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# Cryptos, digital currencies and the future of money

*Implications for Central Banks, Commercial Banks and individuals*



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# Executive summary

Up to now, crypto-assets have failed to satisfy the fundamental roles of 'money'. Their deficiencies (primarily associated with the drawbacks of Bitcoin) have offered an excuse for inaction in developing Central Bank issued digital currencies that offer lower transaction costs (amongst other benefits) than existing forms of electronic money.

The cogs of innovation however do not stand still, and electronic tokens constantly improve on transaction speeds, safety, privacy and - potentially- storage of value.

We envision a competitive path towards money digitisation, with Central Bank issued digital currencies and cryptos vying for consumer preference and trust.

Even though it may appear to be early days, our opinion is that there is an imperative for Central Banks (primarily) and for Commercial Banks (as a consequence) to thoroughly analyse the implications of future scenarios for their role in an increasingly digitised monetary universe.

Nobody can control the future; but when it comes to the issuance and use of money, Central Banks should at least try to influence.

## Introduction

The end of the physical cash era has long been envisioned and oftentimes gloriously announced.<sup>1</sup> The wildfire-like appearance and expansion of numerous so-called crypto-currencies and digital tokens (coins) has added further fuel to the speculation.

Indeed, at least conceptually, there is no reason why money cannot exist solely in a digital form. However, a cash-less world does not constitute a straightforward path in the evolution of money.

This article will discuss the considerations and implications of a path towards digital money, arguing that this will be a competitive one between Central Bank issued digital currencies and decentralised alternatives (cryptos).

Even though it may appear to be early days, our opinion is that there is an imperative for Central Banks (primarily) and for Commercial Banks (as a consequence) to thoroughly analyse the implications of future scenarios in an increasingly digitised monetary universe, and take the lead in the development and embedding of Central Bank issued digital currencies.

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*“Reports about my death are  
grossly exaggerated”*










*Mark Twain*

*(speaking on behalf of papernotes and coins)*

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<sup>1</sup> The Economist, February 2007

	<b>Asset</b>	A resource with economic value
	<b>Money</b>	An asset that satisfies three roles <ul style="list-style-type: none"> <li>▪ Unit of account</li> <li>▪ Medium of exchange</li> <li>▪ Store of value</li> </ul>
	<b>Currency</b>	A widely accepted form of money
	<b>Central Bank currency</b>	A currency that is issued by and constitutes a liability of a Central Bank
	<b>Digital currency</b>	A currency that exists in digital form. Can be Central Bank issued or not
	<b>Crypto</b>	A cryptographic based, digital asset or currency. Not issued by a Central Bank
	<b>Bitcoin</b>	The most widely known and circulated crypto
	<b>Alt-coin</b>	Any crypto other than Bitcoin
	<b>Stable Coin</b>	A crypto that attempts to preserve a stable value

### A taxonomy of money

Before we proceed, it is useful to define the terms that will be used as part of this analysis (summarised in the figure above).

Any asset that satisfies three fundamental roles, namely unit of account, medium of exchange and store of value can be considered as money. Indeed, as Hyman Minsky put it already back in 1986 “everyone can create money; the problem is to get it accepted”.

Historically, Central Banks have had a monopoly in the issuance of money. A decade ago, a white paper signed by the pseudonym ‘Satoshi Nakamoto’ introduced a form of a peer-to-peer electronic cash system that can potentially do away with the trust based model of Central Bank issued currencies (Bitcoin).

Since then, several attempts have surfaced in the form of electronic tokens that aim to constitute ‘digital money’. Up to now, such tokens have failed to satisfy the three fundamental roles of money, especially the need to be a store of value.

Indeed, there is no doubt that Bitcoin (and several other cryptos<sup>2</sup>) suffer from several problems such as price volatility, low speeds, high power consumption and algorithmically controlled supply. Having said that, Bitcoin is nothing more than an early experiment which is constantly improved upon by newer entrants, specifically developed to address its shortcomings.

There is, therefore, little reason why new forms of digital assets may not -at some point in the future- provide price stability, universal acceptability and lower transaction costs, challenging a Central Bank’s monopoly in the issuance of money. Attempts towards

<sup>2</sup> In order to bypass the debate as to whether Bitcoin and other similar tokens currently constitute crypto-

currencies or crypto-assets, we will simply call them cryptos.

the creation of so-called ‘stablecoins’ have already surfaced, with -as expected- varying degrees of success. But once again, the apparent failure of, say, Tether, does not mean that the cogs of innovation will subsequently stand still.

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*“We should consider the possibility to issue digital currency. With appropriate design, there may be a role for the state to actually supply money to the digital economy”.*

*Christine Lagarde, IMF*

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### **Isn't money already mostly digital?**

In most advanced economies, the vast majority of money already exists in an electronic format. Bank reserves, deposits and card balances are already digitised and far outnumber the outstanding balance of notes and coins in circulation.

This immediately begs the following two questions: what is the difference between electronic money and cryptos, and what are the benefits offered by digital currencies and cryptos vis-à-vis payments by -for example- credit and debit cards?

Other than serving all three roles outlined above, Central Bank issued currencies (whether held in a physical or electronic form) have an important characteristic: they are a liability of the issuing institution.

On the other hand, Bitcoin and other cryptos demonstrate a property that differentiate

them from other forms of digital money (such as electronic deposits or the mPesa payments system in East Africa): they are based on a decentralised, peer-to-peer framework utilising a distributed ledger architecture (widely known as ‘blockchain’).

Nakamoto envisioned a number of additional benefits for Bitcoin vis-à-vis bank-intermediated electronic payments. These benefits include, amongst others, the reduction of transaction costs (which in the case of credit card payments can constitute up to 4%-5% of the transaction value, in the form of the merchant discount and interchange fees); and the ability to remit money globally with lower fees and higher speeds.

If successful, cryptos could constitute an alternative form of money that can displace Central Bank monopoly in the issuance of assets that satisfy the fundamental roles of money. Even though they have arguably failed to do so until now, our opinion is that we cannot preclude this possibility from materialising in the not-so-distant future.

In either case and, whether we like it or not, cryptos are here to stay. The primary question is not whether they (or which ones) will survive, but who they are going to be used by.





### **Innovation with money is nothing new**

Whether one studies the move from commodity money (such as cowry shells or cocoa) to the minting of the first coin in ancient Lydia, the issuance of the first paper note by Stockholms Banco, the launch of mPesa, or the creation of Bitcoin, it is obvious that ‘money’ has constantly evolved.

In other words, the current crossroads with regards to the future of money is not a new situation to be in. But it is a complex one. Will Central Banks retain their monopoly in issuing money? Or will technological advances shift people’s preference towards alternatives that may pull the carpet from underneath the feet of our current monetary and financial establishment?

The implications of such innovation are not limited to the role of Central Banks, nor to the choice of technology. As a matter of fact, technology is likely the simplest consideration when it comes to the development and use of

digitised assets that satisfy the economic requisites for constituting money.

### **Implications for Central Banks**

When Uber launched, it did not seek permission to operate from the Department of Transport. Instead, regulators ended up weighing their responses in the face of *de facto* events. Deciding to shut down Uber would have been a feasible option given the existence of a legal entity behind the ride sharing application<sup>3</sup>, but the utility and perceived value of the service had already been established in the minds and hearts of consumers.

It is a common occurrence in our digital world: innovations grow in the fringes of existing frameworks and statutes. When they have gained wider adoption, regulating them becomes a reactive tactic that tries to

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<sup>3</sup> An option that is not available when it comes to decentralised, peer to peer electronic ‘cash’ systems such as Bitcoin.

balance principles against *de facto* situations and perceptions of societal wellbeing.

Central Banks have a number of roles to play in the emerging world of cryptos and digital currencies, given their mandate to protect financial, monetary and economic stability. These roles include, but are not limited to, prudential supervision, regulation of crypto activity (to the extent possible), and the education of market participants, including financial institutions and the average Joe Blogs on the street.

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*Nobody can control the future; but when it comes to the issuance and use of money, Central Banks should at least try to influence it.*

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But most importantly, Central Banks need to pre-empt a potential shift of population preferences towards decentralised options. In other words, the most important and complex consideration a Central Bank needs to attend to is not so much the regulation of cryptos, but rather the proactive establishment of a venerable competitor to the benefits offered by decentralised (and consequently unregulated) digital currencies - or assets if we prefer that term.

This may not be an easily imaginable scenario given the current state of crypto alternatives. The fundamental deficiencies of Bitcoin have unfortunately offered a convenient excuse for inaction. Yet, the achievement of some form

of price stability (e.g. as demonstrated until now by the Dai), combined with lower transaction costs and the ability to remit globally may lead to wider trust and consequently adoption of decentralised means of storing value and exchanging it. This would completely turn the tables of our monetary establishment with all the downstream implications this may have!

Offering Central Bank issued retail digital currencies is, therefore, an option that should be considered thoroughly and pursued actively. In order to be successful, Central Bank issued digital currencies will need to match, if not improve on, the characteristics offered by cryptos.

Central Banks therefore need to act fast, as the race for developing decentralised alternatives is real and intense. If Central Banks do not take the lead in harnessing new technologies (not necessarily blockchain, we would like to note<sup>4</sup>) they may be left playing catch up with privately issued stores of value and mediums of exchange that have established a lead start in people's perceptions and habits.

Standing still and waiting for the market cap of cryptos to become economically significant is the wrong approach! Nobody can control the future; but when it comes to the issuance and use of money, Central Banks should at least try to influence it.

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<sup>4</sup> Blockchain technologies come with their pros and cons and there is no *a priori* reason as to why they have to be used as the basis for Central Bank issued digital currencies. This is echoed by the Swedish Riksbank's E-krona project first interim report (Sep 2017) stating that

the choice of technology to be used (blockchain or alternatives) for a future e-krona is still open.

## What a about Wholesale Digital Currencies and Real Time Gross Settlement (RTGS) systems?

Several Central Banks are already experimenting with the development of blockchain based RTGS systems. Examples include the Monetary Authority of Singapore (Project Ubin), the Central Bank of Canada (Project Jasper), the European and Japanese Central Banks (Project Stella) and the South African Reserve Bank (Project Khokha).

There are a number of motives underlying the rationale for such experimentation. Existing RTGS systems are often based on an aging infrastructure that requires replacement. In addition, the real time monitoring of financial activity can improve regulatory efficiency; the time required for clearing and settlement can be reduced; payment queue handling (prioritisation, holding and cancellation) can be rendered more effective; and interbank liquidity can be optimised.

But, just like with all experiments, there are also several downsides that need to be considered. Participation in the RTGS process may become more unequal for smaller banks and non-financial services players. Despite the potentially decentralised structure of the new systems, Central Banks are still required to oversee the payment and settlement processes. And the cost savings for Central Banks may be negligible, if not negative, even though there is a potential for savings from more efficient inter-bank reconciliations.

It is up to the respective Central Banks' judgement to evaluate whether further experimentation with employing blockchain technologies in RTGS systems is warranted. From a principles perspective, however, blockchain is a valuable technology where lack of trust is *the* fundamental problem that needs resolution. Such an argument is hard to make for wholesale settlements performed between a trusted intermediary and a limited number of trusted participants. Non-blockchain based systems may be equally, or more, attractive contestants for the refresh of RTGS infrastructures.





## Commercial Bank funding structure - for the better or the worse, changes may be on the horizon

The challenges and implications for commercial banks are naturally different, but also potentially worrying. The most fundamental one pertains to the funding structure of commercial banks' balance sheets, given that holding deposits lies at the heart of their business model.

There are two, almost equally undesirable scenarios that need to be considered. Both could potentially result in the shifting of retail (and wholesale) deposits away from the commercial banking sector.

The first scenario would entail the shifting of deposits to some sort of 'crypto-currency' which has managed to satisfy the three fundamental characteristics of money. For this to happen, of course, cryptos would need to demonstrate their ability to perform as credible stores of value and mediums of exchange. As we have already discussed, such a scenario is not easy but also not implausible.

An alternative scenario would involve the issuance of retail Central Bank issued digital currencies which sit on a Central Bank's balance sheet. Assuming this scenario, there are several ways to avoid completely disrupting the business model of commercial banks. Similarly to existing forms of money (physical or electronic), digital currencies may well be sitting on the balance sheet of the commercial bank. Alternatively, if deposits were to sit on the Central Bank's

balance sheet, commercial bank funding may be created on the basis of collateralised borrowing from the Central Bank, similar to existing means of Central Bank liquidity provision. Having said that, such solutions are merely conceptual at this moment and have never been tested in practice.<sup>5</sup>

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*Some commentators have put forward the potential benefits of having retail deposits sitting on the balance sheet of Central Banks. For example, Swiss Economists Berentsen and Schaefer (2018) argue that “ ‘Central bank electronic money for all’ would have a disciplining effect on commercial banks. To attract deposits, they would need to alter their business model or to increase interest rate payments on deposits to compensate users for the additional risk they assume”. Whether this theorem will stand the test of implementation is unknown, as we have had no real experience applying it.*

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In either case, whether deposits shift to cryptos or Central Bank issued digital currencies, the result for commercial banks is likely going to be net negative.

In addition, one cannot discount the impact on commercial bank revenues from the shifting of payments to more efficient means.

were at least as much societal and political, as they have been monetary based.

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<sup>5</sup> The study of *dinero electronico* in Ecuador, the first Central Bank issued digital wallet and its subsequent evolution into a commercial bank based model is an interesting one, but the dynamics that led to change



At a minimum, interchange fees may at some point be a thing of the past.

Therefore, taking a proactive stance is, once again, preferable to trying to remediate the consequences of inactivity *ex post facto*. Specifically, commercial banks have to strategically consider a number of questions pertaining to the fundamentals of their business model:

- How do we react to a potential displacement of deposits as a source of funding?
- What would our role be in a payments ecosystem dominated by non-bank players and / or Central Banks directly and / or decentralised exchanges?
- How do we make money from handling and processing Central Bank issued digital currencies?
- Can our intermediary role expand in the field of cryptos? (in other words facilitate the trading and exchange of cryptos between each other and into national currencies?)

#### **Money does not only have monetary implications**

Where does this leave us, the plebs who can neither control *nor* influence the financial system? A world of digital money (whether of the form dreamed of by libertarians, or Central Bank issued ones) entails numerous implications for the average consumer. Money is not simply a financial medium; the societal, cultural and personal implications have to be thoroughly analysed.

### *Back to the future: 1984*

Privacy is the most widely discussed consideration. So let's start by dispelling a widely held misconception: Bitcoin transactions are not private at all! To the contrary, all transactions, transactors and their history are fully visible and 'immutably' stored on the blockchain. The real identity of the transactor may not be immediately obvious (especially for the ones who entered the arena early enough, without providing proof of their identity), but their unique ID is always present in the same way that our email address does not necessarily reveal our name but it does constitute a unique identifier nonetheless. Monero is a much better example of a private crypto, and this is the reason why it has become the medium of choice for illegal activities and the dark web.

A world where all our transactions are tied to our ID seems like an Orwellian nightmare whereby the Big Brother, whoever that may be, has full visibility of our spending patterns and consequently lifestyles. Having said that, this Orwellian prediction is almost already a fact today. With the exception of payments with physical cash, all other transactions including card payments, bank transfers or other digital exchanges are already tracked, visible and often widely shared for commercial (and more) reasons. As a matter of fact, the anonymity of physical cash was a consequence of the technology available (or lack thereof), rather than a conscious design option.

Privacy concerns can be overcome technologically, culturally and / or via the lack of alternatives. Technologically, we can

employ mechanisms conceptually similar to the ones preventing airport security staff from seeing our naked bodies when we go through the latest x-ray machines. At the cultural level, we already observe an indifference of (mistakenly only) the younger generation towards privacy. Practically, this is nothing more than the perennial trade-off between privacy and convenience.

On top of this all, the absence of alternative convenient yet private mechanisms, may simply leave us with no option but to adopt digitally traceable money, unless we opt to go back to modes of barter that provide anonymity but with a lot higher transaction, liquidity and convenience costs.

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### *Are we heading towards a libertarian dream or an Orwellian nightmare?*

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Alas, there is a lot more than privacy that needs to be factored in. As we have already argued, a move towards a digital-only cash world is technically feasible (and from a number of viewpoints desirable) scenario. However, the road to Valhalla is full of several other pitfalls that need to be explicitly addressed.

### *No money, no crime?*

Lycurgus, one of the most enlightened governors of Ancient Sparta, decided to issue money in a large and heavy physical form called "pelanors". The rationale was that such forms of money would be harder to store



and steal, therefore reducing greed and petty crime.

In a similar strain of thought, one of the arguments put forward in favour of the digitisation of money is the better control of illicit activities: if money and its transfer is fully traceable, then our ability to commit (financial) crimes is severely hampered.

While this argument may be conceptually appealing, a migration to a crime-free world is a wild leap of logic, if not of irrationality. Crime has existed long before money was invented; it is naïve to assume that the prevalence of digital money will lead to its eradication. At best (or worst), it will lead to the diversion of financial crime to more sophisticated forms, likely controlled by more powerful syndicates and conducted via societally more dangerous means.

#### *How do we pay James Bond?*

An additional consideration that cannot be ignored is the impact of a digital cash-only world to legitimate yet clandestine activities such as espionage. Payments to secret service agents are unlikely to be executed digitally,

and the absence of the option to hand in a suitcase full of notes is not one to be taken lightly. This may be less of a worry for issuers of 'weaker' currencies as long as USD paper notes are still available, but the withdrawal of 'greenbacks' from circulation is likely to cause havoc in several dollarised activities, as well as economies.

#### *Digital money under the mattress*

The ability of individuals to be protected from negative interest rates is another often-discussed consideration. While such a scenario may sound undesirable for savers, it is not one that is macroeconomically detrimental. But as we said, money is not simply a monetary and economic medium and the societal implications of this scenario are not to be taken lightly. If cryptos do not allow for negative interest rates but Central Bank digital currencies do, an individual's preferences for one over the other are definitely going to be influenced by this consideration as well.

## Conclusions

A future with no physical cash is a highly plausible scenario, perhaps more likely than one that entails carrying physical notes in our wallet. However, this scenario does not come without upsides and downsides that need to be carefully analysed.

The uncontrollable emergence and diffusion of cryptos adds an additional parameter that dictates the need for proactive action.

While there are several implications that need to be analysed, Central and commercial banks ought to take the lead in developing and embedding digital currencies in society, before any alternative form of 'money' gains customer trust.





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