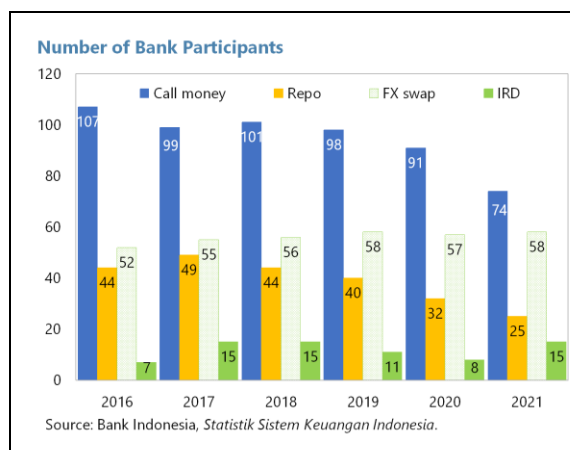
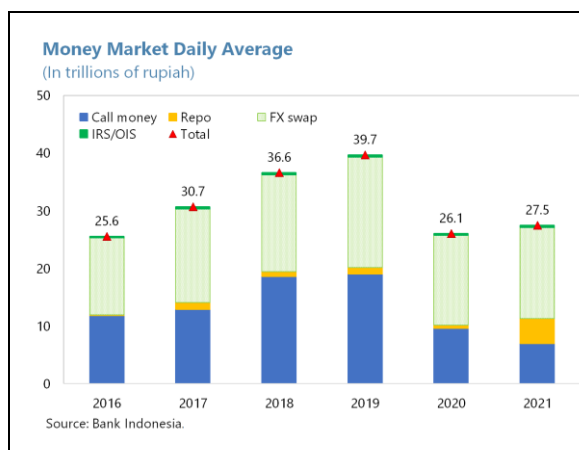


THE RUPIAH MONEY MARKET IN INDONESIA: RECENT EVOLUTION AND IMPLICATIONS OF INTRODUCING A CENTRAL BANK DIGITAL CURRENCY¹

The rupiah money market in Indonesia has grown rapidly over the last decade. However, banks' overall incentives to trade in money market remain weak and the available instruments are limited. The authorities have thus made more efforts in modernizing the money market, as envisaged in their 2025 Money Market Development Blueprint. As a further step towards modernization, the introduction of a central bank digital currency (CBDC) could potentially increase instruments and market participants, improve liquidity management, and promote financial inclusion. This paper provides a conceptual framework on CBDC's role in promoting Indonesia's money market.

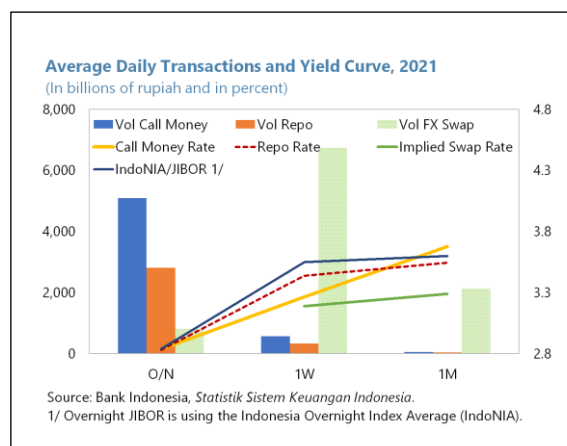
A. Money Market in Indonesia: An Overview

1. The money markets in Indonesia consist of the rupiah market, the foreign currency market, and their derivative markets. Just like all other money markets in the world, it is where short-term liquidity is traded. The size of the rupiah money market in Indonesia has grown rapidly over the last few years. The daily average volume as well as the outstanding transactions have steadily increased since 2016. During the COVID-19 pandemic, the market experienced a sharp contraction in volume, mostly driven by a decline in interbank call money market transactions, as banks' incentives to trade liquidity decreased.



¹ Prepared by Tao Sun and Hou Wang (both MCM), with helpful inputs from Darryl King (MCM), John Kiff, Rani Setyodewanti and Wahyu Ari Wibowo (both RRO in Jakarta). Kaili Chen (MCM) provided excellent research assistance.

2. Money market transactions are dominated by interbank transactions, with call money and FX swap being the mostly used instruments. Call money transactions are easy to conduct, and therefore they have the largest number of bank participants and fulfill most of the short-term liquidity needs. They are also unsecured, which causes market participants to only prefer to conduct those transactions in very short tenors, mainly overnight or up to 1 week. FX swap is the most liquid instrument in almost all tenors ranging from overnight to 12 months, as it is used not only for liquidity management but also to hedge FX risk.



3. The repo market is still developing. The number of repo users is much less than that of call money, and the users have been limited to banks and some licensed brokerage companies. Non-bank financial institutions such as insurance and pension funds are not using repo transactions due to regulation and tax reasons. Most of the repo transactions use government bonds as the underlying securities, while some other monetary instruments such as BI certificate, BI deposit certificate, sukuk BI, and sovereign bonds in foreign currencies are also acceptable. As repo transactions require transfers of title collaterals, they typically have lower credit risk compared to unsecured interbank call money. However, in Indonesia, the repo instruments are priced at a similar, if not higher, rate than unsecured interbank borrowing for the same maturity, a reflection of the challenges and weak incentives for using repos (Aditya, 2021).²

4. Despite the divergent liquidity risk profile across banks, overall incentives to trade in the interbank money market are weak. Large state-owned banks are the main liquidity providers in the rupiah money market, as they usually have abundant liquidity due to better access to deposit funding and network infrastructure. Foreign banks have a stable supply of foreign exchange (mainly U.S. dollars) but lack rupiah liquidity. As a result, they frequently access the money market to maintain their rupiah liquidity. The small banks usually face more volatile liquidity conditions and borrow from large banks, as well as trade among themselves, to fill their liquidity needs on the interbank call money. Likely due to the counterparty risk concerns, large and medium-sized banks tend to trade among themselves rather than lending to small banks, and the small banks have the most limited access to other counterparties.

² One of the challenges that discourages smaller banks from using repo is the complexity to maintain collaterals for repo transaction. Other challenges include the fact that the lack of tax rate synchronization among instruments has impeded the development of the money market: for example, unequal tax treatment between short-term (20 percent) and long-term financial instrument (10 percent) and between banks' repo transactions (nonfinal tax) and those on nonbanks (final tax).

5. Banks' excess reserves are relatively insensitive to their opportunity cost, a likely reflection of precautionary savings motive and less efficient liquidity management through the money market.

This is illustrated by a simple VAR that consists of changes in banks' excess reserves as a percent of third-party funds, as well as the spread between the overnight money market rate (IndONIA) and the deposit facility rate, for the period of January 2017 to December 2019. Both variables are of weekly frequency, and detrended with a time trend. The impulse responses show that a positive shock to excess reserves leads to a temporary reduction in the spread, while a positive shock to the spread does not have any meaningful impact on excess reserves (Figure 1).

Excess Reserves and Interbank Spreads - Vector Autoregression Estimates

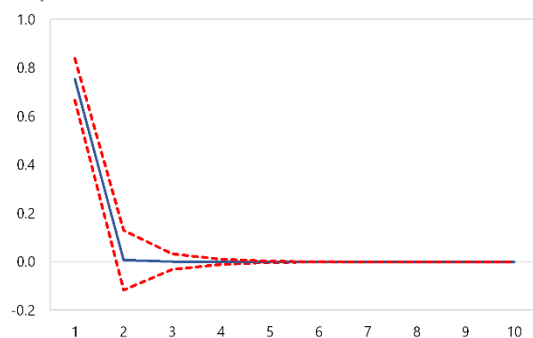
	Δ Reserve	Spread
Δ Reserve	0.0086 (-0.0854)	-0.0383 (-0.0178)
Spread	-0.0209 (-0.3801)	0.2951 (-0.0791)
constant	0.0037 (-0.061)	0.0022 (-0.0127)
R-squared	0.0001	0.1470

Standard errors in ().

Sample: 2017-2019, weekly data (153 observations).

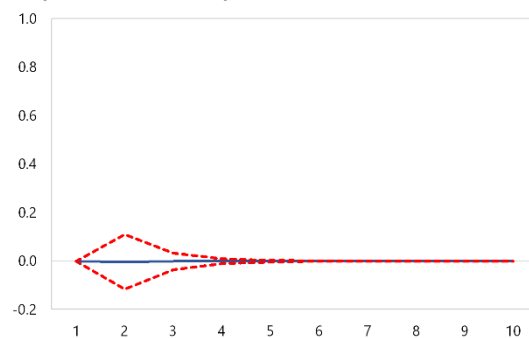
Figure 1. Excess Reserves and Interbank Spreads—Vector Autoregression Impulse Responses

Response of Reserve to Reserve Shock



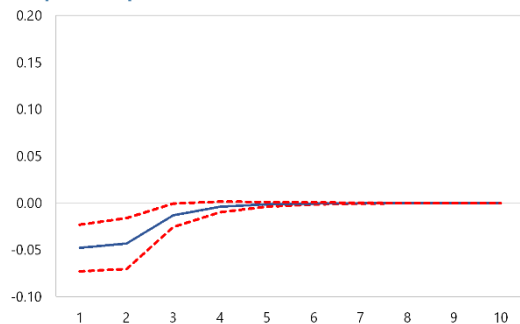
Sources: Bank Indonesia; and IMF staff estimates.

Response of Reserve to Spread Shock



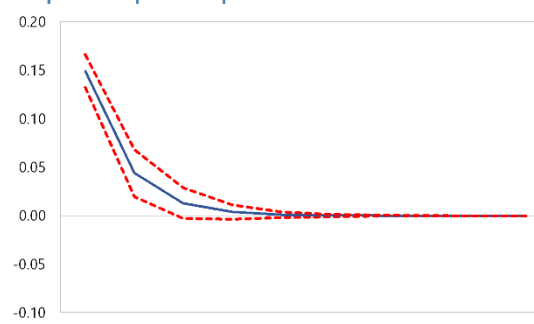
Sources: Bank Indonesia; and IMF staff estimates.

Response of Spread to Reserve Shock



Sources: Bank Indonesia; and IMF staff estimates.

Response of Spread to Spread Shock



Sources: Bank Indonesia; and IMF staff estimates.

6. The distribution of banks' excess liquidity as share of their size does not seem to be overly skewed towards larger banks.

Due to their sheer size, BUKU 4 banks hold the most excess liquidity in the system, as reflected by their placement at the BI. Once normalized by their size, BUKU 4 banks' excess liquidity relative to their total assets is about 8.5 percent, somewhat lower than the other banks on average. It is also worth noting that given the high heterogeneity within the BUKU 2 group, it is likely that those banks' excess liquidity positions are widely dispersed and many of those banks hold large amount of excess liquidity to self-insure against liquidity risk.

December 2019 Snapshot

(In billions of rupiah)

	Demand Deposit at BI (a)	Fine Tune Operation (b)	Deposit Facility (c)	Total Asset (d)	Percent of Total Asset ((a)+(b)+(c))/(d)
BUKU 2	48,783	29,675	19,374	905,190	10.8
BUKU 3	127,947	41,977	57,132	2,616,734	8.7
BUKU 4	212,815	95,453	85,291	4,628,888	8.5

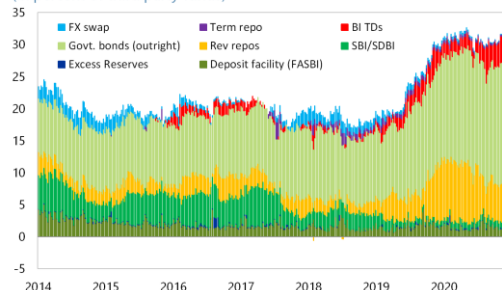
B. Recent Evolution: Impact of the COVID-19 Pandemic

7. The COVID-19 pandemic has led to a contraction in the size of the rupiah market, mainly driven by a decline in call money transactions due to banks' lower incentives to participate in the money market.

On the one hand, the economic slowdown has led to weak loan demand and declining loan disbursement, resulting in ample liquidity and reducing the need for some banks to borrow in the interbank market. On the other hand, the recession has led to a flight to safety in the banking sector, with some small banks experiencing deposit outflow and contraction in assets. This has increased the perceived credit risk, reducing banks' incentives to lend to each other. A similar but smaller contraction was seen in FX swap transactions.

Banks' Rupiah Liquid Assets

(In percent of third party funds)



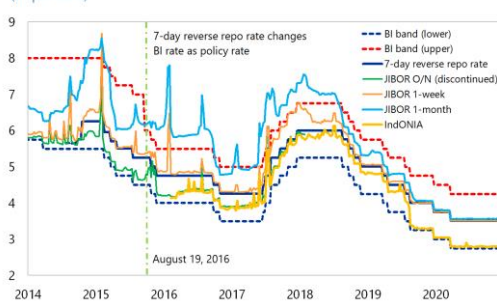
Sources: Bank Indonesia; Ministry of Finance, DJPPR; and IMF staff estimates.

8. Much of the increase in liquidity is a result of policy support during the pandemic.

BI has injected large amounts of liquidity into the banking system, through a 200 bps reduction in the statutory reserve requirement in April 2020 and monetary expansion by buying government bonds in both the primary and the secondary market. At the same time, the government placed funds in selected banks as part of the large fiscal response to the pandemic. As banks' credit growth was suppressed due to both supply and

Bank Indonesia Policy Rates and Money Market Rates

(In percent)



Source: Bank Indonesia.

demand factors, only part of those funds was eventually channeled to the real economy, resulting in a large amount of excess liquidity in the banking sector.³ A reflection of such excess is the rapid decline of the overnight JIBOR (IndONIA), much more than the decline in other JIBOR with longer tenors.

9. BI significantly increased its open market operations in the money market to absorb the excess liquidity in the banking system. Two snapshots of banks' placement at BI, one before the pandemic in end-2019 as shown previously and the other one in August 2021 below, show that the size of BI's fine tune operations have increased significantly. A closer look at banks' claims on BI—demand deposit, fine tune operations, and deposit facility—by BUKU groups (capturing bank size), shows that larger banks (BUKU 4) were more engaged in BI's open market operations than smaller banks, a reflection of both their more favorable liquidity positions and their expertise in conducting repo transactions.

August 2021 Snapshot					
	Demand Deposit at BI (a)	Fine Tune Operation (b)	Deposit Facility (c)	Total Asset (d)	Percent of Total Asset ((a)+(b)+(c))/(d)
(In billions of rupiah)					
BUKU 2	40,255	48,199	33,958	939,399	13.0
BUKU 3	111,406	143,263	60,446	2,582,672	12.2
BUKU 4	167,143	242,318	73,588	5,586,649	8.6
	Demand Deposit at BI (% share) (a)/((a)+(b)+(c))	Fine Tune Operation (% share) (b)/((a)+(b)+(c))	Deposit Facility (% share) (c)/((a)+(b)+(c))	Sum	
(In percent of share)					
BUKU 2	33	39	28	100	
BUKU 3	35	45	19	100	
BUKU 4	35	50	15	100	

C. Towards a Modern Money Market

10. A well-developed money market provides an alternative funding source for market participants to manage their liquidity. A deeper money market distributes short-term liquidity more efficiently, facilitates price discovery, mobilizes new savings, and provides a solid foundation for the development of other segments of the financial markets (securities, derivatives, and FX swap markets). With more instruments and participants, yields will better reflect underlying liquidity and credit risk. Nevertheless, money market themselves can also be a financial vulnerability, amplifying shocks due to the short-term nature of the instruments as well as their linkage with the broader financial system. A recent example is the U.S. money market in March 2020. The market experienced a rush out of prime funds, causing a crunch in short-term corporate debt. This has prompted regulators to again consider substantive reform to strengthen money market.⁴

11. Money market development is key to effective monetary policy. If interest rate actions are to influence output, it is essential that changes in the policy rate cause changes in the same direction as the longer-term rates at which households and firms borrow and lend (King and Mancini-Griffoli, 2018). Money market, as the first link in the chain of monetary transmission, allows

³ Though not directly relevant here in a narrow sense of assessing the impact on money rates, credit (and broad money) growth can be relevant in the longer run. High credit growth leads to more broad money and therefore more reservable deposits (through the reserve requirement), thus leading to fewer excess reserves for a given volume of total reserves.

⁴ One can argue that the U.S. money market problem arises from regulatory arbitrage which may not happen in places with different regulations. This U.S. money market problem exhibits that money market themselves can be a financial vulnerability, although the causes of the money market problem could vary in different jurisdictions.

the central bank to keep short-term interest rates at or near its operational target. By participating in the money market, banks manage their liquidity more tightly and in turn facilitate the transmission from the short rate to market interest rates (deposit and lending rates).

12. Indonesia has made considerable efforts over the past decade in modernizing its monetary operations framework, in line with IMF recommendations. BI reverted to a mid-corridor system in 2017, with the 7-day reverse repo rate as the operational target. It has been successful in aligning the overnight interbank rate with the operational target—the midpoint of the 100 basis-point corridor—except for the post-COVID-19 period for the abovementioned reasons. Since 2017, a reserve averaging mechanism has been in place, which was intended to increase banks' incentives to trade, and is in line with international best practices. Those reforms have spurred the deepening of the money market.

13. Meanwhile, parallel reforms on payment systems are expected to generate positive spillovers to the money market. More advanced digital payment methods can lower transaction costs and reduce risk. Faster processing and reduced reconciliation work can lead to more transactions occurring in real-time or near real-time in money market, freeing up liquidity that could be tied up in collateral. In theory, this could lead to less demand for excess liquidity (although the magnitude is unclear), thus possibly strengthening monetary policy transmission. In Indonesia, progress has been made on both the retail and wholesale fronts. BI launched BI-Fast as a real-time, 24/7 retail payment infrastructure in December 2021. On the wholesale front, the plan is to upgrade the current RTGS by 2025, including adding the multi-currency feature and strengthening risk management.

14. BI's plans to further develop the money market are progressing nicely. The Blueprint for Money Market Development 2025 aims to establish reliable infrastructure, offer a variety of instruments, foster high market integrity, and create a well-informed investor base. Progress has been made on the five key deliverables (market; market infrastructure; payment infrastructure; data digitalization; and regulation, licensing and surveillance). On market infrastructure in particular, 2021 has seen the implementation of Multimatching ETP for FX spot, as well as the conceptual design of BI-SSSS (Gen III) and trade repository.

15. A deeper repo market is one of the key deliverables of the reform. Since the launch of the Blueprint in December 2020, BI has conducted several initiatives to develop the repo market focusing on 3P+1I (product, participants, pricing, and infrastructure). As a result, the volume of interbank repo transactions increased significantly, with the daily average volume reaching to IDR 4.3 trillion in 2021, up from IDR 0.5 trillion in 2020. A few highlights are summarized below.

- **Market education.** BI employs an active strategy through continuous market education and moral suasion. During the pandemic, BI encouraged banks to use repo for liquidity management due to its collateralized and secured nature. Big banks were also encouraged to conduct knowledge transfer through webinars to small banks on repo accounting, settlement, and the use of infrastructure. Over time, the increase in market awareness and knowledge can lead to sustainable growth in the repo market and a reduction in the repo rate.

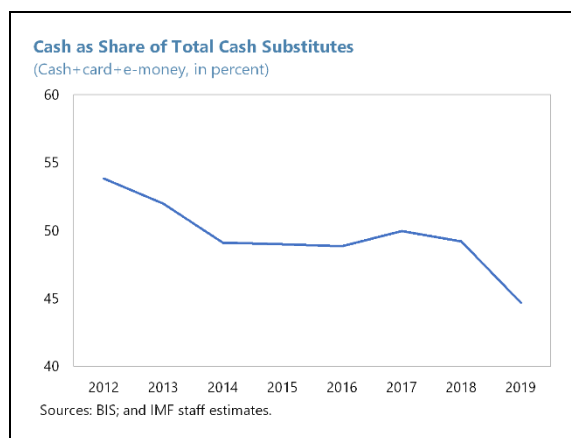
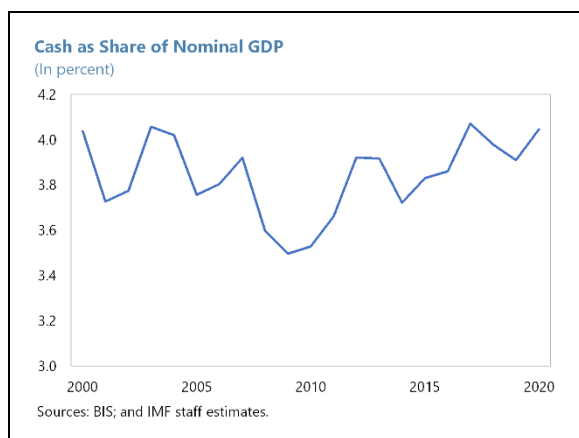
- **Regulation.** The intention is to strengthen regulatory framework (e.g., close-out netting regulation, financial sector omnibus bill, and repo taxation regulation) to support broader market participants base, particularly nonbank financial institution (NBFI) and large corporation. The authorities have added new clauses in harmonization tax law to provide umbrella regulation on equalizing tax treatments between short-term and long-term financial instruments, and between banks' repo transactions and those on nonbanks. The plan is to issue further regulations regarding the technical implementation of those taxes.
- **Infrastructure.** On the trading system, the focus is to standardize repo transactions for trading through the Electronic Trading Platform (ETP) and settled via a central counterparty (CCP). On the post-trade side, the objective is to improve transaction transparency and efficiency supported by straight-through processing. As the liquidity in the repo market has been increasing, the availability of ETP multi-matching system is becoming crucial for increased and more complex transactions. The CCP for repo is expected to be in place in 2022, considering the time for developing the business model and IT system design, alignment of priority in systems development among authorities, and tackling the legal challenges on close-out netting.

D. Implications of Introducing CBDC in Money Market

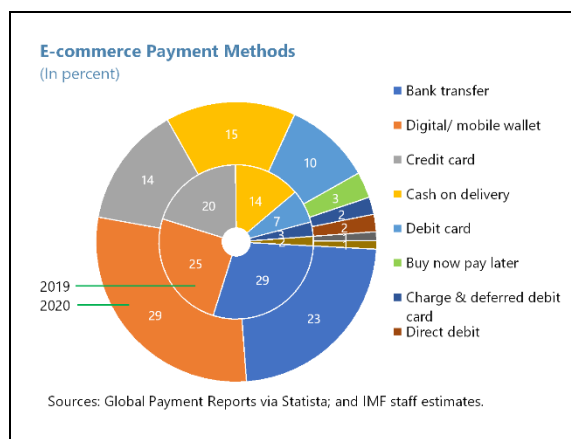
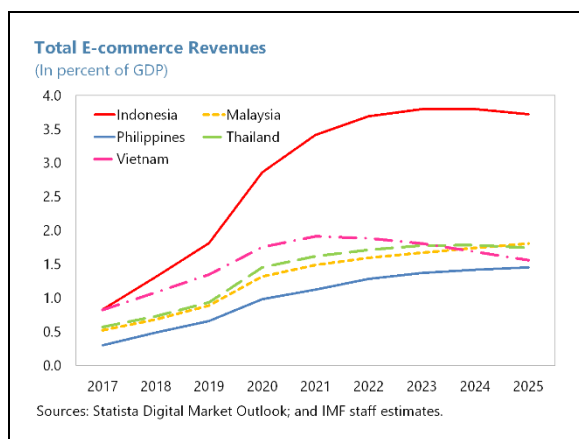
16. Interest in CBDC has risen worldwide in recent years. CBDC is a central bank's liability denominated in the local currency, which can be used as a medium of exchange and store of value. This new form of money could promote diversity in payment options, increase financial inclusion, and facilitate cross-border payments. There are various design choices for a CBDC: for example, access (widely vs restricted, or retail CBDC vs wholesale CBDC); degree of anonymity (ranging from complete to none); operational availability (ranging from current opening hours to 24 hours a day and seven days a week); and interest-bearing characteristics (yes or no) (CPMI, 2018). So far, two countries have formally introduced CBDC that are fully open to the public (Bahamas and Nigeria), while many other countries and regions such as China and the Eastern Caribbean Currency Union are running pilots open to a smaller set of the population.

17. Like many other countries, Indonesia has seen the relative importance of cash as a payment method declining over the years, although cash usage will likely remain there for its anonymity and less dependence on digital devices. Cash use (as a share of nominal GDP) in Indonesia has fallen very slowly overtime from the early 2000s until the global financial crisis, after which it started to rise again steadily. Many factors likely have contributed to the gradual increase in recent periods, including a steady increase in the household consumption share of GDP. Alternative measures of the importance of cash, such as cash relative to its alternatives, show that cash is losing its importance relative to its alternatives such as cards and e-money.⁵ While this significant shift towards digital payment methods reflects technology advances as well as change in consumer preferences, the pandemic also played an important role.

⁵ Khiaonarong and Humphrey (2019) discussed many measures including cash withdrawn from automated teller machines (ATMs) and over the counter at banks.



18. Indonesia has the potential for a secured, cash-like retail CBDC to play an important role in the retail payment landscape. Aggregate value of e-money transactions in Indonesia has risen exponentially since 2010, reaching around IDR 205 trillion as of 2020, and is expected to continue to grow (Statista, 2021). Digital/mobile wallet accounted for nearly 30 percent of the total e-commerce payments, followed by bank transfers (23 percent), cash on delivery (15 percent), credit card (14 percent), and debit card (10 percent). A few domestic nonbank players dominate Indonesia's digital payment market, including Gopay, OVO, DANA and LinkAja. When surveyed about concerns regarding digital payment methods, respondents cited security (59 percent), more comfortable with cash (49 percent), and concern over scams (36 percent) as top three answers (Statista, 2021). Launching retail CBDC (rCBDC) can explore more potential in the retail payment landscape by addressing these remaining concerns.



19. On the other hand, wholesale CBDC (wCBDC), whose access is more restricted and mainly open to financial institutions, may improve financial market settlement efficiency. Contrary to rCBDC, wCBDC may not be too new of a concept. As Mancini-Griffoli and others (2018) put it, central bank reserves can be interpreted as a wholesale form of CBDC used exclusively for interbank payments. Studies suggest that that wCBDC comparable to traditional central bank reserves in the interbank payment systems could potentially reduce cost and improve liquidity

management (CPMI, 2017). One way is to settle the outright or repo transactions using wCBDC, both on the securities leg and the cash leg, using integrated or single ledger of securities and cash on the CBDC platform. This could improve the settlement efficiency in terms of speed and complexity compared to Indonesia's current system which involves two FMIs (RTGS and securities settlement system) to complete the transaction. Nevertheless, should transaction speed further increase in existing FMIs, it remains to be seen how much additional gains the wCBDC itself can generate.

20. While any decision to launch CBDC should be carefully made, the rest of the section aims to provide some initial thoughts regarding the role of CBDC in promoting money market development. Among the major design choices (Table 1), a key consideration is along three main dimensions in CBDC issuance—collateral, remuneration, and redeemability.

Table 1. Key Design Features of Launched/Piloted Retail CBDCs

	Central Bank of the Bahamas Sand Dollar	Eastern Caribbean Central Bank Dcash	Central Bank of Uruguay e-Peso	Central Bank of Nigeria eNaira	People's Bank of China eCNY	Bank of Jamaica
Launch dates	Pilot started Dec. 2019; launched Oct. 2020	Pilot started March 2021, still ongoing	Pilot started Nov. 2017; ended April 2018	Pilot started Oct. 2021; still ongoing	Pilots started April 2020; still ongoing	Pilot to start in Q1 2022
Transaction fees?	No, but maybe yes later	None during pilot	None during pilot	None during first 90 days	None during pilot	None
Interest bearing?	No	No	No	No	No	No
Access	Smartphones and smart cards	Smartphones only?	Smart- and feature-phones	Smart- and feature-phones	Broad array of devices	Smart-; feature-phones and smart cards.
Offline?	Limited value payments when network down. Wallets update when network is back up.	Sender must be online. If the receiver is offline the payment will process when back online.	No but can use a USSD mobile network for settlement without an "internet" connection.	Sender must be online. If the receiver is offline the payment will process when back online.	The PBOC is piloting offline universal access devices.	CBDC can be transferred in various offline media as a bearer instrument.
User holding/ transaction limits	Physical/email address, phone number and photo for low-limit access (B\$500 holding and B\$1,500/month transaction). Plus, government-issued photo ID for higher limits (B\$8,000 holding and B\$10,000/month).	Physical/email address, phone number, photo and birth date/place for low limit access (EC\$1,000 to EC\$2,700/month transaction depending on risk profile). Plus, full name and bank account for higher limits (EC\$3,000 to EC\$20,000/day).	Physical/email address, SIM card and national ID for low limit access (UYU30,000).	Physical/email address, phone number, passport photo and birth date/place for low limit access (N120,000 holding; N20,000/day). National ID Number and bank account for higher limits (N300,000 – N5,000,000 holding; N50,000 – N1,000,000/day).	SIM card for low limit access (¥10,000 holding; ¥2,000/transaction; ¥5,000/day). Plus, full name, address, phone number and bank account for higher limits (¥500,000 holding; ¥500,000/transaction and ¥100,000/day).	CBDC transactions subject to the existing risk-based AML/CFT PSP framework, including collecting know-your-customer (KYC) information on all holders.
Central bank (CB) and payment service provider (PSP) data access	CB sees pseudonymous transactions data to monitor for suspicious activity and stop accounts if necessary.	CB sees anonymous holdings and transactions data. PSPs can see the identity of payers and payees and the purpose of transactions.	CB sees anonymous holdings and transaction data, which can be decrypted under very restrictive legal conditions-e.g., with a court order.	Unclear based on available information	Controllable anonymity: The CB can see all holdings and transaction data, but users can control what information they expose to counterparties.	The CB does not see holdings or transactions data. PSPs maintain the IDs of their respective users and transactions in line with KYC regulations.
Programmable?	No, but smart contracts could be used for point-of-sale tax payments, integration with physical devices or IoT applications, or automate distribution of economic relief based on specific demographic or other characteristics.					At the wallet and service provider level.
Cross-border?	Not directly	No	No	Unclear based on available information	No	No
Platform vendor and type	NZIA Limited (DLT private permissioned)	Bitt Hyperledger Fabric (DLT private permissioned)	Roberto Giori Company (Centralized ledger)	Bitt Hyperledger Fabric (DLT private permissioned)	No known platform vendor (hybrid platform type)	eCurrency (DSC3 Digital Bearer Instrument)

Sources: Various central banks and technology platform vendors.

- **Collateral.** Two options are usually considered in theory: issuing CBDC against reserves or against high-quality liquid assets (HQLA) such as government bonds. Introducing CBDC against reserves could lead to more volatile market interest rates and monetary conditions, which could then be mitigated by more frequent fine-tuning OMOs. This is illustrated in the following example. Assume that the commercial banking sector converts some reserves to an equal amount of (retail or wholesale) CBDC. If the commercial banks do not call back loans, the loan to reserves ratio would increase, and the reserve requirement might be breached. To avoid that,

commercial banks would borrow from each other in the money market, pushing money market interest rates higher, driving up transactions volume in call market. In an extreme case, this could lead to bank disintermediation.⁶ Monetary policy can offset the tighter monetary conditions and volatile money market interest rates caused by CBDC creation using open market operations (OMO).⁷ Theoretically, introducing CBDC against HQLAs such as government bonds could imply less impact on reserves and thus monetary conditions, but incurs an expansion of the central bank's balance sheet, in which case the central bank will need to make decisions on portfolio composition choices consistent with its risk appetite. Additionally, an increased demand for government bonds by financial institutions could push up their prices and lower yields.

Table 2. Hypothetical Analytical Balance Sheets

Commercial Bank		Central Bank	
Assets	Liabilities	Assets	Liabilities
Before CBDC Introduction			
Loans (300)	Deposits (320)	Net Foreign Assets (20)	Cash (20)
Reserves (40)	Capital (40)	Claims on Other Depository Corporations (20)	Reserve (40)
Net Claims on Central Govt (10)		Net Claims on Central Govt (10)	
Others (10)		Others (10)	
Total (360)	Total (360)	Total (60)	Total (60)
CBDC Against Reserves			
Loans (300)	Deposits (320)	Net Foreign Assets (20)	Cash (20)
Reserves (30)	Capital (40)	Claims on Other Depository Corporations (20)	Reserve (30)
Net Claims on Central Govt (10)		Net Claims on Central Govt (10)	CBDC (10)
Others (10)		Others (10)	
CBDC (10)		Total (60)	Total (60)
Total (360)	Total (360)		
CBDC against HQLAs			
Loans (300)	Deposits (320)	Net Foreign Assets (20)	Cash (20)
Reserves (40)	Capital (40)	Claims on Other Depository Corporations (20)	Reserve (40)
Net Claims on Central Govt (0)		Net Claims on Central Govt (20)	CBDC (10)
Others (10)		Others (10)	
CBDC (10)	Total (360)	Total (70)	Total (70)
Total (360)			

Source: IMF staff calculations.

- **Remuneration.** Discussions around CBDC remuneration usually distinguish two cases: non-interest bearing and interest bearing. Although it is technically feasible to pay interest on any type of CBDC, central banks may prefer not to issue interest-bearing rCBDC concerning the pressure on commercial banks' deposits and the risk of bank disintermediation. wCBDC can in

⁶ Some literature, such as Kumhof and Noone (2018), argue that CBDC and reserves should be distinct and not convertible into each other, so as to help safeguard financial stability. The logic is that when depositors would like to obtain CBDC against their deposits, they would first transfer deposit to banks that pay out CBDC against deposits, which means that other banks would lose deposits during this process. If this demand for CBDC is in large numbers, then this creates a systemwide, near-instantaneous bank run.

⁷ Issuing CBDC against currency in circulation could be another option. However, because this option would not lead to changes in reserves and thus money market conditions, and the share of CBDC issued in this way can be very limited in a digital payment system, this study does not take currency in circulation as an example.

principle be interest-bearing, which could make it attractive as a substitute for money market instruments as a liquid and risk-free asset facilitating final settlement. Indeed, as suggested by many literatures, if institutional investors could hold wCBDC without limits, the remuneration rate could become the hard floor for money market rates. The risks of setting higher interest rates on wCBDC (higher than that of reserves, for example) could be a reduction in reserves, forcing banks to borrow in money market, and money could flow out of other short-term instruments into wCBDC, pushing those yields higher.

- **Redeemability.** In this context, redeemability refers to the ability of the holders to exchange CBDC for other assets such as physical cash, deposits, and reserves. Different forms of limits or caps on the redeemability can be used as mitigation measures for certain risks related to the introduction of CBDC. For example, by setting a cap on how much reserve can be exchanged for wCBDC in a given period, or by selecting certain banks with strong capital position as leading distributors of rCBDC, the risk of bank disintermediation could be mitigated. Such caps may be especially important as transitional arrangements that aim to ensure financial stability when new CBDC is first introduced. A similar cap can be applied on the conversion from bank deposits to rCBDC in terms of daily transaction and/or balance limits to mitigate risks of bank disintermediation. Existing CBDCs such as the Central Bank of Nigeria's eNaira and People's Bank of China's E-CNY, both have certain caps on transaction and balance limits to ease the crowding-out of bank deposits.⁸

21. If both rCBDC and wCBDC are deemed desirable, an approach where they are disintegrated (i.e., not directly convertible to one another) might be a way to start.

Distinctions are often made between rCBDC and wCBDC to facilitate conceptual discussions. In practice, countries also tend to focus on either the retail or wholesale case to best utilize the existing infrastructure and network, and to mitigate potential risks by minimizing the deviation from the current financial system structure. Having two disintegrated CBDC systems for retail and wholesale cases in parallel could allow for different design features to best meet their respective policy objectives. For example, consider the following two choices:

Examples of CBDC with Different Design		
	rCBDC	wCBDC
Collateral	Reserves	HQLA
Remuneration	Non-interest bearing	Interest bearing with variable interest rate
Redeemability	Redeemable by payment service providers, including banks and NBFIs	Redeemable by money market participants, including banks and NBFIs

- **rCBDC.** The rCBDC is designed as a digital extension of cash. Commercial banks can convert their reserves into rCBDC, to meet users' demand. The rCBDC is non-interest rate bearing.

⁸ The PBOC has put in place system frictions as prevent the rapid spread of bank runs. It uses a tiered design of e-CNY wallet with different caps on transaction and balance for different types of e-CNY wallets (PBOC, 2021).

- **wCBDC.** The wCBDC is designed as a new instrument used for money market transactions. Money market participants can obtain wCBDC from the central bank using HQLA such as government bonds as underlying collateral, through either outright purchases or repo transactions. The wCBDC is interest bearing with a variable interest rate. The interest rate on wCBDC can be set to zero when first introduced (making it closer to banks' excess reserves which are also non-remunerated) and can be allowed to be non-zero in the future.

22. If the banking system is already characterized by excess liquidity, the risk of bank disintermediation due to the introduction of rCBDC is low.

In Indonesia, the aggregate liquidity surplus of the banking system towards the central bank (defined as net foreign assets minus reserve requirement and other autonomous factors such as currency outside banks and government claims) amounts to around IDR 650 trillion in September 2021, just coming down from more than IDR 1,000 trillion last August. Since the early 2000s, the central bank is the net borrower in the interbank money market as the banking system has had excess liquidity. If commercial banks convert a small fraction of reserves into rCBDC, the chance of depleting the reserves is low, as such the probability that central bank would need to inject liquidity would be also low. Indeed, rCBDC could even become a new instrument for the central bank to absorb excess liquidity from the banking sector to incentivize interbank market transactions.

September 2021 Snapshot			
(In trillions of rupiah)			
Asset		Liability	
BI Analytical Balance Sheet			
Net foreign asset	1,976	Required reserves	284
OMO	-388	Cash in vault	93
Government claims	-293	Currency outside banks	749
Other	-168	Other	2
Total	1,127	Total	1,127
Commercial Bank Analytical Balance Sheet			
Rupiah loans	4,964	Rupiah deposits	5,625
Required reserves	284	Other deposits	890
Cash in vault	93	Capital and reserves	2,225
Other claims on BI (net)	749		
Net claims on government	1,212		
Other	1,438		
Total	8,741	Total	8,740

23. The introduction of wCBDC can impact the money market through multiple channels.

In the case of Indonesia, conditional on the abovementioned design features, the following channels could be of relevance.

- wCBDC provides money market participants who do not currently settle in central bank money with the possibility to settle directly in central bank money rather than bank deposits, which can reduce counterparty risk. By design, wCBDC do not entail any credit risk as it is a direct claim on the central bank. For NBFIs, wCBDC provides them with a new instrument that facilitates their participation in the money market.
- If banks exchange CBDC with reserves, it creates another channel on top of the existing ones where excess liquidity in the banking system could be reduced. With tighter liquidity conditions, money market transaction volume could also increase.
- To provide CBDC using HQLA as collateral, permanent expansion of central bank balance sheet by government bond purchases could lower government bond yields. If the supply of HQLA is limited, riskier assets might be tapped, thus promoting repo market development.

- If the interest rate on wCBDC is set to be higher than the return on excess reserves, commercial banks could migrate excess reserves into wCBDC to earn the interest. The interest rate set on wCBDC can become the hard floor for money market rates, which will have an impact on deposit rates. In that sense, wCBDC can become a new monetary policy tool to strengthen the transmission from the policy rate to the market interest rates.

CBDC: Ways to Promote Money Market	
Demand-side	Supply-side
More participants including NBFIs	More instruments: rCBDC and/or wCBDC
More incentives for engaging in money market transactions and increased demand for HQLAs	Absorbing excess liquidity, improving monetary policy effectiveness

24. What underpins the rationale for our analysis is the assumption of imperfect substitutability between CBDC and reserves. When rCBDC and wCBDC are disintegrated,⁹ rCBDC is essentially part of M0 like cash. The demand for rCBDC would largely depend on the degree of adoption (e.g., accepted and used by users), thus could be harder to predict. Therefore, some rCBDC will be kept by users (as a payment means) and by payment service providers (as a buffer to meet user's demand), leading to a consistent reduction in reserves and creating incentives for banks to borrow in the money market. Large banks may have more room to permanently lower their reserves due to their large networks to serve users and excess liquidity. For wCBDC, since its quantity and/or price can be controlled by the central bank, wCBDC essentially becomes a new monetary policy instrument. wCBDC and reserves are more similar in nature, both can carry an interest and be used for interbank payments, but from the monetary operations perspective, using wCBDC to absorb excess liquidity may be less costly for the central bank than using OMOs, especially if the wCBDC carries no or little interest at the very beginning.

25. Enhanced participation of non-bank financial institutions (NBFIs) in the money market can accelerate financial inclusion. CPMI (2018) suggested that if the introduction of CBDC would allow direct participation of nonbanks in the settlement process, gains could further increase. As explained in previous sections, NBFIs play a rather small role in Indonesia's money market, and the secondary bond markets lack depth and liquidity. Granting access to wCBDC using government bonds as collateral could provide opportunities for NBFIs, who often hold bond instruments to maturity, to better manage their liquidity.

26. Banks will need to adapt to overcome the challenges from the introduction of CBDC. As money shifts out of the banking system and gradually migrates into this new form of money, banks may witness deposit outflows. They will face more competition and an increased need to raise interest rates to attract deposits. The capacity to do so seems there, given the high NIMs that

⁹ Running rCBDC and wCBDC separately, at least at the early stage, could be a preferred choice. The design and implementation of a dual-purpose CBDC would be more complex. For instance, when rCBDC and wCBDC are built on DLT-based permissioned networks, the set of such payment service providers for rCBDC and wCBDC may not completely overlap. In addition, if the wCBDC is supposed to be used in a securities settlement context, the wCBDC will have to have certain smart contracting abilities built in, although this is not necessarily the case for rCBDC.

Indonesia banks enjoy. Nevertheless, as BIS (2021) also suggested, whether these challenges would indeed be disruptive would depend on the scale of the take-up of CBDC, how quickly any substitution occurs and extent of offset from third-party and non-bank financial service providers. In Indonesia, smaller banks are likely to face more challenges. Bank consolidation may help prepare banks to enhance their competitiveness and resilience.

27. The design of CBDC should take into account the country's characteristics and policy objectives. A study drawing on experts' opinions revealed that a cash-like general-purpose rCBDC would be the best suited model for Indonesia, since it could enhance financial inclusion and reduce shadow banking (Zams and others, 2020). Another study, Kang (2017), argued that an interest-bearing CBDC may enhance the competitiveness of the banking system by reducing the structurally high NIMs in Indonesia. More research is warranted to study the potential for CBDC in Indonesia, to ensure the robust design and operation of such a system.

28. The analysis also underscores the importance of the authorities' continuous money market reforms and digital infrastructure upgrades. Issuing CBDC is more than just distributing a new digital legal tender, it also requires and brings additional changes to the digital infrastructure while leveraging the existing one, and potentially makes operations more efficient. The ongoing money market development, in turn, would benefit from the improvement in digital infrastructure enhanced by the CBDC issuance. Moreover, other money market development measures, such as enhancing competition, and payment digitalization efforts, such as BI-Fast, would raise the public's digital awareness and help the banking sector to be better prepared if CBDC were to be introduced.

E. Conclusion

29. While the year 2021 saw a big decline in interbank call money transactions as banks' ample liquidity reduced incentives to trade, repo transaction volume increased, helped by BI's efforts and coordination with other authorities. Virtual joint peer learning activities between big banks and small banks have helped to increase volume in the money market.

30. Despite some temporary setbacks caused by the pandemic in other areas, Indonesia continues to develop its money market and payment systems reform agenda laid out in Blueprint for Money Market Development 2025. The improvement of the money market infrastructure through a central counterparty is expected to be in place in 2022. Further reforms of the money market can serve as a catalyst in the broad reform agenda of modernizing Indonesia's financial system.

31. The introduction of CBDC could benefit money market growth in Indonesia mainly through broadening the instruments and increasing financial inclusion of NBFIs. If considered as a feasible alternative, further research on the detailed design choices of CBDC and macro impact analysis can be done, by taking into account Indonesia's money market development, banking sector liquidity, availability of HQLAs, and associated risks.

References

- Aditya, Kemal, 2021, "Analysis of the Bond Repo Market in Indonesia," *Jurnal Riset Ekonomi dan Bisnis*, Vol. 14, Issue 2, pp. 83–96.
- BIS, 2021, "Central bank digital currencies: financial stability implications," Report No. 2.
- Committee on Payments and Market Infrastructures, 2017, *Distributed Ledger Technology in Payment, Clearing and Settlement: An Analytical Framework*, CPMI Papers No. 157 (Basel: Bank for International Settlements).
- , 2018, *Central Bank Digital Currencies*, CPMI Papers No. 174 (Basel: Bank for International Settlements).
- International Monetary Fund, 2019, *Indonesia—Staff Report for the 2019 Article IV Consultation*, IMF Country Report No. 19/250 (Washington).
- Kang, Heedon, 2018, "Financial Deepening and Inclusion," in *Indonesia: Selected Issues*, IMF Country Report No. 18/33 (Washington: International Monetary Fund).
- Khiaonarong, Tanai, and David Humphrey, 2019, "Cash Use Across Countries and the Demand for Central Bank Digital Currency," IMF Working Paper No. 19/46 (Washington: International Monetary Fund).
- King, Darryl, and Tommaso Mancini-Griffoli, 2018, "Monetary Operations," in *Advancing the Frontiers of Monetary Policy*, edited by T. Adrian, D. Laxton, and M. Obstfeld (Washington: International Monetary Fund).
- Mancini-Griffoli, Tommaso, Maria Soledad Martinez Peria, Itai Agur, Anil Ari, John Kiff, Adina Popescu, and Celine Rochon, 2018, "Casting Light on Central Bank Digital Currency," IMF Staff Discussion Note 18/08.
- Patnam, Manasa, 2020, "Foreign Exchange Markets and Instruments in Indonesia," in *Indonesia: Selected Issues*, IMF Country Report No. 21/47 (Washington: International Monetary Fund).
- People's Bank of China, 2021, *Progress of Research & Development of E-CNY in China*, Report prepared by the Working Group on E-CNY Research and Development of the People's Bank of China.
- Zams, Bastian Muzbar, Ratih Indrastuti, Akhmad Ginulur Pangersa, Nur Annisa Hasniawati, Fatimah Az Zahra, Indah Ayu Fauziah, 2020, "Designing Central Bank Digital Currency for Indonesia: The Delphi-Analytical Network Process," *Bulletin of Monetary Economics and Banking*, Vol. 23 No. 3, pp. 411–438.