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Central Bank Digital Currency: A Monetary Policy Perspective

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A. Introduction: If you can't beat Bitcoin, join 'em?

With the rising interest in and usage of private digital currencies (e.g. Bitcoin), a policy question that has arisen is whether central banks should consider issuing official digital currencies (central bank digital currency, CBDC¹). Consequently, research has been initiated globally to evaluate the costs and benefits of the issuance of CBDCs to the functioning of the economy, and its implications on the central bank mandates of monetary and financial stability and most directly, currency issuance and payment systems. This article reviews the current thinking on the potential impact of issuing CBDC to the conduct of monetary policy².

B. Definition: What is CBDC?

CBDC, in essence, is central bank cash (banknotes and coins) made available in electronic form. Yet, “digital currency” is not

new as most central bank money is already “digital”. All commercial bank deposits or reserves with the central bank represent digital claims (monetary value stored electronically). In the current setup, only member banks have access to central bank money and related payment systems such as Real-time Electronic Transfer of Funds and Securities System (RENTAS) in the case of Malaysia.

Therefore, the key innovation with CBDC is the potential for non-banks (individuals and firms) to hold direct accounts with the central banks or to transact directly with one another using the CBDC as a legal tender. This has been made possible by the technology used in private digital currencies, namely the distributed ledger technology (DLT)³.

Given the proposed underlying DLT, CBDCs could be thought of as a “government cryptocurrency”. However, it should be distinguished from e-money, which is

¹ CBDC is also sometimes interchangeably referred to as digital base money, for example in Mersch (2017).

² Featured in research by Barrdear and Kumhof (2016), Bordo and Levin (2017), and Engert and Fung (2017), among others.

³ Private digital currencies allow people to transact anonymously, directly and quickly with each other without the need for a trusted third party due to its underlying technology, the distributed ledger technology (DLT). DLT is a distributed database that allows for decentralised bookkeeping (i.e. processing, validation and authentication of transactions). A DLT keeps all history of transactions in a tamper-proof way and makes them publicly available as the current transactions are linked to the chain of all the previous transactions. The DLT is seen to have a potentially wide range of application, from the financial services sector (e.g. settlements) to retail (e.g. loyalty and rewards) and health-care sectors (e.g. data management). See Andrade and Ketterer (2016); Fung and Halaburda (2016); and Monetary Authority of Singapore (2017).

merely a payment system innovation enabling cashless transactions. The key features of these forms of payment are in Table 1.

C. Central bank initiatives on CBDC (Diagram 1)

Central banks have shown varying levels of interest and progress in CBDC, with different motivations. Where the US, Sweden, China and Ecuador are interested in the CBDC for day-to-day transactions by the public, experimentations in Canada and Singapore are focused on improving the efficiency of the wholesale payments and settlements system.

There has also been mixed sentiments with regards to the applicability and reliability of CBDC. Bank of Canada staff research cautions central banks to proceed carefully

given operational complexities and uncertainties of retail CBDC. Moreover, Bank of Canada, Bank of England and Sveriges Riksbank have communicated the need for multi-year research before making a decision on issuing CBDC. Similarly, European Central Bank senior officials have treaded with a guarded stance, posing both the merits and dangers of central banks progressing either too expeditiously or adapting too slowly given rapid technological changes.

D. What would CBDC look like? (Diagram 2)

While the CBDC would be underpinned by the use of DLT, researchers have proposed different frameworks for how CBDC could be implemented. One key consideration is the verification of transactions.

Table 1

Comparison of Private Digital Currencies, CBDC and e-Money

	Private digital currencies / Virtual currencies	Central bank digital currencies	E-money / mobile money
Definition	<ul style="list-style-type: none"> Digital representation of value, not issued by a central bank, credit institution or e-money institution, which, in some circumstances, can be used as an alternative to money Cryptocurrencies are a subset of private digital currencies, which uses cryptographic proof for its verification process 	<ul style="list-style-type: none"> Monetary value stored electronically that is a liability of the central bank and can be used to make payments 	<ul style="list-style-type: none"> Actual monetary value stored in an electronic device that can be used to make payments across retailers and purposes
Key aspects	<ul style="list-style-type: none"> New currency New payment system (DLT) 	<ul style="list-style-type: none"> New currency New payment system (DLT) 	<ul style="list-style-type: none"> A form of cashless retail payment system
Examples	<ul style="list-style-type: none"> Bitcoin Ripple 	<ul style="list-style-type: none"> Dinero Electronico (Ecuador) 	<ul style="list-style-type: none"> Touch'n'Go card (Malaysia) Octopus card (Hong Kong) 

Source: European Central Bank (2015), *Virtual Currency Schemes - A Further Analysis*; and Bank for International Settlements Committee on Payments and Market Infrastructures (2015), *Digital Currencies*

In one framework resembling private digital currencies, CBDC would involve “digital tokens” that can be transferred directly from payer to payee, and are verified by third parties. This “decentralised” CBDC would then function just like physical banknotes and coins, as it can be used directly and transactions can be done anonymously. However, for practical reasons, most research suggests limiting the DLT verification process to selected participants, such as among commercial banks. Furthermore, the central bank could also serve a “notary” role, by auditing transactions and verifying that funds are available.

The other proposed framework would involve private individuals and firms having an account with the central bank,

and all transactions between accounts would be validated and processed by the central bank. Under this “centralised” framework, the CBDC could be thought of as an application of a payment system like RENTAS, but to the wider economy. The central bank would play a similar role to commercial banks, which intermediate funds between accounts across its balance sheet.

Given the shift towards “digital” currency, it raises the opportunity to consider whether CBDC should be paid interest at a rate similar to other risk-free assets such as government bonds. If it is not paid interest, CBDC would be analogous to physical cash. This remuneration aspect would have important bearing on how it affects monetary policy, which is described in the next section.

Diagram 1

Milestones in CBDC by Other Central Banks



Source: Central bank websites, newsflows, Bordo and Levin (2017) and Andrade and Ketterer (2016)

E. Impact on monetary policy from the introduction of CBDC

Some general observations have been made on the potential impact to monetary policy from an introduction of CBDC.

For example, CBDC could unlock central banks’ ability to capture rapid, real time economic surveillance, which would greatly inform monetary policy formulation. This is due to the underlying DLT property that preserves all transactions, and the virtually instant transactions immediately captured by the ledger.

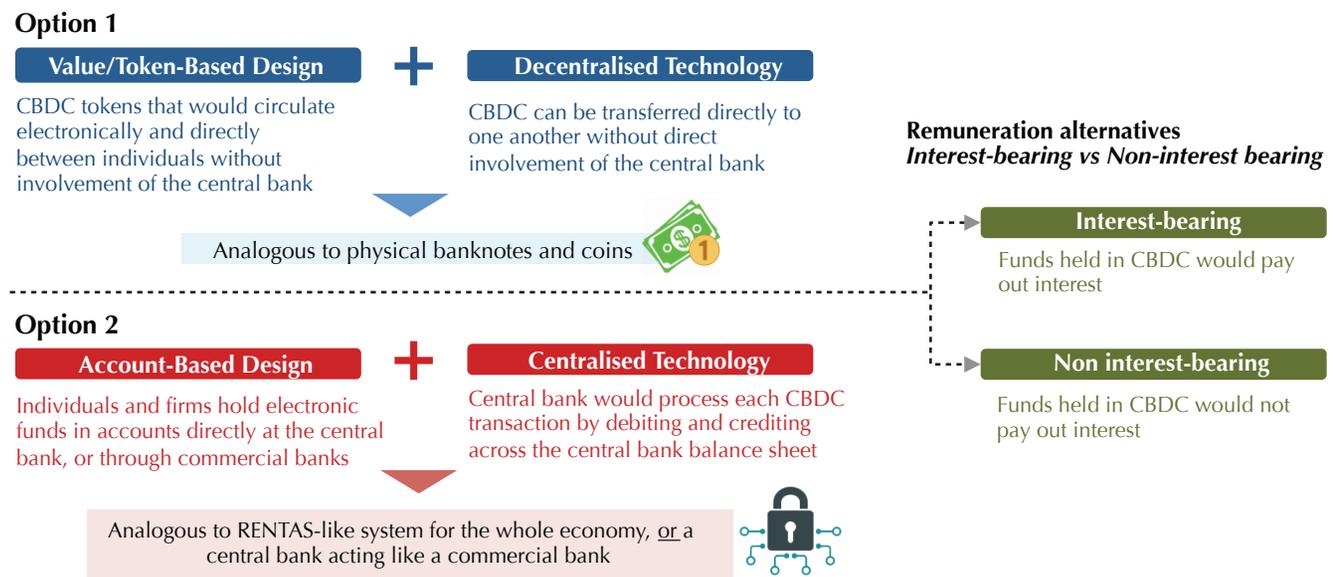
As described earlier, CBDC could function like physical cash and receive no interest payments. In normal times, economic agents would prefer to keep

their money in bank deposits as opposed to CBDC given that bank deposits receive interest payments. However, in the tail-risk event of economic instability or a system-wide bank run, CBDC would be another option in addition to cash. It is fully guaranteed by the central bank with no risk of losing its face value and easily stored in large amounts. This easy switch to CBDC would speed up the bank run. The consequent impairment to financial intermediation would directly weaken the efficacy of monetary policy.

On the other hand, researchers propose that CBDC could receive interest payments for the purpose of transmitting monetary policy action directly to economic agents, which increases the efficiency of monetary policy.

Diagram 2

Potential Modalities of the CBDC



Pre-requisites for CBDC

- Central bank controls the money supply
- The CBDC system uses the distributed ledger technology, potentially between a group of participants (e.g. banks)

Note: By design, a value/token-based CBDC would imply a decentralised system, while an account-based CBDC would imply a centralised system

Note: Based on Bordo and Levin (2017), Fung and Halaburda (2016), Mersch (2017), and Skingsley (2016)

Under this modality, economic agents could also switch to CBDC from bank deposits, which could lead to a deposit outflow. This outflow of deposits to CBDC could motivate banks to compete for deposits, which could in turn increase deposit rates and thus also retail lending rates, despite no increase in the policy rate.

Some advanced economies currently have negative policy rates⁴, which are typically not transmitted to retail deposit rates. But the CBDC could perhaps be charged a negative interest rate⁵, thus efficiently transmitting to the economy the negative policy rate. This would remove the so-called zero lower bound problem⁶. However, a key caveat is that given that CBDC is expected to only be a complement to cash (see section F), there could still be a limit to how effectively this negative interest rate is transmitted. If a negative interest rate on CBDC was introduced at a large enough magnitude, economic agents could end up choosing to hold physical cash instead of CBDC. A further counter-argument is that negative returns on currency holdings could prove to be unpopular with the public.

Finally, with CBDC, it could be feasible for central banks to implement helicopter money⁷ as an additional tool for monetary policy – although whether such a policy tool is warranted or desirable is beyond the scope of this article.

In conclusion, the potential impact on monetary policy from an introduction of CBDC is unclear; and given limited CBDC currently in existence⁸, pure conjecture.

F. Broad conclusions and relevance to Malaysia

Research is still nascent

While the potential impact to the transmission of monetary policy is recognised, this needs to be analysed further. This analysis should be balanced with implications in other intersecting areas of central banking, and also wider implications on the economy, commercial banks and economic agents.

Cash is still king?

It is quite unlikely that cryptocurrencies would replace cash transactions any time soon. Pioneering work reviewed generally concludes that CBDC, even if introduced in the future, would likely be a complement rather than a substitute to cash and bank deposits.

Technological hurdles need to be considered, as central bank credibility must take priority

Fung and Halaburda (2016) questioned whether “the central bank would have a comparative advantage in issuing a digital currency, given its lack of market and technical expertise”. Conversely, People’s Bank of China and European Central Bank challenged whether the underlying technology is advanced and reliable enough to be applied by central banks⁹. The bedrock of currencies is the trust that people have in the central bank to preserve the value of money. If the technology for CBDC falls short in guaranteeing this

⁴ Japan, Sweden, Switzerland and Denmark.

⁵ This could be done through reducing balances on economic agents’ accounts, or the CBDC not being redeemed at full value (Source: Skingsley (2016)).

⁶ A situation that characterises the difficulty for central banks to change short-term nominal interest rates to below zero to stimulate economic growth. This is because cash, which can be thought of as being remunerated at 0%, can always be held as an alternative to negative interest rate bearing assets.

⁷ The concept of helicopter money was first introduced by Milton Friedman, and is broadly defined as the printing and distributing of money directly to individuals in the economy, in order to boost economic activity.

⁸ Currently, only Ecuador has issued CBDC. See Diagram 1 for details.

⁹ Source: Mersch (2017) and Coindesk (Feb 2016), *China’s Central Bank Weighing Blockchain Tech for Digital Currency*

(e.g. cyber-security breach), the central bank risks losing its credibility. This is a key risk, in light of recent data thefts and hacking resulting in millions of losses from cryptocurrency exchanges¹⁰.

CBDC must be welfare-enhancing

“Just because [CBDC] is feasible does not mean it is desirable”¹¹

- David Andolfatto, Vice Governor, Federal Reserve Bank of St. Louis

To quote Bank of Canada Deputy Governor Carolyn Wilkins, “If it simply provides another payment mechanism when cash is a viable alternative, there are

circumstances under which the well-being of people could be reduced by its introduction”¹². It is not compelling enough for CBDC to be implemented just because the technology allows for it. The issuance of CBDC must be research-driven and needs-based, with the aim to unambiguously improve the well-being of people.

Each country’s response would be unique

Ultimately, the extent of country’s responses and intervention with regards to digital currency and CBDCs would vary, reflecting the different economic structure, demographics, risk appetite, and institutional capacity and framework¹³.

Issues for discussion

- 1) If each country’s response to digital currency or CBDC is unique, what could Malaysia’s response be?
- 2) Will interest in digital currencies become widespread enough in Malaysia to warrant consideration on issuing CBDC?
- 3) Should there be a global, concerted shift towards issuing CBDCs, where would Malaysia stand on this issue?

¹⁰ Source: New York Times (Aug 2017), *Identity Thieves Hijack Cellphone Accounts to Go After Virtual Currency*; Fortune (July 2017), *One of the Biggest Ethereum and Bitcoin Exchanges Got Hacked*

¹¹ Source: Andolfatto (2015), *Fedcoin: On the Desirability of a Government Cryptocurrency*

¹² Source: Wilkins (2017), *Canada Explores Digital Currency: Fintech Collaboration Vital to Unlock Promise*

¹³ Adapted from Fung and Halaburda (2016), which attributed the level and type of intervention of central banks to different histories, institutional structures and legislative authorities.

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