

## THE ACTUALITY OF RETAIL CENTRAL BANK DIGITAL CURRENCY

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### Annotation:

Central bank digital currencies (CBDCs) promise to provide cash-like safety and convenience for peer-to-peer payments. To do so, they must be resilient and accessible. They should also safeguard the user's privacy, while allowing for effective law enforcement. Different technical designs satisfy these attributes to varying degrees, depending on whether they feature intermediaries, a conventional or distributed infrastructure, account- or token-based access, and retail interlinkages across borders. We set out the underlying trade-offs and the related hierarchy of design choices.

**Keywords:** central bank, digital currency, bank, method, economy.

### INTRODUCTION

The question of whether central banks should issue digital currency to the general public has attracted increasing attention. This special feature sketches out some key technological design considerations for a retail CBDC, in the event that a central bank decided to issue one. We do not investigate the case for or against issuance, the systemic implications, or how these might be managed.

### MATERIALS AND METHODS

We structure our approach around consumer needs and the associated technical design choices. Current electronic retail money represents a claim on an intermediary, rather than functioning as the digital equivalent of cash. CBDCs could potentially provide a cash-like certainty for peer-to-peer payments. At the same time, they should offer convenience, resilience, accessibility, privacy and ease of use in cross-border payments. Different technical designs meet these criteria to varying degrees, with attendant technical trade-offs. We explore these issues. The aim is not to promote or highlight any particular approach, but to lay some groundwork for more systematic discussions.



## RESULTS AND DISCUSSION

The focus of our approach is the “retail” aspect of CBDC; we ask what consumer needs a CBDC could address. We thus sketch the development of a CBDC through an approach that proceeds from consumer needs to design choices.<sup>4</sup> The left-hand side of the CBDC pyramid (Graph 1) sets out such consumer needs and six associated features that would make a CBDC useful. Starting with cash-like peer-to-peer usability, these features also comprise convenient real-time payments, payments security, privacy, wide accessibility and ease of use in cross-border payments. The pyramid’s right-hand side lays out the associated design choices.

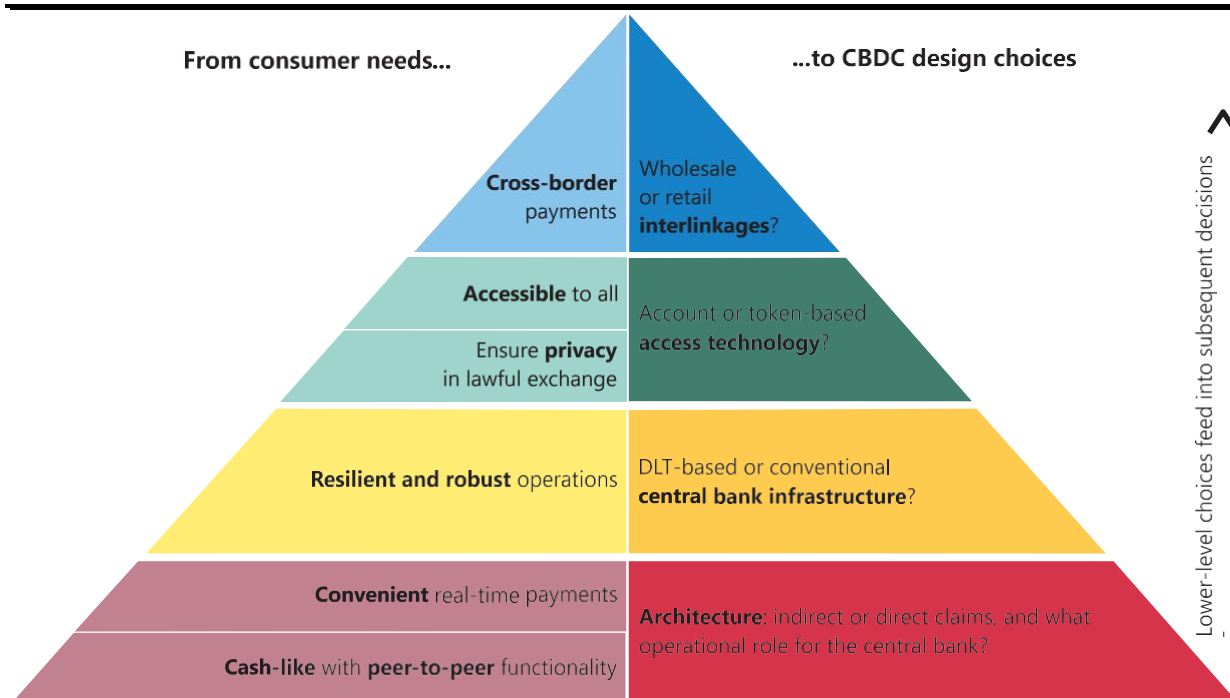
At the same time, consumers are unlikely to adopt a CBDC if it is less convenient to use than today’s electronic payments. Banks and payment service providers run sophisticated infrastructures that can handle peak demand, such as on Singles Day in China or Black Friday in the United States. And intermediaries help to smooth the flow of payments by taking on risk, for example during connectivity breaks or offline payments.

These two needs – cash-like safety and convenience of use – lead to the foundational design consideration for a CBDC (see lowest layer of pyramid in Graph 1): the choice of the operational architecture, and how it will balance the consumer’s demand for a cash-like claim on the central bank with the convenience that intermediaries confer on the payment system. The choice is shaped by two questions. Is the CBDC a direct claim on the central bank or is the claim indirect, via payment intermediaries? What is the operational role of the central bank and of private sector intermediaries in day-to-day payments?

Further, the consumer’s need for cash-like payment safety means that a CBDC must be secure not only from the insolvency or technical glitches of intermediaries, but also from outages at the central bank. The choice is whether to base this infrastructure on a conventional centrally controlled database or instead on DLT – technologies that differ in their efficiency and degree of protection from single points of failure. Importantly, this decision can only be made once the architecture has been decided upon, as DLT is only feasible for some operational setups. This is why the choice of infrastructure lies in the pyramid’s second layer.

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.

## CONCLUSION

Two further consumer needs are easy, universal access and privacy by default. From a technical perspective, there is an underlying trade-off between privacy and ease of access on the one hand and ease of law enforcement on the other. The associated design choice – the pyramid’s third layer – is whether access to the CBDC is tied to an identity system (ie an account-based technology) or instead via cryptographic schemes that do not require identification (ie an access technology based on so-called digital tokens).

The final consumer need we consider is that CBDCs should also enable cross-border payments. At a design level, this could be arranged via technical connections at the wholesale level that are built on today’s systems. Alternatively, novel interlinkages could be envisaged at the retail level, ie allowing consumers to hold foreign digital currencies directly. Importantly, the means of implementing the latter option would depend on whether the CBDC was account- or token-based. This is why this design choice belongs in the top layer of the pyramid.



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