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DISINTERMEDIATION OR REDESIGN? THE ROLE OF BANKS IN FIAT AND CBDC MONETARY SYSTEMS

Disintermedijacija ili redizajn? Uloga banaka u fiat i CBDC
monetarnom sistemu

Abstract

This paper examines the evolving role of commercial banks in the context of central bank digital currencies (CBDCs), with a comparative focus on the Chinese digital yuan and the European digital euro. While traditional fiat systems rely on commercial banks as key intermediaries and creators of money, CBDCs introduce a new form of central bank liability accessible to households and firms, potentially altering the structure of financial intermediation. The paper develops a stylized theoretical framework to examine the substitution between bank deposits and CBDC, and its implications for bank lending. The analysis is complemented by a comparative institutional assessment of the Chinese and European CBDC models, as well as a numerical illustration of their potential impact on deposits and credit. The findings suggest that CBDC does not eliminate the role of banks but significantly reshapes it. In particular, the degree of disintermediation depends on institutional design. Systems allowing more direct access to central bank money are associated with stronger substitution effects, leading to a reduction in deposits and lending capacity. In contrast, intermediated models with regulatory constraints mitigate these effects and preserve financial stability. The paper contributes to the literature by linking CBDC design to the changing role of banks and highlighting the trade-off between monetary control and financial intermediation.

Keywords: *Central bank digital currency (CBDC), banking system, financial stability, digital euro, digital yuan, disintermediation*

Sažetak

Ovaj rad ispituje evoluirajuću ulogu komercijalnih banaka u kontekstu digitalnih valuta centralnih banaka (CBDC), sa uporednim fokusom na kineski digitalni yuan i evropski digitalni evro. Dok se tradicionalni fiat sistemi oslanjaju na komercijalne banke kao ključne posrednike i kreatora novca, CBDC uvode novi oblik obaveza centralne banke dostupan domaćinstvima i firmama, potencijalno menjajući strukturu finansijskog posredovanja. Rad razvija stilizovani teorijski okvir za ispitivanje supstitucije između bankarskih depozita i CBDC-a, i njenih implikacija na bankarsko kreditiranje. Analiza je dopunjena uporednom institucionalnom procenom kineskih i evropskih CBDC modela, kao i numeričkom ilustracijom njihovog potencijalnog uticaja na depozite i kredite. Rezultati sugerišu da CBDC ne eliminiše ulogu banaka, već je značajno preoblikuje. Konkretno, stepen dezintermedijacije zavisi od institucionalnog dizajna. Sistemi koji omogućavaju direktniji pristup novcu centralne banke povezani su sa jačim efektima supstitucije, što dovodi do smanjenja depozita i kreditnog kapaciteta. Nasuprot tome, posredovani modeli sa regulatornim ograničenjima ublažavaju ove efekte i čuvaju finansijsku stabilnost. Rad doprinosi literaturi povezujući dizajn CBDC-a sa promenljivom ulogom banaka i ističući kompromis između monetarne kontrole i finansijskog posredovanja.

Ključne reči: *digitalne valute centralnih banaka, bankarski sistem, finansijska stabilnost, digitalni evro, digitalni yuan, disintermedijacija*

Introduction

The contemporary monetary system is characterized by a dual structure in which central banks issue base money, while commercial banks create the majority of money in circulation through deposit creation associated with lending activities. This institutional arrangement positions commercial banks as key intermediaries, not only in financial intermediation but also in the process of money creation.

Recent technological advancements and the rapid digitalization of payment systems have prompted central banks worldwide to explore the issuance of central bank digital currencies (CBDCs). Unlike traditional forms of central bank money—cash and reserves—CBDCs introduce a novel form of sovereign money that can be directly accessible to households and firms. This innovation has the potential to fundamentally reshape the architecture of the monetary system by altering the relationship between public and private money.

A central concern in the emerging literature is the extent to which CBDCs may alter the role of commercial banks. Specifically, the introduction of CBDCs raises questions about the future of bank intermediation, the stability of deposit funding, and the transmission of monetary policy. While some models suggest that CBDCs could lead to partial disintermediation of banks, others emphasize that appropriate institutional design can preserve their core functions.

The paper contributes to this debate by comparatively analyzing two leading CBDC models: the Chinese digital yuan and the European digital euro. These models differ significantly in their institutional design, particularly regarding the role of commercial banks as intermediaries between central banks and end users.

The paper addresses the following research questions:

- (1) Do commercial banks retain an intermediary role between central banks and users in CBDC systems?
- (2) Can CBDC holdings within banks be considered deposits, or do they represent a distinct category of central bank liabilities?
- (3) How does the introduction of CBDC affect the deposit base and lending capacity of commercial banks?

By developing a conceptual framework and applying it to the comparative analysis of the two models, the paper seeks to provide insights into the evolving role of banks in digital monetary systems and the broader implications for financial stability and monetary policy.

The contribution of this paper lies in explicitly linking CBDC design to the degree of bank disintermediation through a simple analytical framework.

Literature Review

The growing body of literature on central bank digital currencies (CBDCs) reflects increasing academic and policy interest in the transformation of monetary systems. Existing research can be broadly categorized into several interrelated strands.

The first strand focuses on the macroeconomic implications of CBDCs. Barrdear and Kumhof [4] provide one of the earliest quantitative analyses, demonstrating that CBDCs could increase economic output by enhancing the effectiveness of monetary policy transmission. Meaning et al. [10] further explore the implications for interest rate control, suggesting that CBDCs may strengthen the central bank's ability to implement unconventional monetary policies, including deeply negative interest rates.

The second strand examines the implications of CBDCs for financial intermediation and banking stability. Brunnermeier and Niepelt [6] argue that CBDCs may be neutral with respect to financial intermediation under certain institutional arrangements, particularly if central banks offset deposit outflows through lending facilities. In contrast, Diamond and Dybvig [7], while not directly addressing CBDCs, provide a foundational framework for understanding bank runs, which has been extended in recent CBDC literature to highlight the risk of accelerated digital bank runs. Fernández-Villaverde et al. [8] further develop this line of reasoning, emphasizing that CBDCs may increase the fragility of bank funding structures.

The third strand focuses on the design and technological architecture of CBDCs. Auer and Böhme [3] distinguish between direct, hybrid, and intermediated CBDC models, arguing that design choices are critical in shaping the role of financial intermediaries. Kahn et al. [9] analyze the

coexistence of private and public money, highlighting the importance of competition and complementarity between different forms of money.

The fourth strand addresses institutional and policy considerations. Reports by the Bank for International Settlements [11] outline foundational principles for CBDC design, emphasizing financial stability, efficiency, and coexistence with existing payment systems. Bindseil [5] introduces the concept of a tiered remuneration system as a mechanism to mitigate the risk of deposit outflows. Similarly, the European Central Bank [12] emphasizes an intermediated model aimed at preserving the role of commercial banks, while the People's Bank of China [13] presents a two-tier model that allows for greater central bank oversight and control.

A growing body of recent research also explores the competitive dynamics between CBDCs and bank deposits. Andolfatto [2] argues that interest-bearing CBDCs could significantly alter the demand for bank deposits, while Agur et al. [1] highlight the trade-off between financial stability and financial inclusion in CBDC design.

Despite the rapid expansion of the literature, limited attention has been devoted to the explicit link between CBDC design and the evolving role of commercial banks. In particular, limited attention has been given to the legal and economic classification of CBDC holdings within commercial banks and their implications for deposit creation and credit supply.

This paper contributes to the literature by integrating insights from monetary theory, banking economics, and institutional design, and by providing a structured comparative analysis of the Chinese and European CBDC models, with a specific focus on the role of banks in each system.

Theoretical Framework

The introduction of central bank digital currencies (CBDCs) challenges the traditional structure of the monetary system by introducing a new form of central bank liability accessible to households and firms. In order to analyze its implications, this paper adopts a simplified conceptual framework that captures the interaction between central banks, commercial banks, and the private sector.

Structure of the Monetary System

In the traditional fiat-based system, the money supply consists of two main components: central bank money (cash and reserves) and commercial bank money (deposits). Commercial banks play a dual role as financial intermediaries and creators of money through the extension of credit.

In a fiat-based monetary system, the total money supply is defined as:

$$M = C + D$$

where:

- C denotes cash,
- D denotes bank deposits.

With the introduction of CBDC, the money supply becomes:

$$M = C + D + E$$

where:

- E denotes CBDC holdings.

CBDC represents a direct claim on the central bank, distinguishing it from bank deposits, which are liabilities of commercial banks.

Deposit Allocation and Substitution Mechanism

The introduction of CBDC creates a portfolio choice problem for economic agents. Households and firms allocate their liquid assets between bank deposits and CBDC based on relative attractiveness.

Deposit demand is defined as:

$$D = D(r_d, r_e, \theta, \rho)$$

where:

- r_d – interest rate on deposits,
- r_e – effective return on CBDC,
- $\theta \in (0,1]$ – confidence in the banking system and
- $\rho \geq 0$ – regulatory constraints on CBDC (e.g., holding limits).

Comparative statics imply:

- $\partial D / \partial r_d > 0$,
- $\partial D / \partial r_e < 0$,
- $\partial D / \partial \theta > 0$ and

- $\partial D / \partial p > 0$.

The substitution effect between deposits and CBDC is:

$$\partial D / \partial E < 0$$

The strength of this substitution effect depends on the institutional design of CBDC.

Bank Lending and Credit Creation

Commercial banks rely on deposits as a primary funding source for lending. A simplified relationship between deposits and loans can be expressed as:

$$L = \alpha \cdot D$$

where:

- L – total lending and
- $\alpha \in (0,1]$ – lending coefficient.

Thus:

$$\partial L / \partial D = \alpha > 0$$

Combining with substitution:

$$\partial L / \partial E = \alpha \cdot (\partial D / \partial E) < 0$$

CBDC Design and Degree of Disintermediation

The impact of CBDC on the banking system critically depends on its institutional design.

Two stylized regimes can be distinguished:

- 1) Direct or quasi-direct model (Chinese approach):
The central bank provides CBDC directly to users (potentially via digital wallets), reducing the role of banks as intermediaries.
- 2) Intermediated model (European approach):
Commercial banks and payment institutions act as intermediaries, maintaining customer relationships and operational control over CBDC distribution.

Introduce parameter $\beta \in [0,1]$, representing the intensity of substitution from deposits to CBDC:

$$D = D_0 - \beta \cdot E$$

where:

D_0 – initial level of deposits

Thus:

$$L = \alpha \cdot (D_0 - \beta \cdot E)$$

Interpretation:

- $\beta \approx 1 \rightarrow$ strong substitution (Chinese model) and
- $\beta \approx 0 \rightarrow$ weak substitution (European model).

Implications for Monetary Transmission

CBDC may strengthen the direct transmission of monetary policy by enabling central banks to influence retail-level liquidity conditions. At the same time, reduced reliance on bank intermediation may weaken the traditional bank lending channel.

Thus, CBDC introduces a trade-off between:

- enhanced central bank control, and
- reduced role of commercial banks in credit creation.

The model is intentionally stylized and abstracts from interest rate dynamics, risk heterogeneity, and bank capital constraints. It is designed to isolate the substitution mechanism between deposits and CBDC and its implications for lending.

Research Hypotheses

Based on the theoretical framework, the following hypotheses are formulated:

- H1:** The introduction of CBDC leads to a reduction in bank deposits due to substitution effects between deposits and central bank digital money.
- H2:** The reduction in bank deposits is more pronounced in CBDC systems that allow direct or quasi-direct access to central bank money (e.g., the Chinese model) compared to intermediated systems (e.g., the European model).
- H3:** CBDC reduces the lending capacity of commercial banks by weakening their deposit base.
- H4:** Regulatory constraints on CBDC holdings (e.g., quantitative limits or tiered remuneration) mitigate the negative impact of CBDC on bank deposits.
- H5:** CBDC enhances the effectiveness of monetary policy transmission by providing a direct channel between central banks and economic agents.

H6: In intermediated CBDC systems, commercial banks retain a significant operational role despite the shift in the nature of money from private to public liabilities.

Comparative Analysis: Fiat vs. CBDC Systems

Structural Differences Between Fiat and CBDC Systems

In the traditional fiat system, households and firms hold money primarily in the form of bank deposits, while central bank money is accessible only indirectly. Commercial banks play a central role as intermediaries and creators of money.

In contrast, a CBDC-based system introduces a direct claim on the central bank available to non-bank agents. This fundamentally alters the structure of money by introducing direct competition between public (CBDC) and private (deposit) money.

The introduction of CBDC adds a new component E to the monetary system:

$$M = C + D + E$$

This creates a substitution mechanism affecting deposits:

$$D = D_0 - \beta \cdot E$$

Role of Banks as Intermediaries

In the fiat system, banks are indispensable intermediaries. All non-cash transactions rely on bank deposits, and there is no direct access to central bank money.

In the fiat system:

$$E = 0$$

Deposits dominate:

$$D \approx M - C$$

In CBDC systems:

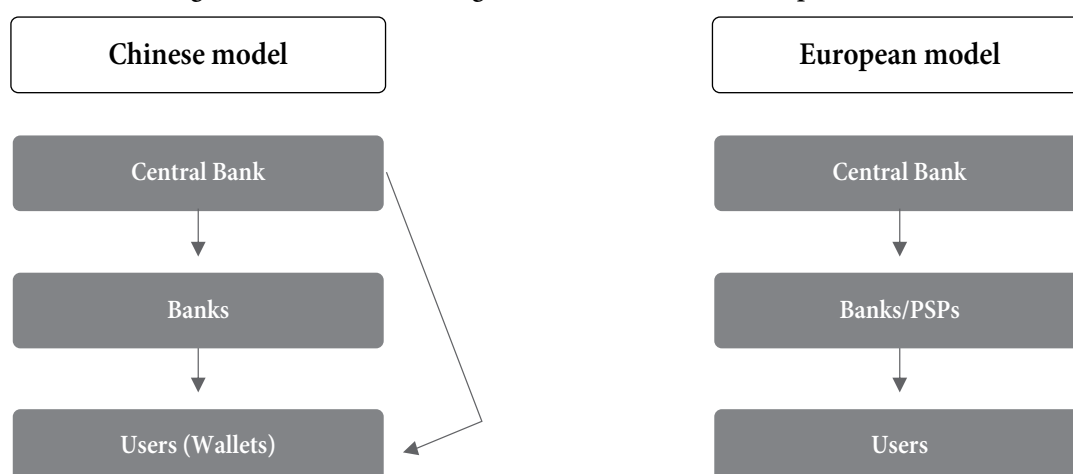
$$E > 0$$

Deposits compete with CBDC. The intensity of this competition depends on β .

In CBDC systems, the role of banks depends on institutional design:

- In the Chinese model, banks perform operational functions but are partially bypassed, as users can hold CBDC in digital wallets that represent claims on the central bank. This corresponds to a higher value of β , reflecting stronger disintermediation.
- In the European model, banks remain the primary interface between users and the monetary system. CBDC is distributed through intermediaries, and user access is structured to preserve bank involvement. This implies a lower β .

Figure 1. Institutional Design of CBDC: Chinese vs European Model



Source: Author

Thus, while banks are not eliminated in either model, their role shifts from money creators to service providers.

The figure illustrates the institutional structure of CBDC systems under two alternative designs. In the Chinese model, users may access central bank digital currency both directly and through banks, implying partial disintermediation. In the European model, access to CBDC is intermediated by banks and payment service providers, preserving the traditional role of financial intermediaries.

Nature of CBDC Holdings: Deposits or Not?

A key distinction between fiat and CBDC systems concerns the legal and economic nature of money holdings.

In the fiat system, deposits are liabilities of commercial banks and constitute the dominant form of money used by the public.

In CBDC systems, holdings of E represent liabilities of the central bank, regardless of whether they are accessed via bank interfaces.

CBDC holdings are distinct from deposits:

$$E \neq D$$

CBDC:

- liability of central bank

Deposits:

- liability of commercial banks

This distinction has important implications:

- CBDC does not provide funding to banks,
- It does not support credit creation directly and
- It represents a safe asset from the perspective of users

Financial Stability and Bank Runs

CBDC introduces a new dimension to financial stability. In crisis situations, households may rapidly shift funds from deposits to CBDC, accelerating deposit outflows.

In stress scenarios:

$$E \uparrow \Rightarrow D \downarrow$$

Speed of adjustment depends on β and regulatory constraints (ρ).

Monetary Policy Implications

CBDC enhances the direct transmission of monetary policy by allowing central banks to influence retail-level liquidity conditions.

CBDC increases direct control via E , while reducing reliance on:

$$L = \alpha \cdot D$$

However, this comes at the cost of weakening the traditional bank-lending channel, as captured by the decline in D and L .

Thus, the comparative analysis reveals a fundamental trade-off:

- The Chinese model prioritizes control and efficiency and
- The European model prioritizes stability and institutional continuity

The choice between these models reflects differing policy preferences rather than purely technical considerations.

Numerical Illustration

To complement the theoretical framework, this section provides a simple numerical illustration of the impact of CBDC on bank deposits and lending.

Assumptions

We consider a stylized banking system with the following parameters:

- Initial deposits: $D_0 = 100$
- Lending coefficient: $\alpha = 0.8$
- CBDC adoption levels: $E \in \{0, 10, 20, 30\}$

Two scenarios are analyzed:

- European model (low substitution): $\beta = 0.2$
- Chinese model (high substitution): $\beta = 0.7$

The model is defined as:

$$D = D_0 - \beta \cdot E$$

$$L = \alpha \cdot D$$

Results

Scenario 1: European model ($\beta = 0.2$)

CBDC (E)	Deposits (D)	Lending (L)
0	100	80
10	98	78.4
20	96	76.8
30	94	75.2

Scenario 2: Chinese model ($\beta = 0.7$)

CBDC (E)	Deposits (D)	Lending (L)
0	100	80
10	93	74.4
20	86	68.8
30	79	63.2

The figure illustrates the relationship between CBDC adoption (E) and bank lending (L) under different substitution parameters (β). The results indicate a significantly stronger decline in lending in systems with higher levels of disintermediation.

The results clearly illustrate the role of the substitution parameter β in shaping the impact of CBDC on the banking system.

In the European model, characterized by a low β , the decline in deposits is gradual. Even with an increase in CBDC holdings to $E = 30$, deposits decrease only modestly (from 100 to 94), resulting in a limited reduction in lending capacity.

In contrast, the Chinese model exhibits a significantly stronger effect. With $\beta = 0.7$, the same increase in CBDC leads to a substantial decline in deposits (from 100 to 79), accompanied by a pronounced contraction in bank lending.

These results support the hypothesis that the institutional design of CBDC systems plays a critical role in determining their macro-financial impact. In particular, systems with higher degrees of disintermediation may significantly weaken the bank-based credit channel.

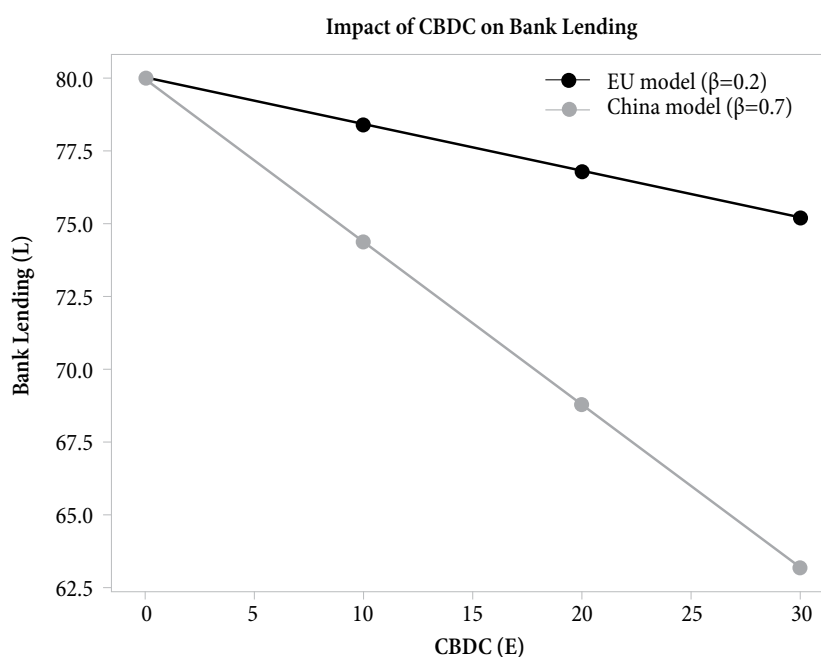
Furthermore, the simulation highlights that even relatively small increases in CBDC adoption can have non-negligible effects on lending, especially in high-substitution environments.

The numerical illustration reinforces three key insights:

1. The impact of CBDC on banks is not binary but depends on design parameters.
2. Regulatory constraints (captured by lower β) can effectively stabilize the banking system.
3. There exists a trade-off between innovation (higher CBDC adoption) and financial intermediation (bank lending capacity).

This simple framework can be extended in future research to include interest rates, risk factors, and dynamic adjustments.

Figure 2. Impact of CBDC on Bank Lending under Different Institutional Designs



Source: Author's calculation

Discussion

The analysis shows that the introduction of CBDC represents not merely a technological innovation, but a structural transformation of the monetary system. The key shift lies in the redefinition of the relationship between central banks, commercial banks, and end users.

In the traditional fiat system, commercial banks occupy a central position as both intermediaries and creators of money. Their ability to generate deposits through lending constitutes the foundation of modern monetary economies. In this context, central banks influence the economy indirectly, primarily through the banking sector.

The introduction of CBDC alters this architecture by enabling central banks to establish a direct monetary relationship with households and firms. This reduces the exclusivity of commercial banks as providers of liquid money and introduces a new form of competition between public and private money.

The comparative analysis demonstrates that the magnitude of this transformation depends critically on institutional design. The Chinese model, characterized by a higher degree of direct access to CBDC, implies a more pronounced shift toward centralization. In terms of the theoretical framework, this corresponds to a higher degree of substitution between deposits and CBDC, leading to a potential weakening of the traditional bank-based credit channel.

In contrast, the European model reflects a deliberate effort to preserve the existing monetary structure. By imposing holding limits and maintaining the role of intermediaries, the European Central Bank effectively constrains the substitution effect, thereby stabilizing the deposit base and preserving the lending capacity of commercial banks.

This divergence reflects a deeper policy trade-off. On the one hand, CBDC can enhance monetary control and improve the efficiency of policy transmission. On the other hand, it may undermine the role of banks in financial intermediation, potentially reducing credit availability and altering risk allocation within the financial system.

An important implication concerns the nature of financial stability. While CBDC may reduce certain types

of risk—such as payment system inefficiencies—it may simultaneously introduce new risks, particularly related to rapid shifts from deposits to central bank money. In crisis scenarios, this could accelerate bank runs, especially in systems with fewer constraints on CBDC holdings.

At a more fundamental level, the introduction of CBDC challenges the traditional distinction between public and private money. By expanding access to central bank liabilities, CBDC blurs the boundary between these two forms of money and raises questions about the long-term role of commercial banks in money creation.

Policy Implications

The findings of this paper suggest several important implications for policymakers designing CBDC systems. First, the degree of disintermediation must be carefully managed. A CBDC design that allows unrestricted access to central bank money may lead to a significant decline in bank deposits, thereby weakening the credit creation capacity of the banking sector. Policymakers should therefore consider mechanisms such as holding limits, tiered remuneration, or restricted functionality to control the scale of substitution.

Second, the role of commercial banks should be explicitly defined within the CBDC framework. Rather than eliminating banks from the system, a more sustainable approach is to integrate them as operational intermediaries, responsible for customer interface, compliance, and financial services. This approach, reflected in the European model, helps preserve financial stability while enabling innovation.

Third, the legal and accounting treatment of CBDC holdings requires clear definition. As CBDC represents a liability of the central bank, it should not be treated as a bank deposit. This distinction has implications for bank balance sheets, regulatory capital requirements, and deposit insurance schemes.

Fourth, policymakers must consider the implications for monetary policy transmission. While CBDC may strengthen the direct transmission channel, it may also weaken the bank lending channel. The overall effect on monetary policy effectiveness will depend on the balance between these two mechanisms.

Fifth, financial stability considerations should be central to CBDC design. In particular, safeguards should be implemented to prevent rapid and large-scale shifts from deposits to CBDC during periods of stress. This may include dynamic limits, conversion frictions, or liquidity backstops for banks.

Finally, the choice between different CBDC models reflects broader institutional preferences. Systems that prioritize control and efficiency may adopt more centralized designs, while those emphasizing stability and continuity may favor intermediated models. There is no universally optimal solution; rather, CBDC design must be aligned with the structural characteristics and policy objectives of each economy.

Conclusion

This paper examined the evolving role of commercial banks in the context of central bank digital currencies (CBDCs), with a comparative focus on the Chinese and European models. By combining a theoretical framework with a comparative institutional analysis and a numerical illustration, the paper provides a structured assessment of how CBDC design influences the position of banks within the monetary system.

The findings suggest that CBDCs do not eliminate commercial banks, but fundamentally redefine their role within the monetary system. In traditional fiat systems, banks act as both intermediaries and creators of money. With the introduction of CBDC, this role shifts toward a more service-oriented function, while the central bank gains a more direct presence in the monetary system.

The analysis confirms that banks continue to play an intermediary role in both examined models, although to different degrees. In the Chinese model, this role is operational and potentially weaker, as users can access central bank money more directly. In contrast, the European model preserves the intermediary function of banks through an institutional design that limits direct access and emphasizes financial stability.

Furthermore, the paper clarifies that CBDC holdings do not constitute bank deposits. Instead, they represent direct liabilities of the central bank, even when accessed

through banking interfaces. This distinction has important implications for bank balance sheets and the mechanics of credit creation.

The results also demonstrate that CBDC can affect the deposit base of banks, with corresponding implications for lending capacity. Both the theoretical model and the numerical illustration show that the magnitude of this effect depends critically on the degree of substitution between deposits and CBDC. Systems with higher substitution parameters, such as the Chinese model, are more likely to experience a reduction in deposits and bank lending, while systems with stronger regulatory constraints, such as the European model, mitigate these effects.

Overall, the paper highlights a fundamental trade-off in CBDC design between increased monetary control and the preservation of bank-based financial intermediation. The choice between alternative models reflects broader institutional priorities rather than purely technological considerations.

Ultimately, CBDC does not eliminate banks, but transforms them from creators of money into competitors within a redefined monetary hierarchy.

While this paper provides a conceptual and comparative analysis of CBDC systems, several avenues for future research remain open.

First, empirical validation of the proposed framework will become increasingly important as CBDC projects move from pilot phases to broader implementation. Future studies could analyze real-world data on CBDC adoption, deposit dynamics, and lending behavior.

Second, the model could be extended to incorporate interest rate dynamics, allowing for a more detailed analysis of competition between deposits and interest-bearing CBDC. This would enable a more precise evaluation of monetary policy transmission mechanisms.

Third, future research could explore the implications of CBDC for financial stability under stress scenarios. In particular, dynamic models of bank runs incorporating CBDC could provide valuable insights into systemic risk and crisis management.

Fourth, the interaction between CBDC and bank funding structures deserves further attention. As banks adjust to potential deposit outflows, alternative funding

sources—such as wholesale funding or central bank facilities—may become more important, with implications for risk and regulation.

Fifth, cross-country comparative studies could examine how differences in institutional frameworks, financial development, and regulatory environments influence the design and impact of CBDC systems.

Finally, future research could investigate the broader macroeconomic consequences of CBDC adoption, including its effects on financial inclusion, competition in the financial sector, and the long-term evolution of the monetary system.

By addressing these questions, future studies can contribute to a deeper understanding of how digital currencies will reshape the role of banks and the structure of modern monetary economies.

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