

The Effects of CBDC on Aggregate Income Through Credit Dynamics and Household Confidence

Serçin Şahin¹ Kaan Ögüt²

Extended Abstract

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1. Motivation and objective

A retail central bank digital currency (CBDC) gives households access to digital central bank money alongside commercial bank deposits. Its introduction can change the composition of household portfolios and the funding conditions under which banks create credit. Understanding these effects requires a framework that connects financial balance sheets to expenditure and income. In an endogenous-money setting, lending creates deposits, while profitability and funding costs shape the terms of credit provision [1]. The macroeconomic consequences of CBDC therefore depend on how portfolio substitution feeds into banks' liabilities, lending rates and household borrowing.

This study examines that transmission mechanism using a stock-flow consistent (SFC) model implemented through system dynamics. It addresses two questions: how does CBDC introduction affect bank funding and household income when confidence is unchanged, and how does a subsequent decline in confidence in banking-sector stability alter those effects? The analysis focuses on two simulation experiments that connect household portfolio decisions to credit-financed durable expenditure and income dynamics.

2. Model and transmission mechanism

The model comprises households, final consumption goods firms, durable consumer asset firms, commercial banks, the central bank and the government. The SFC framework links financial assets and liabilities across sectors and tracks the interaction between monetary flows and accumulated stocks [2]. Final consumption goods have a normalized price, while durable asset prices adjust with inventories. Households receive wages, distributed profits and interest income; they hold financial wealth and durable assets and borrow from banks to finance durable purchases. Consumption, saving and desired wealth depend on perceived disposable income, habitual spending and financial buffers.

Households allocate financial wealth between bank deposits and CBDC according to relative remuneration and confidence in banking-sector stability. In the simulated confidence shock, a lower willingness to hold deposits induces additional substitution into CBDC at unchanged administered interest rates. The resulting portfolio adjustment changes the composition of bank funding. Banks hold loans and required reserves and finance their balance sheets with deposits, central bank advances and equity. The central bank supplies the advances demanded by banks, and banks accommodate household loan demand.

The key transmission channel is the cost of replacing deposits with central bank funding. With D denoting deposits, A central bank advances, r_D the deposit rate and r_P the policy rate, banks' weighted average funding rate is

$$r_F = r_D \frac{D}{D + A} + r_P \frac{A}{D + A}. \quad (1)$$

The deposit rate is set below the policy rate in the experiments. Consequently, a greater share of advances raises the average funding rate and, through banks' loan-pricing markup, the lending rate. Higher borrowing costs weaken household loan demand. Since durable purchases are financed by bank loans, this reduces durable expenditure and firms' receipts. Changes in wages and distributed profits then affect household income, spending and desired wealth. Partial adjustment of perceived income, expectations and inventories generates feedback between these financial and real variables.

¹Yildiz Technical University, Department of Economics, Email: sesahin@yildiz.edu.tr

²Bahcesehir University, Department of Economics, Email: kaan.ogut@bau.edu.tr

3. Simulation design

The experiments share the same initial regime, in which households hold their financial wealth in deposits. In the *baseline experiment*, CBDC becomes available at simulation period $t = 100$, and household confidence remains at 1. In the *confidence-shock experiment*, CBDC is also introduced at $t = 100$, followed by an exogenous fall in confidence from 1 to 0.5 at $t = 200$; confidence subsequently remains at that level. The policy rate, CBDC remuneration, deposit markdown and loan markup are unchanged in both experiments. This comparison isolates the additional portfolio and credit effects of weaker confidence after CBDC becomes available.

4. Results

CBDC introduction with unchanged confidence. At $t = 100$, households transfer part of their deposits into CBDC, producing a sharp change in the composition of financial wealth. Banks become more dependent on central bank advances, increasing their average funding costs and lending rates. Household income falls initially and subsequently exhibits sustained oscillations. The durable asset stock follows a declining, cyclical trajectory, while durable asset prices fluctuate along an upward-moving path. The joint behavior of income, inventories and prices indicates a dynamic adjustment process: an initial portfolio shift generates continuing interactions between borrowing, expenditure and asset accumulation.

CBDC introduction followed by a confidence decline. The shock at $t = 200$ produces a further marked shift from deposits to CBDC. Greater reliance on central bank advances lifts funding costs and loan rates above those in the unchanged-confidence experiment. More expensive borrowing weakens loan-financed durable demand and transmits the financial adjustment to household income. Following the transition, income fluctuates within a narrower range, with lower peaks than in the baseline. Durable holdings undergo an additional short-run contraction after the shock and subsequently continue to decline relative to their pre-CBDC level. Durable asset prices remain cyclical, but their upward drift is substantially weaker than in the baseline.

Together, the experiments identify household confidence as an amplifier of deposit substitution and the associated increase in borrowing costs. The income response is oscillatory, so the results should not be interpreted as a uniform reduction at every point in time. Credit adjustment operates through banks' funding costs, loan pricing and household demand. Central bank liquidity provision sustains the availability of funding, but replacing deposits with more expensive advances still transmits portfolio changes to spending and income.

5. Conclusion

The simulations show how CBDC adoption can connect household portfolio choices to aggregate income through the bank funding and credit channels. Under the assumed interest-rate configuration, substitution away from deposits raises the cost of bank funding and changes credit-financed expenditure dynamics. A decline in confidence intensifies that substitution and raises lending rates further. Assessing CBDC therefore requires attention to confidence in the banking sector, the relative cost of alternative bank liabilities and the transmission of funding costs into loan prices.

These findings are illustrative model outcomes conditional on the behavioral rules, funding-rate differential and assumption that durable purchases are loan-financed. Their contribution is to clarify a conditional macro-financial transmission mechanism linking digital money adoption to financing conditions and income dynamics.

References

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