

# Central Bank Digital Currency and Quantitative Easing

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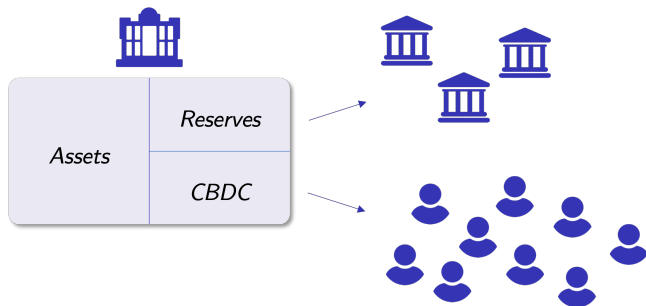
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# What is a Central Bank Digital Currency?

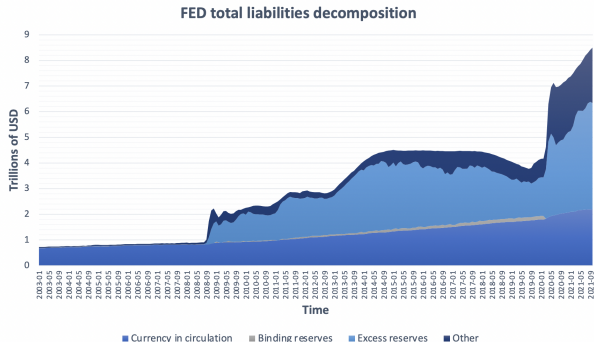
*"[A CBDC is] a digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank."*

(BIS, 2020)



# Motivation

- FED's balance sheet size: 9 trillions USD
- Excess reserves in US: 4 trillions USD
- Bank deposits in US: 17 trillions USD



Source: FRED, Federal Reserve Bank of St. Louis

# Summary

## Problem:

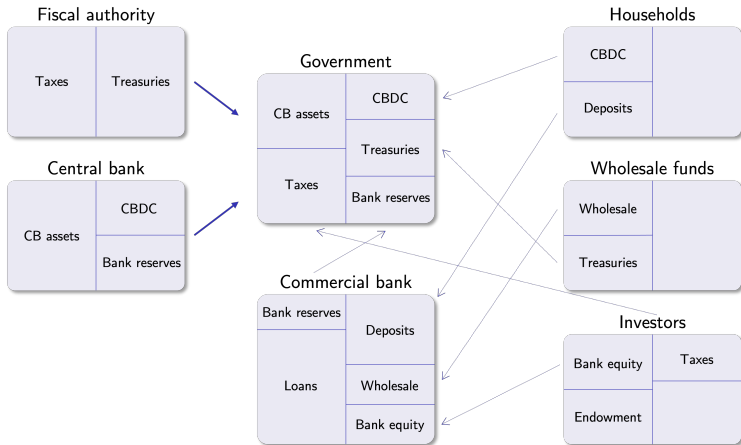
- Study **how the introduction of a CBDC interacts with ongoing monetary policies** (standard policy or quantitative easing).

## Results:

- The equilibrium impact of a CBDC depends on the ongoing monetary policy.
- The introduction of a CBDC can be neutral to the economy under specific conditions.
- Under quantitative easing, commercial banks optimally use their excess reserves to accommodate retailers' demand for switching from bank to CBDC deposits.
- Introducing a CBDC is likely to render quantitative easing a quasi-permanent policy.

# Model

We extend the model in Magill, Quinzii and Rochet (2020) by adding an interest-bearing CBDC.



# Monetary policies

1. **Standard** pre-2008 policy:  
central bank holds *treasuries* as assets
2. **Quantitative easing (QE)** policy:  
central bank holds *risky securities* as assets

## CBDC introduction mechanism

When households want to transfer 1 unit of their savings from bank deposits into CBDC deposits, the commercial can:

- Liquidate 1 unit of its assets in favour of the central bank  
central bank balance sheet: + 1 unit
- Swap 1 unit of excess reserves into CBDC deposits  
central bank balance sheet:  $\pm 0$  unit

When possible, the commercial bank prefers to liquidate excess reserves to accommodate households' demand for CBDC.

# Equivalence Theorem

## Definition

We define the introduction of a CBDC as **neutral** for equilibrium economic allocations when it has no impact both on banks lending and on taxes.



## CBDC impact under standard policy

- Since the liquidity requirement is binding, the commercial bank can only liquidate assets in favor of the central bank to accommodate CBDC demand.
- The central bank indirectly channels funds back to the commercial bank.
- The reduction in bank deposits is fully compensated and lending to the economy not affected.

### Theorem

*Under standard policy, introducing a CBDC is neutral for the economy when there is no impact on taxes:*

$$(1 + \mu_d)R^d = (1 + \mu_h)R^h.$$

## CBDC impact under quantitative easing

- Since the liquidity requirement is not binding, the commercial bank prefers to reduce its excess reserves to accommodate CBDC demand.
- If the demand for CBDC deposits is lower than the amount of excess reserves, lending to the economy remains unchanged.
- If the demand for CBDC deposits is greater than the amount of excess reserves, the central bank is not able to channel funds back to the commercial bank and lending decreases.

### Theorem

*Under QE, introducing a CBDC is neutral for the economy when there is no impact on lending ( $h < \bar{h}$ ), and no impact on taxes:*

$$R^r = (1 + \mu_h)R^h.$$

## Reverting quantitative easing

**QE tapering:** reverting asset-purchase programs, the central bank sells assets back to the banking sector in exchange for reserves.

This operation would be much harder after introducing a CBDC for two reasons:

1. Commercial bank's reserves have been transferred to households in the form of CBDC deposits;
2. Deposits tend to be inelastic.

The adoption of a CBDC under QE policy might render quantitative easing quasi-permanent.

## Conclusions

- The equilibrium impact of a CBDC depends on the ongoing monetary policy.
- The introduction of a CBDC can be neutral to the economy under specific conditions.
- Under quantitative easing, commercial banks optimally use their excess reserves to accommodate retailers' demand for switching from bank to CBDC deposits.
- Introducing a CBDC is likely to render quantitative easing a quasi-permanent policy.

## Selected literature

- [1] M.K. Brunnermeier and D. Niepelt. On the equivalence of private and public money. *Journal of Monetary Economics*, 106:27–41, 2019.
- [2] Bank for International Settlements (BIS). Central bank digital currencies: foundational principles and core features. 2020.
- [3] M. Magill, M. Quinzii, and J.C. Rochet. The safe asset, banking equilibrium, and optimal central bank monetary, prudential and balance-sheet policies. *Journal of Monetary Economics*, 112(C):113–128, 2020.

