

What is money and what is the role of the state in the payments market?

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In this article, we argue that the state should take its responsibility to ensure that future payment systems work well in a global digital world. Part of this responsibility is to ensure that Sweden issues digital central bank money, if money issued by the state is still to be widely available to the public.

Our conclusion is that the Riksbank should issue e-kronas within the next few years and that these e-kronas need to be usable by the public in everyday life. This is necessary to ensure that fundamental objectives for society, such as confidence in the monetary system, resilience, accessibility and competition can be safeguarded in the payments market in the future.

A regulatory framework is needed to enable the introduction of a new digital payment instrument and to set the scope for it. From a legal perspective, our analysis suggests that electronic central bank money in the form of electronic cash as a complement to physical cash is preferable to electronic central bank money in the form of claims on the state. In other words, this implies a dematerialisation of cash in the same way that paper shares have already been dematerialised into book-entry shares. The central bank is thus modernising the product it has been offering for hundreds of years with the help of new technology.

1 The payments market is changing faster and faster

The modern economy is based on our ability to make payments. It is therefore crucial to our society that payment systems function smoothly. In prehistoric times, we

* The views expressed in this paper are those of the authors and are not necessarily shared by the Executive Board of Sveriges Riksbank.

exchanged goods with one another; today, we exchange means of payment in the form of cash or carry out digital transactions through accounts. Recently, digitalisation has also brought a growing flurry of potential new means of payment – e-money, stablecoins, crypto assets and digital central bank currencies.¹

Not so long ago, banknotes were usually equivalent to a value in gold or other metal. This direct link has long since disappeared in most countries. Today, we use what is commonly referred to as "fiat money", where the public's trust in the state creates confidence in the value of the means of payment.² The state guarantees, through the central bank, that the means of payment issued by the nation has what is usually referred to as the basic characteristics of money, namely being a store of value, a unit of account and a means of payment.

In Sweden, the state, through the Riksbank, has issued banknotes and coins that have been used by the public for hundreds of years. But in the past decade, digitalisation and globalisation have had a revolutionary impact on payment patterns and methods. Fewer and fewer consumers use cash. We appear to be on a very fast-moving path towards the cashless society. Money (in the broad sense of that term) is being privatised, and this directly affects the role of the state in the payments market.³

Analysing the consequences and considering possible measures when the national state payment instrument no longer works in practice is a responsibility that the state should reasonably assume.

In this descriptive analysis, we discuss and argue why a Swedish digital central bank currency, a so-called e-krona, is needed in the future payments market.⁴ We begin with a historical review in section 2, after which we move on in section 3 to analyse what money is and then, in section 4, we focus on the legal framework for money and a future e-krona. In section 5, we discuss the marginalised role of the state in the payments market and why an e-krona is needed for the future. Finally, we provide a summary and some recommendations regarding the role of the state in the payments market.

The positions and arguments in this article are based on a subjective analysis of the work produced within the Riksbank's e-krona project and the authors' many years of work in the area of payments for the Riksbank and other authorities in Sweden.⁵ The

¹ Electronic money refers to electronically stored monetary value, which represents a claim on the issuer, usually issued by private operators, the remaining concepts are explained later in the article.

² Fiat, translation from Latin "let it happen". According to Bossu et al. (2020), this is the mechanism by which states sanction a means of payment. The meaning of this concept is that the value of a banknote is the amount in the official monetary unit that is printed on it by the issuer. The banknotes are to be accepted as payment for that value, without having to be convertible into, for example, gold coins. This is the function that leads economists to call banknotes "fiat money".

³ See, for instance, Julin (2022).

⁴ The arguments in favour of an e-krona have been described in various ways in the Riksbank's many reports and speeches (e.g. Sveriges Riksbank 2017, 2018, Skingsley 2016, Armelius et al. 2020).

⁵ In 2016, the e-krona project was launched at the Riksbank and several speeches, articles and reports are published at www.Riksbanken.se. In 2020, the Riksbank also launched a pilot project, the e-krona pilot, to gain knowledge about how an e-krona could look and work in technical terms. Together with the company Accenture, the project has developed an e-krona platform.

messages and conclusions in the article are solely those of the authors. Questions about digital central bank currencies fall within a sphere where we touch on everything from politics, philosophy, economics and not least values, so there may be other stances and conclusions that are at least as reasonable.

2 History repeats itself!

The rapid digitalisation of the world has brought with it a rapidly growing flurry of potential means of payment. This is similar to the situation before central banks in most parts of the world were given the exclusive right to issue cash.⁶ Several of the world's current central banks, such as the US Federal Reserve, did not exist until the early 20th century, and money in the United States was therefore issued by private banks. The United Kingdom had the Bank of England, but it was not a central bank in the modern sense - instead it was privately owned and competed with a large number of smaller banks that issued banknotes. In Sweden, where the Riksbank was established as early as the 17th century, private banks were created in the 1830s and given the right to issue banknotes to finance loans to businesses and individuals. Commercial bank money thus existed in physical form and circulated as a means of payment in society.

Although private banknote issuance was regulated in various ways, the exclusive right of the central bank to issue banknotes was introduced in almost all countries. The specific reasons in each country differed, however, depending on the context. In Sweden, private banknote issuance was particularly tightly regulated and private banknotes were legally redeemable for Riksbank banknotes.⁷ Nevertheless, after a long political process, the Riksdag decided in 1897 to grant the Riksbank the exclusive right to issue banknotes. The overall motive was to ensure the stability and security of the monetary system for the future by making banknotes completely risk-free and ensuring that their issuance would not be driven by profit interests. International developments, with a virtually complete transition to a banknote monopoly in country after country, probably also influenced the decision.

In the United States, for example, the situation was much more chaotic. In the mid-19th century, more than 1,500 private banks issued private banknotes that could circulate far from the issuing bank. These notes were therefore not as valuable, and there were even special books published that note recipients could consult to ascertain the exact value of a particular note. Dissatisfaction with this situation contributed to the eventual creation of the Federal Reserve in 1913, which was given a monopoly on the issuance of banknotes.

From at least the beginning of the 20th century, the state has therefore been almost exclusively, through the central bank, the sole issuer of physical means of payment to the public. Alongside these means of payment, there have also been account-based commercial bank money which holders could use for payments, for example by writing cheques. With the development of technology, physical means of payment in several countries, and especially in Sweden, have been outcompeted by digital

⁶ This section is based on Söderberg (2018).

⁷ Instead, from 1874 onwards, banknotes were formally redeemable for gold.

payments. This has also meant that government money has been used less and less for payments in favour of privately issued money.

To fully begin to analyse the consequences of this transformation, we first need to discuss what money actually is.

3 What is money?

3.1 Money in the economic sense

Economists traditionally say that "money", for example Swedish kronor, is something that fulfils three functions: to be a unit of account, a means of transaction and a store of value. The first function means that prices in the economy are quoted in kronor (F1). The second means that payments can be made in kronor (F2) and the third that the value of kronor is stable over time (F3).⁸

None of the functions are black or white, they are grey scales where the function can be filled more or less well. For example, as we have already discussed, there were banknotes issued by private banks in the United States in the 19th century, with the possibility of paying with these decreasing with distance from the bank.

Money as a phenomenon is older than written history, so we don't know exactly how it came into being. There are two alternative accounts of how it came into being. The first, which tends to be the focus of economists, assumes that money was invented to facilitate trade. Barter became impractical as the number of goods in the economy increased, and money conveniently solves a number of related problems (easier to find trading partners, divisibility, unnecessary transport, etc.).

The second narrative, more common among historians and sociologists, is that money originates in the exercise of power. We can imagine a king who finances an army by paying it with newly printed coins and at the same time demands that citizens pay taxes with such coins. This creates a demand for them and enables the soldiers to buy equipment, etcetera and pay with the coins.

Both of these stories are relevant to understanding how money came to be, and in practice they are easily confused in real economies. For example, if we assume that the origin of money is in the king's story, it is easy to believe that once this money circulates, it would also be used as a broader means of transaction (F2) and as a store of value (F3).

Historically, (F3) has periodically been handled by linking the means of payment to precious metals, either directly in the form of silver and gold coins, or indirectly by mandating a central bank to redeem banknotes for a certain amount of precious metal. The best-known example of the latter is the so-called gold standard, which was the dominant system from about the 1870s until the First World War. None of these systems has operated smoothly. Medieval rulers could dilute the metal content of

⁸ See Hull and Sattath (2021) for a discussion of how digital aspects affect this classic definition.

coins, and central banks, despite the gold standard, could end up holding far less gold than would be needed if all banknotes were to be redeemed at the same time. Both of these weaknesses have led to periods when the value of money has been called into question and to a bank run, a rush of withdrawals from central banks.

One problem with linking the value of money to gold, for example, is that when the supply of gold unexpectedly increases (new gold deposits are discovered) or the economy grows faster than the gold deposits, the relative price of gold changes. For this and other reasons, modern central banks have opted instead to use so-called "fiat" money, i.e. money that has no direct link to anything real, as we have already mentioned.

3.2 Money in the legal sense

Payments can be made using other means than banknotes and coins. In practice, this is done to a large extent, through bank money which is a claim on the bank. However, bank money is linked to banknotes and coins in that bank money is in legal terms a claim to receive banknotes and coins. That claim is not legally different from a claim to receive, for example, a certain quantity of wheat of a particular quality, other than that wheat is a tangible product, whereas banknotes and coins represent a generic value, that is to say a value without its own utility function.

So what is money in the sense of notes and coins in legal terms? The simple but not entirely enlightening answer is that under Swedish law, banknotes and coins are a class of property in themselves (*sui generis*), defined in terms of a value determined in the Swedish currency, the krona. A better understanding can be gained from a brief historical review.

As described earlier, previously a utility was exchanged for a utility, with certain types of utility becoming an intermediate step. In time, it came to be mainly a question of precious metals. When coins were created, it was both a small and a large step in the development of money. The small step was the quality assurance of the metal piece that the minting implies (or at least was intended to imply). The large step was that the denomination on the coin became the basis for currency as a unit of value.

When the banknote printing press came about, the foundation was laid for several subsequent steps in the development. To begin with, a representation system was introduced. A piece of paper represented a piece of metal that was kept in safe storage. The paper was a form of representation, and the piece of metal was the object represented. Initially, the banknote was probably a proof of storage which, for practical reasons, was used to make exchanges instead of the actual metal in storage. Gradually, merchants and bankers began to create banknotes for use in trade. Furthermore, the representational object changed from a specific piece of metal to a certain amount of metal. The banknote had changed from being a certificate of deposit to a certificate of debt, which represented a certain value in the form of metal, usually gold of a certain grade and in a certain quantity. After the nationalisation of the right of issue, the last major step in the development of the representative object was the abolition of the gold standard. With this, the

representational object had become a general social concept of value measured in the national currency.

Coins thus once *represented* a tangible value (the metal minted), while banknotes *represented a right* to a tangible value (the metal deposited, but gradually a claim to metal of a certain quantity and type). Today, both coins and banknotes are merely representations of a generic value measured in the currency of the issuing central bank. The medium of representation is, for historical reasons, paper and metal, but it can now just as easily be plastic or something else that functions in practice. The division into denominations (the different values in kronor represented by the banknotes and coins) has historical explanations. For practical reasons, large and valuable pieces of metal were not suitable for circulation and had to be represented by a paper banknote. Today, the order may just as well be the reverse, so that coins may represent larger denominations than paper.

But what exactly is a generic value measured in the currency of the issuing central bank? Functionally, it is what can be called purchasing power. Banknotes and coins are thus forms of representation of purchasing power rather than, as in the past, metals. Value as such (purchasing power) is based on social trust in the authenticity of the currency and in the currency itself, a trust which the central bank is responsible for maintaining.

3.3 Who creates the money in today's economy?

To understand the role of money in today's society, we also need to understand how money is created today. Therefore, we need to briefly explain how the banking system works.

Banks issue loans to borrowers and receive matching liability items on their balance sheet. When a bank issues a new loan, the amount of bank deposits increases at the same time. The bank records the loan as an asset of the bank, while depositing the corresponding amount in the borrower's bank account (the bank's debt to the customer). This increases the total amount of bank deposits in the economy.⁹ Most Swedes pay their bills by instructing the bank to transfer bank deposits (i.e. deposits on a payroll account) from their own account to the recipient's account. Thus, (F2) is satisfied for bank deposits. At the same time, the value of the money is backed by both the borrower's future ability to pay and the Riksbank's responsibility to preserve the value of nominal money via the inflation target. Thus, (F3) is fulfilled and bank deposits are considered as "money". This money constitutes the absolute majority of means of payment in circulation in Sweden.

The Riksbank issues money in the form of cash and central bank reserves, where the latter can only be held by banks and some financial market participants, so-called

⁹ The banks can actively manage the various debt items on the balance sheet, and can issue bonds, for example. When this happens, the amount of bank deposits in the whole banking system is reduced, as buyers pay the bank with deposits. The easiest way to see this is when a customer buys a bond in his own bank and pays from his balance on his account in the bank – bank deposits are then converted into holdings of a bond.

monetary policy counterparties. The Riksbank also ensures that the exchange rate between bank deposits, cash and central bank reserves is fixed at 1.

Some economists argue that all financial assets can be considered as money to some extent, and that the difference between them is the degree of liquidity, that is how easy it is in practice either to pay with them or to convert them quickly into means of payment.¹⁰ Others focus precisely on the part of the banks' balance sheet that constitutes what we have described above as money, namely bank deposits alone.

3.4 The role of the Riksbank as the banks' bank and the RIX payment system

If there were only one bank in the economy, in addition to cash transactions, payments could be made entirely by moving bank deposits between the bank's customers. Since there are several banks, there needs to be a way of transferring money between them. There are several possibilities.

One option would be that the banks accepted claims on one another, for example Bank A could have accounts with Bank B and vice versa. If a customer in Bank A wants to transfer money to a customer in bank B, Bank A would increase the balance of Bank B's account with Bank A and reduce the balance for its own customer. Bank B would then have a claim on Bank A, and a debt in the form of bank deposits for its customer.

However, this system would be impractical if it resulted in excessive net exposures between banks, which could happen, for example, if their customer bases are different. Suppose, for example, that Bank A has younger customers who borrow to buy housing, while Bank B has older customers who sell their housing to customers in Bank A. This increases Bank B's claim on Bank A as a trend over time.

Another option is that banks regulate imbalances through an asset that is not created by the banks themselves. It could be gold, government bonds or anything else that is easy to move and share.

Most economies have decided that a good alternative is to manage this regulation in central bank reserves, in Sweden's case through the RIX payment system operated by the Riksbank. The system works in such a way that each major bank has one account (actually several, but for the sake of simplicity we can think of it as one account) with the Riksbank. When a payment is to go from Bank A to Bank B, Bank A instructs the Riksbank to transfer a certain amount from its RIX account to the corresponding account in Bank B. The banks have deposited collateral so that their balances can be allowed to become negative. In principle, the system can be operated so that the sum total of the banks' accounts is equal to zero, and central bank reserves are then automatically created when necessary (in the sense that the bank's account balance is allowed to be as negative as the collateral provided permits). However, over the past ten years, the amount of central bank reserves in the system has been allowed to increase as a result of the Riksbank having increased its balance sheet in combination

¹⁰ See Tobin (1963) for an early discussion.

with not offering the banks, as before, the entire surplus of central bank reserves in the weekly certificate auctions.

The central bank reserves discussed here are thus a form of digital central bank money that is only available to the banks, and which they use to pay one another. The question is therefore whether central banks should also issue digital money that can be held by the public and not just by banks. Why should only companies have access to digital central bank reserves, or, let us say, central bank money, and not the public? That brings us to the next section and the question of how digitalisation changes payments in society.

3.5 Digitalisation and new forms of money?

A revolutionary development in the last ten years, which is now changing the monetary landscape, is the emergence of various forms of digital currencies, at the same time as cash appears to be losing ground in the payment market. As we have seen historically, both private and state options are emerging and becoming established. The private options in the digital world are primarily unbacked crypto assets (such as Bitcoin) and what are known as stablecoins.¹¹ The state alternative to this is the so-called CBDCs – Central Bank Digital Currencies, what we call the e-krona in Sweden.

In the case of CBDCs, there is no generally accepted definition. In the world of central banks and economists, there is sometimes talk of different types of digital central bank money according to purpose and needs. They have often been divided into so-called retail and wholesale CBDCs. The common definition of large payments – wholesale – is time-critical payments between financial participants in settlement systems such as RIX-RTGS. Small payments, often called retail payments, refer to all that are not large payments. The market for small payments is called the retail payment market to make it clear that it is not a market for payments in general (large and small). A retail CBDC would therefore be used for small payments. A wholesale CBDC, on the other hand, is intended to be used for roughly the same kind of large payments as are currently being made through the central banks' settlement systems. The terminology and classification of different CBDCs are not crystal clear. There are also general purpose CBDCs that can be used for both large and small payments. Whether a CBDC is token-based or account-based, the basic idea for both retail and general purpose CBDCs is that they should be publicly available and function in the retail payment market.¹² The concepts retail and general purpose are therefore partly overlapping. The important thing is not the area of use, but the fact that it is a question of state-guaranteed digital payments.

¹¹ In general, the concept of backed assets is used for those guaranteed by central bank money.

¹² A token-based CBDC usually refers to the CBDC being created as a token within a token-based system, that is, a data file with its own unique value and with a specific tag. The transfer of a token from one party to another does not require the combining of two databases, but rather the almost immediate transfer of ownership, as with banknotes.

As in the past, private and public money cannot be equated. We will return to the reasons for this. Below we describe the different forms of potential digital means of payment.

3.5.1 Stablecoins

A stablecoin is a private digital means of payment that seeks a fixed or, at least, stable value. There are different ways of achieving this. For example, the issuer may hold a basket of low-risk assets, such as fiat currencies, issued by trusted central banks. Stablecoins can also operate a fixed exchange rate regime, for example against an existing currency like US dollars.

To explain how stablecoins work, we can take an example. Let us assume that a private company offers customers the possibility to exchange dollars for “SCoins” (our fictitious stablecoin) and provides SCoins entirely according to demand. When customers want to exchange existing bank deposits for SCoins, the debt side of the company grows as it issues more "coins", and on the asset side the amount of fiat currency grows – in this example, US dollars. If the company does not make any changes on the asset side, this is equivalent to a bank which voluntarily applies a 100 % reserve requirement to deposits, i.e. holds the same amount of central bank reserves in the bank's account in the central bank as its customers have in their accounts in the bank. The business model is now based on the fact that the company offers a lower return on SCoins – in reality usually zero – than they themselves receive in return on their central bank reserves at the US central bank.¹³ Customers are attracted by the fact that the company offers its customers to transfer SCoins to other account holders, just as a normal bank allows its customers to transfer money to other customers in the bank.

The company differs from a normal bank with regard to *how* it allows customers to transfer SCoins to one another, and this is where technology development comes into play. SCoin can open up its systems and allow payments 24/7 and even allow SCoin transfers to be linked to so-called smart contracts, which, based on certain triggers, automatically transfer SCoins between customers.¹⁴ This also means that stablecoins could possibly offer cheaper and faster cross-border payments – something that is expensive and slow in the traditional system.

Note, however, that this technology development does not only apply to stablecoins. In principle, there is no obstacle to private banks using the same technology to enable their customers to do the same with bank deposits. In practice, however, the regulations applied to banks, but not to stablecoins, may prevent them from doing so.

¹³ An alternative business model is to sell information about the payment habits of their customers. This option only works if the technical solution on which the currency is based does not offer anonymity.

¹⁴ A smart contract is a digital contract that uses block chain technology. The contract contains conditions and a code to be executed if the contract conditions are met. No third party needs to verify whether the contract's conditions are met; this is done automatically, directly in the contract code. If the contract conditions are met, the code in the contract is automatically executed. Smart contracts are therefore secure, traceable and completely transparent.

One weakness of stablecoins is that in practice they do not function as the ideal variant above, but the company that issues them can choose to hold more risky assets as collateral. If the company does not have sufficient equity, this construction risks causing instability and a bank run if customers start to doubt the company. This is exactly the same type of mechanism as in classic bank runs in crisis situations, where customers begin to doubt the value of their bank deposits. Stablecoins are not central bank money, even if they are backed by this. Only central banks can issue completely risk-free money.¹⁵

3.5.2 Unbacked crypto assets

Unbacked crypto assets, such as Bitcoin, differ significantly from stablecoins in that they do not promise a fixed exchange rate against another currency. In this way, we can say that the crypto currencies are only technical platforms. What the creators of a crypto currency need to do to make it attractive is to convince other people that it is valuable. They must therefore regulate the supply of the crypto currency in order to maintain, or increase, its value over time. Something has to take over the role of the central bank in the normal system, and many crypto currencies use a mechanical rule that ensures that the amount of the crypto currency increases in a predictable way that usually means that growth decreases and, in the long term, moves towards zero. This is often done by creating new crypto currency only when verifying payments in the system and by reducing the amount allocated to those verifying payments over time.

This creates the conditions for a kind of pyramid scheme. If demand for the crypto currency increases over time, the exchange rate between the crypto currency and ordinary currencies must increase, because the supply of the crypto currency, in contrast to the stablecoins case, does not adjust at all to demand. This means that those who 'enter' early on will make a lot of money if demand increases, just like those who enter early in a pyramid scheme. Most people who buy crypto currency do not seem to do so to use it as a means of payment (F2), but rather for speculative purposes in the hope that more people will want to do the same thing in the future. In addition, very few prices are set in crypto currency (F1) and the exchange rate against other currencies is very unstable (F3). So far, on the grey scale of what we can call money, crypto currencies have a very low rating. However, this could change later on if the technology for making payments becomes more efficient and more customers choose to hold crypto currency and use it to make payments. Economists tend to talk about "network effects" in the payment context. This means that the willingness to use a means of payment depends on how much others use it and that developments can be very rapid once there is a critical mass of users.

¹⁵ Weaknesses in trust in privately-issued digital currencies during times of unease show that these cannot be equated with government-issued guaranteed money. See, for instance, Gorton (2021). At present, there are several examples of weak crypto exchanges that are probably linked to both the political and economic turmoil.

3.5.3 Does new digital money pose problems for the future payment system?

As a result of this development, part of the payment system falls outside the traditionally regulated banking sector. This may give rise to financial stability risks, as a bank run can occur against both stablecoins and crypto currencies. The stability of the payment system could therefore be affected in the future if more and more transactions are made with such means of payment.

Another problem for central banks concerns the implementation of monetary policy. This is now done by central banks setting the conditions for the banks in the payment system and thereby affecting shorter market rates. If, in future, a larger proportion of transactions were to take place in other means of payment, or if the major banks were to choose to make customers' deposits directly transferable to other recipients using the same kind of technology, a large proportion of payments would be made outside of the central bank's payment system. It is likely that the central banks would then have problems controlling short-term market rates and would have to develop the monetary policy toolbox to find alternative ways of dealing with the situation.

This system would also remind us of the historical period before central banks were granted a banknote monopoly: at that time, competing banks issued banknotes that circulated freely in the economy. If users started to doubt the solvency of the issuing bank, the exchange rate between notes could deviate from 1, even though they were referring to the same currency. In the late 19th century, it was decided, partly because of these problems, but also because the seigniorage that comes with the right to issue banknotes should go to the state, to instead give the central bank a monopoly on the issue of banknotes. Similar arguments could be put forward for the creation of a state CBDC instead of having many competing private stablecoins.

3.5.4 Central Bank Digital Currencies (CBDC)

A CBDC is basically nothing but central bank money, like cash, except that it is digital rather than physical. As mentioned earlier, these are already in the Riksbank's RIX system but are only available to financial institutions that have accounts there. The CBDCs that we are talking about here are those that are often called retail CBDCs, that is, digital central bank money that can also be held by the public in much the same way as cash.

A CBDC can be designed in many different ways. For example, a CBDC could be a system linked to the rest of the payment system via RIX. That is, the CBDC is in a RIX account and funds are transferred from private banks when their customers switch to CBDCs, which increases the balance on this account and reduces the account balances of the transferring banks.

Since the Riksbank began to examine the issue of a CBDC in 2016, the international discussions on CBDCs have developed rapidly. There is now a broad debate on CBDCs among researchers and economists and central banks around the world. Over 80% (BIS 2021) of the world's central banks are analysing the role a CBDC could play in

their respective jurisdictions.¹⁶ There are already officially released CBDCs in emerging economies in particular, such as the Bahamas, Nigeria and Jamaica. A CBDC is seen above all as a means of modernising the payment system, but also of reducing many of the risks of a digitalised environment. However, there are also many ongoing experiments with CBDCs, or pilot projects, which are circulating in the economy and used by ordinary people to buy goods and services.¹⁷ The most well-known is the Chinese pilot project, which has more than one hundred million users. Extensive CBDC projects are also underway in the United States and the euro area.¹⁸

One could say that the CBDC has now entered some form of phase two. The first phase consisted of initial analysis and research into the phenomenon and surveying both the advantages and risks of a CBDC. In the second phase, it is not only a question of deciding *whether* to issue CBDC, but also of examining how to *design* them. Most central banks want to preserve the role of the private sector in the payment system and all issued CBDCs and CBDC pilots are based on private operators distributing CBDCs, such as banks and other payment service providers. The vast majority of these also have limits as to how much CBDC can be kept by private individuals to eliminate the risk of deposits flowing out of the banking sector. Central banks are also looking at how CBDCs could be used to make cross-border payments more efficient.¹⁹

However, the arguments for the introduction of a CBDC are still diverse and depend to a large extent on national circumstances and the exact problems that different nations are facing in their debate on whether or not to introduce a CBDC. There is also no uniform standard for the design of a CBDC, in the way that exists for banknotes and coins. However, analysis and knowledge in this field are moving forward, and there are some established grounds that many central banks currently support (see BIS and Coalition of Central Banks 2020). The G7 (consisting of France, Italy, Japan, Canada, the United States, the United Kingdom and Germany) has also published a list of thirteen principles to be followed by CBDCs (see G7 2021). Going forward, we will probably see general recommendations and agreements issued by governments and central banks on this matter.

4 A CBDC from a legal perspective

The central role of law in the monetary system means that a specific discussion of the legal implications of a CBDC is needed.

From a legal perspective, it does not really matter how the basic premise of the legal order that value should be generically tradeable is satisfied, as long as there is a tradeable means of payment of some kind. At the same time, there is a problem with a clear legal dimension if there is no central bank money. It then becomes difficult to explain what bank money actually is. Claims, yes, but on what and on whom? If a bank customer sues the bank for payment, should the bank be obliged to pay with bank

¹⁶ See, for example, Söderberg et al. (2022).

¹⁷ For an overview, see, for example, the Atlantic Council (2022).

¹⁸ See for example ECB (2022), Brainard (2020) and White House (2022).

¹⁹ For example, see BIS-IMF-WB (2022).

money? Central bank money is quite simply needed as a kind of anchor in the legal system. In Sweden, central bank money in the form of banknotes and coins has almost disappeared because the physical form of representation is impractical. It must therefore be given another form of representation, which in the light of developments cannot be anything other than electronic.

4.1 The two design options

On the question of central bank money, we have already noted that forms of representation other than paper and metal are possible. However, with regard to the object represented, that is, the value that banknotes and coins in daily circulation are considered to have, there is probably no further development step following the abolition of the gold standard. The notion of a value linked to certain forms of representation and with a currency as a measure of value is an extremely advanced and socially important, but also in some respects fragile, concept. For it to be maintained, care and maintenance are required of the social institutions, and in particular the legislator and the central bank. The introduction of electronic central bank money should therefore involve as limited an intervention as possible in the established concept. This suggests that the form of representation (the paper in the banknotes and the metal in the coins) is dematerialised, but retains the object of representation (the value it represents, the purchasing power) as it is. Exclusive access to and handling of electronic cash will then be a 'handle' to the value to which banknotes and coins are also 'handles' to, namely purchasing power.

However, one alternative is to not only create an electronic form of representation, but also to change the object of representation to a state equivalent of "bank money" (i.e. means of payment in the form of monetary claims on a banking institution). This is not a dematerialisation of notes and coins, but a negotiable electronic form of representation for monetary claims on the state, which are intended to function as means of payment in much the same way as bank money does. For such a claim to arise, some kind of reciprocity is needed (cf. the deposits or debts that are a prerequisite for the creation of bank money).

In the following, the two possibilities – electronic representation of (a) the same object of representation as banknotes and coins (i.e. purchasing power), and (b) negotiable claims on the state on (ultimately) cash (i.e. currently banknotes and coins) - will be contrasted, mainly from a legal perspective.

4.2 Some legal comments on the two design options

Banknotes and coins (physical cash) are thus a form of representation of money in the sense of purchasing power as the object of the form of representation. Purchasing power is a position of economic power created and maintained by the central bank with cash as its instrument and social trust as its precondition.

Bank money, on the other hand, is in legal terms a claim on (ultimately) cash, albeit that the claims can usually be met with bank money and that the system is in that sense circular (a monetary claim can be met with bank money that is a monetary claim). Unlike cash (banknotes and coins), bank money does not have a specific form

of representation but could be given one in the form of a promissory note (which, however, as mentioned, would possibly conflict with the central bank's monopoly on the issuance of banknotes).

Cash may only be issued by the central bank. It is created by the bank's "banknote printing press" and distributed through a system coordinated with the banking system. Bank money is created by deposits or lending.

Electronic central bank money can be created following the pattern of either cash or bank money. The former implies a new electronic form of representation of purchasing power as the represented object, i.e. an electronic form of cash. The latter also implies the introduction of a new electronic form of representation, but with a claim (for cash) on the state as an object of representation. It can also be described as the former entailing the introduction of an electronic banknote (or coin) and the latter the introduction of an electronic promissory note (with the state as the debtor).

An electronic form of representation with purchasing power as the object of representation of (i.e. electronic cash) can function alongside notes and coins (i.e. physical cash) without requiring the existence of notes and coins. The choice between having only one form of representation (in the long run electronic) or two forms of representation (one electronic and one physical) is, from a legal system point of view, unimportant. On the other hand, electronic central bank money in the form of (monetary) claims presupposes, from a purely systemic point of view, the existence of cash (i.e. notes and coins, unless electronic cash is introduced) as a kind of anchor in the system.

The requirements for the electronic form of representation should essentially be the same regardless of whether electronic central bank money is created on the model of cash or on the model of bank money, but in the former case, as mentioned above, the object of representation remains unchanged, while claims on the state as the object of the electronic form of representation would be something new (albeit a step backwards in development, to the time prior to the abolition of the gold standard, when a banknote represented a claim on the state). If the object of representation is money claims, this leads to the application of the procedural and legal system for claims with several complications (concerning, for example, prescription, set off and interest), which most certainly require special modifying legislation.

Electronic cash can be based on what applies to banknotes and coins for general linguistic, management and legal purposes. The linchpin is the possibility to use them. A legal condition for this is that the holder's effective control (power over the flow) of his electronic cash corresponds to what is the case for physical cash. Provided that this power to control the flow can be ensured technically, the need for legislation is in principle limited to clarifying that a transfer of electronic cash is legally equivalent to a handover of physical cash. This does not preclude consideration of more detailed civil law legislation, which would appropriately cover and, as far as possible, equate electronic and physical cash.

Due to their physical form, banknotes and coins must have specific denominations. This is not the case for electronic cash. Regardless of design, the funds are presumed

to be registered in some form of electronic wallet in a manner similar to bank money for the holder. However, the absence of denomination cannot be assumed to have any civil law implications. Nor does the construction of the electronic wallet seem to have any legal significance, as long as the holder has exclusive access to the electronic cash.

When central bank money is handled electronically, it becomes possible to control and trace it in a different way than when handling physical cash. If electronic cash is to function in a similar way to physical cash in practical terms and in the application of the civil law rules applicable to physical cash, the technical possibilities for users to trace and control it should be limited to what applies to physical cash. The recipient of electronic cash should know no more than who has given it to them, and the payer should know no more than who they are paying. More detailed knowledge of the electronic flow may open up for restitution and other legal claims that disrupt marketability.

4.2.1 Electronic cash is preferable to claims on the state

Regardless of whether electronic central bank money is constructed as electronic cash, that is, as a digital equivalent of physical cash, or as claims on the state, it requires an electronic form of representation. How this is designed will probably not be more than marginally dependent on the construction. The difference concerns the object of representation; physical cash or claims on the state.

Electronic cash would represent the same as physical cash, that is, purchasing power. It is simply a matter of dematerialising the physical representation in the form of paper and metal in the same way that paper shares have been dematerialised into book-entry shares.

Electronic central bank money would represent claims for (ultimately) banknotes and coins. While the legal status of monetary claims as a means of payment is not new, the use of claims on the state as a means of payment is not known to be widespread in any western state.

The difference between cash and claims becomes apparent when considering the question of issuance. Electronic cash can be issued on the same practical and legal basis as physical cash, with the only difference that the "banknote printing" and other requirements are entirely electronic. The claim option presupposes a deposit scheme, which will be a practical innovation and may be assumed to require specific legislation.

For Sweden, the need for civil law regulation of electronic cash can be assumed to be small, as it will function in the same way as physical cash. Basically, all that is needed is to clarify that this is the case, and that the transfer of electronic cash is legally equivalent to the physical handing-over of banknotes and coins. Under the claims option, the procedural and civil law regulations on monetary claims would apply. The need for legislation will therefore largely depend on what derogations should be made from these regulations. The questions concern whether the state can be sued

for payment and, if so, what should apply. What is the state going to pay with? What about interest and prescription regulations? Etcetera.

The conclusion is that, from a mainly civil law perspective, electronic central bank money in the form of electronic cash as a counterpart to physical cash is preferable to electronic central bank money in the form of claims on the state.

5 The role of the state in the payments market and the need for an e-krona

As payments are increasingly made digitally, we are using private money more often and the state's presence in the payment system is decreasing. In practice, we could ultimately end up with a system similar to that of the United States in the 19th century, where state money had virtually no role and instead a variety of privately issued money and potential means of payment circulated. But today there are both physical and electronic options. Since the state has an obligation to ensure the functioning of society at an overall level and since the payment system is a cornerstone of a functioning society, we believe that the role of the state in the payments market needs to be secured. The question to ask is whether the state should stop issuing money as a means of payment to the public? Because this is the development we will have in practice if the state does not issue money in the form of a digital krona in the future.

The public's overall confidence in the money system is based on the fact that their private digital money can be easily exchanged for state-guaranteed money, cash. We believe it is likely that this arrangement has resulted in private money held in different banks having a one-to-one exchange rate to each other and to cash. The public can rely on the fact that there is a state alternative, cash, to complement private bank money. We do not know whether public confidence in private money would be the same if cash did not exist. Nor do we know whether the exchange rate on different private bank deposits would vary during a crisis or in times of turmoil.

We cannot comment on what would happen if the state withdrew completely from the small payments market. But given the major consequences if problems were to arise in the payment system of the future, we cannot wait to act until the consequences become apparent. We therefore believe that an e-krona, as a complement to cash, is needed to ensure that the state maintains confidence in the ability of the monetary system to always exchange private money one-to-one for state money.

We believe that the state needs to maintain a direct presence in the payments market by providing citizens with state money with which they can make payments. In a digital future, this means that state money, via the central bank, should also be digital and not just physical. In other words, in Sweden we need to issue an e-krona to complement cash and private digital money. The direct argument for this is that a payment system that is run entirely privately cannot be expected to meet the societal goals of the payment system. These goals may be different in different countries. But in Sweden they can be summarised in four points:

- *Confidence in the Swedish krona needs to be maintained.* In a situation with several different private digital means of payment but no state money for which these can be exchanged, there is no anchor in the system. Confidence in privately issued money increases when it can be redeemed for state money. This also increases confidence in the Swedish krona as a whole.
- *The resilience of the payment system must be protected.* In a more digital society, payments are also more vulnerable to disruptions. We are also moving towards a more uncertain and conflict-ridden era where aggressions, for example in the form of cyber attacks, can be directed against the payment system even in peacetime. An e-krona could be made more resilient than would be economically feasible for a private operator and also provide an alternative to other digital payment systems in case these were to fail for any reason.
- *All citizens must be able to make payments.* An e-krona could be designed to be used also by smaller groups with special needs that are not economically feasible for private operators to accommodate.
- *Competition in the payments market needs to be maintained.* Payment systems, due to what economists call network effects, promote the emergence of a few monopolistic players. The more people who are connected to a given payment service, the more people and companies the user can reach. This makes it difficult for new payment service providers to enter the market. In cases where several private operators build a payment service together, there is a risk that new entrants cannot join and start competing with the previous operators. In contrast, an e-krona could be designed as an open platform where private operators can develop new services and thus increase competition in the payments market.

An alternative, or at least a complement, to issuing an e-krona is for the state to instead tighten regulation on private issuers of money to try to achieve these goals. Such regulation is undoubtedly very important and will continue to be a cornerstone of a functioning payment system even with an e-krona. But regulation has limitations compared to a direct state presence in the payments market. As we saw in the years before the great financial crisis of 2007-2008, private companies can find ways to circumvent regulations in order to render them ineffective and thus build up significant risks. Regulations also take a long time to implement and evaluate - and then change if necessary. If the state is directly present in the payments market, it is easier to react quickly to changes in the payments market and to act more decisively in crisis situations. Our assessment is also that regulation alone cannot provide sufficient security, especially given the major consequences of a breakdown in any of the payment market functions. A direct state presence in the form of central bank money will also be required in the future.

It is also about politicians needing to decide what position the Swedish krona should have. If digital central bank money is issued in the future in other countries, Swedish citizens can easily use it instead of Swedish kronor. Such a development could ultimately affect the Riksbank's ability to conduct monetary policy, for example. The Swedish krona is therefore exposed to competition and we should have a Swedish

krona that is at least as efficient in transactions as other currencies in our neighbouring countries.

6 Sweden needs state-issued digital money

This article has provided an overview of the question of what money is and the role of the state in the future payments market. Our conclusion is that central bank money in the future needs to remain widely available and then be digital. In Sweden, we have come to call this potential CBDC the e-krona.

Our recommendation is that the state should take its responsibility for the smooth functioning of future payment systems. The regulation of financial agents and payment service providers must therefore be modernised. But we also need - as we have argued in this text - to ensure that the state has a direct presence in the payments market in the form of a CBDC and does not rely exclusively on regulating the activities of private operators. We should not forget that the payment system is changing fundamentally whether we issue a CBDC or not. Ultimately, the impact on the financial system of widespread use of various stablecoins is likely to be greater than the impact of introducing CBDCs especially since, unlike central banks, stablecoin issuers have no explicit purpose to take into account the overall societal effects. Regulation and a CBDC complement one another and both are needed to ensure that we have a functioning payment system in the future.

In 1897, the Riksbank was granted the exclusive right to issue banknotes. The overall aim was to ensure the stability and security of the monetary system for the future by making banknotes completely risk-free and ensuring that their issuance was not driven by profit interests. We do not consider that the Riksbank should have the exclusive right to issue digital money, but the above hundred-year-old arguments hold just as well today to justify the Riksbank being given the task of issuing a new legal tender in the form of a CBDC, an e-krona.

In this article, we have also focused on the legal issues surrounding an e-krona. The reason is that, ultimately, a regulatory framework is needed to introduce a new digital means of payment and set the framework for this. The conclusion is that electronic central bank money in the form of electronic cash, as a complement to physical cash, is preferable to electronic central bank money in the form of claims on the state.

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