SPEECH

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Money and payments – where are we heading?

Today, I am going to talk about money. This is a subject that concerns us all – most of us use money practically every day. But we probably don't give much thought to how important it is that our daily purchases can be carried out smoothly. It's more or less the same as not giving so much thought to your health as long as you're healthy. But once you get sick, it becomes almost the only thing you can think about. Our system for payments is similar; as long as it works securely and efficiently, we don't think about it. And, to continue the analogy: It is the Riksbank's task to ensure that the payment system remains healthy and contributes to a well-functioning society.

Right now, we, at the Riksbank, are devoting a lot of time to issues regarding payments and the payment system. The background to this is formed by the rapid changes on the payment market and the rapid decrease in cash usage in Sweden – a development that we are practically alone in, worldwide. Only a few other countries are undergoing a similar, albeit less dramatic, development.[1] This means that we have to take the lead and prepare for the new situation faster than other countries.

If this development continues without the Riksbank taking action, we risk finding ourselves in a situation in which the payment market is completely dominated by private players with no public alternative. Incorrectly handled, this could lead to monopoly situations, which are difficult to manage, and socio-economic inefficiency.

When we talk about money, it can be helpful to bear in mind that it was our need for a well-functioning payment system that led, once upon a time, to the formation of the Riksbank and other central banks and that explains why we still have the tasks we do, namely safeguarding price stability and promoting an efficient and safe payment system. Today, I shall explain why I think it is important

[1] Our Nordic neighbours, South Africa and possibly a few other countries in northern Europe also have low levels of cash usage. For the euro area as a whole, however, the value of cash in circulation as a proportion of GDP is just over 10 per cent. The equivalent figure for Sweden is 1.1 per cent (source: BIS and the Riksbank).

that central government – in the form of the central bank – also continues to play an active role on the payment market in the future.

What is money and what is required for it to function?

When the human race moved from subsistence to conducting trade, the need for some kind of instrument of payment soon arose. Barter is inefficient, as it is not easy to find a counterpart who not only wants the goods or services you can offer but is also willing to give you what you want in exchange. Possibilities for trade are thereby highly restricted.[2] This problem has been solved by various cultures around the world with the use of various forms of money. For example, some island cultures used seashells as money.

History tells us that money can be absolutely anything that a group of people in a region have decided will act as money. It is, quite simply, a social convention, more or less in the same way as an alphabet is an agreement over how a language should be written.[3] Money works, therefore, because everybody accepts the convention.

So which conditions need to be met for the convention of money to be accepted by everybody? Many people have pondered this question over the ages, leading to a definition of money that goes all the way back to Aristotle.[4] Put simply, it could be said that the conditions are met when *you can trust that you will be able to pay with money* to purchase what you want and that *money's value or purchasing power will not be undermined* if you want to use it later on. It involves all prices being expressed in the same unit, usually called a **unit of value**, in exactly the same way as we need a standardised way of measuring distance. Money also has to have a stable value (money must be a "**store of value**"), as this makes it possible to postpone consumption. *It also needs to be accepted by everybody.* It must be easily accessible and easy to use (it must act as a general **means of payment**).

For a long time, the most common form of money was coinage issued on royal authority, with its value being determined by its metal content. In Sweden, the copper standard was introduced at the start of the 17th century, in addition to the silver and gold standards that already existed.[5] But handling the copper coins proved to be clumsy, which contributed towards King Charles X Gustav granting permission, in 1656, for the formation of Sweden's first bank, Stockholms Banco, which was allowed to accept coins in exchange for promissory notes. These promissory notes soon started to be used as money, as they were much easier to carry

[2] It is unclear how common barter was in early, primitive economies but we know that money appeared several thousand years ago. See, for example, Humphrey (1985) "Barter and Economic Disintegration". *Man, New Series*, Vol. 20, No. 1.
[3] See Camera, G. (2017). "A perspective on electronic alternatives to traditional currencies". Sveriges Riksbank Economic Review 2017:1. Sveriges Riksbank and Schnabel, I. and Shin H. S. (2018) "Money and trust: lessons from the 1620s for money in the digital age". BIS WP No 698.
[4] Camera, G. (2017). "A perspective on electronic alternatives to traditional currencies". Sveriges Riksbank Economic Review 2017:1. Sveriges Riksbank.
[5] The copper standard was introduced in 1624. The reasons for this were the shortage of silver and gold due to the prolonged wars, and a desire to maintain the price of copper, which was Sweden's most important export product.

than several kilos of metal. This is how Europe's first modern paper money to use printing technology came to be. Unfortunately, the bank issued more money than it had cover for, leading to bankruptcy. But the need for a bank remained and, a few years later, the Riksbank was founded and was eventually able to issue banknotes on behalf of the government under more controlled forms.[6]

However, it was not just the government that was allowed to issue banknotes at that time. For example, in Sweden, private banks were allowed to issue their own banknotes into the 20th century. The Riksbank did not gain a monopoly on issuing money in the form of banknotes and coins until 1904. The problem with the private issue of banknotes was the risk of the bank issuing the money entering bankruptcy, in which case this money could fall in value. In the United States and United Kingdom, it happened that banknotes issued by private banks were traded at a lower value than was printed on them. The advantage of government issue is that government banknotes are usually considered to be completely safe. This is the main reason why the government, via the central bank, is granted a monopoly on issuing banknotes. Quite simply, it has turned out to be easier for central banks, which are run in the national interest, by what is also best for society in the long term, to build the required confidence than it is for private companies that have profit motives.

Substantial costs arise if confidence in the value of money disappears

Right up until modern times, the value of banknotes and coins was linked to the value of a precious metal, such as silver or gold. But this link could be problematic as it meant that the supply of money was determined by access to precious metals and not by activity in the economy.[7] When production increased at the same time as the money supply was fixed, deflationary pressures arose. The best-known example of this is the depression of the 1930s, when the restrictions under the gold standard led to serious deflation. Research has revealed the existence of a relationship between how quickly a land chose to abandon the gold standard and how quickly its economy started to recover.[8]

The decision to restrict the issue of money in this way, despite the disadvantages, had, of course, to do with the strong temptation to issue too much money.[9] And, as we all know, this results in their value being undermined due to high inflation. There are many historical examples showing what happens when central government mismanages its assignment in this area. For example, we have the hyperinflation in Germany in the 1920s, which led to an economic collapse and political

[6] See, for example, “Sveriges Riksbank and the history of central banking”. Edvinsson, Jacobson and Waldenström. 2018. Cambridge University Press.
[7] It was also common for the metal content in the coins to be debased. See, for example, Schnabel, I. and Shin H. S. (2018) “Money and trust: lessons from the 1620s for money in the digital age”. BIS WP No 698.
[8] See, for example, Eichengreen, B and Temin, P. (1997) ”The gold standard and the great depression”. NBER Working Paper 6060.
[9] The fixed exchange rates maintained between 1944 and 1971 under the Bretton Woods system were also tied to the value of gold. It was not until after this that the convertibility to gold was abandoned and the US dollar became a fiat currency, which is to say a currency whose value is not linked to any external store of value. However, even after this, many currencies, including Sweden's, were tied to other currencies in fixed exchange rate arrangements.

instability.[10] More recent examples include Zimbabwe in 2008 and Venezuela today. What history clearly shows is that when the citizens of a country lose confidence in the value of money, this also has major negative effects on the real economy. When nobody knows how to price goods and services, the risks become too large and economic activity comes to a halt.

The importance of confidence for payments and the payment system was, as I mentioned earlier, what actually led to the creation of central banks, and it explains why central banks around the world have a mandate to "promote a safe and efficient payment system" or the like. But other parts of the central bank's mandate also originate from the need for a well-functioning system for payments: monetary policy ensures that money (the means of payment) keeps its value, and financial stability means that payments and the financial system function. Together, this contributes towards confidence in the monetary system being maintained.

More account-based money in the 20th century

The payment market has constantly developed. At some point in the second half of the 20th century, the general public started increasingly to use funds from bank accounts to pay in transactions where cash was not considered appropriate, for example for paying at a distance. Initially, these payments consisted of cheques and paper-based giro payments from account to account. In the 1920s, a system for giro payments was created in Sweden in the form of Postgirot. Later on, payment instruments issued by the private banks took ever greater market shares and the use of cash has declined steadily since the 1950s as a proportion of GDP. During the 1990s, electronic alternatives such as card payments also gradually started to replace cash for purchases in shops.

Money is now electronic and is created by banks

When we talk about money, many people probably envisage a banknote in one currency or another. But in today's digital society, cash forms a very small part of the total amount of money, only about 2 per cent.[11] The overwhelming majority is completely electronic.

Neither is it the case that the Riksbank or other central banks are normally the ones who create new money these days.[12] Many of us have been taught that, when banks get new deposits, they can create new loans, but it actually works the other way around. At present, it is the banks that create new money when they issue new loans. If I approach my bank with a request for a new loan for a home and the bank grants me credit, I will receive a liability in my account with the bank. At the same time, the money I have borrowed is transferred to the seller of the property, who deposits the money in his or her bank account. So new loans

[10] Eichengreen, B and Temin, P. (1997) "The gold standard and the great depression". NBER Working Paper 6060.
[11] By cash, I mean banknotes and coins held by the Swedish public as a proportion of total deposits in MFIs and central government.
[12] The exception is when the Riksbank (or another central bank) introduces quantitative easing and purchases government bonds with newly created bank reserves, which is a form of newly created money. See Alsterlind et al. (2015) for a more detailed description of this.

actually create new deposits. In the same way, money is destroyed if I repay a loan to the bank. The new money created is thus private, electronic bank money and the amount of money is governed by lending. The Riksbank thereby indirectly influences demand for new money via the interest rate, but monetary policy does not attempt to steer the money supply directly.[13]

Private bank money (sometimes called "inside money" in the sense it is inside the private sector) is a claim on the issuing bank. In the same way, money created by the Riksbank, for example Swedish banknotes and coins, is a claim on the Riksbank or Swedish government (known as "outside money"). It is thus possible to regard a 100-krona banknote as a kind of IOU with an eternal maturity that does not pay any interest. There is also another kind of central bank money in Sweden, namely the banks' balances in the Riksbank. Liabilities on the Riksbank's balance sheet are usually considered to be completely safe, as the Swedish government stands as guarantor. Debts on the banks' balance sheets, which is what private bank money is, are usually considered less safe as they could lose value if the bank were to enter bankruptcy. However, deposits in bank accounts are protected by a government guarantee, known as the deposit guarantee, up to a certain amount.[14]

As the banking sector fulfils a central function in society for credits and payments and as it also receives government insurances such as the deposit guarantee, there are many regulations aimed at making the banking system secure. With the help of these regulations and the deposit guarantee, the public authorities have attempted to ensure that, for the general public, it should be more or less as secure to use private money as central bank money. This has been done because society gains when there is confidence in the payment system.

The special characteristics of the market for payment infrastructure suggest an active role for central government

As payments and a well-functioning monetary system form the basis on which economic activity rests, they are also fundamental to growth and welfare. In this regard, the payment system can be seen as a part of the basic infrastructure in a country. And, just as with other parts of it, such as military defence or our national parks, for example, the payment system has the characteristics of a public good. For the payment system, it is confidence in the currency that constitutes the public good that other aspects of the payment system then build upon. Economic theory says that such goods will not be offered to a sufficient extent or sufficiently efficiently by the private market. Tobin (1987)[15] argued that this aspect of the monetary system means that central government should have a central role on the payment market and I am inclined to agree with him.

The implementation of payments involves the exchange of a large amount of information, demanding large IT systems which are expensive to obtain but with

[13] The banks' possibilities for creating new loans are also limited, to a certain extent, by the requirement that they have a certain amount of equity in relation to the size of their balance sheets. There are also regulations for the composition of the balance sheet that are aimed at reducing the risks in the financial system.
[14] Up to SEK 950,000 per person and institution is protected according to the deposit guarantee. See www.riksgalden.se/sv/Insattningsgarantin/Om_Insattningsgarantin/.
[15] See Tobin, J. (1987) "A Case for Preserving Regulatory Distinctions." Challenge 30 (5).

which the marginal cost for executing a further payment is small. In other words, there are *economies of scale*, which, in theory, leads to natural monopolies. This means that, if the market is left unregulated, the dominant company will have an incentive to supply too little of the product for too high a price. Monopolies can also create worsened conditions for innovation as these are often driven by competition. In addition, the system can be vulnerable when one company, and thus one technical platform, dominates. On such markets, central government therefore usually applies regulations, such as those concerning the electricity network, for example, or actively runs the system, such as for the rail network, for example.

Another characteristic of the payment market is the existence of positive *network externalities*. This means that when new users join a system, the utility increases for all participants, even those already in the system. Another example of a product with positive network effects is the telephone: the utility of having a telephone increases as more people join the telephone network, allowing you to call them. This means that coordinating different players on the market may lead to economic gains for society. Since utility increases with the number of users this means that the market has a tendency to eventually end up being dominated by a monopoly that takes over (a situation of natural monopoly, just as with economies of scale). The combination of economies of scale and network effects thus creates tendencies towards heavy concentration. Monopolies that maximise their returns will give rise to efficiency losses in the economy in general.[16] All in all, this suggests that it may be justifiable for central government to undertake the task of regulating the market, to reduce the power of monopolies, and as coordinator, to ensure that network externalities are internalised, which is exactly how it works in Sweden today.

We can thus observe that, as money provides the necessary lubrication for all economic activity, efficient and secure forms of money are important for economic growth. The most recent estimate we have for Sweden puts the total cost of executing payments at just below 1 per cent of GDP per year.[17]

Account-based payments require a network of intermediaries and technical systems

Unlike when we use cash, using the money we have in our accounts as a means of payment requires a relatively advanced technical infrastructure. This is because the purchaser's money or credit needs to be verified, payment instructions need to be sent and so on. A transfer must also be arranged between the banks of the purchaser and the seller. At present, this usually takes time, often a day and sometimes more. This means that risks arise for the parties involved in the transaction. As consumers, however, we do not normally notice that payments take time and that risks arise.

[16] See, for example, Rochet, J.-C. and J. Tirole. (2003) "Platform Competition in Two-Sided Markets" *Journal of the European Economic Association* 1(4).
[17] The total cost includes both the private and the social cost. See Segendorf, B. L. and Jansson, T. (2012) "The cost of consumer payments in Sweden". Sveriges Riksbank Working Paper Series No. 262. Similar costs have been calculated for other EU countries (see Schmiedel, H, Kostova, G. and Ruttenberg, W. 2012. "The social and private costs of retail payment instruments". Occasional Paper Series 137. ECB.

As I mentioned previously, positive network externalities are something that characterises the payment market. This means that there are efficiency gains to be made by using coordination. In Sweden, we have several historical examples of successful coordination on the payment market. In 1925, the public-owned Postgirot was formed to answer the need for more efficient mediation of payments via cashless payments by giro transfer. As this was a social need, a publicly owned solution was created to facilitate the required coordination. In the 1950s, the banks then formed their own version in the form of Bankgirot, in which standardised paper forms facilitated the management of payments between banks. In more modern times, the Swedish banks have also collaborated over withdrawals from ATMs and purchases with debit cards, to give two examples. They have also established a joint system for Bank ID and, a few years ago, the mobile application Swish[18], to which the largest Swedish banks are connected.

The Swedish banks have been able to take continual advantage of the benefits of coordination to which economies of scale give rise. Again, this is something that we perhaps do not give too much thought to, but in many other countries these activities do not work anything like as smoothly. There, for example, it can be difficult or expensive to withdraw money from another bank's ATM.

In Sweden, the Riksbank provides, like the central banks of other countries, a central payment system so that the banks can exchange money with each other. Allow me to explain in a little more detail what this means, before going on to discuss the challenges we must consider for the future. All major Swedish banks, clearing organisations, the Swedish National Debt Office and the Riksbank are participants in the Riksbank's RIX system where weekly turnover corresponds to a little less than Sweden's GDP. In practice, this means that participants have accounts in the Riksbank's system in which they regulate debts to each other via transfers between their RIX accounts. A bank's balance in its RIX account forms a risk-free claim on the Riksbank. At some point during the day, the money thus ends up on the Riksbank's balance sheet, which is the meaning of the term 'central bank money', as I explained previously. The system has been constructed to manage major payments between the dominant players in the market in a secure manner. Private persons' payments are lumped together into larger amounts before they pass through the system. It has been optimised to manage a smaller amount of payments of larger amounts with a very high level of security. The mean value of a payment sent through the system is about 35 million kronor.[19] The Riksbank also has regular contact with all participants, who also participate in training sessions, crisis exercises and so on. As the Riksbank and the banks must have personnel on site, opening hours are currently restricted to normal office hours.

It is conceivable that the banks would have their own system to regulate payments with each other. But this would increase the counterparty risks in the financial system. If a private player were to run such a system, all participating banks

[18] Swish is owned by Getswish AB but administrated by Bankgirot.
[19] As of April 2018. Current statistics on payments can be found on the Riksbank's website, www.riksbank.se/sv/finansiell-stabilitet/betalningssystemet-rix/statistik-over-betalningar-i-rix/2018/.

would have large claims on that player, just as they have on the Riksbank at present. If such a private player were to enter bankruptcy, this money would be lost. That risk does not exist when the central bank runs the system. In addition, the central bank can supply the necessary liquidity that allows payments to function without friction. The central bank can thus function as 'the banks' bank'. It is therefore common for the settlement system to be placed at the central bank. It is also a service demanded by the banks themselves. Settlement in the RIX system also involves finality, which is to say that the payment is legally executed when it arrives in our system.

The payment market is changing

The arrival of the Internet in the late 1990s and early 2000s boosted the digitalisation of society and the payment market. New participants entered the market and many digital services linked to payments are presently offered, such as mobile solutions, electronic identification and so on. Changed consumption patterns such as increased on-line shopping are also generating demand for digital payments. The availability of goods and services around the clock on-line raises the question of why it should take longer to make a payment than it does to send a text message or private message via Facebook.

All of this leads to demand for real-time payments. Instant payments, meaning the possibility of paying person to person in real time around the clock, have been made possible by digitalisation and new technology. In other words, this is a matter of small payments between private persons and is thus something other than what the Riksbank's system has traditionally handled. Previously, verification, clearing and settlement has taken time to implement, but, at present, using new technology, it takes a few seconds instead of a few days.

In Sweden, the number of users of the mobile application Swish has increased to over 6 million since its launch in 2012.[20] Swish is a system that makes it possible to execute instant payments between private persons. This means that I can enter a payment into my mobile phone and, a few seconds later, show you that it has been executed without having to wait a few banking days for account transfers. In addition, we can make payments with the system around the clock. In this way, it is reminiscent of cash. When banknotes change hands, the payment is completed, at the same time as the possibility of paying does not depend on the opening hours of the system or the banks. It could be said that Swish has replicated the advantages of cash, adapted to today's technology. However, one difference is that cash is central bank money, while Swish mediates payments in private bank money.

Swish's rapid growth has contributed to the further marginalisation of cash. Since 2008, cash usage has fallen by about 50 per cent in Sweden. In surveys, only about 10 per cent of people in Sweden report having used cash for their latest purchase. At the same time, 20 per cent report that they use their mobile telephone to

[20] Swish statistics can be downloaded from www.getswish.se/sv-press/statistik/.

make payments at least once per week.[21] Half of traders expect that they will stop accepting cash as a means of payment within seven years.[22]

There is reason to believe that instant payments will be an increasingly dominant form of payment in the future. Declining cash usage is leading to increasing demand for electronic alternatives that enable instant payments and account transfers.[23] Another reason is that risks for the players on the payment market decrease when electronic payments are instant.

At the same time, we are seeing interest in payment solutions increasing among major internet companies. One of the reasons for this is new EU regulations aimed at increasing competition and making it possible for new players, including Fintech[24] companies, to enter into the market and offer innovative services on equal and non-discriminatory terms. The entrance of other types of company than banks on the retail payment market[25] may result in major changes. These companies have large customer bases in several countries, giving them a platform for offering both domestic and cross-border payment services, which could provide them with a competitive advantage in on-line shopping, for example.[26]

Even if we welcome the increased competition on the payment market, there is a risk that the development on the market will be too fast. When many players are moving rapidly in different directions, we risk losing the economies of scale of the old model of cooperation that has worked well in Sweden. This argues in favour of some type of central coordination, similar to the role adopted by the ECB. In Sweden, the Riksbank has a very important task, namely ensuring that coordination continues to work for payments in Swedish kronor in the future.

Centralisation of payment systems

At the Riksbank, we are therefore investigating how our systems can be adapted to better meet the increased demand for instant payments. However, if the Riksbank offers a system, this does not necessarily mean that the actual technical platform for settlement needs to be present within the Riksbank's premises or even within Sweden’s borders.

The European Central Bank (ECB) is currently extending its infrastructure for payments. In the field of instant payments, it is in the process of developing a new technical platform called “Target Instant Payment Settlement” (TIPS). This will make it possible to make instant payments 24 hours a day, seven days a week, and is expected to be ready at the end of 2018. It will also be prepared to be able to handle other currencies than the euro. One alternative could therefore be for

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[21] See “Payment patterns in Sweden” at www.riksbank.se/sv/statistik/betalningar-sedlar-och-mynt/betalningsstatistik/.

[22] Swedish Retail and Wholesale Council (2018). “När slutar svenska handlare ta emot kontanter?” (When will Swedish traders stop accepting cash?) Research report 2018:1 http://handelsradet.se/wp-content/uploads/2018/01/Sammanfattning-2018_12.pdf.

[23] Cash payments are instant: When the seller has received the payment in the form of cash, the payment is settled. If cash is unavailable, a need arises for the rapid transfer of money between different participants in other ways. Swish is an example of such a solution.

[24] Companies combining financial services with software technology.

[25] Retail payments are payments of lower value and between private individuals, companies and authorities. A distinction is made in retail payments between cash payments and payments in the form of account transfers.

[26] Sveriges Riksbank “The Swedish retail payment market”. Riksbank Studies, June 2013.

the Riksbank to open a central bank account in Swedish kronor in the European system for instant payments. The ECB's menu of systems for creating a single market for payments will mean that economies of scale can be utilised even more and is thus basically a positive development.

There are also plans among some Nordic banks to create a pan-Nordic payment infrastructure with joint products. However, at present, we have too few details around these plans to be able to express an opinion on it.

What we see here is the ongoing centralisation of payment systems generated by globalisation. There has been a movement within the euro area from national systems and a fundamentally fragmented market to centralised, cross-border systems. Deregulation in the 1990s and 2000s contributed towards the integration of the banking market in the EU. And now the same thing is happening to the payments-infrastructure side.

The European Commission intends to propose an amendment of the EC regulation on cross-border payments in euro to reduce fees for cross-border transactions in all member states and thereby facilitate trade and contribute towards increased competition. Other initiatives are also taking place on the EU level to develop the market for electronic payments and create better conditions for secure and efficient payments. The new regulations will entail a gradual adaptation of Swedish payment services to EU standards.

Crypto-currencies are not money

Another new trend is the new crypto-currencies such as Bitcoin, Ethereum and Ripple, to name a few. Bitcoin was launched in 2009 and is still the most commonly-used crypto-currency. Bitcoin was created by networks of users. Participants who pool their hardware resources to verify the payments made are rewarded with newly-created Bitcoins. The size of the rewards declines over time in a way that means there cannot be more than 21 million Bitcoins. The situation of a supply that is not adjusted to demand is reminiscent, in its way, of the situation with the gold standard that I mentioned earlier. However, there is nothing to prevent the supply of other crypto-currencies, which are close substitutes to Bitcoin, from increasing. At present, there are over 1500 different kinds of virtual currency and, if prices rise, there will probably be more.

We have also seen how the value of Bitcoin, for example, varies heavily due to fluctuations in demand. This alone makes it difficult to use them as a means of payment. Even if Bitcoin is used for payments between certain private persons over the Internet and in a few on-line shops, it is likely that most owners of Bitcoins do not use them as a means of payment, but rather as an asset that is expected to increase in value. The situation remains that few shops accept them – for example, only three of the world's largest on-line shops. [27]

Even though they are called currencies, the crypto-currencies do not fulfil the criteria for what we usually call money that I mentioned earlier; at present they do

[27] For more information on crypto-currencies, see Söderberg, G. (2018) "Are Bitcoin and other crypto-assets money?". Economic Commentary No. 5, 2018. Sveriges Riksbank.

not work well as units of value, stores of value or means of payment as few shops accept them and their value fluctuates heavily over time.

The e-krona, a new kind of money for the general public?

We have thus been able to establish that cash is disappearing at a rapid rate, while, at the same time, new electronic 'currencies', issued by other players than central banks, are appearing. In general, technological developments are proceeding rapidly and digitalisation is placing higher demands on payment services that are available round the clock. In this environment, it is natural to ask whether central banks should offer the general public a secure electronic alternative that could work in approximately the same way as cash. It is for this reason and others that we, at the Riksbank, have opened an analysis of the possibilities for issuing a so-called e-krona.[28]

The analysis is founded in the question of which problems may arise if cash were to disappear. We can note that this means that banks are continuing to have access to central bank money, while the general public in Sweden is losing the access to central bank money it has had since the 17th century.[29] But is this a problem? Has there been a weakening of the arguments that have existed for providing the general public with an asset and a means of payment that is completely free from risk? Is it a fact that the Swedish people generally no longer have a need for central bank money? Or is it rather that they do not want physical banknotes and coins? If this second statement is correct, I see it as the Riksbank's obligation to investigate the possibilities of issuing an e-krona that can fulfil approximately the same role as cash previously did. If the Riksbank does not offer an electronic alternative, this also means, in practice, that all of our payments will have to go through banks or other financial institutions.

Since the payment market has the imperfections it does, as I have described earlier, it is likely that monopoly situations, inefficient for the economy as a whole, would arise if the private market was allowed to act freely with no central government involvement. This problem could possibly be managed with the use of regulations, but it can be difficult to effectively regulate a monopoly. As long as a public alternative exists, this puts certain natural restrictions on the private players. Historically, cash has been this alternative.

There are various possibilities for creating a technical platform for the e-krona. One possibility is to connect it to the existing infrastructure. Another alternative could be to develop a new system that could act as backup for other payment systems. This would give us an alternative independent platform that can build upon other technology, which would reduce vulnerability in comparison with only having one system. This could be particularly important if we decide to utilise the ECB's system so that the main payment infrastructure becomes located beyond Sweden's borders.

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[28] The Riksbank's e-krona project. Report 1. September 2017. See also Bjerg, O. (2017) "Designing New Money - The Policy Trilemma of Central Bank Digital Currency". CBS Working Paper, June 2017, and Bordo, M. and Levin, A. (2017) "Central Bank Digital Currency and the Future of Monetary Policy". Economics Working Paper 17104 Hoover Institution.

[29] The banks would still have access to central bank money as they have reserves at the Riksbank.

An e-krona system could work for the instant settlement of payments around the clock. We are also analysing the possibility of getting certain parts of it to work off-line. This could turn out to be important, not least in a crisis situation. In addition, there exists a risk for cyberattacks, which may increase in the future. I consider that Sweden's preparedness will be weakened if, in a serious crisis or the event of war, we have not decided in advance how households and companies will pay for fuel, food and other necessities. Making it possible to make payments off-line may also be necessary to ensure that payments can be executed in all parts of the country.

Any e-krona would also have to be designed bearing in mind that there are certain groups in society that presently experience problems with the disappearance of cash as, for various reasons, they find it difficult to use digital solutions. This may include older people, disabled people or people without access to bank cards for economic or other reasons. As cash becomes increasingly marginalised, it becomes central government's task to help these people as we cannot expect the private market to do so. Under the framework of the e-krona, we can work with alternative solutions for these groups, such as some kind of prepaid card for example.

In addition, it is important to consider whether legislation needs to be updated. Under the Sveriges Riksbank Act, Swedish kronor (SEK), in the form of banknotes and coins issued by the Riksbank, are legal tender. The Swedish Riksdag has thereby given cash a unique position as a means of payment. This provision means, for example, that traders and companies are obliged, in principle, to accept payment in cash. However, this obligation is not applied without exception. In many cases, it is possible for parties to *contract* that payment shall be made with other means of payment than cash. Shops, hotels and restaurants are thus not obliged to accept cash if they have clearly signalled this to their customers, for example in the form of a sign.

It may therefore be appropriate to review whether the concept of a legal tender should be changed and whether the e-krona should be given a stronger position to ensure that it is established and accepted by the market. If the means of payment issued by the Riksbank is not generally accepted, it will be difficult for the Riksbank to perform its task of promoting a safe and efficient payment system. If the Swedish payment system were to become dominated by private crypto-currencies or by something other than Swedish kronor, domestic monetary policy would be marginalised.

The ongoing Riksbank Inquiry has examined the matter of cash in a so-called fast track and a few proposals on access to cash services have been produced. This could contribute to slowing down the trend of decreasing cash usage. However, there are indications that that the latter is mainly a consequence of reduced demand for cash. [30] I hope that the Riksbank Inquiry, in its final report, will put forward further proposals for the long term protection of Swedish kronor issued by the Riksbank, whichever form these may take, physical or digital. New legislation,

[30] For an analysis of this development, see "Times are changing and so are payment patterns". Guibourg, G. and Erlandsson, F. Economic Commentary No. 6 2018. Sveriges Riksbank.

strengthening the protection for Swedish kronor, should be technologically neutral to allow for a future totally dominated by electronic money.

I would like to be clear that, as yet, we are only at the start of the analysis of the e-krona. Last autumn, we presented a few preliminary conclusions and, at the end of this year, we will decide whether and, if so, how we will proceed with the next stage of the project. Neither are we alone in the central banking world in considering this. Many other central banks, including the Bank of England and Bank of Canada, have ongoing analysis projects on digital central bank money.[31] Considering how rapidly developments are proceeding, it is probably good to be aware that it will require both resources and cooperation with external players, both authorities and companies, for the Riksbank to act proactively in this matter.

The Riksbank will modernise the supply of settlement services

I have given several reasons for why the private market cannot be expected to provide a secure and efficient payment system without government interference: economies of scale and network effects lead to concentration in a monopoly system that becomes vulnerable and results in a lack of competition and innovation. At the same time, positive network effects suggest that cooperation and standardisation may be effective solutions. In Sweden, we have a long tradition of cooperation between the banks in the area of payment which has been very positive for Swedish consumers. Bankgirot, Bankomat (ATMs), Bank ID and Swish are a few examples.

The Riksbank and other central banks have traditionally provided systems and central bank money to allow financial institutions to be able to regulate their mutual debts in a secure manner. The payment market is now in a state of transformation, among other things due to technological progress, not least via solutions for smart phones. In other words, we are on the way to a market in which end users demand that payments be rapid and constantly available. As I mentioned earlier, the market is also facing increased competition at the same time as the EU is placing demands for standardisation. This is shrinking the scope for tailor-made national solutions. Changing preferences and expectations among end-customers also puts pressure on financial institutions to change their range of services. The Riksbank therefore has to update its range of services so that the role of central bank money in the settlement of payments between financial institutions is preserved. Otherwise, solutions entailing higher risks for the financial system may appear.

According to the Sveriges Riksbank Act, the Riksbank's task is to promote a safe and efficient payment system. This means finding solutions that are both secure and efficient, and which therefore must be in harmony with technological developments. One reasonable starting point is that the payment infrastructure must be at least as secure and efficient in Sweden as it is abroad. At present, this requires central bank money to be available around the clock, not least if we decide

[31] See, for example, Engert, W. and Fung, B. (2017) "Central Bank Digital Currency: Motivations and Implications". Staff Discussion Paper 2017-16. Bank of Canada and Barrdear, J. and Kumhof, M. (2016) "The macroeconomics of central bank issued digital currencies" Working Paper No. 605. Bank of England.

to launch an e-krona. We can take certain steps in the modernisation of the Swedish payment infrastructure soon, such as, for example, extending opening hours in our own system RIX, which is also our ambition. We have approached the market for consultation about this.

As regards the instant settlement of payments in central bank money, this is a service which is now being demanded and the technology for which is available. For reasons of efficiency, the Riksbank should thus ensure that it is delivered. At the same time, settlement should be made in central bank money for security reasons. I am therefore of the opinion that we should decide, as soon as possible, to offer instant settlement of payments in central bank money. As I mentioned previously, we, at the Riksbank, are currently analysing whether the infrastructure for this needs to be located within Sweden's borders. Economies of scale speak in favour of placing it with the ECB's system TIPS.[32] Preliminary calculations indicate that this alternative would also be competitive from a cost perspective. It would also probably be advantageous to join the ECB's system from a security perspective as this has a high level of security. At the same time, emergency preparedness reasons suggest our own Swedish system or at least that a domestic backup alternative should be available. The drawback is that a completely domestic solution risks becoming very expensive.[33]

Concluding comments

Let me sum up and round off. Money has arisen in different ways in various cultures to make people's day-to-day lives easier. A little over 350 years ago, Stockholms Banco, which later became the Riksbank, became the first issuer of modern paper banknotes because people wished to avoid having to carry heavy copper coins around. Now we are facing a situation in which we will perhaps be among the first in the world to launch a new kind of central bank money, a kind adapted to today's digital society and the needs that exist there.

When market conditions are changing rapidly due to new technical innovations and increased European integration of technical systems, the Riksbank must adjust its range of services. Among other things, we are planning to modernise our range of settlement services. I also think that we should extend the opening hours of RIX and ensure that our systems are technically constructed so that we can offer the possibility of settling instant payments in central bank money so that the market does not start to use alternative, less efficient solutions. There are also interesting possibilities here for an e-krona to cover the need for central bank money for the general public in a digital world. One possible way forward is for us to continue to analyse and develop a pilot version in 2019.

There is also reason to review how legislation regarding the legal tender can be adjusted to the new digital reality. How else will the position of the Swedish krona be protected if cash disappears? All of these issues must be managed together with other players such as the market, public authorities and legislators. History,

[32] This would involve the colocation of data systems, which, for our part, would concern payments in Swedish kronor.
[33] In the very near future, we will approach the market with a consultation on joining TIPS.

however, has shown that it works best when the Riksbank leads the development in cooperation with the market.