



Central bank digital currencies: motives, architectures and the international dimension

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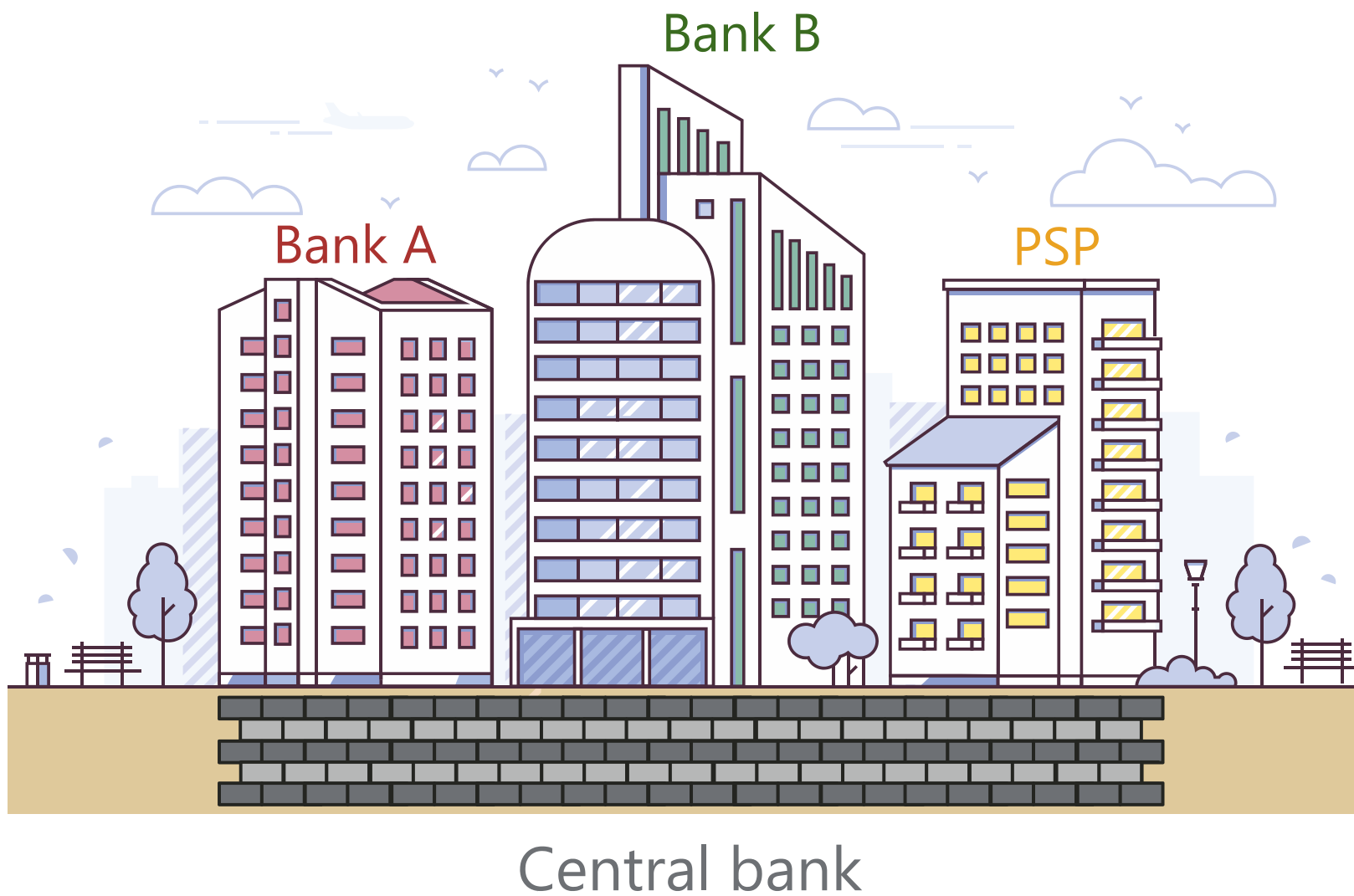
18th Annual NBP-SNB Joint Seminar "Digital Finance"- Zurich, 16 November 2022

Main works used in the presentation

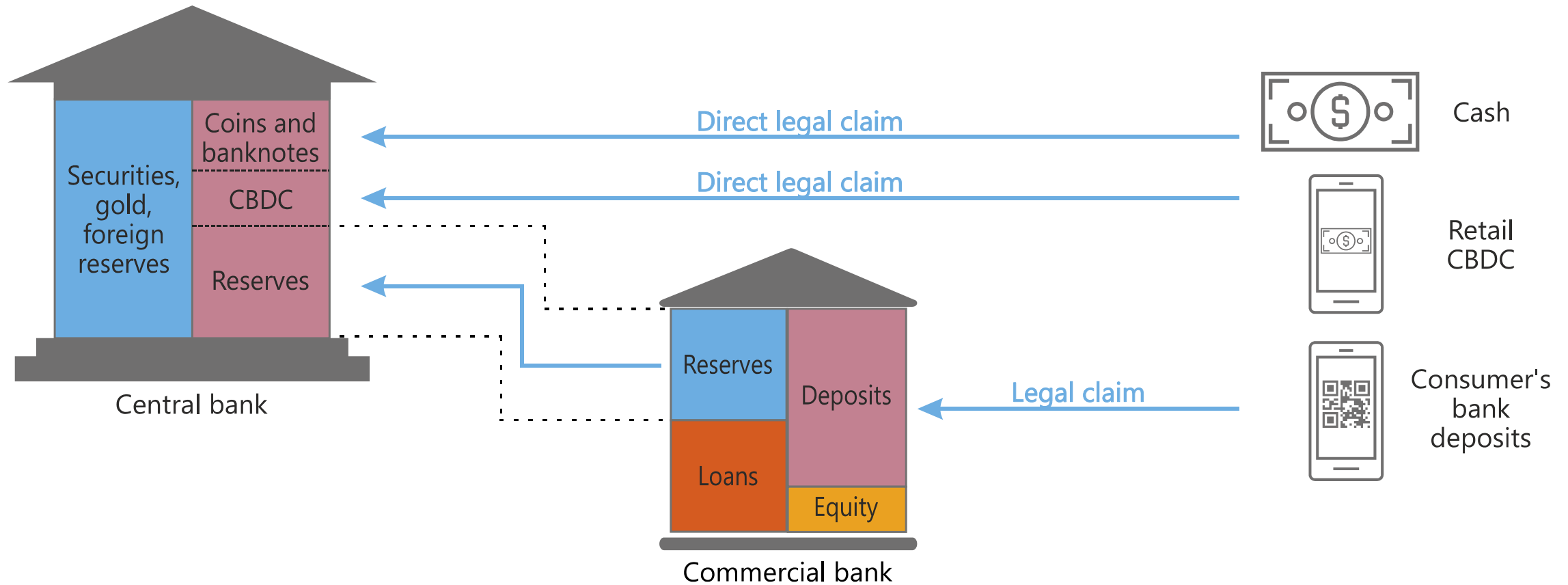
- BIS (2021), “CBDCs: an opportunity for the monetary system”, Annual Economic Report, Chapter III, June.
- BIS (2022), “The future monetary system” Annual Economic Report, Chapter III, June.
- Auer, R, J Frost, L Gambacorta, C Monnet, T Rice and HS Shin (2022), “Central bank digital currencies: motives, economic implications and the research frontier”, Annual Review of Economics (published also as BIS Working Papers, no 976).
- Auer, R, G Cornelli, S Doerr, J Frost and L Gambacorta (2022): “Crypto trading and Bitcoin price: evidence from a new database of retail adoption”, BIS Working Papers, no 1049.

Disclaimer: The views expressed here are those of the presenter and not necessarily of the Bank for International Settlements.

Central bank foundations for the payment system



An example of a monetary system with retail CBDC and commercial banks



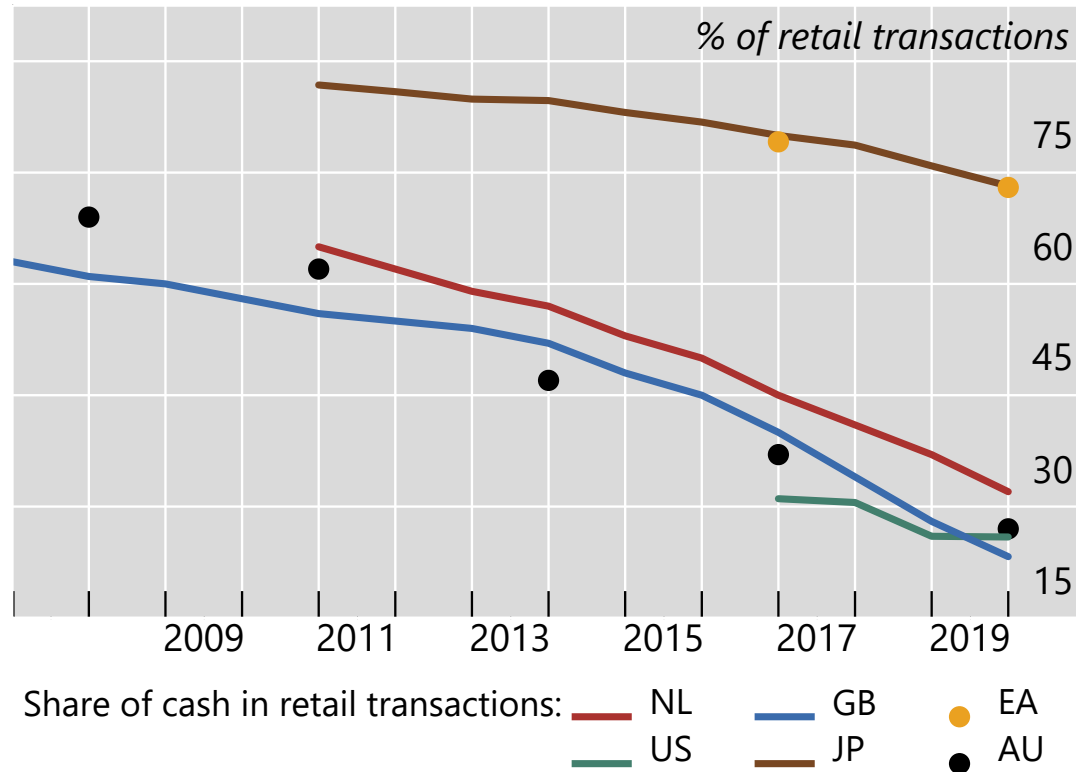
Source: R Auer and R Böhme, "Central bank digital currency: the quest for minimally invasive technology", BIS Working Papers, no 948, June 2021.



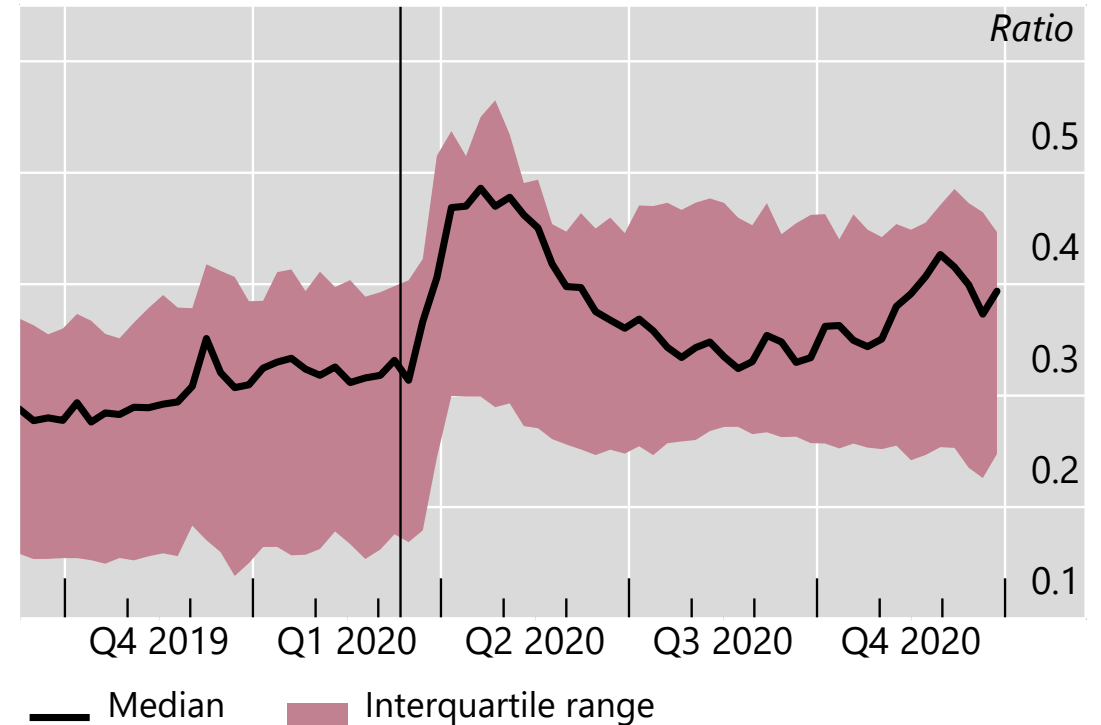
CBDCs in light of
new and emerging
policy issues

1. As cash use falls, digital payments are rising

Use of cash is falling

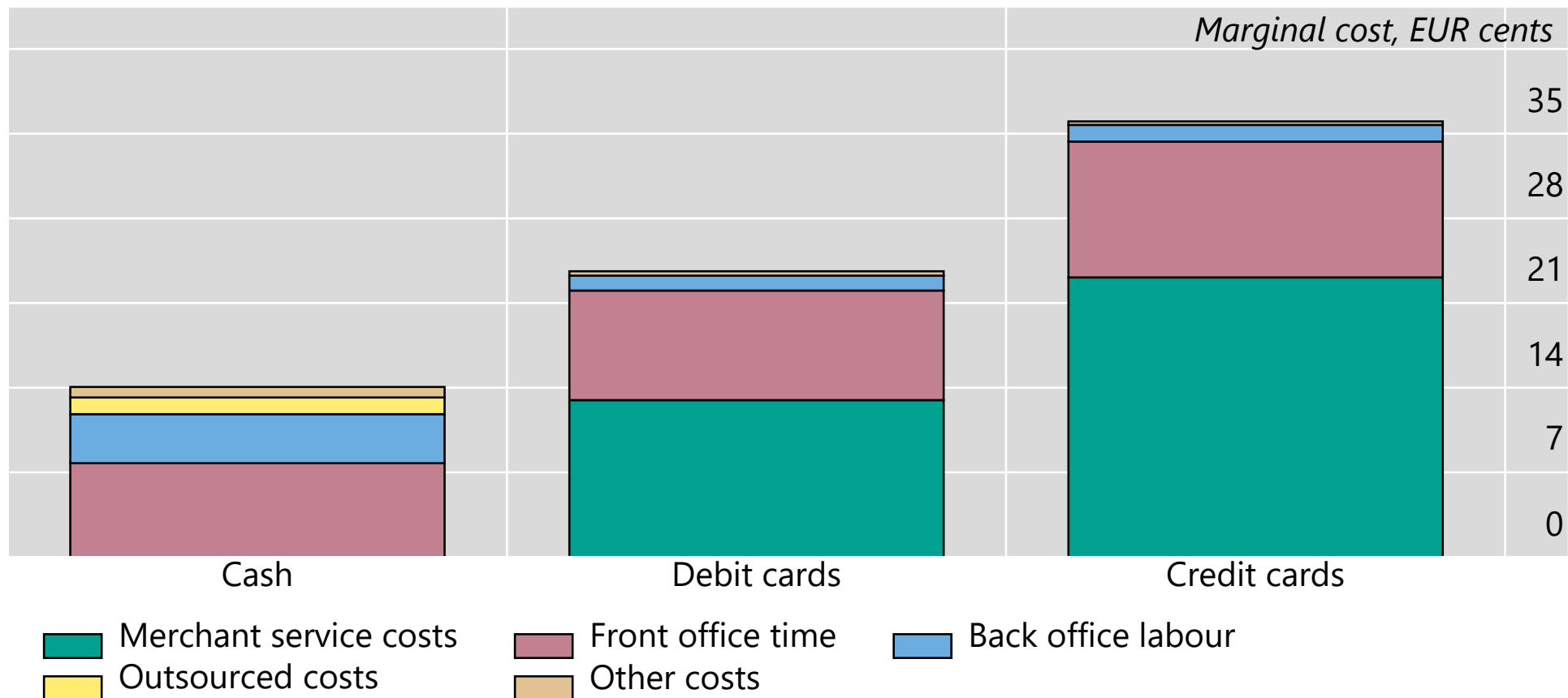


Remote digital payments rose

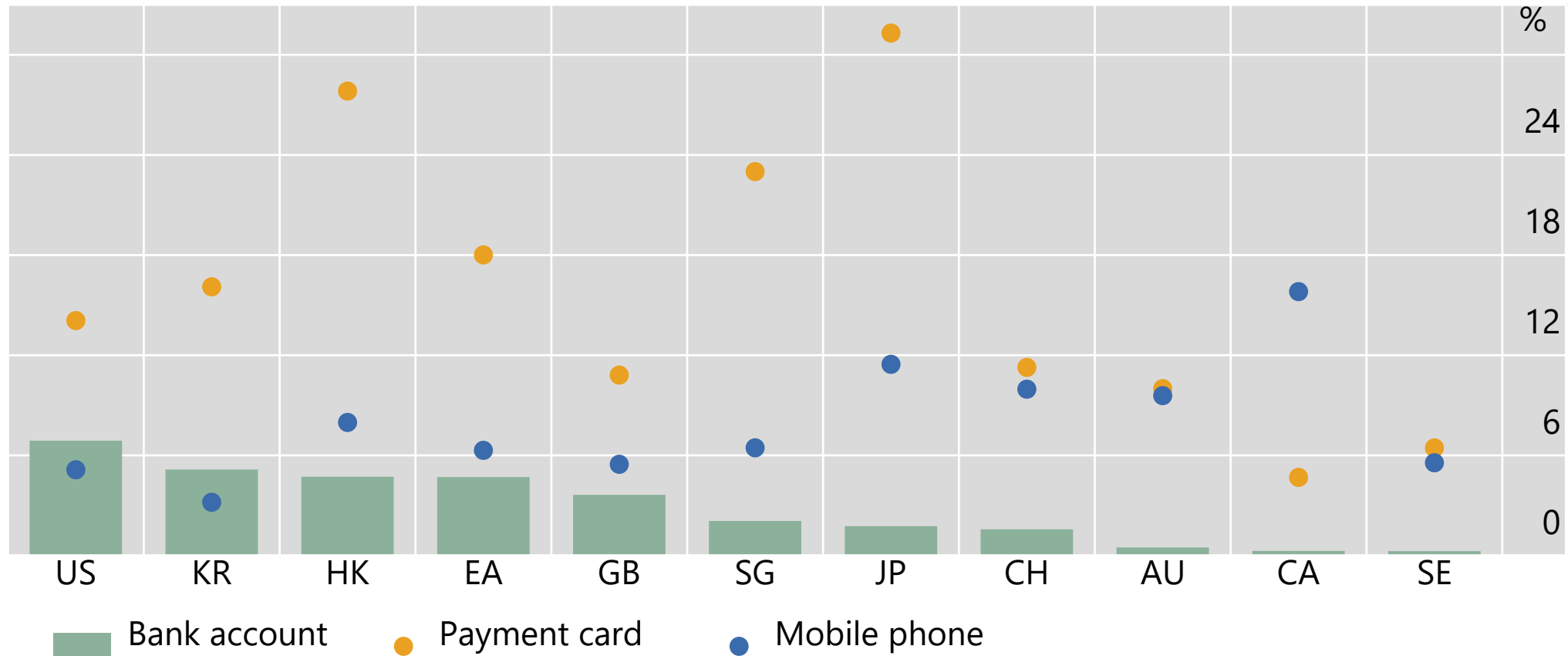


Sources: F Alvarez, R Auer, G Cornelli and J Frost, "The impact of the pandemic on cash and retail payments: insights from a new database", mimeo; central banks' websites; Japan's Ministry of Economy, Trade and Industry; global card networks; BIS calculations.

2. In spite of technological progress and declining information processing costs, card payments are still more expensive than cash for a €25 transaction



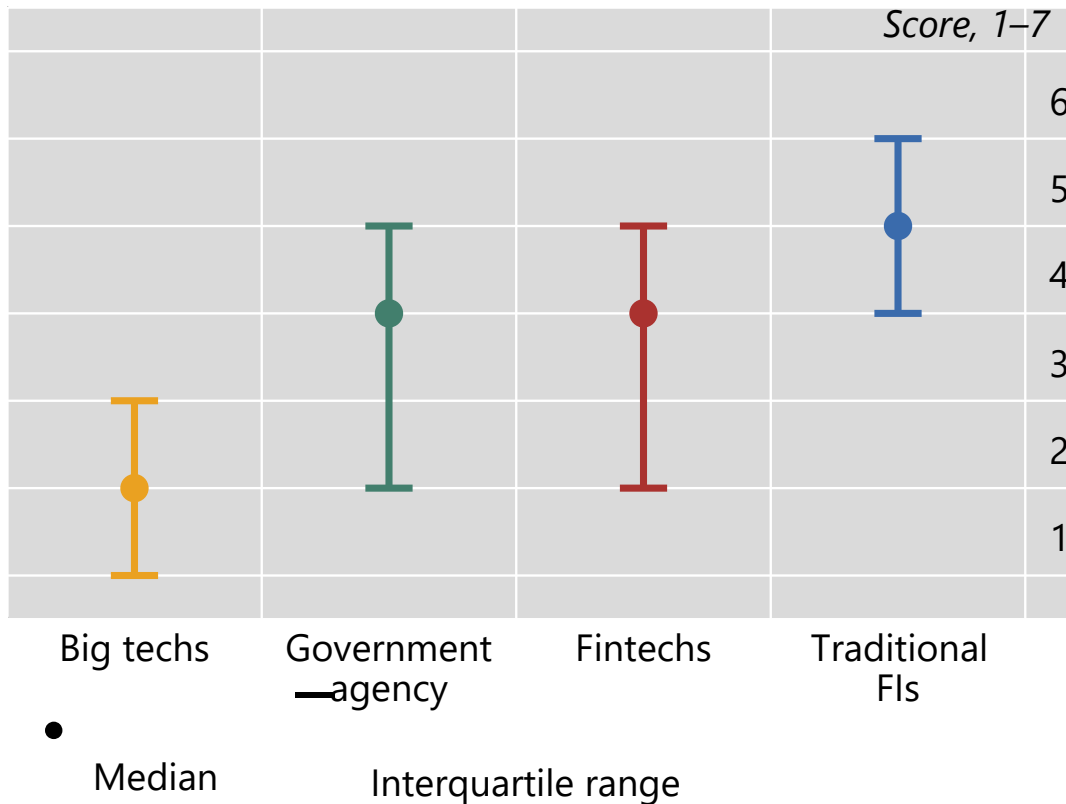
3. Even in advanced economies many households did not have bank accounts, payment cards and mobile phones in 2017



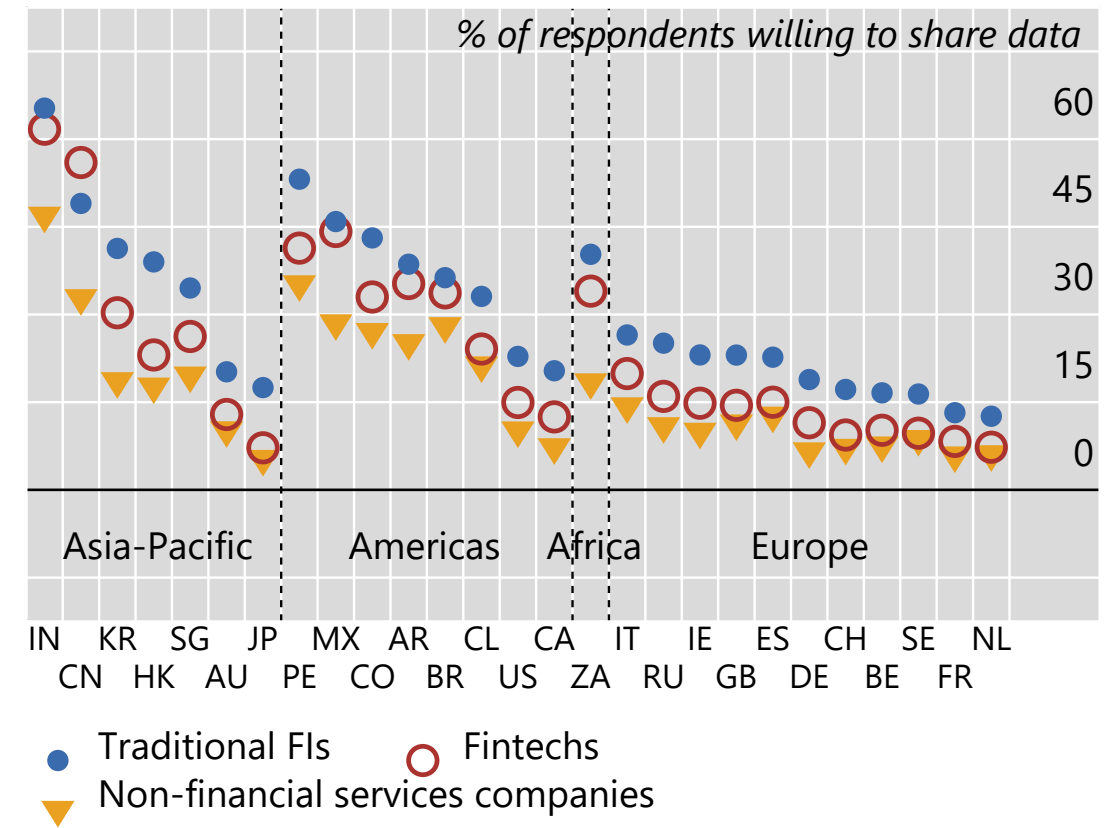
Source: World Bank.

4. Consumers do not trust all counterparties equally to safely handle data

Americans trust big techs the least to safeguard their data

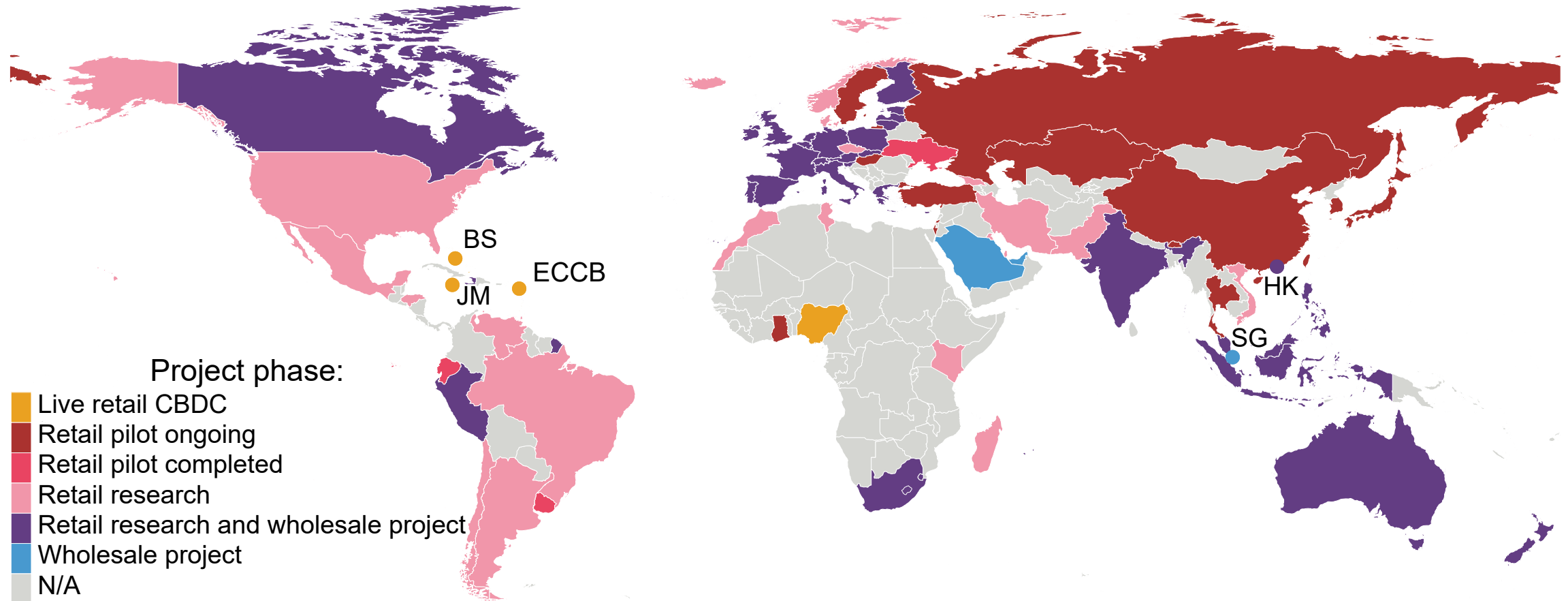


Consumers are generally more willing to share data with traditional FIs



Sources: O Armantier, S Doerr, J Frost, A Fuster and K Shue, "Whom do consumers trust with their data? US survey evidence", *BIS Bulletins*, no 42, May 2021; S Chen, S Doerr, J Frost, L Gambacorta and H S Shin, "The fintech gender gap", *BIS Working Papers*, no 931, March 2021.

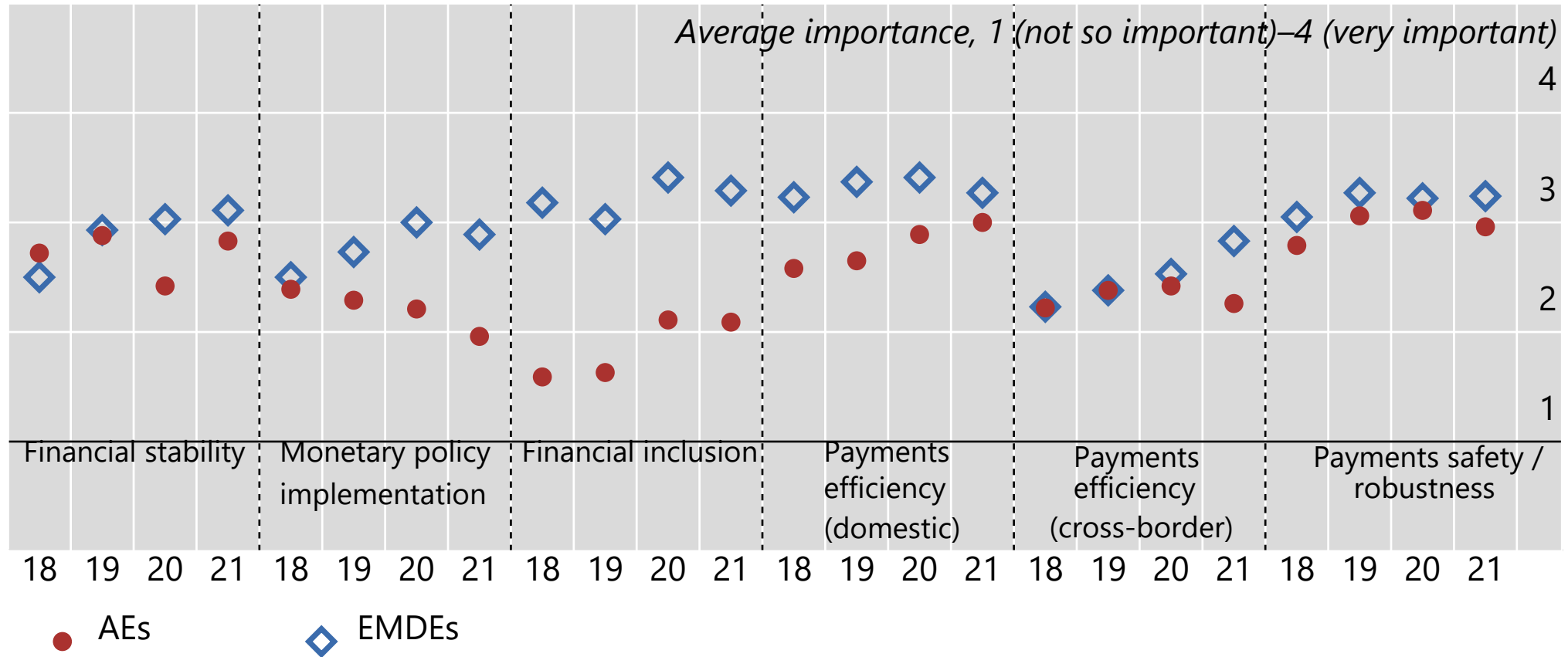
CBDC research, pilots and live CBDCs around the globe



BS = The Bahamas; ECCB = Eastern Caribbean Central Bank; HK = Hong Kong SAR; JM = Jamaica; SG = Singapore. The use of this map does not constitute, and should not be construed as constituting, an expression of a position by the BIS regarding the legal status of, or sovereignty of any territory or its authorities, to the delimitation of international frontiers and boundaries and/or to the name and designation of any territory, city or area. Update 1 July 2022.

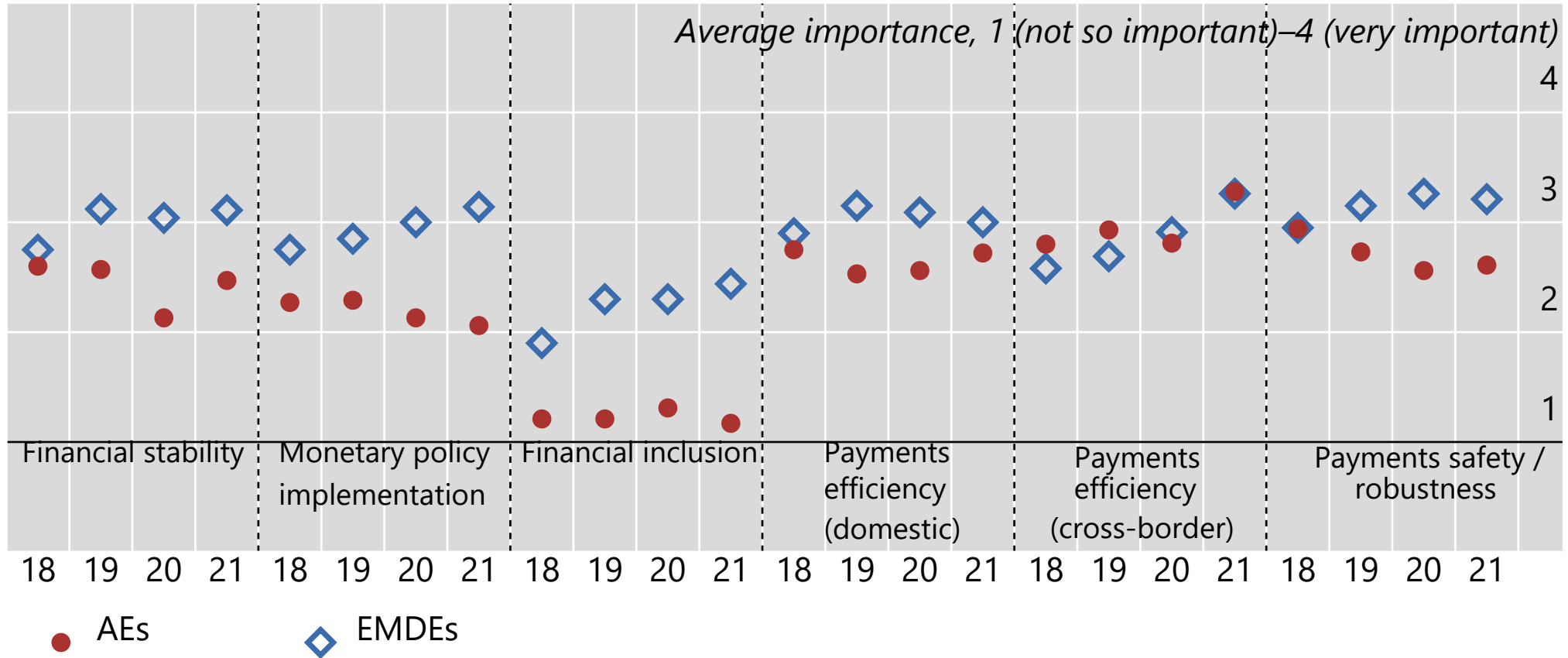
Source: R Auer, G Cornelli and J Frost (2020), "Rise of the central bank digital currencies: drivers, approaches and technologies", *BIS working papers*, No 880, August.

Motivations for issuing a retail CBDC



Source: CPMI survey; A Kosse and I Mattei (2022): "Gaining momentum – Results of the 2021 BIS survey on central bank digital currencies", *BIS Papers*, no 125.

Motivations for issuing a wholesale CBDC

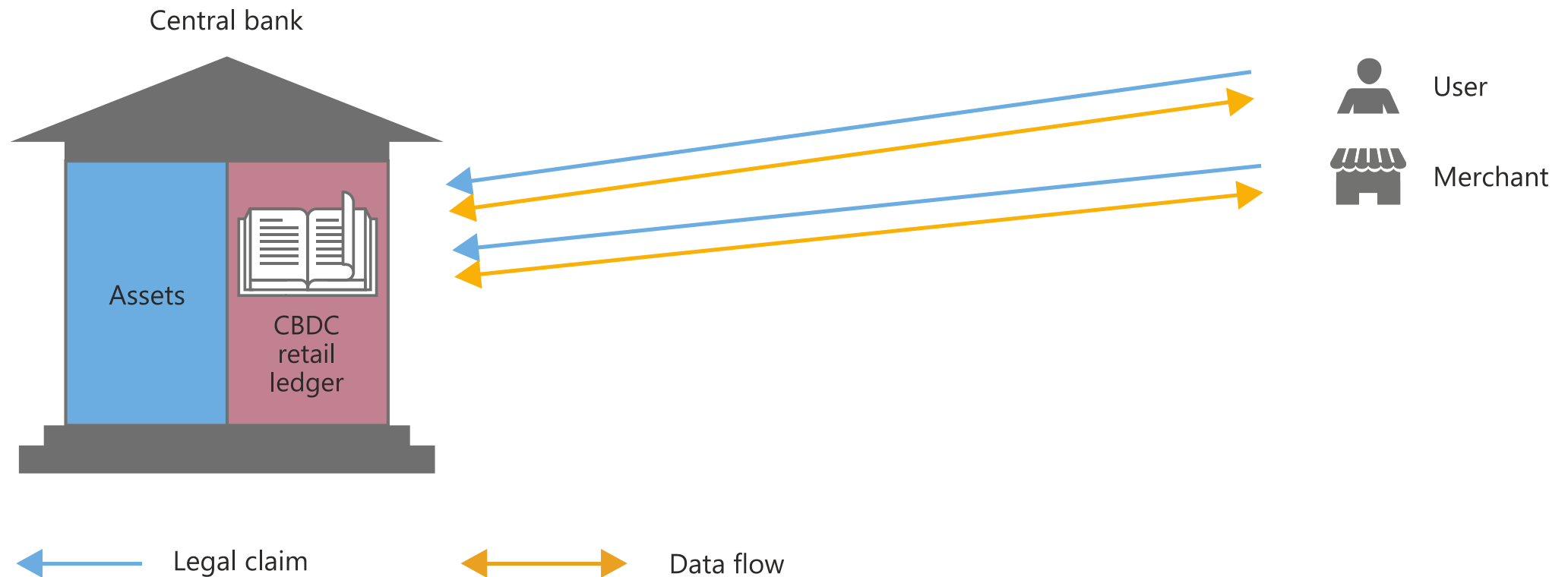


Source: CPMI survey; A Kosse and I Mattei (2022): "Gaining momentum – Results of the 2021 BIS survey on central bank digital currencies", *BIS Papers*, no 125.



CBDC architectures and the financial system

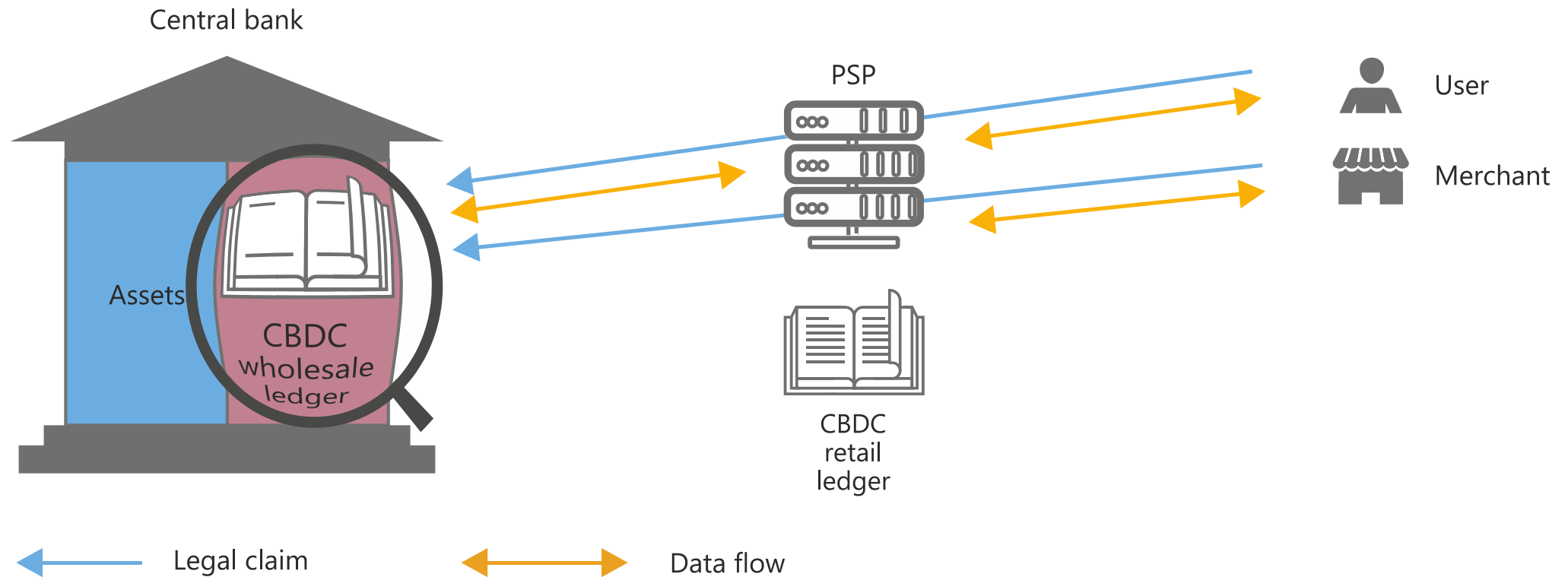
The “direct model” of CBDCs entails a large operational role for the central bank
Users and merchants have claims on the central bank without an intermediary



Source: Adapted from R Auer and R Böhme, “Central bank digital currency: the quest for minimally invasive technology”, *BIS Working Papers*, no 948, June 2021.

In the “intermediated model” the central bank only has a wholesale ledger of payments between PSPs, not between the individual users

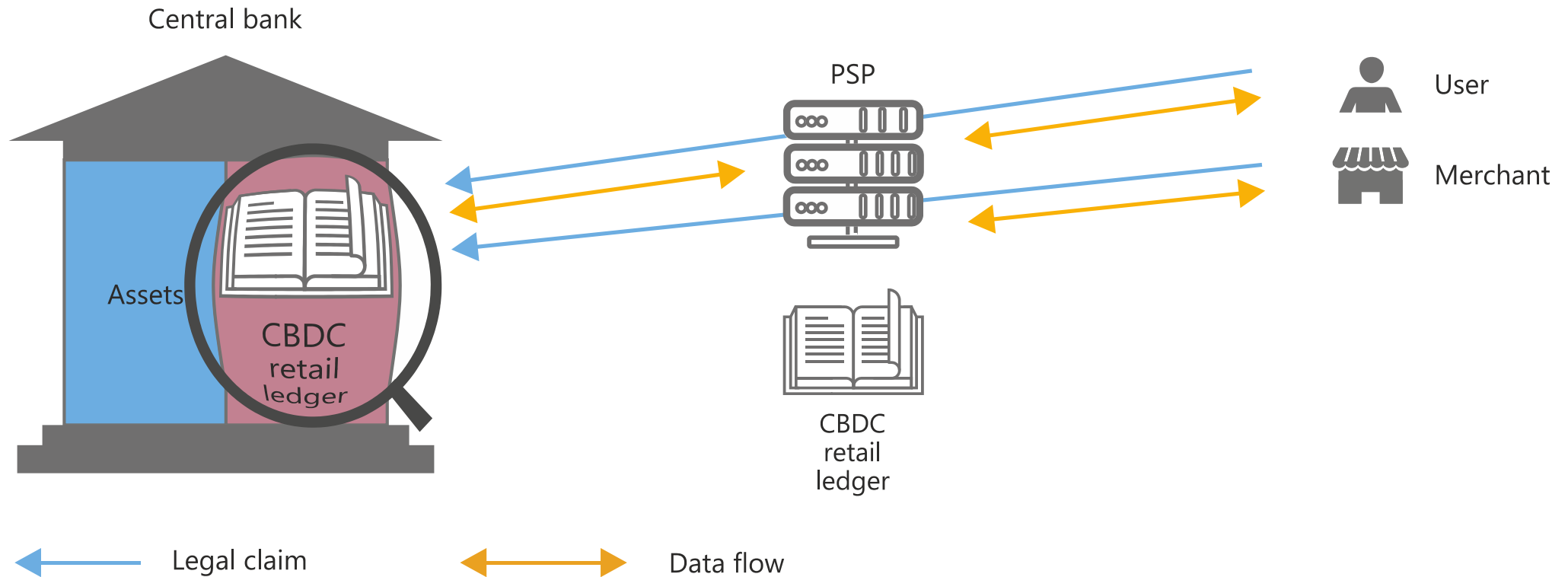
Central bank records wholesale balances



Source: Adapted from R Auer and R Böhme, “Central bank digital currency: the quest for minimally invasive technology”, *BIS Working Papers*, no 948, June 2021.

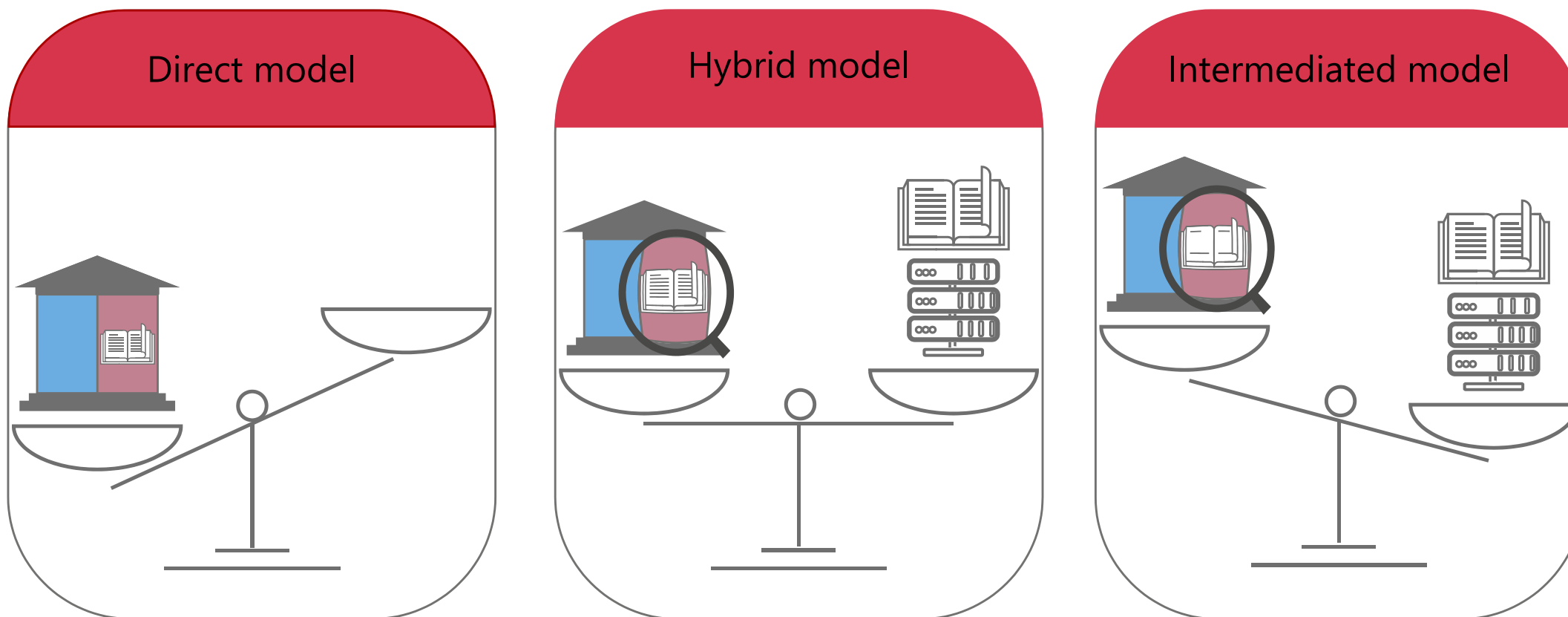
In the "hybrid model", the central bank retains a copy of the full retail ledger

Central bank records retail balances

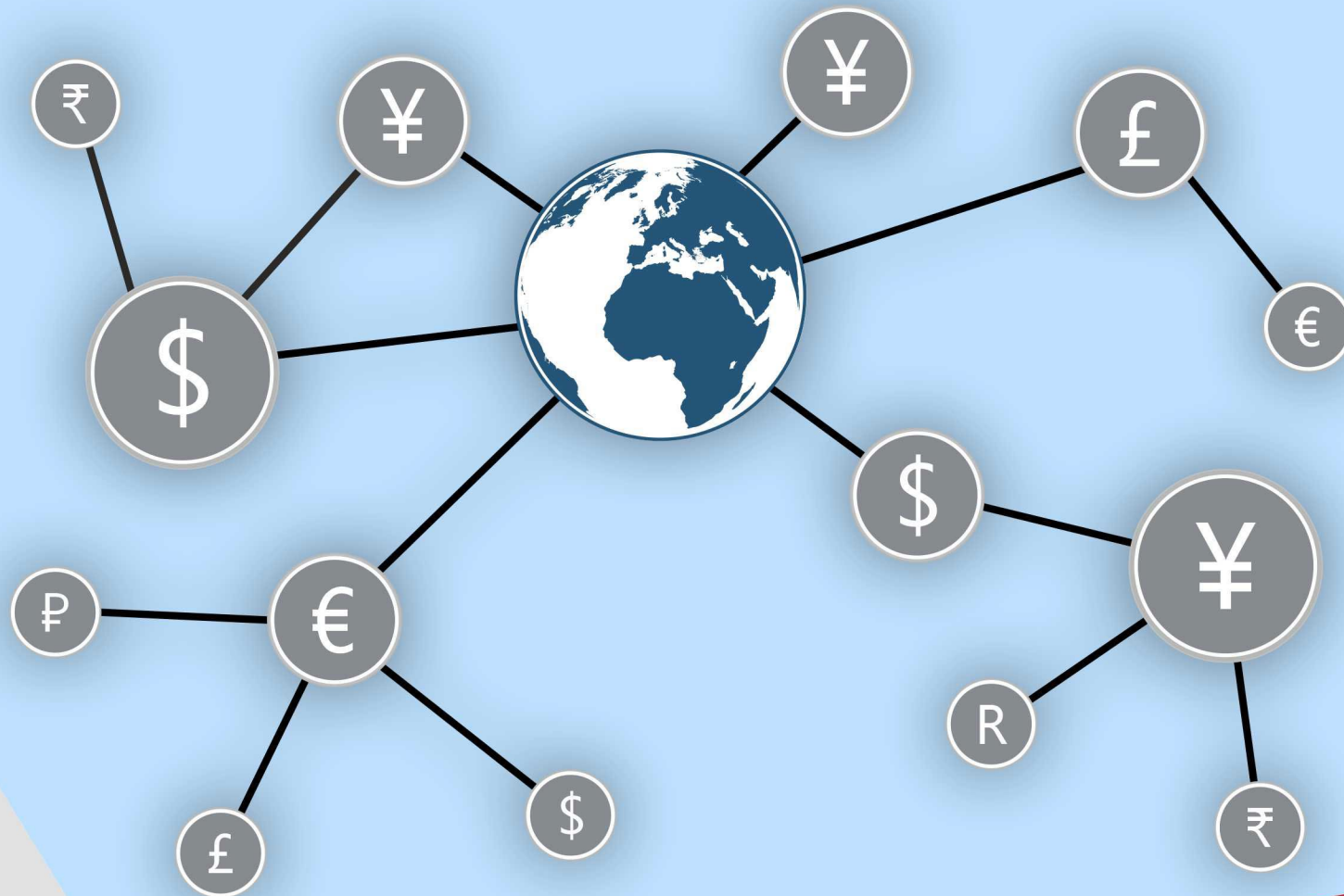


Source: Adapted from R Auer and R Böhme, "Central bank digital currency: the quest for minimally invasive technology", *BIS Working Papers*, no 948, June 2021.

Operational involvement of the central bank is highest in the direct model, and lowest in the intermediated model



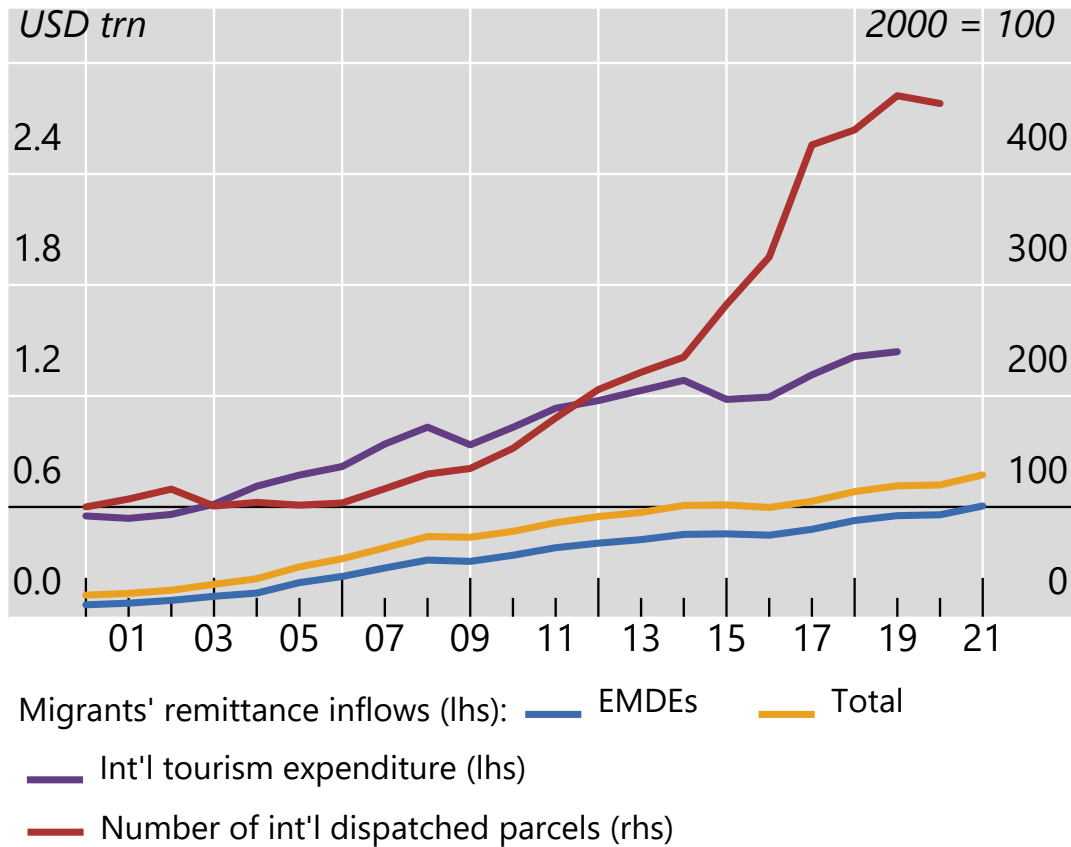
Source: Adapted from R Auer and R Böhme, "Central bank digital currency: the quest for minimally invasive technology", *BIS Working Papers*, no 948, June 2021.



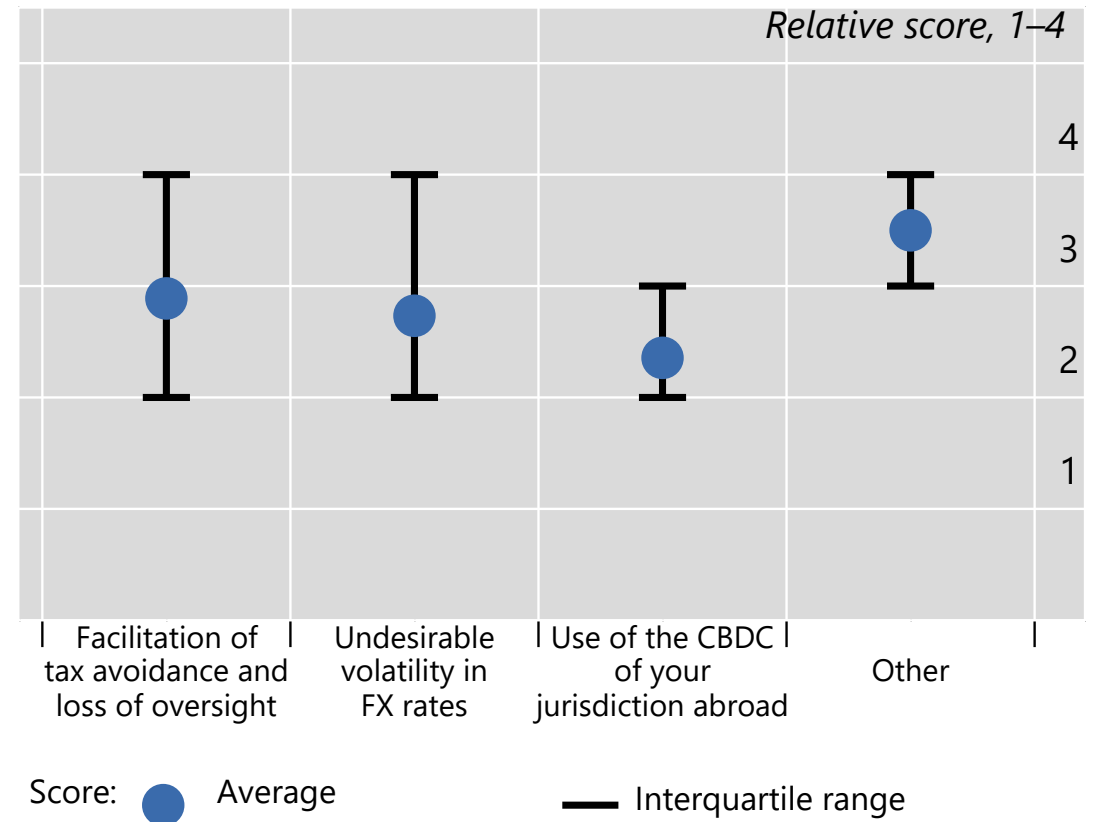
The international dimension of CBDC issuance

Cross-border payments are a priority area, and there are specific concerns

Globalisation of retail activity



Foreign CBDC issuance risks



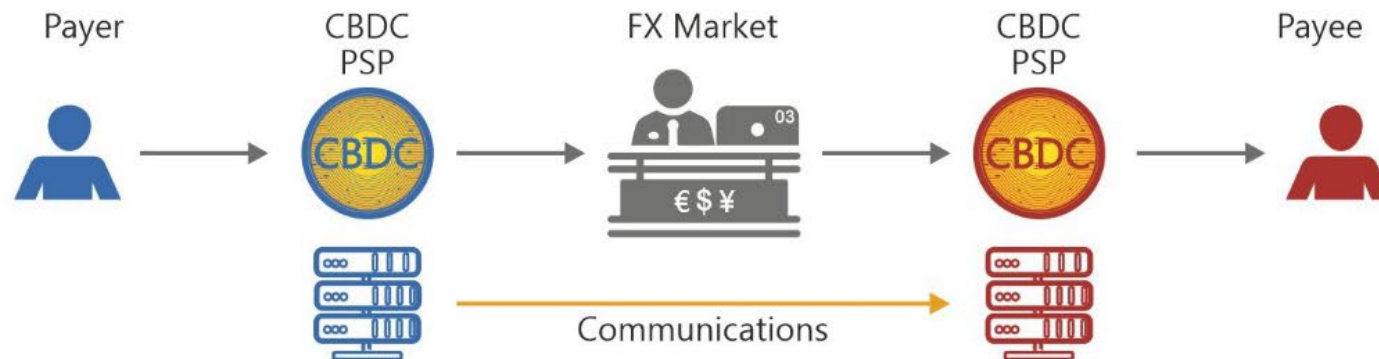
Sources: R Auer, C Boar, G Cornelli, J Frost, H Holden, A Wehrli, "CBDCs beyond borders: results from a survey of central banks", *BIS Papers*, no 116, June 2021; World Bank; Universal Postal Union; BIS calculations.

CBDCs could simplify the monetary architecture and substantially streamline the cross-border payment chain

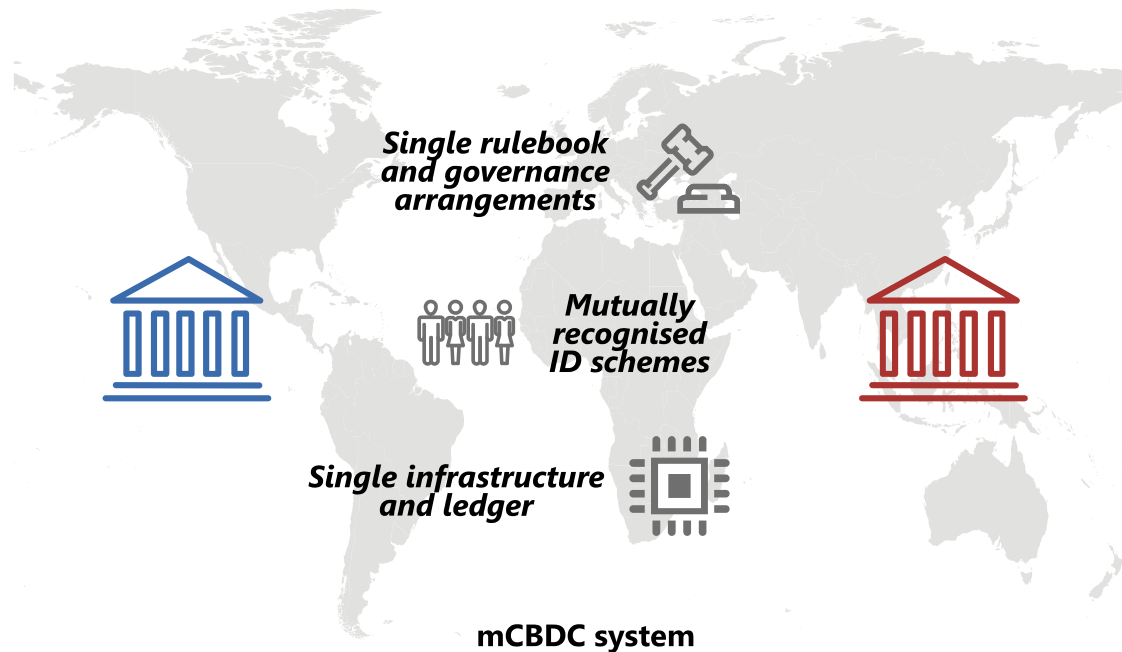
Today's arrangement



mCBDC arrangement



Multi-CBDC arrangements can facilitate cross-border payments



mCBDC Model 3: Integration into a single system

- Multiple CBDC can be run on a single platform (eg mCBDC Bridge or Project Dunbar)
- Central banks mutually recognise ID schemes

Source: R Auer, P Haene and H Holden, "Multi-CBDC arrangements and the future of cross-border payments", BIS Papers, no 115, March 2021.



Conclusions

Main takeaways

- Growing global work on CBDCs.
- Yet CBDCs should be considered in the full context of the digital economy and the centrality of data, with concerns around competition, payment system integrity and privacy.
- New capabilities such as programmability, composability and tokenisation are not the preserve of crypto, but can instead be built on top of CBDCs, fast payment systems and associated data architectures.
- CBDCs should be designed with the public interest in mind. CBDCs could ensure open payment platforms and a competitive level playing field that is conducive to innovation.
- A set of questions, particularly on the cross-border dimensions of CBDCs need to be solved and calls for further work to expand the research frontier.