

Central Bank Digital Currency for the BSP

Fundamentals and Strategies



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Report Prepared by the Technical Working Group on Central Bank Digital Currency

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TABLE OF CONTENTS

1

Introduction

5

Chapter 1. The ABCs of CBDC: Concepts and Classification

Faith Christian Q. Cacnio

15

**Chapter 2. Central Bank Digital Currencies:
Implications on Monetary Policy**

Vanessa T. Espano and Raquel A. Silva

25

**Chapter 3. Financial Markets: Financial Intermediation
and Financial Stability**

Marie Tanya Z. Recalde

33

Chapter 4. Payments and Settlements and the CBDC Technology

*Remedios C. Macapinlac, Marie Joyce C. Elevado, Jay M. Dizon
Jan Marlon A. Evangelista, Anne Michelle N. Andres,
Anatoly DC Gusto and Gerald R. Daval-Santos*

43

**Chapter 5. Exploring Central Bank Digital Currency for the Bangko Sentral:
Legal and Regulatory Issues and Challenges**

*Elmore O. Capule, Vanessa P. Tabernero-Bunag, April Michelle D. Salamatín
and Alain Bert G. Regis*

53

**Chapter 6. CBDC and the Consumer: Financial Inclusion
and Consumer Protection**

Ramon Abraham A. Sarmiento

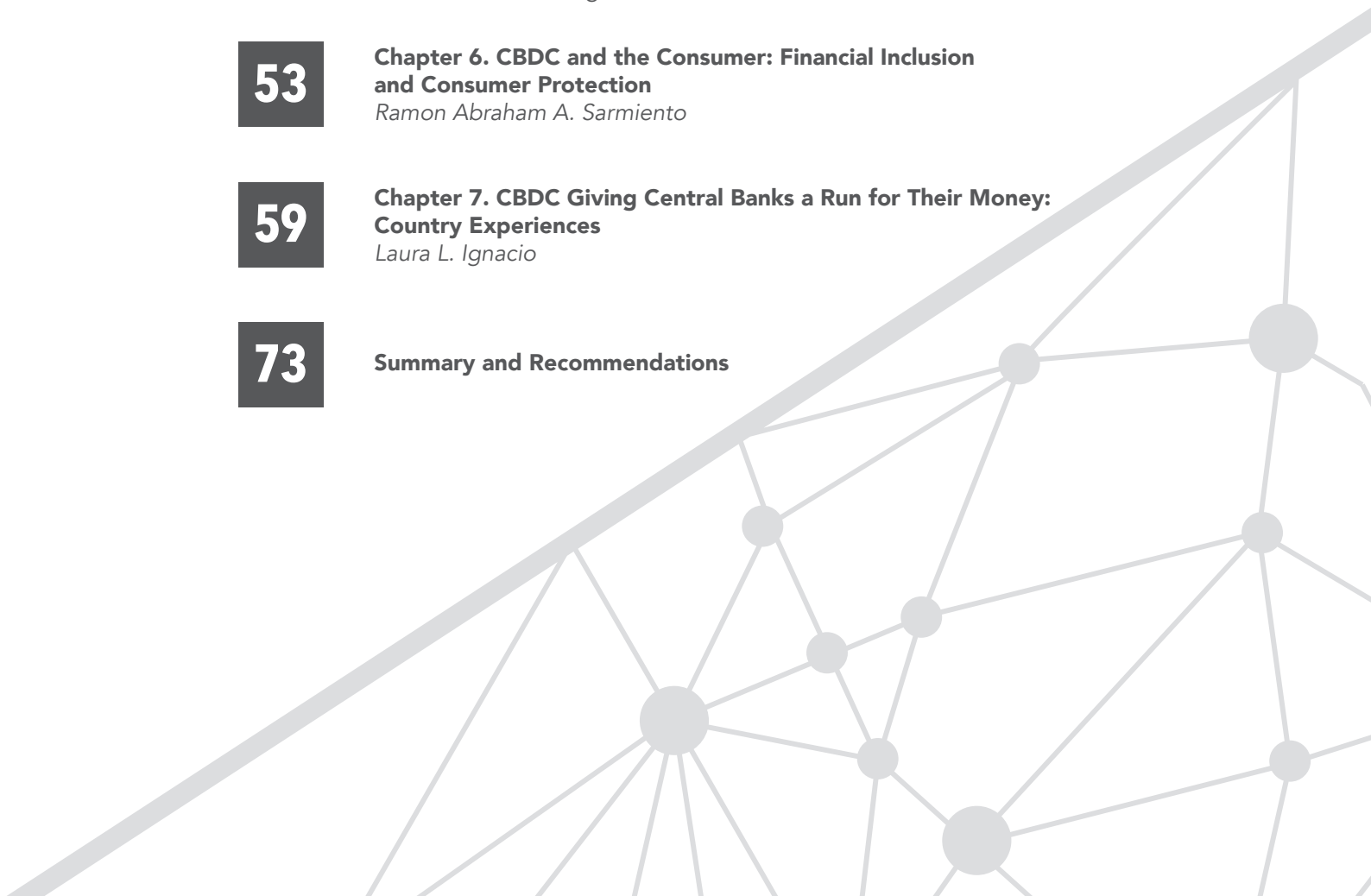
59

**Chapter 7. CBDC Giving Central Banks a Run for Their Money:
Country Experiences**

Laura L. Ignacio

73

Summary and Recommendations



Acronyms and Abbreviations

ACH	Automated clearing houses	NHFCE	Nominal household final consumption expenditure
AML	Anti-money laundering	NIST	National Institute of Standards and Technology
AMLA	Anti-Money Laundering Act of 2001	NPSA	National Payment Systems Act
API	Application programming interface	NRPS	National Retail Payment System
ATM	Automated Telling Machine	OGCLS	Office of the General Counsel and Legal Services
BCU	Banco Central del Uruguay	PBoC	People's Bank of China
BdF	Banque de France	PCI-DSS	Payment Card Industry and Digital Security Standard
BIS	Bank for International Settlements	PDIC	Philippine Deposit Insurance Corporation
BoC	Bank of Canada	PET	Privacy-enhancing technology/technique
BoE	Bank of England	<i>PhilPaSS</i>	Philippine Payment and Settlement System
BoJ	Bank of Japan	PoC	Proof-of-concept
BoK	Bank of Korea	PSO	Payments and Settlements Office
BoT	Bank of Thailand	PSOD	Payment System Oversight Department
BRM	Banque Régionale de Marchés	RRP	Reverse repurchase
BSP	Bangko Sentral ng Pilipinas	RTGS	Real-time gross settlement system
BTCA	Better Than Cash Alliance	SWIFT	Society for Worldwide Interbank Financial Telecommunication
CBDC	Central bank digital currency	TRISD	Technology Risk and Innovation Supervision Department
CFT	Combating Financial Terrorism	WAEMU	West African Economic and Monetary Union
CiC	Currency in circulation	WEF	World Economic Forum
CPMI	Committee on Payments and Market Infrastructures	ZLB	Zero lower bound
DCEP	Digital currency electronic payment		
DDA	Demand deposit account		
DDR	Digital depository receipt		
DLT	Distributed ledger technology		
DSGE	Dynamic stochastic general equilibrium		
DvP	Delivery versus Payment		
ECB	European Central Bank		
ECQ	Enhanced Community Quarantine		
EFT	Electronic fund transfer		
EMV	Europay, MasterCard and Visa		
FAQs	Frequently asked questions		
Fintech	Financial technology		
GDP	Gross domestic product		
HKMA	Hong Kong Monetary Authority		
HTLC	Hash Time-Locked Contract		
ICO	Initial Coin Offering		
IMF	International Monetary Fund		
IRR	Implementing rules and regulations		
KYC	Know your customer/client		
LPT	La Poste Tunisian		
MAS	Monetary Authority of Singapore		
MB	Monetary Board		
NBC	National Bank of Cambodia		
NBQB	Non-banks with quasi-banking functions		

Introduction

Central bank digital currency (CBDC) has elicited immense interest among central banks in recent years. This is evident in the increasing number of central banks engaged in some form of work on CBDC. Many are undertaking conceptual research while some have progressed to proof-of-concept experiments. A smaller number of central banks have already developed and implemented pilot tests of their CBDC. Various factors underpin the interest in CBDC. These include: i) rapid technological innovations in the financial sector; ii) emergence of new entrants into payment services and intermediation; iii) decline in the use of cash in some countries; and iv) increasing interest on privately-issued digital tokens (BIS, 2018).

Central banks have varying motivations for considering CBDC. Some are of the view that wholesale CBDC (i.e., CBDC variant with restricted access) can improve domestic payments efficiency, increase safety of payments, promote financial stability, and raise the efficiency of cross-border payments (Boar et al., 2020). Meanwhile, those central banks that are considering general purpose/ retail CBDC (i.e., CBDC variant that is widely accessible) think that it can enhance domestic payment efficiency and payment safety and boost financial inclusion (Boar et al., 2020).

In view of these developments, the Bangko Sentral ng Pilipinas (BSP) formed a Technical Working Group (TWG) on CBDC¹. The main tasks of the TWG are to conduct an exploratory study on the CBDC and to come up with recommendations on how the BSP would proceed in this area. This report aims to provide a comprehensive discussion of the manifold issues that surround CBDC based on careful perusal of the academic and empirical literature as well as the experiences of other central banks.

This report starts with a broad discussion on CBDC. Succeeding chapters will tackle the implications of CBDC on the pillars of central banking in the Philippines: monetary policy and price stability, financial stability, and the payments and settlement system. Additionally, the legal aspects of CBDC are considered. The potential of CBDC in fostering greater financial inclusion is also examined. The report will also present the diverse views of other central banks towards CBDC and the work that they have done in this area.

Chapter 1 provides a general overview of CBDC. It presents the variants of CBDC (i.e., wholesale and retail/general purpose), their characteristics and design features. The chapter also includes a discussion of some of the concepts that are commonly associated with CBDC such as distributed ledger technology (DLT) and blockchain technology. The key takeaways from this chapter:

- With rapid financial technological innovations and declining use of cash in some jurisdictions, central banks have been looking into the feasibility of issuing their own digital currency.
- There are a number of benefits associated with issuing a CBDC but there are also attendant risks.
- The economic effects of a CBDC as well as its implications for payments, monetary policy and financial stability will significantly depend on its form and design.

Chapter 2 discusses the potential benefits and risks of introducing CBDC on the conduct of monetary policy. It looks at the implications of CBDC on the transmission mechanism of monetary policy (e.g. bank lending channel). Also, the chapter features a short discussion on the possible impacts of the

¹ Office Order No. 0782, Series of 2020

issuance of CBDC on the demand for cash in the Philippines. The key points from this chapter:

- CBDC could pose risks to both monetary and financial stability as one of the key transmission channels of monetary policy, i.e., the bank lending channel may weaken and result in a potential disintermediation of the financial system.
- The impact on monetary policy transmission varies, depending on whether the CBDC is remunerated or not.
- An interest-bearing CBDC provides the central bank an opportunity to enhance the effectiveness of monetary policy by removing the encumbrance associated with the zero lower bound (ZLB).
- However, removing cash altogether or restricting its holdings could result in, among others, financial exclusion of the most vulnerable segment of the society.

Chapter 3 explores the possible impact of introducing wholesale CBDC or retail CBDC on financial stability and intermediation. The chapter lays down the benefits and risks of CBDC to the banking system and financial sector. The key takeaways from this chapter:

- CBDC can have major ramifications on financial system stability, and/or may have some adverse consequences for the Philippine banking system.
- Wholesale CBDC is noted for its potential to improve the efficiency, safety and robustness of domestic and cross-border payments. It could also provide banks with another option, apart from reserves, to deposit money in the BSP for use in real-time interbank payments and settlements system. However, further in-depth study is needed to fully validate these purported benefits and assess whether they amount to any significant value in addition to what is already provided by current payment solutions. Likewise, a cost-benefit analysis would determine whether the desired efficiency gains in payments, payments safety and financial stability would be higher than the cost of upgrading current systems.
- Through the issuance of retail CBDC, the BSP would be able to provide the general public with a credit risk-free alternative to deposits in private banks, independent back-up solution for electronic payment systems, and a suitable legal tender which is a supplement or replacement to cash. However, benefits that may be gained from the issuance of retail CBDC must be carefully weighed against its implications on the functioning of the financial system such as the risk of disintermediation, including accelerating bank runs during times of stress, and a potentially larger central bank footprint in the financial system.

Chapter 4 examines the potential of CBDC in improving payment systems and in ensuring that they remain competitive. The chapter identifies cross-border payments as an area that could benefit from the CBDC. The key takeaways from the chapter:

- CBDC issuance is best considered in the broader context of national payment systems development and assessed based on the perspectives of desirability, security, feasibility, and viability.
- One potential motivating factor for the BSP to explore CBDC issuance is to ensure competitive payment systems.

- The underlying technology of CBDC has potential in areas where the clearing and settlement function has not yet reached operational capabilities of an RTGS system.
- While domestic retail payments in economies across the globe have become more rapid and efficient, cross-border retail payments remain cumbersome, expensive and slow. Development of CBDC across jurisdictions may ameliorate inefficiencies for these payments.

Chapter 5 tackles the legal aspect of issuing CBDC. The chapter examines the feasibility of issuing CBDC under the existing legal framework of the BSP. The key points from this chapter:

- The BSP, under the existing legal framework, may further boost advancement of cash lite economy through digital payments to create a more broad-based and critical mass of digital payments users in the Philippines.
- The expanded authority provided by the National Payment Systems Act (NPSA) for the BSP to own and operate a payment system may be used as the legal framework to introduce the use of CBDC in wholesale form.
- Issuance of retail CBDC cannot be accommodated under existing legal framework.

Chapter 6 weighs on the use of CBDC to foster greater financial inclusion. Financial inclusion has been cited by some central banks as a motivation for considering CBDC. The chapter looks into the practicality of this objective for the Philippines. The key ideas from this chapter:

- CBDC may contribute to financial inclusion, but under specific conditions which include, among others, that the central bank directly offer retail CBDC and that there is adequate digital connectivity and literacy.
- Designing a CBDC to foster financial inclusion is inherently complex, risky, and may lead to sub-optimal outcomes for other CBDC policy objectives of the central bank.
- Financial inclusion issues involving cost, accessibility, utility of opening accounts (typically cited as exclusion factors) can be addressed without the need for CBDC.

Chapter 7 presents the motivations and experiences of other central banks on CBDC. The chapter details the work phases and the country projects that other central banks have carried out on CBDC. It also includes results of the survey that the BSP conducted on selected central banks regarding their CBDC work. The key takeaways from this chapter:

- Surveys among central banks show that while there are significant efforts directed towards research on CBDC, very few central banks plan to issue CBDC in the next five years.
- Payments safety and efficiency are the primary factors driving the CBDC engagement of central banks.
- Collaboration among central banks and the private sector is a common practice among CBDC projects and initiatives.

The last section provides a summary of the report and the recommendations of the TWG on CBDC on the way forward for the BSP.

Chapter 1

The ABCs of CBDC: Concepts and Classification

This chapter was prepared by Faith Christian Q. Cacnio, Bank Officer V,
of the Center for Monetary and Financial Policy (CMFP).



Key points

- With rapid financial technological innovations and declining use of cash in some jurisdictions, many central banks have been looking into the feasibility of issuing their own digital currency.
- There are a number of benefits associated with issuing a CBDC but there are also attendant risks.
- The economic effects of a CBDC as well as its implications for the payments, monetary policy and financial stability will significantly depend on its form and design.

Preliminaries on digital currencies

In recent years, increased interest in the use of digital currencies has been apparent. Businesses and consumers as well as financial institutions have been exploring ways on how to leverage the use of digital currencies to enhance existing economic systems and infrastructures, particularly in the area of payments.² Digital currencies are digital representations of value. E-money, for example, is a form of digital currency that is denominated in fiat money and used as a means of payment for goods and services. Virtual currencies are another form of digital currencies. However, unlike e-money, virtual currencies are not denominated in fiat money and they have their own unit of account. The digital representation of value or “currency” in virtual currencies can be transferred between parties through their underlying payment and settlement mechanisms (e.g., distributed ledger technology) (He, et. al., 2016).

In 2008, a white paper was published that mapped out an electronic peer-to-peer cash system with a distributed ledger comprised transactions organized in blocks (Nakamoto, 2008). The distributed ledger technology (DLT) and the blockchain became the foundation for an encrypted form of digital currency known as cryptocurrencies (Box Article 1.1 gives a more detailed discussion of DLT and the blockchain technology). Cryptocurrencies (or cryptoassets) swiftly gained wide following and various types have come into existence. With their proliferation, cryptocurrencies and other privately issued digital currencies are seen as possible threat to monetary control. These digital currencies could potentially replace central bank currency, which in most countries remain the largest component of central bank liabilities. Raskin and Yermack (2016) argued that in some economies, cryptocurrencies appear to be a viable competitor to sovereign fiat currencies during periods when the central bank is perceived as weak or untrustworthy. Moreover, the use of the DLT could potentially transform payment services by removing the need for a trusted intermediary or third party. This would reduce the role of central banks and weaken the authority of the state over the money supply (IMF, 2018).

Central banks, in general, can respond in two ways to the emergence of privately-issued digital currencies. On the one hand, central banks could monitor and respond to recent innovations and developments through regulations. However, regulatory arrangements could facilitate or hinder the development and use of digital currencies. On the other hand, central banks may choose to issue their own central bank digital currency, also known as CBDC.

² The idea of digital currencies has actually been around for decades. In a 1982 paper, David Chaum expounded on the idea of an electronic cash application that aims to preserve a user's anonymity. He likewise introduced the cryptographic primitive of a blind signature. Blind signatures are extensions of digital signatures. They provide anonymity by allowing someone to obtain a signature from a signer without the signer seeing the actual content of the document s/he is signing (i.e., “blinded”). Thus, if a signer later sees the signed “un-blinded” document, s/he cannot relate it with the signing session and with the person for whom s/he signed the document. David Chaum invented blind signatures as a basic building block for anonymous eCash. They can also be used to have anonymity in other applications, such as eVoting.

Central bank digital currency (CBDC): concepts, variants, and designs

While a CBDC is a digital currency, it fundamentally differs from cryptocurrencies. Cryptocurrencies are mostly privately-issued and they do not have any central entity to back them (BOE, 2020).³

Moreover, cryptocurrencies cannot be considered as money. For an asset to be considered as money, it should be able to function as a medium of exchange, a unit of account, and a store of value. Traditional cash satisfies all three. Given the volatility of their prices, cryptocurrencies cannot function as either medium of exchange or unit of account and only the least risk-averse investors would consider them a store of value (Carney, 2018). By contrast, a CBDC is a digital form of central bank money that is denominated in a unit of account and functions as both a medium of exchange and a store of value (BIS, 2018).

Money flower and the different forms of CBDC

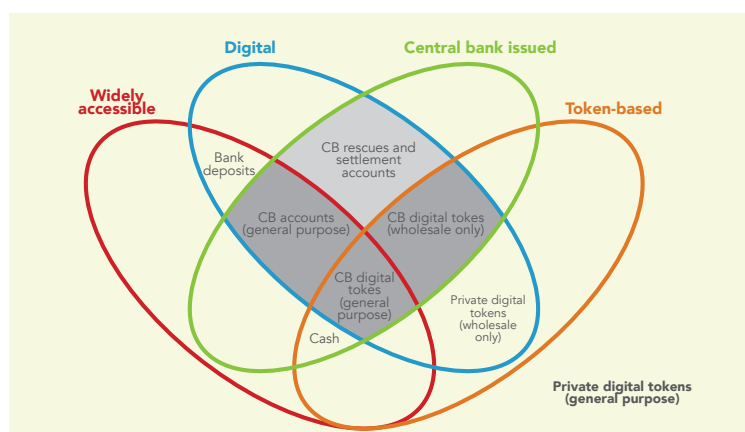
To gain a better perspective of CBDC, Bech and Garratt (2017) put them in the context of other types of money using a form of a Venn-diagram referred to as the money flower (Figure 1.1). The money flower focuses on the combinations of four key properties:

- Issuer (central bank or other);
- Form (digital or physical);
- Accessibility (widely or restricted); and
- Technology (token- or account-based).

In Figure 1.1, CBDC is at the center of the money flower. Three (3) variants of CBDC are described in the money flower – wholesale CBDC (token-based) and retail CBDC (token-based and account-based). Their differences lie in their accessibility and in the technology that underlie them. A general purpose or retail CBDC is a widely accessible digital currency that could be used for retail transactions and other purposes. Meanwhile, a wholesale CBDC has restricted access (i.e., mainly for banks and other financial institutions) and it is used as digital settlement for wholesale transactions.⁴

A wholesale CBDC is different from central bank money that is in the form of reserves or settlement account balances which commercial banks and other financial institutions keep with central banks. These reserves are integral to an economy's wholesale payment system, and they constitute the bulk of central bank money. Under this system, each commercial bank has an account with the central bank and transactions using this account are entirely electronic.

Figure 1.1 The money flower: a taxonomy of money



Source: Bech and Garratt, 2017

³ Stablecoins are privately issued cryptocurrencies that are designed to minimize the volatility of their value through some form of backing. These cryptocurrencies are pegged to assets such as fiat money or trade commodities (e.g. precious metals). The largest of these stablecoins is Tether (US\$10.02 billion market capitalization as of 10 August 2020), followed by USD Coin (US\$1.14 billion), Dai (US\$411.6 million), Paxos Standard (US\$245 million), TrueUSD (US\$205.7 million) and Binance USD (US\$180.1 million). However, depending on the assets that underlie these stablecoins, their value may not be as stable as claimed and they could still entail a lot of risks (BOE, 2020).

⁴ Central banks issue two types of liabilities. One is physical cash (i.e. notes and coins) which is mainly used by the general public as means of payment for goods and services. The other type of central bank liability is commercial banks' deposits with the central bank (i.e. reserves) that is used for wholesale transactions (BIS, 2020a).

While commercial bank reserves held at central banks are in digital form (and thus, they are effectively like CBDC), they differ in certain features from a wholesale CBDC. Access to central bank money is currently limited to central bank operating hours. Wholesale CBDC could be made available 24 hours a day, 7 days a week. Moreover, a wholesale CBDC could help mitigate the risk of fraud and cyberattacks as its technology could improve the irrevocability of digital record-keeping (BIS, 2020a).

The other form of CBDC is the general purpose or retail CBDC. It can either be token-based or account-based. The key distinction between token- and account-based money is the process of verification needed when it is exchanged (Kahn and Roberds, 2019). Token-based money relies on the ability of the payee to verify the validity of the payment transaction. Meanwhile, account-based money depends on the ability to verify the identity of the account holder. Token-based retail CBDC are essentially like cash but in digital form. They are transferred between the wallets of users. Account-based retail CBDC involves the transfer of a claim on an account. As such, transactions using account-based retail CBDC would be akin to transactions between depositors of commercial banks. However, with retail CBDC, individuals would have accounts with the central bank which could be used to settle transactions.

Wholesale CBDC vis-à-vis retail CBDC

A wholesale CBDC could facilitate a more efficient central bank clearing and settlement operations. It could likewise improve the risk management in interbank payment systems. Moreover, it would facilitate the use of new technologies for asset transfers, authentication, record keeping, data management and risk management (BIS, 2018). There are a number of central banks that have already run experiments in operating DLT-based wholesale CBDC real-time gross settlement (RTGS) systems. These central banks include the Bank of Canada (Project Jasper)⁵, the ECB and the Bank of Japan (Project Stella), Monetary Authority of Singapore (Project Ubin) and Bank of Thailand (Project Inthanon).⁶

Based on their experiments, central banks mainly succeeded in replicating existing large value payment systems. However, the results have not been superior to existing infrastructures (BIS, 2018). Thus, central banks continue to explore other areas that may yield higher value-added.

Between wholesale and retail CBDC, the latter is expected to bring more innovation and to have wider implications. There are a number of objectives that central banks cite for considering the issuance of retail CBDC. These include (Kiff, et al. 2020):

- To enhance payment system competition, efficiency, and resilience in the face of increasing concentration in the hands of few very large companies.
- To support financial digitization, reduce costs associated with issuing and managing physical cash, and improve financial inclusion, especially in countries with underdeveloped financial systems and many unbanked citizens.
- To improve monetary policy effectiveness in implementing targeted policy, or to tap more granular payment flow data to enhance macroeconomic projections.

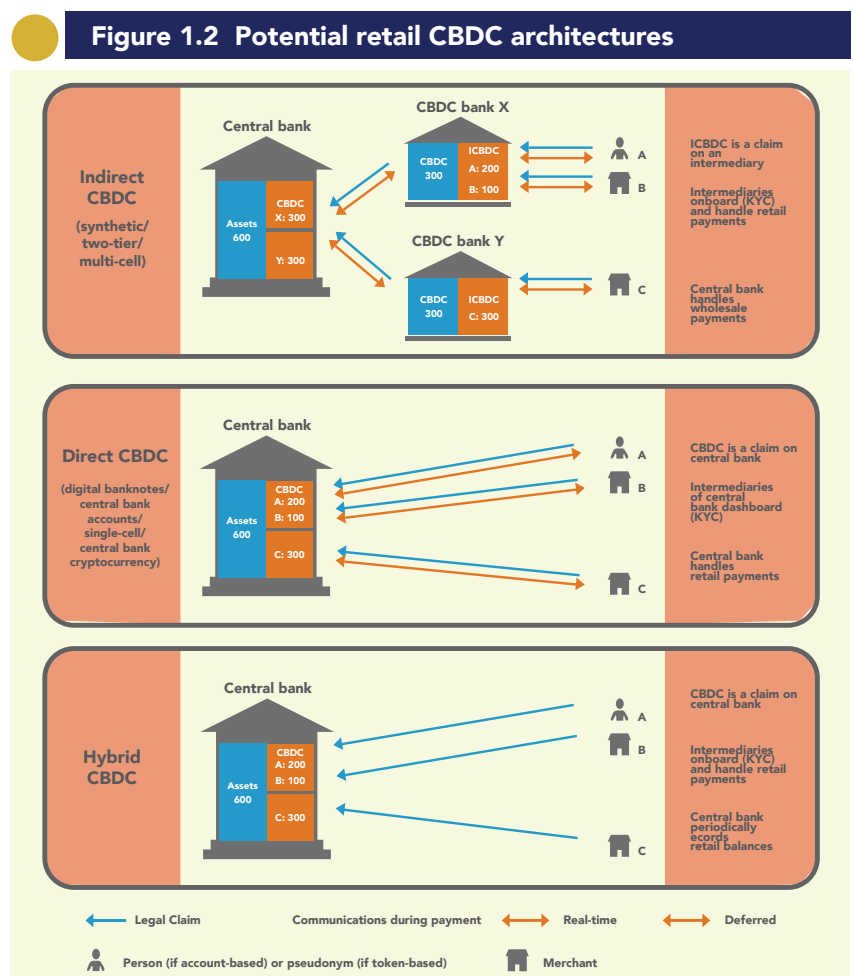
5 Most of these central banks chose a digital depository receipt (DDR) approach. Under this approach, the central bank issues digital tokens on a distributed ledger that is backed by and redeemed for central banks reserves that are held in a segregated account. The tokens can then be used to make interbank transfers on a distributed ledger.

6 For example, in 2019, Bank Canada together with Payments Canada partnered with the Monetary Authority of Singapore and the Bank of England to work on a cross-border, cross-currency settlement system. The collaboration combines Project Jasper and Singapore's Project Ubin, with a view to using DLT to make cross-border payments faster and less expensive.

- To enhance the transmission of monetary policy through an interest-bearing CBDC by increasing the economy's response to changes in the policy rate. An interest-bearing CBDC could be used to break the "zero lower bound" on policy rates to the extent cash were made costly.
- To help reduce or discourage the adoption of privately issued currencies, which may threaten monetary sovereignty and financial stability, and be difficult to supervise and regulate.
- To help improve the traction of local currency as means of payments in jurisdictions attempting to reduce dollarization.
- To assist in distributing fiscal stimulus to unbanked and other recipients.

Retail CBDC is seen as digital complement to physical cash. Thus, it must have the basic features that make cash attractive: trust in the issuing entity, legal tender status, guaranteed real-time finality and wide availability (BIS, 2020a). Retail CBDC must likewise be similar to cash in other aspects. First, it needs to be user-friendly (i.e., ease of use for all age groups). Second, it has to be highly resilient to infrastructure outages and cyberattacks. These events could really be very disruptive, particularly if cash is no longer in use. Third, it has to safeguard the safety and integrity of payments. Retail CBDC need to be counterfeit-proof and it has to ensure the privacy of the user without hampering effective law enforcement (BIS, 2020a).

Nonetheless, the issuance of retail CBDC would constitute a radical change for central banks and for the private sector banking system. Figure 1.2 illustrates three potential retail CBDC architectures (Auer and Bohme, 2020). In all of these architectures, the central bank is the only institution that issues and redeems CBDC. The indirect CBDC architecture (top panel) is also known as the "two-tier CBDC" given its resemblance to the existing two-tier financial system. Under this architecture, the central bank issues CBDC indirectly to consumers (i.e. through an intermediary). The CBDC held by consumers represent a claim on the intermediary. In the other two architectures, consumers have a direct claim on the central bank. In the direct CBDC model (center panel), the central bank processes all payments in real time and keeps a record of all retail holdings. Meanwhile, the hybrid CBDC model (bottom panel) combines elements of the direct and indirect solutions. Consumers have direct claims on the central bank but intermediaries handle real-time payments. In the hybrid architecture, the central bank retains a copy



Source: Auer and Bohme (2020)

of all retail CBDC holdings. This enables the central bank to facilitate transfer holdings from one payment service provider to another in the event of a technical failure. The three architectures allow for either account- or token-based access.

Aside from financial intermediation concerns, the introduction of retail CBDC could impact monetary policy transmission and, thus, the conduct of monetary policy. Succeeding chapters in this report will discuss in more detail the potential impact of CBDC on monetary policy (Chapter 2), financial intermediation and financial stability (Chapter 3) as well as on the payment system (Chapter 4).

CBDC design features and attributes

CBDC are considered as “programmable” money. This means that specific design features and attributes can be built into them. Central banks recognize that the design features of a CBDC are crucial. The economic effects of a CBDC as well as its implications for the payments, monetary policy and financial stability will significantly depend on its attributes (BIS, 2018).

Table 1.1 provides a comparison of properties across existing and potential new forms of central bank money (BIS, 2018). There are different possible combinations of features indicating a number of potential CBDC variants.

Availability. Access to digital central bank money is currently limited to the operating hours of central banks. CBDC could be available 24 hours a day and seven days a week or over a specified period of time (e.g. operating hours of a large value payment system).

Anonymity. Similar to privately-issued digital tokens, a token-based CBDC can be designed to provide some degree of anonymity. However, a key consideration is the extent of anonymity vis-à-vis the central bank given concerns on money laundering, terrorism financing and privacy.

Transfer mechanism. Physical cash is transferred on a peer-to-peer basis while central bank deposits are transferred through the central bank, which acts as an intermediary. A CBDC can be transferred either on a peer-to-peer basis or through an intermediary (e.g., central bank, commercial bank or a third-party agent).

Interest-bearing. Interest payments could be made on both token- and account-based CBDC. This feature would likely increase the attractiveness of CBDC as a store of value. However, if CBDC earns positive interest, it could compete directly with other forms of interest-bearing instruments, including deposits. This would have important implications for financial intermediation and the financial system as a whole.⁷

Limits or caps. Quantitative limits or caps on the use of holdings of CBDC can be implemented to mitigate its potential adverse effects on particular segments of the economy or to direct its use towards a certain direction. Such limits or caps can most likely be imposed in non-anonymous account-based systems.

⁷ The Central Bank of the Bahamas and Eastern Caribbean Central Bank are separately running pilot tests on retail CBDC in their economies. To avoid the disintermediation of their banking systems, these central banks placed limits on the amount of digital currency that their citizens and businesses can hold, and no interest were paid.

Table 1.1 Key design features of central bank money

	Existing central bank money		Central bank digital currencies		
	Cash	Reserves and settlement balances	General purpose/retail		Wholesale
			Token	Accounts	
24/7 availability	✓	x	✓	(✓)	(✓)
Anonymity vis-à-vis central bank	✓	x	(✓)	x	(✓)
Peer-to-peer transfer	✓	x	(✓)	x	(✓)
Interest-bearing	x	(✓)	(✓)	(✓)	(✓)
Limits or caps	x	x	(✓)	(✓)	(✓)

✓ = existing or likely feature; (✓) = possible feature; x = not typical or possible feature

Source: BIS (2018)

Central banks and CBDC

Various factors drive the growing interest of central banks on CBDC. These include: i) rapid technological innovations in the financial sector; ii) emergence of new entrants into payment services and intermediation; iii) decline in the use of physical cash in some countries (e.g. Sweden); and iv) increased interest on privately-issued digital tokens (BIS, 2018).

Financial technological (fintech) innovations are resulting in transformational changes in economies, particularly in their payments system. Advances in encryption and network computing as well as the widespread use of mobile smartphones are the enabling factors that led to significant developments in global and domestic payments systems. Fintech companies have been aggressively developing and implementing digital payment systems and financial service delivery platforms that are deemed more efficient and cost-effective than conventional ones. Consequently, these financial innovations have influenced the consumption decisions and behavior of households and individual market agents (Guinigundo and Cacnio, 2019).

Some central banks (e.g., Sweden's Riksbank, Norway's Norges Bank) are exploring the possibility of issuing their own digital currencies due to the declining demand for physical cash. For example, in Sweden, the value of cash in circulation has declined by around 50 percent between 2008 and 2018. The value of cash as a percentage of GDP in Sweden is a little over one (1) percent compared to an average of over 10 percent in the Euro area. Moreover, half of the retailers in Sweden would no longer want to accept cash as means of payment by 2025 at the latest, as it will become too expensive to accept physical cash if its use continues to decline (Sveriges Riksbank, 2018).

Privately-issued digital currencies are being touted as possible substitutes for central bank-issued money. As such, they could potentially affect the control of central banks over money supply. To address such possibility, many central banks are currently exploring the feasibility of issuing their own digital currencies.

Potential benefits and risks of issuing CBDC

Using a DSGE model calibrated to match the pre-crisis United States, Barrdear and Kumhof (2016) observed that issuing CBDC equivalent to 30 percent of Gross Domestic Product (GDP), against issuing government bonds, could permanently raise GDP by as much as three (3) percent due to reductions in real interest rates, tax evasions, and monetary transaction costs. However, while CBDC could potentially benefit the economy, they also involve significant risks.

Dyson and Hodgson (2016) looked into the merits and risks of issuing CBDC. Their arguments for issuing CBDC include:

- **It can widen the range of options for monetary policy.** The issuance of a CBDC could allow new monetary policy tools to be used.⁸ Also, a CBDC can be used as a tool to increase aggregate demand by making 'helicopter drops' of newly created digital cash to all citizens, making it easier to meet the central bank's monetary policy target of price stability.
- **It can make the financial system safer.** Allowing individuals, private sector companies, and non-bank financial institutions to settle directly in CBDC (rather than bank deposits) significantly reduces the concentration of liquidity and credit risk in payment systems. This, in turn, reduces the systemic importance of large banks.
- **It can encourage competition and innovation in the payment systems.** It will be significantly easier for new entrants to the payments sector to offer payment accounts and provide competition to existing banks.
- **It can improve financial inclusion.** Access to digital accounts will be easier and thus, will facilitate the inclusion of households and individuals that have been excluded from the traditional banking services.

Meanwhile, the arguments against the issuance of CBDC include:

- **CBDC could hurt financial stability.** A shift from bank deposits to CBDC could have an impact on bank funding and credit provision. This could consequently hurt financial stability. Shifting deposits to the central bank (in times of financial stress) and then back towards the leveraged commercial banking sector when risk aversion is low has important implications. On the one hand, it might make commercial banks safer;⁹ but on the other hand, taking deposits away from banks could make the supply of loans more variable and may even impair their ability to grant loans. Moreover, during times of economic uncertainty, citizens would most likely convert their fiat into the sovereign digital currency. The ease of conversion could make bank runs occur more frequently, which could negatively affect the solvency of banks.
- **Introducing a CBDC could result in a wider presence of central banks in financial systems.** Central banks would have a greater role in allocating economic resources. This could result in overall economic losses should central banks be less efficient than the private sector in allocating resources (BIS, 2019). Also, this could move central banks into unfamiliar territory and may lead to greater political interference.
- **The extra competition between a CBDC and bank deposits would drive up costs for commercial banks.** A retail CBDC could compete

⁸ If a CBDC will completely replace physical cash, this could allow interest rates to be lowered below the zero lower bound, if warranted.

⁹ The shifting of deposits to the central bank from commercial banks during periods of financial stress lessens the possibility of disorderly bank runs.

with guaranteed bank deposits, with implications for the pricing and composition of banks' funding. This could be particularly problematic in a recession or financial crisis.

- **A successful cyberattack on a central bank implementing a centralized distributed ledger would be catastrophic.**

To determine the net benefit of a CBDC for the economy, central banks should take into consideration their specific country circumstances. Additionally, central banks should explore alternative solutions that will achieve the perceived goals of CBDC and weigh their relative advantages and disadvantages. There should likewise be a careful assessment of technological feasibility and operational cost (Mancini-Griffoli, et al., 2018).

Box Article 1.1

The distributed ledger technology (DLT)

Central banks' interest in the use of CBDC in wholesale applications is centered on new applications of distributed ledger technology. Central banks recognize the potential of DLT in enhancing and reconfiguring certain central banking functions. These include (Del Rio, 2017): payment, clearing and settlement; risk management; identity management; issuance of digital fiat currency; and trade reporting.

A distributed ledger is a database that is spread across several nodes or computing devices. Each participant node in the network replicates and saves an identical copy of the ledger. Likewise, each node updates itself independently.¹⁰ One commonly known form of the distributed ledger is the blockchain. The structure of the blockchain differentiates it from other kinds of distributed ledger. Data on a blockchain is grouped together and organized in blocks. The blocks are then chained to one another using cryptography. The append-only structure of a blockchain only allows data to be added to the database. Previously entered data on earlier blocks cannot be revised or deleted.

DLT could also have important implications for the financial sector. Table 1.1.1 presents the financial sector applications of DLT (Natarajan, Krause and Gradstein, 2017).

Table 1.1.1 Overview of potential DLT applications (at varying stages of development)

Financial Sector Application	
Money and payments	<ul style="list-style-type: none"> • Digital currencies • Payment authorization, clearance and settlement • International remittances and cross-border payments (alternative to correspondent banking) • Foreign exchange • Micropayments
Financial services and infrastructure (beyond payments)	<ul style="list-style-type: none"> • Capital markets: digital issuance, trading and settlement of securities • Commodities trading • Notarization services (e.g. for mortgages) • Collateral registries • Movable asset registries • Syndicated loans • Crowdfunding (as initial coin offerings) • Insurance (in combination with smart contracts) for automating insurance payouts and validation of occurrence of insured event
Collateral registries and ownership registers	<ul style="list-style-type: none"> • Land registries, property titles and other collateral registries
Internal systems of financial service providers	<ul style="list-style-type: none"> • Replacing internal ledgers maintained by large, multinational financial service providers that record information across different department, subsidiaries, or geographies

¹⁰ <https://towardsdatascience.com/the-difference-between-blockchains-distributed-ledger-technology-42715a0fa92>

Proponents of DLT underscore its ability to transform existing market infrastructures and financial services (Mills, et al., 2016) by:

- reducing complexity;
- improving end-to-end processing speed;
- decreasing the need for reconciliation across different record-keeping infrastructures;
- increasing transparency in transaction record keeping;
- improving network resilience through distributed data management; and
- reducing operational and financial risks.
- Nonetheless, the use of DLT likewise comes with risks (BIS, 2017). These include:
- potential uncertainty about operational and security issues arising from the technology;
- lack of interoperability with existing processes and infrastructures;
- ambiguity on the settlement finality;
- legal and regulatory challenges for DLT implementation;
- lack of an effective and robust governance framework; and
- issues related to data integrity, immutability and privacy.

DLT is an evolving technology and it is yet to be proven robust for wide scale implementation. Similar to any technological innovations or advancements, DLT is still highly dependent on the following: 1) level of maturity of the development of the technology; 2) the user- institution's requirements; and 3) the user-institution's level of maturity with respect to its knowledge and expertise on the area/ technology. This becomes particularly true in the financial industry and in systemically important financial market infrastructures wherein security, confidentiality, efficiency, and inter-operability, among other things, are high priorities. Moreover, like any other type of IT project implementations, DLT would require investments in terms of infrastructure, development costs, consulting, research and development and manpower sourcing either through direct hiring or outsourcing to DLT providers. However, since the DLT model is usually shared among various participants or players, the way these costs will be distributed or shared may vary, either through subscription or joining fees.

Against the balance of potential and risks involving DLT, central banks are experimenting with DLT and seek to identify the potential for its use in their large-value payment systems.¹¹ In their initial stages, each of the experiments largely succeeded in replicating existing high-value payment systems. However, the results have not been clearly superior to existing infrastructures. Central banks continue to experiment with broader financial applications with potential higher value-added (BIS, 2018). A common conclusion is that benefits from DLT are promising, but there are still considerable hurdles to overcome before DLT can be widely used in the financial system. The benefits will only materialize when the technology has been developed further with respect to the requirements expected of real-time gross settlement systems.

11 These include Bank of Canada (Project Jasper), De Nederlandsche Bank (Project Dukaton), European Central Bank and Bank of Japan (Project Stella), Monetary Authority of Singapore (Project Ubin), South Africa Reserve Bank (Project Khokha) and Bank of Thailand (Project Inthanon).

Chapter 2

Central Bank Digital Currencies: Implications on Monetary Policy

This chapter was prepared by Ms. Vanessa Espano, Bank Officer V, of the Department of Economic Research (DER) and Ms. Raquel Silva, Bank Officer V, also from the DER.



Key points

- CBDC could pose risks to both monetary and financial stability as one of the key transmission channels of monetary policy, i.e., the bank lending channel may weaken and result in a potential disintermediation of the financial system.
- The impact on monetary policy transmission varies, depending on whether the CBDC is remunerated or not.
- An interest-bearing CBDC provides the central bank an opportunity to enhance the effectiveness of monetary policy by removing the encumbrance associated with the zero lower bound (ZLB).
- However, removing cash altogether or restricting its holdings could result in, among others, financial exclusion of the most vulnerable segment of the society.

Impact on the balance sheet

At present, there are two forms of central bank money, namely physical cash, which is widely held by the public but not electronic, and central bank reserves or commercial bank deposits with the central bank, which is electronic but accessible only to certain financial institutions (e.g, commercial banks). A CBDC would be an electronic form of central bank money that could be more widely used by firms and households to make payments and store value. Thus, introducing a CBDC is similar to adding a third form of central bank money, or equivalently adding to the central bank liability and forming part of the supply of base money (Kiff, et al, 2020). Just like the two forms of central bank money, CBDC would be risk-free, as it is backed fully by the central bank. To analyze the potential impact of CBDC on monetary policy, it is useful to first look at the implications on the balance sheet of the central bank, as well as those of the banking sector and the non-bank private sector.

If CBDC is a substitute for cash. Since CBDC and physical cash are just two kinds of central bank money, substituting one for the other, e.g., cash to CBDC, results in a change in the composition but not the size of the balance sheet of both the central bank and households. This scenario also does not influence the banking sector's balance sheet.

If CBDC is a substitute for commercial bank deposits. Under the scenario of allowing depositors to withdraw CBDC on demand, there are risks to bank funding and liquidity as the size of the balance sheet of the banking sector is reduced (i.e., banks lose both deposits and CBDC) (Meaning et al 2018). Meanwhile, there is no change in the size of the balance sheet of the non-bank private sector, merely the composition. There is likewise no change in the size of the balance sheet of the central bank (Figure 2.1).

One of the key transmission channels of monetary policy is the bank lending channel. In today's modern economy, rather than functioning as mere intermediaries, that is, matching borrowers to savers in the financial system, banks also play a crucial role in the creation of money (McLeay, Radia, and Thomas, 2014). This is because when banks make a loan, they also generate a corresponding deposit in the same amount in the borrower's bank account, thus creating new money.

However, this money-creating process is not without limits as banks are subject to constraints such as competition from other banks, prudential regulation from the central bank, and the decision of firms and households that lower money supply, e.g., repayment of existing debts (Carney, 2018). Ultimately, however, it is the central bank's conduct of monetary policy that limits banks' ability to create new money. By being able to set the price of

obtaining money, the central bank therefore controls the demand for the money created by the banking sector in the economy.

Under a scenario where a CBDC substituted for bank deposits, this may potentially impact the financial intermediation structure of the banking system, leading to a “disintermediation” (IIF, 2018). Bank deposits are the safest, most liquid, and most stable source of funding for the banking system. It is for this reason that they are weighted heavily in the calculation of measures of short-term resilience of banks’ liquidity risk profile, such as the Liquidity Coverage Ratio and the Net Stable Funding Ratio (BIS, 2014; IIF, 2020).

Figure 2.1 Balance sheets with and without CBDC



Banks may compensate for this erosion of stable funding base by turning to market sources of financing, which are relatively riskier and more expensive, and they may in turn, pass these higher costs to depositors. A reduction in the banking system’s funding base, therefore, could raise the cost and affect the availability of credit, which in turn, impact on financial stability and at the same time lessen the importance of bank lending in the overall transmission of monetary policy.

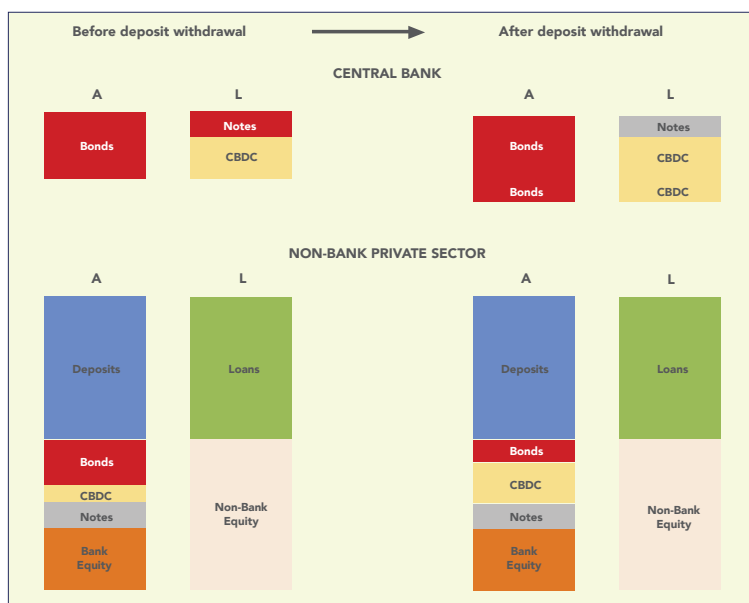
Moreover, under a scenario whereby a CBDC substituted for bank deposits, thereby reducing bank funding, it is unclear whether it would be desirable for the BSP to deal directly with the public and effectively crowd out bank lending activity, which would have implications for both monetary transmission and financial deepening.

If the central bank changed the supply of CBDC via asset purchases. One way of increasing the supply of CBDC in the economy is for the central bank to buy assets (e.g., government bonds) from the non-bank private sector by paying with newly-created CBDC (Meaning et al, 2018). In this scenario (Figure 2.2), the composition of the asset side of the non-bank private sector balance sheet changes but the size remains the same. However, the central bank’s balance sheet expands. This is because the newly-created liability (CBDC) is equally matched by a corresponding increase in assets (government bond).

Introducing a CBDC would not change the process of monetary policy implementation, including central banks’ use of open market operations (BIS, 2018). Similar to cash, the demand for CBDC, which is envisioned to be another form of central bank money, would need to be accommodated by the central bank. This would entail having a regular estimate of the flows into and out of CBDC. However, challenges could arise during financial stress whereby CBDC holdings would become large and volatile (and are not accompanied with offsetting decline in banknotes or cash). During such times, when banks begin to prefer holding CBDC instead of government securities (GS), this would reduce the available GS holdings of banks that would otherwise be used for collateral for short-term interbank borrowing during periods of funding stress. This would mean that the central bank would need to consider accepting a broader set of collateral assets from banks when lending to banks during stress periods, since the banks will no longer hold a large amount of GS to put up as collateral for BSP.

The impact of CBDC on seigniorage. Seigniorage refers to the profit earned by the central bank from issuing (non-interest bearing) physical cash. There are several ways by which introducing a CBDC may impact broad seigniorage value (BIS, 2018). First, CBDC could lower operational costs (e.g., printing, storage, and transportation of cash). Second, to the extent that it may substitute for other non-deposit financial assets (e.g., shares in money market mutual funds), an interest-bearing CBDC could increase money in circulation, and thus, increase the overall seigniorage base.

Figure 2.2 Changing CBDC supply via asset purchases



Impact on monetary policy

The impact on the interest rate channel of monetary policy transmission varies, depending on whether the CBDC is remunerated or not. If no interest rate is imposed (i.e., CBDC is similar to cash), CBDC may not generate sufficient demand as the non-bank private sector would rather keep their deposits which generate higher return with commercial banks.

If CBDC were remunerated (CBDC would resemble bank deposits), the impact would then depend on the amount of CBDC in circulation and the level of interest rate imposed on CBDC balances. There are a couple of ways by which the amount of CBDC in circulation could be controlled. These could be

via the level of interest paid on certain amounts of CBDC deposits and setting limits, the details of which will be discussed in the next section.

An interest-bearing CBDC provides the central bank an opportunity to enhance the effectiveness of monetary policy by removing the limits associated with the zero lower bound (ZLB). When the policy rate is reduced, this generally translates into lower market rates. However, in economies where policy rates are already close to or at the zero level, this gives central banks little to no room to further lower policy rates and effect a corresponding reduction in market rates. To deal with the limits of the ZLB, central banks have resorted instead to providing additional stimulus to the economy via unconventional monetary policies such as large-scale asset purchases or forward guidance.

Even in economies where negative rates were already introduced, such as the euro area, empirical evidence shows that almost no banks have passed on negative rates to their depositors, in order to preserve their stable deposit funding (Coere, 2018). If banks were to pass on the negative rates, depositors would then rather switch from holding bank deposits (which yields negative nominal yields) to cash (which holds a higher nominal rate of return at zero percent). This limits the effectiveness of monetary policy as negative policy rates do not transmit to market rates, weakening the interest rate channel.

Introducing an interest-bearing CBDC can address the limits of monetary policy at the ZLB as the central bank can impose negative rates on CBDC. This gives the central bank direct control over the transmission of interest rates to households and firms, as during economic contraction or recession, it could lower interest rates more quickly (and even go negative) than is currently

possible, thereby stabilizing economic activity (Coere, 2018).¹² Conversely, during an economic upturn, increasing the interest rates on CBDC balances would encourage banks to likewise raise the interest rates on their deposits (Panetta, 2018).

Having a CBDC also means that central banks' need to implement unconventional monetary policies is reduced. An interest-bearing CBDC thus provides opportunity for the central bank to have an additional policy instrument.

Another benefit of introducing a CBDC is to help preserve monetary sovereignty. Rather than having an alternative means of payments that would become widely used but that is not denominated in domestic currency (e.g., foreign CBDC and cryptocurrencies), introducing a CBDC may be preferred to help preserve central bank monetary sovereignty and its control on its policy objectives.

The widespread adoption of alternative means of payment not denominated in the domestic currency (e.g., cryptocurrencies) would weaken the transmission of monetary policy because the central bank would have influence on a smaller portion of the economy. This consideration is particularly important if the suppliers of the alternative means of payment have interests that are not in line with the objectives of the central bank (Davoodalhosseini and Rivadeneyra 2018).¹³

In such a case, the central bank may be forced to respond to the policy of the supplier of alternative means of payment. This could increase the constraints and reduce the effectiveness of central bank monetary policy (Zhu and Hendry 2019). A CBDC, if it is appropriately designed, could counter the adoption of alternative means of payment. The design of the CBDC should likewise be consistent with the BSP's Digital Payments Transformation Roadmap.

The lack of consensus surrounding the efficacy of negative interest rates underscores the importance of looking at local conditions and ascertaining whether negative interest rates would prove beneficial. Unlike other economies, the BSP has not had to confront the need for negative rates because historical fluctuations in inflation have tended to be driven by supply-side factors, which were adequately addressed through government supply-side interventions or through monetary tightening when the inflationary pressures became more persistent. For example, the BSP implemented a cumulative 175-basis-point hike from May to November 2018 to anchor public's inflation expectations amid a persistent rise in oil and food prices. The monetary tightening measures helped ensure that price pressures would not further evolve into sharper gains in wages, transportation fares, and prices of other goods and services. With the subsequent easing of inflation pressures and the benign outlook, the BSP, therefore, had ample room to provide monetary accommodation to address the Covid-19 pandemic.

Going into the pandemic, the key policy rate was sufficiently above zero at 4.0 percent. At this level, it meant that the BSP had sufficient conventional monetary policy room to respond to the liquidity concerns arising from the Covid-19 pandemic. The BSP has duly taken advantage of this policy space during the current Covid-19 pandemic by aggressively reducing the overnight RRP by a total of 200 basis points in 2020.

12 In the euro area, one study shows that a full pass-through of interest rates leads to a 30-percent increase in inflation and GDP over a baseline scenario which takes into account banks' sluggish pricing behavior (Darracq et al, 2016). Meanwhile, introducing a CBDC is estimated to lead to a 3-percent increase in gross domestic product, which results from the 30-percent increase in aggregate liquidity, a form of quantitative easing (Barddear and Kumhof, 2016). In another study, introducing a CBDC represents an increase of 0.16 percent of total consumption, which can rise to 0.64 in various scenarios where the different advantages of cash over a CBDC are taken into account (e.g., anonymity) and the relative size of large and small transactions (Davoodalhosseini, 2018).

13 It has also been argued that declining demand for domestic currency reduces the central bank's ability to raise seigniorage income. This would also reduce the size of the balance sheet, limiting the central bank's ability to implement monetary policies, and jeopardize its independence.

Another issue is that theoretically, a necessary condition for CBDC to breach the ZLB is the removal of cash or the restriction of large-denominated bills (Davoodalhosseini et al, 2020). However, this may not be sufficient and would prove to be difficult to implement in reality. During periods wherein the central bank implements negative interest rates, the public can seek other alternative assets which pay higher return.

Removing cash from the economy or restricting its holdings could also have several immediate implications. First, some groups in society could be severely or disproportionately affected depending on their geographic location, level of income or other demographic characteristics, like age and disabilities. Second, removing cash could lessen the resilience of the payments ecosystem by increasing cyber security risks and the system's dependence on other infrastructures (e.g., the internet, telecommunications, and the electric grid). Third, removing cash could incite resistance from the public, especially in those economies where usage of cash has been increasing.

Remuneration of CBDC

In the literature, there are several ways to address two of the most important arguments against CBDC (e.g, disintermediation and more frequent bank runs).¹⁴

One way is for the central bank to set “a ceiling on the amount of CBDC that each individual investor can hold” (Panetta, 2018). However, there are several issues associated with this proposal (Gurtler and Rasmussen, 2017). One is that setting a fixed quota per depositor limits the number or size of payments, as a prerequisite for the finalization of a payment requires knowing the recipient's ceiling. Second, this ceiling would then have to be high enough for normal transactions to take place and to maintain the effectiveness of the payments system. However, this argument of imposing a quota runs counter to the original policy objective of ensuring continued end-user access to a risk-free instrument.

Meanwhile, bearing in mind that it can be politically difficult to implement negative rates during a crisis period, another solution relates to putting in place a tiered remuneration system, whereby remuneration would be varied depending on the amount of CBDC deposits held (Bindseil, 2020). In this scenario, a higher (lower) interest rate is imposed on CBDC balances up to (beyond) a predetermined ceiling. By making interest rates conditional on balances—for example, if agents held high CBDC balances, they would be subject to a different interest rate than if they held low money balances, the central bank can maintain an efficient level of liquidity.¹⁵

Mandate-consistency of the introduction of CBDC

The decision to introduce CBDC should be consistent with the BSP's fulfillment of its mandates of maintaining price and financial stability as well as robust and reliable payments system. A good starting point to determine whether an introduction of a CBDC is suitable at this point would be to examine some characteristics of the Philippines' current payments landscape system.

¹⁴ A CBDC could facilitate more frequent bank runs. Unlike bank deposits which entail risks, a CBDC's risk-free feature (since it is backed by the central bank) means that during periods of financial stress, e.g., flight to safety during financial crisis, the public would rather hold onto the CBDC rather than bank deposits, with the result that a significant portion of bank deposits would be transferred to the central bank at a velocity that is much faster than previously observed before (BIS, 2018; Mersch, 2018; DNB, 2020). This is because unlike the scenario where people would need to queue in front of the ATM or go to the bank themselves to get cash, a digital bank run would enable consumers to transfer their bank deposits much easier and in a much more frequent manner.

¹⁵ This tiering system is similar to the practice of differentiated remuneration of bank deposits at the Bank of Japan. During its “introduction of quantitative and qualitative monetary easing with a negative interest rates” in 2016, the BOJ stated that “the Bank will adopt a three-tier system in which the outstanding balance of each financial institution's current account at the Bank will be divided into three tiers, to each of which a positive interest rate, a zero interest rate, or a negative interest rate will be applied, respectively” (BOJ, 2016).

One of the primary motivations for countries (e.g., UK, Canada, Scandinavian Countries, the Netherlands, and China) in introducing a CBDC has been the observed decline in the use of cash. This arose due to the significant advancements in payments technology, with the proliferation of smart phones paving the way for increasing usage of electronic payments. With the possibility that the usage of cash will disappear in the future, or that it would no longer be accepted as a means of payment, this would imply that the public would no longer have access to central bank money (BIS, 2018). A CBDC addresses the issue of a declining use of cash because introducing this new type of central bank money could be designed in a such a way that it would be universally accessible.

In the Philippines, however, cash remains the predominant mode of payment for retail transactions. In contrast to the scenario in some advanced economies where cash use has been declining, the Philippines has experienced the opposite, with currency in circulation (CiC) as a percentage of GDP, having grown from 0.3 percent in 1980 to 8.7 percent in 2019 (Figure 2.3).

A closer look at Figure 2.3 reveals a greater propensity of the public to hold cash during crisis periods, as evidenced by the sharp rise in CiC/ GDP during the Asian Financial Crisis and Global Financial Crisis. Figure 2.4 shows the impact of the most recent crisis, the Covid-19 pandemic, on the amount of cash held by the public, with month-on-month cash growth at 13.1 percent in March and 11.0 percent in April. This indicates greater demand of the public for cash during times of heightened uncertainty due to precautionary reasons.

Figure 2.3 Currency in circulation

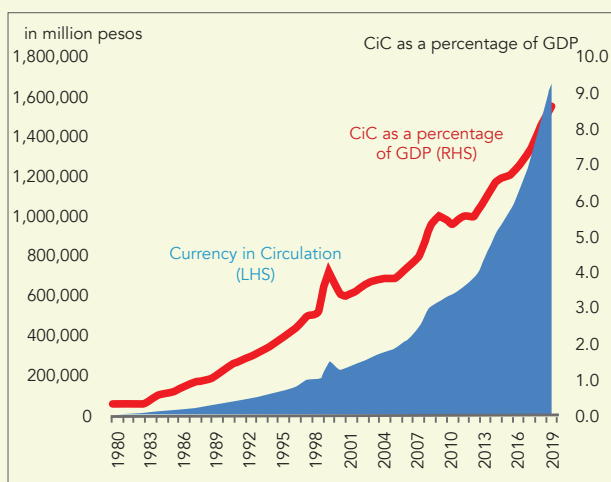
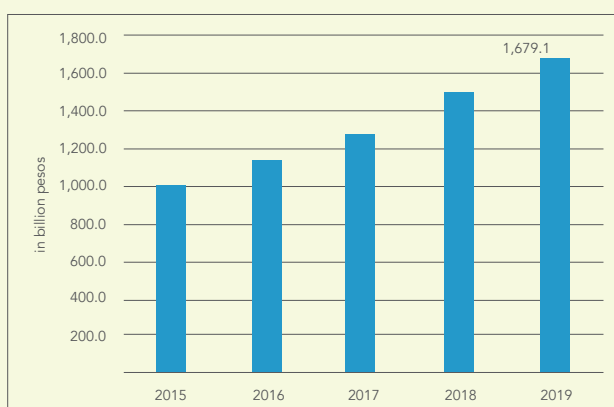


Figure 2.4 Notes in circulation, in trillion Php



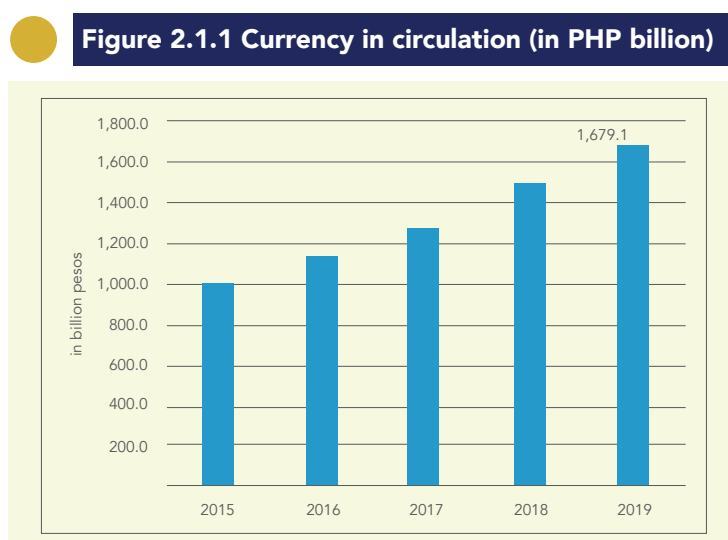
Box Article 2.1

The Impact of Issuing a Central Bank Digital Currency on the Philippines' Demand for Cash¹⁶

Over the past decades, technological developments have significantly improved the convenience and efficiency of digital forms of private sector payment instruments compared with the use of physical currency (BIS, 2018). Thus, while cash remains the preferred instrument to operationalize the demand for money, alternative to cash instruments that serve as money appear to be gaining ground.¹⁷

Demand for currency

The stock of cash in the economy is recorded as currency in circulation (CIC), which consists of the physical currencies (banknotes and coins) that are used in transactions and can be deposited and stored in banks. (Chandani et al, 2017). As of end-2019, the CIC grew by 12.7 percent in value and 9.5 percent in volume year-on-year to reach PhP1,679.1 billion and 38,646.2 mpcs, respectively. In value terms, banknotes accounted for 97.3 percent, while coins accounted for the remaining 2.7 percent. However, in volume terms, banknotes accounted for only 11.5 percent, while 88.5 percent are comprised of coins.¹⁸



The ratio of CIC to nominal GDP is an indicator of how much of the economy is financed through cash and it is the most common way to express the degree of cash usage in a country (Khiaonarong and Humphrey, 2019). Figure 2 presents the CIC to GDP ratio of the Philippines, which follows an increasing trend reaching 8.6 percent in 2019.

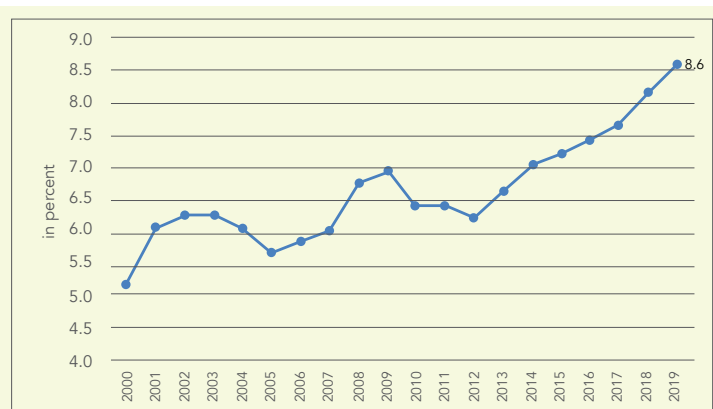
¹⁶ This box article was prepared by Mr. Roy R. Hernandez of the Currency Issue and Integrity Office (CIIO).

¹⁷ A study by the Better Than Cash Alliance-United Nations (BTCA-UN) showed that digital payments in the country expanded to 20 percent of total transactions in 2018 in terms of value. Digital payments accounted for 10 percent of the total volume and 20 percent of the value in 2018 compared with one percent in volume and eight percent in value terms in 2013. The latest numbers translated to 470 million to 490 million in monthly digital payment transactions in the Philippines, which is nearly 20 times the estimated 25 million in 2013

¹⁸ For banknotes, the highest denomination notes of 1000-Piso accounts for 74.9 percent of the value in circulation during the same period. The 1000-Piso has also the second highest volume of circulation with a share of 27.6 percent, next to the lowest denomination of 20-Piso notes that accounted for 30.6 percent. For coins, the 1-Piso and 25-Sentimo coins accounted for almost two-thirds of the coins in circulation, in volume terms, with a respective share of 33.2 percent and 31.6 percent in 2019. Lower-denomination coins comprising 10-, 5- and 1-Sentimo accounted for 20.9 percent of the pieces of coins in circulation. It should be noted that the 10-Sentimo coins were dropped under the New Generation Coin (NGC) series.



Figure 2.1.2 CIC-to-GDP (in percent)



Aside from financial technology, the demand for cash in an economy is affected by several factors, which include the cost of holding cash, consumption and savings, and population.

Cost of holding cash

The rise in inflation may lead to increased demand for cash. Lower returns on banknote deposits discourage and disincentivize the citizens to open bank accounts by keeping their holdings in cash.¹⁹

Household consumption and savings

Movements in CIC are linked with consumption, and thus, it is an indicator of the volume of transactions and future consumption in the economy (Davidovska-Stojanovska et al., 2005). In 2019, household consumption expenditure in the Philippines accounted for almost three fourths of the country's aggregate demand.²⁰

Population

A rising population implies higher aggregate demand. This may require additional cash to support increasing economic activity (Dela Rue, 2020). The country's population continues to rise; reaching 108.1 million in 2019. In addition, the population density of the Philippines continues to increase. As of 2018, there are 358 Filipinos per square kilometer of the country's land area

Existence of shadow economy

Some studies suggest that increases in shadow economic activities such as the informal labor market as well as higher share of self-employed in the population could also be drivers of higher cash demand (Goodhart and Ashworth, 2014). In 2017, informal economy²¹ of the Philippines employs close to 60 percent of the total workforce.²²

19 For example, in 2018, inflation exceeded the National Government's (NG) target of 3.0 + 1.0 percent due to supply side factors. Deposit rates remain subdued and even slipped into negative territory during this period. By 2019, with inflation decelerating to 2.5 percent (i.e., within the NG's target range), deposit rates recovered and settled at 1.6 percent.

20 This is relatively higher compared with other countries. For example, Indonesia and Malaysia accounted for less than 60 percent of aggregate demand.

21 According to the International Labor Organization (ILO), informal economy refers to all economic activities by workers that are – in law or in practice – not covered (or insufficiently covered) by formal employment arrangements.

22 ILO, Size of the Informal Economy in the Philippines, Retrieved from https://www.ilo.org/manila/eventsandmeetings/WCMS_634914/lang-en/index.htm, 31 July 2020

Costs and benefits of physical currency

Physical currency incurs storage and production costs. In contrast, e-cash are convenient and can be stored in its digital form without the need for storage facility. The cost incurred in producing banknotes and coins delivered in 2019 amounted to PhP13.6 billion, which is only 1.2 percent of the total value of delivery. The average unit cost to produce a banknote in 2019 amounted to PhP2.3, with a higher cost for producing high denomination notes. On the other hand, the cost incurred in producing low denomination coins is more than their face value with a total loss amounting to PhP3.3 on a per unit basis. Nonetheless, this is offset by the total positive variance observed for high denomination coins of PhP9.9, resulting in a total net gain of PhP6.6 on a per unit basis.

From a currency management perspective, the BSP earns seigniorage from the value of demonetized banknotes not returned to the BSP for exchange. For example, the demonetization of the New Design Series (NDS) banknotes effective end-2017²³ resulted in the booking of miscellaneous income for the demonetized NDS banknotes not returned to the BSP after deadline which amounted to PhP11.6 billion. Subtracting the cost of producing these banknotes (i.e., PhP254.1 million) yields a total net income of PhP11.3 billion.

Currency production

Rising demand for physical currency (as shown by rising trend of CIC and CIC/GDP) outpaces the BSP's production capacity leading to the acquisition of outsourced finished currency to meet the economy's requirement. Over the years, the share of outsourced banknotes was higher than in-house production, particularly for high denomination notes.²⁴

Impact of CBDC on physical currency

The impact of the issuance of CBDC on the demand of physical currency would be a function of the type of CBDC and on the amount of issuance of CBDC as a percentage of currency in circulation and/or national output, and the accessibility and acceptability of such instruments. It is envisaged that the issuance of CBDC would complement, albeit shift some of the demand for physical currency leading to a cash-lite economy. Regardless of the motive for a CBDC, every potential design must address the interaction that the CBDC would have with cash in order to assess the likelihood of its success in meeting the defined objectives as well as its potential side effects (Judson, 2018).

23 On 29 December 2014, the BSP issued Circular No. 863, Series of 2014, on the replacement and demonization of the NDS banknote series, which has been circulating starting in 1985. The BSP has extended this deadline three (3) times. The original deadline for the replacement of NDS banknotes was on 31 December 2016. This was extended to March 2017, then to June 30 2017, and finally to 29 December 2017 (last working day of the year) due to insistent public demand.

24 In the past two years, the requirement for 50- and 20-Piso banknotes was supplied via in-house production. Meanwhile, outsourcing of finished coins for 2019 is concentrated in 1-Piso and 25-sentimo coins, which accounted for 70.3 percent of the 2019 coin requirement in volume terms.

Chapter 3

Financial Markets: Financial Intermediation and Financial Stability

This chapter was prepared by Atty. Marie Tanya Z. Recalde, Acting Deputy Director, Supervisory Policy and Research Department (SPRD), with contributions from Ms. Veronica B. Bayangos, Director, SPRD, and Mr. Rafael Augusto D. Cachuela, Bank Officer IV, SPRD. The views expressed are those of the author and do not necessarily reflect those of the SPRD, the Financial Supervision Sector, and the Bangko Sentral ng Pilipinas.



Key points

- CBDC can have major ramifications on financial system stability, and/or may lead to some adverse consequences for the Philippine banking system.
- Wholesale CBDC is noted for its potential to improve the efficiency, safety and robustness of domestic and cross-border payments. It could also provide banks with another option, apart from reserves, to deposit money in the BSP for use in real-time interbank payments and settlements system. However, further in-depth study is needed to fully validate these purported benefits and assess whether they amount to any significant value in addition to what is already provided by current payment solutions. Likewise, a cost-benefit analysis would determine whether the desired efficiency gains in payments, payments safety and financial stability would be higher than the cost of upgrading current systems.
- Through the issuance of retail CBDC, the BSP would be able to provide the general public with a credit risk-free alternative to deposits in private banks, independent back-up solution for electronic payment systems, and a suitable legal tender which is a supplement or replacement to cash. However, benefits that may be gained from the issuance of retail CBDC must be carefully weighed against its implications on the functioning of the financial system such as the risk of disintermediation, including accelerating bank runs during times of stress, and a potentially larger central bank footprint in the financial system.

Financial system stability implications

Depending on the design features of the CBDC, its introduction can have wide-ranging effects on a country's financial system stability and financial intermediation.

Wholesale CBDC

Existing literature points to the potential benefit of wholesale CBDC to improving a country's domestic and cross-border interbank payments, thereby supporting financial stability. Wholesale CBDC could be used to improve the wholesale financial systems—including interbank payments and settlement systems, delivery versus payment systems, and cross-border payments and settlement systems—by speeding up and rationalizing the clearing and settlement processes and reducing the associated costs of transactions and of developing and upgrading computer systems (Shirai, 2020).

Improving settlements. According to the World Economic Forum (WEF, 2019), wholesale CBDC can be most useful for emerging economies whose interbank payment systems are not yet highly efficient.²⁵ However, actual evidence of this benefit is scarce. Nonetheless, there is still room for wholesale CBDC to be a part of some central banks' toolkit to improve settlements. If a new payment system built on CBDC were to be established, it could reduce systemic risk by providing some core payment services that are outside of, and not reliant on, the banking system (BOE, 2020). The wholesale financial system could be more stable as a result of limiting the chances of data manipulation and removing single point of failure problems and their resultant disruption from the systems (Shirai, 2020). New applications of technology

²⁵ As in the case of small emerging market economies without wholesale, real-time gross settlement system (RTGS) for their currencies or those where transfers are not instantaneous or the RTGS is not available round the clock.

could allow participants to interact directly with a synchronized securities ledger to add, verify and report transactions, with activity to be accelerated, at least theoretically, to real-time settlement. Central counterparties might no longer be necessary to guarantee trades between execution and settlement. Nonetheless, many legal, technical and market coordination challenges would need to be addressed first (Fernández-Villaverde, 2020).

Reducing settlement and counter-party risks. Research on the potential of wholesale CBDC to increase efficiency in cross-border interbank payments and in interbank securities trading and settlement also produced promising results. Many major central banks²⁶ late stage experimentation on CBDC using distributed ledger technology (DLT) showed its potential for rapid and complete cross-border interbank securities transactions. In “delivery versus payment” transaction, there is instantaneous settlement of trade through simultaneous (or “atomic”) transfer of full and final payment to the seller and delivery of asset to the buyer. The result is greater operational efficiency and reduced settlement and counter-party risk. More work however is needed to assess the full potential of wholesale CBDC on cross-border interbank payments, interbank securities trading and settlement, and trade finance (WEF, 2019).

Mitigating risk of fraud and cyber attacks. Another argument in favor of wholesale CBDC is its potential to mitigate the risk of fraud and cyberattacks. In particular, its technology could improve the irrevocability of digital record-keeping (BIS, 2020).

Retail CBDC

Impact on correspondent banking. Similar to wholesale CBDC, there is a strong use case for retail CBDC in terms of cross-border payments, which remain slow, expensive and cumbersome. This is mainly due to coordination problems brought about by multiple systems, currencies, and legal and regulatory regimes (Carstens, 2020). The introduction of a retail CBDC design that takes a clean-slate perspective and incorporate interlinkage options between national systems right from the start could dramatically improve cross-border payments. This would represent a unique opportunity to facilitate easier cross-border payments, reducing inefficiencies and fees by shortening the payment value chain (Auer, 2020). However, the popularity of retail CBDC in this area might adversely affect correspondent banking, a market segment that has seen a 20 percent decline globally between 2011 and 2018, even as the value of payments increased (Rice, 2020). The retreat of correspondent banks might result in higher costs for cross-border payments, less diversity in available products or services, or even a loss of access to the global banking system, all of which could lead to greater use of informal, unregulated payment networks (Carstens, 2020).

Interfacing retail wallets with FX markets. Retail CBDC would also benefit tourism through its potential to permit novel retail interlinkages if consumers were allowed to hold multiple currencies. In today’s account-based system, a cross-border transaction is inseparably linked to a foreign exchange transaction. The intermediary processing the transaction is allowed to impose extra fees and unfavorable exchange rates. In contrast, if consumers were given the option to purchase foreign currency in advance, before spending it abroad, just as they can with cash, the payment would be separated from the foreign exchange transaction. This in turn would open up the possibility of interfacing retail wallets directly with competitive foreign exchange markets (Auer, 2020).

26 Such as the European Central Bank and Bank of Japan’s Project Stella (Phase 2), the Monetary Authority of Singapore’s Project Ubin (Phase 2), the Deutsche Bundesbank’s BLOCKBASTER prototype (2016-2018), and the 2018 joint paper “Cross-border interbank payments and settlements” by the Bank of Canada, Bank of England and MAS all investigate this specific application.

Reducing moral hazard. Allowing individuals, private sector companies, and non-bank financial institutions to settle directly in central bank money (rather than bank deposits) could significantly reduce the concentration of liquidity and credit risk in payment systems. This in turn could reduce the systemic importance of large banks as well as the negative externalities that banks' financial instability can have on society. In addition, by providing a genuinely risk-free alternative to bank deposits, a shift from bank deposits to digital cash could reduce the need for government guarantees on deposits, thereby eliminating a source of moral hazard from the financial system." (Bindseil, 2019 citing Dyson and Hodgson, 2016).

Digital runs. As the BIS (2018) has pointed out, the risk-free nature of a retail CBDC entails its most significant and plausible financial stability risk, i.e., its ability to facilitate a flight away from private financial institutions and markets towards the central bank. Absent CBDC, the public may suddenly shift their deposits towards government securities and/or financial institutions perceived to be safer when faced with systemic financial stress. They could also always flee towards the central bank by holding more cash. With the introduction of a retail CBDC, however, the incentives to run even from a strong bank could be sharper and more pervasive than today, especially if deposits are inadequately or not insured. "Digital runs" towards the central bank with unprecedented speed and scale would be possible (BIS, 2018) and would be independent of geographical proximity and time (Olsen, 2018).

Depending on the design of the retail CBDC, its introduction could also cause a corresponding decline in money market instruments. This results in decreased income of money market issuers and banks for lost deposits. If CBDC replaced a large portion of bank deposits, central bank demand for government securities could be large, which might then affect sovereign debt markets. More broadly, a larger central bank balance sheet could present challenges as it reduced the role of the market in price setting. Such a reduction could lead to allocative distortions and tie up higher-quality assets. This could, in turn, adversely affect the functioning of collateral markets. All of this would have implications for financial stability (BIS, 2018).

There are also dire consequences of the conversion of bank deposits into retail CBDC units on the central bank's balance sheets, banks' financing and balance sheets, and the structure of the banking sector (Olsen, 2018). As deposits shrink, banks could try to prevent a loss of deposits by raising interest rates or seek funding to replace such outflows, such as through wholesale funds and term deposits, which would likely be more costly. This could lead some banks to raise spreads and increase transaction fees in order to maintain profitability. Depending on existing market structures, including the importance of retail versus wholesale funding, banks might have to shrink their balance sheets, with possible adverse consequences (BIS, 2018). Banks would be forced to invest in riskier assets in order to offer higher-interest paying deposit (Sanches, 2020). These effects would produce gains and losses for banks, which, in turn, could influence their financial robustness and hence have systemic financial stability consequences. Regardless, the BIS (2018) states that the implications of a shrinkage of commercial bank balance sheets and activity are very hard to assess and require further analysis.

There could also be changes to market liquidity and interlinkages. If the demand for CBDC exceeded the decline in the demand for cash and/or reserves, larger outright holdings of retail CBDC could hamper market functioning if they reduced the free-floating share of outstanding bonds.²⁷ While a retail CBDC would by itself be very liquid, it could result in reduced liquidity and increased "specialness" in collateral (repo) markets. The depth of repo and short-term government bill markets could decline as demand was redirected to wholesale market use of CBDC. While the central bank

²⁷ The number of a company's outstanding shares owned by public investors or the number of shares available to the public for trading in the secondary market.

could step in on the demand side of these markets, it would need to broaden its holdings to match its increasing liabilities. This expanded role of central banks in wholesale markets could also reduce interbank activity and the price discovery role of these markets (BIS, 2018).

Implications on financial intermediation

Wholesale CBDC

With wholesale CBDC, the central bank could occupy a larger role in financial intermediation (BIS, 2018). If the demand for wholesale CBDC grows, the central bank might need to acquire (or accept as collateral) additional sovereign claims and, depending on size, private assets (e.g., securitized mortgages, exchange-traded funds and others). At some point, it may need to hold less liquid and riskier securities. Central banks may also need to provide substantial maturity, liquidity and credit risk transformation at times to both banks and markets. Since central banks could assume more important roles, they could have a larger impact on lending and financial conditions.

Retail CBDC

Impact on bank deposits. The existence of retail CBDC could also have a large impact on financial intermediation patterns. Money and credit creation by banks are the cornerstone of any modern economy featuring deposit money. Banks are in a unique position of being able to create money through their own financing (Olsen, 2018).

While retail CBDC promotes efficiency in exchange, it also crowds out banks' deposits, raises banks' funding costs, and decreases investment (Fernández-Villaverde, et al., 2020). Due to its being an ultra-safe and liquid asset, consumers would prefer CBDC over bank deposits if given similar characteristics such as traceability and protection from loss or theft (BIS, 2018). This is especially true if bank deposits are not sufficiently insured or fails to offer an attractive interest rate.

As deposits are a cheap and stable funding source for banks, decreasing their deposit base through migration from bank deposits to retail CBDC would increase banks' funding cost for maturity transformation. This would alter the amount and cost of credit provided to the economy by the banking sector (BOE, 2020) and decrease investment in the economy (Sanches, 2020).

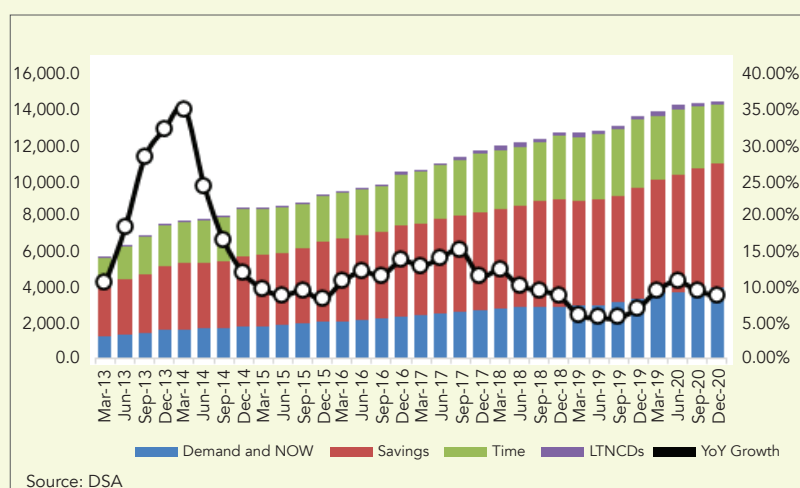
Should all bank deposits shift to retail CBDC, society may be left without the socially optimal amount of credit creation and maturity transformation (Fernández-Villaverde, et al, 2020). However, disintermediation of the banking sector is already happening as a result of developments in payments (e.g., increasing use of electronic money). The introduction of retail CBDC could give the central bank more opportunity to manage these disintermediation risks and, depending on the CBDC's design, may not result in greater disintermediation than is expected regardless of the introduction of CBDC (BOE, 2020). A careful design of retail CBDC, such as using tiered remuneration and placing a cap on CBDC holdings, may solve many of bank disintermediation issues identified in literature (Bindseil, 2020).

Considerations for BSP issuance of CBDC

The benefits that may be gained from the issuance of retail CBDC must be carefully weighed against its implications on the functioning of the financial system, such as the risk of disintermediation, including accelerating bank runs at times of stress, and a potentially larger central bank footprint in the financial system (BIS, 2018; Bindseil, 2020; cited in BIS, 2020a).

Disintermediation of banks. The introduction of an ultra-safe digital asset with cash-like properties could reduce the preference for bank deposits which carry credit-risk. However, CBDC is not the only asset that can shift demand away from bank deposits. In China for example, the dominance of WeChat and Alipay dampened interest in bank deposits. The introduction of retail CBDC, depending on its design features, may further disintermediate banks in particular if CBDC accounts offer relatively comprehensive account services so that many households may no longer feel a need to have a bank deposit account (Bindseil, 2020). In the Philippines however, bank deposit volume has continued to increase annually. As of end-November 2020, the banking system's total deposits posted modest growth at 8.9 percent year-on-year to Php14,492.9 billion as of end-November 2020 (Figure 3.1). The growth is slower than the 9.6 percent recorded in March 2020 but faster than the 6.2 percent in the same period last year.

Figure 3.1 Philippine Banking System Deposit Liabilities (in billion pesos)



Bank runs. As of the end-September 2019, fully insured deposits totaling Php1.5 trillion amounted only to 11.4 percent of the total domestic deposit amount in the Philippines (PDIC, 2019).²⁸ Assuming that partially and uninsured deposits are more prone to runs compared to CBDC in the presence of trigger events, about Php11.6 trillion or 88.6 percent of total domestic deposits are at risk. This is equivalent to 60.6 percent of annualized nominal GDP as of end-September 2019, or 63.3 percent as of end-September 2020 (BSP, 2020).

The Bank of Canada (2020) argues that the incidence of bank runs has not increased globally despite developments that make it easier to withdraw money at any time, such as automated teller machines, internet banking and faster retail payment systems. Moreover, large sophisticated depositors already have many tools to move their money quickly out of banks, including buying treasury bills or moving to other domestic or offshore banks. Regardless, the possibility of digital runs requires the BSP to always stand ready to give liquidity assistance to banks and act as lender of last resort to sound banks under Article IV (Loans to Banking and Other Financial Institutions) of the BSP Charter, as amended²⁹. Even if it is an extreme event, the BSP must be prepared for the worst-case scenario of a swift digital run from a systemically important bank. The same is true when the gravity of deposit depletion forces a bank to close or qualify for closure. In an effort to protect remaining depositors, the BSP may observe that the procedure outlined under Section 30 of the BSP Charter for Receivership and Liquidation³⁰ must be complied with under time pressure.

28 PDIC's maximum deposit insurance coverage is Php500,000.00.

29 This includes Emergency Loans and Advances, under Section 84 of the BSP Charter as amended, granted to sound banking institutions, even during normal periods, for the purpose of assisting a bank in a precarious financial condition or under serious financial pressures brought by unforeseen events, or events which, though foreseeable, could not be prevented by the bank concerned.

30 Among the grounds for summary closure of a bank are a determination by the Monetary Board that the bank has (1) unilaterally closed, suspended the payment of its deposit/deposit substitute liabilities, or is unable to pay its liabilities as they become due in the ordinary course of business (unless this is due to extraordinary demands induced by financial panic in the banking community), (2) it has insufficient realizable assets to meet its liabilities; or (3) cannot continue in business without involving probable losses to its depositors or creditors. The Monetary Board shall notify the board of directors of the closed bank of the bank's closure, in writing through the Philippine Deposit Insurance Corporation (PDIC, the designated receiver)

Larger central bank footprint. The additional functions that could fall to the BSP should it decide to issue CBDC could extend to remits that it is not most suited to perform. For example, an account based CBDC, in which accounts are directly opened and maintained at the central bank, would require the BSP to undertake “know-your-customer” function including its associated costs. In view of the ability of CBDC transactions to become traceable, the BSP could also be called upon to provide information to tax and other government authorities and be subjected to search warrants and other court processes. Moreover, the BSP would have to manage privacy and anonymity issues stemming from the insights obtained from private transactions. It might also have to deal with many requests and customers, although some of these challenges may be mitigated or avoided by careful design (BIS, 2018).

One way to avoid the risks associated with a direct account with the central bank is for the BSP to use the hybrid CBDC model, which is an intermediate solution providing for direct claims on the central bank while allowing intermediaries to handle payments (Auer, 2020). However, this hybrid system brings with it its own host of issues, risks, and challenges such as in the areas of licensing and supervision of these intermediaries, as well operational, legal and reputational risks to the BSP should an intermediary fail to fulfill its required functions.

Regardless of the model used, the bar for a CBDC technical design and system is high. Intermediaries can run into technical difficulties or solvency issues (BIS, 2020a). Account based CBCD may suffer from technological failure, power outage, or issues preventing conversion to cash, which might decrease the public’s trust on the BSP, thereby damaging its reputation and creating financial stability concerns.

Chapter 4

Payments and Settlements and the CBDC Technology

This chapter was jointly prepared by the Payments and Settlements Office (PSO), Payment System Oversight Department (PSOD), and Technology Risk and Innovation Supervision Department (TRISD). The chapter authors are Ms. Remedios C. Macapinlac (Officer-In-Charge) and Ms. Marie Joyce C. Elevado (Acting Deputy Director) of PSO; Mr. Jay M. Dizon (Deputy Director), Jan Marlon A. Evangelista (Bank Officer V) and Ms. Anne Michelle N. Andres (Bank Officer IV) of PSOD; and Mr. Anatoly Gusto (Bank Officer V) and Gerald Daval-Santos (Supervision and Examination Specialist II) of TRISD with contributions from Mr. Melchor Plabasan, Director, TRISD, and Mr. Ace Jerico Alvaro, Acting Deputy Director, TRISD.



Key points

- CBDC issuance is best considered in the broader context of national payment systems development and assessed based on the perspectives of desirability, security, feasibility, and viability.
- One potential motivating factor for the BSP to explore CBDC issuance is to ensure competitive payment systems.
- The underlying technology of CBDC has potential in areas where the clearing and settlement function has not yet reached operational capabilities of an RTGS system.
- While domestic retail payments in economies across the globe have become more rapid and efficient, cross-border retail payments remain cumbersome, expensive and slow. Development of CBDC across jurisdictions may ameliorate inefficiencies for these payments.

Existing payment technologies in the Philippines provide a baseline from which CBDC technology could be assessed. A CBDC can be evaluated based on the perspectives of desirability, security, feasibility, and viability:

- Desirability* - Covers the requirements of the BSP from the technology/s to contribute to its achievement of its objectives and mandate for its stakeholders.
- Security* - Describes the risk management features of the technology/s for payments-related risks such as (but not limited to) legal, settlement, and cybersecurity risks as well as compliance with legal and regulatory requirements such as (but not limited to) data privacy and anti-money laundering.
- Feasibility* - Describes technical and functional requirements of the system as well as the required customer relationships.
- Viability* - Describes the necessary organizational and cost structure to implement the technology/ies.

Wholesale CBDC

In the payment and settlement context, a wholesale CBDC may not appear to significantly add value considering its similarity to an efficient RTGS system that is already in place. The BIS (2018) observed that current proposals for the implementation of wholesale payments that are designed to comply with existing central bank system requirements (e.g., capacity, efficiency and robustness) look broadly similar to, and not clearly superior to, existing infrastructures. Thus, the potential lie in applying the underlying technology of wholesale CBDC in situations where the clearing and settlement function has not yet reached operational capabilities of a RTGS system. These involve other types of financial assets such as securities and derivatives where the CBDC technology can still simplify the settlement and reconciliation processes being executed by multiple participants in the payment and settlement arrangement of such assets.

Desirability

CBDC could provide efficiency gains and innovative enhancements in interbank wholesale transactions given the desired functional design and use-case. To appreciate the potential of wholesale CBDC on a more granular level, certain processes in the payments value chain are discussed below (BIS, 2017a):

- Pre-transaction: processes associated with creating, validating and transmitting payments, transfer instructions or other obligations, including verifying asset holdings and linking data for clearing and settlement.
- Clearing: processes associated with transmitting, reconciling and, in some cases, confirming transactions as well as potentially including the netting of transactions and the establishment of final positions for settlement.
- Settlement: processes associated with transferring an asset or financial instrument, or the discharge of an obligation by the [Financial Market Infrastructure] or its participants in accordance with the terms of an underlying contract.
- Post-settlement: processes related to certain actions taken after settlement, including reconciliation, recording and reporting activities, asset servicing (for example, principal and interest payments), and enforcement of contract terms (for example, smart contracts).

Depending on the design, wholesale CBDC can provide improvements to the existing system or may also create new features in any of the processes above. For example, a report by Baringa, Fintium and R3 (2018) proposes enhancements in managing intraday liquidity using underlying CBDC technology (i.e., distributed ledger technology).³¹ The CBDC technology can also provide automated mechanisms for enforcing contract terms (e.g., earmarking funds, limiting the use of certain funds, applying conditional interest rates) through smart contracts.³²

Security

One of the reasons why CBDC have gained popularity is due to its perceived security features. Some use-cases rely on the efficiencies gained from fewer intermediary involvement in the clearing and settlement process. The key enabler for such innovation is the security embedded in the CBDC through the blockchain technology. However, it should be recognized that threats and vulnerabilities may still arise.

When the use of the CBDC is limited to a wholesale interbank payment and settlement system, the new technology would be similar to the one already in place. The operational and security requirements, as well as its susceptibilities (e.g., electric system failures, single-point-of-failure vulnerabilities and security breaches) would not differ significantly. However, given the distinction between the existing “accounts-based” system and a “token-based” wholesale CBDC system, some differences may still arise.

The existing accounts-based system is said to be vulnerable against fraudulent activities conducted in the wholesale payment system. A discussion by the BIS (2017b) has since prescribed measures to counter fraud in similar situations by presenting a strategy which safeguards against unauthorized access, among others. However, for the underlying technology of CBDC, the proposed technologies have not undertaken security and operational resiliency tests in the same magnitude as the existing system given its early developmental stage. While this may mean that some cybersecurity concerns remain unanswered, providers of CBDC solutions have had promising third-

31 The BIS defines DLT as the protocols and supporting infrastructure that allow computers in different locations to propose and validate transactions and update records in a synchronized way across a network. From https://www.bis.org/publ/qtrpdf/r_qt1709y.htm

32 According to the U.S. Department of Commerce National Institute of Standards and Technology (NIST), a smart contract is defined as a “collection of code and data (sometimes referred to as functions and state) that is deployed using cryptographically signed transactions on the blockchain network. The smart contract is executed by nodes within the blockchain network; all nodes must derive the same results for the execution, and the results of execution are recorded on the blockchain.” From https://csrc.nist.gov/glossary/term/Smart_contract

party independent assessments for their technology's resiliency, security, privacy and performance.³³

In addition, a study by Minwalla (2020) stated that no universally accepted standards for CBDC security currently exists. Prospectively, central banks may move towards implementing CBDC standards similar to existing security standards for payment systems (e.g., PCI-DSS³⁴ and EMV³⁵). Moreover, the study finds that a consensus with regards to CBDC security standards are unlikely to be established in the near future, as the forms of CBDC currently designed have been manifold, with no preferred approach identified. This supports a view raised in the World Economic Forum (WEF) report (2020), which stated that one of the primary challenges for considering CBDC is its nascent technology infrastructure. The associated costs and risks may therefore not be fully determined under such circumstances. Until then, the technical capabilities and track record of CBDC solutions providers must continue to grow to build credibility. For the BSP, coordinating its CBDC initiatives with other central banks and industry players can help towards the creation of universal standards and regulations.

Feasibility

A Bank of Canada report (2018) highlighted the potential benefits of expanding the ecosystem of CBDC's underlying technology beyond wholesale payments to include other financial assets (i.e., securities settlement). The result of their expanded proof-of-concept project showed promise in improving efficiency in terms of operational cost savings and reduced reconciliation efforts.

In a way, developing a CBDC wholesale system could therefore be a baseline for building the technological foundations that would enable advanced use-cases. Wholesale CBDC can potentially serve as a starting point in terms of establishing the technical and functional requirements of CBDC systems for applications beyond wholesale interbank payments (e.g., retail CBDC, securities settlement, cross-border CBDC).

The primary technical consideration of a CBDC system that would fit the desired applications for payment and settlement could be evaluated in terms of adopting a mix of elements of a DLT³⁶ A Bank of England paper (2020) highlighted the relevant elements of DLT. These include: i) decentralization; ii) sharing of data; iii) use of cryptography; and iv) programmability. Certain degrees of specifications for each element must be considered for establishing a wholesale CBDC. For example, the amount of decentralization would depend on the preference for multiple players to validate transactions that occur under the wholesale CBDC ledger. Meanwhile, the use of cryptography could be highly considered for enhancing security. Other technical and functional requirements, some of which are already expected or implemented in existing wholesale systems, include the system resiliency, capacity/scalability, and interoperability.

Viability

Given the context-specific aspects of CBDC, the necessary costs entailed in implementing CBDC innovations cannot be adequately quantified

33 See Howard, J. and Vachino, M. (2019) "Blockchain Compliance with Federal Cryptographic Information Processing Standards" <https://ssrn.com/abstract=3381692>

34 "PCI Digital Security Standard (PCI-DSS)," PCI Security Standards Council. <https://www.pcisecuritystandards.org/>

35 "EMV Standard," Europay MasterCard and Visa Corporation. <https://www.emvco.com/>

36 In the paper cited (Bank of England, 2020), it was not presumed that CBDC must be built with DLT as its underlying technology, but individual components of DLT were deemed as potentially useful depending on the CBDC design choice.

prior to any preliminary implementation towards the adoption of wholesale CBDC. As with other emerging technological innovations, undertaking a wholesale CBDC initiative must begin with a “proof of concept” (PoC). Following Mills et al (2016), the path of adoption follows several stages of development, which must first begin with an experimental approach under a controlled, small-scale environment via a PoC. At this initial stage, the BSP should consider partnering with a CBDC technology solutions provider to help understand the actual potential and limits of a wholesale CBDC within the BSP’s context. It should be noted that issues such as scalability and network security may not be fully observed under such testing condition. This, however, would still be beneficial for the BSP in terms of identifying the most suitable technology to deliver the CBDC, as well as for providing better direction towards subsequent steps (i.e., the pilot phase and the production stage). These steps must be taken gradually so as to provide the BSP and potential participants (e.g., banks and other financial institutions) with enough caution and attention as the CBDC technology builds on existing legacy systems.

General purpose or retail CBDC

Current state of the digital retail payments in the Philippines

The Better Than Cash Alliance (BTCA, 2019) estimated that the share of digital payments to total transaction volume in the country grew from 1 percent in 2013 to around 8 to 11 percent in 2018. This is equivalent to an 18 to 21 percent share in the total transaction value. In absolute terms, this translates to 470-490 million digital transactions per month³⁷ amounting to USD 21-25 billion. The largest shift came from payments made by individuals which is driven in part by the increased usage of prepaid and debit cards at merchants. The number of prepaid and debit cards in circulation has doubled to 70 million each and the number of merchants that accept digital payments has increased from 35,000 to 180,000. Mobile money ownership improved from 4 percent to 5 percent between 2014 and 2017. Meanwhile, growth in digital payments by businesses has remained sluggish in terms volume. By contrast, payments have significantly increased in terms of value. Businesses continue to prefer checks as there is a lack of awareness and an ambiguity regarding acceptance of electronic Official Receipts (eOR).

In 2020, the COVID-19 outbreak heightened the urgency for organizations to transform digitally. With some parts of the country being placed under an enhanced community quarantine (ECQ), restrictions on business and public movements

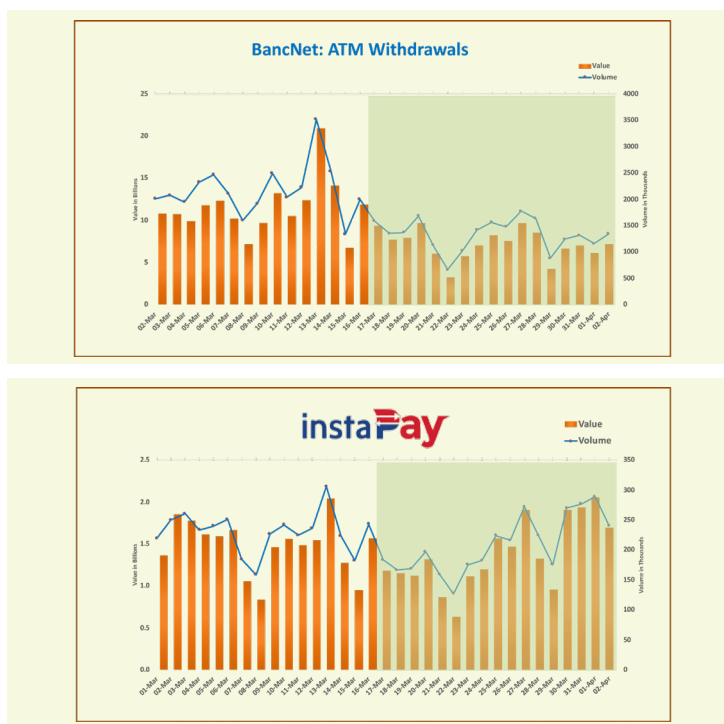
Figure 4.1 Retail Payments: Check payments and PESONet transactions before and during ECQ



37 The estimated total transactions per month is 4.6 to 6.0 billion.

have limited the physical presence and face-to-face transactions of customers. During this period, checks, which are predominantly used by business entities, substantially declined in volume and value. By contrast, there was an upward trend for transactions under PESONet, which is an electronic fund transfer (EFT) facility designed to be the electronic alternative for checks (Figure 4.1). Similarly, while ATM withdrawals were on the downtrend, transactions under the InstaPay facility, which is a cashless alternative to make low-value payments, grew during the period (Figure 4.2).

Figure 4.2 Retail payments: ATM withdrawals-InstaPay transactions before and during ECO



Potential uses and benefits of retail CBDC

- In view of the COVID-19 crisis, retail CBDC may enable central banks to take part in and increase the ability for private-public partnerships to achieve the following objectives:
- First, retail CBDC would have given a digital alternative to handling physical currency at a time when there are unprecedented public concerns about viral transmission via cash.
- Second, governments could have used them for distributing emergency support to households. With CBDC, these handouts would be instantaneous and cost effective, providing direct relief.
- Third, the programmable nature of retail CBDC can enable the government to institute rules as the CBDC circulates. This is something that is not possible with physical cash. For example, CBDC can be configured to be withdrawn only in accredited partners or be used solely for its intended objectives, such as for food, medicine or intended loan purpose.

Retail CBDC can also be used to enable atomic delivery (i.e., exchange of payment and securities are exchanged in real-time while ensuring settlement finality is achieved). Atomic DvP effectively reduces costs associated with settlement cycle delays and margin calls which are common issue with current traditional infrastructure. Ultimately, the goal with retail CBDC is the reduction of the cost payment which enables broader participation and further increase economic activities.

Moreover, retail CBDC can provide diversification in payment rails since it offers an added payment instrument option that the general public can use to settle transactions. Hence, adopting it reduces a single-point-of-failure risk and supports safety and resilience in terms of serving as a contingency retail payment system in case operational problems occur with any of the private payment service providers.

However, it may introduce a new level of security and safety risks since its failure can cause substantial interruptions in the economy and pose reputational risks to the central bank. Absent effective controls and security measures, it can also be a significant target for theft and terrorism.

Payment system competitiveness and access

Retail CBDC has the potential to enhance payment system competition. Maintaining competitive payment systems is the most significant factor motivating most central banks to explore CBDC issuance. Retail CBDC may be aimed at mitigating market dominance of private payment systems or reducing concentration risk in such payment systems. Fostering competition in payment systems shall aid in ensuring the efficiency and reliability of payment services.

Promoting competition in the retail payments industry is necessary since payment systems tend to become natural monopolies reflecting strong network externalities that operate under large economies of scale and of scope. This means that monopolistic or oligopolistic payment systems, owing to the presence of a single or few service providers, can maximize profits by providing exclusive services to large number of users while enjoying decreasing average costs.

Despite capturing such substantial gains however, some payment service providers may underinvest in effective security controls as they may not internalize the social cost of possible systemic disruptions from operational failures such cyberattacks. In addition, monopolistic e-money issuers may abuse their market power by offering partial, inadequate and expensive services which lead to inefficiencies. Adopting retail CBDC is one of the means for boosting competition in the payment services industry, along with ant-trust regulations and legislations on data protection.

Implications of greater competition and access for the structure of the payments market

To the extent that a retail CBDC would further open up payments to non-banks, commercial banks could see their payment-related income streams eroded by increased competition. Wojtuzko and Bujnowski (2018) show that adopting retail CBDC as an alternative payment system will negatively impact banks' profitability in its payments service business line through lower number of card transactions and consequent lower revenues from interchange fees. Retail CBDC issuance is seen as pushing customers to move their transactions out of the usual payment channels towards the digital currency. Thus, the potential adverse impact on earnings from payments services is more pronounced for banks that are more reliant on their debit, credit and prepaid card businesses.

Based on service provider interviews, there are several considerations and approaches to extend non-bank entity participation in retail CBDC. These include:

- Flexibility and track record of the CBDC solution to adopt different tiering models from two-tiered to other alternative models.
- API connectivity for incumbent and non-bank players to interface their payment systems and e-money systems to the CBDC infrastructure to access and transact in CBDC.
- Support functionality for offline transactions so that people living in areas where network connectivity is not always available can still access and transfer CBDC using appropriate user devices.

Cost Efficiencies

Use of cash poses similar burden for the private sector. Retailers incur storage, security and transport costs in maintaining cash holdings while private agents incur withdrawal costs (i.e., transport, travel time and withdrawal fees in some instances) for using the same.

CBDC can reduce these costs through the provision of 24/7 access to payments with instant final settlement. This shall reduce counterparty risks and release a significant amount of collateral. Many economies, including the Philippines, have already similar round the clock payment systems (i.e., Instapay).³⁸

Information from service providers indicates that CBDC requirements of other central banks have gravitated towards instant settlement and settlement finality. Based on interviews, they have helped central banks to optimize the latter's settlements to real-time mode from batched mode on RTGS settlements, resulting in significant reduction in settlement risks.

CBDC for cross-border payments

The significant increase in mobility of goods and services, capital and people across jurisdictions in the past decades led to the importance given to cross-border payments. While domestic retail payments in economies across the globe have become more rapid and efficient, cross-border retail payments remain cumbersome, expensive and slow. Development of CBDC across jurisdictions may ameliorate inefficiencies for these payments.

Desirability - interoperability for cross-border payments.³⁹

Interoperability of CBDC between jurisdictions could reduce reliance on costly correspondent banking networks and pre-funded nostro and vostro accounts. This implies substantial benefits for low- and middle- income countries that receive substantial volume of remittances like the Philippines.

Nowadays, retail cross-border payments such as remittances flow through banks or money service operators that charge high fees using SWIFT messaging. While participants benefit from SWIFT's network, scale, and reliability, SWIFT still uses corresponding banking networks.⁴⁰ Since the

³⁸ Instapay is an automated clearing house under the Bangko Sentral's National Retail Payment System (NRPS). Launched in April 2018, Instapay enables individuals, businesses and government institutions to send and receive funds or make payments in real time, 24/7 through mobile banking applications and internet banking facilities of participating banks and e-money issuers.

³⁹ The NRPS Framework defines interoperability as the quality of a payment system to enable financial products and services belonging to a particular scheme or business model to be used or interoperated between other schemes or business models usually of another institution.

⁴⁰ SWIFT stands for Society for Worldwide Interbank Financial Telecommunication, a global member organization that facilitates cross-border settlements by issuing standard payment orders among its transacting member institutions.

financial crisis, banks have been reducing the number of their correspondent networks which made cross-border payments less efficient. Hence, money transfer organizations incur greater costs which they pass on to customers.

A retail CBDC would lower costs and significantly reduce the number of intermediaries involved. With it, payments into a country using CBDC would go from the payer's account to the central bank of the receiving country and then directly to payee's wallet if the CBDC is designed to accommodate peer to peer transfers, without having to go through a network of commercial banks. Both payer and payees' countries have to be capable though of issuing an interoperable CBDC in order that such payments would only need an exchange market to function across borders.

On feasibility

In the latest study on the BIS survey on CBDC (Auer and Bohme, 2020), the authors note that among ongoing retail CBDC projects, none had an explicit focus on payments outside the central bank's jurisdiction. Information regarding the technical requirements of a cross-border CBDC have been limited to the utilization of a wholesale CBDC.⁴¹ One such case is the collaborative project between the Bank of Canada and the Monetary Authority of Singapore (i.e., "Project Jasper-Ubin") where CBDC and its underlying DLT system was tested in terms of providing better means to conduct cross-border payments (Bank of Canada and Monetary Authority of Singapore, 2019).

On security

The Jasper-Ubin project has demonstrated that a cross-border transaction can be successfully executed by harnessing the underlying technology of CBDC (i.e., DLT and smart contracts). However, security considerations cannot be comprehensively assessed from a proof of concept test. One particular concern is the lack of global standards for ensuring interoperability of systems across different participants. Without interoperable systems in place, market players involved in cross-border CBDC transactions may result in having certain procedures being executed outside the platform (e.g., manually readjusting transmitted data in order to proceed with the transaction). This may result in additional security risks and vulnerabilities with the system becoming more susceptible to attacks.

In addition, a Bank of England report (2020) observes that uncertainties in the anti-money laundering capabilities of some jurisdictions could result in security concerns for cross-border payments. Moreover, there are frictions which have not yet been fully addressed by the underlying technology of CBDC. These include liquidity management and the harmonization of messaging standards of a nascent CBDC payment system.

The applicability of cross-border CBDC discussed thus far rely on the underlying technology of DLT. It has been cautioned, however, that DLT has not yet been fully vetted in terms of a wide-scale live implementation which, to an extent, is due to being in its early developmental stages for CBDC applications.

Similarly, the costs may not yet be specifically quantified, but undertaking technological innovations that could entail replacing legacy systems could entail significant costs. For a better perspective, an IMF study (Kiff et al, 2020) categorizes the costs associated with developing and operating CBDC in terms of labor (e.g., consultancies, software developers), infrastructure (IT servers), software (e.g., licenses and platforms), cyber security (i.e., security and resiliency tests), and support (e.g., help desks and capacity building).

⁴¹ Despite this limitation, it is understood that cross-border wholesale payments also include transfers made on behalf of banks' customers.

As a concurrent strategy while cross-border CBDC are considered for pilot and experimentation, the BSP can partake in global efforts to enhance cross-border payments. Specifically, the BIS CPMI is working towards establishing a global roadmap in order to achieve such goal. In its Stage 2 report (BIS, 2020b), they laid out “building blocks” which central banks could work on alongside industry players in enhancing cross-border payments and establishing a universal approach towards addressing existing frictions in the cross-border payments sphere. Among the 19 building blocks identified, 3 are focused on new payment infrastructures and arrangements as a focus area, where the consideration of an international dimension into CBDC designs was highlighted. In order to fully attain the benefits in this focus area, the report mentions the importance of simultaneously advancing other supplementary focus areas. Alongside exploratory efforts in setting up a cross-border CBDC, central banks are encouraged to enhance the existing payments ecosystem in such a way that barriers to the emergence of new technologies such as CBDC would be removed.

Chapter 5

Exploring Central Bank Digital Currency for the Bangko Sentral: Legal and Regulatory Issues and Challenges

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Key points

- The BSP under existing legal framework may further boost advancement of cash lite economy through digital payments to create a more broad-based and critical mass of digital payments users in the Philippines.
- The expanded authority provided by the National Payment Systems Act for the BSP to own and operate a payment system may be used as the legal framework to introduce the use of CBDC in wholesale form.
- Issuance of retail CBDC cannot be accommodated under existing legal framework.

Promoting cash lite economy or introducing CBDC under existing legal framework***Expansion of the BSP's depository function may serve as an avenue to further boost digital payments in the Philippines***

The BSP, under the existing legal framework, may further boost advancement of cash lite economy through digital payments to create a more broad-based and critical mass of digital payments users in the Philippines, which may provide further support to the introduction of CBDC.

Under Section 8 of Republic (Rep.) Act No. 11127, otherwise known as the National Payment Systems Act, or the NPSA, the BSP is authorized to: (i) own and operate payment systems as may be deemed necessary by the Monetary Board (MB), and (ii) determine who shall be allowed to participate in the payments systems owned and operated by it and who shall be allowed to open an account with the BSP for settlement purposes. Moreover, Section 10 of the NPSA requires all operators of payment system as defined under Section 4 thereof to register with the BSP. The relevant provisions are quoted below:

Rep. Act No. 11127 (National Payment Systems Act)

Section 8. Bangko Sentral Authority to Own and Operate a Payment System. - The Bangko Sentral shall have the authority to own and operate payment systems as may be deemed necessary by the Monetary Board. The Bangko Sentral shall have the authority to determine who shall be allowed to participate in payment systems owned and operated by it and who shall be allowed to open an account with the Bangko Sentral for settlement purposes. The Bangko Sentral shall adopt internal safeguards to ensure appropriate independent oversight of its operator functions.

Section 10 Registration of Payment System Operators. - Within six (6) months from the effectivity of this Act, all operators of payment system as defined under Section 4 of the Act shall register with the Bangko Sentral. Operators of payment systems, which shall commence business or operations subsequent to the effectivity of the Act, shall register with the BSP in such manner and within such reasonable period as may be prescribed by the Monetary Board.

The BSP, through the Payments and Settlement Office, operates the country's real-time gross settlement system (RTGS), known as the PhilPaSS, facilitating time critical payments and thus promoting economic activity and

financial stability.⁴² It serves (i) as the payment system operator responsible for the operation and maintenance of PhilPaSS and its critical components,⁴³ (ii) as lender of last resort, it provide liquidity tools⁴⁴ to PhilPaSS participants,⁴⁵ and (iii) as user of its own RTGS system, through its different departments, it also make use of the payments and settlement systems for the settlement of its own transactions with its stakeholders.⁴⁶

At present, to become eligible to participate in or use the PhilPaSS, user-institutions must maintain Demand Deposit Account (DDA) with the BSP. Thus, PhilPaSS users are classified either as “Direct Users” which are able to directly interface with PhilPaSS as these users maintain DDAs with the BSP (i.e., universal banks, commercial banks, thrift banks, rural banks and non-banks with quasi-banking license [NBQB]); or “Indirect Users,” which refer individuals or corporations which may avail of the service of PhilPaSS to settle their interbank fund transfers and other large value payments, through their designated depository banks.⁴⁷

At this juncture, it is important to emphasize that one (1) of the major amendments to Rep. Act No. 7653 (the “New Central Bank Act”), introduced by Rep. Act No. 11211, is the authority of the BSP under Section 113 of its Charter, to accept deposits and other similar placements from the Government, its political subdivisions and instrumentalities, banks, and other BSP-supervised entities, thus:

SECTION 113. Official Deposits. — The *Bangko Sentral* shall be the official depository of the Government, its political subdivisions and instrumentalities as well as of government-owned or -controlled corporations. As a general policy, their cash balances should be deposited with the *Bangko Sentral*, with only minimum working balances to be held by government-owned banks and such other banks licensed to operate in the Philippines as the Monetary Board may authorize. **The Bangko Sentral may accept deposits and pay interest on such deposits and other similar placements of the Government or of its political subdivisions and instrumentalities, banks and other Bangko Sentral-supervised institutions.**

The amended Section 113 authorizes the BSP to accept not only deposits but also other similar placements and pay interest thereon. It also expands the list of entities which can make deposits and similar placements to include other BSP-supervised institutions, when formerly it was limited to the Government, its political subdivisions and instrumentalities, and banks. In this regard, Section 3 of the BSP Charter, as amended, enumerates the entities now falling within the jurisdiction of the BSP to include, in addition to banks and non-bank financial institutions with quasi-banking operations, money service businesses, credit granting businesses, and payment system operators, to wit:

SECTION 3. Responsibility and Primary Objective. — The *Bangko Sentral* shall provide policy directions in the areas of money, banking, and credit. It shall have supervision over the operations of **banks** and exercise such regulatory and examination powers as provided in this Act and other pertinent laws over the **quasi-banking operations of non-bank financial institutions**. As may be determined by the Monetary Board, it shall likewise exercise regulatory and examination powers over

42 <http://www.bsp.gov.ph/financial/payments/PhilPaSS.pdf>

43 http://www.bsp.gov.ph/financial/payment_roles.asp.

44 Intraday Liquidity Facility (intended to avoid interbank payments gridlock in the settlement process within PhilPaSS business hours; and Overdraft Credit Line (aims to assist banks experiencing unexpected or higher than usual volume of inward check transactions).

45 http://www.bsp.gov.ph/financial/payment_roles.asp.

46 *Id.*

47 http://www.bsp.gov.ph/downloads/primers/FAQ_PhilPaSS.pdf

money service businesses, credit granting businesses, and payment system operators. The Monetary Board is hereby empowered to authorize entities or persons to engage in money service businesses.

The expansion of the BSP's depository function may serve as an avenue to further boost digital payments in the Philippines by exploring the possibility of allowing other BSP-supervised institutions, *i.e.*, money service businesses, credit granting businesses, and payment system operators, to open DDAs with the BSP pursuant to Section 113 of Rep. Act No. 7653, as amended, and thereby becoming "Direct Users" of PhilPaSS. The increase in the number of "Direct Users" of PhilPaSS may be instrumental in achieving a critical mass of digital payments users in the Philippines, and could signal the readiness of the country to the introduction of CBDC in the financial system.

Use of wholesale CBDC for PhilPaSS pursuant to the NPSA

In an article entitled "*Digital Cash: Why Central Banks Should Start Issuing Electronic Money*," written by Dyson and Hodgson (2016), the authors answered the question on how Bank of England can implement digital cash in this wise:

How to Implement Digital Cash

The Bank of England already issues digital money, in the form of deposits held by commercial banks in accounts at the Bank of England. It could provide digital cash simply by making these accounts available to non-bank companies and individuals.... (Dyson and Hodgson, 2016, p.2).

According to said article, bank deposits at the central bank are precisely what is called digital state-issued money, thus:

...As Haldane (2015) put it: **"In one sense, there is nothing new about digital, state-issued money. Bank deposits at the central bank are precisely that,"** and explained: "A central bank's balance sheet is the foundation on which both money and monetary policy are built. A central bank's liabilities define the quantity of so-called base money in circulation." However, whilst members of the public are allowed to hold physical cash, deposit accounts at the Bank of England are currently provided only to banks, building societies and a small number of systemically important financial firms. So, members of the public have no way of holding digital state-issued money.⁴⁸

Consequently, a central bank can provide 'digital cash' simply by allowing members of the public (and businesses) to hold digital deposit accounts at the Bank of England...

As discussed above, the BSP has been granted additional authority under the NPSA to own and operate payment systems, and allow opening of an account with the BSP for settlement purposes.⁴⁹ Said law likewise vests the BSP with powers to issue, through the MB, (i) rules and regulations governing payment systems,⁵⁰ and (ii) directives and orders to any participant of a payment system whenever the MB has determined that it is necessary to ensure the safety, efficiency or reliability of a payment system or it is in the interest of the public to do so.⁵¹

While there is no explicit power to issue CBDC under its Charter, the expanded authority provided to by the NPSA for the BSP to own and operate

48 *Id.*, p. 4.

49 Section 8, NPSA.

50 Section 6(d), NPSA.

51 Section 6(e), NPSA.

a payment system may be used as the legal framework to introduce the use of CBDC in wholesale form similar to the case of Bank of Thailand (BOT). In the case of BOT, while there is no explicit power to issue a digital currency under the Thailand Currency Act, it has legal power under the BOT Act⁵² to design, establish and operate the payment system.⁵³ Pursuant thereto, BOT is deemed to have the power to issue CBDC in the context of building payment system.⁵⁴ Hence, on 18 June 2020, BOT has announced the project to develop the prototype of the payment system for businesses using CBDC which will build upon knowledge from *Project Inthanon*, the collaborative project between the BOT and the eight (8) leading financial institutions to study and develop the proof-of-concept for domestic wholesale funds transfer using wholesale CBDC.⁵⁵

Accordingly, to support the operation of a payment system using wholesale CBDC under the NPSA, the BSP may enter into a memorandum of agreement or contract with participating banks/financial institutions so as to set forth the terms and conditions, scope and limitation of the issuance, as well as to determine the rights and obligations of the parties thereunder, among others.

In general, the following are among the possible legal implications and considerations on the issuance of wholesale CBDC anchored under the NPSA.

1. **Wholesale CBDC will be considered as mere representation of fiat money.** While CBDC are not recognized under existing laws as legal tender in the Philippines, the parties who, by contractual stipulation, will agree to open wholesale CBDC accounts with the BSP for purposes of participating in PhilPaSS operations, will effectively recognize that wholesale CBDC is a representation of fiat money and, thus, a valid means to settle obligations passing thru PhilPaSS.
2. **The provisions of the NPSA and its implementing rules and regulations (“IRR”) will apply.** Use of wholesale CBDC for the operation of PhilPaSS will be covered by the provisions of the NPSA and its IRR. Hence, all PhilPaSS users will be subject to the obligations and responsibilities provided under said law and regulations, such as provisions on finality of settlement and netting.
3. **Existing laws and regulations on data privacy will apply.** The opening of account using CBDC for settlement purposes may involve personal information which shall be held under strict confidentiality and shall be used only for the declared purpose as required under the Rep. Act No. 10173 (“Data Privacy Act of 2012”). Under Section 6(d)(4) of the NPSA, the BSP may issue rules and regulations covering the appropriate measures to ensure the confidentiality of payment information which, under the provisions of Rep. Act No. 10173 and other existing laws, is considered confidential. Thus, confidentiality concerns under the Data Privacy Act of 2012 and other confidentiality laws for the use of CBDC may be addressed depending on the nature of contract or agreement with participating entities in the payment system.
4. **Existing anti-money laundering (“AML”) rules and regulations will apply.** Section 6(d)(5) of the NPSA mandates the BSP to issue necessary measures to ensure compliance of designated payment systems with Rep. Act No. 9160 (the “Anti-Money Laundering Act of 2001” or AMLA), as amended, and other related laws. Thus, the use of wholesale CBDC for purposes of operating the BSP’s payment system is covered by measures to ensure compliance with laws and regulations related to AML.

52 Section 8, Bank of Thailand Act, B.E. 2485, pertinently states that BOT shall have the power to establish or support the establishment of a payment system.

53 See Bank for International Settlements (BIS) Central Bank Legal Experts’ Meeting, Basel 2-4 December 2019. Cryptocurrencies and Central Bank Digital Currencies – Legal Considerations.

54 *Id.*

55 <https://www.bot.or.th/English/PressandSpeeches/Press/2020/Pages/n3063.aspx>.

Issuance of retail CBDC cannot be accommodated under existing legal framework

The primary characteristic of retail CBDC is that it is akin to a fiat currency or liability issued by central banks in a digitized form which the general public can own and use for payment and settlement of obligations.

One of the types of retail CBDC is the account-based retail CBDC which involves the issuance of a digital currency to the general public in the form of directly providing an account in the central bank (Amstad et al., 2019). Thus, the issuance of retail CBDC should consider the following legal implications and considerations:

1. **Opening of deposit accounts by the general public with the BSP is not contemplated under Rep. Act No. 7653, as amended.** In establishing the feasibility of adopting this type of CBDC in the Philippines, it must be determined whether existing laws allow the general public to open deposit accounts with the BSP.

In this regard, the provisions of Section 113 of Rep. Act No. 7653, as amended, is instructive. Said section provides that the BSP may accept deposits and other similar placements, and pay interest thereon, from the government, its subdivisions and instrumentalities, banks, and other BSP-supervised entities. Stated otherwise, only the government, its subdivisions and instrumentalities, banks, and other BSP-supervised entities may open bank accounts with the BSP. Thus, to operationalize an account-based retail CBDC directly issued by the BSP, the provisions of Section 113 of Rep. Act No. 7653, as amended, must be revisited in order to allow the public to open and maintain accounts with the BSP.

2. **AML and Combating Financial Terrorism (“CFT”) laws and regulations may need to be revisited to cover CBDC transactions.** Rep. Act No. 9160, as amended, and its 2018 Revised Implementing Rules and Regulations require covered institutions⁵⁶ to perform customer due diligence measures to verify the identity of their clients,⁵⁷ and to notify the AML Council regarding any covered or suspicious transactions⁵⁸ of their customers. In this light, it is necessary to further amend AML law to expand the coverage of the requirements to cover CBDC transactions.

It is significant to note that in formulating AML/CFT laws/regulations to cover CBDC, several issues may be considered depending on the type of CBDC that will be issued by the BSP. For instance, in the case of token-based retail CBDC, the AML Council and law enforcement agencies may encounter challenges in determining the owners or monitoring transactions using said digital currency since this type of retail CBDC may be used and transacted without the need for identity verification (Hayashi, et al., 2019). Such anonymity, however, would make it easier for users to avoid AML regulations, which may lead to an increase in illegal transactions or tax evasion (Ward and Rochemont, 2019). In such case, the regulations to be issued must ensure that appropriate safeguards are in place in transacting token-based retail CBDC in order to prevent its usage for money laundering schemes and criminal activities.

On the other hand, for account-based retail CBDC, individuals may be allowed to open CBDC accounts directly with the central bank and use the same for its transactions. This brings certain account management challenges, particularly on who shall be responsible for conducting the “Know Your Customer” (KYC) process and submitting reports to the

56 Covered institutions refer to banks and other financial institutions enumerated under Section 3(a) of Rep. Act No. 9160, as amended.

57 Rule 18, 2018 Revised IRR of Rep. Act No. 9160, as amended.

58 Rule 22, 2018 Revised IRR of Rep. Act No. 9160, as amended.

appropriate government units as required under existing AML/CFT rules and regulations, and who shall be ultimately legally responsible in case there is a violation or non-compliance with said regulations.

Under current AML rules, it is the financial institutions which are required to conduct the due diligence process and perform reportorial requirements for covered and suspicious transactions. Applying these rules to account-based retail CBDC directly issued by the BSP, the responsibility to perform the requisite due diligence procedures and reporting of covered and suspicious transactions shifts to the BSP as it is the institution which manages the CBDC accounts of depositors. Accordingly, it is the BSP which bear the legal responsibility in case there is a breach of AML/CFT regulations. There may, therefore, be a need for the BSP to expand its operations and go beyond its existing mandates to comply with AML/CFT rules and regulations (Auer and Bohme, 2020).

For account-based retail CBDC indirectly issued by a central bank through financial intermediaries, the responsibility to conduct the KYC process to verify the identity of clients naturally lies with said financial intermediaries. These entities may also be required by the central bank to conduct other prudential measures to ensure compliance with AML/CFT regulations. However, in this kind of arrangement, it is unclear on who shall be ultimately legally responsible in case there is failure on the part of financial intermediaries to comply with said regulations. It may be argued, on one hand, that it is the central bank which may be held ultimately legally liable since these entities are operating under its auspices. However, it can also be argued that said entities have the sole responsibility for any breach of AML/CFT regulations since the requirements are part of the nature of their business as financial institutions (Hayashi, et al., 2019). Thus, there is a need to clearly define who bears the ultimate responsibility to comply with AML/CFT regulations in the laws to be formulated for retail CBDC of this nature.

- 3. Rules on data privacy concerning retail CBDC must be considered vis-à-vis AML/CFT regulations.** User privacy is one of the most important considerations for the issuance of retail CBDC. Access to a user's transaction history not only allows for tracking spending behavior but can also enable location tracking and identification of sensitive personal data.⁵⁹ Thus, in the issuance of retail CBDC to the public, the BSP must ensure that the privacy of users are adequately protected while ensuring compliance with existing AML/CFT policies and other audit mechanism.

Under the Data Privacy Act of 2012, all natural and juridical persons involved in the processing of all types of personal information obtained from a data subject are required to provide adequate safeguards to ensure the confidentiality and privacy of such information and to prevent the access of third parties.⁶⁰ Notably, this obligation shall apply to the BSP and financial intermediaries in the issuance of CBDC, specifically to account-based retail CBDC, considering that opening and maintaining CBDC accounts would entail the collection and storage of information from account holders. Thus, there is a need for the BSP to develop a user data policy that clearly articulates the rules for data management, access, privacy and custody.⁶¹

As regards token-based retail CBDC, the main feature of this type of retail CBDC is its capability to be transacted without the need for identity verification. While, as earlier noted, this type of retail CBDC would require additional safeguards to prevent its use for money laundering or to finance criminal or terrorist activities, such safeguards must not intrude with the privacy of their holders in such a way that their identities and private

59 *Id.*

60 Section 4, Rep. Act No. 10173.

61 WEF, *supra*.

transactions will be compromised or unduly profiled by third parties. To this end, it is necessary to craft policies that will balance the need to protect the privacy of account holder information while ensuring that the same will not be used for criminal activities and money laundering schemes.

Issuance of CBDC, either wholesale or retail, as legal tender Philippine currency: Legal and regulatory issues/concerns/limitations

The complexity and novelty of the introduction of CBDC in the Philippines carries with it certain legal considerations since most financial laws were formulated under a backdrop of a fiat or physical currency regime. It is, therefore, of paramount importance to revisit existing laws, rules and regulations to ensure the legal feasibility of the issuance of CBDC in the Philippines and guarantee its general acceptability as legal tender Philippine currency. The possible legislative measures should take into account the design, features, characteristics and terms of digital currency, vis-à-vis its legal implications on various existing laws such as the New Central Bank Act, as amended, AMLA, as amended, confidentiality laws, criminal laws on counterfeiting/duplicating, foreclosure and garnishment, among others.

CBDC do not fall under the definition of the term "currency" and do not qualify as legal tender in the Philippines under existing laws

The provisions under Chapter II, Article II(A) of Rep. Act No. 7653, as amended, prescribe the authority of the BSP to issue currency and provide the characteristics of the currency which shall be considered as legal tender in the Philippines, are relevant, thus:

Chapter II.

The Bangko Sentral and the Means of Payment

...

Article II. Issuance of Mean of Payment

Currency

SECTION 49. *Definition of Currency.* — The word "currency" is hereby defined, for purposes of this Act, as meaning all Philippine notes and coins issued or circulating in accordance with the provisions of this Act.

...

SECTION 51. *Liability for Notes and Coins.* — Notes and coins issued by the *Bangko Sentral* shall be liabilities of the *Bangko Sentral* and may be issued only against, and in amounts not exceeding, the assets of the *Bangko Sentral*. Said notes and coins shall be a first and paramount lien on all assets of the *Bangko Sentral*.

The *Bangko Sentral's* holdings of its own notes and coins shall not be considered as part of its currency issue and, accordingly, shall not form part of the assets or liabilities of the *Bangko Sentral*.

SECTION 52. *Legal Tender Power.* — All notes and coins issued by the *Bangko Sentral* shall be fully guaranteed by the Government of the Republic of the Philippines and shall be legal tender in the Philippines for all debts, both public and private: *Provided, however,* That, unless otherwise fixed by the Monetary Board, coins shall be legal tender in amounts not exceeding Fifty pesos (P50) for denominations of Twenty-five centavos and above, and in amounts not exceeding Twenty pesos (P20) for denominations of Ten centavos or less.

SECTION 53. *Characteristics of the Currency.* — The Monetary Board, with the approval of the President of the Philippines, shall prescribe the denominations, dimensions, designs, inscriptions and other characteristics of notes issued by the *Bangko Sentral*: Provided, however, That said notes shall state that they are liabilities of the *Bangko Sentral* and are fully guaranteed by the Government of the Republic of the Philippines. Said notes shall bear the signatures, in facsimile, of the President of the Philippines and of the Governor of the *Bangko Sentral*.

Similarly, the Monetary Board, with the approval of the President of the Philippines, shall prescribe the weight, fineness, designs, denominations and other characteristics of the coins issued by the *Bangko Sentral*. In the minting of coins, the Monetary Board shall give full consideration to the availability of suitable metals and to their relative prices and cost of minting.

SECTION 54. *Printing of Notes and Mining of Coins.* — The Monetary Board shall prescribe the amounts of notes and coins to be printed and minted, respectively, and the conditions to which the printing of notes and the minting of coins shall be subject. The Monetary Board shall have the authority to contract institutions, mints or firms for such operations.

...

SECTION 56. *Replacement of Currency Unfit for Circulation.* — The *Bangko Sentral* shall withdraw from circulation and shall demonetize all notes and coins which for any reason whatsoever are unfit for circulation and shall replace them by adequate notes and coins: *Provided, however,* That the *Bangko Sentral* shall not replace notes and coins the identification of which is impossible, coins which show signs of filing, clipping or perforation, and notes which have lost more than two-fifths (2/5) of their surface or all of the signatures inscribed thereon. Notes and coins in such mutilated conditions shall be withdrawn from circulation and demonetized without compensation to the bearer. (Underscorings supplied)

As can be gleaned from the aforequoted provisions of Rep. Act No. 7653, as amended, the term "currency" which may be issued and circulated by the BSP refers only to physical banknotes and coins. Relatedly, Section 52 provides that only notes and coins issued by the BSP may be considered as legal tender for all debts in the Philippines. Moreover, Sections 53, 54 and 56 specify the characteristics of the currency, requirements on the printing of notes and minting of coins, and replacement of currency unfit for circulation, which are all referring to physical banknotes and coins. Thus, CBDC do not fall within the purview of "currency" and "legal tender" as these terms are described under Rep. Act No. 7653, as amended.

To legitimize the issuance by the BSP of CBDC and in order for said form of currency to have the same standing as the BSP-issued banknotes and coins, there is a need to pass either (i) a separate law to grant explicit authority for the BSP to issue CBDC and issue, through the MB, rules and regulations governing its issuance and use, or (ii) amend existing laws (e.g., the New Central Bank Act or the NPSA, as the case may be) to provide explicit authority to issue a legal tender CBDC.

AML laws, rules and regulations should address possible issues/concerns arising from CBDC transactions

As discussed earlier, there may be a need to reassess existing AML/CFT laws, rules and regulations, and introduce necessary amendments thereto so as to address AML/CFT concerns which may arise from issuance of legal tender CBDC, whether wholesale or retail. It is worth noting that legislative measures relating to AML considerations may vary depending on the nature, characteristics and terms of CBDC that will be issued by the BSP, and thus, AML laws, rules and regulations should either be flexible or targeted to ensure that CBDC transactions shall not be used for money laundering schemes and criminal activities.

Data privacy, secrecy of deposits, as well as other confidentiality concerns must be considered in the issuance of CBDC

It cannot be overemphasized that the issuance and use of CBDC has associated risks that personal information, transactions and even secrecy of deposits using CBDC may be leaked and become open to public. Thus, appropriate safeguards should be in place to ensure that these confidentiality concerns are duly taken into consideration and properly addressed either through issuance of regulations governing the confidentiality of CBDC transactions or amendments to the law on secrecy of deposits (Rep. Act No. 1405) to expressly indicate the extent of confidentiality of deposits using CBDC, but without sacrificing compliance with AML laws, rules and regulations.

Counterfeiting of CBDC is not contemplated under the Rep. Act No. 3815 (the "Revised Penal Code of the Philippines") and Rep. Act No. 7653, as amended.

The Revised Penal Code of the Philippines punishes the forging or counterfeiting of any coin and currency note of the Philippine Islands. In this regard, Section 50 of the Rep. Act No. 7653, as amended, on the BSP's sole power to issue legal tender Philippine currency also carries with it the authority to investigate, make arrests, conduct searches and seizures in accordance with law, for the purpose of maintaining the integrity of the currency. The same section also provides for penalty for its violation or any regulation issued by the BSP pursuant thereto, and that, in case the Revised Penal Code of the Philippines provides for a greater penalty, then that penalty shall be imposed. A careful reading of these provisions, however, yield that the same only apply and refer to physical currency. Thus, CBDC may not be an object of the crime of counterfeiting under the aforesaid provisions.

Rules on foreclosure and garnishment must be revisited to cover CBDC

Under the existing legal framework, creditors collecting a debt or judgment can typically seize a debtors' property, subject to certain restrictions through the process of foreclosure and garnishment (Allen et al., 2020). However, with respect to CBDC, it is not clear how they can be used as a collateral to cover loans and other obligations and be subject of foreclosure or garnishment. While account-based CBDC may be foreclosed or garnished in the same manner as the process for foreclosing or garnishing deposits with private financial institutions, as it has the same nature as a deposit claim, the same cannot be said with token-based CBDC, which by its nature, is a mere data.⁶² Thus, there is a need to revisit relevant law and rules governing secured credit transactions to determine how CBDC can fit thereto.

The foregoing legal views expressed herein are made in connection with the study on the feasibility of issuing CBDC in the Philippines being conducted by the BSP's Technical Working Group on CBDC. Said legal views are based on the limited available resources and literature on CBDC. It is understood that a more extensive legal study should be undertaken in case the BSP decides to pursue the issuance of CBDC taking into consideration the specifics of said CBDC issuance.

Chapter 6

CBDC and the Consumer: Financial Inclusion and Consumer Protection

This chapter was prepared by Atty. Ramon Abraham A. Sarmiento, Bank Officer V, Office of the Deputy Governor, Monetary and Economics Sector. The chapter benefited from comments and contributions from Mr. Mynard Bryan R. Mojica, Ms. May H. Valdez and other staff of the Center for Learning and Inclusion Advocacy (CLIA).



Key Points

- CBDC may contribute to financial inclusion, but under specific conditions including, among others: that the central bank directly offer retail CBDC, and that there is adequate digital connectivity and literacy.
- Designing a CBDC to foster financial inclusion is inherently complex, risky, and may lead to sub-optimal outcomes for other CBDC policy objectives of the central bank.
- Financial inclusion issues around cost, accessibility, utility of opening accounts (typically cited as exclusion factors) can be addressed without needing for CBDC.

Potential financial inclusion benefits of a CBDC

There is potential for a properly designed CBDC to increase the benefits and reduce the costs and risks inherent in a payment system, which in turn, may encourage financial inclusion (Mancini-Griffoli, et al., 2018). The Sveriges Riksbank (2018) observed that arguments for a widely-accessible CBDC (i.e., retail CBDC) are based on the idea that it could increase financial inclusion and reduce the use of cash which is considered costly, risky, have negative environmental effects and facilitate the black economy. Moreover, an internet application-based CBDC that takes advantage of mobile technologies can increase access to financial services for the poor, rural households, and other segments of the population that may be underserved by the banking system (Allen et al., 2020). This would be of great interest to the BSP as 4.6 percent of cities and municipalities do not have any financial service access points as of 4th quarter 2019⁶³.

The BSP has identified potential financial benefits for consumers in using e-money such as safety, convenience, time savings, and speedy value transfers⁶⁴.

The National Government (NG) and various local government units (LGUs) have also actively used e-money in distribution of social amelioration. These benefits could be magnified given a properly developed, designed and implemented retail CBDC. Researchers have reiterated that a CBDC can only achieve its maximum usefulness when ordinary individuals can hold and use the digital currency (Allen et al., 2020). Thus, a retail CBDC could be of benefit to Filipinos that are unable to reach or for whom it would be costly to reach any financial service access point⁶⁵.

However, the financial inclusion benefits of a retail CBDC come with three (3) main caveats. First, central banks, including the BSP, do not ordinarily offer or maintain accounts for individuals, business and non-bank entities (Allen et al., 2020). Moreover, there is no legal basis for the BSP, at this time, to issue a retail CBDC. Second, it is unclear what design choices must be made for the retail CBDC to have sufficient utility that could promote financial inclusion (Allen et al., 2020). Third, these financial inclusion benefits may be attainable by other means such as strengthening the existing payments system (Kiff, et al., 2020)

63 BSP Financial Inclusion Dashboard as of 4th Quarter 2019, available at http://www.bsp.gov.ph/downloads/Publications/2019/FIDashboard_4Q2019.pdf

64 Bangko Sentral ng Pilipinas (2020, August 05) "The E-Money Platform: Opportunities for Digital Payments" [Presentation]. Available at: <http://www.bsp.gov.ph/downloads/PPT/EMoneyPlatform.pdf>

65 The BSP 2018 Report on the State of Financial Inclusion

Legal basis for use of retail CBDC for financial inclusion

Incorporating financial inclusion as a goal for the possible issuance of retail CBDC is well within the mandate of the BSP.⁶⁶

However, as discussed in the preceding chapter, the BSP currently does not have the legal authority to issue retail CBDC. The mandate of the BSP to promote financial inclusion or its authority to own and operate payment systems cannot be stretched to include the authority to issue a retail CBDC.⁶⁷

However, even if legislative initiatives would allow the BSP to issue retail CBDC, it remains to be seen if such a CBDC can address financial inclusion needs and what design choices need to be made.

Designing a retail CBDC to foster financial inclusion

Designing a retail CBDC to foster financial inclusion is inherently complex, risky, and may lead to sub-optimal outcomes for other CBDC policy objectives of the central bank. A properly designed retail CBDC could enhance financial integrity relative to cash but a poorly designed one could undermine the authorities' compliance with financial integrity standards (Kiff, et al., 2020). Central banks do not generally offer and maintain accounts for individuals. This lack of experience in the matter, may lead to unintended design consequences such as poor security, poor privacy controls, lack of customer care facilities and a misperception of the role of the BSP as issuer of the currency. The BIS (2003) pointed out that the provision of account facilities may lead to the misperception that account holders are within the central bank's "safety net" and thus, in a broad sense, risk-free.

Lack of stable and wide use of the internet

A CBDC, if rolled out in the short term, should take into consideration weak internet connectivity and limited internet access. Even advanced economies are grappling with the issue of lack of internet access in the design of their potential CBDC. For example, the BOJ has reservations about completely transferring to a digital and online currency. The possibility of a natural disaster affecting internet connection, even temporarily, could have significant repercussions to citizens by crippling the payment system. Meanwhile, the Bank of Canada is studying the use of universal access device, which may allow for use of a CBDC even when the internet is out.⁶⁸

Some of these challenges and questions, may be answered by delegating some of the responsibility to financial intermediaries. However, it is unclear how CBDC can significantly foster and promote financial inclusion should consumers need to engage with financial institutions (Allen, et al., 2020).

Exploring other channels to attain financial inclusion benefits

Issuance of a CBDC is not the only solution to improve financial inclusion. Rather than issuance of a retail CBDC, other options to promote financial inclusion could include promoting mobile money and incentivizing private-sector financial institutions to improve their product offerings or changing (Kiff, et al., 2020). Moreover, a retail CBDC, may not be an optimal financial inclusion solution as it will still be limited by the following factors: 1) access to the Internet; 2) access to smartphones; 3) trust in technology and

66 Pursuant to Section 3 of the BSP Charter as amended, the BSP is mandated in the attainment of its objectives to "promote a broad and convenient access to high quality financial services and consider the interest of the general public."

67 There is currently a legislative proposal to grant the BSP authority to issue retail CBDC. Congressman Junie Cua introduced House Bill No. 6646 "An Act Creating A Bangko Sentral Digital Peso (BSDP) as a Medium of Exchange or as Money for Use on All Digital Means, Appropriating Funds Therefore and for Other Purposes" in the 18th Congress. A hearing was held by the House of Representatives Committee on Banks and Financial Intermediaries on 19 June 2020.

68 <https://www.bankofcanada.ca/2020/06/staff-analytical-note-2020-10/>

financial literacy; and 3) historical inequality and lack of wealth (Raghuveera, 2020).

The BSP has identified possible financial inclusion benefits of e-money. The promotion of e-money is similarly the subject of two bills introduced in the House of Representatives.⁶⁹ In fact, recent initiatives are translating in the growth of e-money usage from 2018 to 2019 (Table 6.1):⁷⁰

As opined by the BIS (2020c), a retail CBDC will not necessarily alleviate all the constraints to access. For some segments of the population, barriers to the use of any digital currency may be large (e.g., lack of access to affordable and reliable internet service) and the preference for trusted alternatives, such as cash, is strong (BIS 2018).

It has been observed that financial development is a prerequisite for interest in digital currencies including a retail CBDC. With a lack of experience with traditional internet banking services such as Instapay and Pesonet, Filipinos may not be prepared to deal in digital currencies. Similarly, a lack of familiarity with financial intermediaries and their services may also lead to little interest in exploring their alternatives (Saiedi 2020). This is currently being addressed by the BSP's Digital Literacy Program which aims to increase awareness, trust, and confidence in the digital financial ecosystem.

Table 6.1 Use of e-money in the Philippines: 2018-2019

Electronic Money			
	2018	2019	2020
Number of Transactions (in millions)			
Inflow	119	178	● 50.1%
Outflow	406	449	● 10.8%
Amount of Transactions (in millions)			
Inflow	546.4	745.2	● 36.4%
Outflow	543.7	740.1	● 36.1
Number of E-Money Accounts (in millions)			
Active e-money wallets	5.0	8.8	● 74.0%
Prepaid cards (linked to e-money)	28.2	20.6	● -27%
Cards (in millions)			
ATM debit cards	39.5	43.0	● 8.7%
Credit cards	9.4	9.0	● -4.3%

CBDC, remittances and financial inclusion

Notwithstanding, a possible link between CBDC and financial inclusion may be through payments and remittances. Based on the 2019 Financial Inclusion Survey⁷¹ Report, 9 out of 10 Filipino adults have payment transactions. These include payments to government (i.e. taxes, licenses, loans, contribution) and businesses (bills payment, loans, purchases, and services). Most transactions were settled through cash (over the counter) as it is

⁶⁹ House Bill No. 6652 introduced by Rep. Jose Enrique "Joet" S. Garcia III, entitled "An Act Promoting the Adoption of Electronic Money as a Medium of Exchange for Financial Transactions of the Government and All Merchants and for the Other Purposes" and House Bill No. 6716 introduced by Rep. Ferdinand Hernandez, entitled "An Act Promoting the Adoption of Electronic Money as a Medium of Exchange for Financial Transactions of the Government and All Merchants and for other Purposes."

⁷⁰ BSP Financial Inclusion Dashboard as of 4th Quarter 2019, available at http://www.bsp.gov.ph/downloads/Publications/2019/FIDashboard_4Q2019.pdf

⁷¹ The Financial Inclusion Survey (FIS) is a nationally representative survey dedicated to collect financial inclusion data from users and non-users of financial products and services. The 2019 FIS is the third run of the biennial survey which began in 2015.

still considered to be more convenient, more secured, affordable due to lack of fees, and reliable.

Remittances play an important role to the Philippine economy, with around 10.2 million Overseas Filipinos (OFs) in more than 200 destination countries and territories⁷² sending annual remittances equivalent to 10 percent of the country's Gross Domestic Product (GDP).⁷³ As of end 2019, the OFs' cash remittances totaled USD 30.13 billion.⁷⁴ In addition, over three-quarters of poor households in the country rely on remittances to complement their own earnings.⁷⁵ On another note, OTC cash transactions are still preferred in remittances as pawnshops and money service businesses remain the top remittance channels used by 98 percent of senders and 93 percent of receivers.⁷⁶

As cited by Koumbarakis and Dobrauz-Saldapenna (2019), a CBDC initiative could lead to a reduction in transaction costs for retail and institutional payments. It could also improve settlement speed and allow for payments in real time not having to rely on intermediaries such as banks.⁷⁷ Given these, it may be noted that CBDC has the potential to help in achieving less dependence on cash and decreasing the cost of financial transactions by removing the intermediaries. However, these objectives may be achieved through existing solutions like e-money as well as digital currencies that are not necessarily issued by the central bank (e.g., cryptocurrencies like Bitcoin and Ethereum).

At present there appears to be no specific financial inclusion challenge that can be addressed solely by CBDC. As highlighted by Kiff et. al. (2020) financial inclusion may be furthered by other options which include, among others, promoting mobile money and incentivizing private-sector financial institutions to improve their products offerings.⁷⁸ It may be more useful to look at the technology behind digital currencies – distributed ledger technology (DLT) and blockchains which have demonstrated many applications (e.g., digital identity, smart contracts, regtech/suptech) to financial sector in general and to financial inclusion in particular. Moreover, the relevance/usefulness of CBDC in the short, medium and long terms will depend on what can be practically implemented based on what is allowed as set by existing legal framework.

72 <https://cfo.gov.ph/statistics-2/>

73 World Bank. Migration and Remittances. <https://www.worldbank.org/en/topic/labormarkets/brief/migration-and-remittances>

74 http://www.bsp.gov.ph/statistics/spei_pub/Table%2011.pdf

75 <https://blogs.worldbank.org/eastasiapacific/governments-facing-tough-choices-covid-19-coronavirus-crisis>

76 BSP 2019 Financial Inclusion Survey Report, available at <http://www.bsp.gov.ph/downloads/Publications/2019/2019FISToplineReport.pdf>

77 Koumbarakis, A. and Dobrauz-Saldapenna, G. (2019), "Central Bank Digital Currency: Benefits and Drawback", accessed through <https://www.researchgate.net/publication/325023632>

78 Kiff, J., J. Alwazir, S. Davidovic, A. Fairas, A. Khan, T. Khiaonarong, M. Malaika, H. Monroe, N. Sugimoto, H. Tourpe and P. Zhou (2020), "A survey of research on retail central bank digital currency," IMF Working Paper 20/104.

Chapter 7

CBDC Giving Central Banks a Run for Their Money: Country Experiences

This chapter was prepared by Ms. Laura L. Ignacio,
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Key points

- Surveys among central banks show that while there are significant efforts directed towards research on CBDC, very few central banks plan to issue CBDC in the next five years.
- Payments safety and efficiency are the primary factors driving the CBDC engagement of central banks.
- Collaboration among central banks and the private sector is a common practice among CBDC projects and initiatives.

Central bank surveys

In 2018, the Bank for International Settlements (BIS) and the Committee on Payments and Market Infrastructures (CPMI) conducted a survey among central banks as a stocktaking of central banks' activities on CBDC (Barantoni and Holden, 2019).⁷⁹ The survey asked, among others, about current work and motivation, and how likely the central banks are to issue a CBDC.

The survey showed that most central banks (70 percent) were looking into CBDC, however, majority of those who did were doing conceptual research. The central banks not engaged in CBDC research were those from smaller jurisdictions and/or were pre-occupied with more pressing priorities. A number have indicated reliance on studies by international or regional institutions.

The survey was re-run a year later in the latter part of 2019—with the 2018 definitions and with only a small of number of questions changed (Boar, Holden and Wadsworth, 2020).⁸⁰ The survey showed that there were more central banks engaged in CBDC research (80 percent).

Both 2018 and 2019 BIS surveys showed that although central banks, in general, were engaged in the study of CBDC, only a limited number were proceeding to the pilot phase and even fewer were considering the issuance of a CBDC in the short to medium term. According to the 2019 survey, about 10 percent of the central bank respondents are likely to issue a general purpose CBDC in the short term. The 2018 survey concluded that most central banks appeared to have understood the challenges of adopting a CBDC and they were not convinced that the benefits will outweigh the costs.

The above findings are consistent with the results of *Central Banking's* inaugural Central Bank Digital Currency Survey⁸¹ that very few central banks plan to issue CBDC, in any form, within the next five years— 2 percent have issued a prototype, 9 percent have plans to issue a live CBDC in the short term (one to three years), 9 percent to issue within the next four to six years, and 80 percent have no plans at all to issue (King, 2020b).

In fact, only 13 percent of the respondents considered CBDC to be a top-five strategic priority. For 38 percent of respondents, CBDC would be relevant, but not a strategic priority. Thirteen percent were not sure of the importance of CBDC research on their institution, while 4 percent thought it would not be relevant. Most of these respondents came from Eastern Europe and the Balkan regions, which are still highly dependent on cash, and have a conservative view towards digital payments. This also suggested that most

79 There were 63 central bank respondents, 41 of which came from emerging market economies (EMEs) and 22 from advanced economies (AEs). The central banks represented about 80 percent of the world's population and over 90 percent of its economic output (Barantoni and Holden, 2019).

80 There were 66 central bank respondents, with majority having been respondents to the 2018 survey. Forty-five central banks represented EMEs and 21 from AEs, covering 75 percent of the world's population and 90 percent of its economic output.

81 The article "The Central Bank Digital Currency Survey 2020 – debunking some myths" by Rachel King presents the highlights of the results of Central Banking.com's inaugural Central Bank Digital Currency Survey, indicating possible surveys in the future. The survey with 46 respondents was conducted in February 2020.

of CBDC initiatives in Europe are being driven by the ECB and Eurosystem members.

The *Central Banking* survey referred to a direct correlation between the importance of CBDC for a central bank and the central bank's allocation of both budget and human assets to it. Of the central banks that considered CBDC research work as a strategic priority, 80 percent have a dedicated team for research development, and 46 percent have allocated budget.

Motivations

In the BIS 2018 survey, across all types of central banks, the primary motivating factors for potentially issuing a wholesale or a general purpose CBDC, are payments safety and domestic efficiency. Other reasons include issues about the declining use of cash or discouraging the use of cash by promoting electronic innovations and payments, particularly, for general purpose CBDC. For wholesale CBDC, other factors include better monitoring of transactions as well as safety and efficiency benefits for end users. For emerging market economy (EME) central banks, domestic payments efficiency and financial inclusion matter most; while for advanced economy (AE) central banks, payments safety and financial stability are the primary motivators. The results from the 2019 survey were generally comparable.

Cashing in on CBDC. Central banks have different views on motivations regarding cash. Central banks in economies having a high reliance on cash would like to reduce costs, and improve “Know your client/ Countering Financing of Terrorism (KYC/CFT)” arrangements. Other central banks are facing a low or declining use of cash for payments and are, therefore, considering CBDC to maintain public access to central bank money. Additional questions of the 2019 survey showed that a little less than half of the central banks were studying the public's use of cash and a third were concerned that access to cash could decline in the medium term.

Work phases

Generally, central banks began their CBDC engagement with theoretical and conceptual research. At the time of the 2018 BIS survey, about half of the respondents have progressed to experiments or more “hands-on” proof-of-concept activities to test new technologies. In the 2019 survey, 40 percent of the respondents have progressed from conceptual research to experiments, or proofs-of-concept; and another 10 percent have developed pilot projects—all of these central banks were from EMEs. Nonetheless, many of these proofs-of-concept or pilot projects were only investigative in nature with the central banks having no plans to issue a CBDC.

Based on the *Central Banking* survey, majority (57 percent) of central banks researching digital currencies were in the initial research phase, 23 percent have developed proofs of concept, and 13 percent are in the pilot phase of their projects.

- **Wholesale vs. general purpose CBDC.** For those that were engaged in CBDC research, both 2018 and 2019 surveys of the BIS showed that more than half considered both general purpose and wholesale CBDC, about a third were looking at only general purpose CBDC, and about an eighth only on wholesale CBDC. Nonetheless, in the 2019 survey, there were fewer central banks that plan to issue wholesale CBDC, in either the short or medium term. About half of the central banks in 2018 that were likely to issue a wholesale CBDC in the short term, said they were less likely to do so in 2019. Similarly, the *Central Banking* survey found that

while a number of central banks' early initiatives focused on wholesale applications, 70 percent of respondents are convinced of the importance of retail uses. These findings were consistent with the project studies of the Bank of Canada and the Bank of Thailand that show distributed ledger technology facing challenges as it seeks to improve on current payments and settlements arrangements.

- Citing financial inclusion as a benefit of CBDC, the **South African Reserve Bank** invited bids from private companies to develop the infrastructure necessary for a CBDC in 2019. (King 2020b)
- The **Bank of Jamaica** is looking for technology firms to develop and test "potential" central bank digital currency solutions in its sandbox.⁸² Earlier, the central bank established a fintech regulatory sandbox to allow firms to test technology solutions while ensuring consumer protection and data privacy. It is also in the process of reviewing its retail payment infrastructure, looking into the feasibility of a CBDC. In addition to financial inclusion, the central bank noted that a CBDC would present deposit-taking institutions with an opportunity to improve cash management processes and costs.
- The **Central Bank of the Bahamas** started the "digital sand dollar" project to expand access of residents to modernized digital payments. The system should "reduce service delivery costs, increase transactional efficiency and improve the overall level of financial inclusion." NZIA, a private blockchain company, was selected to design and implement the CBDC. The first phase of the pilot was rolled out in a single district in January 2020, with plans to extend to a second region later this year (King 2020b).
- **Tunisia** was the first country in the world to issue a blockchain-based national currency called eDinar (also Digicash and BitDinar) in 2015 with the assistance of Monetas, a Switzerland-based software company. Similar to cash money, eDinar's distribution and issuance is overseen by a governmental body — La Poste, or La Poste Tunisian (LPT). Tunisians can use their smartphones to make instant mobile money transfers, pay for goods and services online and in person, send remittance, pay salaries and bills, and manage official government identification documents. (O'Neal 2018)
- Senegal issued its blockchain-based eCFA (after CFA franc) in December 2016. eCFA was created through the collaboration between local bank Banque Régionale de Marchés (BRM) and eCurrency Mint Limited. The eCFA is fully dependent on the central banking system and can only be issued by an authorized financial institution. It was designed to be distributed alongside paper money as legal tender. The eCFA is a high-security digital instrument that can be held in all mobile money and e-money wallets. It will secure universal liquidity, enable interoperability and provide transparency to the entire digital ecosystem in the West African Economic and Monetary Union (WAEMU). If proven efficient, the eCFA might be rolled-out to other WAEMU member states, including Cote d'Ivoire, Burkina Faso, Benin, Togo, Mali, Niger and Guinea-Bissau (O'Neal 2018).
- The **Marshall Islands** has been using the U.S. dollar (USD) as its official currency. However, since March 2018, it has implemented another legal tender: a cryptocurrency called "sovereign" (SOV). In late February 2018, the government (the island has no central bank) passed the Declaration and Issuance of the Sovereign Currency Act. The SOV was made in collaboration with Israeli fintech startup Neema and was publicly released through an Initial Coin Offering (ICO), with a separate presale. The SOV is

82 Central Banking Newsdesk. 2020. "Jamaican central bank seeks CBDC partner." 20 July 2020. <https://www.centralbanking.com/fintech/cbdc/7657146/jamaica-central-banks-seeks-cbdc-partner>

completely decentralized and the government cannot control the money supply (after the ICO). The government has reportedly limited the SOV supply to 24 million tokens in order to avoid inflation. (O Neal 2018)

- The **National Bank of Cambodia (NBC)** has developed the Bakong, a blockchain-based payment and money transfer platform, to promote the use of local currency and electronic payment in Cambodia. Cambodia is still considered a highly dollarized economy and most transactions are cash-based (Shen, 2020).

The NBC is conducting a pilot of the peer-to-peer payment system with participating financial institutions to examine the feasibility of the network and identify potential issues before the official launch. The first test started in July 2019 with eight participating institutions, including six banks and two microfinance deposit-taking institutions. The performance of the system will be measured based on latency, downtime, complaints filed by users and the number of transactions handled.

The two-tiered network distributes CBDC to the general public in the form of digital tokens through the country's banking system, without charging fees to users of retail shops. The network is built on Hyperledger Iroha, and provides both a bank application programming interface (API) and a consumer-facing mobile application. The Bakong system is designed to allow real-time fund transfers among different payment service providers – including banks and technology firms. Since Cambodia does not have a real-time gross settlement (RTGS) system, the network uses standardized QR codes to create interoperability among different payment providers. With the network, customers of banks or other payment service providers can withdraw cash from their bank and place it in their physical wallet, or withdraw a digital version of money and store it in the Bakong e-wallet.

The peer-to-peer payment system will also promote financial inclusion. There is no fee charged when customers transfer funds from their own banking account to Bakong account or vice versa. The next step may be to use Bakong in cross-border fund transactions, which would allow migrant workers to send money home at no cost.

- The **Banque de France (BdF)** and Societe Generale have successfully settled securities using a prototype wholesale CBDC blockchain network in May 2020.⁸³ Societe Generale said its securities arm, Societe Generale SFH, had issued €40 million (\$43.9 million) of covered bonds as “securities tokens” registered on a public blockchain network on May 14. Societe Generale itself then fully subscribed to the issue by paying in a digital form of euros issued by Banque de France through a blockchain platform.

The transaction formed a part of Societe Generale's digital currency project. The experiment demonstrated the feasibility of financial securities being digitally settled and delivered in CBDC for interbank settlements. It may eventually lead to the automation and shortening of payment processes, with simplified market infrastructures and strengthened security.

The pilot also formed part of the Banque de France's initiative to find partners for wholesale CBDC experiments. In March, BdF called for applicants to work on proofs of concept that would explore whether CBDC has the potential to streamline payments. It received a large number of applications and would conduct similar experiments in the coming weeks. Some of the firms selected to take part in CBDC experiments that include improving cross-border payment infrastructure include Accenture, HSBC, and Euroclear (King, 2020b).

- The **European Central Bank (ECB)** developed a proof-of-concept (PoC) issued on R3's distributed ledger platform Corda. The PoC makes use of

83 Central Banking Newsdesk. 2020. “Banque de France CBDC project uses blockchain to settle transactions.” 21 May 2020. <https://www.centralbanking.com/fintech/7548891/bdf-settles-securities-transactions-in-cbdc-pilot>

anonymity vouchers for small transactions, that is, users make payments without revealing their identities. This privacy measure, however, could not be extended to larger transactions. The concept shows the possibility of a CBDC payment system that safeguards users' privacy for lower-value transactions, while ensuring high-value transactions are subject to mandatory anti-money laundering/countering financing of terrorism (AML/CFT) regulatory measures. (King 2020b)

- The **People's Bank of China** (PBoC)'s project on its "digital yuan" is being carried out by its Digital Currency Research Institute. PBOC is considering a two-tier CBDC model, where commercial banks would serve as operating agencies – they would pay the PBOC 100 percent reserves against all CBDC issued. The PBOC plans to have pilots in two Chinese districts, hoping to roll out a CBDC in time for the 2022 Winter Olympics. (King 2020b)

Recently, the PBoC chose Didi, a ride-hailing firm, to explore applications of the digital currency electronic payment (DCEP), China's digital cash (Shen, 2020). The firm is backed by investors including China Life Insurance, SoftBank, Temasek Holdings and Toyota.

Look-see approach

As mentioned above, going into research does not imply moving forward to implementation. The **Bank of Israel** completed its research on the varied issues and implications of a CBDC with the recommendation that it would not issue CBDC (e-shekel) in the near future but would "continue to examine and monitor this field before we can form the proper foundation for a decision on whether to recommend digital currency." Similarly, the **Central Bank of Brazil**, in 2018, completed a study about different technical models of CBDC and how this could be implemented within the current ecosystem. The central bank, instead of implementing a CBDC, opted to update its existing payments infrastructure, to invest resources in the implementation of an instant payment system to accelerate retail digital payments. (King 2020b)

Country projects

The study looks at the CBDC projects of four central banks—Project Ubin of the Monetary Authority of Singapore (MAS), Project Jasper of the Bank of Canada (BoC) and Payments Canada, Project Inthanon of the Bank of Thailand (BoT) and Project Stella of the Bank of Japan (BoJ) and the European Central Bank (ECB). MAS and BoC started sometime in 2016, while BoT started in 2018.

The motivations of the four projects were generally the same, that is, to assess if the current payments and settlements systems can be run in DLT platforms as well as to have a better understanding of the technology. The projects of MAS, BoT and BoC involved the participation of supervised private financial institutions. Both MAS and BoT have R3 as the technology partner.

There is also a similarity in the pattern in the projects' phases. The initial phases of the projects focused on the replication of the payments system. This was later extended to the Delivery versus Payment (DvP) capabilities for settlement of tokenised assets across different DLT platforms to allow for the simultaneous exchange and final settlement of tokenised digital currencies and securities assets. Subsequent phases involve cross-border payments usually carried out with other central banks.

Country perspectives: BSP survey of central banks

Survey questions were sent to 15 central banks. Of these, ten banks have provided answers to the survey questions—Sveriges Riksbank, Reserve Bank of Australia (RBA),⁸⁴ Bank of Canada (BoC), Hong Kong Monetary Authority (HKMA), Bank of Korea (BoK), Monetary Authority of Singapore (MAS), Bank Indonesia (BI), Bank of Japan (BoJ), Banco Central del Ecuador (BCE) and Banco Central del Uruguay (BCU). The questions were grouped around certain topics. The first set of questions was on the central bank stance on CBDC and the motivation thereof. The second set was about the demand for physical money. The third set of questions focuses on the technological aspects and the last set on regulatory issues.

Central bank stance on CBDC

- **Bank of Canada:** No decision to issue CBDC has yet been made. Also, the development time for a CBDC will be long so issuance in the next five years is unlikely.

The BoC conducts research on CBDC as a contingency preparation should a CBDC would need to be issued in the future although it has been decided that current conditions do not warrant issuance of a CBDC. The BOC believes that the central bank has an important policy role to play in providing retail payment services in either the physical or digital space. Thus, the declining use of cash and the possibility of adoption of alternative digital currencies are trends that have led them to think seriously about CBDC.

- **Bank of Korea:** The BoK acknowledges that the need for CBDC in the near future still remains slim considering the demand for cash that still exists, the competitive payment service market and high level of financial inclusion.⁸⁵ The Bank of Korea is conducting CBDC research with a view to responding preemptively to the changing environment surrounding payment systems both at home and abroad.
- **Hong Kong Monetary Authority:** Based on its CBDC study Project LionRock in 2017, the HKMA concluded that the prospect of issuing CBDC for retail payment purposes is “limited” in view of the efficient payment infrastructure and services available in Hong Kong (Ng, 2020).
- **Bank of Japan.** For the BoJ, there is no immediate plan to issue a CBDC. However, technology can develop rapidly, thus, the BOJ wants to be ready. A lot of transactions still use cash because of its inherent benefits. BOJ is committed to managing the cash supply as long as its stakeholders need it.
- **Monetary Authority of Singapore.** MAS has no intention of issuing a CBDC at this point in time but sees value in exploring new technology and new models of payments that would enable more efficient transactions and reduce the frictions of cross-border transfers.
- **Bank Indonesia.** BI currently has no official stance on CBDC but is conducting studies to understand the various potential risks of CBDC issuance. It wants to look at alternative designs and their impacts on BI’s main tasks if the CBDC would be implemented in the future.

84 RBA’s response was provided for BSP’s internal use only.

85 Central Banking Newsdesk. 2020. “Bank of Korea launches CBDC pilot.” 7 April 2020. <https://www.central-banking.com/fintech/cbdc/7522056/bank-of-korea-launches-cbdc-pilot>

- **Banco Central del Ecuador.** BCE is currently conducting research on digital currencies with other central banks.⁸⁶ The interest is brought about by the high use of physical money among the population and for the promotion of financial inclusion.
- **Banco Central del Uruguay.** The BCU ran a pilot for six months starting in November 2017. The pilot looked at a token-based system that could be used for payments in registered stores and for peer-to-peer transfers among registered users. After April 2018, the digital currency was destroyed.
- **Sveriges Riksbank:** The main reason for the Riksbank's interest in CBDC is the rapid decline in the usage of physical cash on the Swedish payment market due to digitalization of the Swedish society.⁸⁷ Cash is the only payment method provided by the state and a disappearance of cash on the Swedish payment market would implicate that the citizens of Sweden would no longer be able to pay with money that is provided and guaranteed by the state. One thing to make clear is that there are no decisions as yet if Sweden and the Riksbank should make a CBDC available for the public.

On CBDC motivations

Most of the banks are interested in CBDC for the potential improvement in the payments and settlement systems, including cross-border payments. MAS considers cross-border payments as inefficient, slow and costly compared to domestic payments and wants to explore new technology and new models of payments that would enable improved cross-border transfers. The BoK would like to ensure competitiveness and innovativeness in the payment area, while minimizing macro-economic impacts as well as to be able to establish, operate safe and efficient payment systems, and at the same time to provide cash-like payment methods. The BoC's interest is motivated by public policy objectives for payment safety, universal access, privacy, resilience, competition, and monetary sovereignty. The aim of the HKMA pilot project is to address the pain points of cross-border funds transfer and settlement by enhancing process efficiency, cost effectiveness, traceability and regulatory compliance. For the Riksbank, the more immediate concern is the declining use of cash. BCE is motivated by the high use of physical money in the country and the need to promote financial inclusion since 51 percent of the population has no access to the traditional electronic means of payment.

For MAS, the project will help them and the industry better understand blockchain technology and the potential benefits it may bring through practical experimentation. This is with the eventual goal of developing simpler to use and more efficient alternatives to today's systems based on digital currencies.

For the BOK, the view is more to responding preemptively to the changing environment surrounding payment systems both at home and abroad, such as a possible expansion in the use of private digital currencies, a decline in the use of cash, and a rise in demand for digital legal tender. This is

⁸⁶ Ecuador announced its own electronic currency (dinero electrónico, or DE) in 2014. By February 2015, it was functioning as means of payment, allowing qualified users to transfer money via a mobile app. (O Neal 2018) However, the currency ultimately failed. In December 2017, Ecuador's National Assembly passed legislation to abolish the central bank electronic money system and outsource e-payment systems to private banks. By 31 March 2018, the system was completely deactivated, closing all accounts. According to one study (White, 2018), the main reason was the inability to attract enough users—71 percent of the accounts opened remained inactive for the whole time since people were reluctant to accept another currency (being used to US dollars).

⁸⁷ Besides the decline in the use of cash there are other arguments for a Swedish CBDC (see: <https://www.riksbank.se/en-gb/payments--cash/e-krona/e-krona-reports/>)

similar to the BoC view on CBDC research as a preparation for the contingency that this may need to be issued at some point in the future. This is the same case for the BoJ and BI, which want to be ready, even if there is no immediate plan to issue a CBDC.

Priority. In light of the above, CBDC research has some level of importance for these central banks. For BoK, it is one of the 16 strategic goals set under the medium- to long-term development strategies. For MAS, Project Ubin, as an industry collaboration, aims to develop and deepen the technical expertise of the broader financial industry in this new area of technology. The exploration and development of new technology and new models of payments is a medium to long term objective, while the industry and talent development is a more immediate objective. Conducting research on CBDC and preparing for the contingency that this may need to be issued at some point in the future is a strategic priority of the BoC, even if current conditions do not warrant issuance of a CBDC. This is the same case for BCE and BI. It is likewise important for the HKMA, since one of its four main functions is to help to maintain Hong Kong's status as an international financial centre, including the maintenance and development of Hong Kong's financial infrastructure. The decline of cash usage is a rapid process in Sweden (perhaps just some years or a decade in the future) which makes it a priority for the Riksbank for the medium term as well as the long term.

Conduct of research

Most of the central banks started their CBDC research on their own (or in-house) without any external collaboration. The BoC has been at the leading edge of CBDC work since the beginning so there were no external experts on the subject. For some areas, the Riksbank consulted with external subject experts. The BoC worked with academics with interest in the area, and BoK recruited an external IT expert. They also made use of international research and discussions on the matter. BCU started research on its own but collaborated with private firms (Di Giori Company and In Switch) for its pilot implementation.

There is greater collaboration with the projects, particularly those involving cross-border payments. The HKMA collaborated with BoT (Project Inthanon-LionRock), 10 participating banks from Hong Kong and Thailand, and technical partners, i.e. R3 and CryptoBLK. Similarly for MAS, Project Ubin was a collaborative project with the industry, including financial institutions, fintech companies, blockchain platform and technology solution providers. The participating organizations contributed resources, including experts, to support the research and development.

On the design of the CBDC

As articulated by the BOC, the motivations for CBDC issuance drive the CBDC design and restrict the design choices. The BOC's research has been focused on retail versions because they consider settlement balances in their large value payment system to be a wholesale CBDC. They are open to both token- and account-based designs but do not consider the distinction relevant because token-based systems can be made very account-like and vice versa. In addition, the BoC would prefer a CBDC to be "cheap, easy and convenient for end users." BCE and BCU are both concerned with the public use of CBDC—BCE on token-based, low value payments and BCU for payments in registered stores and peer-to-peer transfers. The HKMA's Project Inthanon-LionRock is focused on a wholesale and token-based CBDC model. The BOK is not looking into any particular form of design.

Similarly for MAS, Project Ubin focused on wholesale payments and settlement. As an exploratory project, different technology design options were explored in the course of the project. In Phase 2, they looked at developing payment systems using blockchain technology and digital tokens that could fulfil the basic functionalities of a RTGS system. Some of the challenges and considerations specific to blockchain and distributed ledger technology are privacy, finality, and scalability. The balance of privacy vs needs for monitoring and AML processes remains a key design trade-off/consideration.

For the Riksbank, the focus of their CBDC research has been primarily on the retail CBDC due to the reasons given above. The Riksbank has no official stance at the time being with regard to how exactly a Swedish CBDC should look like or which technique is best suited for the purpose. The main objective with their current work is to gain more knowledge regarding the pros and cons with different designs and techniques for a CBDC. They have done theoretical analysis of both the token-based and the account-based CBDC, but the initial research approach was technology neutral because they were focused on the use case perspective. BOJ has likewise taken a technology neutral stance.

The Riksbank enumerated some of the considerations they take into account: whether the CBDC should resemble cash as much as possible i.e. a digital version of cash, or should it be more of an account resembling asset; the role and purpose the CBDC should fill and have; the role of the central bank in providing CBDC to the public; the effect on the existing market and its actors; the digital technique for the CBDC; and the legal issues since it is a new and unexplored territory with a new form of central bank money.

Dedicated CBDC offices

- **BOC:** CBDC work is being managed by an inter-department committee with involvement from policy teams (payments, currency, financial stability), technology, legal, and communications.
- **HKMA:** The Fintech Facilitation Office (FFO) leads the Project Inthanon-LionRock. Among others, the FFO acts as a platform for exchanging fintech ideas on initiatives among key stakeholders and an interface between market participants and regulators.
- **BOK:** In February this year, the BoK established dedicated CBDC research units, including the Digital Currency Research Team and a Section for CBDC Technology within the Payment and Settlement Systems Department. They also set up a task force within the Bank in charge of reviewing the impacts of CBDC issuance on the BOK mandates, such as monetary policy and financial stability.
- **BOJ:** The BoJ formed the Payment and Settlements Systems Division about 2 months ago.
- **MAS:** CBDC work is supported by working groups formed across departments, as well as from the financial industry and blockchain ecosystem.
- **BCE:** BCE has a Payment Systems Investigation Department.
- **Riksbank:** The Riksbank is currently developing and investigating a solution for e-krona with an external technical supplier. The pilot project involves a dedicated group of 8 persons. But there are people working on the e-krona with a more policy strategical perspective. Moreover, different experts around the bank are involved since the e-krona touches almost every part of the Riksbank's areas. The CBDC work is also governed by a steering group consisting of senior experts from different areas of the Riksbank.

On the implications for demand for physical money

HKMA, for its part, is focused on wholesale cross-border CBDC which is not meant to replace any physical currencies. For the BoC, the question has been discussed and they are only now trying to conduct detailed modeling to try to forecast. They think a retail CBDC is a complement, not a replacement, for physical currency. However, since they are looking primarily at CBDC that is most cash-like, it is likely that a CBDC will substitute more for physical notes than for bank deposits. Still, the BoC will continue to supply physical cash to users for as long as there is a demand.

MAS thinks that the impact of a wholesale CBDC on the demand for physical currency will be limited. A wholesale CBDC is akin to existing central bank reserves, especially if access to the CBDC is restricted to the same group of FIs that currently have accounts with the central bank. Almost all transactions in the wholesale segment are already settled electronically today. Hence, the impact of a wholesale CBDC on physical currency is negligible.

A retail CBDC represents a new form of public money for use among households and businesses. Thus, its adoption as a medium of exchange would necessarily displace some existing payment instruments (e.g. physical currency and bank deposits) to some degree. However, the extent to which a retail CBDC substitutes for or complements physical currency would ultimately depend on its design. As a retail CBDC is unlikely to be able to replicate some features of physical cash, including its accessibility and the privacy it confers, there could continue to be demand for physical cash. On the other hand, a retail CBDC would allow the use of public money for online transactions.

The Swedish payment market is already highly digitalized and the majority of payments in the Swedish society are done with digital money. The effect a CBDC would have on demand for physical money is under consideration, among others, as they work with the theoretical analytical work of the effects of a CBDC. A CBDC would have the same essential attribute as cash in the sense that it will be money issued by the Riksbank and not a commercial actor. But some of the fundamental attributes of cash in its physical nature will by definition not exist in a CBDC, and vice versa. So cash will still have its advantages towards a digital alternative and therefore also a role and function on the payment market (even though it is declining in use), thus, a CBDC will not be a substitute for the physical cash but rather a complement.

Technological aspects

Duration of research. The central banks were asked on the length of time for their CBDC research to progress from analytical research into testing and proof-of-concept activities. The BoK started in 2017 and has been continually conducting research and monitoring developments related to CBDC and distributed ledger technology. The BOC spent a few years of analytical research before moving to proof of concepts. Still, technologies have been an important part of their research since the beginning and they have been actively investigating the various technology options. The HKMA has started looking into the benefits and technical issues of CBDC in the domestic wholesale payment environment since 2017, and expanded the scope into the cross-border wholesale context in 2019.

BCU ran a six-month pilot plan for the issuance and use of the digital version of the Uruguayan peso that started in November 2017. Accordingly, 10,000 mobile phone users of ANTEL, the state-owned telecommunications company, were able to download an app with an integrated digital wallet. The total issuance was limited to 20 million Uruguayan pesos. The e-wallets were limited to 30,000 Uruguayan pesos (about USD 1,000) for each user and 200,000 Uruguayan pesos for each registered business.

MAS started Project Ubin in 2016 as a proof-of-concept project. As a nascent technology with a lack of available publications and materials, MAS decided early on to conduct practical experimentations to better understand the technology, its applications and potential benefits.

The first official report of Riksbank on the e-krona was published in September 2017. However, the report had been preceded by research and discussions concerning the declining use of cash and the risks associated with that. The Riksbank has published another official report in October 2018 and various speeches and analyses on the CBDC field. The more hands-on work with developing and testing a technical solution with technical supplier started in the beginning of 2020 after a preceding procurement process in 2019. Parallel to the technical stream there is also a legal stream investigating the legal issues and mandate for the Riksbank to issue a CBDC.

On the CBDC technology. For the HKMA, the PoC of Project Inthanon-LionRock was built on R3's Corda. The BOC is still actively investigating all options as with the BOK which is considering overall up-to-date CBDC related technologies, including distributed ledger technology. Within MAS' Project Ubin, technological capacity was developed over the phases of the project. Multiple technologies and platforms were trialled over the 5 phases, including Ethereum, Quorum, Corda, Hyperledger Fabric, Zilliqa, Chain etc. There were also resource contributions by the industry for the project.

The pilot project at the Riksbank is now testing a tokens-model with DLT where the Riksbank is the issuer of the e-krona but actors at the market will be intermediaries distributing the e-krona to the end user. This two-tier model resembles the distribution of cash and the Riksbank's role remains as it is today where the distributors of the e-krona will have the contact with end users and KYC/AML responsibilities.

CBDC capacity building

- **BOC:** Capacity was built internally amongst the existing research teams. The BoC has a strong history of leading edge research in monetary theory so there were already resources in place with interest and expertise to move into this new field. On the technology side, the BoC hired several resources early in the process with backgrounds as solution architects and technical researchers. These resources were then given the time and materials needed to train up to the expert level. The BoC conducted several phases of Project Jasper, a series of experiments into the possible use of DLT for inter-bank payments and securities settlement. There was never any intention of adopting DLT for wholesale payments in Canada. This was simply a known use case for analysis in the research projects.
- **HKMA:** The HKMA collaborated with external service providers, international organizations, other central banks and authorities, commercial banks, universities, and technology vendors. Software and hardware was provided by the service vendor during the course of engagement in the Project Inthanon-LionRock.
- **BOK:** The BoK is building capacity on CBDC, not only through research on their own, but also meetings with domestic and foreign IT and consulting companies, both at home and abroad.
- **BOJ:** The BOJ launched Project Stella in cooperation with the European Central Bank in 2016 in readiness for technological developments.
- **MAS:** Project Ubin participants, which include financial institutions, fintech companies, blockchain platform and technology solutions providers,

contributed resources to the project. This includes expertise (in the form of human resources allocated to support the project) as well as software (platforms and code contributions) and hardware/cloud services.

- **BI:** The IT department formed a small group to study CBDC technology.
- **Riksbank:** For CBDC theoretical work, the Riksbank has own staff with various fields of expertise (economists, legal experts, data experts, security and payment experts). When the Riksbank decided to start testing a technical solution in a pilot project in 2019 for a possible e-krona the bank announced an open procurement with a set of requirements that vendors were allowed to answer to and show how they would build a platform for an e-krona that would meet the requirements. The chosen technical supplier, Accenture, will develop the platform together with the team at the Riksbank and with the required software and hardware.

Legal and regulatory aspects

Based on their particular circumstances and CBDC interest, the central banks deal with different legal and regulatory issues. For the HKMA, since the focus was on cross-border payments, the regulatory issue of concern was compliance with Thai Baht regulation. This was considered and implemented when the PoC was designed and built in the Project Inthanon-LionRock in 2019. Specifically, non-residents were subject to a Thai Baht outstanding balance limit of THB 200 million. This applied to HK banks participating in the cross-border payment corridor.

The project put in place mechanism in the PoC to streamline the monitoring and operation in relation to Thai Baht regulation. Central banks' nodes on the corridor network were able to monitor interbank transactions and banks' wallet balances on a real time basis. HK banks whose Thai Baht balance exceeded the limit would then be alerted. Also, the system was able to perform automatic reduction from HK banks' Thai Baht wallets at a specific cut-off time in case that their aggregated balance had exceeded the limit. The excess Thai Baht amount would be sold to the central bank node on the corridor network at a specific exchange rate.

In their research work, the BOK considers the legal nature of CBDC, legal issues concerning their issuance and circulation, and direction-setting for enacting and revising legislations on CBDC. The BOK created a legal advisory committee comprising of both internal and outside experts with whom it could consult when reviewing legal issues and identifying legislations that need to be enacted or revised.

Some of the challenges that MAS has noted in Project Ubin are privacy and finality. For the purpose of regulating future payment service providers which may deal in CBDC, MAS has clarified under the Payment Services Act that CBDC that takes the form of digitized fiat currencies, will be treated like any other traditional fiat currency and not as a digital payment token. Even if the CBDC takes the form of digital payment tokens, MAS has excluded the dealing and exchange of such tokens as a regulated payment service.

For the BoC, the legal and regulatory issues are still being investigated. The BoC is working with Finance Canada and other policy bodies to identify legal issues as well as other possible policy objectives for a CBDC. Some legislative changes will be required before issuance can occur. These changes have not been fully identified nor started.

The Riksbank is investigating several legal and regulatory issues internally with their legal experts and also consulting external legal experts. This is because a CBDC would by definition be a new form of currency that does not exist today. Some of the issues are:

- What kind of legal asset would it be and does the Riksbank have the legal mandate today to provide it for the public? If not, what is required from a legal perspective for it to be possible?
- What kind of role and responsibility would fall on the Riksbank or/and actors on the market?
- How should a CBDC be designed for it to follow all legal requirements concerning KYC and AML etc.?
- How could a CBDC be designed to live up to the objective of a digital payment solution with more privacy and anonymity and still follow the legal requirements of AML etc.?
- Would a CBDC-platform qualify as a settlement system etc.?

The Riksbank also recognize that there will also be legal issues concerning the different technical solutions.

On data privacy mechanisms being considered

The BoC deems privacy with regulatory compliance as an important policy and technical problem that still needs to be solved. The BoK is reviewing data privacy protection in terms of institutional (AML, KYC, personal information protection law, etc.) and technological (Zero Knowledge Proofs, etc.) perspectives. For the BoJ, there must be balancing of the right to privacy and AML regulations, which must ultimately be decided by society. For the Riksbank, their procurement requires the solution to be presented by their technical supplier to provide for data integrity for the users when it comes to payment data not being used by commercial interest. The technical solution must also demonstrate how to live up to the legal requirements regarding KYC and AML. For HKMA-BOT² Project Inthanon-LionRock, the corridor network was a permissioned based DLT in which only authorized entities were allowed to participate. Transactions were broadcasted only on a need-to-know basis. Cryptographic techniques were deployed so that unrelated parties were not able to discover business-sensitive information.

Coordination and collaborations

As evident in the BIS and *Central Banking* surveys, central banks are moving at different speeds with regard to CBDC research and are at different phases in their implementation. Some studies are concerned with spillover effects across borders.⁸⁸ The BIS 2018 survey mentioned the possibility of collaboration through international vehicles such as the BIS Innovation Hub. Yet, the BIS 2018 survey also showed that the central banks are proceeding with caution and are collaborating and sharing their work and, therefore, may “reduce the likelihood of unintended consequences.”

As indicated in the central banks’ CBDC projects, a number of proof-of-concept activities are collaborations among central banks—Project Stella is a joint work by the ECB and the Bank of Japan, Project Inthanon-LionRock is a joint undertaking by the Bank of Thailand and the Hong Kong Monetary Authority, and the cross-border phase of Project Upin of the Monetary Authority of Singapore is in collaboration with Bank of Canada’s Project Jasper.

88 Committee on Payments and Market Infrastructures and Markets Committee (2018): Central bank digital currencies, March.

Summary and Recommendations



Central bank digital currency is a complex topic with various issues and implications. This study has discussed basic concepts, issues, implications and risks from the perspectives of monetary policy, financial supervision, payments and settlement, legislation and regulations and financial inclusion. For cross-country comparison, there is also a discussion of the experiences of other central banks in their exploration of CBDC. This section presents the highlights of the study.

CBDC: basic concepts and classification

A CBDC is a digital form of central bank money that is denominated in a unit of account and functions as both a medium of exchange and a store of value. There are two commonly discussed variants of CBDC – general purpose/retail CBDC and wholesale CBDC. A general purpose or retail CBDC is a widely accessible digital currency that could be used for retail transactions and other purposes. Meanwhile, a wholesale CBDC has restricted access (i.e., mainly for banks and other financial institutions) and it is used as digital settlement for wholesale transactions. CBDC can either be token-based or account-based. The key distinction between token- and account-based money is the process of verification needed when it is exchanged. Token-based money relies on the ability of the payee to verify the validity of the payment transaction. Meanwhile, account-based money depends on the ability to verify the identity of the account holder. The economic effects of a CBDC as well as its implications for the payments, monetary policy and financial stability will significantly depend on its features. Thus, the design of a CBDC is crucial.

CBDC and monetary policy

Introducing a CBDC is similar to adding a third form of central bank liability in addition to cash and bank deposits. If CBDC substituted for cash, this merely results in a change in the composition but not the size of the central bank's balance sheet. However, if CBDC substituted for bank deposits, there are risks to both monetary and financial stability as one of the key transmission channels of monetary policy, i.e., the bank lending channel may weaken and result in a potential disintermediation of the financial system. Furthermore, if the central bank becomes actively involved in controlling the amount of CBDC via asset purchases, this could mean greater central bank footprint in the financial system, with consequences on the size of the central bank balance sheet and its monetary operations.

The impact on monetary policy transmission varies, depending on whether the CBDC is remunerated or not. If no interest rate is imposed (i.e., CBDC is similar to cash), CBDC may not generate sufficient demand as the non-bank private sector would rather keep their deposits which generate higher return with commercial banks. If CBDC were remunerated, the impact would then depend on the amount of CBDC in circulation and the level of interest rate paid on CBDC balances.

There are potential benefits to introducing a CBDC. First, an interest-bearing CBDC provides the central bank an opportunity to enhance the effectiveness of monetary policy by removing the encumbrance associated with the zero lower bound (ZLB). Second, amid the possibility of a widespread adoption of other means of payments that is not denominated in the domestic currency, introducing a CBDC can help preserve monetary sovereignty of the central bank and its control of its policy objectives.

However, there are caveats to introducing CBDC. First, it is not clear that the benefits of introducing negative interest rates outweigh the consequences. Second, a necessary condition for CBDC to breach the ZLB is the removal of cash or the restriction of large-denominated bills. This may

be difficult to implement in reality especially during periods of economic downturns. Removing cash altogether or restricting its holdings could result in, among others, financial exclusion of the most vulnerable segment of the society.

CBDC and financial intermediation and financial stability

CBDC would open the possibility of the central bank to play a larger role in financial intermediation. As the demand for CBDC becomes very large, and if holdings of cash do not decline accordingly, central banks may accommodate the demand for CBDC by increasing their asset holdings and, at some point, may need to hold less liquid and riskier securities. Central banks may also need to provide substantial maturity, liquidity and credit risk transformation at times to banks and other participants in financial markets.

While a CBDC would by itself be very liquid, it could result in reduced liquidity and increased “specialness” in collateral (repo) markets. The depth of the repo and short-term government bill markets could decline as demand is redirected to wholesale market use of CBDC. While the central bank could step in on the demand side of these markets, it would need to broaden its holdings to match its increasing liabilities. This expanded role of central banks in wholesale markets could also reduce interbank activity and the price discovery role of these markets.

Retail CBDC, being viewed as a safe digital asset, has an innate ability to facilitate a flight away from private financial institutions and markets towards the central bank. Depending on its design features, retail CBDC may disintermediate banks if CBDC accounts offer relatively comprehensive account services that lead households to shift away from bank deposit accounts. The presence of retail CBDC could also provide sharper and more pervasive incentives to run even from a strong bank, especially if deposits are inadequately or not insured. “Digital runs” towards the central bank with unprecedented speed and scale and independent of geographical proximity and time would be possible. As deposits shrink, banks could try to prevent a loss of deposits by raising interest rates by seeking funding to replace such outflows, such as through wholesale funds and term deposits, which would likely be more costly. They would also be forced to invest in riskier assets which, in turn, could influence their financial robustness and produce systemic financial stability consequences.

CBDC and payments and settlements

CBDC issuance may be considered in the broader context of national payment systems development and assessed based on the perspectives of desirability, security, feasibility, and viability.

Wholesale CBDC. A general wholesale CBDC may not significantly add value given its similarity to an efficient real-time gross settlement (RTGS) system that is already in place. There may be more potential benefits in applying the underlying technology of wholesale CBDC in areas beyond interbank domestic currency transfers. For instance, financial assets such as securities and derivatives present areas where the CBDC technology can simplify settlement and reconciliation processes being executed, potentially reaching operational capabilities similar to an RTGS system.

Still, wholesale CBDC can provide improvements to the existing Philippine Payment and Settlement System (PhilPaSS) depending on the desired design and functionalities of the CBDC. One consideration is in enabling automated mechanisms such as smart contracts through the use

of CBDC technology. However, studies and published reports of CBDC experiments have pointed out challenges for distributed ledger technology (DLT) in terms of outperforming existing wholesale arrangements.

Retail CBDC. CBDC issuance at the retail level may promote financial inclusion, providing diversification in payment rails. In the face of similar crises such as COVID-19, retail CBDC may enable central banks to achieve the following objectives:

- Retail CBDC provide a digital alternative to handling physical currency at a time when there are unprecedented public concerns about viral transmission via cash;
- Governments can use them for distributing emergency support to households; and
- Their programmable nature can enable governments to institute rules as the CBDC circulates, which is not possible with physical cash.

However, they may introduce a new level of security and safety risks. The risk resulting from the diminished use of cash increases dependence of the public on banks, electronic money issuers and other payment service providers. The failure of banks, electronic money issuers and other payment service providers can also cause substantial interruptions in the economy and pose reputational risks to the central bank. Absent effective controls and security measures, retail CBDC can also be a significant target for theft and terrorism. Appropriate oversight and supervision of these retail CBDC entities can enable central banks to mitigate such risks. The BSP must also design and implement strict user data storage and privacy policies and protections and create precautions and robust cyber-resiliency policies to reduce risks from cyberattacks.

Cross-border CBDC. Interoperability of CBDC between jurisdictions could provide benefits for low- and middle income- countries that receive substantial volume of remittances like the Philippines by reducing reliance on costly correspondent banking networks and pre-funded nostro and vostro accounts. The key role for DLT in enhancing cross-border CBDC transactions lies in its “programmability” function, allowing payments to be executed under a specified set of conditions, rules or events. For central bank projects such as the Project Jasper-Ubin of the Bank of Canada and the Monetary Authority of Singapore, programmable smart contracts enabled participants to execute an “atomic” cross-border transfer, ensuring reliable transfers without a correspondent bank.

However, due to its being in its early developmental stages, cross-border CBDC have not yet been fully vetted in terms of production-scale implementation. Similarly, while costs have not been specifically quantified, it is expected that undertaking such structural changes would entail replacing legacy systems at significant costs (Kiff et al. 2020).

As a concurrent strategy, the BSP can take part in global efforts to enhance cross-border payments, such as the BIS Committee on Payments and Market Infrastructures (CPMI)'s global roadmap in enhancing cross-border payments. The CPMI has laid out building blocks which central banks could work on alongside industry players to address existing frictions in the cross-border payments sphere.

CBDC and legal and regulatory issues and challenges

Under the existing legal framework, the BSP may boost the advancement of a cash lite economy through digital payments, providing further support to the introduction of CBDC in the Philippines. The National Payment Systems Act (NPSA) authorizes the BSP to operate payment systems

and determine which entities shall be allowed to participate in payment systems owned and operated by it and to open an account with the BSP for settlement purposes. At present, the BSP operates the PhilPaSS and allows banks to participate as “Direct Users” thereof by opening and maintaining Demand Deposit Account (DDA) with the BSP. Notably, the recent National Payment Systems Act has allowed the BSP to open settlement accounts for non-bank BSP-supervised financial institutions and non-BSP supervised institutions. With this, digital payments in the Philippines may further be boosted as this may allow more institutions to become “Direct Users” of PhilPaSS. The increase in the number of “Direct Users” of PhilPaSS, in turn, may increase the number of digital payments users in the Philippines, which could pave the way for the readiness of the country to the introduction of CBDC in the financial system.

The expanded authority of the BSP to own and operate a payment system and to prescribe rules and regulations for payment system operators under the NPSA can be used as a legal anchor in adopting CBDC in wholesale form. The use of wholesale CBDC in the payment system under the NPSA may be operationalized by the BSP by entering into a memorandum of agreement or contract with participating banks/financial institutions so as to set forth the terms and conditions, scope and limitation of the issuance, as well as to determine the rights and obligations of the parties thereunder, among others. The issuance of wholesale CBDC under the current NPSA framework may have the following legal implications and considerations: (i) wholesale CBDC will be considered as representation of fiat money; (ii) the provisions of the NPSA and its implementing rules and regulations will apply; and (iii) existing laws and regulations on data privacy and anti-money laundering (AML) will likewise apply.

As regards the issuance of retail CBDC, this type of CBDC, by nature, is akin to a fiat currency or liability issued by central banks in a digitized form which the general public can own and use for payment and settlement of obligations. However, the issuance of retail CBDC may not be possible under the current legal framework as opening of deposit accounts by the general public with the BSP and the issuance of currency in digital format are not contemplated under existing laws. Moreover, certain laws and regulations concerning data privacy and AML/Combating Financial Terrorism may need to be revisited to operationalize the issuance of retail CBDC.

It is also important to emphasize that the complexity and novelty of the introduction of legal tender CBDC in the Philippines carries with it certain legal considerations since most financial laws were formulated under a backdrop of a fiat or physical currency regime. It is, therefore, important to revisit existing laws, rules and regulations to ensure the legal feasibility of the issuance of CBDC in the Philippines and guarantee its general acceptability as legal tender Philippine currency. To this end, certain provisions of the BSP Charter must be amended to incorporate CBDC in the definition of “currencies” and “legal tender”. Moreover, AML laws, rules and regulations should likewise be strengthened to address possible issues/concerns which may arise from CBDC transactions. Lastly, laws concerning data privacy, secrecy of deposits, counterfeiting of currency, as well as rules on foreclosure and garnishment must be considered in the possible issuance of legal tender CBDC.

CBDC and financial inclusion

CBDC may contribute to financial inclusion, but under specific conditions including, among others: that the central bank directly offer retail CBDC, and there is adequate digital connectivity and literacy. The BSP has already identified potential financial benefits for consumers in using e-money and is actively encouraging its use via its Digital Literacy Program.

Financial inclusion issues on cost, accessibility, utility of opening accounts (typically cited as exclusion factors) can be addressed without the need to implement retail CBDC. Financial inclusion can be furthered without a CBDC, conversely a CBDC can be designed without financial inclusion as a goal.

CBDC experiences of other central banks

The BIS (2018 and 2019) and *Central Banking* surveys among central banks show that notwithstanding the significant amount of research activities on CBDC, very few central banks plan to issue CBDC in the next five years. Payments safety and efficiency are the primary factors driving the CBDC engagement of central banks. Collaboration among central banks and the private sector is a common practice among CBDC projects and initiatives.

These findings were corroborated by the survey responses of 10 central banks. Of the 10 central bank respondents, 9 have carried out or are currently implementing hands-on work with DLT platforms. MAS and HKMA have collaborated with other central banks to explore CBDC cross-border transactions. Riksbank, which has the pressing concern of a declining cash usage, only started with hands-on work early 2020 (CBDC research started in 2016-2017). Bank of Korea launched in March of 2020 a 22-month pilot program to assess the issuance of a CBDC.⁸⁹ Ecuador and Uruguay have both implemented a pilot issuance of a CBDC. **Yet of the 9, none is planning to adopt or issue CBDC in the near future.** For BoC, no decision has been made. The BoJ has no immediate plan to issue a CBDC. MAS has no intention of issuing a CBDC at this point in time. For the Riksbank, there are no decisions as yet if Sweden and the Riksbank should make a CBDC available for the public. The BoK acknowledges that the need for CBDC in the near future still remains slim. Uruguay, despite a successful implementation of a pilot program, has not indicated any plans to issue a CBDC.

Perhaps, we may also learn from the experience of Ecuador, an early adopter, whose CBDC was eventually deactivated due to the system's inability to attract enough users.

Central banks have been conducting research on CBDC to fully understand its benefits and technology. MAS and HKMA are evaluating CBDC capacity to improve cross-border transactions. BoC, BoK, BI and BoJ are engaging in CBDC activities as a contingency planning in the event that there is a development in the market and payment environment that necessitates the adoption of a CBDC.

Summing up: Balancing potential benefits and risks

In all the areas considered, potential benefits of the adoption of a CBDC were identified; however, cautionary points were also recognized:

- For monetary policy, one potential benefit of having an interest-bearing CBDC is the improved effectiveness of monetary policy by facilitating the application of a zero lower bound (ZLB). However, a necessary condition for the effectiveness of the ZLB is the removal of cash, which may be difficult to implement especially during economic downturns or which may result to financial exclusion of the most vulnerable segment of the society.
- A CBDC would open the possibility of the central bank having a larger role in financial intermediation. However, the expanded role of the central bank in wholesale markets could also reduce interbank activity and the price discovery role of these markets.
- In the payment and settlement context, a general wholesale CBDC may

⁸⁹ Central Banking Newsdesk. 2020. "Bank of Korea launches CBDC pilot." 7 April 2020. <https://www.central-banking.com/fintech/cbdc/7522056/bank-of-korea-launches-cbdc-pilot>

not appear to significantly add value given its similarity to an efficient real-time gross settlement (RTGS) system that is already in place. Still, wholesale CBDC can provide improvements to the existing PhilPaSS depending on the chosen design and functionalities of the CBDC. One consideration is in enabling automated mechanisms such as smart contracts through the use of CBDC technology.

- Retail CBDC may have the potential to expand the BSP's capabilities owing to its intrinsic programmability but this may introduce a new level of security and safety risks. Diminished use of cash would result in increased dependence of the public on banks, electronic money issuers and other payment service providers, the failure of which could cause substantial disruptions in the economy. Retail CBDC can also pose significant risk of theft and terrorism.
- Financial inclusion may be supported and promoted with the introduction of a retail CBDC provided there is adequate digital connectivity and literacy. Still, financial inclusion can be promoted without a CBDC, conversely a CBDC can be designed without financial inclusion as a goal.

In addition to the risks mentioned above, there are also legal considerations since most financial laws were formulated under a backdrop of a fiat or physical currency regime. Existing laws, rules and regulations may need to be revisited to ensure the legal feasibility of CBDC issuance and guarantee its general acceptability as legal tender Philippine currency, including the amendment of certain provisions of the BSP Charter. Moreover, AML laws, rules and regulations should be strengthened to address possible issues/concerns which may arise from CBDC transactions. Laws on data privacy, secrecy of deposits, counterfeiting of currency, as well as rules on foreclosure and garnishment must also be taken into consideration.

Recommendations of the CBDC Technical Working Group

Determining the motivation of the BSP

The BSP needs to identify its primary motivation(s) to explore the issuance of a CBDC. The literature has presented various motivations for CBDC which range from enhancing the effectiveness of monetary policy and promoting cashless societies to facilitating financial sector deepening and greater financial inclusion by enabling more affordable and efficient financial services.

At present, the CBDC is not considered as a tool for monetary policy or financial stability. Even financial inclusion may be addressed more effectively by other measures. The CBDC is currently regarded primarily as a form of payment and with major implications, depending on its design and form, on the payment and settlements system. For most central banks undertaking a pilot implementation, the key issue has been to address weaknesses and gaps in the current payment and settlements infrastructure.

Thus, the relevance and usefulness of CBDC can be seen in terms of advancing the BSP's strategic thrust of pursuing a cash-lite economy and a more financially inclusive nation. Specifically, CBDC's compelling value lies in its high level of "programmability", which allows payments to be executed under a specified set of conditions, and instruments – smart contracts – to be built into its platform. As pointed out by Wong and Maniff (2020)⁹⁰, though a CBDC will never be able to fully replicate all characteristics of cash and RTGS simultaneously, in certain circumstances, it has the potential to be an improvement over both existing modes of payment.

90 <https://www.federalreserve.gov/econres/notes/feds-notes/comparing-means-of-payment-what-role-for-a-central-bank-digital-currency-20200813.htm>

Nonetheless from the perspective of efficient real time gross settlement (RTGS) system, CBDC has limited short-term relevance for the BSP. The World Economic Forum (2020) points out that the adoption of domestic CBDC may not add value if an economy already has an efficient RTGS system and fast payments that are supported by reliable private payment service providers. The Philippines has a well-functioning RTGS (PhilPaSS will be further enhanced as PhiPaSS Plus) and retail payments are shifting to digital platforms at an acceptable pace, which is the result of the BSP's strong collaboration with the local payment services industry to modernize the country's retail payment system.

Considering the form of CBDC for the BSP. The benefits of CBDC will largely depend on its form and design. Yet, the form and design depend on the motivation for the CBDC. If the main motivation for BSP is to enhance existing payment and settlement transactions, wholesale CBDC will suit this need and is legally feasible given the relevant provisions of RA No. 11127. On the other hand, if the main motivation is to enable individuals to use digital currencies in support of the BSP's push for a cash-lite economy, retail CBDC may support this objective. However, if issuance of retail CBDC will be pursued, the legal framework should be addressed first, and careful consideration of the emerging risks should be done.

Determining whether the form should be account or token based is premature at this point as the same will highly depend on the specific objectives agreed upon for issuing CBDC.

Recommendation: Take a closer look at the technology

With the fast-evolving technology that drives the emergence of alternative payment instruments in the medium to long term, the BSP may need to keep abreast of CBDC developments and the underlying technology issues. Following the strategies of peer central banks, the CBDC TWG recommends for **the BSP to learn the technology behind CBDC**. As the overseer of national payment system development, it is the responsibility of the BSP to ensure that the capabilities of its financial market infrastructures are aligned with the innovations that are actively being developed by these central banks. In order to be a competitive and sustainably growing economy, the Philippines has to synchronize its technology development efforts with the payment system innovations of other jurisdictions, particularly those with whom the country has significant international trade, remittances and financial market transactions.⁹¹ Moreover, the conduct of a proof of concept and, subsequently, the pilot implementation may reveal practical implications on technology functionalities, BSP operations and on stakeholders that may not be learned from the literature. **As may be seen from the experiences of other central banks, they undertook the pilot implementation not to be able to issue CBDC thereafter but, more importantly, to understand the technology, to have a greater grasp of policy implications and to build capacity.**

This is a more proactive stance as compared to a wait-and-see approach, providing flexibility and readiness in issuing CBDC when the appropriate time to adopt such measure comes. Should future developments shift the economy towards further digitalization, the BSP would find itself more capable and equipped to move towards that direction by having learned the technology of CBDC and its actual implementation.

⁹¹ Some of these jurisdictions include Hong Kong and Singapore, which are the usual sources of international remittances, export revenues, financial portfolio flows and foreign direct investments. Both the Monetary Authority of Singapore (MAS) and the Hong Kong Monetary Authority (HKMA) have ongoing wholesale cross-border CBDC projects with Project Ubin and Project Inthanon-LionRock (in collaboration with the Bank of Thailand), respectively.

The next steps

Should the above recommendation be adopted, the next steps could be undertaken:

- **Further research.** The TWG could continue to do research on the following:
 - Assessment of the current payments system.** A report may be drafted that identifies areas for improvement of the current RTGS with the increasing use of digital retail payments. This could include evaluating the features of the domestic RTGS and determining means by which the capabilities of the same may be compatible with those of other jurisdictions (i.e., seeking ISO certifications on operational processes) to facilitate cross-border payments. -The assessments shall likewise, identify gaps and frictions in the settlement processes for both domestic and cross-border transactions. Such a report may provide support to the determination of the BSP's motivation for a CBDC adoption.
 - Investigation of privately-issued digital currencies in the country.** A report may be drafted on privately-issued digital currencies—their business models and how regulations are crafted on the basis of the industry sandboxes. The experience in regulating privately-issued digital currencies may provide more information, guidance and basis on whether there is a need for BSP to issue its own CBDC.
 - Continuing research on digital currencies across countries.** The TWG should continue to monitor developments pertaining to digital currencies, whether privately issued or issued by a central bank. It is worth noting that developed countries, particularly the USA and EU, have been looking into the possible issuance of their own CBDC in response to China's rollout of its DCEP and the threat of Facebook's Libra. There is a need for the BSP to monitor and to assess the potential implications of increased and worldwide use of these foreign CBDC to the Philippines' monetary sovereignty.
- **Capacity building.** This may be accomplished through capacity building programs such as learning sessions (i.e., seminars, workshops, roundtable discussions) conducted by other authorities and subject matter experts, or actual immersions with CBDC projects.

The BSP may also benefit from a technical assistance on the legal framework. The Riksbank mentioned a number of issues in their survey response and how they consulted with legal experts within Sweden and external legal experts as well. The Federal Reserve similarly faced the legal issue on whether it has the power to issue currency other than cash.⁹²

Adrian and Mancini-Griffoli (2019)⁹³ presented ways in which the IMF can help countries with current and future CBDC plans. "The IMF can help countries think through the implications of CBDC and its attendant potential benefits and risks, including through regional workshops leveraging knowledge in central banks at the frontier of CBDC development, and bilateral technical assistance missions."

This type of engagement need not be limited to the IMF but could also be arranged with other organizations with extensive experience working with jurisdictions on CBDC. A possible but non-exhaustive agenda for technical assistance or partnerships with other institutions is laid out below.

92 Section 16 of the Federal Reserve Act of 1913 (12 U.S. Code § 411. Issuance to reserve banks; nature of obligation; redemption) states:

"Federal reserve notes, to be issued at the discretion of the Board of Governors of the Federal Reserve System for the purpose of making advances to Federal reserve banks through the Federal reserve agents as hereinafter set forth and for no other purpose, are authorized. The said notes shall be obligations of the United States and shall be receivable by all national and member banks and Federal reserve banks and for all taxes, customs, and other public dues. They shall be redeemed in lawful money on demand at the Treasury Department of the United States, in the city of Washington, District of Columbia, or at any Federal Reserve bank."

93 <https://blogs.imf.org/2019/12/12/central-bank-digital-currencies-4-questions-and-answers/>

Proposed Technical Assistance (TA)
Agenda/Scope of Work of TA Partner Organization

- i. Participate in an expectation/kick-off meeting with the BSP at the start of the engagement.
- ii. Undertake an environmental scanning to understand the current state of the country, issues/ constraints, developments around CBDC.
- iii. Identify possible laws that may be impacted by CBDC, e.g. Banking Act, Law on Negotiable Instruments, Obligations and Contracts, Anti Money Laundering Act, and related BSP circulars and regulations, and suggest possible alternatives.
- iv. Facilitate and lead an information sharing and evaluation workshop for the BSP CBDC Technical Working Group in order to assess the country readiness and help the BSP to commence the journey towards bridging the gaps between the current and possibly desired models of CBDC.
- v. Based on the workshop, perform an initial gap analysis and CBDC readiness diagnostic of the BSP in connection with potential desired state of CBDC in the country.
- vi. Present initial findings in a second workshop, and develop an implementation strategy, CBDC design, technology requirements and governance processes.

- **Establishing networks.** Further consultation for updates on research being conducted by peer central banks (HKMA and MAS) may help in conducting surveillance on relevant breakthroughs that may aid in formulating medium to long term action plans regarding CBDC actions. Additionally, the BSP could consider collaborative experimentation with other central banks, financial institutions or selected international organizations that are also conducting CBDC-related research and other related initiatives. Potential partners include the World Bank and the International Monetary Fund (particularly, the Monetary and Capital Markets Department), among others.
- **Development of a roadmap to pilot implementation.** Pilot implementation is a considerable undertaking. The TWG may conduct a more in-depth study of the CBDC projects conducted by the BOT, MAS, BOJ and BOC with regard to the timelines and potential costs, necessary human resources, and technological infrastructure (software and hardware) needed and collaborations, and an assessment of the different technology platforms—whether distributed or centralized, among others. Preliminary consultations with potential service providers and partners may also be held. The roadmap will provide a conceptual blueprint describing how the BSP will explore CBDC in phases, with clear activities and timeline per phase. The development of the roadmap can be guided by technical assistance and other capacity-building initiatives.

The ongoing digital transformation of the Philippine economy is changing, perhaps irreversibly, the way Filipinos make payments. The BSP's Digital Payments Transformation Roadmap goal is to see at least 50 percent of retail payment transactions becoming digital and at least 70 percent of adult Filipinos owning and using a bank account or e-wallet by 2023. Similarly, the Philippines may see increasing wholesale cross-border transactions with other countries. This is an area where digital currencies can be leveraged to provide lower transactions costs and enhanced efficiency. These are but some of the developments that would form the foundation and provide the bases for the potential issuance of a digital form of central bank money in the Philippines in the future.

Nonetheless, the CBDC work for the BSP has just begun and there is still a long way to go.

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