

ISSUES IN PACIFIC DEVELOPMENT

No. 3 | August 2021



CENTRAL BANK DIGITAL CURRENCIES

A POTENTIAL RESPONSE TO THE FINANCIAL
INCLUSION CHALLENGES OF THE PACIFIC

Anton N. Didenko and Ross P. Buckley

KEY FINDINGS AND RECOMMENDATIONS

If well-designed and implemented, central bank digital currencies (CBDCs) likely offer the best solution to the financial inclusion and remittance problems that bedevil the Pacific region. However, the CBDC is a complex piece of software and a complex digital framework capable of generating economy-wide benefits and shocks. The development of a safe, efficient, and accessible CBDC by any Pacific country will require considerable expertise and a deep understanding of the design issues this fundamentally new form of currency gives rise to in this context. It will require Pacific island finance sector regulators to redirect scarce resources away from currently pressing challenges to undertake years of preparatory research and then pilot programs. For this reason, this brief concludes that now is not the time for countries in the region to issue a CBDC, but now is the time to begin laying the groundwork for this potentially game-changing innovation by building specific knowledge and expertise within the region's central banks.



Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO)

© 2021 ADB. The CC license does not apply to non-ADB copyright materials in this publication.

<https://www.adb.org/terms-use#openaccess>

<http://www.adb.org/publications/corrigenda>

Publication Stock No. ARM210301-2

DOI: <http://dx.doi.org/10.22617/ARM210301-2>

Unless otherwise specified, “\$” refers to United States dollars.

CONTENTS

- 4 Executive Summary
- 5 Introduction
- 8 Financial Inclusion Challenges of Pacific Island Countries
- 13 CBDC for Financial Inclusion: Design Choices
- 21 CBDCs for Financial Inclusion: The Opportunities
- 26 CBDC for Financial Inclusion: The Challenges
- 30 Next Steps
- 33 Conclusion
- 34 References
- 39 Appendix: Financial Inclusion Statistics, Selected Pacific Island Countries

AUTHORS:

ANTON N. DIDENKO, Senior Lecturer and Member, Centre for Law, Markets and Regulation, UNSW Sydney.

ROSS P. BUCKLEY, Australian Research Council Laureate Fellow, KPMG Law - King & Wood Malleons Chair of Disruptive Innovation; Scientia Professor and Member, Centre for Law, Markets and Regulation, UNSW Sydney.

EXECUTIVE SUMMARY

Many Pacific island countries are among the world's most remote and geographically dispersed. As such, financial inclusion remains a major challenge, with many in the region still lacking access to financial services. This policy brief considers whether central bank digital currencies (CBDCs) can promote the accessibility of financial services across the Pacific islands and the design choices involved in their development.

The brief suggests that CBDCs may offer a highly efficacious solution to (i) the problem of high remittance costs that currently serve as a tax on the earnings of Pacific islanders abroad when they send money home, and (ii) the financial inclusion challenges of the region. However, implementation of these digital currencies is a significant challenge.

The CBDC is a complex piece of software and a complex digital framework capable of generating both economy-wide benefits and shocks. The establishment and operation of a CBDC by any Pacific country will require considerable expertise and a deep understanding of the designs and issues this fundamentally new form of currency gives rise to in the local context. The development of a safe, efficient, and accessible CBDC is likely to require Pacific island country regulators to redirect scarce resources away from pressing challenges, such as enforcing anti-money laundering and counterterrorism financing regulations, while maintaining correspondent relationships with overseas commercial banks.

For this reason, this brief concludes that now is not the time for countries in the region to issue a CBDC, but it is the time to begin to develop the expertise and understanding. Understanding such matters requires focused study and substantial time for reflection and working through all potential consequences. If well-designed and appropriately implemented, CBDCs likely offer the best solution to the financial inclusion and remittance problems that bedevil the Pacific region. Now is the time to begin laying the groundwork for this potentially game-changing innovation by building knowledge within the region's central banks.

INTRODUCTION

Central bank digital currencies (CBDCs) offer opportunities and risks for the island countries of the Pacific seeking to overcome their physical remoteness and other challenges and to expand financial inclusion. This brief explores the issues that need to be addressed if the promise is to become practice.

Key Terms

The brief interprets *financial inclusion* broadly, as adopted in the Bali Fintech Agenda:

Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs (transactions, payments, savings, credit, and insurance) and are delivered responsibly and sustainably (Bali FinTech Agenda 2018, 12).

A CBDC is “a digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank” (BIS 2020, 3). While the definition appears straightforward, it has not been uniformly understood. As the variety of digital currencies keeps increasing, new designs sometimes envisage different forms of official currency integration into privately issued payment instruments. This complicates analysis of the risks and opportunities underlying CBDCs, in that it can be difficult to distinguish a CBDC from certain privately issued digital currencies.

In a recent report, the Bank for International Settlements (BIS)—joined by the European Central Bank, the board of governors of the US Federal Reserve System, and central banks of Canada, Japan, Sweden, Switzerland, and the United Kingdom—stresses the importance of distinguishing a “true” CBDC from a “synthetic” one (BIS 2020, 4). A synthetic CBDC is a digital currency issued by a private party (e.g., a commercial bank) that is matched by deposits held at a central bank. In this synthetic structure, private parties essentially act as intermediaries between the central bank and the relevant end-users. As a result, it is a misnomer to refer to the structure as a CBDC, since end-users do not have a *direct claim* against the central bank (even if the balances held by the relevant private issuers are fully backed by central bank balances—essentially establishing a full reserve banking model) (BIS 2020, 4). A synthetic structure also differs *conceptually* from a CBDC: while the former benefits from network

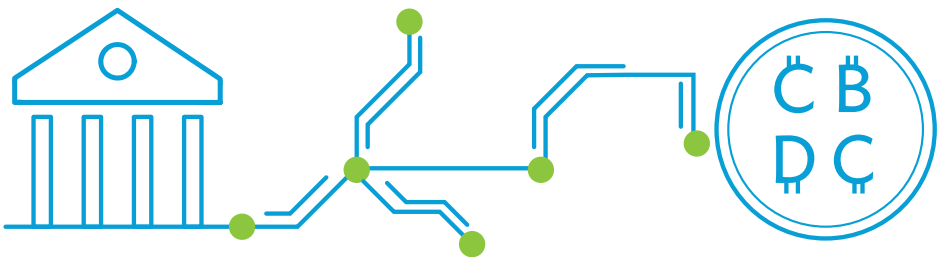
effects created by profit-seeking private issuers, the latter is issued by a central bank acting in the public interest (BIS 2020, 4). Further, privately issued digital currencies backed by central bank deposits lack the flexibility of a CBDC: unlike central banks, which can relatively easily increase the size of their liabilities at short notice, private issuers need to ensure the relevant deposits are available at the central bank first (which cannot be guaranteed) (BIS 2020, 4).

The policy brief uses this narrow interpretation of the CBDC concept for a focused and informed discussion based on straightforward terminology endorsed by the leading organizations investigating the implications of CBDCs.

The Pacific island countries discussed in the brief include the Cook Islands, Fiji, Kiribati, the Marshall Islands, the Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, and Vanuatu.

The Next Steps

The Bali Fintech Agenda is a useful starting point. On the one hand, the agenda proclaims that the evolution of the financial system through financial technology



The Bali FinTech Agenda 2018 defines CBDC as a digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank.



New technologies in Papua New Guinea are providing bank customers with affordable financial products and services that meet their needs (photo by ADB).

Reaping the benefits of FinTech requires improving institutional capacity, locating the relevant talent and expertise, broadening consumer education, and improving the knowledge base and stakeholder communication methods.

should be welcomed, as governments are exploring FinTech to help increase financial inclusion for underserved populations, deepen financial markets, and make financial service provision more efficient (Bali FinTech Agenda 2018, 15). On the other, “[r]eaping the full benefits of FinTech requires adequate preparation.” This includes improving institutional capacity, locating the relevant talent and expertise, broadening consumer education, and improving the knowledge base and stakeholder communication methods (IMF 2018, 15).

Both angles will be crucial when assessing the prospects of CBDCs implemented to advance financial inclusion.

The second section summarizes key financial inclusion challenges in the Pacific. The third section outlines factors that affect CBDC design. The fourth and fifth sections explore opportunities and challenges in a CBDC rollout for financial inclusion in the Pacific island countries. The sixth section considers next steps for designing and determining the viability of a future CBDC rollout in the Pacific. The last section concludes.

FINANCIAL INCLUSION CHALLENGES OF PACIFIC ISLAND COUNTRIES

Financial inclusion is a challenge in the Pacific because of (i) geographic remoteness, (ii) limited digital infrastructure, and (iii) insufficient financial literacy (Davidovic et al. 2019, 3). A small number of banks also tend to dominate its financial systems (Davidovic et al. 2019, 4), undermining competition.

Development of Digital Infrastructure in the Region

The remote and disparate geography of the countries in the region results in highly varied access to basic infrastructure, including electricity and the internet. More than 8 million people, or over 64.21% of a total population of 12.46 million in the 14 Pacific island countries surveyed, have no electricity supply, and access to electricity is lowest in high-population countries (Papua New Guinea in particular) (ADB 2018, 4).

Internet penetration is largely similar to other lower middle-income economies but remains low in absolute terms and very uneven (Davidovic et al. 2019, 5). Internet access ranges from 11.21% of the population in Papua New Guinea and 11.92% in Solomon Islands to 49.97% in Fiji and 57% in Nauru,¹ while bandwidth is often limited or expensive or both (Dickey et al. 2019, 1). The islands' topographies create smaller customer bases, complicating the even distribution of high-speed internet (Safira 2020). Broadband access in the Pacific countries is also unequal. Out of 19 Economic and Social Commission for Asia and the Pacific member countries with just 2% or lower fixed-broadband internet penetration in 2016, 8 were Pacific countries (UNESCAP 2018, 7). Yet, Fiji, Nauru, and Tonga had mobile-broadband penetration of more than 30% (UNESCAP 2018). Moreover, the broadband divide has continued to widen on cost as well. For example, it costs about 230 kina (about \$70) for a mobile, prepaid 6 gigabyte data monthly package in Papua New Guinea, but just 24.99 Fiji dollars (about \$12) for a similar package in Fiji (UNESCAP 2018).

Mobile phone subscription numbers, at around 87% in 2018, also lag other lower middle-income economies (World Bank n.d.). And disparity across the region is substantial: Mobile penetration numbers range from 21% in the Federated States of Micronesia and 28% in the Marshall Islands, through 46% in Kiribati

¹ See UNESCAP (2020, Annex Table 12).

and 48% in Papua New Guinea, and to 110% in Timor-Leste, 118% in Fiji, and 134% in Palau (World Bank n.d.). Despite the relatively high numbers, many Pacific countries predominantly use older and lower-capacity 2G connectivity instead of more advanced 3G, 4G, or 5G networks (Davidovic et al., 7). Another challenge is simultaneously catering to the different needs of remote and more urban populations, where “the urban communities crave the latest internet connectivity like 4G, yet the remote communities prefer a 2G connection via USSD-based platforms” (Safira 2020). These limitations restrict the types of technologies that can be efficiently implemented within the financial services sector in some areas.

Despite these challenges, some Pacific island countries have taken important steps toward improving internet penetration. For example, the installation of the international fiber-optic Coral Sea Cable—a 4,700-kilometer fiber-optic submarine cable system linking Sydney to the cities of Port Moresby and Honiara—is expected to deliver a minimum of 20-terabits-per-second data-transfer capacity to each of Papua New Guinea and Solomon Islands (40 terabits per second in total for the two countries) (Coral Sea Cable Company n.d.).

Connectivity limitations restrict the implementation of financial services technologies.



Cables that connect: The delivery of high-speed internet via subsea cables—such as this one installed with ADB support in the Cook Islands facilitates the development of financial services technologies (photo by Avaroa Cable Ltd.).

Financial Inclusion in the Region

Financial inclusion in the Pacific island countries remains low overall (Appendix). Cash remains the preferred payment method for most retail transactions, with paper checks for larger transactions (Davidovic et al. 2019, 17). Heavy reliance on physical cash makes payments difficult in that it requires the payer to travel to the financial center. This is typically costly and time-consuming in a region with highly dispersed populations and mountainous or multiple island geography (Davidovic et al. 2019, 17).

Several electronic money (e-money) services have been launched in the Pacific, seeking to replicate rapid growth in regions such as sub-Saharan Africa or South Asia. The technology has grown quickly in Fiji, where nearly 1.2 million mobile money transactions were reported in 2017, accounting for 0.8% of gross domestic product (GDP), and annual growth in the number of transactions exceeded 150% during 2014–2017 (Davidovic et al. 2019, 19). Some countries have demonstrated higher usage of e-money transactions, with the total value of transactions in Tonga reaching 2.8% of GDP and, in Samoa, 1.1% of GDP (Davidovic et al. 2019, 17).



Laying the groundwork. Numerous preparations, including consumer education, are necessary for developments in financial technology such as digital currencies, to be beneficial (photo by ADB).

Formal payment systems in the region operate nationally—rather than regionally—with examples including FIJICLEAR, Fiji’s real-time gross settlement system, and Kina Automated Transfer System in Papua New Guinea, which offers different types of settlement. At the same time, the World Bank’s Pacific Payments, Remittances and Securities Settlement Initiative aims to develop new integrated payment and settlement systems in Samoa, Solomon Islands, Tonga, and Vanuatu (Davidovic et al. 2019, 20).

Cross-border payments remain an essential source of income in the Pacific countries—amounting to 10% of GDP on average—because of high emigration rates and seasonal employment (Davidovic et al. 2019, 20). In Tonga, the percentage is substantially higher, exceeding 30% of GDP, while in Samoa it exceeds 15% of GDP (Davidovic et al. 2019, 20–21).

Meanwhile, substantial numbers of unregistered (i.e., not formally identified) people obstruct greater financial inclusion. An estimated 80% of the people in Papua New Guinea lack any clear form of identification (GSMA 2019). In 2017, the Bank of Papua New Guinea supported a pilot “IDBox” project—a digital identity management system using biometric data (fingerprints) and blockchain

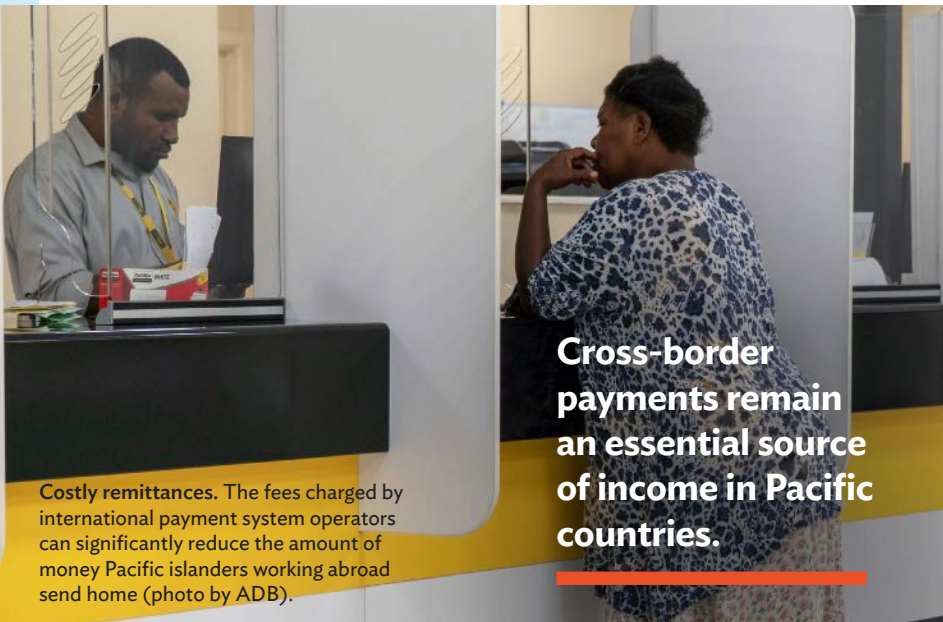


Heavy reliance on physical cash makes payments difficult.

Paper burden. Cash remains the preferred method for payments throughout the Pacific, which forces payers to make often time-consuming and costly trips to financial centers (photo by ADB).

database structure (GSMA 2019). The pilot usefully raised concerns about scalability and transaction capacity speeds (Davidovic et al. 2019, 43), and so the Asian Development Bank supported Papua New Guinea in developing a digital access tool (Schou-Zibell and Phair 2020). This tool—which gathers basic know-your-customer data and captures photo ID before wirelessly transferring it to a plastic identification card using near field communication technology—was successfully trialed as a proof of concept in 2019 (Davidovic et al. 2019, 44) and pilot testing is planned for 2021 (ADB 2020, 10). In 2020, the Government of Samoa contracted international consultants to provide technical assistance for establishing a country-wide identity management system—the National Digital Identification System—as part of a 3-year implementation plan (SBS n.d.).

Among other issues, the COVID-19 pandemic has led to a massive spike in cross-border remittances to Pacific island countries, with transfers to Fiji and Samoa increasing by as much as 400% (Zoumboulis n.d.). However, despite the growing money flows, the high fees charged by payment system operators and infrastructure providers (often with minimal or no competition) remain key obstacles for cross-border money transfers (Zoumboulis n.d.). They obstruct achievement of Sustainable Development Goal 10 targets, particularly the elimination of “remittance corridors with costs higher than 5%” and reduction of transaction costs of migrant remittances to less than 3% by 2030 (UN 2015).



Costly remittances. The fees charged by international payment system operators can significantly reduce the amount of money Pacific islanders working abroad send home (photo by ADB).

Cross-border payments remain an essential source of income in Pacific countries.

CBDC FOR FINANCIAL INCLUSION: DESIGN CHOICES

International regulatory interest in CBDCs is rising, as evidenced by the results of a recent survey by the BIS:

Ever more central banks are currently (or will soon be) engaged in CBDC work. Some 80% of central banks ... are engaging in some sort of work ..., with half looking at both wholesale and general-purpose CBDCs Some 40% of central banks have progressed from conceptual research to experiments, or proofs-of-concept; and another 10% have developed pilot projects (Boar, Holden, and Wadsworth 2020, 3).

While these numbers point to a shift toward greater overall engagement in CBDC projects globally, a closer look reveals that the types of such engagement vary substantially across countries.

Different Approaches to CBDCs

Advanced economies generally have weaker motivations to launch CBDCs: they tend to be mostly concerned with payments safety and opportunities to improve the efficiency of cross-border payments (Boar, Holden, and Wadsworth 2020, 4–5). Even for central banks actively involved in CBDC-related research, the instrument can be seen as a solution searching for a problem (Case Study 1).

In emerging market economies, by contrast, need is greater and thus overall interest in CBDC projects is much higher. The motivations of emerging market economies are also more varied than the developed economies, including goals as different as improving domestic payments efficiency and financial inclusion. This greater interest is more likely to lead to actual CBDC implementation. In fact, according to the BIS, “[e]very central bank that has progressed to development or a pilot [CBDC] project is an (emerging market economy) institution” (Boar, Holden, and Wadsworth 2020, 4). Overall, unlike developed economies, emerging market economies appear to emphasize the practical implementation of CBDCs aiming to resolve a broader variety of challenges (Case Study 2).

Finally, the group of central banks not actively considering CBDCs tend to come from smaller jurisdictions and to focus on other issues deemed more pressing (Boar, Holden, and Wadsworth 2020). Understandably, central banks in these

Case Study 1: Canada's CBDC Project

The Bank of Canada was one of the first central banks to research central bank digital currencies (CBDC), with its Project Jasper. In its four phases, phases 1 and 2 involved building and testing a proof of concept distributed ledger wholesale interbank payment system. Within this system, the central bank issued digital depository receipts “backed one for one by cash pledged...by the participants.”^a In other words, digital depository receipts acted as a new, digital type of currency that represented central bank deposits.

Different design choices were analyzed in phases 1 and 2. Phase 1 involved an Ethereum platform using a proof-of-work consensus algorithm, while phase 2 implemented a Corda platform in which the proof-of-work mechanism was replaced with the notary function performed by the central bank (footnote a).

Phase 3 involved implementing a CBDC for delivery-versus-payment settlement of tokenized assets.^b In phase 4, the Bank of Canada and the Monetary Authority of Singapore joined forces to work on a cross-border cross-currency distributed-ledger-based system which combines Project Jasper^c with Singapore's Project Ubin.^d

Following these stages of research and testing, the Bank of Canada published its evaluation of the need for it to issue a CBDC entitled “Contingency Planning for a Central Bank Digital Currency.”^e The document made clear that the central bank had “no plans to launch a CBDC,” but was building the capacity to issue “a general-purpose, cash-like CBDC should the need to implement one arise” (footnote e). According to the Bank of Canada, advance planning was necessary because capacity building would take several years.

The Bank of Canada has concluded that a CBDC could “become beneficial or even necessary” if (i) the use of banknotes declined beyond a certain threshold level, limiting the ability of Canadians to use cash widely as a payment instrument, or (ii) Canada's monetary sovereignty is threatened by the emergence of one or more alternative digital currencies replacing the Canadian dollar as the main form of money in the country (footnote e).

Ultimately, the Bank of Canada sees a CBDC as a potentially useful solution for problems that are yet to materialize, and its efforts have focused on developing the contingency plans and capacity to issue a CBDC should the need ever arise.

^a Chapman et al. 2017.

^b See Bank of Canada (2018).

^c Bank of Canada (n.d.).

^d Monetary Authority of Singapore (n.d.).

^e Bank of Canada (2020).

Source: Authors.

Case Study 2: The People’s Republic of China CBDC Project

The People’s Republic of China CBDC project, Digital Currency/Electronic Payment (DCEP), was pilot testing in early 2021 and expected to enter a new stage of testing closer to the start of the Beijing Winter Olympics (February 2022).^a

DCEP design envisages the distribution of the new currency via a two-tier system. In the first tier, the central bank will issue DCEP to commercial banks and third-party payment institutions. In the second tier, these banks and payment institutions will distribute these DCEP units to consumers (footnote a). The DCEP project therefore does not envisage complete disintermediation of incumbent payment system operators (which might risk commercial bank runs and otherwise upset the competition framework). It aims to use the third-party payment institutions’ resources and operational experience.

The exact operation of the two tiers, including the scope of cooperation between the central bank and first-tier recipients, remains unknown. However, the report suggests that DCEP will enjoy a preferred legal status and advanced security compared to privately issued payment systems like WeChat Pay and Alipay and will not be affected by the prospective insolvency of the entities operating such payment systems (footnote a).

DCEP governance will be centralized, with the People’s Bank of China in charge, and DCEP transactions will be fully traceable: “There’s an element of anonymity through a characteristic of DC/EP called ‘controlled anonymity’, but true anonymity doesn’t exist, as currency registration and traceability are built into DC/EP’s transaction process. That process, augmented by data mining and big-data analysis, provides the People’s Bank of China with the ability to have complete oversight over the use of the currency” (footnote a).

^a Hoffman et al. 2020.

Source: Authors.

countries are not persuaded to spend time and resources on CBDC projects and are likely to rely on research conducted by international organizations or regional networks (Boar, Holden, and Wadsworth 2020, 4).

Key Design Choices

The different motivations discussed in the previous section determine the design choices of CBDCs.

Now is the time to begin laying the groundwork for this potentially game-changing innovation.



Expanding financial inclusion. Digital currencies may help address some banking difficulties caused by Pacific countries' remote and dispersed geography (photo by ADB).

Wholesale or retail

Some CBDC designs envisage that the circulation of digital currency will be limited and end-users will only be financial institutions, so-called “wholesale” CBDCs. Other CBDC designs aim for broad, daily public use and are known as “retail” or “general-purpose” CBDCs.

The former could be used for improving the efficiency of interbank payments or securities settlement, as seen in Project Jasper (Canada), Ubin (Singapore), or Inthanon (Thailand).² However, these projects are likely to have minimal impact on financial inclusion.

In contrast, central banks interested in addressing financial inclusion are expected to consider issuing general-purpose CBDCs. The internal design of these can be either token-based or account-based.

Token-based or account-based CBDCs

The two types of general-purpose CBDCs differ mainly in verification. In token-based CBDCs, the object of verification is the digital token that represents

² See Bank of Thailand (2019) for further information.



each CBDC unit. This is similar to cash, in which verification amounts simply to determining whether relevant banknotes or coins are genuine (not counterfeit). In account-based CBDCs, verification of account holder identity is required (and usually done by an intermediary).

This design choice is likely to be important in the Pacific island countries, in that CBDCs will be crafted to work in areas with different levels of digital infrastructure development. Account-based CBDC systems resemble typical bank account models, where control of the account is linked to the account holder's identity (BIS 2020b). As a result, such CBDCs are only feasible in places with strong identity verification systems, and typically require good internet connectivity and smartphone use.

In contrast, token-based CBDCs could be more efficient in areas with limited connectivity, as end-users can exchange tokens stored in digital wallets. In token-based CBDCs, a central bank will typically honor the claims of users who can demonstrate knowledge of a certain value. Such value could be a secret key (a digital signature used in public-key cryptography) (BIS 2020b), in which storage would be either custodial (managed by a trusted third-party entity or service), non-custodial (residing on a physical device owned by the end-user), or some balance between the two options. These storage solutions may have a major impact on the benefits and risks associated with a token-based

CBDC. Non-custodial designs leave the control of the secret key in the hands of the end-user: on the one hand, they can provide truly universal access—as anyone would be able to obtain the relevant digital signature for the digital wallet (without the need for costly identification systems). On the other hand, unsophisticated consumers could lose access to their funds if they forget the private key or fail to keep it secret. In contrast, custodial designs rely on third-party verification of end-users’ credentials, which improves accessibility and lowers the risk of misplacing the secret keys at the cost of requiring identity management functionality (thus reproducing the main challenges of account-based CBDCs).

Token-based systems are likely to create obstacles for tracing money flows and enforcement of anti-money laundering laws (BIS 2020b). CBDC design will determine the level of anonymity afforded to end-users. Some experts have argued that cash-like anonymity could be the key benefit of retail CBDCs (Bech and Garratt 2017). However, the leading regulators in this area suggest that complete anonymity of CBDCs is unrealistic:

Full anonymity is not plausible. While anti-money laundering and combating the financing of terrorism (AML/CFT) requirements are not a core central bank objective and will not be the primary motivation to issue a CBDC, central banks are expected to design CBDCs that conform to these requirements (along with any other regulatory expectations or disclosure laws) (BIS 2020a).

One of the key policy challenges in designing any CBDC is determining which entities have access to the transaction data generated by it:

Striking this balance between public privacy (especially as data protection legislation continues to evolve) and reducing illegal activity will require strong coordination with relevant domestic government agencies (e.g., tax authorities) (BIS 2020a).

DLT or non-DLT based

Integration of distributed ledger technology (DLT) is a characteristic feature of many CBDC projects. However, DLT is not technically necessary: CBDC platforms could utilize conventional, centrally controlled databases. While both database structures can be used to store large amounts of data in different locations, the main difference lies in the process of updating stored records.

Centralized ledgers are the most common data storage device in finance today. Data can be stored in different physical nodes, but control is in the hands of a trusted administrator authorized to make changes to the database.

In distributed ledgers, multiple data storage points (nodes) are connected with each other and store all data simultaneously, and together constitute the common ledger. DLT requires consensus of those nodes. The technical details of how to achieve consensus vary; multiple concepts have been developed, such as proof-of-work,³ proof-of-stake,⁴ proof-of-authority,⁵ and many others. While the distributed nature of a database may offer certain security benefits, the need for some kind of coordination between nodes reduces overall transaction processing speed compared to centralized systems. Such need for coordination often makes DLT poorly suited for large-scale general access CBDCs in major economies. However, in small economies (such as in the Pacific), these issues are likely to be less pronounced, given the much lower overall transaction volumes.

Design Principles of the CBDC

In an October 2020 report, the BIS, in collaboration with several leading central banks, outlined core features and foundational principles of a CBDC (BIS 2020a). The report recognizes the role of central banks in issuing cash for public use and highlights the accelerated use of digital payments, with the general decline in the use of cash in payments being spurred on by the COVID-19 pandemic. As such, a primary driver for central banks in considering whether to issue a general-purpose CBDC is how it can be used as an alternative form of money for payments, complemented by physical central bank cash. In formulating its foundational principles, BIS (2020) follows a risk-based approach. It highlights the need to identify all potential risks associated with issuing a CBDC, particularly those that threaten financial stability or negatively impact financial market structures.

-
- ³ In a proof-of-work system, multiple servers (nodes) all try to solve one (generally complex and resource-intensive) mathematical problem. The first node to solve the problem is compensated for the “work” it has performed, while all others use the solution provided by the first node to verify that the problem has been correctly solved; thereby the solution to the mathematical problem assumes the function of a unique, one-time-use code.
 - ⁴ In a proof-of-stake system, the key function of adding new data to the ledger is facilitated by a group of network participants known as “validators.” Validators lock up some of their digital asset holdings as a stake in the ecosystem. Following that, on a blockchain network, the validators facilitate the introduction of new blocks (e.g., by proposing new blocks or approving them). When the block gets added, the validators get a block reward in proportion to their stake. If the validators fail to perform their functions, they get penalized (and may lose up to the amount of their stake).
 - ⁵ A proof-of-authority consensus algorithm leverages the value of identities. Like proof-of-stake algorithms, it relies on validators to add new data to the ledger. However, to become a validator on a proof-of-authority based ledger, a network participant is not required to stake any digital assets—proof-of-authority validators are identified and selected based on their reputation. Proof-of-authority can be considered a modification of a proof-of-stake consensus algorithm, whereby validators’ reputation acts as a “stake” (since the identify of all proof-of-authority validators is known, failure by a validator to perform its functions is likely to diminish its reputation).

BIS (2020) thus outlines three important foundational principles for central banks to consider in issuing a CBDC:

- (i) It should not interfere with public policy objectives or prevent banks from performing their monetary stability mandate (a “do no harm” principle).
- (ii) It should be used alongside and complement existing forms of money (the coexistence principle).
- (iii) It should promote innovation and competition to increase the overall efficiency and accessibility of the payment system (the innovation and efficiency principle) (BIS 2020a, 10).

Overall, BIS (2020) highlights the continued work of the world’s leading central banks in deciding whether to issue a CBDC. It is not meant to be definitive as to those decisions. BIS’s work will therefore continue, particularly in the next phase, which involves additional policy analysis and CBDC design choices and technical experimentation.

It is unlikely that the rollout of CBDC projects will be coordinated or that different CBDCs will use the same technology. Need for cross-border interoperability of different platforms is therefore likely to arise as new CBDC platforms continue to emerge. Further, many CBDC designs envisage public and private sector coordination, which creates pressure to ensure domestic interoperability across jurisdictions.

This brief expects interoperability to become a critical component of any CBDC design. The need for such interoperability has already been acknowledged by some of the leading central banks, including the Bank of Canada, the European Central Bank, the Bank of Japan, Sveriges Riksbank, the Swiss National Bank, the Bank of England, and the board of governors of the Federal Reserve System:

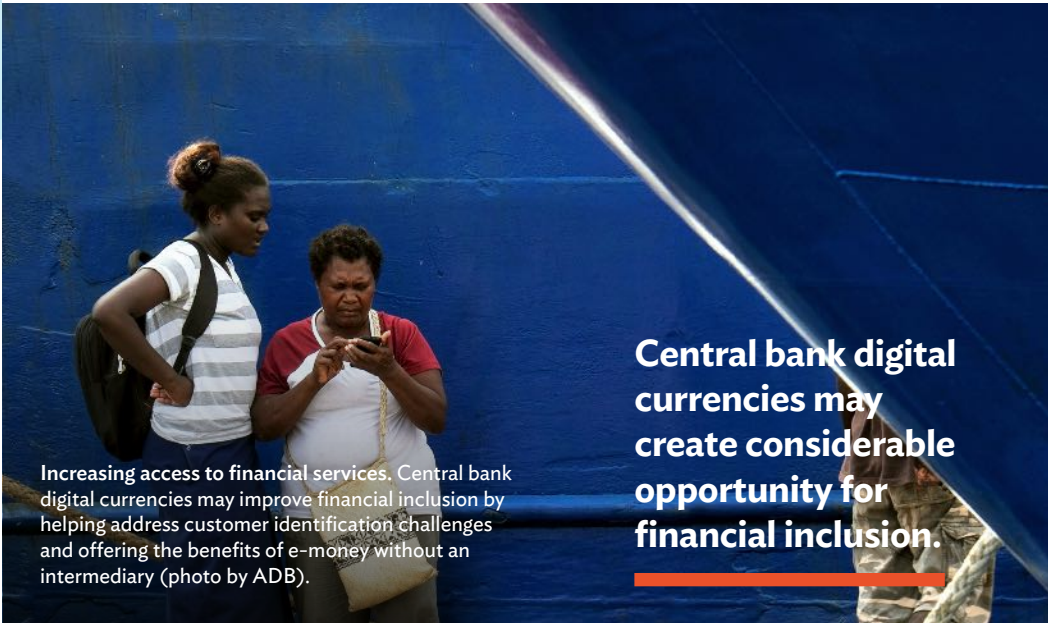
The potential for cross-border interoperability should be considered by central banks from the outset of research on CBDC (focusing on broad harmonization and compatibility between currencies to encourage safe and efficient transfers). The central banks in this group are therefore committed to coordinating as we move forward with our own domestic choices, exploring practical issues and challenges (BIS 2020a, 17).

CBDCS FOR FINANCIAL INCLUSION: THE OPPORTUNITIES

CBDCs may create considerable opportunity for financial inclusion. Depending on design and legal characteristics, a CBDC may offer all, some, or none of the benefits listed below.

First, CBDCs can help extend the typically insufficient reach of existing payment systems by implementing digital distribution channels and information and communication technology infrastructure to provide access to central bank money to most of a population. In countries where maintenance of high-volume, low-value payments and other financial services is deemed unsustainable or commercially unattractive for commercial banks or e-money operators, CBDCs can provide a government-authorized solution for storing value and making payments. This solution can help curb the risks of privately issued cryptocurrencies (particularly among non-expert end-users).

CBDCs can also be a useful channel for governments to make economic stimulus payments to individuals and businesses, particularly during crises. This is important for the Pacific island countries, which are particularly

A photograph of two women, one younger and one older, looking at a smartphone together. The younger woman is on the left, wearing a white and grey striped shirt and a backpack. The older woman is on the right, wearing a red and white shirt and a gold chain necklace. They are standing in front of a blue wall. The background of the entire page is a dark blue gradient with a bright light streak.

Increasing access to financial services. Central bank digital currencies may improve financial inclusion by helping address customer identification challenges and offering the benefits of e-money without an intermediary (photo by ADB).

Central bank digital currencies may create considerable opportunity for financial inclusion.

vulnerable to the effects of climate change and natural disasters. According to the World Risk Report 2019, many Pacific island countries are in the top-20 most-at-risk countries (Ruhr University Bochum 2019, 7). Vanuatu has the highest disaster risk worldwide, with Tonga third, Solomon Islands fourth, and Papua New Guinea sixth; Fiji and Timor-Leste were ranked 12th and 15th globally (Ruhr University Bochum 2019).

Second, by issuing a CBDC, a state may pre-empt some of the customer verification problems associated with privately issued means of payment: if the private sector has not yet developed appropriate customer identification formats, a government can integrate secure customer verification tools into the CBDC from day one. This may help achieve the objectives of anti-money laundering laws and is likely to induce the private sector to improve consumer due diligence.

Third, a CBDC may promote the digitization of value chains in the economy, such as in agriculture, promoting person-to-business and business-to-business payments (Cenfri 2019, 4). It can also foster interoperability within the financial services sector by linking different payment systems through application programming interfaces (Raghuveera 2020), similar to how open banking frameworks around the world are linking financial institutions. Overall, CBDCs can help states build robust digital payment ecosystems.

Fourth, a CBDC can reduce cash management costs, which are particularly high in developing economies for several reasons, such as expensive distribution and safekeeping security, and reliance on bank branches (Raghuveera 2020). It can lower the cost of maintaining the supply of physical currency and protecting it against counterfeiting. It can also create benefits for private payment system operators by reducing the bookkeeping, operational, and payment reconciliation costs (Cenfri 2019, 6). Merchants may benefit from reduced cash logistics and individuals from minimized ATM withdrawal costs (Cenfri 2019).

Fifth, CBDCs can provide regulators with additional tools for exercising national policy (particularly monetary). They can give central banks access to greater data about the economy and monetary flows, thus facilitating monitoring and supervision (particularly in relation to key government expenditure in areas like public procurement). CBDCs can make possible certain monetary policy instruments, including negative interest rates (which are otherwise typically impracticable because of the risk of mass escape into cash). Overall, the control exercised by the state over CBDC interest rates is likely to improve the pass-through effects of monetary policy, making it harder for financial institutions not to adjust their own interest rates accordingly.

At the same time, CBDCs can act as a useful—and more secure and efficient—alternative to decentralized cryptocurrencies (like Bitcoin) that raise multiple challenges in terms of consumer and investor protection, combating money laundering and the financing of terrorism, enforcement of tax laws, and international sanctions.

Sixth, a CBDC has important advantages over other payment instruments used to promote financial inclusion, particularly e-money (also known as mobile money).⁶ Although mobile money platforms are particularly popular in sub-Saharan Africa (with almost 50% of the global share of registered mobile money customers) and South Asia (with a share of almost 34%) (Cenfri 2019, 8), several projects have been recently launched in the Pacific (Case Study 3).

Unlike in e-money, CBDC issuers do not require an intermediary (such as a mobile operator) to issue CBDC units: by definition, a CBDC represents a direct liability of the relevant central bank. The CBDC also does not have to replace e-money and can be used solely for keeping the stored value safe. Suppose the float is kept in a commercial bank account. In that case, insolvency of the relevant bank (in a country with deposit insurance) will typically allow

Case Study 3: e-Money in Fiji

The total volume of e-money in circulation stood at F\$32.2 million as of 31 December 2019, up almost 10% annually.^a The number of registered accounts increased by 11%, to 345,323 accounts. Nevertheless, the share of clients actively using their accounts remained low, at just 44% of all registered users, translating into only 24.2% of adult population with an active e-money account (footnote a).

The year 2019 saw a major drop (72.9%) in the total value of e-money payments in the country, from almost F\$280 million in 2018 to F\$75.8 million in 2019. The reduction was caused by the completion of government assistance programs disbursed through e-money platforms in the aftermath of Tropical Cyclones Jose and Keni (footnote a). However, as could be expected, the figures for 2020 tell a different story: remittances through e-money “recorded an unprecedented surge at \$82.1 million as at 31 December 2020” (footnote b).

^a National Financial Inclusion Taskforce and Reserve Bank of Fiji (2019, 14).

^b National Financial Inclusion Taskforce and Reserve Bank of Fiji (2020).

Source: Authors.

⁶ For a detailed analysis of the distinguishing features of e-money compared to other currency types, see Didenko and Buckley (2019).



Promoting digitization. Central bank digital currencies can help states build robust digital payment ecosystems by linking different payment systems (photo by ADB).

the account holder to recover up to the maximum amount guaranteed by the deposit insurance scheme (if any), which will typically be relatively very small. However, the use of a CBDC for this purpose will allow holders of stored value to guarantee the safety of the entire float even if the float amount exceeds the deposit insurance cap. Furthermore, in smaller countries with a low number of banks that can be used for storing the float, CBDCs can avoid the risks of insufficient market competition (and thus potentially higher costs charged by the holder of stored value) or potential exit from the relevant market by one or more of the commercial banks.

In addition, the state can generate additional demand for CBDCs through regulation (e.g., by giving the CBDC units the quality of legal tender) and accepting CBDC for payment of taxes and charges.

Seventh, of particular relevance to the Pacific, CBDCs have the potential to address some of the recurring challenges of cross-border payments. In 2020, the G20 made enhancing cross-border payments a strategic priority and issued three dedicated reports: (i) the stage 1 Financial Stability Board report “Enhancing Cross-Border Payments” (FSB 2020a); (ii) the stage 2 report, “Enhancing Cross-Border Payments: Building Blocks of a Global Road Map,” by the Committee on Payments and Market Infrastructures (BIS 2020c); and (iii) the stage 3 road map, which sets out a detailed agenda for the years 2020–2025 (FSB 2020b).



A central bank digital currency may promote the digitization of value chains in the economy, such as in agriculture.

The reform proposed by the G20 aims to facilitate cross-border payments while retaining the existing international payments infrastructure. Notably, one of the focus areas identified in the above reports is “[e]xploring the potential role of *new payment infrastructures and arrangements*” (FSB 2020b). Among other things, this seeks to identify to what extent CBDCs may facilitate cross-border payments (Committee on Payments and Market Infrastructures 2020).

In a cross-border context, CBDCs can be implemented in different ways. On the one hand, they could be used to make payments to and from another currency area. On the other, different jurisdictions may facilitate the interoperability of their domestic CBDC platforms to simplify cross-currency payments.⁷ The resulting benefits could be substantial and may include (i) faster transaction processing on a 24/7 basis; (ii) improved transparency; or (iii) enhanced settlement mechanisms (e.g., “atomic” settlement, which guarantees, in a bilateral settlement, that transfer of a currency in one direction occurs if and only if a corresponding transfer is made in the opposite direction) that could, among other things, facilitate intraregional trade.⁸

While these prospective innovations may hold significant potential, at the time of writing, they remained entirely unproven or at very early stages of development because of insufficient insight into the underlying challenges associated with innovative technologies.

⁷ See BIS (2020a, 7).

⁸ See Lopez et al. (2020).

CBDC FOR FINANCIAL INCLUSION: THE CHALLENGES

Although CBDCs can generate substantial opportunities for financial inclusion, the underlying challenges can also be significant.

First, effective implementation of a CBDC is conditional on the availability of required infrastructure (electricity, internet, cellular network coverage, smartphone penetration, and digital ID systems). Some countries may already have established physical payments infrastructure that could be adjusted to accommodate the CBDC integration. Others will need to develop it specifically for the CBDC.

Overall, electricity and internet access are expected to be the main enablers of CBDCs for financial inclusion. Some CBDCs can theoretically implement workarounds to operate in low-bandwidth areas (such as DCEP’s “touch and touch” functionality allowing users to make peer-to-peer transfers by touching their mobile devices) (Yeung 2020). But generally, no simple solution exists for low internet penetration, and any solution requires a token-based system (with its own challenges, such as obstacles to enforcement of anti-money laundering laws and the need for adequate cybersecurity). Smartphone penetration is important for developing comprehensive and secure CBDC wallets because of the level of cryptography involved (Raghuveera 2020) and the need for greater accessibility of mobile wallets.

Second, as with any type of currency, the level of implementation of a CBDC will ultimately depend on the level of trust, demand, and understanding among end-users. In a recent study, only “54% of respondents stated they would trust a digital currency issued by their government or central bank.”⁹ Several factors can cause a lack of trust.

Insufficient technological and financial literacy may lead to confusion between a CBDC, a privately issued decentralized cryptocurrency (like Bitcoin), a centralized, stable coin pegged to an official currency (like Tether or Diem), and a “synthetic” CBDC, as discussed above. The lack of a widely accepted terminology for digital currencies exacerbates the issue. Consequently, in the Pacific, the rollout of CBDCs will likely require additional consumer-based

⁹ See Haig (2020). This survey was conducted in a range of countries, including some developed: Australia, France, the Republic of Korea, Singapore, the United States and the United Kingdom; and some emerging: Brazil, the Philippines, South Africa, Turkey, and Viet Nam.

programs focusing on (i) financial literacy and awareness-raising, (ii) collection of feedback and complaints from end-users, and (iii) consumer protection standards (Raghuveera 2020).

Furthermore, the issuer's reputation may discourage adoption of a new type of currency: as Ecuador has demonstrated, a sovereign issuer or sovereign backing is not of itself enough to guarantee success (Case Study 4).¹⁰

Ultimately, unless the state bans all alternative forms of official currency and forces the transition to a CBDC (which would be highly unusual), market forces will determine CBDC usage. Although sovereigns have a broader arsenal of tools at their disposal (such as the prerogative to designate a CBDC as the official currency equivalent to cash and funds in bank accounts), the need remains to generate sufficient trust in, and demand for, a CBDC. In some economies, the resilience of the underlying technology (like DLT), the composition of the governing entity, and the legal status and reputation of the central bank responsible for the CBDC will often be sufficient. However, where a state or central bank has failed to meet its obligations in the past, state backing may mean little; and when inadequate, additional supporting mechanisms may be needed (such as the price stabilization of Venezuela's Petro—which nonetheless failed) (Government of Venezuela 2018).

Case Study 4: Ecuador's Dinero Electronico

Ecuador announced the launch of a central-bank-operated e-money platform (*dinero electronico*) in 2014, but because of a lack of demand, the project was wound down in 2018.^a

Unfortunately for the Ecuadorian project, the Government of Ecuador had frequently defaulted on sovereign bonds in the past, and thus “it was reasonable for an informed citizen in 2014–17 to think that dollars on deposit at a private commercial bank in Ecuador were *less* risky than dollars on deposit at the central bank” (footnote a). As a result, a lack of demand led to the eventual termination of the program.

^a See Banco Central del Ecuador (2018) and White (2018).

Source: Authors.

¹⁰ See White (2018).

Third, regulatory expertise will be crucial to liberate the benefits and curb the risks of CBDCs. Experience suggests that even central banks in major economies may struggle with the technological implications of CBDCs. It is expected that the development of CBDC platforms in Pacific island countries will be outsourced to third-party developers, in which case, regulators must have the capacity to understand the CBDC programming code and ensure CBDC platforms do not function as “black boxes.” The offering of a CBDC, in addition to current monetary and payment arrangements, is a fundamental change to the financial architecture of any country and thus must be understood in depth by its central bank.

Fourth, the rollout of CBDCs with general access creates new cybersecurity risks for all stakeholders involved in CBDC operation, including the regulators and even financially literate users. While in recent years, several major economies have enhanced their cybersecurity frameworks,¹¹ the corresponding legal frameworks in the Pacific are likely to be insufficiently advanced to match the magnitude of risks associated with the CBDCs. After all, CBDC platforms can only be secure if (i) they are supported by underlying technology and design; (ii) the regulator has the capacity to efficiently oversee CBDC operations, gather cybersecurity intelligence, pre-empt risks, and coordinate recovery efforts in case of a cyber incident; and (iii) end-users understand how to use the relevant technology and minimize its risks.

Fifth, every CBDC project raises a broad range of competition issues. Depending on the type and size of the economy, by issuing a CBDC, a central bank may engage in competition with commercial banks, central counterparties, other payment system operators, and even other central banks. The CBDC may also directly compete with other types of currency in circulation. In Pacific island countries with generally lower levels of financial inclusion and less diversified payment systems, CBDCs are most likely to impact commercial banks and e-money operators. At the same time, the impact on competition will ultimately depend on the CBDC design. On the one hand, DLT may be used to disintermediate access to the new currency, sidelining incumbent payment system operators. On the other, CBDCs may be used in tandem with other payments instruments in a synergistic manner (e.g., if CBDCs are integrated into e-money platforms and used to maintain the safety of the float).

Sixth, outsourcing the development of CBDC platforms raises a wide range of issues. If costs of development are not paid upfront (by or on behalf of the relevant state or development agency), cost-recovery mechanisms are likely to be put in place—and need to be both reasonable and safe from the point of view of the overall monetary sovereignty of the implementing country (Case Study 5).

¹¹ See Didenko (2020).

Case Study 5: Marshall Islands Central Bank Digital Currency Legislation

In 2018, the Republic of the Marshall Islands passed legislation for an upcoming initial coin offering of up to 6,000,000 “Sovereign” (SOV)^a units issued on a digital ledger technology platform by the Ministry of Finance (out of 24,000,000 units).^b According to the new legislation, the SOV “shall be legal tender of the Republic of the Marshall Islands.”^c

The development and issuance of the SOV are outsourced to a third-party developer (Appointed Organizer), which bears all relevant upfront costs: “The costs necessary to issue the SOV and perform the (initial coin offering) shall be borne by the Appointed Organizer. The Republic of the Marshall Islands (RMI) shall not be required to contribute any of the costs necessary to issue the SOV and perform the ICO.”^d

Cost-recovery is on an *ex post* basis: the Appointed Organizer receives 50% of the overall issuance amount (12 million out of 24 million SOV units).^e This is not a cost-recovery model one would ever endorse as a way to proceed to issue a Central Bank Digital Currency—the cost of the digital currency, at 50% of its proceeds, is grossly excessive, disproportionate, and unfair to the issuing country.

^a See Declaration and Issuance of the Sovereign Currency Act 2018 s303(a). https://rmi.parliament.org/cms/images/LEGISLATION/PRINCIPAL/2018/2018-0053/DeclarationandIssuanceoftheSovereignCurrencyAct2018_1.pdf.

^b See the same Act, s305(3).

^c See the same Act s303(a).

^d See the same Act, s305(1).

^e See the same Act, s309.

Source: Authors.

Outsourcing arrangements will need to provide sufficient protection in case of inadequate coding or programming, such as allocation of liability and insurance. In our experience from our private banking practice, software development contracts often substantially limit the developer’s liability. This phenomenon has been referred to as an unusual “legal cocoon” of software developers in academic literature. According to one study based on the examination of hundreds of software license agreements, the problem is not limited to software developed for consumers, but remains prevalent even in contracts with sophisticated commercial parties (Riedy and Hanus 2017). The software

can be offered “as is” (effectively eliminating liability); may come with excluded warranties and with express acknowledgment that it may not be error-free; finally, even where developer liability remains, it is likely to be capped (e.g., to the amount of fees paid for the development of the software). At the same time, the potential reputational risks of central banks implementing a poorly functioning CBDC can be unlimited. As a result, it is critical that central banks that wish to experiment with CBDCs plan accordingly and develop appropriate protections, contractual and otherwise.

Seventh, while this policy brief’s scope is limited to digital currencies issued by central banks, many Pacific island countries lack a central bank that could act as administering authority for a CBDC, an obvious challenge. Only Fiji, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, and Vanuatu had an independent central bank at the time of writing.

NEXT STEPS

Following are steps that must be taken into account when determining the viability of a CBDC rollout in Pacific island countries.

First, CBDC designs should consider the results of research performed by overseas central banks and international organizations. In particular, this brief emphasizes the three design principles listed in the recent report prepared by the BIS jointly with a group of leading central banks:

“The principles emphasize that: (i) a central bank should not compromise monetary or financial stability by issuing a CBDC; (ii) a CBDC would need to coexist with and complement existing forms of money; and (iii) a CBDC should promote innovation and efficiency” (BIS 2020a).

Second, not all CBDC designs are meant to address financial inclusion challenges. It is expected that CBDCs with general access will have the greatest effect on financial inclusion and will be particularly relevant for the Pacific island countries.

Third, CBDCs in the Pacific should make best use of opportunities for regional collaboration and existing arrangements in the sector, such as the *Samoa Commitment for the Pacific Islands*, which confirmed the intention of central bank governors to “deepen and enhance the efficiency of [the] financial systems, so as to best support economic development and inclusion in [the]

region” and agreement to “lead the development of a regional ‘know-your-customer’ facility and associated regionally-linked payment and settlement arrangements” (Reserve Bank of Australia 2018). The Alliance for Financial Inclusion has also started exploring the opportunities of CBDCs (AFI 2020). In addition, countries could consider experiences of other island nations in developing CBDC projects (Case Studies 6 and 7).

Case Study 6: Eastern Caribbean Central Bank DCash Project

In March 2019, the Eastern Caribbean Central Bank launched its CBDC project, envisaging a digital version of the Eastern Caribbean dollar—DCash. The project is in the pilot stage to assess potential for the CBDC to deepen financial inclusion, economic growth, resilience, and competitiveness in the Eastern Caribbean Currency Union.^a

According to the central bank, DCash has legal tender status, but the central bank does not intend to eliminate cash.^b

The DCash project does not aim to completely disintermediate incumbent payment system operators: The new currency is expected to be issued directly to financial institutions so that the latter could distribute it to customers.^b

From a technical perspective, the DCash platform requires an internet connection to initiate a transfer (recipients can be offline at the time of transfer but will only see a change in their balance once they are back online).^c

The central bank plans to issue corresponding guidance for consumers, merchants, and financial institutions to establish “all objectives, terms, and conditions that should be observed during the pilot” (footnote b).

^a Eastern Caribbean Central Bank. n.d. About the Project <https://www.eccb-centralbank.org/p/about-the-project>.

^b Eastern Caribbean Central Bank. n.d. Frequently Asked Questions. <https://www.eccb-centralbank.org/p/frequently-asked-questions>.

^c Eastern Caribbean Central Bank. Accounts. <https://www.eccb-centralbank.org/p/accounts>.

Source: Authors.

Fourth, in light of the relatively low number of competing payment system providers in the region, Pacific island central banks need to seriously consider the potential negative implications of CBDCs for competition in the sector. Specifically, they should assess to what extent CBDCs can be integrated into existing privately issued products and services—and how such integration could be best achieved.

Fifth, the rollout of a CBDC by Pacific island countries should be assisted by a range of activities aimed at promoting customer understanding of the new technology, to generate demand, and promote trust in the issuing central bank—and equally important to prevent misuse and abuse of less financially literate and technologically savvy people.

Some of these themes are highlighted in the experience of the Bahamas (Case Study 7).

Case Study 7: Bahamian Sand Dollar Project

The Central Bank of The Bahamas announced a gradual release of a digital version of the Bahamian dollar starting from 20 October 2020.^a The new currency, known as the “sand dollar,” is rolling out in stages.

The first phase covers the end of 2020 and the first quarter of 2021. It focuses on making the sand dollar available across the private sector, among three tiers of authorized accounts: (i) low-value personal wallets with lower transaction limits, (ii) regular personal accounts, and (iii) business or enterprise accounts. Each tier comes with different know-your-customer requirements. The second phase (first and second quarters of 2021) targets government services and public utilities (footnote a).

Authorized financial institutions are facilitating the rollout of sand dollars: Several money transmission businesses, payments service providers, and one commercial bank have been permitted to offer sand dollar services to end-users. Sand dollar wallets are protected by multi-factor authentication (all mobile devices must support a device passcode or biometrics) (footnote a). All authorized sand dollar wallet providers are expected to offer interoperable sand dollar services (cross-platform interoperability is expected to be implemented “during the early months of 2021”).^b

Importantly, the Central Bank of The Bahamas’ strategy includes “sustained financial literacy campaigns to boost product awareness and encourage more positive behavior around personal finances” and “education around cyber safe financial behavior” (footnote b).

^a Central Bank of The Bahamas (2020).

^b Sanddollar (2020).

Source: Authors.

CONCLUSION

There is no one-size-fits-all approach to CBDCs for financial inclusion, no single accepted method of CBDC implementation, nor any agreed technology or design underlying CBDCs. The global best practice could hardly be less settled. A CBDC is not only a complex kit of software, but rather it is a complex digital framework capable of generating both economy-wide benefits and economy-wide shocks, as noted.

In sufficient time, the issuance of CBDCs will almost certainly come to pass in the Pacific, as CBDCs should offer a simple and highly efficacious solution to (i) high remittance costs that currently serve as a tax on the earnings of Pacific islanders abroad, when they send earnings to families at home; and (ii) financial inclusion challenges of the region, driven mostly by geography.

In the Pacific, the design of any CBDCs will be determined by the central banks. Still, one imagines a centralized account structure in which the ledger sits with the central bank, and the accounts are managed by the commercial banks and other reliable financial entities, which may well be the preferred option. Whether the choice is for a token-based or account-based system probably depends mostly on internet penetration and smartphone usage rates, and thus the choices taken may vary between countries.

The establishment and operation of a CBDC by any Pacific country will require considerable expertise and a deep understanding of the design choices and issues to which this fundamentally new form of currency will give rise. This brief argues that now is not the time to issue a CBDC, but it is most certainly the time to begin to develop necessary expertise and understanding of CBDCs. Understanding such matters requires focused study and substantial time for reflection and working through all the consequences. Pacific island central banks need to establish internal units to research and explore the options around the design and implementation of CBDCs.

Since the level of sophistication and understanding of the underlying issues is likely to vary substantially across Pacific island countries, readiness assessments for individual jurisdictions across the region would serve as useful starting points before initiating the development of CBDC projects (whether on a country-by-country or regional basis).

If well-designed and implemented, CBDCs offer a genuine and, most likely, the best solution to the financial inclusion and remittance problems that currently challenge the Pacific.

REFERENCES

- Asian Development Bank (ADB). 2018. *Pacific Energy Update 2018*. Manila. <https://www.adb.org/sites/default/files/institutional-document/425871/pacific-energy-update-2018.pdf>.
- AFI. 2020. AFI Members Explore Central Bank Digital Currency Opportunities. 16 November. <https://www.afi-global.org/news/2020/11/afi-members-explore-central-bank-digital-currency-opportunities>.
- Banco Central del Ecuador. 2018. *Sobre los Saldos de las Cuentas de Dinero Electrónico*. 1 April. <https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/1081-sobre-los-saldos-de-las-cuentas-de-dinero-electronico>.
- Bank for International Settlements (BIS). 2020a. *Central Bank Digital Currencies: Foundational Principles and Core Features*. Report No 1. Basel. <https://www.bis.org/publ/othp33.pdf>.
- BIS. 2020b. *BIS Quarterly Review: International Banking and Financial Market Developments*. Basel. https://www.bis.org/publ/qtrpdf/r_qt2003.pdf.
- . 2020c. *Enhancing Cross-Border Payments: Building Blocks of a Global Roadmap*. Basel.
- Bank of Canada. n.d. *Digital Currencies and Fintech: Projects*. Ottawa. <https://www.bankofcanada.ca/research/digital-currencies-and-fintech/projects/#project-jasper>.
- . 2018. *Jasper Phase III: Securities Settlement Using Distributed Ledger Technology*. Ottawa. https://www.payments.ca/sites/default/files/jasper_phase_iii_whitepaper_final_0.pdf.
- . 2020. *Contingency Planning for a Central Bank Digital Currency*. 25 February. Ottawa. <https://www.bankofcanada.ca/2020/02/contingency-planning-central-bank-digital-currency>.
- Bank of Thailand. 2019. *Enhancing Bond Lifecycle Functionalities & Programmable Compliance Using Distributed Ledger Technology*. Thailand. https://www.bot.or.th/English/FinancialMarkets/ProjectInthanon/Documents/Inthanon_Phase2_Report.pdf.

- Bech, Morten, and Rodney Garratt. 2017. Central Bank Cryptocurrencies. *BIS Quarterly Review*. Basel.
- Boar, Codruta, Henry Holden, and Amber Wadsworth. 2020. Impending Arrival – A Sequel to the Survey on Central Bank Digital Currency. *BIS paper No 107*. Basel. <https://www.bis.org/publ/bppdf/bispap107.pdf>.
- Cenfri. 2019. *The Use Cases of Central Bank Digital Currency for Financial Inclusion: A Case for Mobile Money*. Tyger Valley, South Africa. https://cenfri.org/wp-content/uploads/2019/06/CBDC-and-financial-inclusion_A-case-for-mobile-money.pdf.
- Central Bank of the Bahamas. 2020. The Sand Dollar is on Schedule for Gradual National Release to The Bahamas in mid-October 2020. Public Update. <https://www.centralbankbahamas.com/viewPDF/documents/2020-09-25-18-25-20-PSDPublic-Update-20200925-Final.pdf>.
- Chapman, James, Rodney Garratt, Scott Hendry, Andrew McCormack, and Wade McMahon. 2017. Project Jasper: Are Distributed Wholesale Payment Systems Feasible Yet?. *Bank of Canada Financial System Review* (June). Ottawa. <https://www.bankofcanada.ca/wp-content/uploads/2017/05/fsr-june-2017-chapman.pdf>.
- Committee on Payments and Market Infrastructures. 2020. *Enhancing Cross-border Payments: Building Blocks of a Global Roadmap*. Stage 2 Report to the G20–Technical Background Report. <https://www.bis.org/cpmi/publ/d194.pdf>.
- Coral Sea Cable Company. n.d. About the Project. <https://www.coralseacablesystem.com.au/about/>
- Davidovic, Sonja, Elena Loukoianova, Cormac Sullivan, and Hervé Tourpe. 2019. *Strategy for Fintech Applications in the Pacific Island Countries*. IMF report No. 19/14. <https://www.imf.org/-/media/Files/Publications/DP/2019/English/sfapicea.ashx>.
- Dickey, Lauren, Erica Downs, Andrew Taffer, and Heidi Holz with Drew Thompson, S. Bilal Hyder, Ryan Loomis, and Anthony Miller. 2019. *Mapping the Information Environment in the Pacific Island Countries: Disruptors, Deficits, and Decisions*. CNA report. https://www.cna.org/CNA_files/centers/cna/cip/disinformation/IRM-2019-U-019755-Final.pdf.

- Didenko, Anton N. 2020. Cybersecurity Regulation in the Financial Sector: Prospects of Legal Harmonization in the European Union and Beyond. *Uniform Law Review*. 25 (1): pp. 125.
- Didenko, Anton N., and Ross P. Buckley. 2019. The Evolution of Currency: Cash to Cryptos to Sovereign Digital Currencies. *Fordham International Law Journal* 42 (4): p. 1041.
- Financial Stability Board (FSB). 2020a. *Enhancing Cross-border Payments: Stage 1 Report to the G20*. Basel.
- Financial Stability Board. 2020b. *Enhancing Cross-border Payments: Stage 3 Roadmap*. Basel.
- Gobierno Bolivariano de Venezuela (Government of Venezuela). 2018. Petro: Towards the Economic Digital Revolution (White Paper) <https://www.petro.gob.ve/eng/assets/descargas/petro-whitepaper-english.pdf>.
- GSMA. 2019. *Digital Transformation: The Role of Mobile Technology in Papua New Guinea*. London. <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/03/Digital-Transformation-The-Role-of-Mobile-Technology-in-Papua-New-Guinea.pdf>
- Haig, Samuel. 2020. Survey: Consumers Trust CBDCs over Privately-Issued Crypto Assets. *Cointelegraph*. 20 April. <https://cointelegraph.com/news/survey-consumers-trust-cbdcs-over-privately-issued-crypto-assets>
- Hoffman, Samantha, John Garnaut, Kayla Izenman, Matthew Johnson, Alexandra Pascoe, Fergus Ryan, and Elise Thomas. 2020. The Flipside of China's Central Bank Digital Currency. ASPI Report no. 40. https://s3-ap-southeast-2.amazonaws.com/ad-aspi/2020-10/Digital%20currency_1.pdf?170Ql0lhfgfSIJeH6YKTN0ml.Y6MLHLI.
- International Monetary Fund (IMF). 2018. The Bali Fintech Agenda—Background Paper. Policy Report. Attachment I. Washington, DC.
- Lopez, Marcos Allende, Antonio Alleyne, Laura Giles Alvarez, Jeetendra Khadan, and Kimberly Waithe. 2020. A Caribbean Settlement Network: Can Blockchain Ease Intra-regional Trade in the Caribbean?

<https://publications.iadb.org/publications/english/document/A-Caribbean-Settlement-Network-Can-Blockchain-Ease-Intra-regional-Trade-in-the-Caribbean.pdf>.

Monetary Authority of Singapore. n.d. *Project Ubin: Central Bank Digital Money Using Distributed Ledger Technology*. <https://www.mas.gov.sg/schemes-and-initiatives/project-ubin>

National Financial Inclusion Taskforce and Reserve Bank of Fiji. 2019. *Financial Inclusion Report*. http://www.nfitfiji.com/wp-content/uploads/Fiji-Financial-Inclusion-Annual-report-2019_final.pdf.

———. 2020. *Financial Inclusion Report*. <https://www.rbf.gov.fj/wp-content/uploads/2021/03/FINANCIAL-INCLUSION-REPORT-2020.pdf>.

Raghuveera, Nikhil. 2020. Central Bank Digital Currency Can Contribute to Financial Inclusion but Cannot Solve its Root Causes. *Atlantic Council*. 10 June. <https://www.atlanticcouncil.org/blogs/geotech-cues/central-bank-digital-currency-can-contribute-to-financial-inclusion-but-cannot-solve-its-root-causes/>.

Reserve Bank of Australia. 2018. Samoa Commitment for the Pacific Islands. Media Release. 29 November. <https://www.rba.gov.au/media-releases/2018/mr-18-30.html>.

Riedy, Marian K., and Bartłomiej Hanus. 2017. It Is Just Unfair Using Trade Laws to “Out” Security Software Vulnerabilities. *Loyola University Chicago Law Journal*. 48: p. 1099.

Ruhr University Bochum. 2019. *WorldRiskReport*. https://reliefweb.int/sites/reliefweb.int/files/resources/WorldRiskReport-2019_Online_english.pdf.

Sanddollar. 2020. Public Update—The Bahamas Digital Currency Rollout. <https://www.sanddollar.bs/publicupdates/public-update-the-bahamas-digital-currency-rollout>.

Safira, Nabilah. 2020. Toward Financial Inclusion in Pacific Islands. Press Release. 4 November <http://www.techinapacific.com/toward-financial-inclusion-pacific-islands/>.

Samoa Bureau of Statistics (SBS). n.d. National ID. <https://www.sbs.gov.ws/nationalid>.

Schou-Zibell, Lotte, and Nigel Phair. 2020. COVID-19 has Created Digital Opportunities in the Pacific. *Asian Development Blog*. 6 July. <https://blogs.adb.org/blog/covid-19-has-created-digital-opportunities-pacific>.

United Nations (UN). 2015. Transforming Our World: The 2030 Agenda for Sustainable Development. GA Res 70/1, UN Doc A/RES/70/1.

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). 2018. Broadband Connectivity in Pacific Island Countries. Working Paper. Bangkok. https://www.unescap.org/sites/default/files/PACIFIC_PAPER_Final_Publication_1_3.pdf.

———. 2020. Telecommunication Infrastructure Index (TII) and Its Components. In, *E-Government Survey 2020*. pp. 288–293.

White, Lawrence. 2018. The World's First Central Bank Electronic Money Has Come—And Gone: Ecuador, 2014–2018. *Cato Institute Blog*. 2 April. <https://www.cato.org/blog/worlds-first-central-bank-electronic-money-has-come-gone-ecuador-2014-2018>.

World Bank. n.d. Mobile Cellular Subscriptions (Per 100 People). World Bank Data. <https://data.worldbank.org/indicator/IT.CEL.SETS.P2>.

Yeung, Karen. 2020. What is China's Cryptocurrency Alternative Sovereign Digital Currency and Why Is it Not Like Bitcoin? *South China Morning Post*. 13 May. <https://www.scmp.com/economy/china-economy/article/3083952/what-chinas-cryptocurrency-sovereign-digital-currency-and-why>.

Zoumboulis, Nicolas. n.d. COVID-19 Leads to Huge Growth in Digital Money Transfers to Pacific but Concerns Remains over High Fees. ABC. <https://www.abc.net.au/radio-australia/programs/pacificbeat/covid-significant-growth-in-pacific-digital-remittances/12731412>.

APPENDIX: FINANCIAL INCLUSION STATISTICS, SELECTED PACIFIC ISLAND COUNTRIES

Country	Adults Who Saved Money at a Formal Institution	Formally Banked Adults	Adults with Credit	Adults with Insurance Products	Remittances (sent or received)
Fiji ^a	39.3%	79.5%	12.6%	41%	23.3%
Papua New Guinea ^b	37%	36.96%	2.4%	n/a	n/a
Samoa ^c	11.1%	39%	13.4%	20.6%	58.3%
Solomon Islands ^d	17.08%	27.26%	3.87%	7.08%	35.94%
Tonga ^e	18.2%	48.0%	13.6%	13.4%	73.2%
Vanuatu ^f	26.8%	36.7%	9.2%	5.4%	48.6%

^a FIJI: National Financial Inclusion Taskforce and Reserve Bank of Fiji (2020) Financial Inclusion Report (Report, 2020) <https://www.rbf.gov.fj/wp-content/uploads/2021/03/FINANCIAL-INCLUSION-REPORT-2020.pdf>; Reserve Bank of Fiji, Financial Services Demand Side Survey Republic of Fiji (Report, 2015) 35 <http://www.pfip.org/wp-content/uploads/2016/08/Financial-Services.pdf>.

^b PAPUA NEW GUINEA: Centre for Excellence in Financial Inclusion, (Second) National Financial Inclusion Strategy 2016–2020 <http://www.pfip.org/wp-content/uploads/2017/01/2-PNG-NATIONAL-FINANCIAL-INCLUSION-STRATEGY-2016-2020-final.pdf>.

^c SAMOA: PFIP, Financial Services Demand Side Survey Samoa (2016a) 43. <http://www.pfip.org/wp-content/uploads/2016/08/Samoa-DSS-REPORT-web-version.pdf>.

^d SOLOMON ISLANDS: PFIP, Financial Services Demand Side Survey Solomon Islands (2016b) 22. <http://www.pfip.org/wp-content/uploads/2016/08/Financial-Services-Demand-Side-Survey-Solomon-Islands.pdf>.

^e TONGA: PFIP, Financial Services Demand Side Survey Tonga (2016c) 6. <http://www.pfip.org/wp-content/uploads/2017/08/TONGA-DSS-REPORT-LOWRES-FINAL.pdf>.

^f VANUATU: PFIP, Financial Services Demand Side Survey Vanuatu (2016) 4. <http://www.pfip.org/wp-content/uploads/2017/05/VANUATU-DSS.pdf>.

Source: Authors.

Central Bank Digital Currencies

A Potential Response to the Financial Inclusion Challenges of the Pacific

This policy brief considers whether central bank digital currencies (CBDCs) can promote the accessibility of financial services across the Pacific islands and the design choices involved in their development. The policy brief concludes that now is not the time for countries in the region to issue a CBDC, but it is the time to begin to develop the expertise and understanding.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members—49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



ASIAN DEVELOPMENT BANK

6 ADB Avenue, Mandaluyong City

1550 Metro Manila, Philippines

www.adb.org