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China's Digital Yuan—Recent Trial Runs and Prospects for Its Use in International Settlements

Introduction

In the midst of the global novel coronavirus (COVID-19) pandemic, China hosted the 2022 Winter Olympics from February 4 to February 20, 2022. It then held the Winter Paralympics from March 4 to March 13.

These two major international sporting events, held once every four years, were conducted at venues in the Chinese capital of Beijing and in the city of Zhangjiakou in the neighboring province of Hebei. The creation of bubbles to control venues and facilities where athletes and tournament officials stayed and to prevent the spread of COVID-19 was a topic of much discussion. Another anti-pandemic measure that drew attention was the experimental use of the digital yuan (or, e-CNY) as well as credit cards as payment methods for shopping and eating inside the bubbles.

The digital yuan is a central bank digital currency (CBDC) issued by China's central bank, the People's Bank of China (PBOC). The digital yuan can be used instead of cash (coins and banknotes) to make payments using a mobile phone

after downloading a dedicated app and charging the amount needed. The PBOC formed a digital currency research team in 2014, and in January 2017 it established the PBOC Digital Currency Research Institute (DCRI) in Shenzhen. With the approval of the State Council, the PBOC started a pilot digital yuan research and development (R&D) program with domestic commercial banks. Then in June 2018, the PBOC Digital Currency Research Institute established the Shenzhen Financial Technology Co. to conduct fintech experiments in Shenzhen and further promote R&D on digital currencies. Since 2020, pilot testing of the digital yuan has been conducted in Shenzhen.

Some of the world's central banks are planning to issue CBDCs and have begun trial runs. For example, among the more advanced nations, Sweden's central bank launched a project in November 2016 aimed at issuing an e-krona as a supplemental payment method for its fiat currency, the krona. Among emerging countries, Cambodia's central bank has begun a project aimed at issuing the Bakong as a CBDC. Meanwhile, China, the world's second largest economy, is far ahead of the rest of the world in R&D on CBDC and is performing trial runs to issue and distribute a digital currency.

This article presents a history of China's efforts to introduce a digital yuan, including its system design and trial runs conducted to date. The article also considers the possibility of the digital yuan's future use in the Asian region.

China's Efforts Toward Launching a Digital Yuan—Accelerated by the Libra Concept and the COVID-19 Pandemic

Libra concept's impact on China

Speaking at a domestic academic conference on July 8, 2019, PBOC Research Bureau Director-General Wang Xin said that the State Council had approved research on the issuance of a digital currency by the central bank. This was the first time the PBOC officially revealed the existence of a plan to issue a digital yuan for use in China.

The announcement's timing in part reflected the PBOC's concerns about the Libra (now Diem) concept launched by Facebook (now Meta). The Libra concept, first announced by Facebook on June 18, 2019, was a plan to issue a crypto asset as digital currency to be used for online transactions. Bitcoin, a conventional digital currency, had already been issued, but it was not backed by any other asset type, such as a national currency, and lacked a super-

visory organization, such as a country's central bank. As a result, Bitcoin's price fluctuated widely, making it an unstable settlement currency. On the contrary, Facebook's Libra concept was a plan to issue a digital currency (or stablecoin) that would be administered by the Libra Association, an organization with capital from member global corporations, and backed by a basket of assets including the USD, the EUR, and government bonds of several countries.

However, the Libra concept raised concerns among the financial authorities in many countries. PBOC's Wang Xin expressed his views on the Libra concept when speaking at the aforementioned academic conference. For starters, he thought that Libra had the potential to function as a currency, whereas the volatile Bitcoin would have difficulty serving as a replacement for conventional currencies. Secondly, he therefore considered that the Libra concept could have a significant impact on countries' monetary policies and financial stability, as well as on the global financial system. This impact stems from currencies as a source of profit and power, with the ability to influence international politics and diplomatic relations. If a single payment method has the same function as a currency, it will become a competitor of countries' legal currencies. Thirdly, Wang Xin noted that central banks would need to quickly issue their own digital currencies to fend off the challenge from Libra, and that China needed to quickly raise its voice in support of China's ongoing effort to gain international support and cooperation for its effort to issue a digital currency.

Soon thereafter, on August 18, 2019, the Central Political Bureau (Politburo) of the Chinese Communist Party Central and the State Council jointly released a document outlining their opinions on turning Shenzhen into a future model of socialism with Chinese characteristics. The document included an opinion supporting research on digital currencies and the innovative application of mobile payments in Shenzhen. With 2020 marking the 40th anniversary of the designation of Shenzhen City as a special economic zone, on October 11 the general offices of the Communist Party of China Central Committee and the State Council jointly announced a five year (2020-2025) pilot plan to implement comprehensive reform measures to build Shenzhen into a model of socialism with Chinese characteristics. The plan included support for the implementation of an internal closed test of the digital yuan and the promotion of R&D and the applications

for the digital yuan as well as international cooperation in those fields. This plan led to the first pilot test of the digital yuan in Shenzhen.

COVID-19 pandemic's impact

China's plan to test its digital yuan took on a more concrete shape in 2020, as one of the country's responses to the spread of the novel COVID-19. During the rapid spread of the infection following the initial outbreak in Wuhan City, Hubei Province in December 2019, it was recognized that the virus adheres to money (coins and banknotes), the handling of which can be a source of infection in humans. Accordingly, measures to quarantine and disinfect cash were strengthened. At the same time, mobile payments such as Alipay and WeChat Pay, which do not require handling of cash, were recommended.

At its annual conference on measures to secure safe use of money, gold, and silver held on April 3, 2020, the PBOC cited its R&D on the digital yuan as an effort to strengthen top-down promotion of the digital currency's use during 2020. The PBOC stressed that the digital yuan's use as a payment method that does not require direct contact with cash could help mitigate the spread of COVID-19 infections.

Digital Yuan's System Design

On July 16, 2021, the PBOC released a white paper entitled "Progress of Research & Development of E-CNY in China," the central bank's first document providing details about its digital yuan. The white paper says that, as of the end of June 2021, the pilot program had seen the e-CNY applied in over 1.32 million scenarios, including payments to restaurants and transportation companies. More than 20.87 million personal wallets and over 3.51 million corporate wallets had been opened, with the number of transactions totaling 70.75 million and transaction value approximating CNY34.5 billion.

In addition to the white paper, PBOC Governor Yi Gang gave an overview of the digital yuan during a lecture later that year on November 9. The institutional design of the digital yuan based on what can be

confirmed from the white paper and Yi's lecture is as follows.

Positioned as a fiat currency

According to the white paper, the digital yuan is defined as a fiat currency issued in data format by the PBOC.

The pilot test run was limited to certain areas within China, and one of the challenges that must be overcome before official issuance of the digital yuan is the legal procedures. On October 23, 2020, the PBOC released a proposed amendment to the Law of the People's Republic of China on the PBOC (hereafter, the People's Bank of China Law), which is China's central bank law, and collected public comments until November 23 of that year. In addition to establishing the yuan as the legal tender of the People's Republic of China (Article 18), the proposed amendment stipulates that "the renminbi includes physical and digital forms" (Article 19), establishing a legal basis for the issuance of CBDC.

In addition to stipulating that the renminbi is produced and issued by the PBOC (Article 20), the amendment says "... any other legal entity or individuals cannot issue or sell tokens to replace the circulation of renminbi" (Article 22) thus clarifying that only the PBOC, in its role as a central bank, can issue digital yuan as legal tender and leaving no room for issuance by private entities. While proceeding with its trial run of the digital yuan, the PBOC also strengthened measures to ban the issuance and distribution of Bitcoin and other crypto assets in mainland China.

After the People's Bank of China Law is revised, the PBOC is expected to proceed with the drafting of detailed rules for the issuance and distribution of the digital yuan, based on the results of market-based trial runs.

Adopting a two-tier operating system

China's CBDC prototype created by the PBOC in 2016 was based on the following ideas. First, the digital yuan is positioned as an alternative to cash in circulation (M₀), and therefore has exactly the same function as cash (coins and banknotes), does not pay interest, and essentially does not compete with bank deposits.

Second, the CBDC operating system is a two-tier system in which the PBOC issues the digital currency to commercial banks or other settlement institutions, which then provide digital yuan exchange and circulation services to the public. CBDC issuance methods include (1) a direct method in which the central bank issues directly to users and an indirect method in

which the CBDC is issued to users through commercial banks, and (2) an account method in which the central bank issues the CBDC through central bank accounts or a token method that enables exchanges among users without using a central bank account. The PBOC statements noted above indicate that China is envisioning an indirect CBDC issuance method that enables digital currency exchanges between users without the use of central bank accounts. Meiji University Professor Shuji Kobayakawa calls this CBDC system an “indirect issuance/value preservation scheme” (Figure 1).¹

Third, China’s digital yuan system design will set upper limits for the outstanding balance and per-transaction amount available on digital wallets on mobile phones that have been charged with digital yuan. These limits are aimed at reducing institutional friction and banks’ risk as much as possible.

Managed anonymity

China’s digital yuan system’s “managed anonymity” follows the principle of “anonymity for small value and traceable for high value” and its collection of person-

al information is based on the principle of collecting the minimum amount of needed information. The e-CNY system collects less transaction information than traditional electronic payment systems. The storage and use of personal information is strictly controlled, and the PBOC cannot provide information to third parties or government agencies unless required to do so by explicit laws and regulations. Data security and privacy protection are strengthened through legislative passage of laws, such as China’s data security law and personal information protection law.

Usage

The digital yuan’s system and usage are intended mainly to meet domestic retail payment demand. As long as there is demand for cash, the PBOC will not stop distributing cash, nor will it use an administrative order to force a complete shift to the digital yuan.

Cross-border use and international payments using the digital yuan are relatively complicated and must be conducted in compliance with legal constraints, such as anti-money laundering and identity verification (Know Your Customer).

Digital Yuan’s Trial Runs

Designation of “4 regions + 1 scene” (2019–20)

In addition to the decision to conduct trial runs of the digital yuan in Shenzhen in August 2019 and October 2020, the PBOC DCRI established Yangtze Fintech Co., Ltd., as a new fintech subsidiary in Jiangsu Province’s Suzhou City on March 1, 2019.

On April 18, 2020, the PBOC DCRI announced that, in addition to the e-CNY trial runs being conducted in Shenzhen and Suzhou, it would carry out closed trial runs in Hebei Province’s Xiong’an New Area, which is near Beijing and was established by President Xi Jinping as a base for innovation, and in Sichuan Province’s Chengdu City, a hub city in China’s interior. In addition to trial runs in those four regions, the PBOC DCRI announced it would conduct a similar closed trial run in “scenes” related to the 2022 Beijing Winter Olympics.

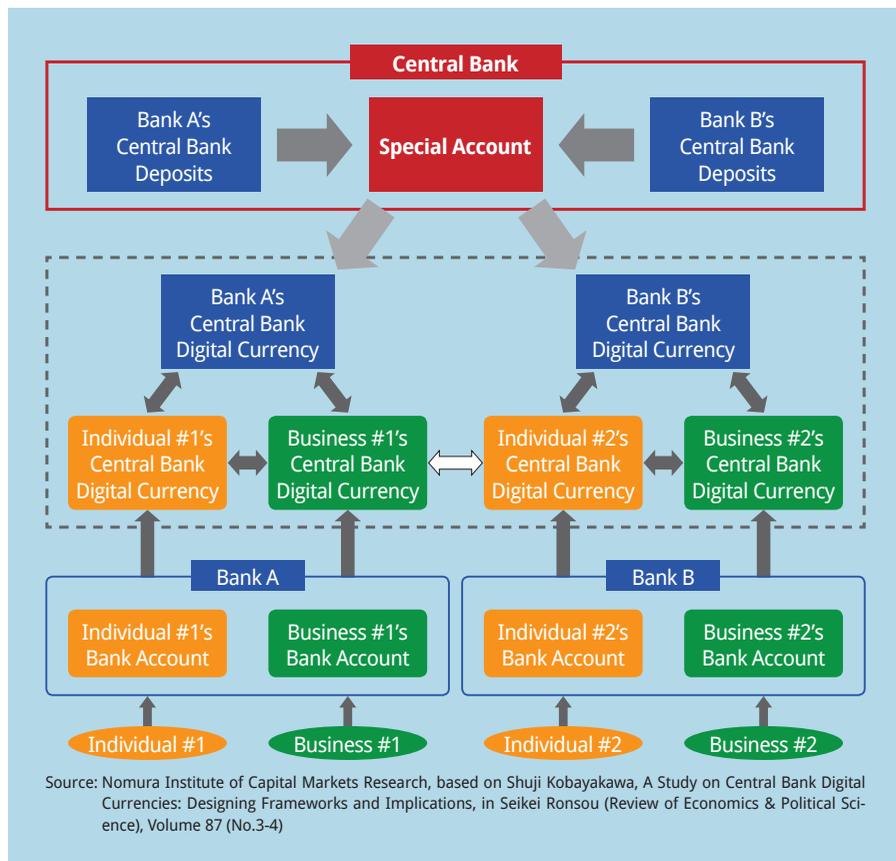
Thereafter, the Shenzhen pilot test run was conducted in October 2020, with 50,000 residents selected by lottery receiving 200 digital yuan per person (total distribution of 10 million e-CNY) in China’s first domestic public trial run of its CBDC. The second domestic public trial run was held in Suzhou in Jiangsu Province in December 2020 and included use of e-CNY for offline sales on December 12. In addition to offline sales at physical stores, the Suzhou trial run tested its use with online mall (JD.com) sales and the ability to transfer digital yuan without a mobile phone network.

Expansion of trial run regions (2020)

On April 12, 2021, Li Bin, head of the PBOC’s Macroprudential Policy Bureau, revealed that in October 2020 the digital yuan trial regions had been expanded from the “4 regions + 1 scene” originally designated at the end of 2019 to six more regions, including Shanghai, Hainan Province, Changsha in Hunan Province, Xi’an in Shaanxi Province, Qingdao in Shandong Province. And Dalian City in Liaoning Province, and that trial runs in those new regions were started a month later in November 2020.

According to the January 4, 2022, issue of the *China Securities Journal*, the

Figure 1: CBDC: Indirect Issuance/Value Preservation Scheme



PBOC began distributing a trial wallet app for managing digital yuan on smartphones. The app can be downloaded to iPhones and smartphones using the Chinese Android version by residents living in 10 regions including Shanghai and as well as near venues of the Beijing Winter Olympics (“10 regions + 1 scene”).

Trial run at the Beijing Winter Olympics (February–March 2022)

1) Two charging methods

The e-CNY trial runs conducted inside the bubbles at the Beijing Winter Olympics used two charging methods. Users in the bubbles were able to select either method.

- Software-based wallet method

The first method uses a “soft wallet” that is charged by downloading the e-CNY app to a mobile phone. Users from abroad using an iPhone were able to get a mainland China Apple ID and then download the e-CNY app from an online app store. Users with Android OS mobile phones could download the e-CNY app using a QR code provided by the Bank of China (which was the official banking partner of the Beijing Winter Olympics and Paralympics).

When opening a software wallet, it is not necessary to link it to a bank account in mainland China, and daily small-lot transactions can be conducted on wallets set up with any authorized operator selected by the user.

- Hardware-based wallet method

The second method is called a “hard wallet,” which can be a payment card or a bracelet. The hard wallet is charged when the user exchanges his or her nation’s currency for e-CNY by using a dedicated e-CNY automatic exchange machine.

2) Trial run results

CNY cash notes (including bank notes) and VISA credit cards also could be used in the bubbles, but third-party payment systems such as Alipay and WeChat Pay could not. On February 10, 2022, Beijing Local Financial Supervision and Administration Deputy Director-General Wang Ying said that transactions conducted during the e-CNY trial run held in the Beijing Winter Olympics bubble venues had exceeded 400,000, with a total transaction value of CNY9.6

billion. However, these figures may include transactions made during test runs conducted before the start of the Winter Olympics.

Expansion of trial run regions (2022)

On March 31, 2022, the PBOC announced that it had designated six more regions for e-CNY trial runs during a roundtable discussion about its digital yuan R&D activities. The added regions are Tianjin City, Chongqing City, Guangzhou City in Guangdong Province, Fuzhou City and Amoy City in Fujian Province, and Zhejiang Province (site of the 2022 Asian Games originally scheduled for September 10–25th but postponed on May 6 until a date to be decided). During the roundtable discussion, it was announced that Beijing and Zhangjiakou City in Hebei Province, where e-CNY trial runs were held temporarily in bubble venues during the 2022 Winter Olympics and Paralympics in February–March, would also become regions conducting e-CNY trial runs.

Future efforts based on trial run results

Based on the trial runs conducted thus far, the PBOC plans to make the following improvements to its CBDC moving forward.

First, it plans to create a management model more suitable for the digital yuan that references the concepts of cash and bank account management. Second, the PBOC plans to improve functionality, including making e-CNY payments more efficient, protecting users’ privacy, and preventing counterfeiting. Third, it will promote interactivity between the digital yuan and existing electronic payment tools and, fourth, the PBOC plans to develop a digital yuan ecosystem that will increase and diversify the scenes where the digital currency can be used.

Research into Cross-Border Settlements using the Digital Yuan

Preparation for international payments (establishment of joint venture with the Society for Worldwide Interbank Financial Telecommunication [SWIFT])

Reuters reported on February 3,

2021, that the SWIFT established a joint venture with the PBOC DCRI on January 16, 2021. The joint venture, Finance Gateway Information Services Company, has registered capital of EUR 10 million, with 55% from SWIFT and 45% from the PBOC DCRI.

The joint venture’s legal representative is Huang Mi-Lin (SWIFT China District Governor), and its chairman is Chen Shigang (former Deputy Secretary-General of the Payments & Clearing Association of China). Three of the joint venture’s four directors are from SWIFT and one is appointed by the PBOC DCRI head. The joint venture’s operations include information system integration, data processing, and technical consulting.

China’s Cross-Border Interbank Payment System (CIPS) has been handling CNY international settlements since 2015, using a system design and processing transactions on the premise of connectivity with SWIFT. The joint venture’s operations may also include research into international cross-border interbank payments using the interconnection between SWIFT and CIPS.

Multiple initiatives

On February 24, 2021, the PBOC announced that it will begin joint research on a multi-CBDC platform called the Multiple CBDC (m-CBDC) Bridge with the central banks of Hong Kong, Thailand, and the United Arab Emirates (UAE). The project aims to develop a prototype platform that will use Distributed Ledger Technology (DLT) to enable simultaneous cross-border settlements for CBDCs in multiple currencies and enhance the convenience of foreign exchange transactions in international trade. The project is being supported by the Bank for International Settlements (BIS) Innovation Hub Hong Kong Centre.

In a report released in March 2021, the BIS presented three conceptual approaches for creating a system that would enable a country’s CBDC to be used for cross-border payments. The first approach would be to create a system of compatible CBDCs issued by various countries with common technical standards for data, technology, and user interfaces as well as aligned regulatory and supervisory standards. The Bank of Japan and some other central banks are participating in an international collaborative research project for this type of model. In the second approach, each country issues its own CBDC, but they share common technology and payment systems. This approach is being examined in a joint project by the Monetary Authority of Singapore and the Bank of Canada.

In the third approach, participating countries integrate their CBDCs into a single multi-currency CBDC system that serves as a payment platform for multiple countries. This third approach is the m-CBDC Bridge model mentioned above.

Pilot project for payments with Hong Kong

On March 30, 2021, the PBOC, in collaboration with the government of the Luohu District in Shenzhen, the Bank of China, and the Bank of China (Hong Kong), conducted a trial of the digital yuan by Hong Kong residents in mainland China. The participating Hong Kong residents included (1) those who frequently visit Shenzhen and have a Mainland Travel Permit with a registered name that identifies them when making digital yuan transactions and (2) those who occasionally visit Shenzhen but do not have a Mainland Travel Permit (and are allowed to enter the mainland anonymously but must provide a registered phone number). The trial participants downloaded the e-CNY app to their mobile phone while in Hong Kong and then showed a QR code to a point of sale (POS) device when making payments for small purchases when in Shenzhen. The Hong Kong residents were allowed to open one of five types of wallet depending on the level of the account registered to their name. Participants could upgrade to the “No. 2 type” wallet by linking with a Bank of China card, which would enable them to make single payments of up to CNY50,000.

Then, on June 8, 2021, the Hong Kong Monetary Authority (HKMA) announced its “Fintech 2025” strategy. The strategy clarified the HKMA’s plan to (1) start research on digital Hong Kong dollars (e-HKD) for retail in cooperation with the BIS Innovation Hub Hong Kong Centre and (2) collaborate with the PBOC in supporting the technical testing of e-CNY in Hong Kong with a view to providing a convenient means of cross-boundary payments for Hong Kong and mainland China residents.

In addition, according to a *China Securities Journal* report on December 9, 2021, PBOC DCRI Director Mu Changchun told an audience attending a forum on the role and prospects of the Hong Kong international financial center on that same day that the DCRI and HKMA bilateral collaborative project had completed its first-stage technical test. The test involved Chinese mainland banks with branches in Hong Kong charging digital yuan wallets held by designated stores in Hong Kong and con-

ducting transfers and consumption transactions using e-CNY. Mu also explained that the two parties were in the midst of a second-stage test that connected the digital yuan system with Hong Kong’s Faster Payment System (FPS) that supports instant payments using the Hong Kong dollar or the e-CNY.

Closing Remarks

In Article 21, Section 3 “Deepen supply-side structural reform” of China’s 14th Five-Year Plan covering the years 2021–2025, it is clearly stated that China “will steadily advance digital currency R&D.” The PBOC has stated that it will use the digital yuan mostly for domestic retail payments for the foreseeable future and that it will not announce a specific issuance schedule in advance. More recently, the PBOC’s trial distribution of digital yuan consumption

coupons in some regions as part of domestic economic stimulus measures since June 2022 is being watched closely.

The PBOC has explained that international settlements using the digital yuan will be based on respect for the currency sovereignty of other countries and in compliance with the laws and regulations of countries involved in the transactions. The central bank also stated that it will establish a cooperative mechanism for foreign exchange trading and administrative supervision of its CBDC. The PBOC will consider a digital yuan international payment method from a long-term perspective that takes into account other countries’ R&D on CBDC and technical cooperation. Its digital yuan internationalization strategy also will emphasize overcoming the international monetary policy trilemma of the free flow of capital, a fixed exchange rate system, and autonomous monetary policy.

Notes

- 1 Shuji Kobayakawa, *A Study on Central Bank Digital Currencies: Designing Frameworks and Implications in Japanese*, in *Seikei Ron-sou* (Review of Economics & Political Science), Volume 87 (No.3-4), March 22, 2019.



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