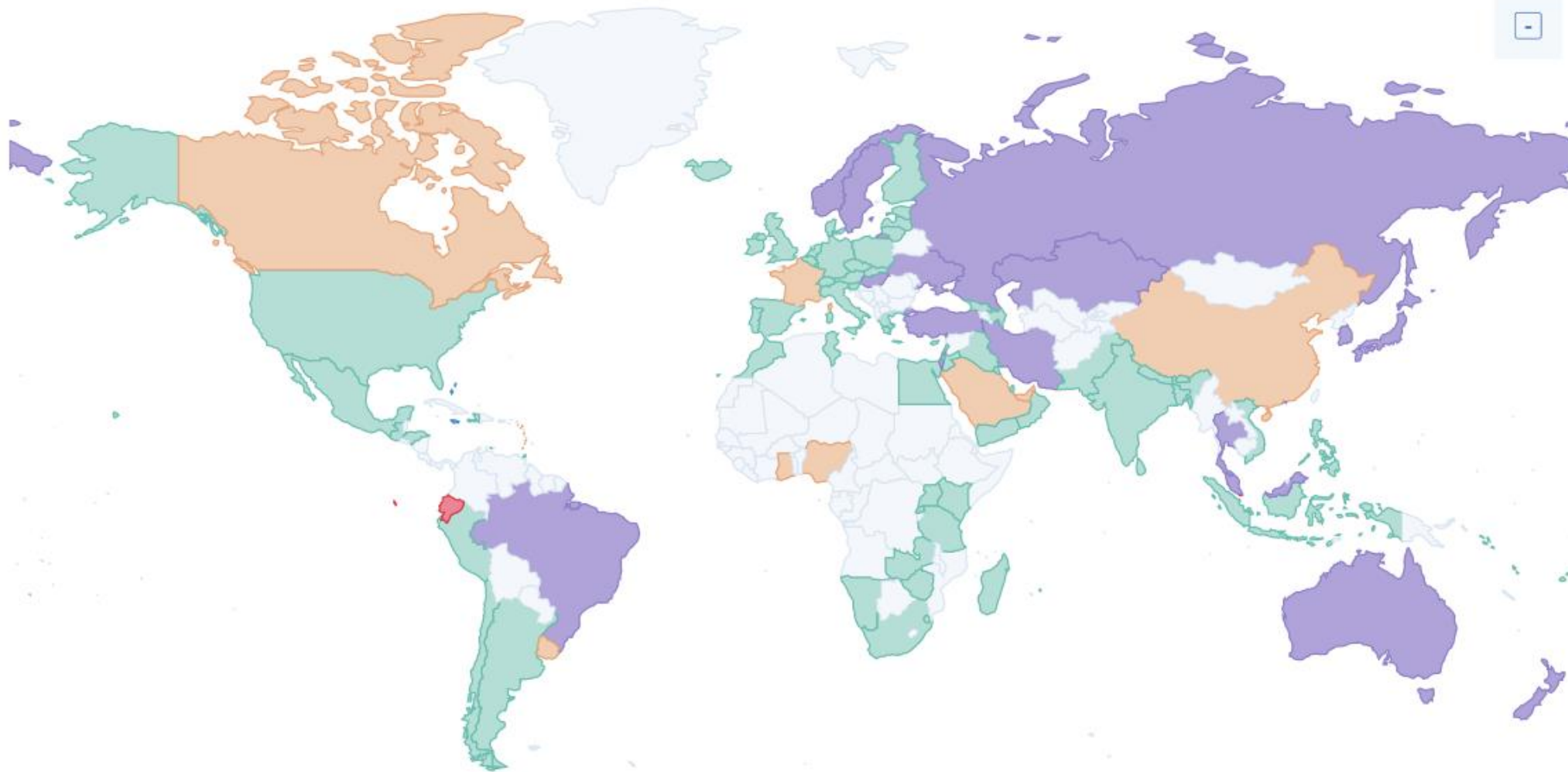
Although there is not a consensus about the size of the coefficients of policy rules, it is useful to consider what a representative policy rule might look like. One policy rule that captures the spirit of the recent research and which is quite straightforward is:

$$r = p + .5y + .5(p - 2) + 2 \quad (1)$$

where

- $r$  is the federal funds rate,
- $p$  is the rate of inflation over the previous four quarters
- $y$  is the percent deviation of real GDP from a target.

Cancelled
Research
Proof of concept
Pilot
Launched
[Show all](#)



# Types of Central Bank Digital Currencies (CBDCs)

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Four types of CBDCs could exist, according to Auer and Böhme (2020)

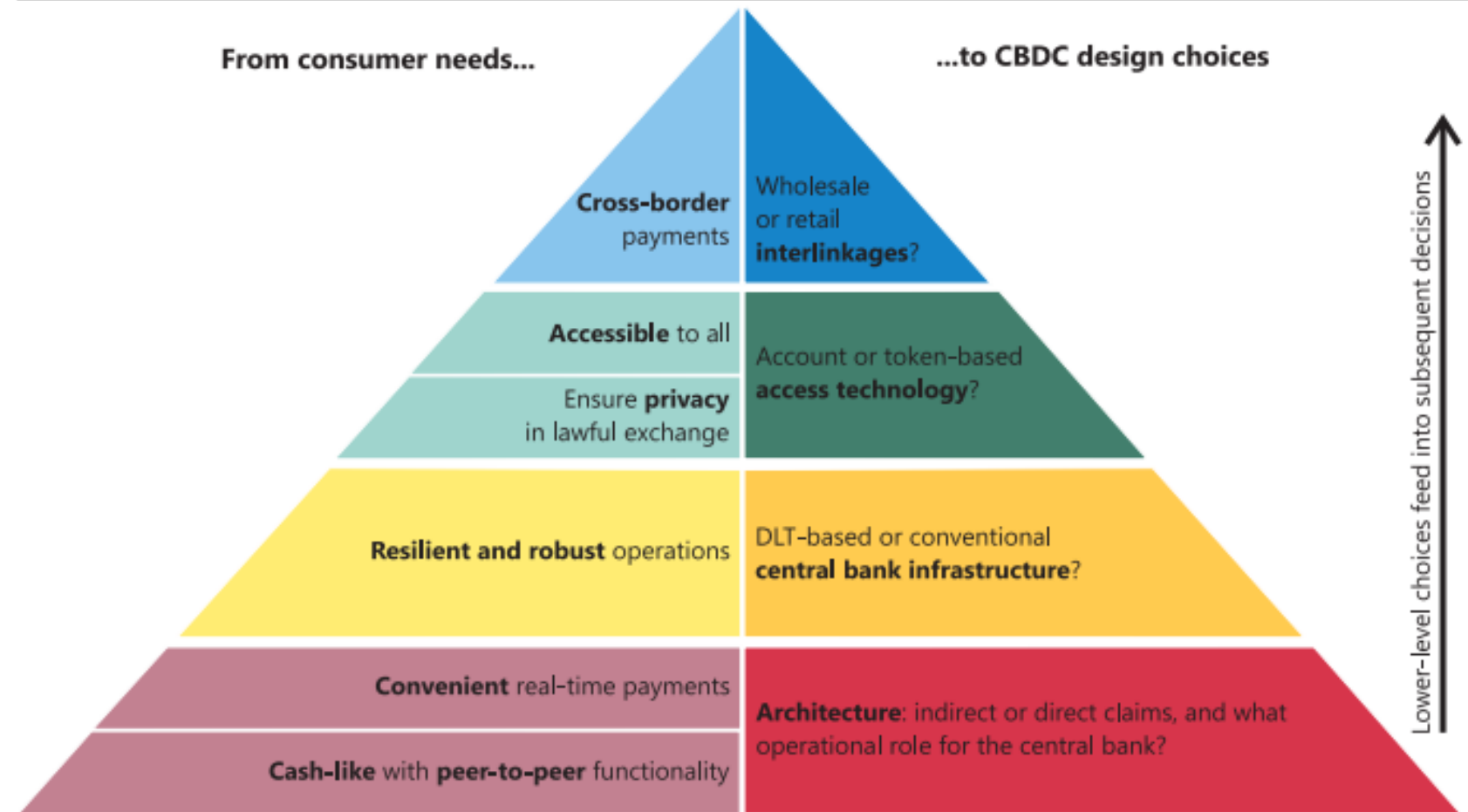
- Direct CBDC – a payment system operated by the central bank, which offers retail services. A CBDC is a direct claim on the central bank. The central bank maintains the ledger of all transactions and executes retail payments.
- Hybrid CBDC – an intermediate solution that runs on two engines. Intermediaries handle retail payments, but the CBDC is a direct claim on the central bank, which also keeps a central ledger of all transactions and operates a backup technical infrastructure allowing it to restart the payment system if intermediaries fail.
- Intermediated CBDC – an architecture similar to Hybrid CBDC, but in which the central bank maintains only a wholesale ledger, rather than a central ledger of all retail transactions. Again, the CBDC is a claim on the central bank and private intermediaries execute payments. For the purposes of this paper, this will be considered alongside the Hybrid model in our stock take.
- Indirect or Synthetic CBDC – a payment system operated by intermediaries that resemble narrow payment banks. Consumers have claims on these intermediaries, which operate all retail payments. These intermediaries need to fully back all liabilities to retail clients with claims on the central bank.

# Visual from Auer and Böhme (2020):

- Left = consumer needs that make CBDC possibly useful
- Cash safety and convenience of use are the key needs, and they influence the design / architecture
- Key element is privacy: is there an identity (account) system or cryptographic that is more anonymous

The CBDC pyramid

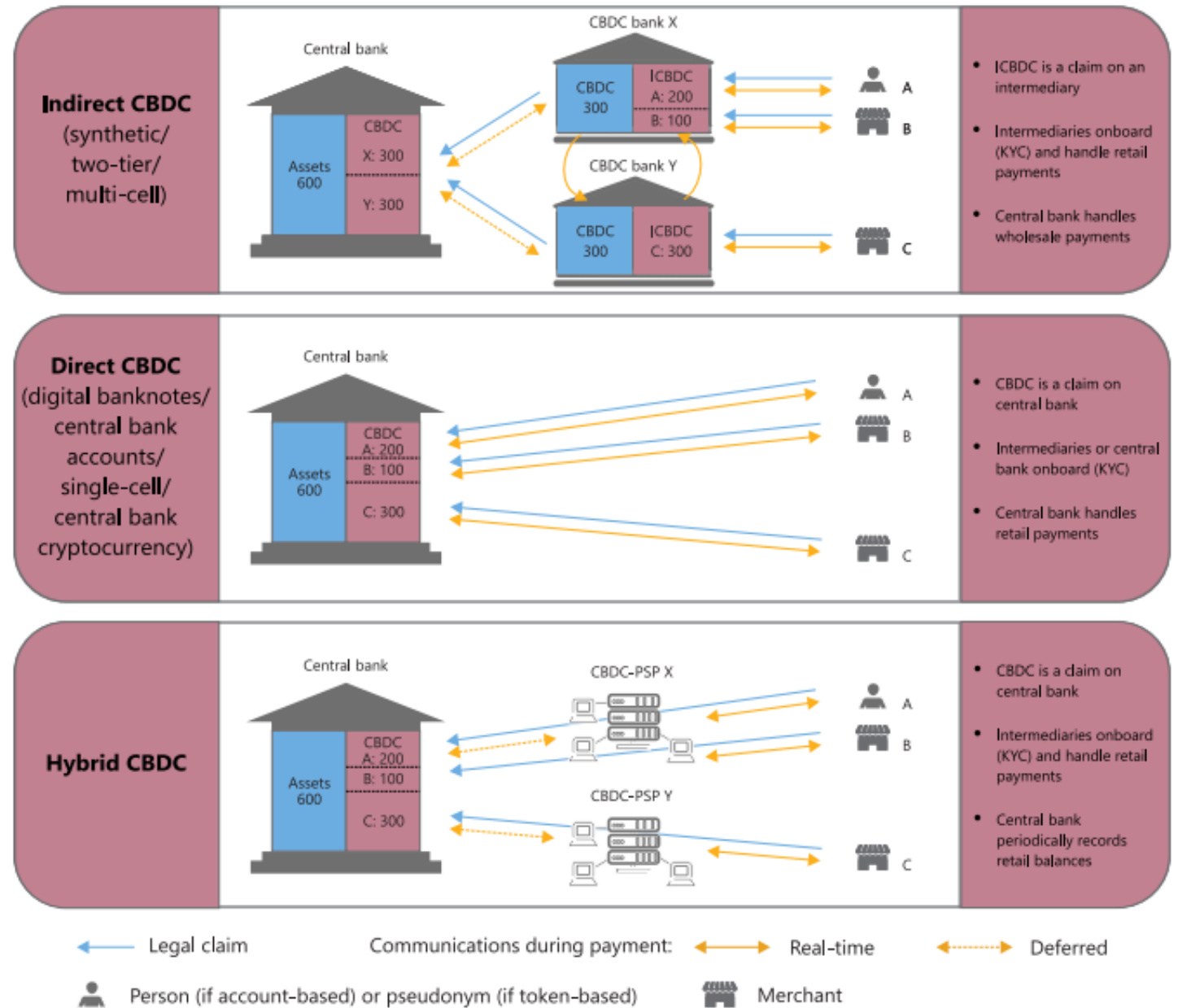
Graph 1



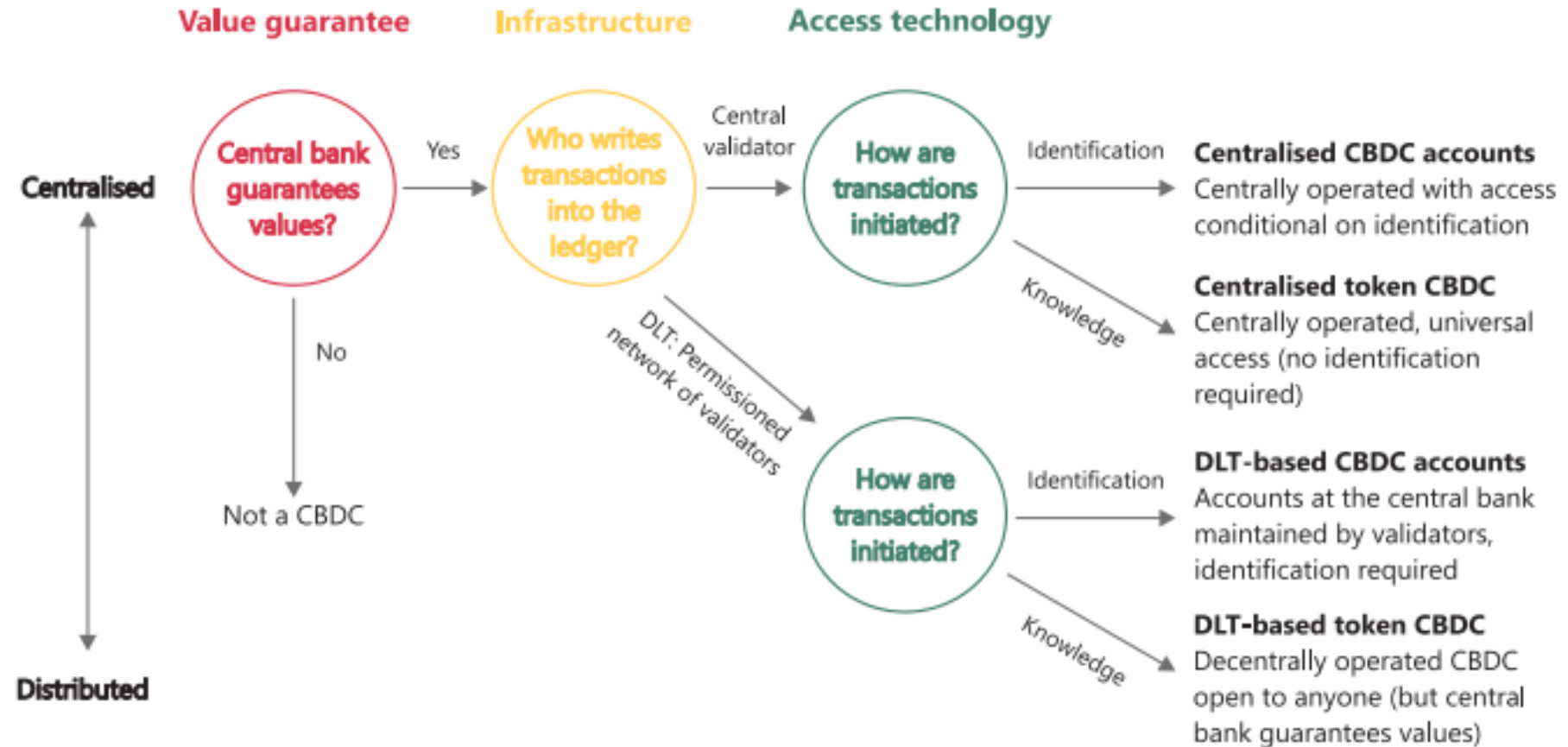
The CBDC pyramid maps consumer needs (left-hand side) onto the associated design choices for the central bank (right-hand side). The four layers of the right-hand side form a hierarchy in which the lower layers represent design choices that feed into subsequent, higher-level decisions.

Source: Authors' elaboration.

# Architectural CBDC aspects from Auer and Böhme (2020)



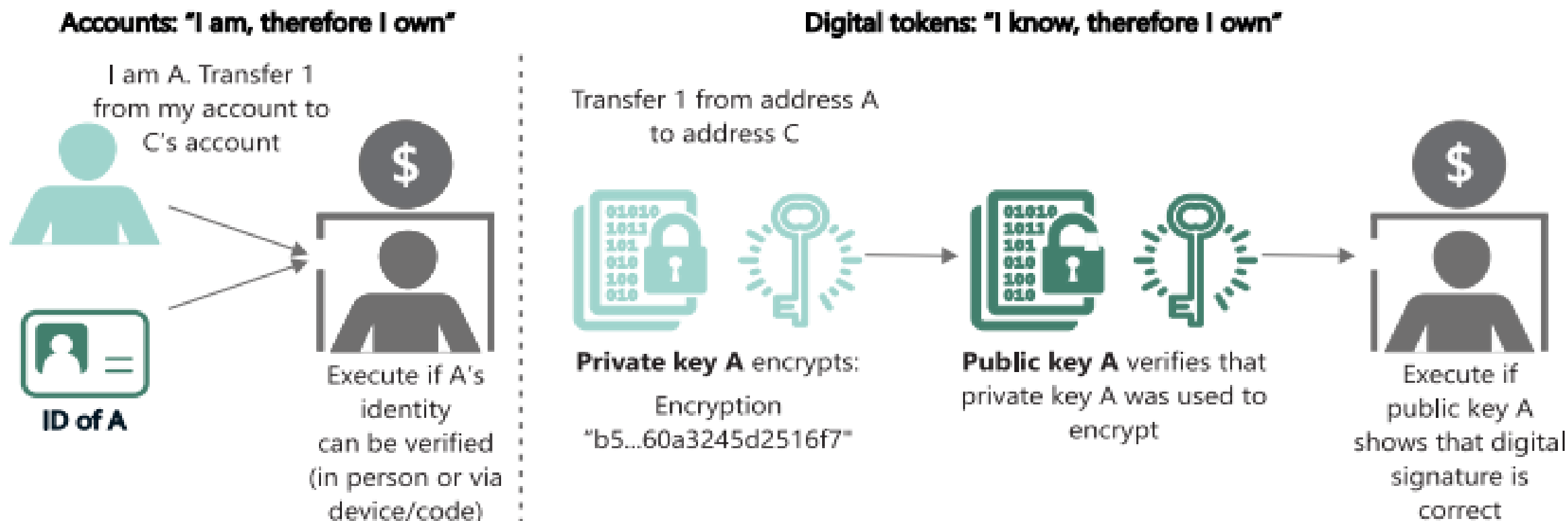
# DLT aspects from Auer and Böhme (2020)



This graph maps out the four possible combinations of whether a CBDC infrastructure is distributed or centralised and whether access is based on identification (accounts) or cryptographic knowledge (digital tokens). All four combinations are possible for any CBDC architecture (indirect, direct or hybrid), but in the different architectures, the central bank and the private sector operate different parts of the respective infrastructure.

Source: Authors' elaboration.





In an account-based CBDC (left-hand side), ownership is tied to an identity, and transactions are authorised via identification. In a CBDC based on digital tokens (right-hand side), claims are honoured based solely on demonstrated knowledge, such as a digital signature.

Source: Authors' elaboration.

# Potential CBDC Use Case

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On March 10, 2022, Paola Ardoino, the CTO at Tether, said (on Twitter):

- CBDCs are based on the idea that #tether had 8 years ago creating the first stablecoin
- CBDC will replace SWIFT etc
- Banks will accept transfers via CBDCs as any wire
- CBDCs will settle most of credit/debit card flow, especially over the weekend
- CBDCs will use private blockchain as modern and cost-controlled tech infrastructure
- CBDCs won't be issued on your favorite chain, private stablecoins will continued to serve that use case

Here, CBDCs are not about digitizing the fiat currency – already been done – but rather to use private blockchains as a modern and cost-controlled tech infrastructure, where most of the bank transfers and credit/debit card transactions will be settled via CBDCs.



# Benefits v. Costs of CBDCs

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- Proponents of CBDCs, including whitepapers from the Bank for International Settlements, argue that there are a handful of potential benefits: financial inclusion, cross-border payments, financial resilience and stability, efficiency of fiscal transfers, privacy.
- However, when you take these one-by-one, the benefits are not clear – alternatives already exist.
- In fact, there are potentially big downsides to consider and the jury is not yet out.
  - Concentration of risk with the CBDC
  - Expansion of power and the loss of privacy
  - Inflation and lack of collateralization
- Great article by Fernandez-Villaverde et al. (2021) about how a CBDC becomes a monopolist.



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## Questions?

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