



A Journey through the Monetary Cyber World

By Christian Pfister¹

Paris 1 Panthéon-Sorbonne and Sciences Po

JEL codes: E40, E42, E58.

Keywords: Bitcoin, central bank, currency, financial stability, monetary policy, stablecoins.

The author aims to guide the reader through the swift evolution in the concept of digital money since early 2009, when Bitcoin was launched with the project, still not implemented, to replace legal tender. Stablecoins, have emerged more recently, and aim to remedy the shortcomings in the first generation of crypto-assets. However, they carry many risks. Meanwhile, central banks are considering whether to launch a digital currency and are in some cases preparing for it.

In order to guide the reader through the swift evolution in the concept of digital money since early 2009, three stages are distinguished. In the first one, which started in early 2009, the launch of Bitcoin triggers a blossoming of crypto-assets in its wake. Tether, launched in 2014, ushered in the stage of stablecoins. The third stage is starting, with central banks considering whether to launch a central bank digital currency (CBDC) and is some cases preparing for it.

¹ This Policy Brief is based on the author's article in the [Banque de France Bulletin \(Pfister, 2020b\)](#). The views expressed are his and not those of the Banque de France, the Eurosystem, Paris 1 Panthéon-Sorbonne or Sciences Po.

The table below summarises the main potential benefits and risks of crypto-assets, also drawing on Pfister (2020a).

Table: Main potential benefits and risks of crypto-assets

		"First generation" crypto-assets		Stablecoins		Central bank digital currency	
		Bitcoin and similar	Issued in ICOs	Tether and similar	Global stablecoins	Wholesale	Retail
Benefits	Micro	New technology Speculation Pseudonymity International fund transfers	Speculation Financing of the economy	Protection against volatility of "first generation" crypto-assets with similar benefits (except speculation)		Perfectly safe and liquid instrument, permanently at par with legal tender	
						End-to-end transactions in crypto-assets	Complement to banknotes
	Macro	Insignificant due to small size			?	Internationalisation of currency Stimulus to financial and payments innovation	
						Possibility to have real-time money market and monetary policy	Financial inclusion Link between central bank and public More efficient monetary policy if remuneration of CBDC linked to policy rate
Risks	Micro	Loss of value Hacking of wallets and platforms	Loss of value Scams if not regulated	Imperfect stability Fees/Low yield Lack of transparency	Fees? Low yield Transparency? Insufficient scalability/Interoperability Cyber risks	Insufficient scalability/Interoperability Cyber risks Single point of failure	
	Macro	Financing of illegal activities			Wholesale: Fragmentation of liquidity + Concentration of risks Retail (in user countries): Loss of monetary policy efficiency + Disintermediation	Economic damage and reputation loss for central bank if micro-risk(s) materialise(s)	
						?	Less efficient monetary policy if remuneration of CBDC not linked to policy rate Bank disintermediation Runs facilitated

First stage: Crypto-assets in search of a myth

By early-September 2020, there were more than 6,700 crypto-assets, with a total capitalisation of around EUR 268 billion (source: CoinMarketCap). However, Bitcoin accounted for close to 59% of this total, compared with some 12% for Ethereum, slightly over 4% for Tether, and around 4% for Ripple. For this reason, and because from the outset it aimed to play a monetary role (Nakamoto, 2008), the focus here is on Bitcoin.

The three main characteristics of Bitcoin, also shared by many of the other crypto-assets, are as follows:

- It combines a public key with a private key, which defines the asset in the absence of an issuer and guarantees user anonymity. This lack of an issuer is what most distinguishes Bitcoin from legal tender, be it fiduciary money or bank deposits.
- It relies on distributed ledger technology (DLT), which makes the scheme more resilient and enables the decentralised confirmation of transactions. However, for many crypto-assets, such as Ripple, stablecoins (see below) or assets issued via initial coin offerings (ICOs; see below), transaction confirmation is not decentralised.
- It systematically uses cryptography.

Bitcoin and the other first-generation crypto-assets are essentially used for three purposes: speculative investments; carrying out payment transactions under a pseudonym, which helps to protect privacy but also facilitates the financing of illicit activities; and transfers of funds abroad.

Overall, Bitcoin only very partially fulfils the three functions of money. It is not a unit of account (it is rarely if ever used to price goods and services). Nor is it a payment instrument (very few purchases of goods and services are settled in bitcoins), or a store of value (its exchange rate against other currencies, and hence its value in terms of goods and services, is too volatile).

While the idea that Bitcoin or other crypto-assets might become a decentralised fiduciary currency is thus a myth, the use of the underlying technology (DLT or blockchain) to issue financial assets in the form of tokens appears more promising. To date, two possible extensions of the use of DLT have emerged:

- The first is ICOs. These operations are used for project financing, and consist in the issuance of tokens on a blockchain in exchange for crypto-assets. Holders of the tokens are given access to services on the issuing blockchain (utility tokens), or may instead be remunerated, making the tokens similar to marketable securities (security tokens). The presence of an issuer is what distinguishes tokens from other first-generation crypto-assets. In 2018, more than 1,000 ICOs were carried out, raising in excess of EUR 21 billion. However, the number of ICOs has declined since the second quarter of 2018, following the sharp drop in the price of Bitcoin.
- The second possible use is the issuance of stablecoins.

Second stage: Stablecoins as a desire to reconcile crypto-assets with legal tender

Stablecoins first emerged in 2014. They are designed to maintain a stable price vis-à-vis a benchmark, which is most often the US dollar. Offering users the benefit of a stable environment while enabling them to remain in the “crypto universe”, stablecoins seem to offer “a brave new world” (Melachrinou and Pfister, 2020). Nonetheless, as at early-September 2020, the Stelareum website lists only nine stablecoins for a total market capitalisation of around EUR 14 billion or just over 5% of the capitalisation of all crypto-assets. Moreover, Tether (USDT), a stablecoin referenced on the dollar, accounts for more than four-fifths of the total amount.

Stablecoins in fact have a number of disadvantages (Melachrinos and Pfister, 2020):

- They are not perfectly stable vis-à-vis their benchmark.
- The fees on stablecoins are high.
- The current low level of interest rates means there are limited returns on projects backed by most major currencies.
- There is a lack of transparency notably because the reserves backing them are often held outside the blockchain (off-chain), and because the claims users have on the assets held in the reserve are unclear.

At present, therefore, despite its differences vis-à-vis first-generation crypto-assets, the market for stablecoins is merely an appendix to that of other crypto-assets, starting with Bitcoin. However, this status of stablecoins could change with the arrival of global stablecoins (GSCs) issued by very large players. The problem is that this would also potentially give the projects a systemic footprint (G7, 2019).

Two main categories of GSCs (wholesale and retail) can be distinguished (Melachrinos and Pfister, 2020):

- Wholesale stablecoins are designed for large-value transactions and aim at financial institutions and large corporations. Two main projects stand out in this category: the USC project and JPM Coin.
- Retail stablecoins are designed for mass transactions. Among retail stablecoin projects, the most famous is Libra, made public in June 2019 with the publication of the first White Paper on Libra². Its different denominations would be backed by a legal currency or by a basket including only stable currencies. Libra would be accessible to Facebook account holders.

More than the historical crypto-assets, GSCs could encourage the greater use of blockchain technology to reduce frictions in cross-border payments and contribute to financial inclusion in emerging countries. These projects nonetheless pose significant risks to monetary policy and financial stability, many of which are akin to those caused by dollarization:

- Regarding monetary policy, if stablecoins backed by a currency other than the national legal tender of the user country crowded the latter out, then any changes in the legal tender interest rate would have less of an impact on domestic demand. This risk would be particularly acute in emerging and developing economies. An extreme case would be if a stablecoin became very widely used and then was depegged from its reference currency and instead pegged to itself, meaning it could set its own issuance terms.
- In the case of financial stability, wholesale GSCs carry a residual credit risk, as the issuer might default. They could also lead to a fragmentation of liquidity or, conversely, to a concentration of risks in the event a single player dominated the market. Retail GSCs could lead to a structural decline in the resources of banks in user countries whose currency is not used by the GSC if customers substituted the GSC for legal tender.

Third stage: Central bank digital currencies for digitized economies?

Should central banks also offer their own digital payment instruments, in addition to banknotes, which are physical, and to the reserves banks hold on accounts with them, which have long been digitized, as they are already considering, notably in China (Pfister, 2020a)?

² An updated version of the Libra White Paper was published on 16 April 2020.

A prerequisite for issuing a CBDC would be that it is especially resilient, thus non-vulnerable to cyber-attacks, as it would offer a “single point of failure” and a successful attack would put the economy at risk, also damaging the reputation of the central bank.

The reasons for issuing a CBDC may differ depending on the country:

- In developing and emerging economies, the main concern is to promote financial inclusion. A retail CBDC could also help reduce the cost of cash and the size of the informal economy.
- In developed economies, a wholesale CBDC may foster financial innovation by enabling the use of blockchain technology in end-to-end transactions. In countries such as Sweden, where banknote usage is declining, a retail CBDC would offer a way of maintaining a direct link of the central bank with the public. For both retail and wholesale CBDCs, the desire to internationalise the currency may also play a role.

How could the distribution of a CBDC be organised?

- In the case of a wholesale CBDC, DLT could be used. However, a number of issues would need to be resolved, such as the interoperability of blockchains accepting the CBDC.
- In the case of a retail CBDC, a central bank electronic currency that did not require the use of a blockchain may suffice. However, a blockchain would allow integrating smart contracts (i.e. contracts that self-execute automatically when certain predefined events occur). Having recourse to payment service providers, which have experience in relationship with clientele, would facilitate the distribution of CBDC.

Whatever the case, the issuance of a CBDC would raise a number of practical questions:

- Do the statutes of the central bank authorise it to issue a CBDC?
- Should the CBDC have legal tender status?
- How respond to the public’s desire for anonymity while preventing associated risks?
- Should non-residents be authorised to hold the CBDC and, if not, what means would the central bank have to prevent them from doing so?
- Should the CBDC model be token-based or account-based? In the case of a retail CBDC, a token-based model would be similar to that currently used for banknotes, prepaid cards and meal vouchers. With an account-based model, financial intermediaries would keep CBDC accounts for their customers.

Above all, how would a CBDC affect the core missions of a central bank?

- With regard to monetary policy, a non-interest-bearing retail CBDC could put a “hard” zero floor on short-term but also to long-term interest rates as expectations for short-term interest rates would not be able to go below zero. Conversely, if the retail CBDC were interest bearing and the remuneration linked to the policy rate, it could reinforce the transmission of monetary policy, as changes in the policy rate would more directly affect bank deposit rates.
- In terms of financial stability, aside from putting pressure on bank deposit rates, a retail CBDC could foster disintermediation by substituting for bank deposits. However, banks currently hold substantial liquidity surpluses resulting from central bank asset purchases, which they could convert into CBDC. The issuance of a CBDC could also facilitate flights to central bank money during financial crises.

Despite these difficult questions, central banks representing a fifth of the world’s population say they are likely to issue the first CBDCs in the next few years (Boar *et al.*, 2020). ■

References

- Boar C., Holden H., Wadsworth A. (2020), "Impending arrival – a sequel to the survey on central bank digital currency", BIS Papers, 107, January, <https://www.bis.org/publ/bppdf/bispap107.pdf>.
- G7 Working Group on Stablecoins (2019), *Investigating the impact of global stablecoins*, Committee on Payments and Market Infrastructures, Bank for International Settlements, October, <https://www.bis.org/cpmi/publ/d187.htm>.
- Melachrinou A., Pfister C. (2020), "Stablecoins: A brave new world?", *Working papers*, No. 757, Banque de France, June, <https://publications.banque-france.fr/en/stablecoins-brave-new-world>.
- Nakamoto S. (2008), "Bitcoin A peer-to peer electronic cash system", <https://bitcoin.org/bitcoin.pdf>.
- Pfister C. (2020a), "Central Bank Digital Currency: A Primer", *SUERF Policy Note* 143, https://www.suerf.org/docx/f_a43fc3d27915b373b163da088684d4a9_10947_suerf.pdf.
- Pfister C. (2020b), "Digital currencies: from myth to innovative projects", *Banque de France Bulletin*, 230(1), 1-9, https://www.banque-france.fr/sites/default/files/medias/documents/bdf-230-1_digital-currencies_en.pdf.

About the author

Christian Pfister is a senior consultant for digital currencies. He was before Deputy Director General for Economics and International of the Banque de France (2011-2013), Deputy Director General for Statistics (2013-2018) and Advisor to the Governor (2019). He teaches at Sciences Po (Financial Stability, with Françoise Drumetz) and Paris 1 Panthéon-Sorbonne (Cryptocurrencies and Monetary Economics, with Lionel Potier and Mariana Rojas-Breu).



SUERF is a network association of central bankers and regulators, academics, and practitioners in the financial sector. The focus of the association is on the analysis, discussion and understanding of financial markets and institutions, the monetary economy, the conduct of regulation, supervision and monetary policy.

SUERF's events and publications provide a unique European network for the analysis and discussion of these and related issues.

SUERF Policy Briefs (SPBs) serve to promote SUERF Members' economic views and research findings as well as economic policy-oriented analyses. They address topical issues and propose solutions to current economic and financial challenges. SPBs serve to increase the international visibility of SUERF Members' analyses and research.

The views expressed are those of the author(s) and not necessarily those of the institution(s) the author(s) is/are affiliated with.

All rights reserved.

Editorial Board

Ernest Gnan
Frank Lierman
David T. Llewellyn
Donato Masciandaro
Natacha Valla

SUERF Secretariat
c/o OeNB
Otto-Wagner-Platz 3
A-1090 Vienna, Austria
Phone: +43-1-40420-7206
www.suerf.org • suerf@oenb.at