

# **Analysis of the Impact of Blockchain Technology on Traditional Financial System - Taking Project Agora as an Example**

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**Abstract:** In the global macroeconomic environment characterized by deep integration of the digital economy and financial technology, the development and application of blockchain technology present both opportunities and challenges for traditional financial systems. This paper studies the Project Agora, we see its foundational background, analyze the usage of distributed ledgers, smart contracts, and tokenized asset technologies in traditional financial system, and testy the technical feasibility on using atomic settlement in dealing with cross-border payment delays and risks. Blockchain applications have positive effects on commercial bank liquidity management, central bank monetary policy transmission, and real firm operations, at the same time, due to the changes of banks' microstructure, new risks of cross-injection, endogenous risks of technology, integration vulnerability of infrastructures, cross-border regulatory friction and institutional conflicts occur. The author thinks that we can lower down the risks from four sides. Firstly, building suitable regulatory frameworks; Secondly, promoting digital transformation in commercial banks; Thirdly, building multi-level risk control systems; Fourthly, strengthening international regulatory cooperation and privacy compliance practices. All methods can provide a solid socioeconomic and legal foundation for future new technological applications.

**Keywords:** Blockchain Technology; Project Agora; Distributed Ledger; Smart Contract; Tokenized Assets;

## **1. Introduction**

Under the background of the global trade characterized by the deep integration of the digital economy and financial technology, the traditional financial system faces the core

problem of delayed cross-border payment settlements. The emergence and application of blockchain technology offers the technical solutions to this issue, while the advent of stablecoins poses potential threats to monetary sovereignty. From a financial perspective, blockchain is essentially a distributed ledger that utilizes cryptographic algorithms and consensus mechanisms to ensure all participants sharing an immutable asset records without central coordination, characterized by three core features: decentralization, immutability, and algorithmic trust. How to effectively use these new technologies to solve traditional challenges becomes important to their rapid development and application. Based on it, the Bank of International Settlements (BIS), in collaboration with central banks from major global economies and over 40 private financial institutions, launched the Project Agora, an experimental initiative aimed at driving digital innovation in the financial system under the framework of maintaining monetary unity and a dual-layer architecture, led by licensed commercial banks.

## **2. Project Agora Analysis**

Project Agora represents the evolution of blockchain technology, from theoretical concept to practical implementation, from technological empowerment to risk management frameworks, standing as a globally recognized, high-stakes experimental initiative that fundamentally restructures traditional financial systems with extensive reach and authoritative credibility. The author firstly examines the macroeconomic context and digital currency dynamics underlying this project, then analyzes how Project Agora leverages three core blockchain technologies, distributed ledgers, tokenization, and smart contracts, applying to deal with the fundamental challenges in traditional finance.

### **2.1 Project Agora Background Introduction**

Under the background of the global digital economy, traditional financial system faces severe infrastructure challenges, primarily manifested in structural friction and asynchronous issues in traditional cross-border payments, as well as path competition with digital currencies and the crisis of financial disintermediation.

On the one hand, within the current global financial system, cross-border payments and agency banking networks have long suffered from inefficiencies and high operational costs. Global cross-border clearing remains heavily reliant on message transmission networks like SWIFT, where information flows and fund movements are decoupled. The SWIFT system essentially functions as an asynchronous financial telegraph network, responsible solely for transmitting payment instructions without the actual fund settlements. When a cross-border payment occurs, funds undergo sequential processing across centralized ledgers maintained by multiple correspondent banks. Due to different time zones, different business hour about the real-time full payment system across central banks, and distinguished national regulatory frameworks, such transactions typically require 1 to 5 business days for the final settlements. This asynchronous processing mechanism not only incurs substantial post-event costs reconciliation but also the nonnegligible principal settlement risks, systemic risks arising from node defaults or time lag which induces the asynchronous fund transfers during multi-node conducting process. Furthermore, to comply with anti-money laundering (AML), counter-terrorism financing (CFT), and global sanctions requirements, each intermediary bank in the payment chain must conduct repeated background checking on the same transaction, further magnifying transaction costs and leading to unnecessary freezes of legitimate commercial funds due to system false alarm.

On the other hand, the digitalization of currency is driving profound transformations in the traditional financial system. In recent years, as the traditional financial framework struggled with the efficiency bottlenecks under its traditional correspondent banking model, private stablecoins like USDT and USDC experienced explosive growth. These stablecoins are anchored one-by-one to US dollars or short-term government bonds within independent reserve

pools, enabling the round-the-clock, low-cost circulation on public blockchains. By the end of 2025, the global stablecoin market value exceeded \$250 billions, with Tether's USDT and Circle's USDC dominating the market. From macroeconomic and monetary banking perspectives, stablecoins enhance payment efficiency while separating from commercial banks' balance sheets. Large amounts of bank deposits are being converted into private stablecoins, shrinking bank s' liability funding sources. To deal with the potential redemptions and meet the liquidity regulatory requirements, commercial banks will be forced to reduce lending and significantly increase holdings of highly liquid and risk-free assets, if this trend turns to out of control, traditional banks' ability to create credit for the real economy will be severely weakened, triggering financial disintermediation. Moreover, this inherent regulatory-free structure introduces significant macro and micro risks. Firstly, run risks directly impact sovereign bond markets. Stablecoin issuers have become among the most influential investors in the U.S. short-term Treasury market, and concentrated redemptions could force them to sell bonds, triggering severe price volatility. Secondly, there are issues of deep regulatory arbitrage and shadow banking practices. Fully reserved Stablecoin operations highly similar to money market funds (MMFs), yet fail to provide equivalent regulatory disclosure and asset isolation safeguards, forming a huge shadow banking system.

In response to these potential threats and to facilitate the synergistic development of WCBDC and tokenized deposits within the same ecosystem, the BIS launched Project Agora, aiming to let the licensed commercial banks to drive digital innovation across the financial system.

## **2.2 Project Agora' Technical Architecture**

Project Agora integrates distributed ledger technology (DLT), smart contracts, and tokenized asset technology seamlessly into the real business process of traditional finance, specifically deal with the challenges such as the agency bank model.

### **2.2.1 Application of DLT in Project Agora**

In Project Agora, DLT is embodied through the concept of a Unified Ledger. Its application primarily aims at the problems in traditional financial systems, such as the existed data silos,

isolated ledgers and asynchronous processing of information flows and capital movements. The introduction of DLT eliminates the historical issue of the separating information and value. By employing encryption algorithms and distributed consensus mechanisms, DLT transforms traditional account balances into programmable tokens with unique identifiers on the blockchain. In this new architecture, tokens serve not only as carriers of value but also the complete records of

ownership transfer history. In DLT network, transaction commands are treated as requests to modify asset states. Once reaching a consensus among network nodes, information transmission and asset transfers occur simultaneously at the same time in shared ledger. The post-transaction checking and error-correction by traditional intermediaries are avoided, thereby enhancing the operational efficiency of financial infrastructure.

**Table 1. Traditional Agency Model vs Unified Ledger Model**

Dimension	Traditional agency model(SWIFT)	Unified ledger model(Project Agora)
Process logic	Asynchronous process: funds settled after information sent	Synchronous process: information are assets, assets are settlements
Intermediary dependency	Multi-level agent banks and their mutual trust relationships	Unified programmable platform and distributed ledger
Settlement cycle	T+1 to T+5(Time zone restrictions)	T+0(Second-level, available 24/7)
Liquidity efficiency	A substantial amount of Nostro/Vostro reserve funds is required	Atomic settlement releases the locked liquidity
Risk model	There is a risk of principal default	The algorithm ensures atomicity, no match without settlement.
Compliance integration	Post-event manual review and duplicate reconciliation	Pre-event verification and automated compliance

### 2.2.2 Application of Smart Contracts in Project Agora

The application of smart contracts primarily targets at the risks associated with principal settlement (particularly the risk of failed settlement) and repeated cross-border compliance reviews. Smart contracts transfers the complex business logic, regulatory policies and legal contracts into the computer code, deploys on the unified ledger for automatic and enforceable execution.

Firstly, smart contracts serve as the execution engine for atomic settlement. According to definition by International Monetary Fund (IMF), the strict atomicity means that multi-step database operations are either fully executed or entirely failed, with no intermediate states permitted. In traditional cross-border transactions, if one side makes an advance payment while the other side fails to pay the corresponding assets, the first payer has the risk of losing the principal. On the Project Agora platform, smart contracts pack the exchange rate conversion, borrowing and lending of multi-party accounts and the reserve fund transfer into an indivisible logical atom. When all conditions are met, tokens from both sides are settled simultaneously, failure at any stage triggers an overall transaction rollback, eliminating exposure risks from settlement mismatches.

Secondly, smart contracts drive embedded compliance. The slowness of cross-border payments stems largely from the need for manual, serially compliance pre-check and anti-money laundering interception at each node. In Project Agora, AML rules, CFT rules and sanction lists of different countries are coded into the smart contracts. Before the payment, through the cryptographic verification, the smart contracts automatically use the shared identity and transaction data from the system to complete the pre-check of both sender and receiver. This replaces massive repetitive labors, reduces compliance costs, and prevents errors caused by information asymmetry.

### 2.2.3 Application of Tokenized Assets in Project Agora

The main target of tokenized technology application in Project Agora is to achieve programmable currency and high liquidity, at the same time to prevent financial disintermediation and protect monetary sovereignty. To do transactions in a unified ledger, traditional account balance must be converted into digital tokens with unique cryptographic identifier on the blockchain. Instead of issuing only digital currency, Project Agora integrates two core traditional financial liabilities as tokens. One is wholesale central bank digital currency (wCBDC). CBDC represents the digital form of a nation's fiat money, it's central banks' direct

liability. It has two forms, retail for the public (rCBDC) and wholesale for financial institutions (wCBDC). The seven central banks in project issue the tokenized reserves in specific areas of unified ledger, wCBDC represents the national sovereign credit and serves as the only settlement asset in system, it's very safe and has no credit and liquidity risks. The other is the tokenized commercial bank deposits. Commercial banks in project make the liabilities of corporate or individual clients into deposit tokens on the ledger. These tokens are still the legal liabilities of the commercial banks, issuing and destroying these tokens directly impact banks' balance sheets.

The above model shows the double-layer monetary framework of central banks and commercial banks on the blockchain. When commercial institutions use tokenized deposits for inter-bank or cross-border payments, at the same, the underlying logic of the unified ledger triggers the transfers of the central bank's wCBDC within its zone. The central bank credit ensures the 1:1 payments of different commercial banks' deposit tokens, thereby protect the singularity of currency. Meanwhile, since tokenized deposits remain in the banking system, commercial banks can continue to use them for lending, maintain the credit creation capacity and solve the disintermediation risks caused by private stablecoins.

### **2.3 Positive Impacts on Applications of Blockchain Technology in Traditional Financial System**

#### **2.3.1 Commercial Bank Level**

The unified ledger model significantly impacts commercial banks' liquidity management. In SWIFT network, transnational commercial banks must hold cash in overseas accounts. According to data from BIS report 2025, trillions of dollars in global funds are constrained by the inefficient liquidity flows everyday. Based on its T+0 atomic settlement, the unified ledger reduces precautionary liquidity demands, releases these free, low return rate cash assets. Commercial banks can put these released funds in the interest-bearing assets, short-term inter-bank lending, and high-value added corporate credits, raise up the assets' returns and make efficient capital turnover. Additionally, bilateral agent banking networks are no longer needed, banks can reduce the relationship maintenance expenses and some compliance

costs.

#### **2.3.2 Central Bank Level**

As final settlement tool of a unified ledger, wCBDC provides central banks a policy tool. The traditional monetary policy transmission mechanism is the aggregate control instrument, whose policy intentions gradually permeate to the real economy through the inter-bank market, a process that introduces time lags and be easy to cause idle rotation or funds flow into non-productive asset bubbles within the financial system. In a highly programmable unified ledger environment, central banks can directly embed specific policy intentions into the underlying code of wCBDC smart contracts. For instance, during liquidity crisis in particular industries, central banks can issue targeted funds with conditional execution tags, allowing them to be used exclusively for credit settlements of enterprises in specific sectors during designated periods, thereby enabling precise micro-level monetary policy delivery. Meanwhile, the distributed ledger nature of the unified ledger enhances the efficiency of macroprudential supervision. With full-time system operating and global consistency of the basic data, regulators can overcome the delayed data problems, achieve the real-time, detailed monitoring (accurate to every cross-border capital flows) the global exchange rate exposures, capital flight risks, and liquidity black holes.

#### **2.3.3 Real Economic Enterprises Level**

For firms deeply involve in global supply chains and cross-border trade, for multinational company's CFO, the unified ledger promotes financial agility. Currently, multinational firms must raise up the cash reserves or buy foreign exchange derivatives to deal with the delayed remittance and the possible foreign exchange fluctuations in traditional payment networks. Low cost cross-border payment by Agora lowers down the time uncertainties and exchange rate problems in international money flows. Firms can see their liquidity status in all time, they can use actively capital management strategies to minimize idle money amount and promote the efficiency of money use. At the same time, the upgrading infrastructure make easier for the international development of small and medium-sized enterprises (SMEs). Normally, SMEs were excluded by major international banks due to higher fees for single cross-border transfer and rigorous account open requirements, finally, SMEs can only rely on high-risk, costly

informal ways. By reducing single transaction's costs, the unified ledger makes small-scale, high-frequency cross-border B2B payments to be true, let SMEs enter into global digital trade and division of labor system more equitably and smoothly.

### **3. Risk Analysis of Blockchain Technology Application in the Traditional Financial System**

While the application of blockchain technology has brought a series of positive impacts on the operation of the traditional financial system, it has also given rise to new risks inherent to the adoption of such technologies.

#### **3.1 Cross-Contagion Risks**

From traditional views, the crypto asset market and the physical financial system remain relatively isolated. However, fiat-backed stablecoins represented by USDT and USDC have broken down this barrier, creating new channels for cross-sector risk contagion. The tokens issued by these stablecoins correspond to short-term U.S. Treasury securities, cash, or repurchase agreements held in their reserves, with direct balance sheet linkages. Stablecoin issuers have thus become significant non-bank institutional investors in the U.S. short-term Treasury market. According to BIS (2025) statistics, as of the fourth quarter of 2025, stablecoins held approximately 3% of the total short-term Treasury market. When the crypto market experiences major negative shocks (such as sudden price crashes of mainstream cryptocurrencies), investors' risk-averse sentiment rapidly spreads to stablecoins. Once large stablecoin issuers face bank runs, they must liquidate billions of dollars in assets within an extremely short time. Since U.S. Treasuries serve as the pricing benchmark for the global financial system, such forced liquidations trigger rapid declines in Treasury prices and sharp increases in market interest rates, thereby raise financing costs for the real economy. If multiple stablecoin issuers simultaneously face bank runs, collective liquidations could trigger liquidity crisis in the Treasury market, create systemic risks that facilitate cross-contagion of digital risks into the real economy.

#### **3.2 Endogenous Risk in Technology**

The law is coded in smart contracts, the main value is the un changed execution and

disintermediation. But, the technology is also a problem on the risk management while the system crisis happened. In traditional financial crises, regulators could control the risk spread by cutting off the network, stopping the market, manually operating transactions and providing emergency loans. Under distributed ledger system, once the transaction happens and reaches an agreement, the settlement will be absolutely unchangeable. Once smart contracts are found to have serious logic flaws, and the financial system are in crisis, regulators will enter into a governance dilemma, they can do nothing to stop the transactions, but to see the algorithm-driven clearing disasters[1].

#### **3.3 The Integration Risks in Infrastructure Level**

In traditional financial systems, IT systems of different institutions are independent from each other, central banks can have a response time because time is needed for risk transmission. Brunnermeier et al. (2023) worked on macro-financial frictions, they found that once financial markets achieved multiple equilibrium, technical shocks finally turned into system risks through positive feedback mechanisms[2]. In a unified ledger, all nodes synchronize datas at the same time. If hardware of any node fails to run, frequent network shocks happen, or receives the wrong external asset price signals, the wrong instructions and panic could spread to the global financial network through consensus mechanisms, the localized failures would be turned into the worldwide systemic collapse. Moreover, to ensure mutual operations between different institutions, the unified ledger requires the same cryptographic standards, consensus agreements and the underlying framework of all participants, we will lose the isolating capacity on the basis of technical diversity. If any code is broke through, all connected financial institutions will not have the secrets anymore. Additionally, due to blockchain's unchangeable nature, asset losses due to the operational errors such as private key loss or incorrect transfers cannot be repaired by recovering the database.

#### **3.4 Cross-Border Regulatory Frictions and Institutional Conflicts**

The global nature of blockchain conflicts with the territorial rules of the existing regulatory system. Project Agora concerns lots of coordination problems among central banks

across different zones. In cross-border atomic settlements, if smart contracts mismatch the funds, which country's law should be used for judging and take back the money? Which jurisdiction should solve the disputes? These problems are still unclear now. Lack of clear and legal coordination mechanism between countries leaves financial institutions facing significant uncertainty with disputes.

To reach agreements and achieve compliance, distributed ledgers share some transaction data and identity labels in every nodes. However, this conflicts with increasingly rigorous global data privacy and information security regulations, such as the EU's General Data Protection Regulation (GDPR). GDPR grants citizens the right to be forgotten, having the right to request the physical deletion of all historical data, which contradicts blockchain's inherent characteristics, once data is written, it is immutable and non-erasable. The core governance challenge hindering the large-scale deployment of new technologies in traditional financial systems lies in ensuring compliance with AML regulations while protecting national macro-financial security data, strictly complying to national data privacy laws, and preventing compliance penalty risks.

#### **4. Policy Recommendations for Improving the Application of Blockchain Technology in the Traditional Financial System**

The application of blockchain in the traditional financial system truly can promote the efficiency, but also bring risks. Policy makers must balance the process between fostering innovation and maintaining stability.

##### **4.1 Establish an Adaptive Regulatory Framework**

Firstly, establish a regulatory simulation mechanism that allows eligible blockchain financial projects to test innovative operations in a controlled environment, with regulators enter in the monitoring process, dynamically adjust the rules based on actual risks. Secondly, improve the functional regulatory framework, they should divide responsibilities according to business substance rather than institutional type, so to avoid the regulatory gaps and repeated supervisions. Thirdly, promote the application of Regulatory Technology (RegTech), use blockchain and artificial intelligence to improve the regulatory efficiency, enabling real-time

monitoring and risk alerts for on-chain transactions and solving the double-edged nature of compliance technology. Fourthly, develop an embedded regulatory system with the compliance logic. when a transaction occurs, smart contracts automatically use compliance interfaces such as ID and geographic location data to verify transaction's legality at the time. If a transaction fails to meet regulatory requirements, the contract automatically rolls back before execution, control risks at the beginning.

##### **4.2 Promote the Digital Transformation of Commercial Banks**

Firstly, commercial banks should actively embrace digital transformation by issuing tokenized deposits to counter the erosion of stablecoins on the liability side. Project Agora shows that the core advantage of tokenized deposits lies in their programmability, which enable direct interaction with on-chain smart contracts, support atomic settlements and conditional payments, facilitate T+0 atomic settlements, and release the locked money, offering significant efficiency in a unified ledger. Secondly, Xiaolin Xiao(2024) pointed out that central bank issuance of CBDCs does not necessarily lead to bank disintermediation[3]. On the contrary, if commercial banks tokenize deposits and complement with CBDCs, their credit creation capacity may actually enhance in the digital environment.

##### **4.3 Establish a Multi-Level Risk Prevention and Control System**

Firstly, establish a stablecoin redemption defense mechanism by setting redemption ceilings and cooling-off periods, limit the minimum proportion of highly liquid assets in stablecoin reserves, and require issuers to buy insurance from third-party insurers or establish industry mutual funds to enhance their capacity against run risks. Secondly, increase the risk weighting of crypto assets and limit the total holdings' scale of crypto and tokenized assets by banks and insurers to curb excessive speculation. Thirdly, regulators should classify cross-chain bridges and unified ledger platforms under the Financial Critical Infrastructure (FMI) framework, implementing capital adequacy supervision, regular security audits, enhancing information disclosure and building the risk isolation mechanisms. Fourthly, establish a

monitoring and early-warning system. Regulators should create a cross-market risk monitoring platform to track real-time capital flows and risk transmission between crypto and traditional markets, issue timely alerts when necessary.

#### **4.4 Strengthen International Regulatory Cooperation and Privacy Compliance**

Firstly, regarding cross-border jurisdictional conflicts and institutional challenges, Project Agora's international practices have provided valuable insights for subsequent regulatory coordination. The global central banks and regulators should actively enter in test program and rules making in international organizations such as BIS. At the beginning on establishing a unified cross-border ledger, it is important to define legal application principles and responsibility sharing mechanisms for international disputes, every country should find ways to solve the problems which combine the integrated supervision with different level's authorization together, while enter into the global programmable financial network, the national financial sovereignty and monetary policy independence remain intact. Secondly, to deal with the conflict between the open data and the personal privacy protection, the modern cryptographic privacy technologies should be widely adopted. In real business, systems should verify the fund's legitimacy only through mathematical validation, detailed transaction records should not be used. This approach can not only meet national requirements for supervise the cross-border AML but also protect core business secrets of domestic enterprises and individuals, to some extent, mitigate some institutional frictions.

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