

Digitization of money and the future of monetary policy

Peter Bofinger

Universität Würzburg

Speech for the Constancio-Colloquium at the ECB, 16 May 2018

Most economists will agree that the future of money will be more digital than today. But while everybody speaks of “**digitization**” the concrete meaning of this term remains very often unclear. Therefore I want to specify four major areas where digitization could modify the traditional forms of money and credit and as consequence also modify the theory and practice of monetary policy. In my view the most interesting trends are the following:

- The substitution of cash by electronic money
- The substitution of traditional bank deposits and bank notes by cryptocurrencies
- The substitution of bank deposits by central bank deposits for everyone (“universal reserves”)
- The substitution of bank lending by peer to peer lending on the basis of digital platforms

1. Substitution of cash by electronic money

An area where digitization has already made progress is the use of cash in payments. In the member states of the euro area from 1980 until today the share of cash in the money stock M1 has declined from 23 % to 14 %. But as a recent study by the ECB (Esselink and Hernández 2017) shows in terms of number, still 79% of all transactions were carried out using cash, which amounts to 54% of the total value of all payments. But as this study states this could change rapidly, as payment cards and POS terminals are more and more enabled with contactless technology for payments under 25 Euro and 81% of all payments at point of sales in the euro area are under this threshold.

What would a completely cashless economy imply for monetary policy? First, it would remove the zero-lower bound for interest rates. This would increase the central bank’s room for maneuver in deep recessions, above in a deflationary environment. Second, it would remove the risk of a general bank run, as depositors could only switch their deposits between banks but not totally out of the banking system. This would reduce the need for the central bank to become active as lender of last resort. On the other hand could argue, if savers can no longer withdraw their deposits, this could reduce or even remove the market discipline for the banking system.

But for these effects to materialize it is not sufficient that the usage of cash approaches zero over time. It would require that cash is totally abolished. Because as long as the convertibility of bank deposits in cash is possible, the use of cash could rapidly rebound if interest rates become significantly negative or if the health of the whole banking system is at stake.

Thus, in the area of cash digitization by itself cannot lead to a qualitative change for monetary policy. But it could facilitate a political decision to abandon cash altogether. However, at least from the German point of view, and I have made my personal experience with the proposal to abolish cash, a fully cashless euro area is very unlikely for the time being.

2. Substitution of traditional monetary base and money stock by cryptocurrencies

A second challenge to the traditional concepts of money and monetary policy comes from cryptocurrencies like Bitcoin. They can be regarded as the realization of Hayek's dream of a "denationalization of money" from 1976. Hayek was not very precise about the concrete implementation of such a system of "competing currencies". He mainly had in mind private banks issuing banknotes leaving it open whether they are convertible not. For a discussion of these issues it is useful to have a taxonomy which makes it possible to classify types of money along for criteria:

1. private versus public issuer
2. convertible versus non-convertible money
3. physical versus electronic money, and
4. money which is transferred in a peer-to-peer nature and money which is transferred in accounting systems with a central book-keeping agency.

Graphically such a taxonomy can be represented by a money-flower. The idea goes back to the BIS (Bech and Garratt 2017). But instead of criterion "convertibility versus non-convertibility"¹ the BIS uses the criterion "limited versus general accessibility". The other three criteria are the same.

Without going into details, the taxonomy makes clear that due to their inconvertibility cryptocurrencies have a strong similarity with the traditional central bank reserves and cash monetary base or cash. In this respect cryptocurrencies differ from bank deposits which promise convertibility in cash.

Are cryptocurrencies a serious challenge to cash, traditional bank deposits or central bank reserves? Due to their inconvertibility they do not have an intrinsic value. While this is also true for cash and central bank deposits, the monies issued by the central banks have the enormous advantage of being legal tender. This is an important protection against the full implosion of the value of a money without intrinsic value. An important additional value protection is provided by the legal mandate of the ECB "to maintain price stability" which so far has been achieved remarkably well.

While an individual issuer of a cryptocurrency can try to install a value guarantee by setting an upper limit for the issuance of its currency, the logic of currency competition implies that there is no limit of the number of issuers thus no limit of the total amount of the aggregate stock of cryptocurrencies. Thus, holding a cryptocurrency always bears the completely unpredictable risk of a total loss. In other words, as a store of value the high volatility of cryptocurrencies makes them unattractive for most investors.

In addition, they are also not attractive as a means of payment. As Bitcoin shows production costs are increasing, transactions costs and transaction times are high and all transactions are public.

Overall, I do not expect that cryptocurrencies have to potential to replace the established national monies and to have a relevant impact on monetary policy making. As far as they are used to circumvent laws against money laundering adequate legal restrictions are required.

3. Universal reserves: Substituting cash and bank deposits by central bank deposits for every one

With the emergence of cryptocurrencies and the reduced demand for cash especially in countries like Sweden some central banks have started to develop concepts for allowing non-banks to hold deposits with the central. The most elaborate concept is the E-Krona developed by the Swedish central bank.

¹ This is identical with the "inside versus outside money" definition of money

Digital central bank money for non-banks could become a substitute for cash, especially if the value is stored locally on an app or a card (value-based solution). At the same time it could become a substitute for traditional bank deposits if the balance is stored in accounts in central data base (register based solution).

The introduction of digital central bank money for non-banks would not necessarily require an accounting mechanism which is based on distributed ledger. And even in the case of a distributed ledger it must not be blockchain.²

Deposits with the central bank could become a very attractive investment as they would provide a totally safe asset. This feature which would be appreciated above all by private households and firms with bank deposits exceeding 100.000 euro. With Bank Recovery and Resolution Directive such investors are exposed to the risk of a bail-in which they could avoid by holding central bank deposits. Of course, the attractiveness of such deposits depends on their interest rate relative to the interest rate of bank deposits.

Assuming a situation where all citizens have a bank account with the central bank, the run risk or commercial banks would be increased, as it makes it much easier to switch especially higher deposits out of the banking system. In an even more extreme scenario where all citizens hold overnight deposits the central bank, the central bank's room for maneuver would again be increased. It would not only be easier to enforce negative interest rates. It would be also become technically possible to use the instrument of helicopter money. The central bank would simply credit a certain amount to the account of each citizen.

Widely used central bank deposits would fundamentally transform the role of banks and their relationship with the central bank. The banks would still be able to provide loans. But the banking system would then always need a corresponding refinancing from the central bank, as the loans have to be paid out on the central bank deposit of the borrower. This would come close to the concept of full-reserve banking restricting the bank's ability to create loans autonomously. However, it does not imply a 100 % refinancing by the central bank. The banking system could always try to attract a longer-term refinancing from the non-banks out of their central bank deposits.

Digital central bank money for all could also have far-reaching implications for payments system which is currently based on bank accounts. The role of banks could be reduced in favor of non-banks offering payments services based on central bank accounts. This could offer a potential for innovation and competition in payments services. Therefore, in my view, central banks should refrain from providing payments services.

4. Peer-to-peer lending substituting traditional bank lending

A fourth possible innovation is the substitution of traditional bank loans by peer-to-peer lending. China is leading in this field and it shows the risks and the regulatory challenges that are associated with this instrument.

Conceptually P2P-lending has many similarities with capital market lending as it established a direct relation between lenders and borrowers. One can say that P2P-lending creates a capital market for

² Corda replaces blockchain with a "notary" architecture. The notary design utilises a trusted authority and allows consensus to be reached on an individual transaction basis, rather than in blocks, with limited information-sharing.

small borrowers. Digitization has the potential to widen the scope of this form of finance, especially if it is based on established internet platforms.

5. Using information from credit scores, social networks or platforms like Amazon P2P-platforms can provide the screening and delegated monitoring which is core function of banks in an environment with asymmetric information.
6. By distributing the investments over a large group of borrowers P2P-lending can also offer the traditional diversification provided by banks.

As peer to peer lending does not need an intermediary which bears risks it has the advantage that it needs less regulation than traditional bank lending. This concerns above all capital requirements and liquidity requirements. So far P2P-lending is still in its infancy, but it could have the potential to become a similar challenge to the traditional bank business as Uber to the traditional taxi business.

For the central bank an uberization of banking could imply less influence on financial processes and also real processes. In the same way as capital markets P2P-lending makes it possible to mobilize the

But as long as bank deposits remain the basis for this form of financing the central banks will be able to influence it by its interest rate policy. The decision of an investor to use money which is held on a bank account for P2P-lending will depend on the interest rate that she receives for such a deposit. With its control of the money market interest rate the central bank can indirectly target the interest rates for such deposits.

5. Digitization of money does not erode the power of central banks

The digitization of money has the potential to change traditional structures of the financial system. It can redefine the roles of banks and central banks.

But, by itself digitization does not erode the control of **central banks** over the financial system. Massive regime changes (abolishment of cash, universal central bank reserves) are possible. But they would require a political decision and they would strengthen the role of central banks.

Banks could be massively challenged by new forms of intermediation, above all by P2P lending. The decision by central banks to offer central bank accounts for all would fundamentally change the function of banks, above all by limiting their ability to create loans autonomously. In addition, this could also reduce the importance of banks in the provision of payments services.

In spite of **cryptocurrency hype** I do not regard them as a serious game changer. They may have some attraction for investors but they will hardly come into a position that they could threaten the dominant role of national currencies and bank deposits which are based on them.