



Digital Currencies

THE US, CHINA, AND THE WORLD AT A CROSSROADS

Edited by Darrell Duffie and Elizabeth Economy

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Edited by
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Foreword

Over the past four decades, no country's economy has grown more rapidly than China's. Today, China has the world's second-largest economy, a large and increasingly sophisticated military, and the most pervasive system of domestic surveillance. It is the world's largest exporter, its second-largest importer, and globally the biggest provider of infrastructure development. While the uneven playing field that China has created for itself has aided its economic rise and military modernization, China is increasingly innovating on its own. Beijing aspires to take the lead in many areas of science and technology, with large-scale government investments in research and development. In digital commerce, China has become a leader—perhaps the leader. And building on that success, China has resolutely developed a central bank currency—the digital yuan (e-CNY).

As this report makes clear, China's deployment of the e-CNY—already underway—could give its economy significant advantages by promoting efficiency and financial inclusion and, potentially, tackling the problem of pervasive corruption. Without proper oversight and restraint, it also poses stark challenges for the Chinese people, the United States, and the world. In the hands of a state that has already deployed a massive network of cameras and biometric detectors to monitor its people and store data on their political, social, and digital behavior, the addition of comprehensive information on payments could represent a staggering enhancement of authoritarian control.

China's 1.4 billion citizens are not the only ones who will be affected by this financial transformation. China aims to roll out its digital currency on a global basis through cooperation with many potential partners. As this report indicates, China's "first mover" advantage here threatens to consolidate its lead in e-payment technology and to shape the global rules and standards for digital finance in ways that will elevate authoritarian norms and undermine principles of transparency, accountability, and human rights. Some argue that even the dominance of the dollar as the world's reserve currency is threatened. For instance, the ability of the United States to use financial sanctions to punish states that pursue nuclear weapons or support terrorists would be diminished.

The result of a yearlong effort by a distinguished group of experts on China, finance, technology, and national security, this report provides a pathway for the United States to revitalize its international financial leadership by helping to shape the emerging global digital economy. It does not advocate that the US Federal Reserve create a "digital dollar" but stresses that US authorities should move energetically to develop US central bank digital currency (CBDC) technology and standards to counter this growing Chinese influence. It will take time to develop a design that strikes the best possible balance among goals that any democratic society should care about: privacy, security, accessibility, efficiency, and transparency. And should the United States decide that its transition to the digital economy would be better served by new private sector monetary technologies, such as stablecoins, it will take time to write the necessary regulations and implement the infrastructure to ensure the success of that transition. US officials will also need time to coordinate with their G7 and other democratic partners on the principles and standards for a system of global digital finance that enhances, rather than diminishes, privacy, accountability, security, and the rule of law. This will require hard thought and careful planning to ensure that international criminals and pariah states cannot flagrantly utilize digital currencies to make payments and transfer funds across borders.

In short, for the executive branch, the Federal Reserve, Congress, and indeed the American people, this is an urgent task. Now is the time to accelerate research, development, planning, and preparation to ensure

US global leadership and competitiveness in digital financial technology with a whole-of-government and whole-of-society approach that taps the best talent in our universities, research centers, and corporations.

This is the third book-length report produced by the Hoover Institution's project on China's Global Sharp Power. Going forward, the study of China's political and economic development and its evolving global posture will remain a major theme of research at the Hoover Institution. It is our goal to bring a broad perspective, analytic rigor, and careful judgment to our work—as we have tried to do in this report. In the final analysis, policy makers will have to take up this challenge. We hope that this work will give them the intellectual tools and information to do so.

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We owe an especially large debt to Ty McCormick, senior editor of *Foreign Affairs*, for devoting many evenings and weekends to editing this report. To the extent that the complex issues surrounding digital currencies, central bank policies, China's evolving financial architecture, and the global implications for the United States are expressed here in clear, consistent, and accessible prose, this is due in no small measure to Ty's deft editorial hand.

Finally, our largest debt is owed to the remarkable individuals from diverse professional backgrounds and areas of academic expertise who agreed to serve on this working group, and who then devoted many hours to reading materials, listening to presentations, presenting ideas, debating perspectives, and drafting various sections of this report. From beginning to end, our work has been a deeply collaborative venture, and every member contributed to its success. No particular finding or policy recommendation of this report is necessarily subscribed to

by all members of the working group. Rather, the report shows those findings and recommendations for which there was at least a substantial commonality of agreement. In addition to the editors' drafting work, the individual chapters of this report were drafted by teams led by Reena Aggarwal, Dan Boneh, Jared Cohen, Zhiguo He, Sigal Mandelker, Evan Medeiros, Neha Narula, Raghuram Rajan, Glenn Tiffert, Robert Townsend, and Matt Turpin, drawing on groupwide comments and meeting deliberations. We are particularly grateful to these team leaders for their exceptionally generous investments in this project.

DARRELL DUFFIE AND ELIZABETH ECONOMY

Abbreviations

AFSL	Anti-Foreign Sanctions Law
AML	anti-money-laundering
API	application programming interface
BIS	Bank for International Settlements
BSN	Blockchain-based Service Network
CBDC	central bank digital currency
CCDI	Central Commission for Discipline Inspection
CCP	Chinese Communist Party
CFT	countering (or combating) the financing of terrorism
CHIPS	Clearing House Interbank Payment System
CIPS	Cross-Border Interbank Payment System
CNHC	A stablecoin convertible with CNH (RMB deposits in Hong Kong)
CPMI	Committee on Payments and Market Infrastructure
CRADA	Cooperative Research and Development Agreement
DCEP, DC/EP	Digital Currency Electronic Payment
DCRI	Digital Currency Research Institute
DLT	distributed ledger technology
DR	depository receipt
e-CNY	digital renminbi
ECB	European Central Bank
FATF	Financial Action Task Force

FSB	Financial Stability Board
FX	foreign exchange
G7	Group of Seven
G20	Group of Twenty
GSC	global stablecoin
HKMA	Hong Kong Monetary Authority
IBC	identity-based cryptography
IC	integrated circuit
ICBC	Industrial and Commercial Bank of China
IJOP	Integrated Joint Operations Platform
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
KYC	know your customer
m-CBDC, mCBDC	multiple central bank digital currency
NFC	near-field communication
NWF	National Welfare Fund (Russia's sovereign wealth fund)
OECD	Organization for Economic Cooperation and Development
OMFIF	Official Monetary and Financial Institutions Forum
PBOC	People's Bank of China
PKI	public key infrastructure
POE	privately owned enterprise
PRC	People's Republic of China
PSP	payment service provider
PvP	payment versus payment
QR	Quick Response
RMB	renminbi, China's fiat currency
SCS	social credit system
SWIFT	Society for Worldwide Interbank Financial Telecommunication
W-CBDC	wholesale central bank digital currency
WEF	World Economic Forum
WTO	World Trade Organization

Executive Summary

Central bank digital currencies (CBDCs) have taken flight globally. More than ninety central banks are researching, piloting, or deploying CBDCs. Several are already testing cross-border transactions. Among the countries exploring CBDCs, China occupies a particularly important position. It is the first major country to deploy a CBDC widely within its own economy, and its central bank is dominant among those participating in a cross-border payments development project under the auspices of the Bank for International Settlements. China's emergence as a first mover in this space gives Beijing a significant opportunity to cement its international leadership of payments technology innovation and adoption, to set economic norms and technical standards that align with its authoritarian governance system, and to increase its ability to undercut the traditional dominance of the US dollar as a source of geo-economic and strategic influence.

China's government asserts that its CBDC, the e-CNY, is primarily for domestic economic purposes: the e-CNY will yield greater efficiencies within China's domestic payment systems, enable more Chinese people to access the banking system, and allow for greater government oversight and control of business and individual financial transactions. However, Chinese commentators and analysts have also underscored the key role that the e-CNY could play in a larger global technological ecosystem defined by the People's Republic of China (PRC)—a “community of common destiny in cyberspace,” as President Xi Jinping has

put it,* that engages internet regulation, data security, and international standards. The PRC government views digital currency as one of several areas within the broader cyberspace arena where it can exert a leadership role in setting global norms and rules around both digital policy and technical standards. To this end, China's central bank, the People's Bank of China (PBOC), has already begun to propose international principles for cross-border digital currency transactions. While Chinese officials present a benign view of their engagement with digital currency on the global stage, some Chinese analysts emphasize rivalry with other powers, describing digital currencies as a "new battlefield for competition" in which China can win through its first-mover advantage.

The US government has been alert to China's development of the e-CNY and to the new digital currency's implications for the position of the US dollar as the world's reserve currency, the ability of the United States to implement sanctions through the international financial system, and the potential loss of financial and other personal data privacy. However, US officials have been cautious about exploring the potential creation and deployment of a US CBDC. The US administration and the Federal Reserve System have yet to put forward their own visions for the integration of digital currencies into global payment systems, and have not yet set norms governing the use of public and private digital currencies, domestically or internationally. The focus of the US official sector has instead been primarily on how to manage the explosion of cryptocurrencies and stablecoins that have recently appeared within the United States. However, the stakes are too high and the pace of digital currency development too rapid for the United States to remain on the sidelines. Many emerging economies and an increasing number of the world's advanced economies are moving forward aggressively to develop technological and regulatory frameworks for the deployment of their own CBDCs. For the United States to remain competitive and a leader in global finance and financial technologies, and to ensure the continued strategic influence of the US dollar, Washington should adopt a far more proactive strategy.

*Sources for this and other quotations and facts cited in this executive summary are provided in the body of the report, chapters 1 through 6.

Major Findings

China is a global leader in financial technology (fintech) innovation and adoption, building upon technological advances that largely originated in the United States. Ant Group's Alipay and Tencent's WeChat Pay are the most dynamic and successful fintech payment services in the world. The e-CNY harnesses this technological dynamism for a set of government-directed objectives that include supporting China's transition away from paper money; providing more efficient payment services, both commercial and governmental (including social welfare programs); expanding access to payment systems through the ability to make offline e-CNY payments in areas without cellular or internet services; and reducing corruption. The e-CNY also enables the PBOC to respond more quickly to changes in macroeconomic conditions with adjustments to its monetary policy, including more flexible and targeted forms of liquidity. According to one estimate, the e-CNY also has the potential to save China more than US \$24 billion annually in direct and indirect costs associated with producing and distributing physical money.

The e-CNY is part of a broader push by Beijing for greater control over its own financial sector. In recent years, many Chinese citizens have moved away from their heavy reliance on traditional state-owned commercial banks to take advantage of services offered by China's large fintech sector—dominated by Ant Group and Tencent—not only for payments but also for wealth management, small loans, insurance, and other financial products. In the process, these two giant tech firms have gained access to vast quantities of personal data and undercut the government's control over the financial sector. In response, Beijing recently implemented a raft of regulations designed to limit the market power of Ant Group, Tencent, and other tech firms; reduce their access to Chinese citizens' data; and enhance the ability of China's large state-owned banks to compete. China's government has also banned private cryptocurrencies such as Bitcoin.

In the context of the PRC's authoritarian system, the e-CNY also increases Beijing's ability to enforce political control over Chinese society. The e-CNY will provide state-owned banks with a more direct

window into personal financial transactions. To the extent that the e-CNY becomes heavily used, the PBOC will be able to directly trace money flows via bank accounts, ID cards, domestic phone numbers, and potentially even foreign phone numbers. (Full anonymity will probably apply only to small payments from hardware wallets that function like prepaid gift cards.) Transactions can be tracked, accounts frozen, and balances adjusted. With this power, the e-CNY could become an important tool for punishing Chinese citizens for their social or political activism or criticism of the government. The e-CNY could also be linked to other programs, such as the social credit system, that aim to reward or punish Chinese citizens, as well as Chinese and multinational corporations, for their adherence to or defiance of government regulations and Chinese Communist Party (CCP) norms of behavior.

The international implications of the e-CNY are also significant. Several factors have converged to enable Beijing to promote the internationalization of its currency, the renminbi (RMB), without needing to liberalize capital controls. These factors include the growing role of the Cross-Border Interbank Payment System (CIPS) and other potential alternatives to the payment messaging system of the Society for Worldwide Interbank Financial Telecommunication (SWIFT), the global reach of payment platforms such as Alipay and WeChat Pay, the developing role of the e-CNY in multi-CBDC cross-border payment corridors, and the budding use of the e-CNY in offshore instant payment systems. Even before the e-CNY's deployment, Indonesia and Russia were conducting a substantial part of their bilateral trade with China in RMB. Russia has also shifted the composition of its sovereign wealth fund (the National Welfare Fund) and its central bank's foreign exchange reserves significantly away from dollar-denominated bonds and toward yuan-denominated bonds. Given China's heft in global trade and investment, the e-CNY may become a currency of choice for transactions between a significant number of foreign governments and businesses and their Chinese counterparts.

In addition, China has a robust domestic digital technology infrastructure and a suite of technology products that it exports abroad via the Digital Silk Road, the digital infrastructure pillar of the Belt and

Road Initiative. Huawei, for example, is a strategic partner of the PBOC's Digital Currency Research Institute and collaborates on e-CNY projects related to distributed databases and networks, as well as on e-CNY-enabled mobile phones. This partnership is reflected in Huawei's business and sales at home and abroad. More than 60 percent of smartphones sold in Africa are made in China, for instance, and new phones like Huawei's Mate 40 come with e-CNY wallets. These factors significantly enhance the likelihood of international payments in e-CNY and other RMB instruments, including RMB stablecoins, by consumers and businesses outside China.

The e-CNY also adds to Beijing's ability to weaken the US-led financial sanctions regime. The United States and its allies frequently enforce financial sanctions against international actors via SWIFT. For example, when the United States sanctioned Hong Kong chief executive Carrie Lam for undermining Hong Kong's democracy movement, Lam had to be paid in cash because no bank would provide account services to her. Although CIPS is still largely a Chinese enterprise dominated by Chinese banks, countries such as Turkey and Russia have used CIPS to avoid SWIFT sanctions in the past. The e-CNY might enable more countries to do the same, although the precise mechanisms that could enable this are not yet clear. E-CNY data also enable monitoring that could trigger applications of China's new Anti-Foreign Sanctions Law, which authorizes travel restrictions, asset freezes, and commercial transaction prohibitions to prevent entities from complying with foreign sanctions regimes.

Finally, China is asserting leadership in shaping global norms and institutions for multicurrency cross-border payments. Along with the Hong Kong Monetary Authority, the Bank of Thailand, and the Central Bank of the United Arab Emirates, the PBOC is one of four monetary authorities participating in the m-CBDC Bridge, a Bank for International Settlements pilot project intended to enable cross-border transactions between CBDCs. This project gives China an additional opportunity to advance its norms, for example around privacy, within a group of politically friendly countries under the auspices of a prestigious international institution.

Recommendations

The United States should embrace the opportunity to shape the future digital economy. In particular, it should pursue three key priorities. First, the United States should move quickly to determine the appropriate nature and role of digital currencies within the US economy. Second, the United States should attempt to prevent the e-CNY from undermining US geo-economic and strategic influence, which derives in significant part from the dominance of the US dollar in the global economy. And third, the United States should take adequate steps to prevent the global spread of RMB-based payment arrangements, including the e-CNY, from threatening individual freedoms and human rights.

A further top US priority should be to initiate a well-resourced CBDC research and development effort that engages the innovative strength of the private sector and the intellectual capital of US universities. The partnership between the Boston Fed and the Massachusetts Institute of Technology is only one step in this direction. To bring payment-system technology development to the next stage, the Center for Enterprise Modernization, the US Treasury Department's research and development center, should coordinate and provide contracts for the development of CBDC and other digital payment technologies, while also generating standards for modernized payment systems. The federal government should also utilize its program of Cooperative Research and Development Agreements, a federally sanctioned system that enables industry to collaborate with the government to jointly research and develop technologies with both commercial and governmental applications. Further, Congress should pass the US Innovation and Competition Act, legislation that focuses on improving US competitiveness. The Senate bill, which was passed on a bipartisan basis, would invest more than \$200 billion into US scientific and technological innovation over the next five years. The final version of the bill, which is currently being considered by the House of Representatives, should explicitly fund CBDC research and development and other projects that modernize US payment systems.

While it is crucial that the United States develop CBDC technology, this does not imply that the United States should necessarily deploy its

own CBDC. A CBDC design that maintains the privacy of Americans, while at the same time defeating illegal payments and providing for a competitive, inclusive, and innovative payments landscape, will not be a simple or rapid achievement. However, precisely because it will take some time to reach these design objectives, the United States should move now to develop CBDC technology.

More broadly, the United States should establish a strategic plan for the role of payment systems in the US digital economy. This plan should provide for the development of data-privacy standards and the integration of payment infrastructure such as CBDCs, fast-payment systems, and private payment arrangements including stablecoins into many forms of economic transactions. To date, the US government has concentrated on managing risks to conventional US payment systems. While controlling these risks is critically important, regulations that shield legacy payment systems from competitive disruption may hinder innovations that can improve the everyday lives of Americans and enable the United States to lead in the rapidly evolving global digital economy. In addition to developing new forms of payment rails, the United States can upgrade its legacy bank-railed payment systems by regulating in favor of greater competition and by leveraging the potential power of FedNow, the new fast-payment system currently under development by the Federal Reserve System.

The United States should also position itself as a global leader in the digital currency space, especially in the development of a global framework of regulatory principles that is consistent with US expectations concerning consumer protection, privacy, financial anti-crime compliance, financial stability, and the protection of monetary sovereignty. The United States should ensure high standards for cross-border uses of CBDCs and other payment instruments such as stablecoins.

In particular, the United States and other democracies should make clear that international adoption of the e-CNY and other Chinese e-payment platforms could give the Chinese government significant coercive leverage over countries, companies, and individuals outside China. These democracies should move expeditiously to coordinate standards for privacy and for the protection of monetary sovereignty in

relation to the use of CBDCs and private cryptocurrencies. Such coordination can counter the potential proliferation of standards being set by China's government that are not consistent with the norms of market democracies.

Alignment of principles is already underway within the G7. However, several members of our working group support broadening that effort to include other democracies—large and small—that are in the CBDC research and development phase or that have already deployed CBDCs. The United States should be vocal in its leadership. Given China's dominance in global trade, its e-CNY technology and the lack of privacy norms embodied in that technology are likely to proliferate rapidly unless compelling alternatives are available.

In addition to leadership in standard setting, Washington and its key allies and partners should prioritize assistance to other countries interested in exploring CBDCs or other digital payment systems. Such an effort should be included in the G7's Build Back Better World (B3W) partnership. Support can be provided from the US Development Finance Corporation and the US Agency for International Development. Further support for developing countries to participate in this emerging financial ecosystem should also be provided by the World Bank in a manner that is consistent with the standards that are being set by market democracies.

This volume supports and elaborates on this brief summary of the findings and recommendations of our working group. Our work is based on extensive evidence-based research and group deliberation over the past year. While the members of the working group may not agree on every specific step that the United States should take, we stand as one in underscoring the urgent need for the United States to reassert its leadership in this fast-moving and decisively important arena.

Introduction: At a Global Crossroads in Digital Currencies

At the G20 summit in November 2020, Chinese president Xi Jinping called on the world's leading economies to begin discussing standards and principles for central bank digital currencies (CBDCs).¹ At the time, China was the only G20 nation to have begun testing a CBDC, known as the e-CNY, in pilot projects throughout the country. (The Bahamas was the first country to launch a nationwide CBDC, the Sand Dollar, in October 2020.) Xi's appeal at the G20, like earlier Chinese official pronouncements that the e-CNY would be fully rolled out in time for the 2022 Winter Olympics in Beijing, drew significant international attention: as the world's largest authoritarian state, second-largest economy, and a global leader in digital technology, China hopes that the e-CNY will help it transform the landscape of international finance and global security.

To assess the economic, security, and political implications of the e-CNY for the United States and the wider international community, the Hoover Institution in early 2021 assembled a group of scholars and practitioners. This working group brought together expertise from a range of different disciplines, including national security, economics, finance, central banking, technology policy, computer science, and history, to explore the implications of China's digital currency and its related policy and payment-system initiatives. The working group also addressed the much broader digital transformation underway in the global e-payments landscape, recognizing that US policy needs to be informed not only by domestic needs but also by the policies of China and other countries.

The group's report, divided into six chapters in this volume, addresses a set of foundational policy questions: What are the implications of the e-CNY for China's own domestic political and economic agenda? How might the e-CNY or its underlying and related technologies be adopted by other countries? What are the potential international economic and security ramifications of widespread adoption of the e-CNY within China and globally? How should international norms and institutions be reformed—or replaced—to address changes in the international financial system as China and other countries move forward with CBDCs and other digital payment technologies? How can the United States most effectively respond to the range of new policy issues raised by the e-CNY and its own changing e-payments landscape? For example, under what conditions should the United States introduce its own CBDC?

The rest of this first chapter provides additional background on China's development of the e-CNY and summarizes the state of play in payment systems globally, paying specific attention to US payment systems. Chapter 2 focuses on the structure and functionality of the e-CNY and the likely motives for its introduction. Chapter 3 analyzes how the e-CNY and its related technologies may be used internationally. Chapter 4 describes the potential global impact of the e-CNY, focusing in particular on US interests. Chapter 5 discusses effective frameworks for international standards and agreements on digital currencies and cross-border payments. And chapter 6, the conclusion, provides a policy road map for the United States, taking into account China's policies and progress in payments as well as general developments in the payments arena.

1.1. Background

China's government began formal exploration of a potential government-backed digital currency as early as 2014, under the leadership of the People's Bank of China (PBOC). A PBOC task force set out to understand the technology and policy environment for a digital currency, as well as the experience of other countries. Two years later, the PBOC created the Digital Currency Research Institute, which moved from discussions of a CBDC into a pilot phase, launching the first tests of a CBDC in

2017 with commercial institutions.² At that point, the CBDC was branded the Digital Currency Electronic Payment (DCEP) system, but it was later relabeled the “e-CNY,” appending *e* for *electronic* to the conventional foreign exchange symbol for China’s currency, CNY.

The PBOC is the central actor not only in researching and developing China’s e-CNY but also in issuing and managing the currency, including determining who has access to it. While the PBOC’s initial pilots were limited to banks, there are now hundreds of pilot projects underway throughout the country. The Beijing Municipal Finance Bureau, for example, provided more than US \$6 million in e-CNY in one promotional give-away, while Shanghai offered a “Happy Shopping” event in which 350,000 citizens each received a “red envelope” with US \$9 worth of e-CNY. In Shenzhen, more than thirty thousand stores accept e-CNY, and five hundred of them offer discounts to e-CNY users.³ By the end of 2021, over 250 million people in China had set up e-CNY wallets and had made e-CNY transactions worth over US \$13 billion.⁴

Domestic Implications

In their official statements, Chinese authorities stress that the rationale for the e-CNY is overwhelmingly domestic: among other goals, it will help to combat individual corruption, enhance financial inclusion, ensure that central government funds are deployed for their designated purposes at the local level, and serve as an alternative to China’s private mobile payment platforms, Alipay and WeChat Pay, as part of a more tightly state-controlled e-payment system. Chapter 2 explores these and other motives for the e-CNY, including the ability to conduct significantly enhanced government surveillance. As that chapter explains in more detail, e-CNY infrastructure includes a certification center that will record the identities of all users, a registration center that will document each user’s ownership of digital currency and history of transactions, and a big-data analytics center that will analyze how the e-CNY is being used.⁵

Under a system of so-called managed anonymity, larger e-CNY wallets and transactions will be granted less anonymity than smaller ones. Particularly noteworthy is the PBOC’s ability not only to monitor but also to control the transactions themselves: the PBOC can, for example,

stop a transaction midstream or even empty an individual's e-CNY wallet of funds for perceived infractions.⁶ Use of the e-CNY has expanded rapidly, although some Chinese citizens have questioned the need for it given the ease and prevalence of China's two enormous mobile payment service providers, Alipay and WeChat Pay. They note, for example, that the government's apps are not as appealing as those in the private sector.⁷

International Security

Despite the Chinese government's claims that it is developing the e-CNY for overwhelmingly domestic reasons, the digital currency has significant potential ramifications for international actors, norms, and institutions. For example, the Chinese government could as easily apply the e-CNY's enhanced monitoring and control capabilities to multinationals as to Chinese citizens. With the e-CNY, Beijing could potentially gain detailed real-time insights into corporate supply chains or even shifts in the strategies or financial conditions of individual firms.

In addition, some Chinese officials have quietly begun to signal a broader set of international ambitions for the e-CNY, which raise important questions for the United States over the continued role of the dollar as the world's reserve currency. The dollar's dominance has enabled Washington to borrow cheaply and to exert an outsize influence in many other ways, including the use of the global payments system to sanction entities and people in other countries. The Chinese government has long desired the dollar's position to be diminished and its own currency, the renminbi (RMB), to be more widely adopted in international trade and financial settlements. Some Chinese policy analysts have suggested that the e-CNY could facilitate this process through the country's massive global infrastructure investment project, the Belt and Road Initiative (BRI). Pakistan, one of China's top BRI funding recipients, for instance, has proposed replacing the dollar with the RMB for BRI projects, although Chinese firms reportedly prefer to be paid in dollars.⁸ The PBOC is also planning to use the e-CNY in Hong Kong,⁹ and has already established a cross-border payments partnership with Hong Kong, Thailand, and the United Arab Emirates under the auspices of the Bank for International Settlements, as explained in chapter 3.

The international dominance of the US dollar rests on the relative lack of US barriers to cross-border capital flows, the depth and liquidity of globally accessible markets for US treasuries and other US financial instruments, the reliance of global financial market participants on the US rule of law, and the stability of US monetary and financial policy.¹⁰ The collective effect of these and other strengths of the US system will not be easy for China to replicate anytime soon. While the e-CNY does not pose an immediate threat to the global dominance of the US dollar, it could—depending on US policy—contribute to a gradual erosion of the dollar’s status over the long term and impinge on other US international priorities, such as exerting influence in emerging-market economies and retaining the ability to impose sanctions through payment systems that are based on conventional correspondent banking.

For example, dollar dominance enables the United States to leverage the Society for Worldwide Interbank Financial Telecommunication (SWIFT) messaging system, used globally by banks to enable cross-border payments, to track money laundering and terrorist financing and to levy sanctions. Historically, the United States has used this power to impose sanctions against economic or political entities in countries as disparate as Iran, Venezuela, Russia, North Korea, and China that it deems to be violating international law or harming US or international security. This volume explores whether the e-CNY, alone or in combination with RMB stablecoins or China’s alternative to SWIFT, the Cross-Border Interbank Payment System (CIPS), can effectively undermine the financial sanctioning power of the United States and other authorities, and whether the e-CNY substantially increases China’s ability to wield its own financial sanctions against others.

Global Governance

As a growing number of countries formulate domestic policies around CBDCs and other digital currencies, including stablecoins and other cryptocurrencies, there is simultaneously a growing need for international rules and institutions to govern public and private interactions around these currencies. Differences between China and other major economies over issues such as data privacy and private sector autonomy

have already contributed to significant international conflict in the telecommunications sector. These sources of tension underscore the importance of early negotiations to establish the rules and institutions that govern the international use of digital currencies.

Partly because of the e-CNY, China is well positioned to play a leading role in such negotiations. Among the major economies, China has a first-mover advantage not only in positioning the e-CNY as the world's first major CBDC, but also through deploying the currency's underlying technology. Furthermore, the e-CNY fits neatly into Beijing's broader vision for a Digital Silk Road, part of the BRI, complementing China's position as a global leader in both the hardware and software of telecommunications and e-commerce. Xi has identified the establishment of global standards for a wide range of next-generation technologies as a government priority via his China Standards 2035 plan, and he has asserted that China should assume a leadership role in setting digital currency standards in particular.¹¹ To this end, Chinese officials have already put forth a set of general political principles around which they would like the international community to cohere.¹²

Chapter 5 reviews China's first steps to shape the negotiating environment around CBDCs. Chapter 5 also identifies existing relevant institutions of global governance and suggests how the United States and its partners might best use and adapt these to ensure that their interests are protected and advanced as new forms of digital currencies gain traction.

1.2. A Global Inflection Point in Payment Systems

Although China's e-CNY is an important entrant to the emerging field of digital currencies, US policy makers must also consider the broader global context of e-payments when setting their strategy for developing US payment systems and for influencing the development of digital currencies internationally.

For centuries, the world has relied on banks to handle the vast majority of payments via a straightforward and generally safe method. In the simplest common cases, a bank-railed payment system works like this: Alice pays Bob \$100 by instructing her bank to deduct \$100 from

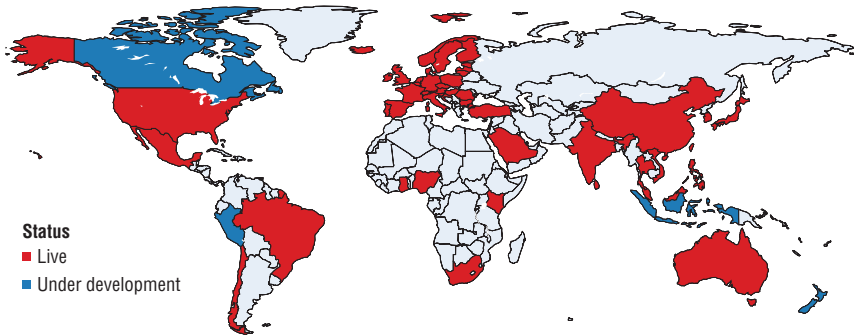


Figure 1.1. The Development of Fast-Payment Systems

Sources: Data for this map were retrieved from *Flavors of Fast 2020: The Global Real-Time Payment Trends Transforming Money Movement* (FIS Global, 2020), https://empower1.fisglobal.com/rs/650-KGE-239/images/Flavors-of-Fast-Report_2020.pdf?mkt_tok=NjUwLUtHRS0yMzkAAAF-8HMpguKsu7w9MCgHl8Aixqm6pV1rc4xP7cS00Ajop-T4VRx5Rd_0WDAvs2gqkBLbo2p28Gag-HrgM09DfAdF7FBKgljmLWMWqwb9r7rvJuFb. Countries participating in the SEPA Instant Credit Transfers scheme were based on *Status Update on SCT Inst Scheme: November 2020 ERPB Meeting*, EPC 192–20 (European Payments Council, November 9, 2020), https://www.ecb.europa.eu/paym/groups/erpb/shared/pdf/14th-ERPB-meeting/Status_update_on_the_SCT_Inst_scheme.pdf?cbec7731aa9f25fdc11a649ab133ee1a.

her bank account and to deposit \$100 into Bob’s account at his bank. The instruction can take the form of the tap of a credit or debit card, a wire transfer, or a paper check, among other methods. In some countries, including the United States, the payment medium—bank deposits—is extremely safe, and banks take reasonable care to protect the privacy of their customers and monitor the legality of payments.

As shown in figure 1.1, many countries have been upgrading bank-railed payments by introducing “fast-payment systems,” which can make instant payments possible around the clock, largely eliminating costly delays and payment risks. The United States has a fast-payment system provided by a consortium of large banks.¹³ Not satisfied that the bank-provided solution will be sufficient, the US central bank, the Federal Reserve, will introduce its own fast-payment system, FedNow, by 2024.

With this and certain other improvements in traditional payment systems, why are most countries now considering radically disrupting their bank-railed payment systems by introducing CBDCs, or by accommodating other kinds of digital currencies? The answer is that most central banks have begun to question whether merely upgrading their

bank-railed payment systems will be enough to meet the challenges of the future digital economy. They have also begun to consider whether to encourage, and how to regulate, private sector fintech innovations such as stablecoins. Moreover, some in the official sector are concerned about whether banks face sufficient competition for providing innovative and cost-efficient payment services.

Cryptocurrencies and Other Private Fintech Solutions

A cryptocurrency is a digital currency that is recorded on a blockchain, a form of ledger that is updated by cryptographic methods. Cryptocurrencies are rapidly gaining acceptance, especially as speculative assets. Stablecoins, which form a specific subset of cryptocurrencies, also play an increasingly significant role in payments. A stablecoin is a cryptocurrency that, in principle, can be created with a fiat currency or redeemed for a fiat currency, like the dollar, unit for unit. Provided this works in practice, the price of a stablecoin is effectively constant in fiat-currency terms. This allows the stablecoin to serve as a useful payment medium.

Currently, stablecoins are used primarily as a payment medium for cryptocurrency trading. They could potentially also be used in the broader economy for peer-to-peer payments, customer-to-business payments, business-to-business payments, remittances, programmable payments, and securities settlements. Stablecoins may eventually become common for payments involving the Internet of Things and other innovations that may emerge based on advances in blockchain technology.¹⁴ Stablecoins also enable smart contracting, which can increase efficiency by facilitating transactions among strangers without necessarily relying on trusted third parties. Smart contracting can reduce the need for intermediaries, agents, and clearinghouses, and reduces transaction costs and settlement times.

Some stablecoins, however, are viewed as unsafe because their convertibility to fiat currency at a constant price may not be sustainable, leading to investor losses or financial instability. Regulators also worry that stablecoins could in some cases be used to make illegal payments.¹⁵

Stablecoins, novel fintech banks, and other new private sector payment service providers are beginning to challenge traditional commercial banks. In China, for example, 94 percent of mobile payments are

now processed by Alipay and WeChat Pay, with 90 percent of residents of China's largest cities using these services as their primary method of payment.¹⁶ In the United States and other countries, fintech firms and stablecoin issuers are vying for central bank accounts, enabling them to offer novel payment services well beyond the cryptocurrency market and to better compete with legacy commercial banks.

Central Bank Digital Currencies

Often in response to private fintech innovations or the declining use of paper money, some central banks are developing CBDCs. A CBDC is a deposit in the central bank that can be used to make payments. For example, Alice can pay Bob \$100 by shifting \$100 out of her central bank account and into Bob's central bank account, whether on an internet website, a mobile phone app, or a payment smart card, among other methods. Depending on their designs, CBDCs can also be used for offline payments, meaning without access to the internet or a phone network. In many cases, Alice and Bob would obtain their CBDC and the necessary application software ("apps") from private sector firms such as banks, even though the CBDC itself is a claim against the central bank. A general purpose CBDC, often called a "retail" CBDC, would be available to anyone and accepted by anyone, much like paper currency but allowing for greater efficiencies and a wider range of uses. Special-purpose CBDCs can also improve the efficiency of wholesale financial transaction settlements and cross-border payments.

Figure 1.2 maps the progress of CBDC development around the world. A majority of central banks are now working on CBDCs.¹⁷ While few central banks have specific plans to issue CBDCs, roughly thirty central banks have moved from research to active pilot or development programs, according to data collected by the Atlantic Council's Geo-Economics Center.¹⁸ These include the European Central Bank and the central banks of China, Sweden, Canada, Brazil, Korea, South Africa, Nigeria, Russia, and Japan. Among the major economies, only China is close to actually deploying a CBDC for broad use.

Most CBDCs currently being developed adopt a hybrid model, according to which the central bank issues the CBDC to banks and other

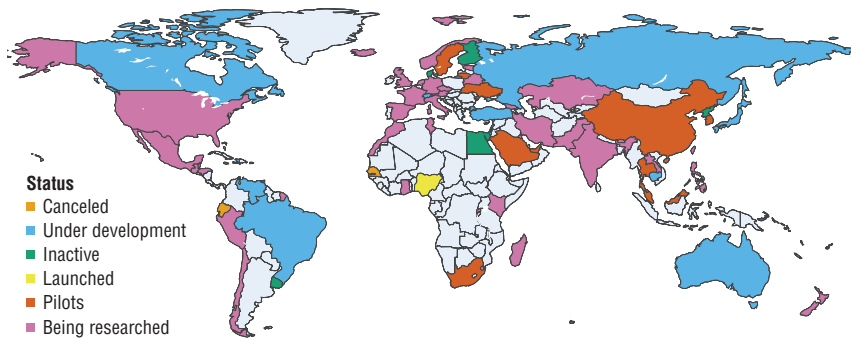


Figure 1.2. CBDC Work around the World

Source: Data for this map were retrieved from “Central Bank Digital Currency Tracker” (Atlantic Council GeoEconomics Center, 2021).

payment service providers, which in turn distribute the CBDC to users throughout the economy and provide them with account-related services.

Some CBDC development programs rely on blockchain technology. Others envision the mixed use of blockchain and account ledgers based on conventional centralized databases. China’s e-CNY is not currently based on blockchain, but the PBOC has indicated that it is open to blockchain-based extensions of the e-CNY. Chapter 2 provides a relatively detailed description of the e-CNY’s design.

Challenges and Opportunities

These various developments—the emergence of cryptocurrencies, the entry of fintech payment service providers, and the launch of China’s e-CNY—have increasingly caused central banks to reconsider their payment-system strategies. More and more central banks are now debating whether to introduce CBDCs. Central banks are also considering the conditions under which they will let fintech payment service providers have central bank deposit accounts in which they can store the cash that backs their deposits or stablecoins, and from which they can access backbone bank-railed payment systems. Central banks and other financial regulators are simultaneously grappling with how to control the risks of cryptocurrencies, including stablecoins, while retaining their benefits.

With these challenges come significant opportunities. Private stablecoins and some forms of CBDC enable smart contracting, empowering the Internet of Things, and allowing contracts to be settled with a high degree of assurance and fewer intermediaries, thus lowering costs, delays, and risks.

CBDCs and other innovative payment arrangements can also improve access to the financial system, which has been a high priority of the G20 and other international organizations. Innovations that have helped drive progress on this front include WeChat Pay and Alipay in China, Mercado Libre in Argentina, open-banking initiatives in Brazil, and Paytm in India. Building on Alipay, the Ant Group provides relatively low-cost and widely accessible small-business credit, wealth management, and insurance. Alipay now reaches small-tier cities and many rural areas in China. All of this enhances welfare by promoting financial inclusion and growth, and by reducing inequality.

Disruption of Banking

Although CBDCs and other potential fintech innovations such as stablecoins and novel fintech payment banks would likely improve the efficiency of payments, they would also disrupt commercial banks. Alipay and WeChat Pay have already disrupted Chinese banks by attracting a significant share of their customers' business and payment data. In the face of sufficiently strong competition from private fintech or CBDC payment services, US banks might be forced to lower credit card fees and to raise their deposit interest rates, reducing their profits. In order to compete with effective new nonbank payment technologies, banks would likely also need to significantly increase their spending on technology improvements. Bank shareholders could suffer.

The most prominent argument against the adoption of CBDCs and private sector fintech entrants is that banks would be forced to replace their relatively cheap sources of deposit financing with more expensive sources of funding. It is frequently argued that this would reduce bank lending. Ostensibly, if a firm has higher costs for inputs (in this case, a bank's funding), then it must charge more for its outputs (in this case, loans to others). This is the main objection made by Greg Baer, CEO

of the Bank Policy Institute, to the introduction of a US CBDC.¹⁹ He writes, “Banks’ lending would decrease in supply and increase in cost as banks paid higher rates to persuade businesses and consumers to hold deposits rather than CBDC.” On its own, this argument is not persuasive, at least in terms of economic logic and empirical evidence.²⁰ The Federal Reserve suggested that “These concerns could potentially be mitigated by CBDC design choices. A non-interest-bearing CBDC, for example, would be less attractive as a substitute for commercial bank money. In addition, a central bank might limit the amount of CBDC an end user could hold.”²¹

In the view of Bank for International Settlements and seven major central banks, including the US Federal Reserve:²²

A significant shift from bank deposits into CBDCs (or even into certain new forms of privately issued digital money) could have implications for lending and intermediation by the banking sector. However, our analysis also suggests that these impacts would likely be limited for many plausible levels of CBDC take-up, if the system had the time and flexibility to adjust. . . . Additionally, private sector developments may generate similar deposit substitution risks, irrespective of CBDC and the introduction of CBDC may generate additional innovative opportunities for banks and other financial intermediaries. Central banks would have to carefully consider how they would manage these impacts, particularly through any transition phase for CBDC.

Protecting Privacy while Monitoring the Legality of Payments

Another challenge posed by CBDCs is protecting the privacy of transactions while at the same time effectively monitoring payments for their legality, particularly with respect to money laundering, tax evasion, and terrorism financing. If these responsibilities are absorbed by a central regulator, data repositories will need to be protected from cyberattacks and undue surveillance. Although emerging cryptographic technologies will potentially be able to manage these risks, centralized databases containing personal information may not be popular in the United States. China, however, has not hesitated to concentrate CBDC payment data

in the hands of its central bank. Alternatively, private sector payment service providers could be charged with protecting the privacy of their customers' CBDC data while monitoring transactions for their legality, although CBDC designs allowing this approach are not yet complete.

Data as an Asset

Data on payment transactions are at the heart of consistent, integrated financial account statements, such as income statements, balance sheets, and statements of cash flow. These accounts apply not only to large corporations, but also to households and household-operated enterprises. Household account statements can in turn help with both household management of high-frequency payments and with long-term, life-cycle financial planning. Electronic records and interoperable systems can expand the scope and impact of these accounts. Payment advisory apps and life-cycle planners can be built as tools, while financial service providers can offer appropriate products and services. These account data can be created by apps that connect, consolidate, and analyze diverse data from bank and nonbank accounts for household budget management.

Better digital infrastructure for business financial services is also within reach. The COVID-19 pandemic revealed the vulnerability of supply chains. Powerful new cryptographic tools can improve access to supply-chain information such as identities, objects, values, and amounts, while limiting confidential data access to authorized users. At the same time, analysis can be done on encrypted data, so that data remain accessible as an asset while assuring privacy.

These and other valuable properties of data as an asset call for heightened attention by governments and central banks as they form strategies for future payment systems.

1.3. The US Payment System: Behind the Curve

Compared with the payment systems of some other developed economies, US payment systems are costly to access, especially for low-income households, and are far from meeting the demands of the digital age. US banks are technologically capable of offering cheaper, more efficient,

and more inclusive payment services while continuing to monitor the legality of payments and taking responsibility for data privacy. But US banks have had little incentive to do this effectively, given the relatively low degree of competition for payment-related services and insufficient regulation in support of these goals.

About seven million US households are unbanked, and many more are underbanked.²³ The US Survey of Consumer Finance, a statistical survey of US families, reveals the weak financial position of the poor and much of the middle class. Many small and medium enterprises also face constrained funding and, because of low access to the payment system, are vulnerable to supply chain disruptions. North Americans pay over 2 percent of their GDP for payment services, according to data from McKinsey,²⁴ more than most of the rest of the world pays, particularly because of extremely high fees for credit cards. US payments are also processed and cleared slowly, often taking more than a day before they can be used by the recipient. And Americans' primary payment instrument, bank deposits, is compensated with very low interest rates relative to wholesale money-market rates. When wholesale market rates rise, bank deposit interest rates remain much lower, typically near zero for most depositors.²⁵

US banks and credit card providers operate what the economists Jean-Charles Rochet and Jean Tirole have labeled a “two-sided market.”²⁶ On one side of the market, merchants make high payment fees. On the other, consumers are enticed with low direct payment fees, free credit (if they make timely payments), and rewards. This commercial strategy, when combined with high consumer switching costs and the positive network effects of a common payment system that is already convenient for consumers, binds most market participants to the bank-railed system. So far, competitive entry into US payment services markets has been difficult, in part because of the protective umbrella of bank regulation.

Within a couple of years, the Federal Reserve's fast-payment system, known as FedNow, will come online and allow US banks to improve the services that they offer to their customers. Without additional regulation for competitive interoperable access to FedNow, however, this new fast-payment system will not necessarily achieve its potential for low

cost and high market penetration. FedNow is by and large designed as a service for banks. In most cases, banks will be able to choose how they offer FedNow services to their customers. The narrow range of use cases for which the private sector fast-payment system, RTP Network, has improved payment-system efficiency serves as a cautionary tale.

Even with the emergence of a US CBDC and private digital currencies, it's not clear whether there would be sufficient competition for payment services, given the barriers to entry associated with the legacy bank-railed payment system and the degree of regulatory protections afforded to banks from competition. Indeed, the US official sector may assign to commercial banks the role of providers of the most significant new forms of payment services, including FedNow, stablecoins, and perhaps a future US CBDC. In that case, without an overlay of regulation that promotes competition, the legacy banking system will not necessarily harness these potentially powerful innovations to the yoke of more efficient and interoperable payment services. For example, in response to a recommendation by the President's Working Group for legislation requiring stablecoins to be issued only by banks,²⁷ Federal Reserve governor Chris Waller wrote:

I understand the attraction of forcing a new product into an old, familiar structure. But that approach and mindset would eliminate a key benefit of a stablecoin arrangement—that it serves as a viable competitor to banking organizations in their role as payment providers. The Federal Reserve and the Congress have long recognized the value in a vibrant, diverse payment system, which benefits from private-sector innovation. That innovation can come from outside the banking sector, and we should not be surprised when it crops up in a commercial context, particularly in Silicon Valley. When it does, we should give those innovations the chance to compete with other systems and providers—including banks—on a clear and level playing field.²⁸

More generally, the United States lags behind many other countries in its policies, regulation, and infrastructure for shaping competition and

innovation in the digital economy of the future. National priorities are not well articulated. Regulatory authority is fragmented and unclear. The current regulatory framework is based on outdated categories of objects and functionalities.²⁹ For example, there has been a revealing debate over whether risky cryptocurrencies like Bitcoin are commodities, securities, or money, and hence who should regulate them. US policy makers are closer to taking a stand on the regulation of stablecoins, but suggest a need for new legislation.³⁰ The US Federal Reserve System is at the early stages of considering the adoption of a CBDC. In January 2022, The Fed issued a paper summarizing the costs and benefits, saying that “The Federal Reserve does not intend to proceed with issuance of a CBDC without clear support from the executive branch and from Congress, ideally in the form of a specific authorizing law.”³¹

Nevertheless, innovation remains a great strength of the US economy. Private companies are ready to drive innovation in payment systems, but they would be able to advance more rapidly by having clearer regulatory guidance from the public sector. Significant innovators and their new payment systems include Arbitrum, Avanti Bank, Betterfin, Celo, Chime, Circle (USD Coin), Coinbase, Diem, Electric Capital, Imperial PFS, Jiko, JP Morgan, Mobile Coin, Optimism, Paxos, Plaid, Polygon, R3, Ripple, SoFi, Stellar, Topl, Varo Bank, Venmo, Yodlee, and Zelle. Tellingly, some US fintech firms are more active in other countries than they are in the United States. Chapter 6 of this volume provides a high-level road map for improving US payment systems and for responding to the impact of the e-CNY and other Chinese government initiatives in the international payments arena.

1.4. Conclusion

China and the United States are at radically different stages in the development of their digital currency and e-payment systems. China is a world leader in domestic fintech payment services, CBDC technology, and the testing of cross-border digital currency transactions. China’s government has already begun the process of staking out broad pa-

rameters for digital currency standards—such as calling for interoperability among central banks’ digital currency systems.³² By contrast, the United States is a world leader in cryptocurrencies but lags behind China in the penetration of mobile payment services and in the development of CBDC technology. The United States has yet to decide whether to even seriously pursue the development of CBDC technology. Many media reports have highlighted this gap between the United States and China, as well as the potential for China’s digital currency leadership to challenge traditional sources of US geo-economic and geostrategic advantage, such as the dollar’s role as the world’s reserve currency and Washington’s ability to levy sanctions. Naturally, alarm bells are ringing in many quarters of the United States.

The findings of this volume suggest, among other recommendations, that the United States should indeed move forward with the development of its own CBDC technology, without committing to its deployment until a satisfactory design is achieved, which will likely require significant time and resources. Federal Reserve chair Jerome Powell stated in October 2020: “We do think it’s more important to get it right than to be first and getting it right means that we not only look at the potential benefits of a CBDC, but also the potential risks, and also recognize the important trade-offs that have to be thought through carefully.”³³

Our findings also reveal that despite China’s leadership in domestic retail payment systems, tech firms from other countries, such as the United States and Japan, have been playing a much more active role in developing digital currency technology platforms for the rest of the world. This should ease some of the fears in the United States that China might be able to use a Belt and Road–like approach to advance its digital financial interests.

Each of the chapters that follows explores a different aspect of China’s digital currency development and its implications, both domestic and global, identifying the risks that are real as well as those that are more myth than reality.

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20. For example, suppose that a bank offers a corporate borrower a loan that would generate a loss of L to the bank if the bank’s funding for the loan were to be obtained at wholesale market rates. The bank’s actual funding cost is reduced through deposits obtained at below-market interest rates. If the value of the deposit-funding subsidy S associated with this lending opportunity exceeds the economic loss L on the loan, then the bank can afford to make the loan at a net profit of S minus L . But the bank would not make this loan anyway. Rather than investing the cheaply obtained deposit funding in this loan, the bank would instead invest the same amount of deposit funding in marketable securities, such as corporate bonds, which are at least break-even investments, thus earning a bigger net profit of at least S . Federal Reserve Board research finds that when large banks lost access to roughly \$1 trillion of below-market funding because of the 2016 reform of money-market mutual funds, these banks did not cut back on lending. See Alyssa G. Anderson, Wenxin Du, and Bernd Schlusche, “Arbitrage Capital of Global Banks,” Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series, May 2021, <https://doi.org/10.17016/FEDS.2021.032>.
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29. In 2021, the acting Comptroller of the Currency Michael Hsu testified to the Senate Banking Committee that “As a first step to increase inter-agency coordination, the OCC, FDIC, and Federal Reserve have established a Digital Assets Sprint Initiative (previously dubbed the “Crypto Sprint”) to provide greater clarity and collaboration around digital assets, including cryptocurrencies. The initiative is comprised of a series of sprints focused on providing an active, coordinated, and timely response to questions and issues raised by rapid growth in that space. The first sprint focuses on developing a common taxonomy for digital assets and agreed upon definitions to ensure a common language and understanding of the basic terms and concepts for future discussions. The second sprint centers on understanding use cases and risks associated with cryptocurrencies and digital assets. The third sprint concentrates on potential gaps in regulation and supervision and prioritizing those gaps for additional consideration. The fourth sprint will consider the policy needs based on the work conducted during the previous sprints.” “Statement of Michael J. Hsu, Acting Comptroller of the Currency,” Committee on Banking, Housing, and Urban Affairs, US Senate, August 3, 2021, 13, <https://www.occ.gov/news-issuances/congressional-testimony/2021/ct-occ-2021-79-written.pdf>.
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China's New Digital Currency: Function and Motives

China's new central bank digital currency, the e-CNY, is a general-purpose digital payment system. Its payment medium is RMB-denominated obligations of the People's Bank of China (PBOC) that are distributed by banks.¹ The e-CNY is enabled by a rich ecosystem of wallet types and payment methods that are now being tested in a number of major Chinese cities. According to press reports, the e-CNY will likely be placed into much broader use in 2022.

This chapter explains what the e-CNY is as well as what China's likely motives were for introducing it. We begin with a discussion of the nature and functionality of the e-CNY, which is designed for a wide range of uses and applies a system of "managed anonymity" to provide various levels of privacy, depending on the type of e-wallet used to make payments. We then turn to China's economic incentives for introducing the e-CNY, many of which are common to other countries exploring the introduction of CBDCs but some of which are specific to China's state-guided form of economy. Finally, we analyze China's overarching sociopolitical motives for introducing the e-CNY, which include the desire to increase state-sector control of payments and payment data and thereby secure the Chinese Communist Party's (CCP) grip on power. Despite Beijing's promise that the e-CNY will ensure "managed anonymity," there is little doubt that the senior state and party authorities that head the PBOC would turn private e-CNY payment data over to other government entities if directed to do so.

2.1. What Is the e-CNY?

China's CBDC is called the e-CNY, although it was previously known as Digital Currency Electronic Payment (DCEP). According to Mu Changchun, director-general of the Digital Currency Research Institute (DCRI) at the People's Bank of China (PBOC), the e-CNY can be defined in the following ways:

- As a digital legal base currency (part of the base money supply) issued by the PBOC
- As a currency operated by designated operating institutions and exchanged with the public, running 24/7 both online and offline
- As a currency characterized by managed anonymity, which is based on the loose coupling of bank accounts²

In this section, we explain those features by walking through the e-CNY's "two-tiered" operating system, as well as the functionality of e-CNY wallets and the meaning of "managed anonymity."

Two-Tiered Operating System

The PBOC will distribute the e-CNY through commercial banks, employing the same approach that it uses to distribute banknotes. In other words, e-CNY distribution is based on a two-tiered operating system (shown in figure 2.1): The PBOC sits on the top (distribution) layer, and commercial banks, payment service providers (PSPs), and telecom operators sit on the second (circulation) layer.³ Many smaller commercial banks (joint-stock, urban, and rural banks) are joining the second layer, as are three foreign banks.⁴

An e-CNY coin takes the form of an encrypted numeric string representing a specific amount of money. E-CNY users must have a specialized e-wallet to own and use this currency. Each e-wallet receives funds using a public address communicated to payers by a quick response (QR) code or similar identification device. In addition, the e-wallet manages cryptographic keys used to spend the e-CNY that it stores. To transfer funds, the payer obtains the address of the recipient's wallet, for instance

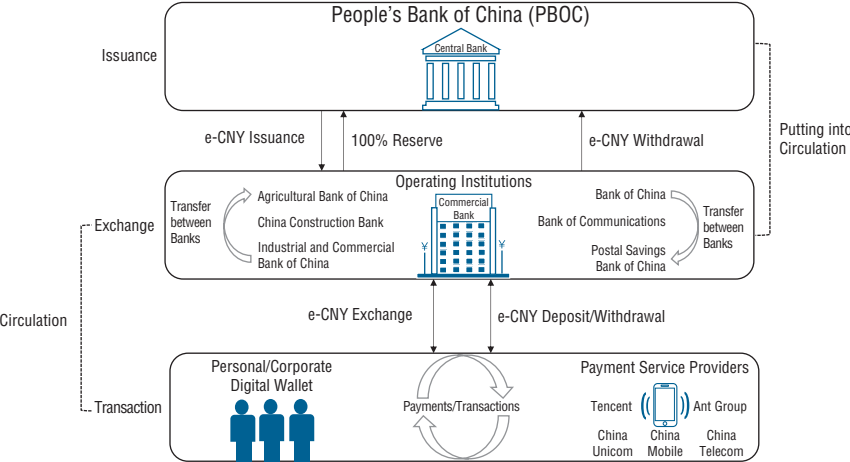


Figure 2.1. The e-CNY's Two-Tier Operating System

Source: Adapted from figure 1.1 in Bai Liang 柏亮, ed., Introduction to the e-CNY (2): Features, Applications and Industry Overview 数字人民币概论(二): 特征、应用与产业图景, 01Blockchain, 01Caijing, and Chinese Institute of Digital Assets 零壹财经 零壹智库 数字资产研究院 eds., 2021, 2, https://pdf.dfcfw.com/pdf/H3_AP202103081469576388_1.pdf.

by scanning a QR code, and initiates an address-to-address transfer. A secret private key stored in the payer’s wallet authorizes the transfer.

The relationship between a wallet address and its user’s physical identity is known only by the PBOC through a know-your-customer (KYC) process. (See our later discussion of “managed anonymity.”) E-CNY transactions are processed directly by the PBOC in a centralized ledger.

The mechanism at the core of the e-CNY system can be summarized as “one coin, two databases, three centers,” as shown in figure 2.2. The one coin refers to the e-CNY itself. The two databases are the central bank’s issuance database and the transaction databases of commercial banks. (There are at least two reasons for this design. First, on the economic and political side, the two-tiered structure reduces the risk of financial disintermediation. Second, on the technical side, the structure improves the availability of the e-CNY by providing some degree of redundancy between the central bank’s database and the databases managed by commercial banks.) The three centers at the heart of the e-CNY system are (1) the registration center, which records all owner identities as well as transactions, including the whole life cycle of issuance, circulation,

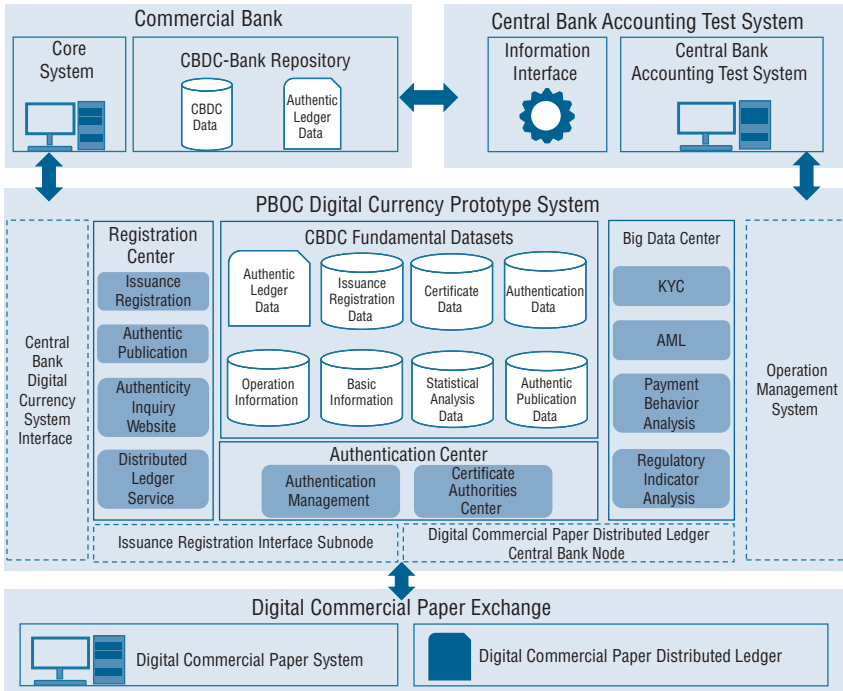


Figure 2.2. The e-CNY Database Management System

Source: Adapted from Yao Qian 姚前, “Experimental Study on Prototype System of Central Bank Digital Currency” 中央银行数字货币原型系统实验研究, *Journal of Software* 软件学报 29(9), 2018: 2723, <http://www.jos.org.cn/html/2018/9/5595.htm>.

and redemption;⁵ (2) the authentication center, which verifies incoming transaction requests via either public key infrastructure (PKI) for financial institutions and high-end users, or identity-based cryptography (IBC) for regular retail users;⁶ and (3) the big-data center, which processes transaction data through big data and cloud computing to monitor transactions for illegal activities.

E-Wallets, Payment, and Funds Flow: An Example

As of August 2021, anyone with an account at one of China’s six biggest banks can walk into a local branch and open an e-CNY software or mobile e-wallet on their mobile phone. The e-wallet will be associated with the institution that operates it, for instance, the Industrial and Commercial Bank of China (ICBC).

Let us suppose that customer C asks the bank teller to deposit 500 e-CNY into his ICBC e-wallet, funded by his ICBC deposit account balance. The bank teller will first verify that C's ICBC account balance exceeds 500 CNY and then deducts that amount while sending 500 e-CNY to C's e-wallet, drawing from the inventory of e-CNY that the bank maintains by exchanging a portion of its reserves (deposits at the PBOC) for e-CNY on a one-to-one basis. The conversion of reserves to e-CNY is done by sending a cryptographically signed message to the central bank currency system to record this transaction.

If ICBC's inventory of e-CNY falls short of C's request, then the bank might first request 1,000 e-CNY from the PBOC, funded by ICBC's reserves. For example, ICBC could first convert 1,000 RMB in reserves to 1,000 e-CNY credited to ICBC. Next, to fulfill C's request for 500 e-CNY, ICBC would communicate with an on-premises hardware device, called a front-end encryption machine, that contains cryptographic keys provisioned by the PBOC.⁷ The role of the front-end encryption machine is to split the 1,000 e-CNY input into two 500 e-CNY outputs—one 500 e-CNY output is credited back to ICBC, and the other 500 e-CNY output is assigned to C's e-wallet. Thanks to the front-end encryption machine, only the PBOC (not ICBC or other third parties) knows the link between C's e-wallet and C's ICBC account number.

If C adds to his mobile phone an e-wallet supported by another bank that distributes e-CNY, the same procedure applies. In fact, C could install an e-CNY app that aggregates multiple e-wallets, each associated with a different operating institution.

Now suppose that C wants to buy a coffee at Starbucks (call it B for business) at a price of 30 RMB. C can pay B by asking B's point-of-sale (POS) machine to scan the QR code on C's ICBC e-wallet, or simply by touching B's device via near-field communication (NFC). This sends a message to the central bank currency system, which will deduct 30 e-CNY from C's ICBC e-wallet and credit 30 e-CNY to B's e-wallet. If B's e-wallet is also with ICBC, then B can instruct ICBC to move the funds out of C's e-wallet and into B's e-wallet.

E-CNY Wallet System and Hardware Wallets

Table 2.1 gives a summary of the e-CNY wallet system. The first dimension captures the degree of anonymity, showing five tiers of e-wallets with spending limits ranging from unlimited to 500 e-CNY per transaction. The first four are for domestic users and entail authentication at progressively greater levels of anonymity, from in-person interactions to email addresses. The fifth category (shaded gray in the table) can be opened by foreign phone numbers or email addresses, the highest level of anonymity that e-CNY wallets can provide.⁸

E-wallets come in both software and hardware forms. Software wallets, of the type in the Starbucks example above, are accessed via an app and often issued by an operating institution (for example, a bank). By contrast, hardware wallets are digital currency chip cards. Examples include visual Bluetooth integrated circuit (IC) cards, IC cards, mobile eSIM cards, mobile SD cards, and mobile SIM cards.⁹ Some hardware wallets reportedly incorporate biometrics such as fingerprint scanning.¹⁰ Others are embedded in wearable devices, such as wristbands and watches, which the authorities have hinted might be introduced during the 2022 Winter Olympics in Beijing.¹¹

Working like prepaid cards, these physical devices carry e-CNY as if they were regular wallets. For instance, a visual Bluetooth IC card typically has a screen displaying information, such as the transaction amount and balance, and interacts with smartphones through Bluetooth and other technologies. Cards like these support double-offline transactions—that is, transactions in which the acceptance terminal and payment device are both offline. These transactions complete once the acceptance terminal goes online. Mu describes hardware e-CNY wallets as “quasi accounts” or “semi-accounts.”¹²

An Example of an App and the Potential Ecosystem of the e-CNY

The PBOC’s vision for the e-CNY goes far beyond the models pioneered by Ant and Tencent, China’s leading PSPs. The PBOC is building a digital payment and monetary infrastructure that will enable interoperability across various types of business entities and economic

environments. Notable examples from this burgeoning ecosystem include the joint launch of a digital RMB wallet by China Mobile and the Industrial Commercial Bank of China in October 2021, the Bank of China's exploration of cross-border e-CNY payment solutions, and China Construction Bank's decision to support e-CNY bank cards outside of the six major operating institutions (see endnote 3).

The PRC government can mandate e-CNY acceptance, supporting the digital currency's swift adoption and interoperability across a rich domestic ecosystem. The e-CNY will not only accelerate the transition to a cashless China but also potentially level the playing field between banks and big-tech firms. This disruption should occur first in the business-to-consumer (B2C) segment of the economy, where Chinese consumers can easily choose to pay with e-CNY wallets instead of Alipay or WeChat Pay. Consumers with e-CNY wallets from China's largest banks are able to use their e-CNY mobile phone apps not only to pay their credit card bills, party membership dues, and dinner checks but also to use coupons and promotional activities launched by merchants.¹³

Big-tech companies such as Ant, Tencent, and JD are partnering with the PBOC to support and advance e-CNY technology. In January 2022, for example, WeChat joined Alipay in supporting e-CNY payments.¹⁴ Finally, the e-CNY also opens up opportunities for technology companies that aim to provide banking services to businesses and consumers—banking as a service, in industry parlance—by working with the commercial banks that facilitate the use of the e-CNY. For instance, in October 2020, Huawei announced that its Mate 40 series of mobile phones will support the e-CNY hardware wallet function. And in August 2021, it was reported that JD had successfully tested the e-CNY for business customers on its platform.

Managed Anonymity

We turn now to the e-CNY's "managed anonymity." Accounts linked to the e-CNY can be divided into two categories: "broad" accounts, which can link to real-world identifying information such as ID cards, phone numbers, or email addresses (e-wallets in category 4 or 5, shown in table 2.1), and "narrow" bank accounts, which are checking accounts

Table 2.1. Matrix System of Digital RMB Wallets

Dimensions		Type of wallet				
		Category 1	Category 2	Category 3	Category 4	Category 5
By the degree of holders' real-name authentication		Category 1	Category 2	Category 3	Category 4	Category 5
Degree of anonymity	Strong	Relatively strong	Relatively weak	Relatively weak	Anonymous (real-name registration not required)	Anonymous (real-name registration not required)
Authentication	In person, ID and phone number required	Remote, ID and phone number required	Remote, ID and phone number required	Remote, ID and phone number required	Remote, email address or phone number (usually based on real-name registration) required	Remote, email address or phone number (foreign number possible, usually based on real-name registration) required
Connected account	Yes	Yes	No	No	No	No
Upper limits (RMB)	Balance	Unlimited	500,000	20,000	10,000	1,000
	Per transaction	Unlimited	50,000	5,000	2,000	500
	Daily	Unlimited	100,000	10,000	5,000	1,000
	Annually	Unlimited	500,000	100,000	50,000	10,000
By account holder	Personal wallet	Corporate wallet				
	Natural person and individual business (Account balance and transaction limits depend on the degree of holders' real-name authentication.)	Legal person and unincorporated organization (Account balance and transaction limits depend on whether the account is opened in person or remotely. Customized solutions are supported.)				

By carrier	Soft wallet	Hard wallet
	App, SDK, etc.	IC card, wearable device, IoT device, etc.
By authority	Parent wallet	Child wallet
	Primary wallet (like a cashbox)	Secondary wallet (under the authority of a parent wallet, like a purse) <ul style="list-style-type: none"> • Personal child wallets support limited payments, conditional payments, and personal privacy protection. • Corporate child wallets support accounting, collecting, and distributing funds, and financial management.

Sources: "The Central Bank Digital Currency Research Institute's Mu Changchun: Detailed Explanation of the Digital RMB Wallet Matrix System" 央行数字货币研究所穆长春: 详解数字人民币的钱包矩阵体系, *mypass.com.cn*, June 11, 2021. <https://www.mypass.com.cn/news/202106/11174558.html>; "Detailed Explanation of the Digital RMB Wallets of Seven Operating Institutions" 详解7家运营机构数字人民币钱包, *mypass.com.cn*, May 12, 2021. <https://www.mypass.com.cn/news/202105/12095529.html>; "A - Mu Changchun: Digital RMB Training Conference Part 1 DCEP & PLUS Digital Wallets" A-穆长春-数字人民币培训会议-Part1-DCEP & PLUS数字钱包, *YouTube*, December 25, 2020. <https://www.youtube.com/watch?v=U6tUrUpDCW4&t=16s>; "B - Mu Changchun: Digital RMB Training Conference Part 2 DCEP & PLUS Digital Wallets" B-穆长春-数字人民币培训会议-Part2-DCEP & PLUS数字钱包, *YouTube*, December 25, 2020. <https://www.youtube.com/watch?v=sJ6qkRuicC0&t=4108s>.

maintained by a commercial bank. We emphasize that the e-CNY is only “loosely” coupled to both types of accounts, implying that it achieves cashlike anonymity from the viewpoint of operating institutions and users. Within the e-CNY system, operating institutions cannot directly see who is paying whom or even how much is being paid because the PBOC’s authentication center verifies the authenticity of circulating e-CNY, not the operating institutions or users, whose verification requests return only a yes or no response from the PBOC.

Only the PBOC, which observes the links between addresses and real-world identities, can trace the entire flow of money. More specifically, as indicated in Table 2.1, the PBOC can trace flows either by bank account (categories 1 and 2), ID card (category 3), domestic phone number (category 4), or even foreign phone number (category 5, which we have not yet been able to confirm). This implementation of managed anonymity positions the PBOC to exchange privacy for compliance.¹⁵

How “managed” will this anonymity be, especially for Chinese citizens? For wallets in categories 1 through 3, it may be quite high. Chinese authorities can link almost everything Chinese citizens do to their ID cards, and from their ID cards to their faces via facial recognition. Although Chinese citizens are permitted to have multiple phone numbers, telecom operators are required to register those numbers to real IDs.¹⁶ The Personal Information Protection Law, passed in October 2020, explicitly bans the PBOC from collecting ID information from telecom operators, but the PBOC can supply detailed transaction information from suspicious accounts to law enforcement agencies, which can then issue summonses requiring telecom operators to supply the real identities of the account holders. Whether law enforcement agencies will “remember” these links, especially those between e-CNY wallets and phone numbers, is an open question. The answer depends on detailed information flows among law enforcement agencies, the PBOC, and telecom operators. Later in this chapter, we will address this question in light of the nature of China’s government and of the ruling CCP.

Finally, it is worth mentioning that certain types of hardware wallets could potentially achieve full anonymity in the manner of prepaid

gift cards. With these, anyone could insert foreign paper currency into an ATM, obtain a card that is completely detached from their identity, and use it to buy something anonymously.

2.2. Economic Motives for the e-CNY

In this section, we explore the motives of China's government for introducing the e-CNY that are primarily related to the economics of China's monetary system and financial services industry. Many of these goals are shared by other central banks currently considering the introduction of CBDCs.¹⁷

One of China's primary stated objectives for developing the e-CNY is reducing the use of "foreign" cryptocurrencies such as Bitcoin and Diem.¹⁸ Significant adoption of these and other cryptocurrencies within China could reduce the efficiency of RMB payments, dampen the transmission of the PBOC's monetary policy into the macroeconomy, and hamper the ability of authorities to monitor transactions for anti-money-laundering and other purposes. Former Bank of China president Li Lihui has underscored the importance of swiftly introducing a Chinese CBDC, cautioning that the dollar-backed Diem would strengthen the US dollar's position in global financial markets. Moreover, China's capital controls would be more difficult to enforce if private cryptocurrencies became widely held and used for payments. In May and June of 2021, China banned payment institutions and certain other entities from using Bitcoin and some other cryptocurrencies.¹⁹

At the official Monetary and Financial Institutions Forum roundtable in April 2021, Mu said that invasive cryptocurrencies were a "main driver" for the e-CNY. Other objectives that he identified include providing an official digital substitute for paper money, providing more efficient payment services, enlarging access to the payment system (in part by increasing service hours), and improving financial inclusion. A "smaller" driver noted by Mu is lowering the cost of printing and minting money. Goldman Sachs projects that the e-CNY could save China up to US \$24 billion annually in direct and indirect costs associated with producing and distributing physical money.²⁰

China already has efficient retail fintech payment service providers, including Alipay and WeChat Pay, which have over eight hundred million users.²¹ Given that, one might ask how much could be achieved by adding the e-CNY, which is also focused primarily on retail payments. Indeed, in May 2021, Ant Group's MYbank was added as the seventh e-CNY issuer-operator and Tencent's WeBank was added as another potential issuer-operator.²² There is little risk of default of consumer claims on these two private payment services, given the PBOC's 2017 rule that customer funds must be held in bank accounts fully backed by PBOC reserves.²³ These facts seem to limit the scope for the e-CNY to improve retail payments. The PBOC has nevertheless said that "a safer, more inter-operable and more inclusive retail payment infrastructure which meets diversified payment needs is an important public good for higher quality growth. Such infrastructure will deliver better and more efficient basic financial services, ensure smooth domestic circulations, and support the building of a new development paradigm."²⁴ Although it is far from clear that most Chinese consumers would prefer e-CNY payment apps to Alipay and WeChat Pay, the e-CNY does offer additional features, such as offline transactions, which can improve access to the payment system from remote areas. The e-CNY may also eventually facilitate cross-border payments, as discussed in chapter 3. Further, the e-CNY may eventually be enabled for smart contracting.²⁵ Although China's Blockchain-based Service Network (BSN) was introduced with the objective of making the country a global leader in blockchain technology,²⁶ the core ledger systems for the e-CNY are not based on blockchain, and at this point there are no explicit connections between BSN and the e-CNY.

Mu has said that the e-CNY is not intended to compete with WeChat Pay and Alipay, but rather to serve as a backstop for them, given the heavy reliance of China's consumers on these two payment service providers, which together recently handled 98 percent of China's mobile payments.²⁷ Transactions volume on Alipay alone reached 188 trillion RMB (about \$29 trillion) in the twelve-month period ending in June 2020,²⁸ roughly seven times the total annual volume of all credit card payments in the United States.²⁹ The PBOC may therefore want the e-CNY to be

available as a backstop to Alipay and WeChat Pay in case of operational outages.

However, the PBOC has also shown increasing concern about the market power and data concentrated at China's largest tech firms. In January 2021, the PBOC proposed regulations by which any firm handling half of online payments, or any two firms handling two-thirds of online payments, would be subject to antitrust probes.³⁰ Starting with the cancellation of a planned initial public offering by Ant Group in late 2020, the Chinese government has been dramatically tightening regulation on privately owned enterprises (POEs) in the tech sector, among other sectors dominated by POEs. As the *Global Times*, an outlet controlled by the CCP, put it in a July 2021 editorial, "No internet giant is allowed to become a super database that has more personal data about the Chinese people than the government does, not to mention using the data at its own will."³¹

Given the CCP's concerns about the market power and the extensive data held by Alipay and WeChat Pay, and in light of the large and prominently reported rollout process for the e-CNY, it would be a surprise to see China's government remain content with having the e-CNY take a low market share of retail payment services and serving largely as an operational backup to those two private services. More likely, China plans for the e-CNY to reduce the market power of Alipay and WeChat Pay and to increase the ability of its largest state-owned and state-controlled banks to compete with these highly successful and entrepreneurial multiline privately owned fintech firms.³² Already, firms such as McDonald's, Nike, and Visa are reportedly being pressured by China's government to accept e-CNY from their customers.³³

Although the PBOC has long sought greater internationalization of the RMB, its officials have downplayed a desire to use the e-CNY to increase the use of RMB in other countries, saying that the e-CNY is not intended for the "yuanization" of other countries.³⁴ In July 2021, for instance, the PBOC stated that "though technically ready for cross-border use, e-CNY is still designed mainly for domestic retail payments at present. Looking ahead, the PBOC will actively respond to initiatives of G20 and other international organizations on improving cross-border

payments, and explore the applicability of CBDC in cross-border scenarios.”³⁵ China is already making arrangements for cross-border exchanges of CBDCs, including those with Thailand, Hong Kong, and the United Arab Emirates.³⁶ The PBOC’s work on this “m-CBDC Bridge” illustrates China’s hopes that the e-CNY will increase the efficiency of its cross-border payments, expand the international use of RMB, and allow China to influence international standards for cross-border uses of CBDCs. This and other examples of the potential international uses for and impacts of the e-CNY are discussed in chapters 3 and 4 of this volume, respectively.

As the first major country to deploy a CBDC, China probably also perceives a commercial advantage for Chinese firms that could provide payment technology services abroad. In chapter 3, we discuss the potential for international adoption of the e-CNY and related technology provided by Chinese firms. Ant Group and Tencent, among other Chinese firms, have already been active investors in the fintech payment services of other countries,³⁷ as mapped in chapter 4, which also discusses the extent to which the e-CNY may increase the ability of the RMB to compete with the US dollar as one of the world’s premier currencies. Strengthening the position of the RMB internationally, both in absolute terms and relative to the US dollar, remains a key goal of China.³⁸

Although the PBOC has promoted the e-CNY primarily as a substitute for paper money, the digital currency also provides new tools to advance the bank’s monetary policy goals. For example, by providing access to real-time transactions data, the e-CNY may enable the PBOC to respond more quickly to changes in macroeconomic conditions with adjustments to its monetary policy, such as interest rate targeting. Various potential programmable features of the e-CNY could also allow the PBOC to target monetary policy actions to particular regions or uses, or with specific timing. And unlike with paper money, the PBOC could potentially implement monetary policy by dialing up or down the interest rate paid on the e-CNY, although it has announced no plans to do so. With access to the e-CNY, the PBOC would also be able to implement the fiscal policies of the central government and local governments via

monetary transfers such as welfare payments, a potential application that has been mentioned by Mu.

Finally, the e-CNY has the potential to serve many of the approximately two hundred million Chinese unbanked consumers,³⁹ expanding access to the payment system beyond the current boundaries of banks, Alipay, and WeChat Pay. This objective is facilitated in part by the ability to make offline e-CNY payments in areas without cellular or internet services, as we have explained.

Overall, China's economic objectives for its monetary system and financial services market are sufficient on their own to justify the introduction of a CBDC. In this respect, China's government has simply gone further along a path now being explored by most countries. However, the economic motives for introducing the e-CNY are coupled with sociopolitical motives that we explore next.

2.3. Sociopolitical Motivation

The e-CNY is a digital currency with Chinese characteristics, among the most salient of which are political. For instance, the PBOC has declared that the primary motivation for developing the e-CNY was the strategic imperative of safeguarding China's monetary sovereignty against cryptocurrencies such as Bitcoin, stablecoins such as Diem, and the possible emergence of a globally hegemonic digital dollar.⁴⁰ In addition, Zhou Xiaochuan, a former governor of the PBOC, suggested that the e-CNY could provide a hedge against the risk of US economic sanctions.⁴¹ Other PRC commentators go further, describing digital currencies as a "new battlefield for competition," where China can turn the tables on its rivals and "win" by capitalizing on a presumed first-mover advantage.⁴² Read in conjunction with President Xi Jinping's exhortations to "seize the commanding heights" in the emerging international competition over the digital economy and official pronouncements about an "irreversible trend of a rising East and declining West," these commentators tap into a swelling vein of nationalism that portrays the e-CNY as an arena of great-power rivalry in which China can assert its global ascendance.⁴³

Substantial political capital is riding on the e-CNY's success. Policy actors in China are promoting it as a vehicle for achieving signature elements of Xi's domestic agenda, such as alleviating poverty, revitalizing rural areas, fighting corruption, reducing systemic financial risk, and stimulating innovation, growth, and consumption. Grander still, the e-CNY features in Xi's vision for a "Digital China" (数字中国). As codified in the fourteenth Five-Year Plan (2021–25), this vision calls for the digital transformation of the domestic economy, society, and government, and the constitution of a corresponding global "community of common destiny in cyberspace," united by complementary international standards for network technologies, internet regulation, data security, digital currency, and digital tax.⁴⁴ True to its ideological roots, the CCP proposes to administer this digital order through "algorithmic governance" (算法治理) and "scientific decision making" (决策科学化)—deeply Marxist paradigms of cybernetic central planning and social control that frame governance as a systems engineering problem to be solved by advances in big data and artificial intelligence.⁴⁵

Beijing has managed information about the e-CNY with sophistication and discipline. The PBOC dominates public engagements and generally hews to a common script written in the sober technocratic language of central banking.⁴⁶ By contrast, much more powerful actors such as the apex party bodies that actually steer economic policy, the Ministry of Public Security, the Central Commission for Discipline Inspection (CCDI), the Cyberspace Administration, and the National Development and Reform Commission have been nearly silent despite their enormous stake in the e-CNY's implementation. And there have been no open hearings or debates in civil society, which means that while the e-CNY's domestic social and political ramifications have been discussed abroad, they have yet to receive a vigorous public airing at home.⁴⁷

Those ramifications could be profound. In recent years, fintech platforms such as Alipay built conduits of proprietary technology through which immense volumes of capital and data flowed beyond the party-state's direct line of sight. Apart from increasing the systemic risk in the economy, their activity encroached on the party-state's monopoly on power over three of China's "five great factors of production," namely,

capital, technology, and data.⁴⁸ (The remaining two are labor and land.) That trespass ended abruptly in 2021, when Beijing brought fintech to heel not just with new regulations and enforcement actions, but also with a model of managed anonymity for the e-CNY that will dramatically recentralize knowledge and power in the party-state's hands. As PBOC deputy governor Fan Yifei has said, "The People's Bank will control all of the information. We can use big data to analyze transaction data and money flow."⁴⁹

What might this look like in practice? Take, for example, China's social credit system (SCS), which is a jumbled collection of databases maintained by varied government entities. The databases record information on firms, social organizations, and individuals with the goal of incentivizing conformist behavior and punishing undesirable behavior, especially noncompliance with laws, court orders, and administrative regulations.⁵⁰

The PBOC is leading efforts to rationalize the SCS in the corporate domain, where the SCS's development is comparatively advanced. Most registered domestic and foreign entities in China have social credit files, which are linked to the individual files of their key personnel. The corporate SCS is meant to modulate the capacity of firms and individuals to do business, but observers have raised serious concerns about its transparency, impartiality, and due process, as well as its absence of remedies and its potential to be instrumentalized for statecraft or social and political control.⁵¹ In conjunction with its SCS portfolio, the PBOC is also partnering with fintech platforms to replace their proprietary credit-scoring systems with a nationwide credit information system. The PBOC may soon oblige these platforms to transfer their related data caches to state-controlled or state-interoperable infrastructure.⁵² The key takeaway from these ventures is that e-CNY data need never leave the custody of the PBOC to advance the regime of individuated social and financial risk management that China aspires to achieve through algorithmic governance.⁵³

E-CNY data could also have applications beyond the PBOC. For instance, in a video for the CCDI, the party's powerful extrajudicial investigatory and enforcement organ, Mu highlights the e-CNY's utility as a crime-fighting tool.⁵⁴ He explains that it can reduce local corruption

by ensuring that social welfare payments reach their intended recipients directly, bypassing officials who have been known to inflate local needs and embezzle funds or divert them to other purposes.⁵⁵ He adds that the e-CNY's comprehensive digital paper trail and identity verification requirements could also assist law enforcement in combating illicit activities such as money laundering, terrorist financing, tax evasion, and violations of China's capital controls.

Mu's presentation leaves open a critical question: Who will watch the watchers? While it is too early to answer this question for the e-CNY, China's record in related domains provides clues. Take Mu's example of social welfare programs, which China is rapidly digitalizing to improve needs assessment, service delivery, and risk management. The imperative to quash dissent and maintain social stability permeates these programs. Officials closely monitor the beliefs and conduct of aid recipients and target them with individually tailored economic and psychological pressure to preempt resistance, inhibit social mobilization, and incentivize or coerce submission.⁵⁶ The e-CNY could tilt the balance of power even further in the state's favor by making the lives of beneficiaries, and indeed, all who use the e-CNY, more visible to and controllable by the government.

Mu's argument that the e-CNY can assist law enforcement in combating illicit activities also raises the question of how PRC authorities will interpret that mission. A favorite technique used to silence critics such as the artist Ai Weiwei and nettlesome civil society organizations such as the Open Constitution Initiative (公盟) has been to charge them with tax evasion.⁵⁷ Laws against financing terrorism are used to jail ordinary Uyghurs who contribute to community groups or send money to relatives abroad.⁵⁸ And Hong Kong authorities have invoked national security legislation to freeze the bank accounts of organizations and peaceful activists connected to the city's pro-democracy movement, forcing the shutdown of *Apple Daily*, one of the city's highest-circulation newspapers. Hong Kong authorities even threatened to jail HSBC and Citibank employees for up to seven years for dealings associated with the bank accounts of the paper's imprisoned majority shareholder, Jimmy Lai, a fierce critic of China's government.⁵⁹

This is the environment that the e-CNY will inhabit, and the digital currency will soon take its place among the instruments that the party-state uses to sustain and magnify its power. The e-CNY will greatly enhance Beijing's surveillance capabilities, generating data that were difficult to capture in an anonymous cash economy or that were siloed in the private stores of fintech firms. Beijing will amass the largest database of personal financial information in the world, the contents of which may persist indefinitely—ripe for exploitation and abuses of power. The party-state and its surrogates have had remarkable success policing cyberspace, eavesdropping on ordinary users, and turning their data against them. Skeptics should not underestimate Beijing's resolve or capability to use the e-CNY in a similar fashion.⁶⁰

The PBOC has claimed that managed anonymity and demanding due process requirements will restrict the access of other government entities to e-CNY data, but there are reasons to doubt this assurance. To begin with, China's laws governing cryptography, cybersecurity, data privacy, and data security include carve-outs for national security, law enforcement, and related interests that grant such entities lawful access to e-CNY data. Organizational reasons also militate against the PBOC rebuffing requests for e-CNY data from higher authorities. In contrast to other major central banks, the PBOC is a comparatively weak institution in a system that celebrates subservience to the party and categorically rejects the separation of powers and judicial independence.⁶¹ The CCP directly controls the PBOC through a hierarchy of embedded party cells that is crowned by a party committee led by the bank's governor and a deputy governor. In 2020, the bank's embedded CCDI and National Supervision Commission group carried out an internal campaign to deepen "adherence to the party's centralized and unified leadership over financial work" and the principle of "one post two responsibilities" (岗双责), according to which PBOC officials must discharge their dual roles as technocrats and party members with equal fidelity.⁶² Moreover, during this campaign, the CCDI identified evidence of malfeasance that resulted in referrals of twenty-two PBOC officials and executives, including the former director of its technology department, to prosecutors for corruption-related offenses.⁶³ Scholars have also found that

local officials sometimes wield political influence over the PBOC's provincial-level offices.⁶⁴

A recently leaked database used by municipal and provincial public security authorities in Ürümqi, the capital of the Xinjiang region, exemplifies the scope and impunity of the party-state's surveillance activities. Developed specifically for law enforcement by Shanghai Landasoft Data Technology, the database is built on a big-data analysis platform and includes functionalities tailored for economic investigations.⁶⁵ It contains 250 million rows of data linked to an ecosystem of apps that harvest text messages, phone call records, biometric data, contact lists, and phone hardware and subscriber data. It also includes references to WeChat monitoring and financial and e-commerce records. A central Integrated Joint Operations Platform (IJOP) analyzes these data and delivers actionable insights in the form of push notifications to officers in the field.⁶⁶

Landasoft's role in the Xinjiang venture illustrates how China's government could outsource surveillance of the e-CNY to private contractors and service providers as a condition of doing business. In fact, a July 2021 PBOC white paper anticipates exactly such an arrangement, though purely in the context of conventional KYC and anti-money-laundering due diligence.⁶⁷ This would preserve space for competition and innovation and encourage participating firms to anticipate and internalize the party-state's priorities. The best algorithms would win. For instance, algorithms could be used to scan incoming data for anomalies and either automate remediation or escalate cases for human review while giving a nod toward privacy by restricting full access to the underlying records to authorized personnel embedded in these firms who would monitor compliance and handle especially sensitive matters. Transactions could be tracked, accounts frozen, and balances adjusted. Smart contracts could deliver personalized carrots and sticks, controlling where and how money is spent. Firms could also be held legally liable for lapses in performance. This is the future that algorithmic governance and scientific decision making aim to bring about. It might seem fanciful, except that China already largely governs its domestic cyberspace this way. And in the final analysis, the e-CNY is nothing more than code and data.⁶⁸

Finally, the e-CNY could harden the despotic qualities of Xi's rule by intensifying his power over not just ordinary citizens and rank-and-file party members but also over China's political and economic elite.⁶⁹ Autocrats are most often constrained or undone by rivals close to the center of power, who can mobilize the resources and legitimacy needed to temper policy or mount an internal challenge. By taming Jack Ma and his Ant Group empire, humbling the mobile transport company Didi Chuxing, and investigating and punishing hundreds of senior officials and business leaders over the past several years, Xi has established dominion over that stratum and greatly raised the stakes of intra-elite competition.⁷⁰ To the extent that the e-CNY makes it easier to track and control wealth and patronage networks, it will be a potent tool for maintaining and enforcing Xi's hegemony, keeping even apex elites vulnerable, dependent, off-balance, fragmented, and less able to defy his will.

In short, regime type matters when it comes to CBDCs. The world's largest economies are liberal democracies, with the sole exception of China, which identifies itself as “a socialist state governed by a people's democratic dictatorship.”⁷¹ Under Xi, the CCP insists that “party, government, army, society and education—east, west, south, north, and central—the party leads everything.”⁷² No matter how conventional the e-CNY's formal architecture and use cases may appear, therefore, the ideological principles that inform it and the political goals that it serves will set it apart from other digital currencies.

Notes

1. The e-CNY is legal tender. Article 19 of the draft revisions to the Law of the PBOC states, “The RMB includes a physical form and a digital form.” See “Law of the People's Republic of China on the People's Bank of China” (draft revision for comments) 中华人民共和国中国人民银行法 (修订草案征求意见稿), State Council of the PRC 中华人民共和国中央人民政府, October 23, 2020, http://www.gov.cn/zhengce/zhengceku/2020-10/24/content_5553847.htm.
2. Although *controllable anonymity* is also widely used, the term *managed anonymity* was used in the official white paper issued by the Working Group on e-CNY Research and Development, People's Bank of China, *Progress of*

- Research & Development of e-CNY in China*, July 2021, <http://www.pbc.gov.cn/en/3688110/3688172/4157443/4293696/2021071614584691871.pdf>.
3. Confirmed operating institutions are the Agricultural Bank of China, Bank of China, China Construction Bank, the Industrial and Commercial Bank of China, Bank of Communication, and the Postal Savings Bank of China (commercial banks); Ant Financial and Tencent (PSPs); and China Mobile, China Telecom, and China Unicom (telecom operators).
 4. See more details at Eliza Gkritsi, “35 Chinese Banks Add Digital Yuan to Apps as Lenders Prepare for Adoption: Report,” *CoinDesk*, August 20, 2021, <https://www.coindesk.com/markets/2021/08/20/35-chinese-banks-add-digital-yuan-to-apps-as-lenders-prepare-for-adoption-report/>. In addition to the thirty-five banks that have already developed e-wallets, another ninety-four banks, including three foreign banks, are planning to join the clearing platform built by City Bank (a Shanghai-based clearinghouse and technology provider).
 5. Ronit Ghose et al., *Future of Money: Crypto, CBDCs and 21st Century Cash* (New York: Citi GPS: Global Perspectives & Solutions, April 2021), <https://ir.citi.com/GWIUPL07uj0WVYQYx2R-XrknVN6Ds25uc8MYgEH1GRBqxUj21SWqy3aRRx5RgTd-I56-9IcPHVk%3D>. Owner identities here refer to real-world identifying information that links to public keys; the “linkage” data are stored at the authentication center.
 6. Zou Chuanwei 邹传伟, “A Preliminary Analysis of the People’s Bank of China DC/EP” 对人民银行DC/EP的初步分析, *Caixin* 财新, November 1, 2019, <https://opinion.caixin.com/2019-11-01/101477903.html>. As far as we can tell, the term *identity-based cryptography* refers to an authentication scheme where the retail user’s public key is bound to the user’s physical identity.
 7. The front-end encryption machine is a tamper-resistant hardware device, meaning that it should be difficult to interfere with its correct operation, and it should be difficult to extract cryptographic keys from it. In this example, the device is provisioned by the PBOC and resides at ICBC.
 8. “Yes, Foreigners Can Use China’s New e-CNY Digital Currency,” *Smart-Shanghai*, May 21, 2021, <https://www.smartshanghai.com/articles/activities/how-to-use-china-digital-yuan-cbdc>. It is reported that foreigners can set up the e-CNY app without providing their real names. Mu Changchun also mentioned this capability in a virtual meeting with our working group on June 16, 2021, but this has not been verified by other official sources.
 9. Visual Bluetooth IC cards and IC cards are mainly smart cards, while mobile eSIM cards, SD cards, and SIM cards are mobile phone cards.
 10. “IDEX Biometrics Enabling Smart Cards to Be Issued by China Construction Bank,” *GlobeNewswire*, June 17, 2020, <https://www.globenewswire>

- .com/news-release/2021/06/17/2248645/0/en/IDEX-Biometrics-Enabling-Smart-Cards-to-be-Issued-by-China-Construction-Bank.html.
11. "China Fast-Tracks Digital Yuan Trials for Beijing Winter Olympics," Xinhua Net, December 12, 2021, http://www.news.cn/english/2021-12/02/c_1310347947.htm.
 12. This differs from the usual account-based system (traditional banking) and token-based system (cryptocurrencies like Bitcoin). See section 3.2.1. in People's Bank of China, *Research & Development of e-CNY*, 7.
 13. We reviewed the e-CNY phone app provided by China Construction Bank.
 14. Arjun Karpal, "China's Digital Currency Comes to Its Biggest Messaging App WeChat, Which Has over a Billion Users," CNBC, January 6, 2022, at <https://www.cnbc.com/2022/01/06/chinas-digital-currency-comes-to-tencents-wechat-in-expansion-push.html>.
 15. Working Group, People's Bank of China, *Research & Development of e-CNY*.
 16. Having said that, it is possible to buy some phone numbers on an e-commerce platform (say, Taobao), which weakens the link between a real ID card and phone numbers.
 17. As a point of comparison, the Bank of England describes its CBDC objectives as supporting a resilient payments landscape; avoiding the risks of new forms of private money creation; supporting competition, efficiency, and innovation in payments; meeting future payment needs in a digital economy; improving the availability and usability of central bank money; addressing the consequences of a decline in cash and enabling better cross-border payments. See Bank of England, "Central Bank Digital Currency: Opportunities, Challenges and Design," discussion paper, March, 2020, <https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf>. A general discussion of CBDC objectives is provided in Group of Thirty, "Digital Currencies and Stablecoins: Risks, Opportunities, and Challenges Ahead," July 2020, https://group30.org/images/uploads/publications/G30_Digital_Currencies.pdf.
 18. Mu Changchun, "A: Digital Renminbi Training Conference, Part 1," DCEP & PLUS Digital Wallet Taiwan Community, A-穆長春-數字人民幣培訓會議-Part1-DCEP & PLUS數字錢包, video, 1:18.26 (in Mandarin), December 25, 2020, <https://www.youtube.com/watch?v=U6tUrUpDCW4&t=2126s>.
 19. "China Bans Financial, Payment Institutions from Cryptocurrency Business," Reuters, May 18, 2021, <https://www.reuters.com/technology/chinese-financial-payment-bodies-barred-cryptocurrency-business-2021-05-18/>. In June 2021, PBOC ordered Alipay and China's banks to not provide payment services for cryptocurrencies, and to cut off payment channels for

- crypto-exchanges. See Joanna Ossinger, “Bitcoin Falls to Two-Week Low as China Cracks Down on Crypto,” *Bloomberg News*, June 21, 2021, https://www.bloomberg.com/news/articles/2021-06-21/bitcoin-pressured-by-post-fed-dip-in-sentiment-china-crackdown?cmpid=BBD062121_OUS&utm_medium=email&utm_source=newsletter&utm_term=210621&utm_campaign=openamericas&sref=008H7iJP.
20. Lin Yingqi, Derek Su, and Shuo Yang, *Reinventing the Yuan for the Digital Age* (New York: Goldman Sachs, November 2020), <https://www.scribd.com/document/485039133/Goldman-Sachs-report-on-China-Financial-Services-Nov-17-2020#download>.
 21. Michael Chui, “Money, Technology and Banking: What Lessons Can China Teach the Rest of the World?,” BIS Working Papers, no. 947, June 7, 2021, <https://www.bis.org/publ/work947.htm>.
 22. “China Enlists Ant-backed MYbank in Expanding Digital Yuan Trial,” *Bloomberg News*, February 22, 2021, <https://www.bloomberg.com/news/articles/2021-02-22/china-enlists-ant-backed-mybank-in-expanding-digital-yuan-trial?sref=008H7iJP>.
 23. Chui, “Money, Technology and Banking.”
 24. People’s Bank of China, *Research & Development of e-CNY*.
 25. The PBOC writes that “e-CNY obtains programmability from deploying smart contracts that don’t impair its monetary functions. Under the premise of security and compliance, this feature enables self-executing payments according to predefined conditions or terms agreed between two sides, so as to facilitate business model innovation.” See People’s Bank of China, *Research & Development of e-CNY*.
 26. See the Blockchain-based Service Network at <https://bsnbase.io/g/main/serviceNetworkLeague> and Yaya J. Fanusie, “China’s Fintech Strategy: Seeking to Dominate the Next Data Revolution,” statement before the US Senate Finance Committee, Subcommittee on Fiscal Accountability and Economic Growth, July 14, 2021, <https://www.finance.senate.gov/imo/media/doc/Fanusie%20Senate%20Testimony%20-%20BSN%20-Fintech-July%202021%20FINAL.pdf>.
 27. “China Digital Yuan Will Co-Exist with Alipay, WeChat, PBOC Says,” *Bloomberg News*, March 25, 2021, <https://www.bloomberg.com/news/articles/2021-03-25/china-digital-yuan-will-co-exist-with-alipay-wechat-pboc-says?sref=008H7iJP>.
 28. This figure is from Ant Group’s memorandum for its then-planned initial public offering.
 29. “The Federal Reserve Payments Study: 2020 and 2021 Annual Supplements,” Board of Governors of the Federal Reserve System, last updated

- December 22, 2021, <https://www.federalreserve.gov/paymentsystems/fr-payments-study.htm>.
30. "China's Central Bank Defines Monopoly for the First Time in Antitrust Curb of World's Largest Online Payment Services Market," *South China Morning Post*, January 20, 2021, <https://www.scmp.com/tech/big-tech/article/3118555/chinas-central-bank-defines-monopoly-first-time-antitrust-curb-worlds>.
 31. "Why Didi's Removal from App Win Public Support: Global Times Editorial," *Global Times*, July 5, 2021, <https://www.globaltimes.cn/page/202107/1227859.shtml>.
 32. "China Crushed Jack Ma, and His Fintech Rivals Are Next," *Bloomberg Businessweek*, June 24, 2021, https://www.bloomberg.com/news/articles/2021-06-24/how-xi-and-the-ccp-turned-on-jack-ma-ant-and-china-s-fintech-companies?cmpid=BBD062521_OUS&utm_medium=email&utm_source=newsletter&utm_term=210625&utm_campaign=openamericas&sref=008H7iJP.
 33. Demetri Sevastopoulou et al., "China Presses McDonald's to Expand e-Currency System before Olympics," *Financial Times*, October 19, 2021, <https://www.ft.com/content/1f4274f4-b914-4534-89c0-62b9b7763f2b>.
 34. Zhou Xiaochuan, "China's Choices in Its Digital Currency System," *Caixin Global*, February 20, 2021, <https://www.caixinglobal.com/2021-02-20/zhou-xiaochuan-chinas-choices-in-developing-its-digital-currency-system-101664882.html>; "China Says It Has No Desire to Replace Dollar with Digital Yuan," *Bloomberg News*, April 18, 2021, <https://www.bloomberg.com/news/articles/2021-04-18/china-to-focus-on-domestic-use-of-digital-fx-first-zhou-says?sref=008H7iJP>. See also Sun Lulu 孙璐璐 and Pan Yurong 潘玉蓉, "Central Bank: The Current Development Focus of the Digital RMB Is to Promote Domestic Use" 央行: 数字人民币目前发展重点是推进国内使用, *Sina Finance* 新浪财经, April 19, 2021, <https://finance.sina.com.cn/roll/2021-04-19/doc-ikmyaawc0435136.shtml?cref=cj>, quoting PBOC deputy governor Li Bo as saying (in an unofficial translation), "The internationalization of the RMB is a natural process. Our goal is not to replace the US dollar or other currencies, but to let the market make choices to further facilitate international trade and investment." Wang Yongli, former vice president of the Bank of China, suggested in February 2021 that e-CNY could help with the internationalization of the RMB, along the lines of the Belt and Road Initiative. "Wang Yongli: Renminbi Internationalization: Goals and Actions" 王永利: 人民币国际化—目标与行动, *Sohu.com* 搜狐, February 14, 2021, https://www.sohu.com/a/450671976_352307.
 35. See People's Bank of China, *Research & Development of e-CNY*.

36. “Joint Statement on Multiple Central Bank Digital Currency (m-CBDC) Bridge Project,” Hong Kong Monetary Authority, February 23, 2021, <https://www.info.gov.hk/gia/general/202102/23/P2021022300482.htm>. Progress with the mBridge project can be found in BIS Innovation Hub et al., *Inthanon-LionRock to mBridge: Building a Multi CBDC Platform for International Payments* (Basel: BIS, September 2021), https://www.hkma.gov.hk/media/eng/doc/key-functions/financial-infrastructure/Inthanon-LionRock_to_mBridge_Building_a_multi_CBDC_platform_for_international_payments.pdf.
37. For the case of Alipay and Ant, see table 1 in Chui, “Money, Technology and Banking.”
38. See, for example, a speech by the director of the PBOC’s Institute of Finance: “Zhou Chengjun: How to Better Assume International Responsibilities for RMB Internationalization” 周诚君: 人民币国际化如何更好承担国际责任, *Moganshan Institute* 莫干山研究院, May 18, 2021, https://mp.weixin.qq.com/s/XAyYEcW5NWZQ3HTcI_EWZQ. Zhou stated: “This is the United States’ own logic of long-arm jurisdiction and the extension of domestic laws to extraterritoriality. It should be said that it also has a certain inherent rationality, but when Americans rely on the international use of the US dollar to frequently raise the bar of sanctions, overemphasize the interests of the United States, and ignore the international responsibilities it needs to bear, more and more countries and markets. . . . [sic] The main body hopes to reduce and get rid of the dependence on the US dollar, and hope that more international currencies can replace the US dollar for international payments and international settlements. It can be said that the world has suffered from the dollar for a long time. At this time, the timing is very good, and it is still necessary to actively promote the internationalization of the renminbi and promote the widespread use of the renminbi.”
39. Asli Demirgüç-Kunt et al., *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution* (Washington, DC: World Bank Group, 2018), https://globalfindex.worldbank.org/sites/globalfindex/files/2018-04/2017%20Findex%20full%20report_0.pdf.
40. “Observer: How the Central Bank’s Digital Currency Will Affect You and Me” 观察: 央行数字货币如何影响你我, Central Commission for Discipline Inspection and the State Supervision Commission 中共中央纪律检查委员会 中华人民共和国国家监察委员会, June 7, 2020, https://www.ccdi.gov.cn/yaowen/202006/t20200607_219642.html; “Former President of the Bank of China Li Lihui: What Will the Central Bank’s Digital Currency Change?” 中国银行原行长李礼辉: 央行数字货币将改变什么, *Sina Finance* 新浪财经, February 15,

- 2021, <https://finance.sina.com.cn/blockchain/2021-02-15/doc-ikftssap5862847.shtml>.
41. “Zhou Xiaochuan: If the United States Always Uses the US Dollar to Sanction Then the RMB May Also Rise” 周小川: 如果美国老用美元搞制裁 人民币也会起来. *Yicai* 第一财经. Posted on *Sina Finance* 新浪财经, April 22, 2021, https://finance.sina.com.cn/money/bank/bank_hydt/2021-04-25/doc-ikmyaawc1633176.shtml.
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Prospects for e-CNY Internationalization

China's central bank digital currency, the e-CNY, has the potential to play an important role in internationalizing the renminbi (RMB) and transforming the geo-economic landscape. This is true even though Beijing has indicated that it is developing the new digital currency primarily for domestic purposes and that any cross-border use of CBDCs would require the adoption of a global framework. The Bank for International Settlements (BIS) has recommended that central banks consider interoperability when designing CBDCs, so that the digital currencies can be efficiently adapted for cross-border use in the future. But China is not waiting for a multilateral framework on interoperability. Rather, it is moving ahead on its own.

This chapter outlines the ways in which China's government is already spurring global adoption of the e-CNY, including its efforts to take leadership of cross-border digital payments experiments such as the Multiple Central Bank Digital Currency (m-CBDC) project; exploit the existing Chinese payment platforms Alipay and Tencent in global markets, especially through its Belt and Road Initiative and in the Greater Bay Area; use economic leverage to coerce international actors; showcase e-CNY payment technology during the 2022 Winter Olympics in Beijing; and meet the desires of other countries to bank unbanked citizens, enhance domestic monitoring capabilities, and promote trade and investment with the second-largest—soon to be largest—economy in the world. In light of

these developments, some foreign banks are already planning to access the e-CNY via a new private clearing platform.¹

Authoritarian countries and those wanting to avoid US sanctions might be especially interested in adopting the e-CNY. Some countries might be interested in the technology underlying the digital currency.² The People's Bank of China (PBOC) has formed a joint venture with the Society for Worldwide Interbank Financial Telecommunication (SWIFT), the messaging system that banks use to make cross-border payments, which could allow China to augment its capabilities in cross-border payments systems beyond its Cross-Border Interbank Payment System (CIPS). However, the RMB faces significant challenges to internationalization, which, as we explore in this chapter, apply to the e-CNY as well. Whether the new digital currency has a global impact will depend more on its adoption by financial intermediaries for wholesale purposes than on its use by individuals for domestic retail transactions.

3.1. Potential for International Adoption

The greatest potential for international e-CNY adoption is in countries that have strong relations with China, particularly those that don't have sophisticated financial systems. As we discuss below, the m-CBDC Bridge is an example of a project through which China's existing ties with other countries could be expanded to include cross-border payments in e-CNY. Similarly strong ties to China exist in the Greater Bay Area and Belt and Road regions.

Evolution of the m-CBDC Project

In 2017, the Hong Kong Monetary Authority (HKMA) conducted a CBDC study called Project LionRock, leading to the finding that the HKMA had little need to issue a CBDC for retail purposes because its payment infrastructure was already sufficient. The following year, the Bank of Thailand (BOT) launched its own study with local banks, known as Project Inthanon,³ to explore the use of distributed ledger technology (DLT). BOT concluded that CBDCs have the potential to improve effi-

ciency and lower costs in cross-border payments. As a result, BOT and HKMA in 2019 jointly initiated Inthanon-LionRock, a wholesale CBDC project designed to enhance the financial infrastructure supporting multicurrency cross-border payments and to increase efficiency by minimizing layers of intermediaries as well as costs. The goal was to facilitate payment-versus-payment transactions of Hong Kong dollars versus the Thai baht between Hong Kong and Thai banks.

In February 2021, the PBOC's Digital Currency Research Institute and the Central Bank of the United Arab Emirates (UAE) joined the second phase of this project, which was then renamed the Multiple Central Bank Digital Currency (m-CBDC) Bridge. The project has the support of the Bank for International Settlements Innovation Hub in Hong Kong. According to a statement issued by HKMA,

The m-CBDC project will further explore the capabilities of distributed ledger technology (DLT), through developing a proof-of-concept (PoC) prototype, to facilitate real-time cross-border foreign exchange payment-versus-payment transactions in a multi-jurisdictional context and on a 24/7 basis. The m-CBDC Bridge Project will also explore business use cases in a cross-border context using both domestic and foreign currencies.⁴

Figure 3.1 shows how the m-CBDC Bridge concept of Project Inthanon would be applied to transfers between banks in Thailand and China.

The m-CBDC Bridge project will test multicurrency transactions across multiple financial entities (including central banks, commercial banks, corporations, and exchanges) and interface with domestic payment networks. Banks will be able to hold and transact in any of the participating CBDCs when making cross-border transfers, and then convert a foreign CBDC back to their domestic CBDC at the end of the day. This may allow China to participate more efficiently in commercial wholesale cross-border transactions, since infrequent but large capital flows take place between China, Hong Kong, Thailand, and the UAE due to trade in oil, gas, and other commodities.⁵

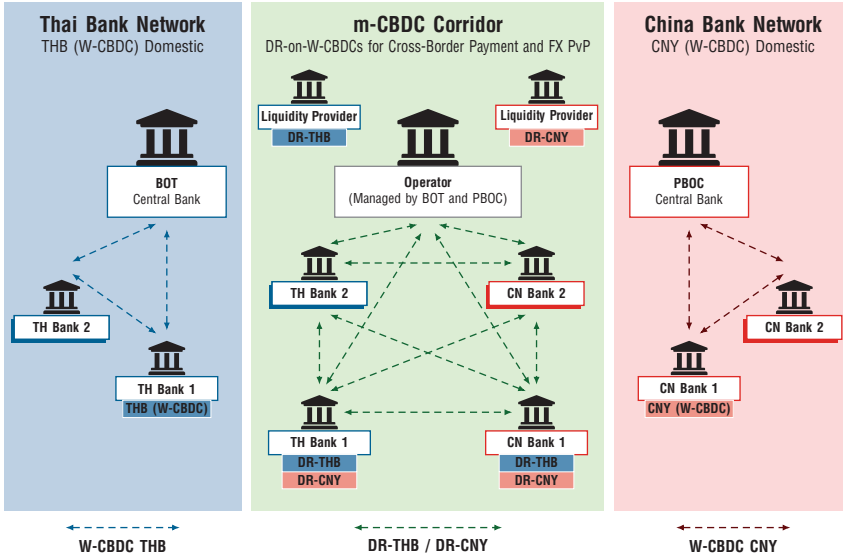


Figure 3.1. Schematic of the m-CBDC Bridge

Note: Applying the m-CBDC Bridge concept of Project Inthanon to a transfer between a Thai bank and a Chinese bank, when a domestic transfer is initiated in either the Chinese or Thai interbank networks, the participating banks settle instantaneously via transfer of the local wholesale CBDC (W-CBDC). When a cross-border transaction request is made, participating banks can simultaneously perform a foreign exchange execution and fund transfer. The corridor network enables banks to maintain a temporary balance of foreign currency via depository receipt CBDC (DR-CBDC), which is then converted back to W-CBDC at the end of the day. This figure is based on a similar figure prepared by Project Inthanon-LionRock (Bank of Thailand and Hong Kong Monetary Authority, *Inthanon-LionRock: Leveraging Distributed Ledger Technology to Increase Efficiency in Cross-Border Payments*, n.d., https://www.hkma.gov.hk/media/eng/doc/key-functions/financial-infrastructure/Report_on_Project_Inthanon-LionRock.pdf).

The m-CBDC project also represents an opportunity for China to build partnerships with the central banks of these other countries. And the inclusion of the UAE makes it possible to pay for oil imports using the digital currency of any of the participating countries. Similar initiatives have been launched in other countries, including Canada and Singapore, whose joint Jasper-Ubin project enables commercial banks to make cross-border wholesale transfers using blockchain.⁶ More recently, Project Durban is an m-CBDC project, again under the sponsorship of the Bank for International Settlements, involving the central banks of Australia, Malaysia, Singapore, and South Africa.⁷

Greater Bay Area

The Greater Bay Area, which encompasses Guangdong, Hong Kong, and Macau, is another potential e-CNY application area. In a 2021 report for the management consulting firm Oliver Wyman, Jason Ekberg and Michael Ho anticipate that although cross-border adoption of the e-CNY will likely begin with retail transactions in the Greater Bay Area, it will eventually expand into business-to-business (B2B) payments, where the economic benefits are predicted to be tremendous. For example, Ekberg and Ho predict that payment and settlement efficiency gains from cross-border e-CNY use in Hong Kong may generate roughly 5 to 10 percent of its GDP.⁸ Already, the PBOC is setting up a link between the e-CNY and Hong Kong's Faster Payment System that will allow consumers in Hong Kong to spend e-CNY from their e-wallets, with merchants receiving their corresponding payments in Hong Kong dollars.⁹

Potential Transition to e-CNY Use in Belt and Road Regions

In 2013, China launched the Belt and Road Initiative (BRI), a massive global infrastructure project stretching from East Asia to Europe that involves many Chinese companies. BRI countries in Southeast and Central Asia and the Middle East are already using RMB—potentially enabling a smooth transition to their use of the e-CNY. For example, China's m-CBDC partners, Thailand and the UAE, are also BRI participants.

Nevertheless, BRI governments might want to maintain much of their cross-border transactions in dollars as a hedge against China's increasing influence over their countries. In a February 2021 article for *The Information*, Morgan Beller, a cofounder of Facebook's Libra project, expressed concern about the implications of the e-CNY's international adoption.¹⁰ She argued that the e-CNY represents phase three of a four-phase BRI rollout, enabled by Chinese telecom investments abroad that create an easy on-ramp for digital currency usage. "At least 64 percent of smartphones sold in Africa are made in China, for example, and new phones like Huawei's Mate 40 come with a e-CNY wallet," she wrote. According to the China Power Project at the Center for Strategic and

International Studies, Beijing could also “provide financial aid to other countries in the form of the digital renminbi.”¹¹

In a podcast produced by the Official Monetary and Financial Institutions Forum, Charles Chang, director of the Fintech Research Centre at Fanhai International School of Finance at Fudan University, offered the following perspective on the possibility of frictionless e-CNY adoption among Chinese partners in BRI regions: “Those people who are on it [e-CNY] are already ‘on chain’ or registered in an appropriate way such that they sort of become part of e-CNY borders. So rather than it becoming a challenge for PBOC, it’s bringing people in [BRI regions] to an environment where they are relatively comfortable and where PBOC is calling the shots. In some sense, e-CNY is well received by these BRI regions, where e-CNY might be viewed as an initiative by the PBOC to address the issue of interoperability and agreement on global standards for CBDC.”¹²

This prediction contradicts the PBOC’s assertion that the e-CNY is being developed primarily for domestic purposes. As Ekberg and Ho point out in their Oliver Wyman report, the use of programmable e-CNY in BRI regions may enable China to retain oversight and control on the back end while giving the impression of liberalizing its business with other countries.

Adoption by Countries Avoiding US Sanctions

It is likely that countries seeking to circumvent US sanctions will explore using the e-CNY as an alternative channel for cross-border transactions. Sanctioned nations such as Iran, Russia, and Venezuela have been innovating with financial technology in an attempt to develop sanctions-proof financial rails.¹³ Even some allies of the United States have tried to develop alternative payment systems to transact outside of the conventional banking system, albeit with little success. For example, in 2019, the European Union and Iran set up a special barter-based payment vehicle to facilitate trade between Iran and Europe, even as the United States tightened its sanctions.¹⁴ However, Iran’s central bank called the system ineffective because European banks—wary of US repercussions—have not fully supported this initiative.¹⁵

China's desire to resist US sanctions is a likely part of its motivation for launching the new digital currency. As one Chinese state media source noted:

A sovereign digital currency provides a functional alternative to the dollar settlement system and blunts the impact of any sanctions or threats of exclusion both at a country and company level. It may also facilitate integration into globally traded currency markets with a reduced risk of politically inspired disruption.¹⁶

In January 2021, China's Ministry of Commerce issued measures to block what it calls the "inappropriate extraterritorial application" of foreign laws and measures—including US sanctions.¹⁷ These measures allow Chinese citizens to sue parties that comply with such foreign laws in China's courts.

China's Cross-Border Interbank Payment System (CIPS) has been used by countries such as Turkey and Russia to avoid sanctions imposed through the SWIFT system.¹⁸ Given their degree of integration with China's payment systems, these countries might develop CBDC technology that interoperates with the e-CNY. Yet China has always denied facilitating sanctions evasion, and sanctions avoidance directly via the e-CNY could be a sensitive issue for the PBOC. According to the legal scholars Jiaying Jiang and Karman Lucero, the PBOC "would have to clear every transaction, it could not feign ignorance as to the existence or nature of the transaction if a foreign government knows that the transaction was conducted in e-CNY."¹⁹ That said, a big difference between the e-CNY and both the EU-Iran alternative payment system and CIPS is that the e-CNY is new technology that might hinder US discovery of sanctions evasion.

North Korea might also become an early e-CNY adopter. The country has shown a strong interest in cryptocurrencies and already has holdings in various digital coins.²⁰ Most cryptocurrency transactions are publicly viewable, thereby allowing detection and analysis by US authorities. By contrast, e-CNY transactions will not be easily accessible

to foreign authorities, potentially leaving US officials unable to gain insight into the use of digital RMB by sanctioned entities.

The annual report of the US-China Economic and Security Review Commission to Congress noted that “a digital RMB will also increase the CCP’s ability to monitor financial transactions, including any transactions involving non-Chinese users of the digital RMB. While the CCP’s immediate motivations are primarily domestic, it views the digital RMB as a potential geopolitical tool that can help China reduce reliance on current international financial systems, evade US financial sanctions, and increase its influence over international standards-setting for digital technologies.”²¹ The 2021 Treasury Sanctions Review stated: “Technological innovations such as digital currencies, alternative payment platforms, and new ways of hiding cross-border transactions all potentially reduce the efficacy of American sanctions. These technologies offer malign actors opportunities to hold and transfer funds outside the traditional dollar-based financial system. They also empower our adversaries seeking to build new financial and payments systems intended to diminish the dollar’s global role. We are mindful of the risk that, if left unchecked, these digital assets and payments systems could harm the efficacy of our sanctions.”²²

Nations trying to use the e-CNY to circumvent US sanctions face a number of challenges, however. Banking institutions need access to US dollars and their correspondent banking relationships, and most would be reluctant to participate in newly developed digital currency payment arrangements that are created to sidestep sanctions. Countries considering adoption of the e-CNY in order to evade US sanctions must also weigh that benefit against the possibility that using the new digital currency will give Beijing access to their transactional data. Despite these risks, the promise of US sanctions evasion might tip some countries more closely allied to China in the direction of adopting the e-CNY for cross-border payments and other purposes.

Much depends on the harnessing of infrastructure for cross-border payments that incorporate sanctions-avoiding e-CNY payments. It is not clear yet how this could be done, whether via m-CBDC Bridge, a direct exchange between commercial banks, an exchange involving central banks as payers or receivers, or something else entirely.

China's international activity around CBDC standards indicates that its strategy is focused less on getting other nations to adopt the e-CNY and more on influencing countries to develop their own CBDCs that would be interoperable with the e-CNY for cross-border transactions. At a BIS summit in March 2021, for instance, Mu Changchun, director-general of the PBOC's Digital Currency Research Institute, formally proposed that nations collaborate to develop a system to facilitate CBDC transactions between the currencies of different jurisdictions.²³ Mu also argued that regulators should be able to monitor the data flows transacting through this proposed system.

2022 Olympics: A Preview of Worldwide Adoption?

In the same way that world fairs once popularized new inventions, recent Olympics have become convenient venues to test and promote scalable digital technologies. Sponsors of the 2018 Winter Olympics in Pyeongchang, South Korea, used the games to showcase 5G telecommunication, immersive media, and payment innovation.²⁴ Visa, for instance, was the exclusive payment partner for the Olympics that year, operating over one thousand contactless point-of-sale terminals that accepted mobile and wearable payments.²⁵ At the 2022 Winter Olympics in Beijing, the digital RMB may take center stage as the frictionless payment medium powering the commercial experience of the games.

The prospect of increased usage of the e-CNY during the 2022 Beijing Winter Olympics has heightened concerns about the implications of worldwide adoption of the digital currency.²⁶ In a recent paper, Zihuan Feng and Xun Liang of Renmin University of China examine the potential for e-CNY adoption at the Olympics.²⁷ Given COVID-related impacts on attendance, however, the Beijing Olympics may not in the end prove to be the critical test of e-CNY system readiness that had been envisioned.

The e-CNY will not be restricted to consumers and businesses within China. At China's Boao Forum for Asia in April 2021, PBOC deputy governor Li Bo suggested that the e-CNY may be available for use by foreigners.²⁸ Around three thousand athletes are expected to take part in the Olympic Games.²⁹ Some of them may decide to download

digital RMB wallets for reasons of convenience, or they may receive payment vouchers from organizers or sponsors in the form of e-CNY wallets or prepaid cards. Famous athletes with extremely large cross-platform social media followings have the potential to shape public perceptions of the e-CNY around the world.

Even Olympics fans outside China might have the opportunity to engage with the e-CNY through media coverage. In 2018, five billion people in more than two hundred countries had access to coverage of the Olympics,³⁰ and nearly two billion tuned in to watch.³¹ In 2022, in the course of what will likely be more than 5,500 hours of television coverage,³² viewers will see special reports on how the e-CNY is being deployed at the games.

In advance of the 2022 Winter Olympics, domestic sponsors and partners of the games might begin to accommodate e-CNY transfers with suppliers and customers.³³ Numerous contract jobs might be paid out through e-CNY wallets. In 2018, over fifty thousand employees, thirteen thousand police officers, and fourteen thousand volunteers worked at the Pyeongchang Games.³⁴ The e-CNY might also be used to enhance safety at the Olympics by coupling event ticketing with ID verification of foreigners through passports and connected e-CNY wallets.³⁵ In the months leading up to the games, the PBOC will likely heighten surveillance of transaction data in Beijing in order to screen for fraudulent or terrorist activity and respond appropriately. In short, the Winter Olympics in Beijing may provide China with a chance to test and promote the e-CNY, normalize its usage, and spur international adoption of its digital payment system.

E-CNY Usage by Foreign Companies Operating in China

Another path to foreign adoption may be onshore acceptance of the e-CNY by foreign companies. Foreign businesses operating in China may have no choice but to integrate with the e-CNY payment system.³⁶ In October 2021, the *Financial Times* reported that McDonald's, Visa, and Nike have been pressured to accept payments in e-CNY, although these firms have failed to confirm the suggestion of pressure.³⁷ (As part of a pilot scheme, McDonald's is now accepting e-CNY payments at its 270 locations in Shanghai.)

The Chinese Communist Party could potentially use the e-CNY as a way to retaliate economically against foreign companies that run afoul of its political and commercial aims. China has already embraced new digital methods to rebuke firms. For example, in mid-2021 H&M was removed from popular Chinese e-commerce sites and geolocation apps after the Swedish clothing manufacturer announced that it would no longer use cotton from the Uyghur Autonomous Region.³⁸ Weeks later, Chinese state media announced that China would retaliate against the Swedish tech firm Ericsson after Swedish regulators banned Huawei 5G technology on national security grounds.³⁹ China has not specified how it will retaliate against Ericsson, but this threat foreshadows how the e-CNY could be weaponized once it is fully launched. If foreign companies are required to accept the e-CNY in order to operate in China, it will be easier for the PBOC to block payments to firms.⁴⁰ China's government currently must go to individual financial institutions and payment companies to enforce its own sanctions against entities operating in China. But the design of the e-CNY puts China's payment infrastructure under much greater PBOC access and control. The PBOC is a direct subordinate organ of China's government, not an independent central bank.

E-CNY Export via Internationalization of Chinese Payment Companies

The internationalization of Chinese payment companies may provide yet another avenue for cross-border retail adoption of the e-CNY. Already, Chinese payment platforms such as Alipay have extended their reach far beyond the country's borders. According to a 2019 Nielson report, "69 [percent] of outbound Chinese tourists used mobile payment while abroad."⁴¹ And according to a 2021 article in *American Banker*, "10,000 US merchants currently accept Alipay, including Walgreens, CVS, Sephora, some department stores and many restaurants."⁴² The article also notes that during the pandemic, Alipay invested in outreach to persuade US e-commerce businesses to add Alipay checkout options.

Within China, the e-CNY has already been tested by major licensed payments companies beyond Alipay and WeChat Pay. For example, Didi Chuxing, JD Digits, Lakala, State Grid Xiong'an Financial Technology Group, and UnionPay have all participated in e-CNY pilot launches.⁴³

Many of these businesses have transnational operations, which may create natural on-ramp opportunities for e-CNY transactions to take place outside China.

The Appeal of Financial Surveillance for Other Authoritarian Countries

Digital authoritarianism is the use of digital information and technology for surveillance of domestic and foreign entities.⁴⁴ China has become a leading supplier of such technology, and the e-CNY gives China's government yet another tool for domestic surveillance that could be attractive to other authoritarian countries. China may market the e-CNY or its underlying technology to countries with authoritarian bents that are motivated to monitor payment activities.

Disincentives and Challenges to e-CNY Adoption

Digitalization of China's currency will not by itself lead to international adoption. There are a number of challenges to international adoption of the e-CNY and a number of reasons for countries to hesitate to adopt this new digital currency.

The RMB's role in global finance remains limited. By value, the RMB is the fourth-most-active currency for global payments, representing only 2.7 percent of the global market share and 2 percent of global reserves.⁴⁵ According to the IMF, however, the RMB's share of global reserves has increased over the past five years, while the share held in US dollar securities has dropped to a twenty-five-year low.⁴⁶ Pierre-Olivier Gourinchas of the University of California, Berkeley, has argued that in the long run, the global economy is likely to become a multipolar environment in which the dollar coexists with other currencies such as the RMB and the euro.⁴⁷ He anticipates that a speedy "switch to RMB anchoring would occur, should significant monetary instability between the two countries arise." Jiang and Lucero argue that to achieve significant additional internationalization of the RMB, China would need to eliminate capital controls, allow the RMB to be a convertible and market-determined currency, develop an offshore RMB market, develop a liquid and deep international RMB bond market, foster greater confidence in domestic rule of law, and conduct further market-oriented re-

forms.⁴⁸ At the moment, however, China is not interested in lifting the existing restrictions on the RMB, as discussed in chapter 4.

Another impediment to internationalization of the e-CNY is the quality of Chinese financial institutions. Even in the BRI region, the services provided by Chinese commercial banks are generally inferior to those provided by their US and European counterparts, and customers have limited investment products denominated in RMB.⁴⁹ Many countries may also find the current international system for wholesale transfers through the SWIFT network to be sufficient to meet their needs. For example, many SWIFT transfers are now settled almost immediately, and SWIFT continues to roll out efficiency upgrades.⁵⁰

Countries may initially be reluctant to adopt the e-CNY due to the high level of uncertainty and murky international guidelines for CBDCs, an issue explored in chapter 5. Some may decide not to adopt e-CNY because of concerns about privacy, security, compliance, system reliability, and options for recourse in the event of disputed transactions. Countries with weaker currencies have concerns about the spillover of financial risks or loss of monetary sovereignty if the e-CNY were to be more widely circulated within their borders. The same concerns may apply to emerging RMB stablecoins, for example, the CNHC.⁵¹

In the event that the United States issues warnings about connecting to specific payment networks, such as those associated with e-CNY or RMB stablecoins, countries with strong ties to Washington may fear the potential ramifications of participation, which could include US sanctions. Countries with close ties to the United States may also wait to participate in any extraterritorial CBDC project until they can choose from a range of options that may be more favorably designed for cross-border use, including privacy protections, possibly under international principles and standards discussed in chapter 5 and recommended in chapter 6. Other countries with well-performing fast-payment systems or CBDC projects of their own underway may choose to connect to other countries via alternative mechanisms for cross-border payment. A March 2021 BIS report outlines a range of features for making CBDCs interoperable, including enhanced compatibility, interlinking, and integration into a single system.⁵²

3.2. E-CNY and Messaging Technology

Central to the internationalization of the e-CNY is a supporting cross-border message system. SWIFT, the international bank messaging system, has served China since the 1980s. China holds a seat on SWIFT's board of directors and about 2.7 percent of SWIFT volume covers RMB payments. In 2016, CIPS, which uses the same messaging format as SWIFT, signed a memorandum of understanding with SWIFT. In 2019, SWIFT opened a wholly foreign-owned subsidiary in Beijing.⁵³ According to SWIFT, this partnership was designed to achieve "inclusion of local language capabilities in SWIFT's offerings, customized services that meet local regulatory requirements, and the recognition of the renminbi as an international billing currency for SWIFT's offerings."⁵⁴ In January 2021, SWIFT, CIPS, the PBOC's Digital Currency Research Institute, and the Payment and Clearing Association of China created a new joint venture, the Finance Gateway Information Services Company,⁵⁵ which is working on "information system integration; data processing; technical consultation."⁵⁶

CIPS offers cross-border RMB payment messaging to facilitate settlement among its members (who then settle via their correspondent accounts). In October 2015, CIPS had 19 direct clearing banks and 198 indirect clearing banks. By February 2018, these figures had risen to 31 and 681, respectively.⁵⁷ And as of the end of 2020, CIPS was on pace to surpass a total of one thousand member institutions.⁵⁸ In addition to Chinese banks, CIPS members include foreign banks such as HSBC, Standard Chartered, and Citibank. A 2020 Bank of China International report suggested that Chinese banks should increase their use of CIPS for cross-border transactions and reduce their use of SWIFT in order to prepare for potential US sanctions.⁵⁹ CIPS said it processed 135.7 billion yuan (\$19.4 billion) per day in 2019, with participation from ninety-six countries and regions, while SWIFT processed between \$5 trillion and \$6 trillion per day.⁶⁰ The 2019 US-China Economic and Security Review Commission Report to Congress considered the threat that CIPS posed to SWIFT,⁶¹ noting that CIPS had grown rapidly since its inception in 2015.⁶² Though the report acknowledged that CIPS made it pos-

sible to bypass US sanctions, the report concluded that this Chinese payment messaging system was “nowhere close to rivaling SWIFT.”

CIPS was conceived as part of a PBOC effort “to facilitate the cross-border use of RMB in trade and investment, and the international acceptance of RMB.”⁶³ Wang Xiaosong, a professor of economics at Renmin University of China, said in 2021 that CIPS was developed by China to “prepare for trade conflicts with the United States and to prepare for US monetary sanctions in the future.”⁶⁴ While ostensibly following in this tradition, the e-CNY represents a “much more convenient and efficient [system], with lower transaction costs, than settling RMB bank balances,” according to Atlantic Council senior fellows Hung Tran and Barbara Matthews.⁶⁵ Questions remain, however, about the extent to which the e-CNY and CIPS may be integrated in the future, or whether their integration is even a desirable option for China. The ultimate implications for the forms of cross-border RMB payment remain unclear.

SWIFT is not itself a payment mechanism. Fund transfers are done through each currency’s clearing system: the New York Clearing House Interbank Payment System (CHIPS) in the United States, for instance, or CIPS in China. In addition to being a digital currency, the e-CNY is a payment platform, including a protocol for a digital RMB, which settles retail payments in RMB at the PBOC via Chinese commercial banks. So far, there is no evidence that the e-CNY, as a payment platform, is meant to accommodate multiple currencies, nor has it thus far been designed for wholesale use. For these reasons, CIPS, and not the infrastructure underlying the e-CNY, seems like China’s closest substitute for SWIFT.

Given that SWIFT is a network, one might consider an analogy between the enforcement of sanctions by denying access to SWIFT and censorship on social networks. When people are kicked off Twitter, they sometimes turn to specialized networks such as Gab or Parler. These networks start small but grow as they gain interested users. However, because nothing prevents people from installing and using multiple social network applications, the analogy breaks down here: US sanctions are enforced not only by the network but also by the financial institutions involved. Institutions with access to the US clearing system are not allowed to interact with institutions that serve sanctioned entities, no matter the network. So,

every financial institution will eventually be forced to make a choice: either give up interacting with the sanctioned entities (and any entity that interacts with them), thus preserving access to US dollar wholesale systems, or do business with those who are sanctioned (even secondarily) by the United States and forgo access to dollar-based wholesale payment systems. This dilemma might eventually lead to a bifurcation of networks and economic activity, at least in some regions of the world. Such a bifurcation would be reinforced if, in the future, the United States decides to simply prohibit US-regulated institutions from accessing alternative networks. Doing so might not be feasible if a significant amount of activity is already happening on other networks, or if it is not clear whether such activity involves sanctioned entities.

One open question is whether the United States will retain access to enough information to effectively enforce its prohibition on interacting, directly or indirectly, with sanctioned entities. If the data trail moves away from SWIFT and onto a China-controlled network such as CIPS or an e-CNY-based platform, then the United States would presumably have less visibility. This might strengthen the case for the United States to simply prohibit access to other networks entirely.

A more interesting question is whether e-CNY technology could conceivably be adapted to make some of the cross-border payments in RMB that are currently handled by the wholesale banking system. It might make sense for smaller merchants and businesses to transact with foreign counterparts directly via e-CNY payments rather than through commercial bank accounts. This would affect wholesale bank flows. However, transactions of this form would not be possible across currencies, because conversions between the respective currencies would still be necessary, and e-CNY could only be used on the RMB side.

It should be noted that a country that adopts e-CNY technology would not necessarily give China or the PBOC insight into transactions happening in that country's currency, as these transactions could be handled by an entirely separate system controlled by that country's central bank. However, adopting e-CNY technology does potentially create a dependency on the Chinese creators of the technology for software support and maintenance.

3.3. Conclusion

The digitalization of the RMB has the potential to play a significant role in the currency's internationalization. However, a number of impediments to wide global adoption will not easily be overcome. The RMB has a small market share of global payments and reserves, mainly due to capital controls. The RMB also lacks deep and liquid bond markets and has a relatively low degree of convertibility. Many in the international community are also concerned about the rule of law and legal systems in China. Introduction of the e-CNY will not remove these headwinds in the short and medium term. China has not indicated a willingness to remove capital controls or make the RMB fully convertible. To the contrary, several Chinese officials have suggested that the e-CNY is for domestic purposes and is not meant to support the internationalization of the RMB.

Yet challenges and professed Chinese intentions aside, the e-CNY is already poised to be internationalized for both retail and wholesale purposes in several ways. The PBOC is already allowing foreigners in China to open e-CNY wallets even if they do not have Chinese bank accounts. Foreign nationals with valid passports will be able to use their countries' banknotes to obtain e-CNY cards. And in addition to domestic banks, three foreign banks plan to access the e-CNY via a new clearing platform built by City Bank, a private Shanghai-based clearinghouse and technology provider.⁶⁶ During the upcoming Winter Olympics in Beijing, the e-CNY might take center stage, providing frictionless payments for both domestic and foreign users. Usage by famous athletes and general media coverage of the e-CNY could potentially shape public perception.

But there are greater impediments to cross-border adoption of the e-CNY for wholesale purposes. It is conceivable that countries with strong ties to China through the m-CBDC project, Belt and Road Initiative, and Greater Bay Area, as well as countries seeking to avoid US sanctions, might find the e-CNY attractive. Meanwhile, use of the e-CNY for retail payments in Hong Kong's Faster Payment System is moving ahead. And authoritarian states could potentially be interested in the technology supporting the e-CNY. However, these countries might not

adopt the digital currency due to concerns about privacy, security, and a loss of monetary sovereignty. The extent of e-CNY usage globally is also likely to depend on the features and designs of CBDCs introduced by other countries, and on potential internationally coordinated principles and standards for digital currencies that are discussed in chapter 5.

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International Security Implications of the e-CNY

The People's Republic of China (PRC) is developing and deploying a new digital currency, the e-CNY, that has interrelated implications for Beijing's geostrategic objectives, the perceptions and decisions of other countries, and the interests and choices of the United States. First and most broadly, the e-CNY could allow Beijing to set standards for domestic and international financial transactions, thereby transforming the roles of the renminbi and the US dollar. Second, widespread adoption of the e-CNY and its related cross-border payments infrastructure being introduced by China could severely disrupt international sanctions regimes, which the United States and other democracies use to deter national security threats, prevent illicit activity ranging from terrorism to narcotics trafficking, and punish gross human rights violations. Third, wide international adoption of the e-CNY would expand Beijing's toolkit for coercion and control. Fourth, the new digital currency will allow Beijing to tilt the payments system in favor of its own commercial actors, likely resulting in increased challenges for US and Western multinational corporations. Finally, successful deployment and wide acceptance of an e-CNY built on the values and governance of the Chinese party-state, particularly if there is no significant digital alternative from the United States (whether private or public) that embodies democratic values, would have enormous consequences for the shape and character of the international order as well as for the US national interest.

The full implications of the e-CNY may not be felt for years, but that should not prevent educated predictions about the new digital currency's negative consequences for the United States and other countries. These negative consequences will be magnified by a regime in Beijing that is intent on building an illiberal, PRC-centric international order that places the interests of the party-state above the interests of individuals.¹

4.1. Potentially Transforming the Roles of the RMB and the US Dollar

For decades, CCP leaders have resented the position of the US dollar in the global economy. They understand the privilege this position grants the United States and have sought to grow the PRC's economic and financial influence while reducing that of the United States. Digital currencies, alongside payment systems and other financial products emanating from China, give Beijing an opportunity to achieve these geostrategic objectives.

At a United Nations information technology conference in New York in 2018, Yao Qian, the former head of the Digital Currency Research Institute at the People's Bank of China (PBOC), likened China's progress on digital currency to the country's advances in robotics, big data, and artificial intelligence.² When discussing CBDC competition, Yao cited "The Next War," the cover story of a recent issue of *The Economist* that addressed technology's role in the rising tensions between the United States and its major-power adversaries, including China.

Because of its tech prowess and its first-mover status in the arena of digital currencies, China has significant potential to use the e-CNY and its related payments infrastructure to crowd out other players in developing countries, particularly when there are few alternative public or private sector solutions coming out of the United States, especially as US banking continues its withdrawal from developing countries.

Technological Innovation: First- or Second-Mover Advantage?

As chapter 3 notes, China is making significant gains in developing countries—including those in Africa, South America, and beyond—by

establishing technical infrastructure that can enable e-CNY use across its Belt and Road Initiative (BRI) network. China's early presence in these markets will not necessarily translate into a definitive win, however. Some experts argue that the so-called first-mover advantage diminishes in situations where the technology and market are evolving quickly, as they are in the digital currency space.³ Their analysis suggests that China may struggle to maintain its advantage over subsequent movers, some of which may even benefit from their later entry into the market. In the payments arena, for instance, China has enjoyed a "second-mover advantage" over the United States.

E-CNY and Internationalization of the RMB: Conflicting Messages

While current and former Chinese officials have presented conflicting messages on China's goal to exploit the e-CNY for internationalizing the RMB, there can be little doubt that this objective is top of mind for them. For example, at China's Boao Forum for Asia in April 2021, Li Bo, a PBOC deputy governor at that time, hinted at a potential broader international role for the e-CNY: "Our goal is not to replace the US dollar or other currencies, but to let the market make choices to further facilitate international trade and investment."⁴ At a Bank of Communications forum in April 2021, Sheng Songcheng, head of the PBOC's Survey and Statistics Department, was even more direct, saying that "steadily driving renminbi internationalization should become a key national strategy for China."⁵

On the other hand, when asked at the World Economic Forum in January 2021 whether a digital RMB would help China's currency compete with the US dollar for primacy as a global reserve currency, Zhu Min, chairman of the National Institute of Financial Research and a former deputy governor of the PBOC, said: "Firstly, I don't think there is a plan. Second, I don't think we are going to use an instrument to compete with the dollar. I don't think the [e-CNY] is moving in that direction."⁶

"Yuanization," as distinct from RMB internationalization, is an adaptation of the term *dollarization*, which refers to the tendency in some currency zones (for example, some emerging-market economies) for

market participants to make payments in dollars in place of their own native currencies. In February 2021, former PBOC governor Zhou Xiaochuan acknowledged that the rollout process for the e-CNY “could come with the internationalization of the yuan,” but warned that this possibility “should not be overly promoted. And China should avoid being accused of promoting ‘yuanization.’”⁷ Even if the e-CNY is not itself used as an instrument of yuanization by China’s official sector, China’s government could leave an open door for yuanization with RMB stablecoins such as CNHC.⁸ This could potentially set up a proxy competition in some emerging-market economies between US dollars and RMB stablecoins.

E-CNY and the RMB’s International Role: Preconditions for Currency Dominance

Whether the e-CNY will in fact accelerate RMB internationalization depends on a variety of factors. In a 2021 report, Martin Chorzempa considers three factors that the economists Huang Yiping, Wang Daili, and Fan Gang have found to be critical to the internationalization of a currency: a country’s economic weight, the openness and depth of its financial markets, and the credibility of its economic and legal systems.⁹ Chorzempa argues that the latter two pose problems for China because the country maintains capital controls and suffers from a widespread lack of trust in its political and legal institutions. Moreover, he writes, “in the short term it may be in fact more difficult to internationalize a digital RMB than a regular RMB because there is no existing CBDC payment network to plug into,” and this preference for conventional bank-railed payments in RMB (or US dollars) may also hold true for BRI-related payments. With regard to the first factor (economic weight), Chorzempa notes, “China certainly has sufficient economic weight to have a global reserve currency.” According to a forecast by the Centre for Economics and Business Research, China will have the world’s largest economy by 2030.¹⁰

Writing in *Foreign Affairs*, Nadia Schadlow and Richard Kang have argued that the e-CNY, Alipay, and WeChat Pay together threaten the international dominance of the US dollar in three ways:¹¹

- Penetration of Chinese fintech would “hardwire” other countries to China’s economy: “Chinese fintech firms function like a geoeconomic Trojan horse. First, Alipay and WeChat Pay . . . integrate themselves into daily economic life in another country. Then, piggybacking off this financial infrastructure, they and other Chinese firms acquire digital banking licenses and rapidly expand into other sectors, including digital insurance, consumer credit, remittances, and lending. These companies soon become too embedded in their host country to remove.” Schadlow and Kang point out that of the four digital banking licenses granted by Singapore in December 2020, three went to Chinese companies.
- The e-CNY will integrate with Alipay and WeChat Pay outside China, shifting international transactions to RMB and challenging the global dominance of the US dollar. “China’s bid for fintech hegemony in Asia is a step toward an even bigger goal: achieving global reserve currency dominance. . . . Beijing is challenging the sway of the US dollar over Southeast Asia and parts of Africa as it prepares to launch, likely within the next year, a sovereign digital yuan, which would make transactions easier and also enable China to better track how its currency is used. Consumers and merchants throughout Southeast Asia will soon be able to use the digital yuan on Alipay and WeChat Pay. Later, these apps would easily serve as distributors of digital yuan as local businesses find it more efficient to use the yuan than the dollar in transactions with Chinese companies. The CCP could then push for the digital yuan to be used instead of the US dollar by bigger institutions and businesses conducting large transactions, such as making interest payments and financing supply chains. That shift has already begun . . . eating into the US dollar’s share of bilateral trade.” To illustrate this shift, Schadlow and Kang cite Indonesia and Russia, where a substantial part of bilateral trade with China has moved from US dollars to RMB. Russia has also shifted the composition of its sovereign wealth fund, the National Welfare Fund (NWF), and its central bank’s foreign exchange reserves significantly away from dollar-denominated bonds and toward yuan-denominated bonds.¹²

- A global shift to RMB may guide transfer activity away from the US-controlled Society for Worldwide Interbank Financial Telecommunication (SWIFT) messaging system, which banks use to make cross-border payments: “China’s digital yuan could siphon transactions away from Western-dominated money exchange platforms such as SWIFT, the key mechanism that maintains US dollar dominance in global trade. CCP officials have described SWIFT as a means for the United States to maintain ‘global hegemony’ and reap ‘huge profits by virtue of the monopoly platform.’” The potential for the growth of China-based alternatives to SWIFT is analyzed in chapter 3.

Forecasting RMB Adoption in the BRI Region

An October 2020 report published by researchers at the Australian Strategic Policy Institute describes how the e-CNY and BRI may amplify each other to promote China’s role in the international economic system, enabling near-instantaneous payment settlement with finality in over sixty countries where China has focused its BRI efforts. The authors are more circumspect in forecasting adoption of the new digital currency: “Requiring DC/EP in payments doesn’t necessarily translate to those countries choosing to hold DC/EP or transact in it in any meaningful way,” they write, using the old name for the e-CNY. “In any case, this process would be likely to take years. Even the integration of DC/EP into China’s financial activities wouldn’t necessarily lead to other countries choosing to either keep or spend DC/EP on their own.”¹³ Still, the e-CNY may create a natural on-ramp toward greater RMB usage and “provide an incentive for [BRI countries] to increase renminbi transactions where they might otherwise be reluctant.”¹⁴ Moreover, it is not difficult to imagine China requiring payment in RMB—perhaps through the e-CNY and outside of SWIFT—for trade relationships and transactions adopted through BRI. Again, chapter 3 discusses the potential for the adoption of an alternative cross-border payment infrastructure, including China’s Cross-Border Interbank Payment System (CIPS) and the m-CBDC Bridge, that may reduce reliance on dollar-dominated infrastructure such as conventional correspondent banking based on SWIFT messaging.

Exercising “Remote” Capital Controls

In an interview in February 2021, Charles Chang, director of fintech research at Fanhai International School of Finance at Fudan University, and Douglas Arner, director of the Asian Institute of International Law at the University of Hong Kong, suggested that the e-CNY might enable China to exercise more, not less, capital control. They did not foresee China losing its ability to maintain capital controls if the RMB is internationalized through the new digital currency. Previously, China risked losing control of yuan use outside its borders. But with a digital yuan, it could retain control via remote ledger surveillance, especially if the PBOC implements a digital currency that is programmable (for example, using smart contracting that can embed constraints) and maintains a limited set of payment corridors that are closely monitored by Chinese officials.¹⁵

Improved Market Reputation, Lower Costs, Same Capital Controls

Recently, and especially since 2019, China has significantly opened its capital markets to participation by foreign financial services firms and has moderately increased the global liquidity of the RMB. Using infrastructure such as the m-CBDC Bridge, China could potentially rely more on the e-CNY than on CIPS to settle cross-border transactions, which would reduce costs, delays, and the need for intermediaries. These changes could increase the appearance of currency internationalization and liberalization, but without relaxing China’s capital controls or meeting its WTO and other trade agreements.¹⁶ Depending on payment methodologies, payment arrangements facilitated by the e-CNY might also be used to avoid detection of violations of trade agreements.

Easier RMB Import–Export Payments

The e-CNY will help China conduct trade settlements without necessarily relying on SWIFT-based correspondent banking, particularly with trade partners that currently experience difficulties or extra costs when making payments to Chinese suppliers. In a 2021 report for the Center for a New American Security, for instance, Yaya Fanusie and Emily Jin explain how the e-CNY may improve trading arrangements

between China and Nigeria: “Small-scale import-export traders in some countries are likely to find DC/EP quite helpful for their day-to-day business. Press reporting shows that Nigerian businesses that import Chinese supplies often use bitcoin for their purchases. Some Nigerians say that the cryptocurrency, despite its volatility, is more effective for cross-border transactions with China because it is difficult getting sufficient Chinese foreign exchange through the Central Bank of Nigeria. If Nigerian traders are able to acquire DC/EP, it will likely facilitate seamless payments to Chinese suppliers.”¹⁷

Standardizing Digital Payments: Mobile Phones and the e-CNY

According to Michael Kimani of the Blockchain Association of Kenya, China may hold the lead over other countries establishing a digital currency in Africa.¹⁸ In his view, China’s digital currency may win on the continent for a number of reasons.

First, China dominates mobile handsets, wireless networks, and mobile payment technology across the continent. The introduction of e-CNY technology will increase this leverage. In particular, Huawei’s Mate 40, which launched in South Africa in October 2021, is the first smartphone to come with a built-in e-CNY hardware wallet. Mobile phones are the primary retail payment device in Africa, where credit cards have seen comparatively weaker adoption. The continent’s current payment systems are fragmented and could see huge efficiency gains through standardization, potentially incorporating e-CNY capabilities through airdrop technology or smartphones with built-in hardware. Kimani cites the venture capitalist Victor Asemota, who “believes a shared local wallet standard would solve at least half of the problems of monetizing apps.”

This is already playing out with companies such as Ant and Huawei, which are at the forefront of digitization in Africa and the Middle East. Huawei is a strategic partner of the PBOC’s Digital Currency Research Institute, working on e-CNY-related projects in distributed databases and networks in addition to e-CNY-enabled mobile phones.¹⁹ The company is also a provider of end-to-end mobile money services in Ethiopia.²⁰ According to Huawei’s marketing materials, Huawei Mobile Money was “commercially deployed” across nineteen countries in 2018.²¹ More re-

cent reports indicate that the company has continued to expand in payment services across Africa and in global money transfers.²²

The e-CNY is already integrated with Ant's Alipay and, over time, China's new PBOC-controlled financial technology could potentially travel anywhere that Alipay users travel.²³ In regions and countries that receive large numbers of Chinese tourists, more sectors of the economy may be willing to adopt e-CNY-compatible technology. (The extent of China's foreign fintech presence and investment is mapped in figure 4.1.)

There is a distinction between the foreign adoption of e-CNY technology, as we have described it, and payments of e-CNY itself within foreign economies. The latter, which amounts to yuanization if the e-CNY becomes popular, could require foreign consumers and merchants to obtain e-CNY accounts at the PBOC through a Chinese bank or other PBOC-authorized payment service provider. Allowing this form of yuanization would be a significant step by the PBOC, especially in light of international norms and claims by PBOC officials about their lack of intent to cause yuanization. Whether the PBOC states that it supports yuanization or not, the foreign adoption of e-CNY technology and an e-CNY-based cross-border payment infrastructure such as the m-CBDC Bridge could give China's government significant international influence.

An intermediate approach to yuanization is for consumers to pay merchants in foreign countries with e-CNY currency held in their e-wallets, and for merchants to receive the equivalent value of local currency through a fast-payment system. (For this to work, banks or other intermediaries must be available to provide automatic foreign exchange services.) This payment arrangement is already being developed for spending e-CNY in Hong Kong through Hong Kong's Faster Payment System, as described in chapter 3. Yet another hybrid approach to yuanization is the foreign use of RMB stablecoins such as CNHC, which is actually intended for use in offshore markets. Besides regulation of the stablecoin issuer in its own domicile, there are few impediments to this form of yuanization. CNHC will be issued by a firm headquartered in the Shanghai Free Trade Zone and will be convertible with RMB deposits in Hong Kong banks.²⁴

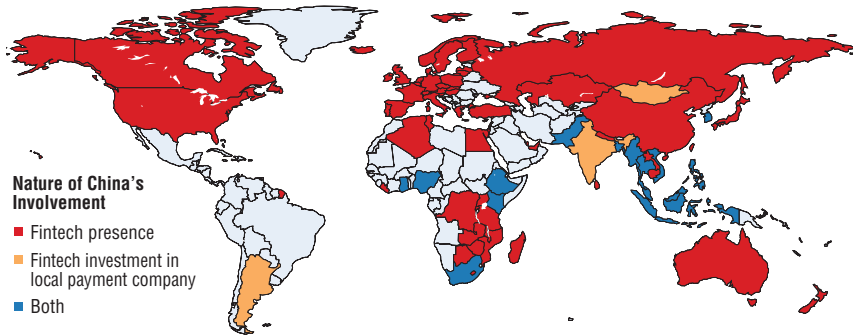


Figure 4.1. Fintech Payments

Note: Countries shaded in red are those with Chinese fintech presence (such as Alipay, WeChat Pay, or Huawei). Countries in orange are those with Chinese investments in local digital payment/e-wallet companies.

Sources: Daniel Keyes and Greg Magana, “Chinese Fintechs like Ant Financial’s Alipay and Tencent’s WeChat Rapidly Growing Their Financial Services Ecosystems,” *Business Insider*, December 18, 2019, <https://www.businessinsider.com/china-fintech-alipay-wechat>; “Alipay Global Footprint Feb 2019,” *Macau Business.com*, February 2019, <https://www.macaubusiness.com/macau-chinese-travellers-in-20s-less-interested-in-macau-hk-and-taiwan-alipay-report/alipay-global-footprint-feb-2019-2>; Charlotte Yang, “Alipay Hits 1 Billion Global Users,” *Caixin Global*, January 10, 2019, <https://www.caixinglobal.com/2019-01-10/alipay-hits-1-billion-global-users-101368472.html>; China-Africa Economic and Trade Expo, <https://www.caetexpo.org.cn>; “Huawei Mobile Money Was Nominated for GLOMO 2018,” Huawei, <https://carrier.huawei.com/minisite/software/mobile-money/globo.html>. Some Chinese investments in local companies are listed according to the Alibaba and Ant Financial: Global Investment Table in Michael Chui, “Money, Technology and Banking: What Lessons Can China Teach the Rest of the World?” *BIS Working Papers*, June 2021, <https://www.bis.org/publ/work947.pdf>. Others were mapped according to news articles: Cassandra Garrison, “China’s Tencent Backs Argentina Mobile Banking Startup Uala,” *Reuters*, April 24, 2019, <https://www.reuters.com/article/us-argentina-economy-tencent-holdings/chinas-tencent-backs-argentina-mobile-banking-startup-uala-idUSKCN1RZ1X2>; Mondia, “Huawei Partners with Mondia Pay to Enable Digital Payment Options for Users in Algeria and Tunisia,” press release, July 8, 2021, https://mondia.com/press_releases/huawei-partners-with-mondia-pay-to-enable-digital-payment-options-for-users-in-algeria-and-tunisia; Otiato Opali, “Ethiopia Inaugurates Chinese-Backed ‘Telebirr’ Mobile Money Service,” *China Daily.com*, May 13, 2021, <https://www.chinadaily.com.cn/a/202105/13/WS609d1509a31024ad0babdbc4.html>; “Ghana Commercial Bank Implements a Mobile Money Strategy,” Huawei, https://e.huawei.com/en/publications/global/ict_insights/ict29-intelligent-finance/success-story/ghana-commercial-bank-mobile-money-strategy; “Travel around the World with Alipay,” *Macau Business.com*, February 2019, <https://www.macaubusiness.com/wp-content/uploads/2019/02/Alipay-Global-Footprint-Feb-2019.jpg>; “Factbox: Ant Group’s Investments Overseas,” *Reuters*, October 29, 2020, <https://www.reuters.com/article/uk-ant-group-ipo-strategy-international/factbox-ant-groups-investments-overseas-idUKKBN27E071>; “SocialPay Digital Wallet Is the First Application That Allows You to Make Payments Abroad,” Golomt Bank, August 3, 2020, <https://www.golombank.com/en/news/8711>; Tony Lai, “Alipay Inaugurates e-Wallet Specific for Macau Residents,” *Macau Business.com*; September 16, 2019, <https://www.macaubusiness.com/alipay-inaugurates-e-wallet-specific-for-macau-residents>; Abubakar Idris, “OPay Does It Again: Fintech Raises \$120 Million Series B Round,” *TechCabal*, November 18, 2019, <https://techcabal.com/2019/11/18/opay-does-it-again-fintech-raises-120-million-series-b-round>.

Setting Standards: A Model for Other CBDCs and Interoperability

China is already a major participant in global standard-setting bodies, including those dealing with digital currencies such as the G20, the Financial Stability Board,²⁵ the Financial Action Task Force (the global anti-money-laundering standard-setting body),²⁶ and the Committee for Payments and Market Infrastructure.²⁷ The CCP has stated its objective to contribute to shaping global CBDC standards, and a draft of its fourteenth Five-Year Plan includes the following directive: “Actively participate in the formulation of international rules and digital technology standards for digital security, digital currency, digital tax.”²⁸ Beijing is already in a position to implement these goals; for instance, it recently held the presidency of the Financial Action Task Force.

At a Bank for International Settlements (BIS) seminar in March 2021, Mu Changchun, the director-general of the PBOC’s Digital Currency Research Institute, called for increasing coordination and interoperability between foreign CBDCs, while also arguing for CBDC sovereignty rights: “Interoperability should be enabled between CBDC (central bank digital currency) systems of different jurisdictions. . . . Information flow and fund flows should be synchronised so as to facilitate regulators to monitor the transactions for compliance,” he said, adding that “digital currency supplied by one central bank should not impede another central bank’s ability to carry out its mandate for monetary and financial stability.”²⁹

Achieving these goals would require a degree of standardization across CBDCs. In an earlier 2020 BIS report, Mu recommended “providing domestic CBDC implementations with the necessary guidance to enable cross-border transactions via access by non-residents and/or interlinking with international infrastructure.”³⁰ China has engaged in CBDC “dialogue” not only through BIS and other central banks involved in the m-CBDC Bridge project, as described in chapter 3, but also bilaterally with the United Kingdom.³¹

Beijing is likely to increase its efforts to shape international standards in the coming months and years. As Samantha Hoffman and her collaborators at the Australian Strategic Policy Institute have pointed out, the e-CNY could allow China to further define international standards for

emerging financial technologies (as opposed to rival stablecoins). As a result, they argue, the e-CNY may serve as a model for digitizing a fiat currency, which would create a new form of power for Beijing: “As a new technology, DC/EP’s incorporation into Chinese apps and cross-border trade might not have major implications initially, but could enable the PRC to push other countries’ financial technology out of developing markets.”³²

Douglas Arner and Charles Chang made a similar point when they observed that “China pushing out CBDC and its own standards in March 2020 really acted as a catalyst for the G20 to start to come together to put together these global standards.”³³ However, it is also likely that developing markets will seek to limit their exposure to a single financial technology. While a complete adoption of e-CNY technology may provide greater efficiency gains, some countries may decide to diversify and adopt several digital currency options, assuming they are available and sufficiently interoperable, even if doing so results in lower efficiency gains.

Banking the “Unbanked”

The importance of China’s central planning cannot be overstated. China is able to align all levels of government and private industry in a way that Western democracies cannot. Thus, when a sector becomes a strategic priority, the CCP can marshal a broad range of resources to support it. We need only to look at 5G technology to see how CCP prioritization can play out in the real world. Huawei has signed dozens of commercial 5G contracts, offering steep discounts and other perks such as free equipment leases, on-site tech support, and longer coverage periods. While their terms may imply a low profit margin for Huawei, these deals will be pursued as long as the CCP believes they have a sufficiently high “value margin.” (The extent of China’s provision of telecom services in foreign countries is mapped in figure 4.2.) In telecommunications, that value margin is determined by China’s national security apparatus. The same may be true for financial services such as payments.

In the short term, the e-CNY could replace some portion of China’s mobile payments. While faster and more efficient digital payments will

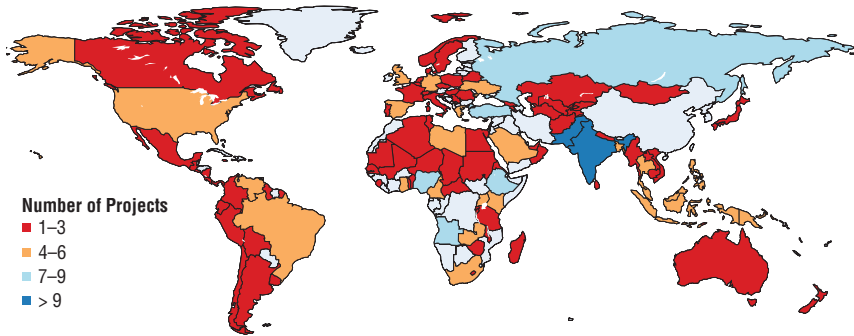


Figure 4.2. Telecommunications Projects Worldwide

Note: The number of tech giants in China can be found at “Mapping China’s Tech Giants,” International Cyber Policy Centre, Australian Strategic Policy Initiative, July 19, 2021, <https://chinatechmap.aspi.org.au/#/map/f3-Telecommunications,f5-Telecommunications%20or%20ICT>.

benefit consumers and businesses, they will also give China a powerful tool to expand surveillance practices and, through foreign adoption of e-CNY technology and cross-border payments in e-CNY, could grant the CCP greater control over domestic financial activities in other countries, especially those that have difficulty accessing US-dependent correspondent banking.

China already wields considerable foreign financial influence through lending. China is the biggest bilateral official lender in fifty-one of seventy-two low-income countries, and Chinese banks continue to expand cross-border lending and grow their position in global capital markets.³⁴ The extent of China’s international lending is mapped in figure 4.3.

In the longer term, the e-CNY could have considerable global impact, depending on how it develops. It does not stretch the imagination to anticipate that the e-CNY could be used for RMB-denominated global remittances and cross-border trade settlement. China could connect BRI-sponsored projects to Chinese financial institutions via digital yuan rails, eventually moving certain payment flows entirely off the SWIFT-based correspondent banking network. Through this technology, China could also make meaningful progress toward banking unbanked individuals, of whom there were 1.7 billion in 2017, according to Findex data provided by the World Bank.³⁵ Such progress is especially

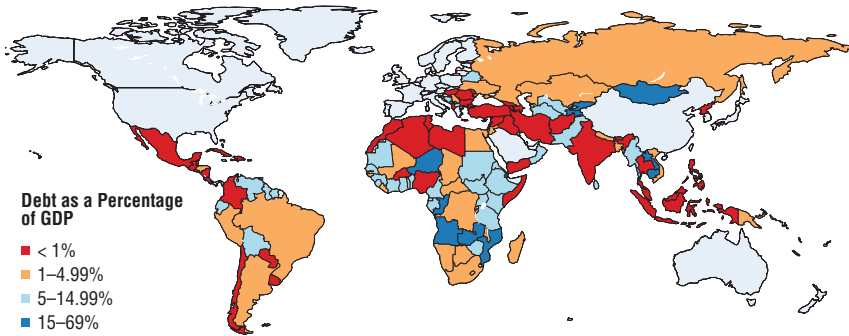


Figure 4.3. Foreign Debt Owed to China

Sources: Sebastian Horn, Carmen M. Reinhart, and Christoph Trebesch, “China’s Overseas Lending,” *Journal of International Economics* 133 (November 2021), <https://doi.org/10.1016/j.jinteco.2021.103539>. The underlying database is Sebastian Horn, Carmen M. Reinhart, and Christoph Trebesch, “China’s Overseas Lending—Loan-Level Dataset and Country Debt Stock Estimates,” Mendeley Data, version 1, September 10, 2021, <http://doi.org/10.17632/4mm6kj4xg.1>.

likely in countries where the dominant mobile and telecom solutions come from Chinese companies and access to US dollars and US financial services is severely limited.

A Potential Decrease in the Transparency of FDI and Lending

Adoption of the e-CNY in developing economies might further enhance Beijing’s ability to make loans and deliver direct investments in ways that undermine transparency and internationally observed best practices to deter corruption. Given China’s refusal to be transparent about some of its international investments, adoption of the e-CNY could reinforce this opacity. Already, PRC aid programs appear to spur widespread local corruption without delivering a positive impact on economic activity, especially in Africa, where researchers have studied the effects of PRC government aid programs.³⁶ Depending on how the infrastructure for cross-border e-CNY payments is developed, this digital currency could accentuate this pattern of enabling corruption through opacity. China’s efforts to assist former Malaysian prime minister Najib Razak by bailing out a state-run development company linked to a multibillion-dollar graft scandal offers some insight into how Beijing could use its digital currency to reward allies and punish perceived opponents.³⁷

Responses from the G7

The G7 has considered the implications of digital currencies, but there is disagreement between—and within individual—G7 countries about the pros and cons of such currencies.³⁸ Moreover, most G7 states have focused more on the domestic implications of CBDCs than on the international implications. This is shortsighted. In January 2020, the Bank of Japan, the European Central Bank, and other central banks formed a joint research group with BIS to study the benefits and costs of issuing CBDCs.³⁹ They published a report in October 2020 but made no mention of China or the e-CNY.⁴⁰ The report acknowledged that digital payments could help improve access to financial services, reduce costs, and prevent fraudulent activities.

Significantly, the G7 has not publicly addressed the geopolitical implications of China's adoption of the e-CNY. G7 countries are focused mainly on the internal steps required to implement widespread CBDC adoption, such as ensuring privacy and sustainability. The group's public statements make no reference to CBDCs as part of a longer-term competition with China, although one of the thirteen principles of the G7's 2021 communiqué addresses international concerns,⁴¹ and some G7 countries such as Japan reportedly feel pressure to develop alternatives as a result of China's drive to deploy the e-CNY.⁴² In a recent G7 meeting, then Japanese finance minister Taro Aso voiced concern about the threat the e-CNY poses to the established international position of major currencies: "I think it's important for us to thrash out [policy measures regarding] digital currency issued by central banks," he said.⁴³ On the whole, however, the G7 does not appear focused on developing an alternative to the e-CNY in a timely manner. In fact, the G7's recent statements suggest a much more general approach to CBDCs. The group's June 2021 communiqué highlighted four broad areas of focus around infrastructure development—climate, health and health security, digital technology, and gender equity and equality. There is no indication that among these areas, the G7 is prioritizing building the kind of financial infrastructure needed to promote digital currencies.

In the future, there are likely to be two competing models for CBDCs: a PRC model and a G7 alternative. Privacy will remain paramount for G7 countries, alongside the issue of sustainability. If there is a race to lock in new types of payment systems, then the G7 is not only behind but failing to compete for the necessary technical infrastructure internationally, as its collective focus remains internal. This suggests that some countries (for example, BRI countries), may already be locking into the internationalization of China's e-CNY framework. The recent appointment of a former PBOC official, Li Bo, as deputy managing director of the IMF will only enhance China's ability to survey and shape the external landscape of international payments, increasing Beijing's potential to use the digital renminbi to bind countries more closely to itself.

G7 countries appear unlikely to take the lead in building the external financial infrastructure needed to ensure that the US dollar remains globally dominant. This is significant because, as Mark Carney, a former governor of the Bank of England, has pointed out, a reserve currency should also serve as a medium of exchange.⁴⁴ And as the economist Diana Choleva has observed, China's progress in setting up a digital renminbi payment system that is "cost-effective and easy to use, satisfies Carney's criterion for usefulness."⁴⁵ The G7 is behind, in other words. And this will have negative geopolitical and geo-economic implications for the US dollar and for countries that value the liberal international system.

4.2. Upending the International Sanctions Regime

Without an immediate path to wider RMB internationalization beyond BRI countries, PRC efforts to boost the use of RMB and the e-CNY internationally are likely to focus on conditions that the PRC can shape while maintaining capital controls at home: global standards, technological infrastructure, and the effectiveness of US financial sanctions.

A weakening of US-led sanctions regimes could be among the most significant potential geostrategic implications of the e-CNY. The power of US sanctions could be severely degraded if countries such as Iran, Russia, and North Korea were to gain the ability to sustain themselves through business transacted via digital RMB—whether in e-CNY or

by other means—that might avoid SWIFT and the network of US correspondent banks that have long facilitated global financial transactions. This would require significant changes in the global commodities markets and banking infrastructure, among other things, but it is part of the promise (and peril) of digital currencies tied directly to central banks and linked to scalable cross-border mechanisms.

Multiple sources suggest that China views the United States' ability to impose sanctions through SWIFT as a national security threat.⁴⁶ Chinese policy makers were particularly upset by the imposition of US sanctions against officers involved in implementing Hong Kong's new National Security Law.⁴⁷ For example, according to a recent account in the journal *American Affairs*, "Hong Kong's chief executive recently disclosed that she has been receiving her HK\$5.2 million (\$672,000) salary in 'piles of cash' stacked at her house because of US sanctions. Amazingly, Lam no longer has access to credit cards or even a bank account."⁴⁸

4.3. Enabling the PRC's Global Surveillance and Coercion

The degree to which the e-CNY will ultimately be made available outside China and its administrative regions such as Hong Kong remains to be seen. As we have discussed, PRC government officials have presented conflicting views on the use of the e-CNY for yuanization. Widespread adoption of the e-CNY outside China would, however, increase Beijing's ability to collect data on citizens around the world, irrespective of data privacy laws and other limitations designed to protect individuals from government surveillance. Given its track record of economic espionage and political interference in the internal affairs of other countries, the CCP could use its control of the e-CNY to coerce countries, companies, and individuals with e-CNY accounts who hold views contrary to the CCP's interests and to reward those who comply with its political objectives.

In their October 2020 report for the Australian Strategic Policy Institute, Hoffman and her collaborators warn that "if DC/EP is successfully rolled out and adopted, then the world would have to be prepared

to contend with a PRC in possession of information that would also allow it to enforce its definitions of the activities that it's monitoring (anti-corruption and anti-terrorism, for instance) globally, thus potentially allowing it to implement PRC standards and definitions of illegality beyond its borders with greater effectiveness."⁴⁹

In June 2020, China's National People's Congress Standing Committee enacted the Anti-Foreign Sanctions Law (AFSL), which offers an indication of how the party might seek to penalize its perceived enemies through a digital currency with a global reach. Under the AFSL, State Council departments such as the Ministry of Commerce and Ministry of Foreign Affairs may: 1) refuse visas or border entry, cancel visas, or expel people from China; 2) seize, confiscate, or freeze assets within China; 3) prohibit or restrict trade, cooperation, or other activities with organizations and individuals; and 4) take other measures deemed necessary by the State Council to prevent persons or entities from complying with foreign sanctions regimes.⁵⁰

The AFSL adds to China's growing lawfare repertoire by laying out "countermeasures" that target individuals and organizations involved in formulating and implementing laws that "contain or suppress" China, unfairly "restrict" China, or "interfere in China's internal affairs."⁵¹ AFSL applies to behavior inside and outside China, making it a significant extraterritorialization of domestically made legislation. The extraterritorial application of PRC law is now becoming a feature of all laws dealing with matters of national security, including the Hong Kong National Security Law and Data Security Law.

With the introduction of the e-CNY, especially if China is successful in creating new rails along which more of the world's monetary transactions can travel, Beijing's ability to restrict the behavior of firms with commercial interests in China could be significant. This potentially includes restricting the ability of consumers to purchase goods and services from these firms within China—a plausible scenario given the CCP's track record of using coordinated media campaigns and boycotts to coerce multinational firms out of taking stances that are seen as contrary to Beijing's interests or policies.

A broadly adopted e-CNY could serve not just as a tool to monitor activities that would trigger the AFSL but as a vehicle through which the PRC government could impose the restrictions and prohibitions authorized by the law. A JD Supra paper from February 2021 urges companies conducting business in China (specifically, during the 2022 Winter Olympics) to “start evaluating use of DC/EP within your company’s internal system and any risks (reporting, compliance, cybersecurity, data privacy, etc.) associated with it.”⁵² As Fanusie and Jin point out, “DC/EP represents a significant risk to the long-held standards of financial privacy upheld in free societies” since it will remove “previous constraints on government data collection of private citizens’ transactions.”⁵³

It is unclear whether Beijing would observe any limits in conducting surveillance and coercion through the e-CNY. Since the CCP regime explicitly rejects an independent judiciary, the separation of powers, and an independent media, there are no effective constraints on how the party-state would employ its digital currency to achieve its geopolitical goals,⁵⁴ as explored in more depth in chapter 2.

Strengthening Authoritarianism through Surveillance and Control

As discussed in chapter 3, countries seeking to digitize their currencies may adopt a suite of e-CNY technologies independent of the RMB, potentially making China a significant exporter of data-intensive monetary technology. Such arrangements could help other countries, especially developing countries, improve payment efficiency and financial inclusion while allowing Beijing to scale and refine its technologies in foreign markets. In this way, China might insinuate its technology into the critical infrastructure of other countries, spurring them to adopt technologies and technological standards that orient them away from Washington. Once established in these markets, Beijing could use the threat of withholding technology to gain influence over governments, companies, and individuals. Additionally, where adopted, e-CNY technology would presumably grant the PRC government the ability to manipulate countries and companies by imposing costs on rivals and rewarding those who fulfill Beijing’s wishes.

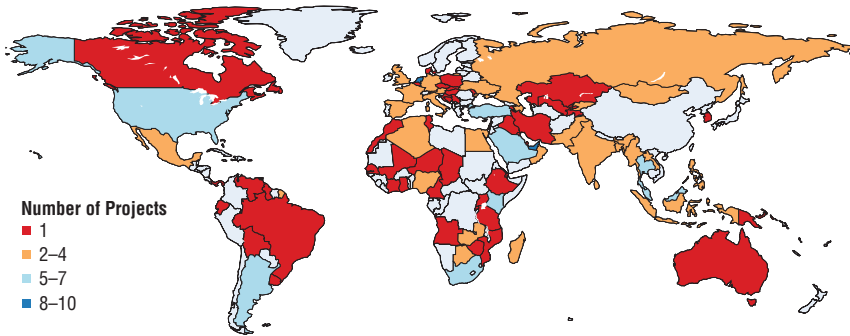


Figure 4.4. Smart City Projects Worldwide

Note: The countries that participate in China's Smart City Project can be found at "Mapping China's Tech Giants," International Cyber Policy Centre, Australian Strategic Policy Initiative," July 19, 2021, <https://chinatmap.aspi.org.au/#/map/f6-Smart%20cities>.

E-CNY technology combined with PRC-exported smart city or safe city technology enables all-encompassing surveillance.⁵⁵ Paired together, these form an attractive toolkit for governments that wish to reduce the power of their domestic political rivals and strengthen their grip on power. (The extent of PRC-exported smart city technology is mapped in figure 4.4.) Ecuador provides a telling example. Beginning in 2011, the PRC government spent years assisting the Ecuadoran government with installing and upgrading a surveillance system that was billed as a way to reduce crime but that was employed by the domestic intelligence agency to track, intimidate, and attack political opponents of former presidents Rafael Correa and Lenin Moreno. These surveillance systems integrate cameras, facial recognition technology, and the ability to track and surveil mobile phones. Civil society groups in Ecuador that sought to push back against these invasions of privacy had few avenues to do so, in part because of Beijing's lack of transparency about its dealings with the Ecuadoran regime.⁵⁶ In Venezuela, the Chinese telecom company ZTE helped create a so-called fatherland card to monitor citizens' behavior. Authoritarian regimes may find the option to use e-CNY technology for surveillance similarly attractive.

The globalization of China's "great firewall" provides yet another disturbing area for synergy: as Beijing seeks to expand its censorship of

the internet beyond China's borders, the e-CNY offers one more tool to pressure states, firms, and people to comply with the CCP's wishes.⁵⁷

4.4. Conclusion: Consequences of International e-CNY Adoption

Without a digital currency alternative—whether public or private—from liberal democracies, it is likely that Beijing will exploit cross-border use of the e-CNY, e-CNY technology, and other Chinese payment arrangements to further the reach of the CCP's illiberal values into the international economic system. This behavior may not manifest itself immediately, but a successful international dissemination of the e-CNY and its related technologies would undermine the system established and maintained by liberal democracies through the US dollar-denominated economic system. At the very least, e-CNY technology offers authoritarian regimes an alternative that they did not previously have and whose implications are difficult to predict. Degrading the liberal economic system is a central pillar in the party-state's strategy to achieve “national rejuvenation” by the middle of this century.

While G7 countries have begun to debate plans for digital currencies, these debates remain mired in inward-looking discussions about privacy and sustainability. Meanwhile, the PRC presses forward with efforts to disrupt and undermine the system that empowers the G7 to set transparent rules and impose costs on authoritarian regimes.

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creased from \$35 billion to \$3 billion. At the same time, the amount of euro-denominated investments increased slightly. The big change was in assets denominated in Chinese yuan, which nearly doubled. Investments in gold rose from zero to \$21 billion. As of end-June, the composition of the highly liquid part of the NWF broke down as follows: 39% in euro assets, 30% in yuan assets, 18% in gold, 5% in British pound assets, 5% in Japanese yen assets and 3% in US dollar assets. The CBR [Central Bank of Russia] invests the liquid share of the Fund on behalf of the finance ministry. Our BOFIT Policy Brief on Russia's international reserves and oil funds provides a good illustration of this process and its impact on the central bank's balance sheet [see Heli Simola, "Russia's International Reserves and Oil Funds," BOFIT Policy Brief 4/2015, April 23, 2015, <https://helda.helsinki.fi/bof/handle/123456789/13669>]. As of end-June, the CBR's foreign currency and gold reserves were worth \$591.5 billion, of which \$130 billion (22%) was held in gold. The CBR has gradually reduced its US dollar holdings since 2018. As of end-2020, the share of dollar assets in Russia's foreign currency reserves was just 21%, while the euro's share rose to 29%. Gold's share was 23% and Chinese yuan-denominated assets 13%. At the end of 2020, the CBR held yuan-denominated securities worth \$75.3 billion. IMF data show that the yuan only accounted for 2.1% (\$269.5 billion) of global currency reserves at the end of 2020. Russia's share of this was an impressive 28%. Russia's decision to ditch the dollar means that the composition of the CBR foreign currency reserves are distinct from those of any other central bank."

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Forging International Cooperation on Digital Currencies

The world's economic system runs on US dollars. Even regimes that are hostile to the United States depend on US currency and the international financial system it supports. The introduction of central bank digital currencies (CBDCs), especially China's e-CNY, poses a challenge to that system. Many countries look to CBDCs as potential game changers for the future of payments and possibly finance itself. And while there is no consensus about the nature and scope of the challenge that the e-CNY poses to the US dollar and the existing financial order, speculations about China's aims have proliferated. (See chapter 2 and box 5.1, on China's stated approach to CBDCs.)

One view of China's ambitions for the digital RMB is that Beijing's goal is to displace the US dollar as the global reserve currency, making the e-CNY a first mover in a new kind of marathon to upend the US-led international economic system. Another view suggests that Beijing's focus is more domestic: among its objectives in introducing the e-CNY are clipping the wings of Chinese technology platforms that have accumulated too much power relative to the public and to the Chinese Communist Party (CCP); keeping out foreign alternative payment arrangements such as stablecoins and other cryptocurrencies; and possibly enhancing state surveillance in the process. A synthesis of these two views is also possible: that the digital RMB began as a tool for domestic control by China's government, but the possibilities of its new CBDC and the US reaction to it have led Beijing to elevate the importance of the e-CNY

Box 5.1. China's View of the Reach and Governance of CBDCs

China's leaders are proud of the role their country plays in setting the pace of technological development in the world's digital economy. As President Xi Jinping noted in a November 2020 speech at the G20 Leaders' Summit, "We need to promote the sound development of the digital economy. To address countries' concerns on data security, the digital divide, personal privacy and ethics, we should adopt people-centered and facts-based policies to encourage innovation and build trust. We should support the UN's leadership role in this field, and work together to foster an open, fair, just and nondiscriminatory environment for building the digital economy. Recently, China launched the Global Initiative on Data Security. We may work on that basis and join other parties for discussing and formulating rules on global digital governance. China supports increased dialogue on AI, and proposes a meeting on this in due course to advance the G20 AI Principles and set the course for the healthy development of AI globally. The G20 also needs to discuss developing the standards and principles for central bank digital currencies with an open and accommodating attitude, and properly handle all types of risks and challenges while pushing collectively for the development of the international monetary system."*

While a number of international institutions such as the Bank for International Settlements (BIS), International Monetary Fund (IMF), G7, G20, and the Organization for Economic Cooperation and Development (OECD) have begun studying and discussing potential norms around digital currency governance, Chinese Academy of Social Sciences scholar Song Shuang has voiced concern that there may be too many disparate efforts—including those of the G7, the BIS, and China's own CBDC Bridge Initiative (discussed in chapter 3)—and stressed the necessity of a more focused approach under the auspices of the G20. Xi himself has supported the G20 as a potential locus of discussion but has also identified the United

*Xi Jinping, "Together, Let Us Fight COVID-19 and Create a Better Future," *Xinhua*, November 21, 2020, http://www.xinhuanet.com/english/2020-11/21/c_139533609.htm.

Nations as a particularly important forum for such negotiations—a preference that was echoed in China’s fourteenth Five-Year Plan, which referred to the UN as the “main channel” for formulating standards around the digital economy, including digital currency. China’s voice in both organizations is powerful. In addition, Song has suggested that global cooperation must include the private sector because it is at the forefront of innovation and will be an important player moving forward.

China has also begun to set out some of its priorities with regard to the digital currency issues that will be adjudicated in global governance fora. At the 2021 BIS Innovation Summit, for example, the PBOC proposed a “Global Sovereign Digital Currency Governance Plan” that called for interoperability among various countries’ sovereign digital currency systems, the coordination of information and fund flows to allow for ease of monitoring, and a “scalable and overseen foreign exchange platform” that would be supported by distributed ledger technology or other technologies. The director-general of the PBOC’s Digital Currency Research Institute, Mu Changchun, further called for strong sovereignty protections so that no country’s digital currency actions could affect the monetary stability of another. (Some Western observers believe that China’s desire to set global digital currency standards is driven in part by its interest in replacing the Society for Worldwide Interbank Financial Telecommunication (SWIFT) messaging system with one that can’t be used for US sanctions enforcement.) In addition, China is playing a particularly active role in leading the global adoption of Legal Entity Identifiers in the digital currency space, calling them “international passports” that can provide governments with the ability to carry out “penetrating cross-border supervision, financial risk monitoring, statistical analysis, and financial institution disposal.” Some Chinese experts may also view such digital currency negotiations as an opportunity for China to moderate some of its own policies. Retired PBOC governor Zhou Xiaochuan has suggested, for example, that China could learn from the EU’s General Data Protection Regulation to help strike the proper balance between privacy and government access to data in retail transactions.

in its strategic calculus. According to this view, China's government now wants to imagine what a better resourced, more global, and more accelerated technology might accomplish.

In this chapter, we consider what a multilateral response to the challenge posed by the e-CNY might look like. Such a response should not be tethered to any particular view of China's motives. Any multilateral approach must take into account different models of governance with different views on the role of technology in society, current technodemocratic disunity, and the possibility of greater collaboration while also addressing the aspirations of countries that do not fit neatly into geopolitical or technological blocs. In what follows, we lay out key aspects of the design for a multilateral approach to global payment systems, a path for the United States to build consensus around this approach among important democracies, and ways that the United States can push for its implementation.

5.1. Considerations for a Multilateral Approach

Technologies—whether they be artificial intelligence, semiconductors, quantum computing, or CBDCs—have a shared aim: efficiency. Technology is the means to efficiency and it is used by people, groups, and states to solve problems. The US model for harnessing technology is based on liberal democratic values shared by many countries around the world that also have advanced technology sectors, making them fellow techno-democracies. China's aspirational model (as opposed to the manner in which much of its technology sector has actually developed) is top down, authoritarian, and focused on state power. This model could be generously described as techno-nationalist. A vital question now is which of these models can best deliver for China's people.

The answer to that question is up for debate, including discussions taking place in new technological areas such as CBDCs. Technodemocracies do not present the kind of united front that China's technonationalism does. While liberal democratic societies respect similar norms and values at home, their conduct abroad differs and they don't always act in concert. In the global financial system, the United States has often

imposed sanctions unilaterally. Sometimes, its financial dominance has persuaded other nations to eventually enforce US sanctions. At other times, however, these nations have sought to work around US sanctions regimes. Like the governments that regulate them, independent private sector firms behave differently in different techno-democracies—sometimes not in keeping with liberal democratic values.

In between China's techno-nationalism and the techno-democratic model on offer from countries such as the United States, Germany, Japan, and Israel lies a hybrid model embraced by countries that adopt aspects of both in order to most efficiently meet their needs. We see some countries adopting aspects of Beijing's model, incentivized by the benefits offered through programs like the Belt and Road Initiative (BRI), China's massive infrastructure financing program. But these countries also want to maintain a degree of independence from China. Beijing's heavy-handed tactics in promoting its model create an opening for techno-democracies to showcase the virtues of their system, even if their interests don't always align with those of the nations in question. In the contest between techno-nationalism and techno-democracy on payment systems, many outcomes are possible. It helps to envisage some of these in order to see what to prepare for or guard against.

Possible Outcomes to Guard Against

One possibility is the creation of a separate PRC-dominated international digital payments system. Such a system would be compatible with Chinese technologies and would acquire, track, and store individual transaction data. Beijing would require Chinese companies to use this system for international expansion and coerce foreign companies to use it to do business with market participants in China. In this way, a separate PRC-dominated system would affect democratic nations, either through their voluntary participation or by limiting their alternatives. It would also attract support and participation from other authoritarian nations that seek to erode US dominance or evade US sanctions, and from countries that depend on China. Each of these outcomes would raise its own set of concerns, including the potential for China to gain leverage over individuals and even smaller countries outside China

through its information-gathering and surveillance activities. Apart from the geostrategic implications of a balkanized global payments system, the emergence of multiple relatively weakly integrated networks would also reduce the efficiency of global payments and financial flows.

A second possibility is a multilateral system whose rules are shaped primarily by Beijing, even while being more universal in membership. The governance structure of such a system would tend to favor CBDCs over less controllable stablecoins and other private forms of payment, and it would be less amenable to constraining rogue regimes than the current system. The rules would presumably focus more on anti-money-laundering, counterterrorism financing, and the pursuit of state policy objectives than on preserving individual anonymity and privacy. Data would be held closely within an official structure, data sharing with private parties would be discouraged, and private innovation could consequently be subdued.

A third possibility is the persistence of the status quo: a US-led system in which countries participate to varying degrees. Going forward, this system would face challenges that it has not previously faced. For instance, it would struggle to bring on traditional allies—including fellow techno-democracies in Europe—who have declining levels of trust in the willingness of US administrations to accommodate their interests. Furthermore, to the extent that the US-led system does not embrace new technologies such as CBDCs, countries might be open to testing Chinese designs that appear to address their concerns. An insistence that the status quo works well might, in fact, cede leadership to China, resulting in the possibilities described earlier. Given these alternatives, it might be best to envision and prepare for a reformed multilateral system whose rules are compatible with the broad values of democratic countries.

Desirable Attributes of a Multilateral System

While each country or monetary union, as a matter of sovereignty, has the right to design and regulate its own payments systems, as a matter of practicality and progress, all will have to adhere to certain international standards in order to facilitate cross-border payments. The design of any new system will need to combine the stability of the current

international system of central banks (delivered through the creation, regulation, and exchangeability of fiat money) with forms of innovation that have up to now been largely led by the private sector. Unlike fiat currency transactions, digital payment transactions generate data, so democracies will also need to pay added attention to the issue of data sharing and individual privacy.

What might be the desirable elements of a multilateral payments system? To focus our discussion on what might need to change, we will assume that national CBDCs or fast-payment services such as FedNow will play a major role in domestic payments. Some payment services will also be provided by private stablecoins, cryptocurrencies, and existing payment solutions. Let us consider what different entities might want from such a system.

Customer and User Objectives

Customers and users will want accessible, cost-efficient, resilient (meaning available continuously, both online and offline), and trustworthy access to global payments, incorporating new productivity-enhancing technologies as they become viable. Clearly, such a collection of payment systems ought to be an improvement over the current one, by making payments faster, cheaper, and more seamless, with fewer gaps or points of handoff between institutions or systems. If there are rival multinational networks of payment systems, one that can reach entities accounting for a larger share of global economic activity, other things being equal, will be preferred to one that can reach a smaller, less valuable set of users. This is because payments benefit enormously from network externalities.

Users should have a choice between service providers, which means ensuring a fair degree of interoperability, data mobility, and easy access to underlying infrastructure rails. Competition should ensure innovation and improvements in service quality. The system should be able to weather disruption and attack, and users should have legal clarity that payments will be made as directed, with adequate means of redressing mistakes.

Users will also want privacy and control over how the data gathered on them are used. National authorities will have to balance these objectives

against legitimate crime and security concerns, including money laundering and the financing of terrorism, especially from parties making payments originating in or going to other jurisdictions. Service providers, including potential entrants to the market, also need data to create new products and improve the quality of their services. Given that data will be distributed across the global system, structures will have to be developed to aggregate and make the data available to service providers and national authorities to the extent appropriate, while ensuring that they cannot be collected, stored, or used in ways that harm the customer or their country.

Country Objectives

Uncertainty about access to payments can be extremely disruptive to trade and investment. Countries would therefore like to be assured of uninterrupted access to global payments so long as they follow reasonable rules of the game. This will require a system that is resilient to hacking and cybercrime, the failure of specific financial institutions or markets, and the failure of specific infrastructure, both at home and abroad. In addition, the system should offer some assurance that countries will not be subject to sanctions originating from geopolitical considerations unrelated to the payments system.

Countries also want to maintain monetary sovereignty. In the same way that foreign cash and bank accounts offer alternatives to domestic fiat currencies today, CBDCs, global stablecoins, and other cryptocurrencies will enable currency substitution in the future—but with added ease and convenience. Naturally, countries want domestic users to hold and transact in their own domestic currency so that their monetary policy influences economic activity and so that their central banks obtain seigniorage¹ and can act as a liquidity provider and lender of last resort. No country wants to suffer a coercive loss of monetary sovereignty (because another country forces its market participants to use a foreign currency) or an involuntary loss of monetary sovereignty (because its citizens prefer using foreign cash or foreign digital alternatives).

Countries want freedom to structure their payments systems—whether private or public, centralized or decentralized, competitive or

oligopolistic, privacy-respecting or state-security-maximizing—in ways that meet the objectives of their national governments. That means retaining the right to exclude or deny access to those who do not meet their rules. This is a natural part of monetary sovereignty.

In addition to sovereignty, countries want to preserve the stability of their exchange rates and capital flows. Digitization of payments can shorten reaction times and increase the speed and volume of cross-border flows, weakening the domestic influence of monetary policy and increasing cross-border spillover effects. These risks highlight the need for greater global dialogue on the exchange-rate effects of digital currencies and of their impact on the spillover of monetary policy through capital flows. Actions may be needed, by both the sending and receiving countries, to mitigate these effects.

Finally, countries do not want global payment systems to unduly increase domestic financial instability or systemic opacity. Making it easier to convert local financial asset holdings into international holdings (and back again) through an efficient global payment system introduces a new set of risks: runs on local institutions may not just be runs from deposits into domestic currency, for instance. They may be runs into foreign currency. Increased exposure to global payments may also increase countries' needs for global liquidity lines. Furthermore, access to global payments should not reduce the transparency of transactions within the domestic system, especially for domestic tax authorities.

Forging a New International System: Democratic versus Nationalist Attributes

In a competition between rival systems, which will prevail? Techno-democratic-dominated systems (henceforth *democratic systems*) encourage a greater role for the private sector, but techno-nationalist-dominated systems (henceforth *nationalist systems*) may be better at shutting down private sector monopolistic practices (while encouraging public sector monopolies), as discussed in chapter 2 in the context of China. Of course, the actions of authorities in nationalist systems may be less predictable and less easy to challenge, and there will be less protection afforded to private property and investment. On balance, therefore,

democratic systems will likely have the edge on competition and innovation, especially to the extent these emanate from the private sector.

Nationalist systems will push more for national security and state control at the expense of individual privacy. Arguably, the private sector's access to data will be more restricted in such systems. It is hard to say what customer attitudes toward these differences will be. In countries where customers trust the government, customers may not worry too much about the loss of privacy in a nationalist system. In others, they may care a lot about any entity—public or private—invading their privacy, especially as public concern about privacy increases worldwide.

Democratic systems could do a better job of ensuring privacy, given their greater ability to constrain government action. But with the possible exception of the European Union, they have not done so thus far. To the contrary, they have tended to place few restrictions on private sector data collection, and government security agencies have uncovered or themselves built many back doors into data. On balance then, private sector players would probably prefer a democratic system, while individual customers may not currently see much difference between democratic and nationalist systems (although this may change). Even more worrisome is that even those customers who care about privacy may not see democratic systems as doing a much better job than nationalist ones, especially given the absence of regulations or constraints on the private sector. There is scope for improvement here.

How will countries choose between these systems? Large countries or regions, such as the United States, China, and the eurozone, have the autonomy and heft to decide for themselves what works best at home. They are unlikely to allow any international system in which they participate to manage their internal workings—for instance, by setting domestic privacy regulations. As a result, international systems will likely have to accept a fair degree of domestic autonomy and variety, especially among the largest and most powerful countries.

At the same time, an international system may be far more intrusive toward small countries, even to the point of taking away their monetary sovereignty. While it might seem that democratic systems would be more respectful of the sovereignty of small countries, this is not a given.

Democracies respect the rights of their own citizens, but not necessarily the rights of other countries or their citizens. A multilateral democratic system must build in these checks and balances if it wants to be seen as more respectful of the rights of small countries. Moreover, it must commit to containing its private sector to the extent appropriate, since a small country's monetary sovereignty might be threatened by a stable-coin as much as by a CBDC.

Small countries may also fear being excluded from the multilateral system for behavior unconnected to payment systems. Particularly worrisome from their perspective is a scenario in which one country dominates the system to the point that its geopolitical interests determine who is in and who is out. Moreover, while both democratic and nationalist systems would implement sanctions against countries exporting terror or crime, small countries may feel more secure in a nationalist system, which would be less concerned with how governments behave toward their own citizens. Once again, it is not a given that small countries will see a democratic system as more beneficial to their interests than a nationalist one; the system's governance structure must assure them.

Finally, it is not clear that either type of system has a better record on cross-border exchange-rate spillovers or financial stability. Democratic systems have larger private sectors, which contribute to volatility in financial flows. But nationalist systems do not have a stellar record on official financing or financial stability, suggesting that this area will probably be one in which many countries do not have a clear preference between systems.

As this discussion suggests, fence-sitting countries will not necessarily come down on the side of a democratic system. Such a system may be attractive if large democracies that still account for a majority of global GDP sign up for it. But to win over many countries, a democratic system will need to provide the specific design features and protections that countries and users desire. This is what we turn to next.

Trade-Offs and Design Features

A variety of domestic payment systems, ranging from the more authoritarian to the more democratic, can be networked into an effective

multilateral system, so long as their spillover effects on cross-border payment systems are minimized. A multilateral system with rules that are broadly compatible with the values of democratic countries can reconcile many stakeholder desires, including those of customers, users, companies, and countries. Democracies will need to get on the same page about principles before coming to a collective agreement with authoritarian nations such as China, since the two systems of government view the role of state power in fundamentally different ways. Techno-authoritarians will in general answer questions about principles in ways that increase state power. Techno-democracies will in general answer those questions in ways that protect individual freedom, privacy, and fundamental rights. Undoubtedly, these answers will involve trade-offs and areas of irreconcilable differences. Below, we focus on what these trade-offs and differences imply for democratic CBDCs and their multilateral use, listing some design features and associated trade-offs.

1. Identity-Based CBDCs versus Anonymous CBDCs

Identity- or account-based CBDCs allow users to be tracked and data to be gathered. To the extent that a central bank makes use of these capabilities, it will have detailed data on individuals or firms, perhaps far more than residents of democratic countries are comfortable with. However, a certain amount of tracking and data gathering will be necessary even in democratic nations.

Knowledge of identities allows authorities to refuse transactions, impose caps on holdings, and offer tiered interest rates on their CBDCs (that is, different interest rates for different holding sizes). Each of these functions may be useful in mitigating some of the worries about CBDCs: the ability to refuse transactions to unauthorized parties in foreign countries can limit involuntary currency substitution in those countries; caps on individual holdings can slow bank or currency runs; and tiered interest rates may help make CBDCs unattractive as large-scale stores of value.²

Some of the privacy concerns associated with an identity-based system can be mitigated with a two-tiered or hybrid CBDC for which payment service providers (PSPs) offer accounts and keep ledgers of transactions but hide the identities of individual currency holders from

the central bank. In order to pierce this privacy wall, government agencies would need to obtain from a court a legally justified warrant. Although courts have varying degrees of independence from the executive across countries, audit trails would at least document whenever a government agency succeeded in piercing that wall and gained access to a CBDC transactor's identity.

Regardless of the domestic arrangements for privacy, what matters for international transactions is some standardization of norms on what data on transactor identity and transaction data should accompany international payments. These should be limited to a need-to-know basis.

Finding ways to address the privacy concerns of citizens and protecting citizens from outside authoritarian interference while allowing the legitimate sharing of identity and transaction information should be central design goals of democratic alternatives.³

2. Bells and Whistles

CBDCs can come with bells and whistles, including expiry dates, changeable positive and negative interest rates, and programmability—for instance, the ability to execute smart contracts. When coupled with the knowledge of user identities, these bells and whistles give authorities many options to target interventions, such as paying differential interest rates or limiting transactability. Once again, while some of these interventions may benefit targeted users, others may be used to discriminate against them—for instance, political opponents of a regime may find their CBDC wallets unusable.

Techno-authoritarian nations such as China will push for features that allow for more targeted interventions. In addition, China's leaders will view bigger, better, and faster features of their own system as points of national pride. To the extent that CBDCs are used in cross-border transactions, the more constraints that democratic nations can place on discriminatory targeting, the better; if successful, these constraints will make CBDCs less likely to be weaponized.

3. Seamless Cross-Border Exchanges

The global payments system benefits from the extent to which it is integrated. But each country's CBDC should be seamlessly exchangeable

into other CBDCs at the border, as the Multiple CBDC (m-CBDC) Bridge infrastructure aims to do, so that countries can apply their own rules internally. Foreigners will have to accept local privacy and data practices when transacting in another country's CBDC.

Many experiments in CBDC cross-border payments currently involve wholesale CBDCs. These do not entail the same privacy concerns involved in retail payments. Nevertheless, the technology may eventually evolve to accommodate cross-border retail CBDC payments. Because we are focused on principles rather than details of the technology, we will not distinguish between wholesale and retail payments. There are different possible levels of coordination among systems for cross-border payments. As described by researchers at the Bank for International Settlements, these include the following:

- Continuation of the current uncoordinated status quo in which a variety of players and infrastructures affect cross-border payments.
- Coordination of standards to ensure compatibility and interoperability between systems.
- Linkage of systems either through a shared technical interface or through designated entities (such as central banks or a designated correspondent bank) that have settlement accounts in both systems.
- Creation of a multicurrency corridor outside all systems, where participants can move CBDCs seamlessly from their domestic system into a final settlement account. Each participant would have final settlement accounts or wallets in all currencies. There would be a single rulebook, governance arrangement, ledger, infrastructure, and set of participants. Central banks would stand ready to provide liquidity in their own currencies to facilitate and unblock payments.⁴

It is possible to envisage even more adventurous arrangements—for instance, a Special Drawing Rights–based stablecoin issued by a multilateral agency (reminiscent of John Maynard Keynes's proposed supranational currency, Bancor), which would be exchangeable with any national currency. Any national currency could thus be convertible into

any other national currency in two steps via the stablecoin. Such an arrangement would resemble the cross-border payments system that Ripple currently operates with its XRP cryptocurrency and is just one of a variety of possible alternatives. Any democratic alternative should allow for private sector solutions. Multicurrency corridors, for instance, should not rule out the use of regulated private stablecoins or cryptocurrencies, even though such solutions might require additional regulation (as discussed below).

Some data will inevitably be generated by such cross-border payments. Much will be captured by the originating PSP, which will have to follow data protocols in the sending country.

4. Collective Supervision and Regulation of Global Stablecoins

While the cross-border use of foreign CBDCs can be limited through appropriate design, it will be harder to limit the use of global stablecoins (GSCs) across borders. Much like multinational banks, materially large GSCs will have to be regulated for safety and soundness by a collegium of supervisors and regulators from across the countries where they are used. Each country will govern GSC use within its own borders to the extent enabled by technology, but some shared norms may be needed on what data authorities in one country can demand of users in another country. Moreover, because private sector options—such as GSCs backed with reserve assets such as CBDCs or fiat currencies—may threaten the monetary sovereignty of small countries, additional international norms will be important when these instruments can be substituted for a national currency. This point is reflected in the seventh of the thirteen G7 Public Policy Principles for Retail Central Bank Digital Currencies, shown in box 5.3.

More generally, in a democratic alternative, the system should be open to private sector innovation and competition. This will mean the system should be designed to incorporate changes in the financial environment and to share best practices so that they become standard across the international system. At the same time, regulation should be knowledgeable and nimble, using technology to augment its capabilities. The safety and soundness of the links between base money and privately

created money and payment systems will be essential in this new digital world order.

5. Principles of Data Collection, Storage, and Use

Individual country authorities will need to forge an international agreement on what cross-border data to share in order to satisfy their security, stability, and soundness concerns. Data collection by private entities should be governed by reasonable principles. For example, individuals should know who processes their data and why, should consent to (or be able to opt out of) data processing, should have the ability to give access to whom they choose, should be able to easily rectify incorrect data, and should be informed quickly of data breaches. Finally, there should be limits on how long individual data can be stored. Users in every country where a PSP operates should have such rights, as they do in the European Union.

6. Limits on Anti-competitive Practices

To foster efficiency and innovation, anti-competitive practices such as hoarding data or coercing users into particular payment rails or systems should be discouraged, both domestically and internationally. Competition in domestic systems will almost certainly complement competition in the multilateral system, and vice versa. One powerful domestic and international tool for fostering competition will be mandated interoperability. This might include a requirement for interoperability of application programming interfaces (APIs), which are software intermediaries that allow two applications to talk to each other. Examples are account information services that allow users to send data from one PSP to another and payment-initiation services that enable one PSP's app to initiate payment from an account at another PSP. The interests of competition and innovation will be best served if national CBDCs are also subject to data-sharing guidelines, keeping in mind our proposed principles for data collection, storage, and use.

The Multilateral System

All this suggests that international negotiations will be required in a number of areas, including standards and infrastructure technology for

multicurrency corridors and linking systems; principles on data storage, sharing, and privacy; antitrust norms to enhance competition; and multilateral agreements on the degree of currency substitution that should be permissible. International organizations will also have to account for the possibility of greater monetary and exchange-rate spillovers as they revise their macroeconomic advice and emergency funding structures for this changed world.

Once rules of the game are in place, they will require monitoring and enforcement. A new multilateral institution—call it the International Payment Agency—could become the forum for such negotiations and would take over work now happening in a variety of venues, including the BIS Committee on Payments and Market Infrastructure, the BIS Innovation Hub, the Financial Stability Board, the Financial Action Task Force, the International Organization of Securities Commissions, and the International Monetary Fund. Alternatively, once discussion at these various organizations reaches a critical point, key contributors to these discussions could come together to form a coordinating body that could be housed in one of the existing multilateral agencies.

Given the differing needs of stakeholders, and the policy requirements and trade-offs examined above, such a multilateral effort should aim to ensure the broadest—and most sustained—access for customers and users, service providers, and countries that is consistent with the goals of efficiency, competition, safety, soundness, security, and the adoption of innovations. It is in the interest of techno-democracies to draw techno-nationalists into a common system that serves the greatest number of users so long as the rules of the game respect democratic practice.

The multilateral effort should also aim to protect the monetary sovereignty of countries to the extent that is feasible and consistent with the interests of these countries' residents. Monetary sovereignty is good for countries and also typically for their citizens, especially when countries are hit by shocks beyond their control; monetary sovereignty gives governments extra policy tools to deal with crises. However, when a corrupt or irresponsible administration trashes its monetary system, citizens are better off having alternatives.

Trust-based systems are often only as strong as their weakest links. The multilateral payment structure should be prepared to exclude countries or entities that endanger the system or that create significant adverse spillovers for others. At the same time, however, members should feel confident that they will have sustained access if they obey the rules of the game. Consequently, it should be difficult for any one country or group of countries to force the system to exclude their geopolitical opponents. The system should have a politically neutral process to distinguish rogue operators from geopolitical rivals.

Importantly, the United States may need to give up some of the unrivaled sanctioning power that it currently enjoys in order to entice other countries to join a new system. The United States will of course retain the ability to exclude anyone from its domestic system, but it may have to agree to limit its power to exclude actors from the international system on geostrategic grounds. If it refuses to accept such limits, Washington will risk pushing more countries toward the techno-nationalist alternative. But if it agrees to these limits, it will ensure that techno-nationalist countries never dominate the system, even when their economies grow much larger.

5.2. From Principles to Practice

Much of this chapter has framed the issue of systematic design in somewhat Manichaeian terms. Yet there are many technical specifics to which all would agree. And many of the differences are differences of degree—for instance, on the extent to which authorities can access individual data without checks. The reality is that the multilateral system already has a number of organizations that have been studying these issues, and China is already at the center of many of these discussions. If the United States wants to lead, it will have to decide whether to join fully in these ongoing discussions or chart a separate path of its own. Several international organizations have been involved to various degrees in discussing reforms to the international payments system.

The Bank for International Settlements and Financial Stability Board

The BIS is the central banker's central bank. It has expressed reservations about cryptocurrencies, but has engaged with central banks in experiments with CBDCs, including those supported by the BIS Innovation Hub. The Committee on Payments and Market Infrastructure, lodged within the BIS, has been tasked by the G20 with developing a global road map for cross-border payments. And the Financial Stability Board, which operates in close dialogue with the BIS, has taken the lead on developing principles for regulating global stablecoins.

The International Monetary Fund

In Article 1 of its Articles of Agreement, the IMF is tasked with promoting “international monetary cooperation through a permanent institution which provides the machinery for consultation and collaboration on international monetary problems.” To that end, the IMF is doing preparatory work on the implications of CBDCs for the international monetary system. While it will leave the technical aspects of the payments infrastructure to the BIS and its allied organizations, the IMF will focus on the monetary and macroeconomic implications of new payment technologies, including the spillover effects on exchange rates, capital flows, and financial stability.

OECD, G20, G7

Because the BIS and the IMF are technocratic organizations, the political consensus for the basic elements of a techno-democratic alternative may have to be built in other fora before the technical details are developed in these technocratic organizations.

The G20 is the most representative group that can provide economic leadership on an issue such as global payments, but it borders on unwieldy and includes a number of techno-nationalist countries. The G20 may be where political consensus is eventually thrashed out, but the key coordination points for techno-democracies may have to be built elsewhere.

Box 5.2. To Separate or to Engage?

The United States has two important decisions to make at the outset: whether to exclude techno-nationalist countries from the emerging multi-lateral payments system and, if not, how to engage them in discussions to create a common system.

A separate techno-democratic alternative is likely to be much less attractive to fence-sitters, and less efficient. Many countries would choose to participate in both systems, with the attendant duplication of costs. Given China's prospective growth and its willingness to use its economic clout, many countries may eventually prefer the techno-nationalist alternative if forced to choose.

By drawing all countries into a common system, techno-democracies may be able to create a more efficient system that has many attributes they desire but sacrifices some favored aspects of design. Importantly, techno-democracies should approach discussions on design of the international payments system with a clear sense of the nonnegotiable attributes they want to embed.

If the United States opts to pursue a common system, it will have to decide how to negotiate with techno-nationalist countries. The easiest approach would be to simply participate more fully in the ongoing technical discussions at various multilateral agencies. An alternative approach that fits better with the principles laid out in this chapter would be to forge a consensus on key design principles within a smaller group of like-minded countries, and then promote those principles in the technical discussions.

The G7 is probably the most focused and nimble political body able to represent democratic concerns. It would make sense for it to take the lead in outlining the keys aspects of the design desired by democratic countries, possibly including some important non-G7 democracies such as India and South Korea. Box 5.2 summarizes two alternative strategic approaches for the United States. Box 5.3 shows the extent to which the G7 has already achieved a degree of consensus regarding CBDCs.

Box 5.3. G7 Public Policy Principles for Retail CBDCs

1. Any CBDC should be designed such that it supports the fulfillment of public policy objectives, does not impede the central bank's ability to fulfill its mandate, and does no harm to monetary and financial stability.
2. G7 values for the International Monetary and Financial System should guide the design and operation of any CBDC: namely, observance of the rule of law, sound economic governance, and appropriate transparency.
3. Rigorous standards of privacy, accountability for the protection of users' data, and transparency on how information will be secured and used are essential for any CBDC to command trust and confidence. The rule of law in each jurisdiction establishes and underpins such considerations.
4. To achieve trusted, durable, and adaptable digital payments, any CBDC ecosystem must be secure and resilient to cyber, fraud, and other operational risks.
5. CBDCs should coexist with existing means of payment and should operate in an open, secure, resilient, transparent, and competitive environment that promotes choice and diversity in payment options.
6. Any CBDC needs to carefully integrate the need for faster, more accessible, safer, and cheaper payments with a commitment to mitigate their use in facilitating crime.
7. CBDCs should be designed to avoid risks of harm to the international monetary and financial system, including the monetary sovereignty and financial stability of other countries.
8. The energy usage of any CBDC infrastructure should be as efficient as possible to support the international community's shared commitments to transition to a "net zero" economy.
9. CBDCs should support and be a catalyst for responsible innovation in the digital economy and ensure interoperability with existing and future payment solutions.
10. Authorities should consider the role of CBDCs in contributing to financial inclusion. CBDC should not impede, and where possible should enhance,

access to payment services for those excluded from or underserved by the existing financial system, while also complementing the important role that will continue to be played by cash.

11. Any CBDC, where used to support payments between authorities and the public, should do so in a fast, inexpensive, transparent, inclusive and safe manner, both in normal times and in times of crisis.

12. Jurisdictions considering issuing CBDCs should explore how they might enhance cross-border payments, including those through central banks and other organizations working openly and collaboratively to consider the international dimensions of CBDC design.

13. Any CBDC deployed for the provision of international development assistance should safeguard key public policies of the issuing and recipient countries while providing sufficient transparency about the nature of the CBDC's design features.

Source: G7, "Public Policy Principles for Retail Central Bank Digital Currencies (CBDCs)," October 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025235/G7_Public_Policy_Principles_for_Retail_CBDC_FINAL.pdf.

A New Multilateral Organization: The International Payment Agency

Once the new multilateral payments system takes shape based on discussions in the various organizations listed above, it may be desirable to have a new International Payment Agency (IPA) take responsibility for the system. The IPA's governance structure could be tailored to the task at hand: for instance, it could have a part-time board that sets principles and strategic directions, and a permanent professional staff that determines operational guidelines, such as those for monitoring, regulating, and supervising global payment systems. The insulation of the board, which would be appointed by member countries, from operational decisions would reduce the potential for multilateral actions to be politicized, thereby inspiring greater confidence among countries that they will maintain access

to global payment systems. The level of authority vested in the IPA—whether it be norm shaping, regulation setting, or decision making—is a matter to be addressed by existing structures and stakeholders.

Implementation through Pilots and Experimentation

The democratic approach requires constant learning from experimentation in policy and organization to ensure that the system realizes the principles we have articulated. Multiple potential avenues exist for such experimentation, including so-called microlateral processes—those that empower smaller countries to lead internationally on discrete issues with the support of larger nations. A microlateral approach can enable innovative policy making that is sometimes impossible in established international fora. It can also leverage the comparative advantages of sometimes-neglected nations, increase buy-in from partners, and even build consensus among great powers that are often at loggerheads and that need trusted brokers to come together.

When it comes to digital currencies, small countries can experiment with payment ecosystems that prove the efficiencies and deficiencies of different models. The archipelago nation of the Bahamas presents a fascinating case study: it, not China, was the first nation to create a CBDC, the Sand Dollar. The Sand Dollar is meant to improve access to finance in areas that are vulnerable to weather events and that don't have a firmly established banking presence. The lessons the Bahamian government has learned from launching and regulating its CBDC can inform other countries' approaches to CBDCs and shape the policy agendas of multilateral bodies. Another candidate for microlateral leadership is Kazakhstan, which is planning to pilot its own CBDC by the end of 2022. Kazakhstan is drawn to elements of both techno-nationalism and techno-democracy, making it a key fence-sitter in this arena. Balkan nations such as Serbia, which have high levels of competence in the areas of fintech, are also compelling partners for microlateralism, as are African nations like Kenya, Nigeria, South Africa, and Rwanda. Some policy areas that are ripe for microlateral experimentation include remittances, cross-border settlements, and even retail domestic payments.

A Multisector Approach

Smaller nations are not the only stakeholders whose support will be required for a successful techno-democratic multilateral approach to shaping digital currency and payments ecosystems. The pluralistic nature of techno-democratic societies will require engagement across sectors, including industry, academia, and advocacy groups that have legitimate priorities and concerns. Unlike many illiberal nations, democratic countries have private sector actors whose agendas are separate from those of the state, and their individual goals must be reconciled with national interests to achieve consensus. In addition to factional and political interests, these nongovernmental stakeholders have policy insights and expertise that their governments often lack but need. They can assist in areas like building capacity, moving from technology development to application, and even subnational coordination.

Engaging the private sector in particular should be a top priority. Several mechanisms could be explored for bringing private sector expertise into the conversation. One option is to create a multilateral industry group that includes the key digital currency and other electronic payments companies in any democratic country and give this group a say in shaping the ecosystem's multilateral agreements. Another is to establish a virtual institute that marries the technical expertise of private stakeholders with the policy expertise of democratic governments. Finally, with the tremendous pace of innovation, it will be important to identify mechanisms that can help governments keep up with technological changes that could impact their digital currency and electronic payments ecosystems.

5.3. Conclusion

Democracies are more efficient than their autocratic competitors when they act in concert and bring together many voices from across society. While the diverse and sometimes contradictory interests of those involved in multilateral democratic cooperation can create collective action problems and bureaucratic impediments, they can also produce

new efficiencies that autocratic nations lack. China is large enough to create a powerful digital payments ecosystem of its own that would appeal to certain countries. But the techno-democracies, united around shared principles and working with stakeholders across government and society, have much greater expertise, much larger combined economic output, and many more citizens whose collective efforts outmatch even those of the world's most populous nation. In the emerging competition over digital currencies and payment arrangements, united techno-democracies have the potential to ensure that these new tools are put to positive ends.

Notes

1. Seigniorage is the interest received by a central bank on assets that it purchases with the funds that it receives by issuing banknotes or other forms of money paying no interest.
2. See Ulrich Bindseil, "Tiered CBDC and the Financial System," European Central Bank Working Paper Series 2351, Frankfurt am Main, Germany, January 2020, <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2351-c8c18bbd60.en.pdf>.
3. For example, see "Privacy Principles for a Digital Dollar," The Digital Dollar Project, October 18, 2021, https://digitaldollarproject.org/wp-content/uploads/2021/10/DDP-Privacy-Principles-10.18.21_Final.pdf.
4. Raphael Auer, Haene Philipp, and Henry Holden, "Multi-CBDC Arrangements and the Future of Cross-Border Payments," *BIS Papers* no. 115, March 19, 2021, <https://www.bis.org/publ/bppdf/bispap115.htm>.

A Road Map for US Leadership

Our findings in the preceding chapters lead to the conclusion that the United States must take up the mantle of leadership in digital currency technology development and rulemaking. Both domestically and internationally, the United States should embrace the opportunity to shape the future digital economy. Until now, the US government has focused most heavily on managing risks that could threaten US payment systems. A focus on risks comes naturally; the economy relies on financial stability and trust in the finality of payments. However, management of risks that could threaten this trust and the resiliency of payment arrangements should be coupled with a heightened focus on opportunities that arise through innovation and competition. Regulations that have the effect of shielding legacy payment service providers from competitive disruption can have the unintended consequence of undermining incentives for innovations that could substantially improve the everyday lives of Americans.

The White House should therefore provide a strategic plan for the role of payments technology in the future digital economy. This plan should prioritize and incentivize innovation by the relevant government agencies, the private sector, and academia. More specifically, the plan should call for significant CBDC research and development as well as regulatory changes that increase innovation and competition for payment-related services while maintaining privacy. Finally, the plan should prioritize working with international partners to set global standards for

payment technologies such as CBDCs, stablecoins, and cross-border payment infrastructure. These standards should embed norms for privacy and noninterference in the monetary arrangements of other countries. The United States will benefit from vigorous leadership in international forums that set these standards.

6.1. US Digital Currencies and Payment Systems

The deficiencies of the US payment system described in chapter 1 are caused in large part by weak market incentives for competition. Network effects, by which most consumers and businesses stick with payment systems that they and others have been using, make it difficult for new payment service providers to enter and disrupt legacy payment services markets. The behavior of many bank customers reflects the high costs for switching their payment service providers and methods. As a result, they tend to remain largely within “walled gardens,” allowing dominant payment service providers to underinnovate and overcharge for some services. For example, high merchant interchange fees for credit card payments are used in part to fund rewards for consumers, creating barriers to market entry, as explained in chapter 1.

Weak competition is exacerbated by regulatory frameworks that create hurdles for fintech entrepreneurs and shield legacy banks from competition. For example, the President’s Working Group’s report on stablecoins identifies gaps in the regulatory framework that will continue to impede useful applications for stablecoins until approved paths to entry are made clearer.¹ Entry of some novel forms of fintech payment service providers will also be held up until the Federal Reserve Board finalizes its policies regarding their access to Federal Reserve bank accounts. A Fed staff report states: “Given that access decisions made by individual Reserve Banks have implications for an array of Federal Reserve policies and objectives, a more transparent, consistent framework for identifying and considering the risks posed by requests for access to accounts and services could help to clarify expectations for potential applicants, address important risks, and support Reserve Banks in making prudent, consistent, and timely account-request decisions.”²

Working to clear these and other impediments to innovation and competition, the US government should adopt a strategy of positive disruption that focuses on research and development, improvements in infrastructure, and regulatory changes that open payment-related markets to greater competition and technology innovation while maintaining privacy and trust in the payment system. Specific policy recommendations related to US payment systems are as follows:

- The US executive branch should provide a strategic plan for the role of payment systems in the future digital economy. The plan should consider the likely future development of both the banking industry and of nonbank intermediaries; standards for the use, control, and privacy of consumer data; the appropriate role in financial services markets of technology firms (and the extent of their market power); the ability to integrate payment infrastructure such as CBDCs, fast-payment systems, and innovative payment arrangements like stablecoins into many forms of economic transactions and workflows; and the imperative of trust in basic payment services and monetary instruments.
- The US Congress should draft and pass legislation that allows the Federal Reserve to introduce a US digital dollar under suitable conditions and that modernizes US financial regulatory frameworks in line with other developments in money and payment systems. In January 2022, the Board of Governors of the Federal Reserve System stated that “the Federal Reserve does not intend to proceed with issuance of a CBDC without clear support from the executive branch and from Congress, ideally in the form of a specific authorizing law.”³
- The United States should undertake well-resourced CBDC research and development. While the Federal Reserve should be commended for initiating basic technology and policy research, far more should be done. In particular, the United States should take advantage of the strength of its private sector and universities in conducting CBDC development projects. A successful CBDC design should seek a satisfactory balance among four values: privacy,

compliance, efficiency, and inclusion. Because this development work presents significant design challenges that may take years to surmount, it should begin right away.

- While it is crucially important that the United States proceed with developing CBDC technology, this does not imply that the United States should necessarily deploy a digital dollar. Designing a CBDC that maintains the privacy of Americans, defeats illegal payments, and provides for a competitive, inclusive, and innovative payment landscape will not be a simple or rapid achievement. Indeed, precisely because it will take time to attain these design objectives, the US government should move now to launch a well-resourced development effort.
- Congress should pass a carefully revised version of the US Innovation and Competition Act, which focuses on improving US competitiveness. The Senate version, which was passed on a bipartisan basis, could be revised to authorize and fund research and development on CBDCs and further modernization of US payment systems. The bill would invest more than \$200 billion in US scientific and technological innovation over the next five years.
- Federally funded research and development centers (FFRDCs), which have been responsible for important US innovations such as the development of GPS and advancements in air traffic safety, should be used to harness the innovative capacities of both the non-profit sector (including universities) and the for-profit sector for the design of payment systems and the development of CBDC technology.⁴ The US Treasury Department has an FFRDC, the Center for Enterprise Modernization, that could coordinate and provide contracts for the development of CBDC technologies and generate standards for a modernized payment system. In order to stimulate innovative developments, the US government should also take advantage of the Cooperative Research and Development Agreements (CRADAs).⁵ CRADAs form a well-honed, streamlined, and federally sanctioned system that enables industry to collaborate with government to research and develop technologies with both commercial and governmental applications. Using CRADAs, national

laboratories and agencies can identify suitable industry and non-profit partners and draw on their expertise to develop, market, and commercialize new technologies.

- Alongside the development of technologies for a digital dollar, the Federal Reserve System, the Office of the Comptroller of the Currency, the US Treasury's Financial Crime Enforcement Network, the National Science Foundation, and other relevant governmental entities should significantly expand their support for research on all critical aspects of payment systems, including cybersecurity and cryptographic methods for privacy protection; machine-learning approaches to the detection of money laundering; new applications of digital ledger technologies; financial inclusion; financial crimes related to payments; consumer payment behavior; and the industrial organization of payment-network markets. The Federal Reserve and other government agencies should increase their collaboration with universities and businesses in the research and development of payment systems.⁶ Universities should create and support multidisciplinary centers for research on payment systems and for the education of future computer scientists, social scientists, engineers, and educators that can sustain innovation in this field. The US government should retain control of the intellectual property arising from its development of CBDC and other payment-system technologies.
- The Federal Reserve should set standards for how economically significant payment systems—whether operated by private or public sector entities—interoperate with each other and with a potential digital dollar. The US government should also explore the possibility of enhancing the interoperability of its payment systems through the development of hub payment infrastructure that increases the range of payer and payee types that are able to transact directly with each other. Interoperability enhances efficiency and lowers barriers to competition.
- The ongoing work of the Federal Reserve in developing its fast-payment system, FedNow, should be targeted as a robust complementary strategy. A fast-payment system will not come close to

Box 6.1. Privacy Principles for a Digital Dollar

The Digital Dollar Project writes that a US CBDC should offer the following features:

Privacy. People should be able to use a US CBDC without making themselves subject to undue government surveillance. People may benefit from above-board, contractual sharing of information with financial services providers, or they may refuse it. Law enforcement access to CBDC usage data should be strictly controlled by due process, and other applicable US law, including the Fourth Amendment.

Security. A US CBDC should improve and not degrade people’s security against theft, hacking, illegal seizure, and fraud. It should provide people with more secure ways to handle money individually, on a system that is secure against attacks and legally protected, with money-handling tools that protect against the frauds that an unfamiliar technology might otherwise allow.

Accessibility. A US CBDC should improve Americans’ and global dollar users’ access to financial services. Because it is a more efficient system, it should cost less to engage in basic financial transactions. And as an open system, it should draw competition into financial services that produces better services at lower costs.

Transparency. The system on which a US CBDC runs should be operationally transparent so that a variety of parties—governments, NGOs, businesses, and academics—can independently assure themselves about its technical functioning, its security, and its resistance to impermissible monitoring or other exploitation.

Source: “Privacy Principles for a Digital Dollar,” the Digital Dollar Project, https://digitaldollarproject.org/wp-content/uploads/2021/10/DDP-Privacy-Principles-10.18.21_Final.pdf.

achieving its potential effectiveness unless it is accompanied by clear regulation for interoperability and low-cost access for all Americans. The Federal Reserve should also study the feasibility and advisability of converting a fast-payment system such as Fed-Now into a basic form of CBDC.

- To increase competition and innovation, the Federal Reserve should allow new types of payment service providers that meet appropriate regulatory standards to access its payment systems with Fed accounts. In addition, the US government should develop streamlined national standards and simplify the web of state and federal regulations that may impede the entry of innovative payment services firms, including stablecoin operators, so long as they meet standards for financial stability, consumer protection, privacy, access, and anti-money-laundering and countering the financing of terrorism (AML/CFT). Regulations for cryptocurrencies, including stablecoins, should be adapted to the activities for which these digital currencies are used. The United States lacks a clear regulatory framework for cryptocurrencies that makes such distinctions and allows useful innovations to succeed while protecting investors and users.⁷
- Safeguarding privacy should be a central concern in the design and regulation of payment systems.⁸ To this end, US policy in the payments arena should be based on an explicit set of privacy principles, along the lines of the principles in the box labeled “Privacy Principles for a Digital Dollar,” authored by the Digital Dollar Project. As discussed in the next section, US leadership on privacy is essential for ensuring that China does not set global standards on this critical issue.

6.2. US Policy in the International Arena

Internationally, US strategy should support the central role of the US dollar, US financial institutions, and other US technology providers in the global financial system. This central role affords the United States great advantages, including low-cost access to the global financial system

and reduced financing costs from global creditors for US consumers, firms, and government entities. Global reliance on the US dollar and on US financial service providers also gives the United States significant strategic influence. These advantages rest on heavy reliance on the US dollar as the leading reserve currency and cross-border payment currency, confidence in US rule of law, and careful application of unilateral coercive financial power.

The United States should position itself as a global leader in the digital currency space, including in the development of global regulatory frameworks that are consistent with US expectations for consumer protection, financial crime compliance, financial stability, privacy, and the protection of monetary sovereignty. The US government should work to establish high internationally accepted standards for cross-border CBDC use. The focus of the US government should remain on the trustworthiness of domestic and cross-border payments, based on principles of privacy, safety, legality, and operational resilience. Specific recommendations for US policy in the international payments arena are as follows:

- The US government should press for international alignment on liberal democratic principles, taking advantage of the ongoing G7 process described in chapter 5 but also moving rapidly to include other democracies—large and small—that are developing CBDCs.
- The US government should be open to leading the creation of a permanent international institution focused on the global operation of cross-border digital payments. This institution would address technical standards, regulatory principles and frameworks, and coordination and monitoring, as described in chapter 5. The US government should advocate for the exclusion of countries and other entities that endanger the global network of payment systems or that create other significant adverse spillovers for others.
- The US Development Finance Corporation and the US Agency for International Development should incorporate digital payment technologies into their approaches to supporting offshore investment projects. They should support the development of technol-

ogy for foreign CBDCs and other digital payment systems, including technologies developed by US firms. Further support for developing countries to participate in this emerging financial ecosystem should be provided by the World Bank in a manner consistent with the standards set by market democracies.

- In addition to a general purpose CBDC for retail and business uses, the Federal Reserve should consider roles for CBDCs that are tailored to special-purpose wholesale applications such as cross-border payments.

China-Specific Policies

China's advances in the arena of digital currencies and e-payment systems have wide-ranging implications for US economic and diplomatic interests in Asia and around the world. The US government—acting on its own and in concert with allies and partners—should adopt measures that ensure that China's advances in this arena do not undermine US interests.

US response measures can be divided into two categories: general strategies and specific policies. The former should seek to increase the relative appeal of US-led options for managing the international effects of China's new digital currency. The latter involve specific actions and policies that are derived from the former and that focus on improving US capabilities and shaping the impacts of China's actions.

In terms of strategies, an effective US response to China's digital currency should have a range of general features. First, the United States should take strategic and tactical actions to ensure that it can address both the immediate and the enduring actions of China's government. Second, the US government should seek to coordinate its actions with the US private sector; neither should go it alone to address this challenge. Third, US policy makers and business leaders should take a long-term view of the development and application of responses, because a significant multiyear effort will be needed to respond to the PRC government's evolving initiatives. Fourth, an effective US strategy will require a diversity of actions across several areas of US policy, including finance, diplomacy, technology, national security, and regulatory policy.

Thus, the US response should rely on a highly coordinated interagency effort. Finally, the US government should undertake a combination of unilateral actions and multilateral actions with other nations. Despite the current dominance of the US dollar in the global financial system, the United States will need the active participation of providers of other major currencies and payment systems to manage the impacts of China's digital currency in a manner that does not undermine US interests and values or those of US allies and partners.

Specific policy recommendations include the following:

- Choices over technology and the regulation of monetary arrangements are heavily based on values. Whereas the e-CNY sacrifices privacy, the United States should work with its allies and other partners to ensure that the provision of digital payment services protects this critical human right. The G7 has adopted the principle that “rigorous standards of privacy, accountability for the protection of users’ data, and transparency on how information will be secured and used is essential for any CBDC to command trust and confidence. The rule of law in each jurisdiction establishes and underpins such considerations.”⁹ In concert with its partners and other allies, the United States should strongly support the application of this principle and convert it into concrete international standards for the privacy of cross-border payment arrangements.
- The US government should develop an interagency mechanism for monitoring how US companies operating in China are affected by the PRC government’s exploitation of its payment systems. Perhaps based in part on voluntary reporting, this mechanism should aim to ensure that China does not use the e-CNY and other payment arrangements for coercive purposes, such as punishing US companies for taking action on political issues.
- The US government should promote (for instance, with financial and regulatory incentives) faster private sector development of technologies that can be offered as alternatives to e-CNY technology, especially in countries that may wish to introduce their own digital currencies.

- The US government should warn payment-system participants that use of the e-CNY involves a loss of privacy.
- The US government should task its intelligence community with assessing the national security risks and opportunities resulting from China's creation and use of digital payment systems globally. The intelligence community will want to pay particular attention to the risks of sanctions evasion, surveillance of payments, money laundering, and the weaponization of digital payments.
- The US government should study the potential for illicit finance and privacy risks associated with use of the e-CNY and should develop a comprehensive assessment of those risks and highlight them at the Financial Action Task Force (FATF), possibly in conjunction with a proposal for further FATF guidance.
- The United States should develop strategies for deterring bad conduct with respect to use of the e-CNY or related payment infrastructure (for instance, to facilitate money laundering or sanctions evasion) and thereby help to protect the integrity of the financial system. Such strategies should focus on both cross-border use of the e-CNY and its related international payment infrastructure, and on use of the e-CNY within China by foreign multinationals.

6.3. Concluding Remarks

The United States, China, and the rest of the world are at a crossroads in the development of digital currencies and other innovations in monetary arrangements. How events are shaped by national policies and market forces will have important consequences for privacy, economic growth, financial inclusion, and international influence, among other US objectives.

China's emergence as the first significant mover in the CBDC arena entrenches the domestic control of the Chinese Communist Party and places Beijing in a powerful position to provide digital currency technology to other countries and to set international standards that align with its authoritarian governance system. Without careful US policy

attention, these realities could undercut privacy and the dominance of the US dollar as a source of geo-economic and strategic influence.

The US government should first determine the appropriate nature and role of digital currencies and other payment systems within its own economy. Much of what the United States should do to improve its payment systems in preparation for the future digital economy does not depend on the emergence of the e-CNY. The US government has significant unrealized opportunities to improve the lives of Americans through the adoption of policies that advance competition, inclusion, and innovation.

In the international arena, the United States should take the lead—on its own and in concert with allies and partners—in establishing standards, providing technology to other countries, and preventing the e-CNY from undermining liberal democratic norms of freedom and human rights or eroding the United States’ geo-economic and strategic influence.

Notes

1. President’s Working Group on Financial Markets, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency, *Report on Stablecoins*, November 2021, https://home.treasury.gov/system/files/136/StableCoinReport_Nov1_508.pdf.
2. Board of Governors of the Federal Reserve System, “Proposed Guidelines to Evaluate Requests for Accounts and Services at Federal Reserve Banks,” staff memo to the board, April 28, 2021, <https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20210505a2.pdf>.
3. Board of Governors of the Federal Reserve System, “Money and Payments: The U.S. Dollar in the Age of Digital Transformation,” Federal Reserve System, January, 2022, <https://www.federalreserve.gov/publications/money-and-payments-discussion-paper.htm>.
4. “Master Government List of Federally Funded R&D Centers,” National Science Foundation, July 2021, <https://www.nsf.gov/statistics/ffrdclist>.
5. “CRADAs—Cooperative Research & Development Agreements,” US Department of the Interior, <https://www.doi.gov/techtransfer/crada>.
6. For example, the Small Business Administration, through its Small Business Innovation Research (SBIR) competitive private-sector-focused awards program, could offer grants to US businesses for the development of fintech payments technology.

7. *Report on Stablecoins*. On January 31, 2022, the CEO of Diem announced the winding down of Diem, writing, “Despite giving us positive substantive feedback on the design of the network, it nevertheless became clear from our dialogue with federal regulators that the project could not move ahead. As a result, the best path forward was to sell the Diem Group’s assets, as we have done today to Silvergate.” See “Statement by Diem CEO Stuart Levey on the Sale of Diem Group’s Assets to Silvergate,” Diem, January 31, 2022, <https://www.prnewswire.com/news-releases/statement-by-diem-ceo-stuart-levey-on-the-sale-of-the-diem-groups-assets-to-silvergate-301471997.html>.
8. The European Union has taken its own regulatory approach, the General Data Protection Regulation (GDPR), to protect privacy. See “General Data Protection Regulation,” Intersoft Consulting, <https://gdpr-info.eu>.
9. See box 5.3 in chapter 5 for this and the other G7 principles released in October 2021.

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