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ISSUE BRIEF

THE DIGITAL YUAN, DIGITAL EURO, AND THE DIEM: Key Issues for Public Debate

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Amid growing public awareness of cryptocurrencies such as Bitcoin, a group of large digital platform corporations and payment services providers launched the Libra (now renamed Diem) project[1] in June 2019 to introduce digital stablecoins to improve payment transactions and promote financial inclusion. This private sector initiative added impetus for central banks in many countries to accelerate their efforts to study the advisability of issuing central bank digital currencies (CBDCs)—for fear of failing to keep pace with financial innovation and changes in user preference in payment mechanisms. Indeed, the Bank for International Settlements (BIS) reports that more than sixty central banks[2] around the world are investigating the issuance of CBDCs, with central banks (CBs) responsible for 20 percent of the world's population ready to do so in the next three years. Furthermore, seven major central banks—the US Federal Reserve, Bank of Canada, European Central Bank, Bank of England, Riksbank, Swiss National Bank, and Bank of Japan—in 2020 outlined three foundational principles[3] for the issuance of CBDCs: not compromising monetary and financial stability; complementing existing forms of money; and supporting innovation and efficiency.

Among major central banks, the People's Bank of China (PBOC) is the first to have staged large-scale trials of digital currency (in their case the yuan, started in the middle of 2020) for retail transactions—calling the unit "Digital Currency/

1 "White Paper, v2.0.," Diem Association, April 2020, https://www.diem.com/en-us/white-paper/.

2 "Ready, Steady, Go?" – Results of the Third BIS Survey on Central Bank Digital Currency," BIS Papers, January 2021, https://www.bis.org/publ/bppdf/bispap114.htm

3 "Central Bank Digital Currencies: Foundational Principles and Core Features," Governors of Federal Reserve, January 2020, https://www.bis.org/publ/othp33_summary.pdf.

A man wearing a mask walks past the headquarters of the People's Bank of China, the central bank, in Beijing, China, as the country is hit by an outbreak of the new coronavirus, February 3, 2020. Source: REUTERS/Jason Lee

Electronic Payment"[4] (DCEP). In October 2020, the European Central Bank (ECB) released its report on a digital euro,[5] setting out the key principles and requirements guiding an eventual issuance of a retail digital euro and highlighting the issues that remain unresolved. Other central banks are further behind. The US Federal Reserve is engaged in researching and developing policies for a digital dollar,[6] with the Boston Fed launching a CBDC project. Recently, Fed staff published a study[7] on the necessary, but not sufficient, preconditions that support a general purpose digital dollar for day-to-day use by the public, concluding that "there is a great deal of work yet to be done." Sweden's central bank, the Riksbank, made progress in the past year and decided to extend the testing of its digital krona[8] for another year to further investigate several technical issues, including offline functions. Other central banks, such as the Swiss National Bank,[9] have explored the use of wholesale CBDCs to facilitate large value payments among approved financial institutions.

This issue brief compares known features of the digital yuan and digital euro to highlight critical issues for public consideration. It also assesses the use case of the Diem, a digital currency that will only increase in importance as major central banks begin to issue their own CBDCs.

4 Hung Tran and Barbara C. Matthews, "China's Digital Currency Electronic Payment Project Reveals the Good and the Bad of Central Bank Digital Currencies," *New Atlanticist,* August 24, 2020, https://www.atlanticcouncil.org/blogs/new-atlanticist/chinas-digital-currency-electronic-payment-project-reveals-the-good-and-the-bad-of-central-bank-digital-currencies/.

5 *Report on a Digital Euro*, European Central Bank, October 2020, https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf.

6 Jay Lindsay, "Boston Fed Exploring the Tech, Benefits, and Tradeoffs of a Digital Dollar," Federal Reserve Bank of Boston, August 2020, https://www.bostonfed.org/news-and-events/news/2020/08/boston-fed-exploring-the-tech-benefits-and-tradeoffs-of-a-digital-dollar.aspx.

7 Jess Cheng, Angela Lawson, and Paul Wong, "Preconditions for a General-Purpose Central Bank Digital Currency," Board of Governors of the Federal Reserve, February 24, 2021, https://www.federalreserve.gov/econres/notes/feds-notes/preconditions-for-a-general-purpose-central-bank-digital-currency-20210224.htm.

8 "Riksbank Extends Test of Technical Solution for the e-Krona," Sveriges Riksbank, February 12, 2021, https://www.riksbank.se/en-gb/press-and-published/notices-and-press-releases/notices/2021/riksbank-extends-test-of-technical-solution-for-the-e-krona/.

9 "Swiss Test of Central Bank Digital Currency Completes," From the Markets, December 4, 2020, https://www.marketsmedia.com/swiss-test-of-central-bank-digital-currency-completes/.

THE DIGITAL YUAN AND DIGITAL EURO

From strategic and technological perspectives, there are many similarities in the design of the two digital currencies, based on information available to the public. Both will be issued by their respective central banks as legal tender in their jurisdictions. China has clarified that the DCEP will be a component of the monetary aggregate M0 (notes and coins, plus bank reserves) and that the digital yuan will ultimately replace the physical yuan—the use of cash in retail transactions has already declined significantly in China as it is increasingly replaced by mobile payment mechanisms. By contrast, the ECB has specified that the digital euro will only complement, not replace, the physical euro—the use of cash, while falling, is still substantial in many euro area member states. This will affect the remunerative policy on the CBDC as well as the privacy of user transactions.

Both central banks will also adopt a two-tiered system not reliant on distributed ledger technology (DLT)—they will issue digital currencies to commercial banks as intermediaries, which in turn will distribute digital currencies to end users, assuming responsibility for compliance with Know Your Clients (KYC), Anti Money Laundering (AML), and Counter the Financing of Terrorism (CFT) regulations. This approach keeps the central banks free from assuming responsibility for dealing directly with hundreds of millions of retail customers and ensures a smooth execution of their numerous transactions, limiting their exposure to considerable reputational risks.

Both CBDCs will be stored in digital wallets with apps that can be downloaded by end users from digital payment services sites sponsored by banks or other authorized intermediaries. Presumably, the digital wallet apps would have to conform to technical standards and specifications laid down by central banks. It is important to note that the identity of the user downloading the wallet apps will be known to the app services providers and, ultimately, the central banks. Digital currencies can be transmitted between different wallets, either via reconciliation of senders' and receivers' bank accounts or directly between end users without going through intermediaries.

The technological properties of CBDCs and digital wallets allow CBs to have a remunerative policy on CBDC holdings, something not possible with bank notes and coins. The ECB has been explicit about the option of paying variable and differentiated interest rates on CBDCs to influence consumer behavior—at the cost of some seigniorage income. The PBOC probably has a similar option in mind when it discusses CBDCs improving the efficacy of monetary policy operations.

Both central banks also emphasize cash-like features of their digital currencies, including the ability to make or receive payments without being online or connected to telephone networks, probably by putting two cell phones close to each other and using near field communication protocols. However, there seems to be nuances here. The PBOC emphasizes the ability to use the digital yuan without having a bank account, pointing out that downloading digital wallets is much easier than opening a bank account, thus promoting financial inclusion for households with telephone or Internet connections, but no bank accounts. In China, about 20 percent of adults[10] don't have a bank account, compared with 8.6 percent unbanked in Europe,[11] and 5.4 percent in the United States.

By contrast, the ECB highlights that using the digital euro as an independent token (or, more accurately, in bearer form) would involve some application of distributed ledger technology (for example, requiring the validation of transactions by a group of authorized validators) or a pre-paid device or card. In either case, the direct transmission of the digital euro among users would not fully satisfy AML or CFT regulations; conceivably, some form of control would have to be implemented. Furthermore, offline transfers of CBDCs among devices still require those devices to be online at certain points, so users can load digital money. More information is needed to ascertain the exact technological configurations and platforms used by the central banks to allow direct transmissions of digital currencies between wallets without going through users' bank accounts or intermediaries, as well as for offline transactions.

Another common technological feature emphasized by both central banks is that their digital currencies and associated wallets will be interoperable with current and future payments

10 "Share of Population Aged 25 and Over with a Bank Account in China in 2011 and 2017," Statista, July 24, 2020, https://www.statista.com/statistics/920173/china-share-of-adult-population-with-a-bank-account/.

11 "Close to 40 Million EU Citizens Outside Banking Mainstream," WSBI, March 5, 2016, https://www.wsbi-esbg.org/press/latest-news/Pages/Close-to-40-million-EU-citizens-outside-banking-mainstream.aspx.

The European Central Bank (ECB) headquarters is pictured during sunset as the spread of the coronavirus disease (COVID-19) continues in Frankfurt, Germany, March 21, 2021. Source: REUTERS/Kai Pfaffenbach

services and platforms. This feature is important for China because current payment platforms operated by Alipay[12] and WeChat Pay,[13]which between them have more than 2 billion users (mostly inside, but also outside China), account for almost 95 percent of mobile payments in China,[14] but are not presently interoperable. This will give the digital yuan a competitive edge in attracting users, further improving payment practices in China. CBDCs also need to be programmable to allow service providers to develop new and competitive front-end services based on CBDCs, coupling their payment functions with a wide range of financial services including credit, investment, insurance, and smart contracts.

Last but not least, both CBs stress the critical importance of ensuring cyber security for the smooth and reliable operations of CBDCs, as well as the integrity and security of their underlying systems and record keeping. Any hacking by bad actors or disruptions of service will reflect badly on the issuing central banks and undermine public confidence in CBDCs.

DIVERGENT INSTITUTIONS AND POLICIES

In addition to the common technological features described above, the CBDCs face further challenges that will require different solutions, due to divergent political, legal, and regulatory regimes in China and the European Union (EU).

First, CBDCs pose a challenge to bank intermediation and financial stability. The ease with which users can transform bank deposits to digital currencies means that banks can theoretically be disintermediated if people prefer to hold CBDCs instead of bank deposits. As a consequence, banks could lose access to a source of relatively cheap and stable retail funding and be forced to rely on more expensive and less stable wholesale funding. Alternatively, banks could borrow more from central banks to fund their assets, but that raises the demand for high quality securities to be used as collateral with central banks, causing a shortage of such assets in financial markets and

12 Rita Liao, "Jack Ma's Fintech Giant Tops 1.3 Billion Users Globally," TC, July 15, 2020, https://techcrunch.com/2020/07/14/ant-alibaba-1-3-billion-users/.

13 Terry Stancheva, "21 Mind-Blowing WeChat Statistics in 2021," Review 42, February 4, 2021, https://review42.com/resources/wechat-statistics/.

14 "Is the Alipay/WeChat Pay Payments Duopoly at an Inflection Point?," Kapronasia, October 7, 2020, https://www.kapronasia.com/china-payments-research-category/is-the-alipay-wechat-pay-payments-duopoly-at-an-inflection-point.html.

heightening the role of central banks in the economy—deeply affecting central banking, monetary policies, and the functioning of a market economy. In times of market stresses, there could be digital bank runs leading to bank failures on timelines much shorter than during traditional bank runs. The ECB clearly recognizes these risks and has mentioned possible remedies, including imposing limits on holding digital currencies (perhaps per wallet or per user) or imposing disincentives like charging negative interest rates on holdings of digital currencies above certain thresholds. These measures also aim to discourage the use of CBDCs as investment instruments. There has been no explicit press coverage of how the PBOC will deal with this problem, but some form of control over the conversion from bank deposit to digital currency will have to be imposed.

Second, even though both CBs stress that their digital currencies are just like physical currencies, that is not quite true—the anonymity of holding and transacting in bank notes and coins will be lost in the transition to digital currencies. The movements of digital currencies in and out of digital wallets will leave electronic footprints which can be traced, monitored, and even controlled, either indirectly through banks or directly by CBs. The question then becomes what authorities will do with the information and how the privacy of personal financial data can be safeguarded. China offers the concept of "controlled anonymity" where other users and many companies are not privy to the financial data of the user, only the authorities are. PBOC officials have been quoted in the media saying that the ability to monitor digital currency transactions, probably in real time, will greatly help authorities deal with crimes like financial fraud, money laundering, and financing terrorism, as well as improve the overall efficacy of monetary policy operations. However, it is also obvious that the availability of personal digital financial data will significantly strengthen China's social credit monitoring system, which is used to monitor and control the behavior of the population.

By contrast, the EBC pledges to respect all EU laws and regulations about protecting the privacy of personal data. In particular, the ECB stresses that the digital euro will only complement, not replace, the physical euro, giving users the option to use cash to preserve anonymity if they wish. Based on media reports, the digital yuan seems positioned to eventually replace the physical yuan—significantly enhancing the ability of the PBOC to monitor user financial transactions. If this is true, the PBOC may fail to observe one of the three CB-established foundational principles mentioned previously: CBDCs should complement existing forms of money.

Third, the continued presence or eventual absence of physical currencies will determine whether central banks can impose negative nominal interest rates on CBDC holdings. The ECB, by promising to retain the physical euro, appears to exclude the possibility of imposing negative interest rates on digital euro holdings. In comparison, by mentioning that the physical yuan can be eventually phased out, the PBOC retains the option to impose negative rates. It is important for central banks to clarify this point.

Fourth, both central banks will allow non-residents of their jurisdictions to use their digital currencies, likely subject to some form of control to avoid destabilizing capital flows. The ECB is also open to making the digital euro interoperable with digital currencies of other major countries, including those in the United States, Japan, and the United Kingdom (UK). Presumably, this interoperability and programmability will allow digital payments services providers to offer end users facilities for digital currency exchanges. This would make cross-border and cross-currency transactions more efficient and less costly. However, this also requires close cooperation among CBs issuing CBDCs to avoid excessive currency substitution and destabilizing capital flows—particularly the risk of boosting the balance sheet of a central bank and exposing it to risks in uncontrolled situations.

By contrast, the PBOC has not indicated whether it wants the digital yuan to be interoperable with other major CBDCs. The PBOC has joined the Multiple CBDC Bridge[15]with Hong Kong, Thailand, the United Arab Emirates (UAE), and the BIS Innovation Hub office in Hong Kong to explore cross-border payments using distributed ledgers. The National Clearing Center, a subsidiary of the PBOC, also formed a joint venture with SWIFT,[16] the international financial messaging service for payments among banks and other financial institutions. According to media reports, the joint venture formed to promote internationalization of the yuan, even though China has long used SWIFT for cross-border payments in yuan—accounting for 2.4 percent of total SWIFT payments in January 2021, ranking

15 Coco Feng, "Beijing is Exploring Digital Yuan Cross-Border Payments by Joining with Hong Kong, Thailand, UAE, and the Bank of International Settlements," *South China Morning Post*, February 24, 2021, https://www.scmp.com/tech/policy/article/3122924/beijing-exploring-digital-yuan-cross-border-payments-joining-hong-kong.

16 Karen Yeung, "China's SWIFT Joint Venture Shows Beijing Eyeing Global Digital Currency Use, to Internationalize Yuan," *South China Morning Post*, February 4, 2021, https://www.scmp.com/economy/china-economy/article/3120582/chinas-swift-joint-venture-shows-beijing-eyeing-global.

fifth[17] behind the USD (38.3 percent), euro (36.6 percent), British pound (6.8 percent) and Japanese yen (3.5 percent). China has also used SWIFT to complement financial messaging through its own Cross-border Interbank Payments System (CIPS), which has cleared all cross-border yuan payments since the beginning of 2021. SWIFT explained that forming the joint venture is an effort to update compliance with regulatory requirements in China. Generally speaking, it appears unlikely that China will want to make the digital yuan interoperable with other major CBDCs, for fear of losing control over non-resident use of the digital yuan. This has been a key motivation behind its reluctance to fully liberalize China's capital accounts and make the yuan freely convertible.

Besides the convenience and relative transaction costs of using different digital currencies, CBDC usage by non-residents will depend more on fundamental considerations—namely trust in issuing authorities, especially in the use or misuse of personal financial data, and the influence of structural issues such as capital controls, currency convertibility, sophistication of financial markets, and robustness of related laws and regulations. On these fundamental grounds, China is seen as less developed than other major countries and thus the digital yuan will likely face strong headwind[18]in gaining widespread international use. However, if the United States continues to use financial sanctions, especially secondary sanctions, to promote its foreign policy goals, sanctioned countries like China will have compelling incentives to make use of the digital yuan—as a political alternative to the USD—to evade US sanctions.

THE DIEM

In June 2019, a group of major digital platform corporations and payment service providers formed the Libra Association (registered in Zurich and to be regulated by the Swiss Financial Markets Supervisory Authority, FINMA) to launch a cryptocurrency—the Libra— based on a group of currencies of major countries, thus referred to as stablecoins. After discussions with CBs and regulators to address concerns about risks to monetary operations, currency substitution, and financial stability, the Libra Association changed its name to the Diem Association and its unit was renamed the Diem. The Diem was also reconfigured and is, at least for now, based on a single currency—there will, for example, be a USD-Diem, a euro-Diem, and a yen-Diem—instead of a cocktail of currencies. The Diem Association (DA) guarantees conversion of the Diem to its base currency on demand and on a one-for-one basis, maintaining 100 percent reserves at all times with pledges to prevent the fractionalization of the Diem by front-end service providers. The 100 percent reserve coverage and non-fractionalization pledges are meant to assuage regulators' concerns about the Diem mechanism eventually developing into a parallel fractional reserve banking system.

Bertrand Perez, Managing Director and COO at Libra Association poses after a Blockchain conference at the United Nations in Geneva, Switzerland September 27, 2019. Source: REUTERS/ Marina Depetris

The Diem will use distributed ledger technology, but not with permissionless validation. Instead, the DA will rely of its small group of founding members to be validators of Diem transactions, hoping that their reputations will help promote the acceptance of the Diem. The DA promises the benefits of a permissionless, public validation system, such as anonymity, by using what they call "Byzantine Fault Tolerance" security protocols and allowing new members to join the DA and participate in its governance, like a standard-setting body. Finally, the Diem will be programmable and interoperable with other payments systems, even able to integrate with central bank digital currencies (to hopefully avoid maintaining 100 percent reserves), allowing other digital services providers to offer new products to end users.

17 Susanne Barton, "Yuan's Popularity for Global Payments Reaches Five-Year High," *Bloomberg*, February 17, 2021, https://www.bloomberg.com/news/articles/2021-02-18/yuan-s-popularity-for-cross-border-payments-hits-five-year-high?sref=a9fBmPFG.

18 Hung Tran, "Can China's Digital Yuan Really Challenge the Dollar?," *New Atlanticist*, November 30, 2020, https://www.atlanticcouncil.org/blogs/new-atlanticist/can-chinas-digital-yuan-really-challenge-the-dollar/.

The Diem is completely different from currently available cryptocurrencies such as Bitcoin and Ethereum. The Diem is designed to be used as means of payment with value completely linked to underlying currency such as the USD or euro, and thus considered stable, whereas cryptocurrencies present significant volatility in their values in terms of major currencies, and are used increasingly as speculative instruments, rather than means of payment. Anonymity in the creation or mining, holding, and transacting of cryptocurrencies continues to allow illegal and criminal activity, a challenge for law enforcement agencies around the world. However, linking the Diem to a national currency and using a permitted validation process with a small group of DA members removes one of the attractive aspects of cryptocurrencies—their position outside the control of central banks.

When the Libra/Diem Association first proposed the Libra (now renamed Diem), it had a strong use case: a cryptocurrency not dependent on third-party authority or controlled by national authorities that provides an efficient payment mechanism for billions of members of platform companies around the world. Following consultations with relevant central banks and financial regulators, changes were made and the current Diem version will move away from permissionless DLT toward reliance on a small group of "reputable" validators in a permitted DLT system, and will be based on and backed by a single major currency on a one-for-one basis, allowing no fractionalization of the Diem. At the same time, the PBOC and the ECB, among others, are making visible progress toward launching their own CBDCs. In this new environment, the use case for the Diem is much less compelling—if CBDCs are available, why use a digital ersatz? This is especially the case as front-end financial services are developed to accompany CBDCs. The key benefit to members of the DA is their ability to monitor, harvest, and monetize user transactions data. However, the accumulation and harvesting of personal transaction data is undergoing growing public scrutiny in many countries and could face tightening regulations in the future.

QR code of the electronic payment service Alipay that belongs to Ant Group Co Ltd is seen at a market stall in Beijing, China, December 31, 2020. Source: REUTERS/Thomas Peter

KEY ISSUES FOR PUBLIC DEBATE

Generally, a comparison between the digital yuan, digital euro, and the Diem suggests that the key differentiating factor is not the technological platforms underpinning the digital units (for CBDCs these seem to converge on the broad features described by the PBOC and the ECB), but the strength of and trust in public policies and institutions—specifically the legal and regulatory environment, including issues such as degrees of currency convertibility and capital account liberalization, as well as the sophistication of the financial ecosystem and robustness of the legal and regulatory framework.

Beyond technological and public institutions issues, the most important of which for individual users are safety, security, reliability, and ease of use of the CBDC system, two important problems must be contended with. First, the intention and ability of a CB to impose negative interest rates on CBDC holdings deserves more attention. Negative nominal interest rates have been advocated by some economists to give CBs more space to ease monetary policies to fight deflation. The existence of physical currencies significantly frustrates the attempt to escape the zero-bound limit to policy rates—people can simply convert their bank deposits to cash to avoid negative policy rates forcing banks to pass on negative rates to their customers. Consequently, the continued existence of cash as envisioned by the ECB will afford their users some protection against negative rates, while users in China will be at the mercy of the PBOC if and when cash is phased out. For people living in democracies, negative interest rates on cash or CBDC holdings represent a confiscatory tax on their wealth made by unelected central bankers and will be resented. This could undermine citizens' trust in their CB—arguably its most valuable asset. As such, the decision to eventually abandon or retain cash, and the ability of CBs to impose negative rates on CBDCs, is critical and should be thoroughly discussed in public fora to raise citizens' awareness.

Second, concerns are growing about the ownership and use of personal financial data arising from transactions in digital currencies by sponsors of the systems, be it central banks in the case of CBDCs or groups of private sector platform companies in the case of stablecoins like the Diem. Decisions must be made as to what extent personal data can be collected, how long data can be retained, how data can be used and for whose benefit, and what safeguards will be created to protect against abuses.

The concerns about the use of personal transaction data related to digital currencies is one part of the overarching issue of protecting the privacy of personal data in an increasingly digitalized world. There are three models competing for wider adoption. At one extreme is the US model, which is weary of government use of personal data and intrusion in personal spheres, but seems indifferent to the mining of personal data by platform corporations for profit. This indifference appears to have changed slightly amid growing concerns about monopolistic powers of those companies and in the context of the debate about the balance of freedom of speech and corporate responsibility to filter out dangerous material. At the other extreme, companies and other entities deemed to be "personal information handlers" in China, as well as those outside China doing business with people or entities inside Chia, are likely to be constrained and regulated in their access to and use of personal information, according to the draft Personal Information Protection Law.[19] However, the Chinese government has total access to all sources of personal data, including information which companies are required by law to turn over to the government. In the middle is the EU's strong legal and regulatory safeguards against abuses of personal data by both companies and governments—as typified by the General Data Protection Regulation[20] (GDPR) and the Digital Markets Law and Digital Services Law recently tabled by the European Commission. Judging by the growing adoption of GDPR requirements by non-EU companies, even in their non-EU operations, GDPR could evolve to become the international standard.

Robust public debate about these issues is warranted and should inform central banks in their final decisions about the issuance of CBDCs.

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19 George Qi and Qianqian Li, "China Releases Draft Personal Information Protection Law," the National Law Review, January 21, 2021, https://www.natlawreview.com/article/china-releases-draft-personal-information-protection-law.

20 "General Data Protection Regulation (GDPR)," Intersoft Consulting, May 25, 2018, https://gdpr-info.eu/.

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