Staff memo

An overview of fintech and cryptoassets

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Contents

Summary[1]

Fintech is defined in this staff memo as when financial services are combined with new technology. The fintech area includes many of the traditional services we associate with the financial system such as lending and payment mediation, but also completely new activities, for instance linked to cryptoassets.

A cryptoasset is a kind of digital asset, and the largest cryptoassets in terms of market value are Bitcoin and Ethereum. Many cryptoassets have a value that fluctuates a great deal, although there are also cryptoassets known as stablecoins that aim to maintain a stable value over time. Although the market for cryptoassets has grown rapidly, it is still only a fraction of the size of the global financial system.

Most cryptoassets have so far been used as speculative investments rather than as a means of payment. A reason for this is that they often lack characteristics that we associate with traditional means of payments – for example, that they should be quick to use and keep their value over time. Mostly private individuals have gained exposure to cryptoassets. Interest in cryptoassets among institutional investors has however increased lately, albeit with still limited investments in relation to their total assets. As the market for cryptoassets has grown in size, a market has also emerged with various financial instruments that have cryptoassets as their underlying assets.

Fintech, including cryptoassets, contributes innovation and development to the financial system, but can also present challenges for authorities and risks to the financial system. There are challenges and risks specifically linked to cryptoassets. At the same time the availability of data associated with them is limited, making it more difficult to follow the rate of risk progression. For example, cryptoassets have low – or no – consumer and investor protection and there is a certain degree of anonymity linked to cryptoassets, which means they can be used in illegal transactions. If the interconnectedness between the traditional financial system and the market for cryptoassets increases, for instance through increased exposures among traditional financial entities, this could give rise to risks to the financial system.

Cryptoassets are currently unregulated in many parts of the world. Regulatory efforts are under way in a number of jurisdictions, for instance in the EU. A number of standard-setting bodies are also pursuing work related to cryptoassets, for instance on devising standards to limit various risks that they can cause.

It is difficult to comment on the extent of exposure to cryptoassets among, for instance, Swedish households. From a global perspective, however, exposure among Swedes is considered to be relatively low. Exposure among Swedish banks and institutional investors appears thus far to be limited. The risk that shocks on the cryptoasset market would affect the Swedish financial system and its participants is therefore

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probably low. However, cryptoassets might affect financial stability further ahead if for instance exposures among financial entities increase.

Introduction

Terms like fintech, cryptoassets, stablecoins and decentralised finance (DeFi) increasingly feature in the media and the reports of various authorities and central banks. Cryptoassets have, in the space of a few years, gone from being a relatively unknown phenomenon to one that is generating growing interest among both private individuals and traditional financial entities.

However, it might be difficult to know exactly what fintech or cryptoasset means. This staff memo therefore aims to provide an overview of fintech and cryptoassets, how these phenomena have developed over time and the various risks and challenges that they pose to private individuals, the financial system, authorities and central banks alike.

We start with a review of what fintech is, how entities operating in the fintech sector are regulated and the state of the Swedish fintech market. We then explain what cryptoassets are, their market and their use. We then discuss the challenges and risks that fintech and cryptoassets can present, and the status of regulation and international standards for cryptoassets. We round off with a brief description of DeFi.

However, this staff memo should not be seen as an exhaustive account of fintech and cryptoassets. Also, these phenomena are developing rapidly and the content of this staff memo is current as of 13 May 2022. A limitation is that we do not address central bank digital currencies (CBDCs) or the phenomenon non-fungible tokens (NFTs) in this staff memo.[2]

[2] For more information on CBDCs, see for example *Payments Report*, 2021, Sveriges Riksbank. For more information on what NFTs are, see for example M. Clark (2021), "NFTs, explained", 18 August 2021, The Verge.

1 What is fintech?

Fintech can be defined as financial services combined with new technological innovations. Fintech activities are found in numerous parts of the financial system and include, for example, payment mediation and lending. Operations linked to cryptoassets are also a type of fintech activity. The fintech sector has grown rapidly in the past few years, but is still of a limited size in many countries. In Sweden, for example, the operations of fintech firms have gone from representing 0.01 per cent of GDP to 0.15 per cent in ten years.

1.1 Financial services combined with new technology

As a combination and abridgement of 'financial' and 'technology', the meaning of the term 'fintech' is clear.

A number of authorities and international forums have developed definitions of fintech. The standard-setting forum Financial Stability Board (FSB) defines fintech as "[…] technologically enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services."[3] The Bank for International Settlements (BIS) has a similar definition: "[…] technology-enabled innovation in financial services." [4]

The definition we use in this staff memo is reminiscent of the above; that is "[...] financial services combined with new technological innovations".[5]

Fintech encompasses numerous activities and entities

The fintech area is broad and essentially includes all the activities that we traditionally associate with the financial system. It concerns for instance payment mediation, lending, asset management and insurance-related services.[6] There are also activities that only exist within fintech, such as those linked to cryptoassets (see the section Cryptoassets are digital assets).

There are essentially three types of entities that use fintech in their operations: new firms offering financial services that are based on new technology (hereinafter 'fintech firms'); existing financial entities, such as banks, which start to incorporate

[3] See FSB (2021), "FinTech", Financial Stability Board. Last updated 28 June 2021. Accessed 25 April 2022. [online] Available at: FinTech - Financial Stability Board (fsb.org).

[4] See BIS, "Innovation and fintech", Bank for International Settlements. Accessed 25 April 2022. [online] Available at Innovation and fintech (bis.org).

[5] See FinTech – increasingly rapid interaction between financial operations and technological innovation. Article in *Financial Stability Report*, 2017:1, Sveriges Riksbank.

[6] The fintech activities that are linked to insurance are often called "insurtech" (a combination and abridgement of 'insurance' and 'technology').

new technology into their service offering; and large technology companies ('bigtech firms') that start to offer financial services.[7] A common way for banks to incorporate new technology into their service offering is also that they initiate cooperation with, or buy out, the more streamlined fintech entities.[8]

In this staff memo, the term 'fintech area' is used to characterise all the fintech activities carried out as part of the financial system, irrespective of which entity performs them. The term 'fintech sector' is used to characterise the fintech activities performed by the fintech firms, including activities linked to cryptoassets.

Fintech can be described using a tree structure

BIS has devised a "fintech tree" that describes different fintech activities and underlying factors enabling them.[9] In this tree, the crown consists of the fintech activities themselves, such as payment mediation, lending, asset management and insurance-related services. In the trunk, there are assorted technologies holding up the fintech activities. This could for instance be distributed ledger technology (DLT), artificial intelligence (AI) and machine learning (ML).[10] The roots of the tree consist of various policies from authorities which, in different ways, promote the use of technology to enable innovations and activities within the financial system. Some examples of this are authorities' policies concerning digital identification methods that enable the general public to access and use assorted digital services (in Sweden, for instance, BankID and Freja eID are used), facilitation of innovation and policies such as open banking regulations. In open banking, third-party developers gain access to client data from banks and can thus build various financial services and functions based on it. Innovation can be facilitated by means of authorities setting up innovation centres or regulatory sandboxes, in which new entities can test their products or services on the real market, but in a controlled environment. In Sweden, for example, Finansinspektionen (FI) has established an innovation centre where firms can obtain guidance on how they should organise their operations according to current legislation.[11] In the UK, the Financial Conduct Authority (FCA) has set up a regulatory sandbox.[12]

[7] Some examples of bigtech firms are US corporations Meta (formerly Facebook), Apple, Amazon, Netflix and Google. Two Chinese examples of bigtech firms are the corporations Tencent and Ant Group.

[8] The Rapid Growth of Fintech: Vulnerabilities and Challenges for Financial Stability. Chapter in the Global Financial Stability Report, April 2022, International Monetary Fund.

[9] J. Ehrentraud et al. (2020), "Policy responses to fintech: a cross-country overview", *FSI Insights* no 23, 30 January 2020, Financial Stability Institute, Bank for International Settlements.

[10] DLT is a technique that supports distributed ledgers (entry and maintenance) of encrypted data. One of the best-known subcategories of DLT is blockchains, on which the cryptoasset Bitcoin is based. DLT is a tool for registering ownership of money or securities, for example. DLT enables, in a decentralised way, proposing and validating transactions and updating ledgers in a synchronised manner between different networks. Access to and the possibility of adding data in the distributed ledger can either be 'permissionless' (unlimited) or 'permissioned' (limited to a specific group of users).

[11] FI (2021), "About the Innovation Center", Finansinspektionen. Last reviewed 13 April 2021. Accessed 25 April 2022. [online] Available at: About | Finansinspektionen.

[12] FCA (2022), "Regulatory Sandbox", Financial Conduct Authority. Last updated 28 March 2022. Accessed 25 April 2022. [online] Available at: Regulatory Sandbox | FCA.

Legislators in various parts of the world have also devised their regulations so as to promote innovation within financial services. An example of this is the Payment Services Directive 2 (PSD2) of the European Union. PSD2 sets requirements for banks to share information with other entities, such as fintech firms.

Network effects can give an advantage in financial services

Network effects are an important factor behind how bigtech firms in particular have gained ground within financial services. In short, network effects mean that the more people who use a service, the more valuable it will be for other people to start using it too. Taking payments as an example, it will be more attractive to use a payment service if more sellers accept it as a payment method, while at the same time it is more attractive for sellers to accept the payment method when more buyers wish to use it. A reason for why not all payment methods are accepted everywhere is that they require certain technical infrastructures to process, clear and settle payments. For example, for a seller to be able to accept a card from one of the major card companies, it must have access to the card company's network. If few people wish to pay with a certain card, the cost per transaction would be high for the seller. At the same time, it is not particularly valuable for the buyer to have a card that not many sellers accept. Network effects are therefore a reason for why only a handful of very large card companies have established themselves rather than, for instance, all banks issuing their own cards on their own card networks. Network effects are also a reason why banks have traditionally had a major role on financial markets, where they have a large volume of customers and a great deal of data about them.

Network effects are thus a reason for why bigtech firms have started to establish themselves within financial markets, particularly within payment mediation. Indeed, an aspect that is relatively unique for the bigtech firms is that, even before they start to offer financial services, they have numerous users and large volumes of data about them, which they can put to use when offering different services. Because the bigtech firms have so many users, they can capitalise on network effects to gain substantial market shares rapidly. In China for example, the payment market is dominated by two bigtech firms – Ant Group and Tencent. Together, the firms had a market share of over 90 per cent within mobile payments in 2020.[13]

Digitalisation of financial services is a way of gaining market share

Fintech involves the digitalisation of various services within the financial system. This can enable the fintech entities to take market share from traditional financial entities. In many cases, the fintech firms have newer and more modern systems than traditional financial entities, which makes it easier for them to provide modern solutions for assorted financial services. They can therefore offer, for example, the same or similar services as traditional entities at a lower price or with simpler and faster processes. The fintech entities often have a digital presence only; that is, they do not have any physical branches that customers can visit. This might be a reason why they can offer services at lower prices than traditional entities. Although Swedish banks,

[13] The Economist (2020), "Do Alipay and Tenpay misuse their market power", 6 August 2020, The Economist.

for instance, have a relatively advanced digital service offering, they have often kept their physical branches that a customer can visit, for instance to take out a mortgage or use other financial services. At the same time, physical branches can make financial services more accessible to people who, for various reasons, have difficulty in using digital services.

Fintech firms can grow to be big in countries where there is a high level of digital services use and a willingness to adopt more new ones. Sweden is an example of such a country. Here, a number of digital payment services have rapidly emerged for instance, while the same time traditional payment methods such as cash have sharply declined because it is considered to be less convenient to use.

However, fintech can also gain ground in developing countries, where a sizeable share of the population might lack access to the financial system and the services offered within it. This is usually called 'financial exclusion'.[14] For example, it might be a case of not having access to a bank account. This makes it more difficult to send money easily to other people in or outside of the country, or take out a loan for consumption. In certain cases, fintech could reduce financial exclusion, for instance through assorted services linked to cryptoassets, because all that a person needs is a cryptowallet to have access to their cryptoassets. In order to buy cryptoassets, access might however be needed to traditional currencies in digital form, such as money in a bank account. This is due to the fact that many of the methods for buying cryptoassets are digital. Cryptoassets can also be used to make cross-border transfers, for instance to countries with less developed banking systems.

Also, lending from fintech and bigtech firms can improve the prospects of certain customer segments to obtain loans (see the section Particularly rapid growth in lending from fintech and bigtech firms).

1.2 Fintech firms adhere to traditional financial legislation

Like other financial firms, fintech firms comply with prevailing legislation. In certain cases, however, fintech operations can circumvent this by using new technology (see the section Fintech activities can lead to circumvention of existing rules).

In general, the fintech firms must apply for authorisation from FI to conduct their operations, and also come under their supervision.[15] The legislation applicable to the fintech firms depends on the type of operations they pursue. They must also comply with other, more generally applicable legislation such as the GDPR.[16]

[14] The opposite to financial exclusion – financial inclusion – is characterised by most of the population having access to financial services such as a bank account.

[15] Under certain laws, firms can, under certain conditions, apply for exemption from authorisation requirements and, in that case, they are not supervised. Some firms only need to register their operations with FI, in which case they are not supervised either. FI verifies at least once a year however that registered firms fulfil the requirements imposed on them.

[16] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

If for example a firm is a payment institution, it shall comply with the Payment Services Act.[17] This category includes firms that enable private individuals to make payments directly from their bank account when making purchases through e-commerce. It also includes fintech firms that lend money to small businesses or that enable private individuals to pay bills and invoices with a credit card.

If instead a firm is a consumer credit institution, it must follow the Certain Consumer Credit-related Operations Act.[18] This category includes firms that take over a customer's existing credits, instalments and personal loans to offer them instead one single consolidated loan. Fintech firms that offer services to compare terms between different lenders or the possibility of consolidating loans and credits are also included here.

Another example of a type of firm into which fintech firms could be categorised is financial institutions. They are special in that they do not need to apply for authorisation from FI, but merely register their operations. This includes firms that provide online lending platforms (see the section Particularly rapid growth in lending from fintech and bigtech firms). This also includes firms that offer services to buy and sell cryptoassets. Financial institutions must follow the Act on Currency Exchange and Other Financial Operations.[19]

There are also numerous other firm types into which fintech firms could be categorised, such as investment firms. Some fintech firms, such as Klarna, are categorised as banking companies and must follow the same laws as the traditional banks.[20]

1.3 The fintech sector has grown rapidly

The Swedish fintech sector grew 15-fold between 2008 and 2018

The Swedish Agency for Growth Policy Analysis published a report in 2020 in which they studied the Swedish fintech sector.[21] They mapped out the number of Swedish fintech firms and the progression of the fintech sector from the beginning of the 2000s to the end of the 2010s.

Between 2000 and 2018, fintech firms totalled around 500 in Sweden, and around 450 of them were active in 2019. The three main categories in which fintech firms have established themselves are credit (credit, lending and savings products), pay-

[17] See the Payment Services Act (2010:751).

[18] See the Certain Consumer Credit-related Operations Act (2014:275).

[19] See the Act (1996:1006) on currency exchange and other financial activities.

[20] See the Banking and Financing Business Act (2004:297).

[21] See Growth Analysis (2020), "Swedish fintech", Memorandum 2020:20, Swedish Agency for Growth Policy Analysis.

ments (payment, transaction and money transfer services) and infrastructure (technical services sold to other companies to enable financial and fintech operations).[22] Around 230 firms in total are included in these categories.

In the report, the growth rate of the Swedish fintech sector is also described. The Swedish fintech sector grew from representing 0.01 per cent of GDP in 2008 to 0.15 per cent in 2018 – a 15-fold increase in ten years. In comparison, Swedish financial and insurance operations contributed around 3.9 per cent in total to GDP in 2021.[23]

Particularly rapid growth in lending from fintech and bigtech firms

Fintech and bigtech firms have, in many parts of the world, become increasingly prominent in one specific type of financial service – lending. A reason for this is that they have straightforward and swift digital loan application processes. Lending from fintech and bigtech firms can also be directed in particular at high-risk borrowers as a way of gaining market share within lending.[24] Borrowers who take out loans through fintech firms fail to fulfil their obligations to a greater extent than those who borrow from traditional financial entities.[25]

When referring to fintech lending, it is often lending over online lending platforms that is meant.[26] There are lending platforms directed at both private individuals and small and medium-sized enterprises. Often, the loans are unsecured. The lending platforms enable individual borrowers to be matched directly with lenders, known as peer-to-peer (P2P). Traditionally, it is banks or other financial institutions that act as lenders in the financial system. They usually fund their lending through deposits and market funding. Unlike the banks, in many cases the lending platforms do not take any credit risk of their own; their role is rather to mediate contact between lenders and borrowers.

From the beginning, online lending platforms worked such that they divided up a borrower's loan into several, smaller units. Private investors could then buy these units. Because the unit was relatively small, investors could buy into several different loans and hence diversify their credit risk. This model is commonly known as crowdfunding.

Over time, the platform model has been developed, however, and now also includes institutional investors such as insurance companies and banks. The types of loans on offer have also been broadened to include various kinds of secured loans.

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[22] Note that the infrastructure category is not the same as financial infrastructure, which the Riksbank defines as infrastructure systems in which payments are made and transactions in financial instruments are processed.

[23] C. Holmström (2022), "BNP – detaljerat" *[GDP, detailed breakdown]*, Ekonomifakta. Last updated 26 April 2022. Accessed 3 May 2022.

[24] The Rapid Growth of Fintech: Vulnerabilities and Challenges for Financial Stability. Chapter in the Global Financial Stability Report, April 2022, International Monetary Fund.

[25] M. Di Maggio and V. Yao (2018), "Fintech Borrowers: Lax-Screening or Cream-Skimming?", 16 August 2018, updated 6 April 2022, The Review of Financial Studies.

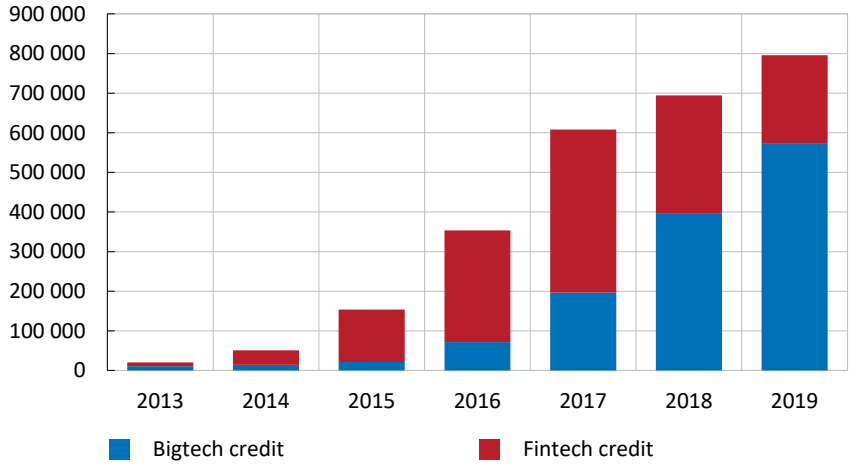
[26] For more information, see C. Bertsch and C-J. Rosenvinge (2019), "FinTech credit: online lending platforms in Sweden and beyond", *Economic Review*, 2019:2, Sveriges Riksbank.

Bigtech firms can also use different types of platform models for lending. Bigtech lending can also take place for example through partnerships between a bigtech firm and a financial institution. The bigtech firms have unique advantages within lending because they can utilise the large volumes of data they have about their customers from other digital services to determine which people make appropriate borrowers. Lending from bigtech firms has grown sharply in the past few years (see Figure 1). Growth in Asia has been particularly high, in countries such as China, Japan and Korea.[27]

Fintech firms can also offer other types of lending. For example, some fintech firms are organised like traditional banks in their business models and lending. They are often called neobanks and their presence is exclusively online. Another common business model for fintech firms is offering customers short-term "buy now, pay later" consumer loans. These types of loans are found within e-commerce in particular. Two large Swedish entities that are active within this type of lending are Klarna and Qliro. The Swedish market for these types of loans is estimated to reach just over USD 20 billion in 2022.[28]

Figure 1. Lending from fintech and bigtech firms

USD million



Note: The diagram shows lending from fintech and bigtech firms, respectively, for each year, totalled for the whole world.

Source: G. Cornelli et al. (2020), "Fintech and big tech credit: a new database", BIS Working Papers no 887, 22 September 2020, Bank for International Settlements.

[27] G. Cornelli et al. (2020), "Fintech and big tech credit: a new database", BIS Working Papers no 887, 22 September 2020, Bank for International Settlements.

[28] ResearchAndMarkets.com (2022), "Sweden Buy Now Pay Later Market and Investment Opportunities Report 2022: BNPL Payments are Expected to Grow by 33.8 % to Reach $20,207 Million – Forecast to 2028", 15 February 2022, Businesswire.

2 What are cryptoassets?

Cryptoassets are a kind of digital asset. One aim of cryptoassets is to create a decentralised financial system without the involvement of, for example, governments or central banks. Most cryptoassets are unbacked and their price is often volatile. There are some cryptoassets, however – known as stablecoins – that are intended to maintain a stable value over time. This is often achieved by backing them with a reserve of assets. Many cryptoassets have so far been used to make speculative investments and to a relatively small extent as a means of payment. There has also been a rise in different financial products that have cryptoassets as their underlying asset. There is relatively little data available concerning cryptoassets, although most indications so far suggest that it is primarily private individuals who have invested in cryptoassets. Data suggest that Swedish cryptoasset holdings are relatively low compared with other countries.

2.1 Cryptoassets are digital assets

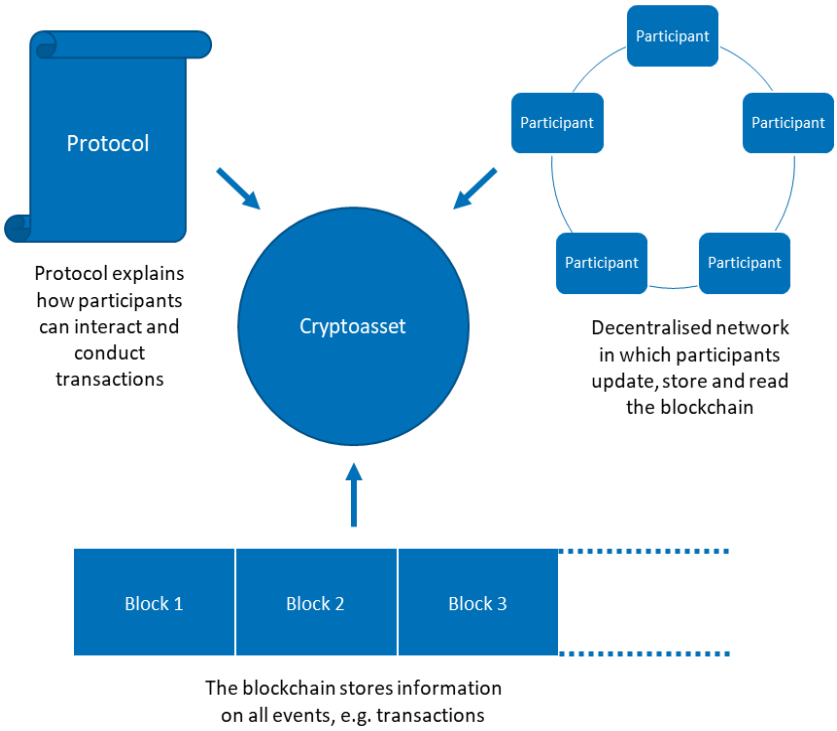
Interest in cryptoassets has risen sharply in a short space of time. A fundamental concept of cryptoassets is the desire to create a decentralised financial system without the involvement of governments, central banks and financial intermediaries such as banks. Instead, control should lie with the participants through decentralised networks, with everyone able to transfer money to anyone anywhere in the world with no party able to limit it and without having to have a bank account for example.

Unbacked digital assets

Cryptoassets are a kind of digital asset. Many cryptoassets are unbacked (i.e. do not have any underlying collateral) and do not have a central issuer governing how many new cryptoassets should be issued or what their price should be. Neither is there any party to turn to if something goes wrong (see the section Cryptoassets have low consumer and investor protection). Instead, it is a set of rules – a protocol – that clarifies how new cryptoassets are created and how participants can interact and conduct transactions. All events such as transactions are registered in a ledger, such as a blockchain, that everyone can read. Cryptoassets also have a decentralised network of participants in which the participants update, store and read the blockchain.[29]

[29] Cryptocurrencies: looking beyond the hype. Chapter in *BIS Annual Economic Report*, June 2018, Bank for International Settlements.

Illustration 1. The components of cryptoassets



Note. The figure is based on information from Cryptocurrencies: looking beyond the hype. Chapter in *BIS Annual Economic Report*, June 2018, Bank for International Settlements.

The cryptoassets Bitcoin and Ethereum are examples of unbacked cryptoassets without central issuers (in this staff memo called "unbacked cryptoassets"). Ethereum is actually the name of a decentralised blockchain. The Ethereum blockchain has its own cryptoasset called Ether, which is often called Ethereum. In this staff memo, the name Ethereum is used both for the blockchain and the cryptoasset.

The price of Bitcoin and Ethereum is determined by expectations that someone else will be willing to pay at least as much as the buyer has paid to buy them. There is thus no guarantee that they will hold their value. Neither is it certain that they will be exchangeable for another asset, such as a national currency. The factor that gives most cryptoassets their value is rather the hope that they will maintain or increase their value. It might also be the case that the decentralised characteristics of cryptoassets are valued.

Crypto wallets are a kind of storage place for cryptoassets.[30] The wallet does not contain the actual cryptoassets, but rather serves as a way of accessing them. A crypto wallet has a private key and a public key. The private key works in a similar way to a password, and the owner of the cryptoassets uses it to access their cryptoassets. The public key serves as the wallet's address, which the owner can provide to have cryp-

[30] For more information on digital wallets, see for example B. Nibley (2021), "What is a crypto wallet? Understanding the software that allows you to store and transfer crypto securely", 28 October 2021, Business Insider.

toassets sent to them. Although the wallet's address is public, the information concerning the wallet's holder is concealed. This is why it is said that Bitcoin and other cryptoassets have a relatively high degree of anonymity, unlike a bank account, as banks are under strict requirements in terms of sound customer due diligence.

Transactions in Bitcoin and many other cryptoassets are based on a method called 'proof of work' (PoW). A general description of how this works is provided in the fact box below.[31]

[31] For more detailed information on the process for a Bitcoin transaction, see B. Segendorf (2014), "What is Bitcoin?", *Economic Review*, 2014:2, Sveriges Riksbank.

FACTS – What is the proof of work (PoW) process?

To enable carrying out, for example, a Bitcoin transaction between two digital wallets, it must be confirmed by the network. The transaction is merged with other proposed transactions in a "block". This takes place automatically every ten minutes. Those who confirm the block of proposed transactions are called "miners", which anyone can become.[32] Miners compete to confirm the transaction by being the fastest one to solve a mathematical problem. The solution to the problem must thereafter be confirmed by other miners through a majority decision.[33] When the block of transactions has been verified, they are added to the chain of blocks of previously completed transactions.

Miners have incentives to verify transactions because the miner who solved the mathematical problem fastest receives a reward in the form of newly created Bitcoins. The miner also receives reward in the form of a transaction fee.[34] The degree of difficulty of the mathematical problem and the number of new Bitcoin created are governed by the Bitcoin protocol. When the price of Bitcoin increases, it will be more attractive to compete for and confirm transactions and hence be awarded newly created Bitcoin. If more computers participate in the network, the degree of difficulty of the problem increases. A more difficult problem requires more computing power.

Since all Bitcoin transactions need to be confirmed by the network and this is done at ten-minute intervals, it can take up to ten minutes for the transaction to be verified. Also, there is a rule of thumb that one should wait for a number of rounds to be sure that the transaction really has been completed and is registered on the blockchain.

There are also other methods for confirming transactions on blockchains. One of the best known is "proof of stake" which requires less computing power than PoW.[35]

There is an embedded halving period for how many Bitcoins are created for each added block and the size of the reward that the miner who solved the problem fastest can thus receive. After 210,000 blocks, the volume of created Bitcoins is halved. Eventually, the volume of newly created Bitcoins will therefore decrease to around zero. This means that there is a cap on how many Bitcoins can be created in total, which is 21 million. In the Middle of May 2022, the volume of Bitcoins in circulation was around 19 million.[36] Since miners receive fewer newly created Bitcoins when they confirm transactions, transaction fees will become a more important part of the network. In other words, transaction fees will form an increasingly important incentive for miners to verify transactions compared with currently, as they are also rewarded with newly created Bitcoins.

[32] This is the case of an open blockchain, also known as a permissionless blockchain. There can also be blockchains that only certain parties are able to update, known as a permissioned blockchain.

[33] The more computing power a miner provides to the Bitcoin network, the more voting power that miner will have.

[34] Transactions with no or a small transaction fee might need to wait longer for confirmation and completion.

[35] Proof of stake (PoS), in short, entails that those who hold a sufficient volume of the cryptoassets concerned can be entrusted with verifying transactions. The cryptoasset and blockchain Ethereum will switch to PoS instead of PoW.

[36] See Blockchain's website: Blockchain Explorer – Search the Blockchain | BTC | ETH | BCH.

Cryptoassets are also called cryptocurrencies but lack the characteristics of regular currencies

It is common for the term "cryptocurrencies" to be used to describe cryptoassets. However, the Riksbank finds the term "cryptocurrency" misleading because it implies that cryptoassets are supposedly a type of money.

There are different ways of defining what money is. A common way of defining it is that an asset must fulfil three criteria to be considered money: It must act as a *store of value*, it must act as a *means of payment* and it must act as a *unit of account*.[37] Because Bitcoin is the largest cryptoasset so far, we take this as an example.

An asset working as a *store of value* means that its holder must be able to trust that it is possible to buy about as much for, let's say, SEK 100 today as it will be tomorrow. The price of Bitcoin has been highly volatile (see Figure 4) and it is thus a relatively poor store of value. There are however cryptoassets that aim to have stable prices over time (see the section How do stablecoins differ from other cryptoassets?).

An asset working as a *means of payment* essentially means that it can be used for payments; that is, a buyer uses the asset to pay and a seller accepts it as payment. There is no exact figure of how many businesses accept Bitcoin as a means of payment in the purchase of goods and services. Coinmap, however, has a map service where users can add different merchants that accept Bitcoin directly for payments and also Bitcoin ATMs where Bitcoins can be bought for cash or with a credit card. As of 13 May 2022 around 29,500 merchants and ATMs worldwide had been added to the map.[38] As a comparison, Visa cards are accepted by more than 60 million merchants worldwide.[39] In El Salvador, Bitcoin has fairly recently been made legal tender, and has the same legal status there as cash has in Sweden. This generally means that it should be possible to use Bitcoin as a means of payment everywhere in El Salvador. In April 2022, the Central African Republic also made Bitcoin legal tender.

An asset working as a *unit of account* in short means that it is used to price goods and services. The other two functions have a bearing on this, because it is more difficult to price a good or service if the value of the asset fluctuates considerably or if it is not used as a means of payment. In Sweden, and other countries, prices are set in the local currency and not in Bitcoin.

Bitcoin does not generally fulfil the three functions and the conclusion can thus be drawn that Bitcoin is not money, at least not in the sense that it works like money in the traditional financial system and in society. The same can be said of many other cryptoassets.

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[37] See for example G. Söderberg (2018), "Are Bitcoin and other cryptoassets money?", *Economic Commentaries* No. 5, 2018, Sveriges Riksbank.

[38] See Coinmap's website: Crypto ATMs & merchants of the world | Coinmap.org.

[39] Visa (2022), "Leading by example", Visa. Accessed 25 April 2022. [online] Available at: Leading by Example | Visa.

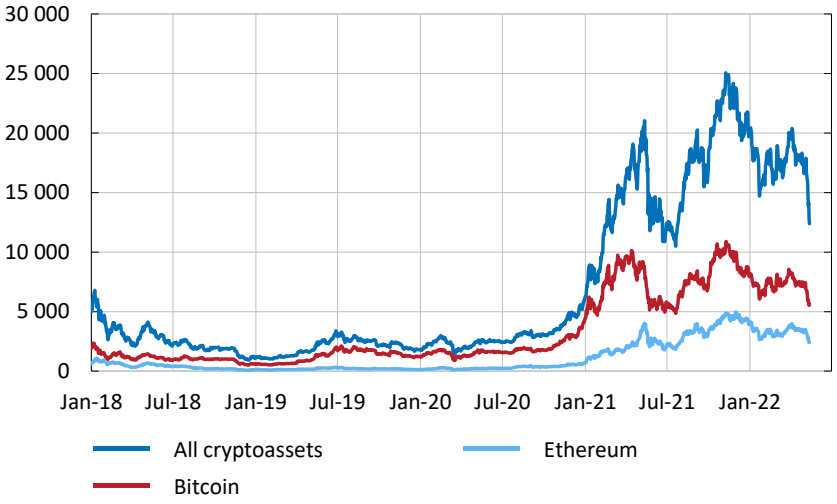
The value of cryptoassets has risen sharply but has been highly volatile

The cryptoasset market has grown a lot since the beginning of 2018. The market value reached a record level of around SEK 25,000 billion in November 2021 but has thereafter decreased rapidly and is currently worth around SEK 12,400 billion (around USD 1,200 billion) (see Figure 2). Moreover, the market for cryptoassets is still only a small market compared with the global financial system, of which the total assets were valued at around USD 470,000 billion at the end of 2020.[40]

In total, there are around ten thousand different cryptoassets. Based on market value, Bitcoin is the largest cryptoasset, but there are also several others that have grown in size.[41] One example of such a cryptoasset is Ethereum. A major reason for the increase in the total market value of cryptoassets is that the price of various cryptoassets has risen, while the number of cryptoassets in circulation has also increased.

Figure 2. Market value of cryptoassets

SEK billion



Source: Macrobond.

There are cryptoassets called memecoins because they refer to internet memes.[42] For some of these, prices have risen rapidly, often after they have been hyped up in various internet forums, to then plummet. An example of this is Dogecoin. At the beginning of 2021 it was worth around 1 US cent (see Figure 3). In April and May 2021, the price increased sharply to around 68 cents per Dogecoin, to then drop in June and July by almost 74 per cent to around 18 cents.

[40] FSB (2021), "Global Monitoring Report on Non-Bank Financial Intermediation", 16 December 2021, Financial Stability Board.

[41] The market value of cryptoassets is usually calculated as the price per cryptoasset multiplied by the volume in circulation.

[42] A meme is a kind of funny image, video or GIF circulating on the internet. The meme often has a caption.

Figure 3. Price performance for Dogecoin in 2021

US dollars

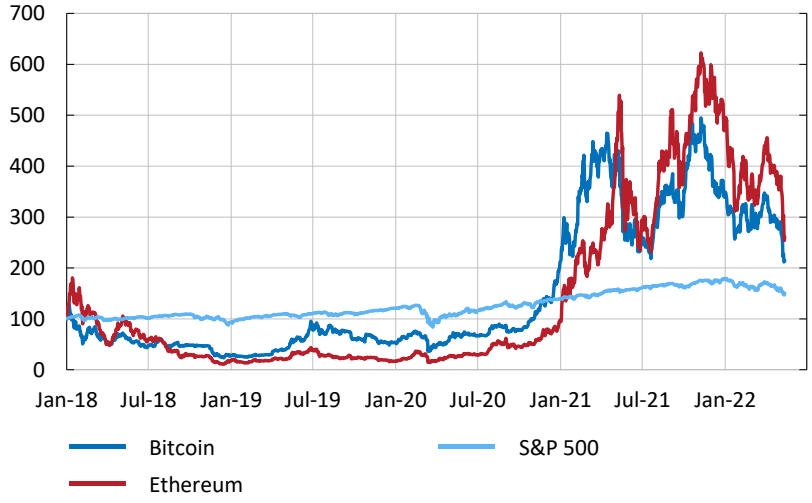
Note: The diagram shows the price per Dogecoin at the end of the day.

Source: Macrobond.

Although the prices of many cryptoassets like Bitcoin and Ethereum have risen considerably in the past few years, they have also been highly volatile. The developments in the past few months have been a clear example of this volatility. Also compared with other assets, Bitcoin and Ethereum have been much more volatile (see Figure 4).

Figure 4. Index for Bitcoin, Ethereum and S&P 500 over time

Index, 1 January 2018 = 100



Note: The diagram shows the indexed performance of Bitcoin, Ethereum and the stock market index S&P 500 over time. Riksbank's calculations.

Source: Macrobond.

2.2 Stablecoins are intended to maintain a stable price over time

How do stablecoins differ from other cryptoassets?

Stablecoins are a kind of cryptoasset that are intended to maintain a stable value over time, for instance by tracking the price of a national currency such as the US dollar.[43] They therefore differ from many other cryptoassets, which do not have stabilisation mechanisms. Instead, their values fluctuate freely.

The value of stablecoins is generally backed by a reserve that can consist of different assets and they can thus be called collateralised stablecoins. The collateral can be financial assets such as commercial paper, bank deposits in one or several national currencies or even other cryptoassets.

There are also algorithmic stablecoins, also called non-collateralised stablecoins, which do not have a reserve of assets that fully equals the value of the issued coins. Instead, an algorithm adjusts the price based on supply and demand, keeping a stable level over time. In short, when the price rises, new stablecoins are created to increase the number of stablecoins in circulation, which has the purpose of reducing the price. When the price falls, the number of stablecoins is reduced – they are repurchased and destroyed. This process can be more or less automated. For example, it might be that part of the process, such as the creation and destruction of coins, is not automated.

Stablecoins can also be a combination of the versions described above, for instance a collateralised stablecoin but with certain features from algorithmic stablecoins. This staff memo focuses mainly on collateralised stablecoins.

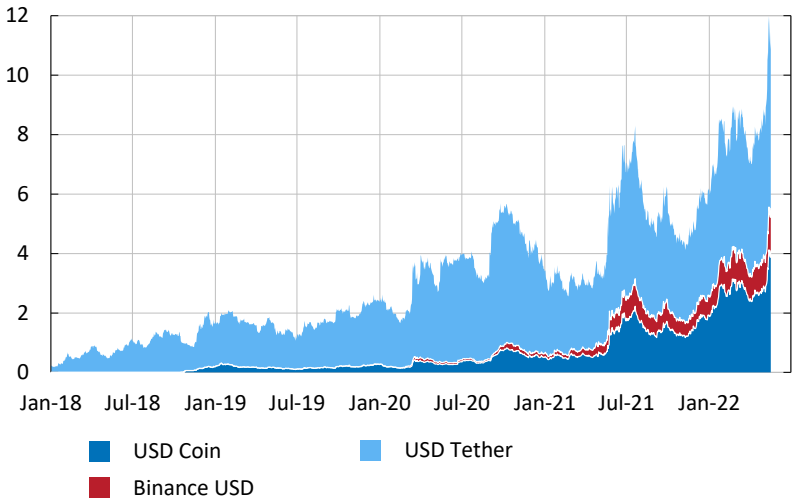
Three of the largest stablecoins that exist today – USD Tether (USDT), USD Coin (USDC) and Binance USD (BUSD) – are intended to maintain a 1-to-1 relationship with the US dollar. These are examples of collateralised stablecoins.

Like other cryptoassets, stablecoins too have grown in popularity in the past few years, resulting in growth in their market value. They now make up a sizeable share of the total market for cryptoassets. The market value of USDT, USDC and BUSD currently equals approximately one tenth of the total market value of cryptoassets (see Figure 5). Unlike other cryptoassets like Bitcoin and Ethereum, the increase in market value is not due to price increases, but to an increase in the number of issued stablecoins. This also means that the asset reserves for these stablecoins have increased in size.

[43] For a more comprehensive overview of the structure of different types of stablecoins, see D. Bullmann et al. (2019), "In search for stability in crypto-assets: are stablecoins the solution?", Occasional Paper Series, No. 230, European Central Bank.

Figure 5. Market share of USD Coin, Binance USD and Tether USD

Per cent



Note: The diagram shows the market value of USD Coin, Binance USD and USD Tether as a share of the total market value of cryptoassets. Riksbank's calculations.

Source: Macrobond.

The overall market value of euro-pegged stablecoins, including EUR Tether, is relatively low thus far. There is currently no major stablecoin pegged to the Swedish krona.

Many stablecoins are available for anyone to buy at various trading venues and can be kept in crypto wallets. There are however examples of stablecoins which, at least for now, are only intended for institutional investors. One is JP Morgan's JPM Coin, which is fixed at 1 to 1 to the US dollar. JPM Coin is used for immediate payments between accounts at JP Morgan.[44]

The term 'stablecoins' might be misleading

In order for the value of stablecoins to be stable, it is essential that the assets backing them are liquid and stable in value. Another condition is that the size of the reserve must equal issued stable coins; that is, when new stablecoins are created, new reserve assets must increase correspondingly. When stablecoin holders instead redeem their stablecoins, these must be destroyed and the reserve assets be reduced correspondingly.[45]

The largest stablecoin, USD Tether, has a reserve that largely consists of short-maturity assets such as commercial paper (see Figure 6). Commercial paper is a type of unsecured asset that could lose value. It could mean that the assets in the reserve no

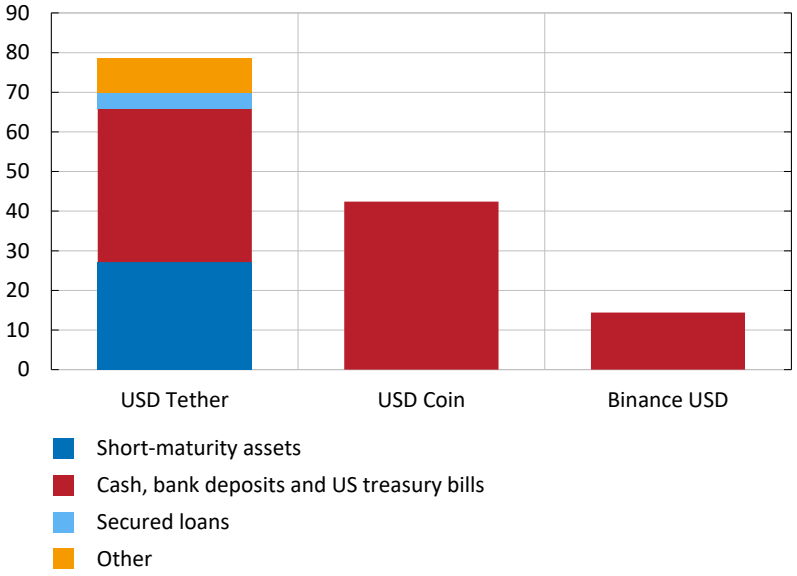
[44] E. Mitchell (2021), "What is JPM Coin and How Do You Buy It?", 10 January 2021, Bitcoin Market Journal.

[45] FSB (2022), "Assessment of Risks to Financial Stability from Crypto-Assets", February 2022, Financial Stability Board.

longer suffice to equal issued stablecoins. In that case, they cannot thus be redeemed at the value expected by holders.

Figure 6. Reserve assets for USD Tether, USD Coin and Binance USD

USD billion



Note: Short-maturity assets include commercial paper, certificates of deposit and money market funds. The "other" category includes reserves in the form of e.g. corporate bonds and other cryptoassets. Data on underlying reserve assets comes from the independent audit report for each stablecoin as of 31 December 2021.

Sources: Circle (USD Coin), Paxos (Binance USD) and Tether.

The company behind the stablecoin USD Tether was ordered to pay a fine of USD 41 million by an American authority in the autumn of 2021, due to their claim that Tether had been fully backed by assets in traditional currency.[46] It emerged, however, that the reserve assets had not always equalled the number of issued stablecoins and that the reserve included various types of unsecured receivables. Also, the reserve assets had been partly held with unregulated entities or in other jurisdictions and not been subject to regular review. On the whole, these factors could have lead to inability for Tether holders to redeem their stablecoins at the intended value of one dollar.

As the reserve for stablecoins often consists of more traditional financial assets, such as bank deposits or various kinds of financial assets, this also tightens the connection between stablecoins and the financial system as a whole. If a situation emerges in which numerous stablecoin holders want to exchange their stablecoins at the same time for national currency, for instance because they have lost confidence in the stablecoin maintaining its value, the assets in the reserve might need to be sold off or redeemed rapidly. This could in turn cause shocks, such as price corrections, on the

[46] CFTC (2021), "CFTC Orders Tether and Bitfinex to Pay Fines Totaling $42.5 Million", Release Number 8450-21, 15 October 2021, Commodity Futures Trading Commission.

markets where the reserve assets are invested and problems for the entities that issue the assets.

There are examples of times when stablecoins have not lived up to their designation. During May 2022, holders of a relatively large algorithmic stablecoin, TerraUSD, sold large volumes during a few days' time.[47] Different factors are believed to have caused this, but altogether this resulted in the algorithm not being able to uphold TerraUSD's promised value of one dollar. Instead, the price of TerraUSD collapsed, to circa 15 cent at the lowest on May 13. In conjunction with the drop in TerraUSD, also other stablecoins were affected, also those who are not algorithmic. One example is USD Tether, which dropped by around five per cent at most from the promised value of one dollar and also met demands for redemption from holders. However, the price of USD Tether has thereafter approached one dollar again. Other cryptoassets were also affected by the events. An earlier example of an unstable stablecoin is the case of the small stablecoin, IRON, which dropped rapidly in price during 2021. This was because IRON's reserve consisted of around a quarter of another cryptoasset, which saw its value drop to zero. At that time, the price of IRON dropped from a value of around USD 1 to 75 cents in the space of a couple of days.[48] Because IRON was a relatively small stablecoin, the drop in price did not have any major implications.

Altogether, these cases illustrate that stablecoins not necessarily are stable. It also shows that it may be difficult to maintain a stable price for a stablecoin if the value of the assets in the reserve is unstable or if their value do not fully correspond to the number of issued stablecoins.

The larger a stablecoin and its asset reserve, the more pronounced the risks. For stablecoins held and used by people worldwide – global stablecoins – the risks could have particularly heavy consequences for both stablecoin holders and the rest of the financial system, because they can spread throughout different economies.[49]

2.3 How are cryptoassets used?

Most cryptoassets have been used as speculative investments

Non-collateralised cryptoassets are used mainly as speculative investments; that is, they are bought in the hope that they will gain value. An indication of this is that a large proportion – over 50 per cent – of the available Bitcoin supply is kept for periods of at least a year.[50] Had their main purpose rather been as a means of payment, the turnover period would be shorter.

[47] R. Nieva (2022) and A. Sethi (2022), "Why Crypto Cratered: 5 Things You Need To Know", 14 May 2022, BuzzFeed News.

[48] The Crypto Ecosystem and Financial Stability Challenges. Chapter in the *Global Financial Stability Report*, October 2021, International Monetary Fund.

[49] G7 Working Group on Stablecoins (2019), "Investigating the impact of global stablecoins", October 2019, Group of Seven, International Monetary Fund and Bank for International Settlements.

[50] Citibank (2021), "Bitcoin: At the Tipping Point", Citi GPS: Global Perspectives & Solutions, March 2021, Citibank.

Although not much data is available, most indications point to cryptoasset investors mainly being private individuals.[51] In the past few years, however, a number of institutional investors also have increased their exposures to cryptoassets, for instance in their hunt for yield and for the sake of diversification.[52] Interest is particularly high among institutional investors in Asia and Europe.

The correlation of cryptoassets, such as Bitcoins, with the stock market has strengthened, however, suggesting that they have limited diversification characteristics.[53] This could pose financial risks for the investors who are exposed to cryptoassets if they do not bear this relatively strong correlation in mind. So far, however, exposure among institutional investors is limited compared with their total assets. Banks' exposures to cryptoassets has also been considered limited thus far.[54]

Cryptoassets have served as a means of payment to a relatively minor extent

Most cryptoassets are used to a relatively minor extent as a means of payment in most countries. One reason for this is that many cryptoassets do not have the characteristics that we generally associate with means of payment. Two such characteristics are that a means of payment should be quick to use and maintain a stable value. In previous sections, we ascertained that cryptoassets such as Bitcoin and Ethereum have been volatile and can thus not be trusted to maintain an equal value from day to day. Also, it takes around ten minutes to carry out a transaction in, for instance, Bitcoin.[55] As a comparison, a Swish transaction only takes a couple of seconds. Also card payments, for example, are fast from the customer's perspective, even though it ultimately takes much longer to settle the payment.

Stablecoins fulfil certain criteria relating to means of payment, because they aim to maintain a stable value over time. Thus far, they have however mainly been used to facilitate trade in other cryptoassets. For example, USD Tether is one of the most traded cryptoassets with a volume of around SEK 60 billion per 24-hour period.[56]

Lately, many of the largest payment service providers such as Mastercard, Visa and PayPal have started to get involved in cryptoassets in different ways. For example, PayPal has launched a service for American users to buy, sell and hold cryptoassets. PayPal is also looking into the possibility of launching its own stablecoin based on US

[51] A. Blandin et al. (2020), "3rd Global Cryptoasset Benchmarking Study", September 2020, Cambridge Centre for Alternative Finance.

[52] J. Neureuter (2021), "The Institutional Investor Digital Assets Study", September 2021, Fidelity Digital Assets.

[53] T. Adrian et al. (2022), "Crypto Prices Move More in Sync With Stocks, Posing New Risks", 11 January 2022, IMF Blog. Blog post available at: Crypto Prices Move More in Sync With Stocks, Posing New Risks – IMF Blog.

[54] Basel Committee on Banking Supervision (2021), "Prudential treatment of cryptoasset exposures", 10 June 2021, Bank for International Settlements.

[55] O. Bosun (2022), "Cryptocurrencies like Bitcoin are still not effective payment options", 23 January 2022, Yahoo Finance.

[56] Based on the 24-hour volume on 16 May.

dollars.[57] Card companies Mastercard and Visa have largely focused on facilitating the use of cryptoassets as a means of payment in different ways.[58] For example, they have initiated cooperation with a number of cryptoasset trading venues and issued payment cards linked to these. When a purchase is made with these cards, the cryptoassets are converted to regular currency through the sale of the cryptoassets. The payment then goes through the regular card networks. There are currently a number of crypto payment cards available for Swedish customers – both credit and debit cards. Even more options are available internationally. Visa reported that use of cryptoasset cards reached USD 2.5 billion dollar in the first financial quarter of 2022, compared with USD 1 billion in the first half of 2021.[59] In the future, cryptoassets might thus be used to a greater extent for payments, even in ordinary society.

Financial products that are based on cryptoassets

The traditional way of investing in cryptoassets has been to buy them directly. As the market for cryptoassets has grown in size, a number of financial products have emerged that have cryptoassets as their underlying asset. These include financial instruments, such as tracker certificates, that exactly follow the price of the underlying asset, as well as futures and options. Some of these are primarily directed at institutional investors, while others are also available to private individuals. A difference between investing directly in cryptoassets and investing in various financial instruments that have cryptoassets as their underlying asset is that many of the instruments are traded on regulated markets, while the cryptoasset is often unregulated.

Some trading venues on which the financial products are sold allow high leverage.[60] This means that investors only need to invest a small amount of equity and borrow the rest. There is thus an opportunity to make major gains with a small investment, while at the same time the risk of financial losses can be substantial. If for example a person has SEK 100 in equity to invest and does not use leverage, the loss can be a maximum of SEK 100, if the investment loses 100 per cent of its value. If however the investment is made at a leverage of 10 times, this means that the total investment will be SEK 1,000 – that is, 10 times the equity. In a 20 per cent price change, the gain or loss will then be SEK 200. On the whole, this therefore means that an investor can lose more than their invested capital, while at the same time there is a chance of making a gain that is greater than it would have been had equity alone been invested.

There are also funds specialised in cryptoassets and related operations. Some of these are exchange-traded funds (ETFs). This means that investments can be made in them over a regular stock exchange.

[57] M. Bellusci (2022), “Paypal Is Exploring Creating Its Own Stablecoin as Crypto Business Grows”, 7 January 2022, updated 8 January 2022, CoinDesk.

[58] For more information, see *Payments report* (2021), Sveriges Riksbank.

[59] F. Holland (2022), “Visa says crypto-linked card usage hit $2.5 billion in its first quarter", 28 January 2022, CNBC.

[60] S. Potter (2022), “Wild Crypto Leverage Is On Offer for Pros In 20 Times Bitcoin Bet”, 26 January 2022, Bloomberg.

Some cryptoasset trading venues also offer other services besides trade in cryptoassets, such as loans collateralised by cryptoassets. Often, these loans are overcollateralised, which means that the collateral in the form of the cryptoassets exceeds the amount of the loan.

2.4 Cryptoassets from a Swedish perspective

Limited information on the exposures of Swedish households to cryptoassets

Ownership of most cryptoassets such as Bitcoin is fundamentally anonymous and data availability is low.[61] The degree of exposure to cryptoassets of Swedish households is therefore difficult to determine.

However, there is some information that can be used. When cryptoassets are sold, the gain should be taxed in the same way as for other financial assets. The Swedish Tax Agency has therefore obtained some information on cryptoasset ownership. As of June 2021 around 3,000 people had declared their gains on cryptoassets.[62] In a survey by the Swedish Internet Foundation, 3 per cent of respondents stated that they had bought or sold some kind of cryptoasset in the past year.[63]

Also, there are a number of Swedish firms that provide platforms for buying and selling cryptoassets. One of these is Goobit, which provides the platform BTCX on which the cryptoassets Bitcoin and Ethereum can be bought. Goobit has reported that it has approximately 200,000 customers, most of whom are Swedish.[64] Another firm is Safello, which enables buying the cryptoassets Bitcoin, Ethereum, Chainlink, Polkadot and Polygon. In its 2021 annual report Safello reported that, since 2013, it has had 250,000 customers.[65] Probably a large proportion of these are Swedes as Safello only offers cryptoasset purchases in Swedish kronor and euro.

For various financial instruments that have cryptoassets as the underlying asset, some information is available. In 2020, FI performed a stocktake of the Swedish tracker certificate market. The stocktake is based on survey responses from Swedish investment firms and data from FI's transaction reporting system. It showed that around 35,000 Swedes at most have had holdings in financial instruments with cryptoassets as the underlying asset.[66]

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[61] All transactions on the blockchain are public, however, and it is relatively easy to see between which electronic wallets a transaction has passed. It is however complicated to trace an electronic wallet to a particular individual.

[62] J. Ohlin (2021), "Få skattar på kryptotillgångar – stort mörkertal" *[Few pay tax on cryptoassets – Numerous undeclared cases]*, 4 June 2021, SVT Nyheter.

[63] *The Swedes and the Internet,* 2021, The Swedish Internet Foundation.

[64] J. Ohlin (2021), "Få skattar på kryptotillgångar – stort mörkertal" *[Few pay tax on cryptoassets – Numerous undeclared cases]*, 4 June 2021, SVT Nyheter.

[65] Safello (2022), "Annual Report Safello Group AB 2021", annual report. [online] Available at: Financial Reports | Safello.

[66] Financial instruments with cryptoassets as underlying asset, FI Supervision Report no. 21, February 2021, Finansinspektionen.

The firm Chainalysis has developed an index tracking the cryptoasset holdings and cryptoasset activity in different countries, with a focus on private individuals.[67] Cryptoasset holdings and activity are particularly high in developing countries such as Vietnam, which has been assigned a high index value. Sweden is considered to have a relatively low index value, which means that, comparatively, Swedes do not have particularly high cryptoasset holdings nor cryptoasset activity.

[67] Chainalysis (2021), "The 2021 Geography of Cryptocurrency Report: Analysis of Geographic Trends in Cryptocurrency Adoption and Usage", October 2021, Chainalysis.

3 Why is fintech of interest to authorities?

The fintech sector can improve the efficiency in the financial system and lead to financial services being cheaper and better. But it also gives rise to different kinds of challenges for authorities. For example, there is a fear of fintech firms circumventing prevailing rules by using new technology. Cryptoassets can present particular challenges and risks, while at the same time data availability is low, which limits the ability to monitor risk progression. Cryptoassets are largely unregulated in many countries, although there are some countries that have put a total ban on cryptoassets and related operations. Work is in progress in many jurisdictions, including the EU, on devising legislation that encompasses cryptoassets. Efforts are also under way within a number of standard-setting bodies on preparing standards that, on the whole, aim to reduce the risks caused by cryptoassets.

3.1 The fintech sector is relatively new

The fintech sector has emerged quickly and grown significantly. This is particularly the case for the market for cryptoassets, which has grown to a value of just over USD 1,200 billion, equalling around SEK 12,400 billion, in the space of just a couple of years. However, the market only represents around 0.3 per cent of the size of the global financial system, which had total assets of around USD 470,000 billion at the end of 2020.

The fintech firms and their operations can, through their use of new technology, improve efficiency in the financial system and lead to cheaper and better financial services. At the same time, this must be weighed against the fact that they can give rise to many kinds of challenges for authorities and risks to the financial system. Cryptoassets in particular are associated with various kinds of risks. Fintech operations, including operations in cryptoassets, have therefore increasingly climbed up the agenda of central banks and various standard-setting bodies.

Fintech activities can lead to circumvention of existing rules

Because of the fintech sector's rapid growth, regulation has not kept up on all fronts, especially not for cryptoassets. As an example, there are certain stablecoins that work as money market funds in that their reserve largely consists of assets such as commercial paper, but without following the same requirements as are typical for such

funds.[68] In these cases, the stablecoin issuer uses new technology to circumvent the rules.

Access of new entities to central settlement systems differs between countries

Central settlement systems make up the very core of financial infrastructure. All payments go through them. In these systems, large payments are settled in central bank money to reduce the risks in the transactions.[69] For large payments in Swedish kronor, it is the Riksbank's RIX system that is the central payment system. Participants in the RIX system are credit institutions, investment firms, clearing organisations, securities depositories, central counterparties and the National Debt Office – that is, traditional financial entities. As the fintech sector and its participants grow, it will become increasingly important for relevant authorities to decide on which entities should have access to settlement systems and which requirements should be placed on them. In the UK for example, non-bank payment service providers are permitted to apply for access to the Bank of England's settlement system for large payments.[70] The fintech firm Wise (formerly TransferWise), which operates in cross-border payments, was the first non-bank payment service provider to gain access to the Bank of England's settlement system.[71]

In the EU, it is, among other things, the Settlement Finality Directive that limits which entities have access to central settlement systems.[72] The directive has not been implemented uniformly in all countries.[73] In Sweden, for instance, it has been implemented in a way that makes many fintech firms unable to participate in the Riksbank's RIX system.[74] A review in the EU is in progress to ensure that it is implemented consistently.

Supervision and oversight of fintech firms

As described previously, fintech firms must follow different rules based on the operations they conduct, just like other firms in the financial sector (see the section Fintech firms adhere to traditional financial legislation). They must generally also apply for authorisation from FI and come under their supervision. There are however some firms with operations that do not require them to apply for authorisation due to how the

[68] A money market fund is a kind of fund that invests in liquid, short-maturity assets such as commercial paper. The funds aim to preserve the value of the investment or offer a return equalling the money market rate.

[69] Central bank money is the money which, in Sweden, is issued by the Riksbank and is on the Riksbank's balance sheet. For the general public, it is currently only available in the form of cash. The money that for example banks have in accounts in the RIX system is central bank money.

[70] Bank of England (2017), "Bank of England extends direct access to RTGS accounts to non-bank payment service providers", news item, 19 July 2017.

[71] Bank of England (2018), "First non-bank service provider (PSP) directly accesses UK payment system", news item, 18 April 2018.

[72] Directive 98/26/EC of the European Parliament and of the Council of 19 May 1998 on settlement finality in payment and securities settlement systems.

[73] See *Payments Report*, 2021, Sveriges Riksbank and *Financial Stability* 21:2, Sveriges Riksbank.

[74] An example of a fintech firm that is a RIX member is Klarna.

rules are devised. One example is Getswish.[75] Operations that are not subject to authorisation are not supervised either. The Riksbank is responsible for oversight of financial entities. However, according to the current Sveriges Riksbank Act, the Riksbank only has the right to retrieve information from entities under FI's supervision.[76] This makes it difficult for the authorities to access information on operations that neither require authorisation nor are supervised. Consequently, it can be difficult to capture risks before they transpire.

3.2 Challenges presented by a lack of data, low consumer protection and high energy consumption

A lack of data makes it difficult to monitor the progression of risks linked to cryptoassets

Data on cryptoassets is barely available. This is largely because cryptoassets are relatively anonymous, which makes it difficult to determine who owns them. Because cryptoassets and related services are largely unregulated and not supervised or monitored, authorities have limited possibilities of requesting information from various entities. It is particularly difficult to determine the degree of cryptoasset exposure in a certain country, because operations linked to cryptoassets are often cross-border. Altogether, the lack of data makes it difficult to determine the breadth of the risks associated with cryptoassets, and the measures that would be required to reduce them.

Cryptoassets have low consumer and investor protection

Most cryptoassets have very low or non-existent consumer and investor protection. The Riksbank, Finansinspektionen and European supervisors alike have therefore expressed that cryptoassets are not an appropriate investment, especially not for private individuals.[77] For example, it is difficult for investors in cryptoassets to place demands if problems arise or if they have been deceived, because there is often nobody to hold accountable.

[75] FI (2020), "FI och Swish - frågor och svar" *[FI and Swish – questions and answers]*, Finansinspektionen. Published 22 January 2020. Accessed 25 April 2022. [online] Available at: FI och Swish – frågor och svar | Finansinspektionen.

[76] In the new Sveriges Riksbank Act, which is proposed to enter into force on 1 January 2023, The Riksbank will monitor operations that are of particular importance to financial infrastructure in Sweden. This could potentially include certain fintech firms.

[77] P. Jansson (2021), "Bitcoin är ingen bra investering" *[Bitcoin is not a good investment]*, published 12 March 2021, updated 15 March 2021, DI Debatt and FI (2022), "Europeiska tillsynsmyndigheter varnar för kryptotillgångar" *[European supervisors issue warning about cryptoassets]*. Published 17 March 2022. Accessed 13 April 2022. [online] Available at: European supervisors issue warning about cryptoassets | Finansinspektionen.

Fraud is not uncommon in the cryptoasset sphere. For example, the Commodities Futures Trading Commission (CFTC) in the United States prosecuted 14 firms in September 2021 because they did not have the right authorisation for their operations or had falsely claimed to have held authorisation.[78]

High energy consumption linked to cryptoassets

Cryptoassets like Bitcoin are associated with high energy consumption. This is because the process for confirming transactions and mining new Bitcoins, known as proof of work, requires tremendous computing power. As the prices of Bitcoin and other cryptoassets have increased, it has become increasingly attractive to try to confirm transactions and hence receive newly created cryptoassets. Because of this, confirming transactions is becoming more difficult. This in turn has led to a need for more computing power to be fastest at successfully confirming transactions. Energy consumption for cryptoassets has therefore risen. This could in turn generate substantial carbon emissions if the energy used is fossil-based. According to estimations from the University of Cambridge, the Bitcoin network uses more energy in a year than, for example, the whole of Norway.[79] A Bitcoin transaction is also estimated to consume several thousand times more energy than a Mastercard or Visa transaction.[80]

The high energy consumption of cryptoassets is widely discussed.[81] In Sweden, Finansinspektionen and the Swedish Environmental Protection Agency have stated their views on this.[82] To tackle the high energy consumption, they propose an inquiry into prohibiting the proof of work method in the EU to the benefit of other, less energy-intensive methods.

3.3 Cryptoassets present certain risks

Increased exposure for traditional financial entities can lead to systemic risks

Several non-collateralised cryptoassets have risen sharply in price in the past few years, but have also been highly volatile. In other words, there is an opportunity to make a great deal of money, while at the same time there is a risk of losing all or part of an investment. The turbulence on the market for cryptoassets during May 2022 is

[78] CFTC (2021), "CFTC Charges 14 Entities for Failing to Register as FCMs or Falsely Claiming to be Registered", Release Number 8434-21, 29 September 2021, Commodity Futures Trading Commission.

[79] See Cambridge Bitcoin Electricity Consumption Index: Cambridge Bitcoin Electricity Consumption Index (CBECI) (ccaf.io).

[80] M. Laboure (2021), "The Future of Payments: Part II. When digital currencies become mainstream", February 2021, Deutsche Bank Research.

[81] R. Singh (2021), "How to make cryptocurrency more sustainable", 15 November 2021, World Economic Forum.

[82] E. Thedéen and B. Risinger (2021), "Crypto-assets are a threat to the climate transition – energy-intensive mining should be banned", 5 November 2021, Finansinspektionen and the Swedish Environmental Protection Agency. [online] Available at: Crypto-assets are a threat to the climate transition – energy-intensive mining should be banned | Finansinspektionen.

an apparent example of this. Data indicates thus far that it is primarily private individuals who are exposed to cryptoassets. This means that any drop in price that might occur will have negative consequences for the individual.

However, interest in exposure to cryptoassets among traditional financial entities, such as funds and banks, has increased in the past few years. This is because return on unbacked cryptoassets and related financial products can be high. When interconnectedness increases between these cryptoassets and the traditional financial system, there is also a heightened risk that price volatility in the cryptoassets will have implications for the financial system as a whole. If for example a fund were to have substantial exposures to a cryptoasset that loses value, this could make it difficult for the fund to meet other financial obligations. These problems can spread on to banks and impair confidence in the financial system as a whole. Thus far, however, exposure among banks and institutional investors appears to be limited. If it increases going forward, it could however cause risks to financial stability.[83]

Potential major implications from price drops when cryptoassets are used instead of national currencies

In many developing countries, the national currency has been replaced by another currency, usually US dollars. This is commonly known as currency substitution, or dollarisation if the national currency has been replaced by dollars. It is often a result of the domestic currency having been mismanaged, for example with inflation having undermined the value of the currency. Dollarisation leads to a substantial impact on the local market from the decisions of the Federal Reserve, such as those concerning monetary policy. It also means that the national central bank only has very slim possibilities, or none at all, to implement its own monetary policy or take measures to safeguard financial stability.

Such a scenario could transpire if cryptoassets replace the local currency. This is called cryptoisation or digital dollarisation. This is considered to be a particular risk if the currency is replaced by a stablecoin issued by a bigtech firm. This is because such a stablecoin has the conditions to rapidly grow to considerable dimensions through the numerous users of the bigtech firms. However, cryptoisation can also occur with other cryptoassets, such as Bitcoin.

The probability of cryptoisation taking place is greater for developing countries than for countries like Sweden, which have an advanced financial system and high confidence in authorities. Cryptoisation can cause risks associated with cryptoassets, such as the risk of a major drop in price, to spread widely throughout the economy. At the same time, it would be difficult for the central bank to take measures when this occurs because their tools are linked to the national currency. This also means that the central bank cannot conduct monetary policy and promote financial stability.

[83] FSB (2022), “Assessment of Risks to Financial Stability from Crypto-Assets”, February 2022, Financial Stability Board.

The degree of cryptoisation in the world is currently limited.[84] As mentioned previously, Bitcoin has, for example, been made legal tender in El Salvador which means that it could eventually fully or partly replace US dollars as the currency in El Salvador.

Cryptoassets as tools in criminal activities

While cryptoassets are relatively anonymous, at the same time there is a high degree of transparency in that all transactions are registered on the blockchain.

Authorities worry that cryptoassets will be used for different types of criminal activity, such as money laundering or terrorist financing. It is estimated that, for 2021, the total value of cryptoassets attributable to criminal activity is around USD 14 billion, or 0.15 per cent of the total transaction volume for cryptoassets.[85] Much of this concerns stolen cryptoassets and fraud. In relation to the total transaction volume, this is however less than before – in 2019 it was estimated that almost 3.4 per cent of the transaction volume was attributable to criminal activities.

To reduce these aspects, in the EU there is an initiative for rules aimed at improving customer due diligence for cryptoasset trading venues and preventing use of cryptoassets for illegal transactions.[86] Also, authorities have some possibilities of tracing cryptoasset transactions that can be linked to criminal activities. This is primarily the case if the cryptoassets are exchanged for various national currencies, because the traditional financial system has controls to improve customer due diligence to reduce the risk of money laundering. For example, authorities in the United States managed to trace almost 120,000 Bitcoins, currently worth roughly USD 3.5 billion, that had been stolen from the Bitfinex trading venue.[87]

3.4 Rules and standards for cryptoassets

Different jurisdictions have tackled cryptoassets in different ways

Cryptoassets are largely unregulated in many parts of the world, although a great deal of work is in progress to regulate them. Certain aspects concerning cryptoassets are however already regulated; for example, legislation aimed at counteracting money laundering and terrorist financing is often applicable also for cryptoassets and related operations.

Some countries have chosen to ban cryptoassets, directly or indirectly, while others are attempting to create new rules or adapt current regulations to encompass cryptoassets and related activity.

[84] *BIS Quarterly Review*, March 2022, Bank for International Settlements.

[85] Chainalysis (2022), "The 2022 Crypto Crime Report", February 2022, Chainalysis.

[86] Regulation of the European Parliament and of the Council on the prevention of the use of financial systems for the purpose of money laundering and terrorist financing COM(2021) 420 final, July 2021.

[87] A. R. Chow (2022), "Inside the Chess Match That Led the Feds to $3.6 Billion in Stolen Bitcoin", 10 February 2022, TIME.

In China, cryptoassets have been banned in a number of stages. The first was to ban financial institutions from getting involved in cryptoasset transactions. Then, all mining of cryptoassets was banned and finally a full ban on cryptoasset transactions was imposed in the country in September 2021.[88] Other countries that have banned cryptoassets are Egypt, Iraq, Qatar, Oman, Morocco, Algeria, Tunisia and Bangladesh.[89] There are also several countries – 42 in November 2021 – that have indirectly banned cryptoassets by limiting the possibility of banks and other financial institutions to trade in them or by banning cryptoasset trading venues.

The United States has opted for a different approach than both a ban and the chosen path in the EU (see the section Work is in progress in the EU to regulate cryptoassets). No concrete proposal has yet emerged on the regulation of cryptoassets from the US Congress, but in a report prepared by a working group under the President of the United States, it is proposed that stablecoins that are used for payments should be treated in a way which, in regulatory terms, resembles banks with deposit guarantee schemes.[90] In March 2022, the President of the United States issued an Executive Order aimed at ensuring that digital assets develops responsibly. The Executive Order is aimed at aspects such as consumer and investor protection, and at preventing cryptoassets from causing systemic risks, in both the American and global financial systems.[91]

The government of the United Kingdom stated at the beginning of April that they wanted stablecoins to be included in the financial legislation of the United Kingdom by primarily updating existing regulations governing electronic money and payments.[92] The government already had plans to strengthen regulation linked to marketing cryptoassets to improve consumer protection.[93]

Work is in progress in the EU to regulate cryptoassets

In September 2020 the European Commission presented a proposed regulation to govern cryptoassets in the EU called the Markets in Crypto-Assets (MiCA).[94] MiCA is a legal framework covering both issuers of cryptoassets and providers of cryptoasset services.

[88] M. Quiroz-Gutierrez (2022), "Crypto is fully banned in China and 8 other countries", 4 January 2022, Fortune.

[89] The Law Library of Congress (2021), "Regulation of Cryptocurrency Around the World: November 2021 Update", November 2021, The Law Library of Congress, Global Legal Research Directorate.

[90] U.S. Department of the Treasury (2021), "President's Working Group on Financial Markets Releases Report and Recommendations on Stablecoins", press release. Published 1 November 2021. Accessed 28 February 2022. [online] Available at: President's Working Group on Financial Markets Releases Report and Recommendations on Stablecoins | U.S. Department of the Treasury.

[91] The White House (2022), "Executive Order on Ensuring Responsible Development of Digital Assets", 9 March 2022.

[92] HM Treasury (2022), "Government sets out plan to make UK a global cryptoasset technology hub", news item. Published 4 April 2022. Accessed 5 April 2022. [online] Available at: Government sets out plan to make UK a global cryptoasset technology hub - GOV.UK (www.gov.uk).

[93] HM Treasury (2022), "Government to strengthen rules on misleading cryptocurrency adverts", news item. Published 18 January 2022. Accessed 5 April 2022. [online] Available at: Government to strengthen rules on misleading cryptocurrency adverts - GOV.UK (www.gov.uk).

[94] Proposal for a regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937.

The background of the proposed regulation is that many cryptoassets are not covered by any regulation in the EU, for example in terms of consumer and investor protection. Also, some EU countries have introduced their own laws that concern cryptoassets in various ways, which means that cryptoassets are not treated in the same regulatory way throughout the EU. When MiCA enters into force, it will however replace rules introduced by individual EU countries.

The European Commission has proposed for MiCA to set a number of requirements for issuers of cryptoassets. For instance, the issuer must be a legal entity and publish a white paper. The purpose of the white paper is to describe the issuer and the cryptoasset and explain the various characteristics of the cryptoasset, such as rights and obligations as well as the number of cryptoassets issued.

Particular requirements are proposed for stablecoins which, in the regulations, are called asset-referenced tokens and e-money tokens.[95]

For example, it is proposed that issuers of asset-referenced tokens are be authorised by a national authority in their home country prior to being permitted to issue tokens. Just like for other cryptoassets, issuers of asset-referenced tokens should issue a white paper. Also, the issuer must, on an ongoing basis, publish certain information on the number of issued tokens and the reserve size and composition, and exercise sound governance and control over it. The proposal also stipulates a number of requirements for the asset-referenced token reserve, such as how it may be invested and managed. For example, it is proposed that reserve assets may only be invested in highly liquid financial instruments with minimal credit and market risk. For asset-referenced tokens that are considered to be of "significant size", special requirements are proposed, for example that they should monitor their liquidity requirements to enable fulfilling redemption requirements.

Similar requirements are proposed for issuers of e-money tokens, for instance that they too must be authorised and publish a white paper. Also for e-money tokens, special requirements are proposed to apply if they are considered to be of "significant size".

Examples of cryptoasset services affected by the MiCA proposal are custody and administration of cryptoassets on behalf of third parties, operation of cryptoasset trading venues and advice on cryptoassets. Authorised service providers can use a "passport procedure" to enable also offering their services in EU countries other than the one where they are authorised.

In the proposal, MiCA also sets requirements for various authorities, such as how they should cooperate and exchange information with each other.

[95] Asset-referenced token refers to cryptoassets that are intended to maintain a stable value by referring to the value of several national currencies that are legal tender, to the value of one or several commodities or one or several cryptoassets, or to the value of a combination of such assets. E-money token refers to cryptoassets that are intended to maintain a stable value by referring to the value of a national currency that is legal tender.

The legislative process in the EU generally works such that the European Commission presents a regulatory proposal. The European Parliament and European Council then review and propose amendments to it. Negotiations are then initiated between the European Parliament and the Council to enable them to agree on the legislation. The Council adopted MiCA at the end of November 2021 and the European Parliament adopted MiCA in mid-March 2022.[96] Negotiations have therefore been commenced. The European Parliament's version of MiCA, among other things, includes proposals that aim to improve the transparency concerning the energy consumption of cryptoassets.

International standards address different aspects of cryptoassets

Besides the various regulatory initiatives in place, a number of bodies have also prepared standards concerning different aspects of cryptoassets and which, on the whole, aim to limit the potential risks that they present.

The Committee on Payments and Market Infrastructures (CPMI) and the **International Organization of Securities Commissions (IOSCO)** published a consultative report on stablecoins in October 2020.[97] It contains overall guidance on how the Principles for Financial Market Infrastructures (PFMI) should be applied to systemically important stablecoin arrangements.[98] A stablecoin arrangement is defined as an arrangement that combines a range of functions to provide an instrument that purports to be used as a means of payment or store of value. In short, CPMI and IOSCO conclude in the report that the transfer functions performed by a stablecoin arrangement are comparable with the transfer functions performed by other types of financial market infrastructure, such as payment systems. A stablecoin arrangement is therefore considered to be a financial market infrastructure and should be expected to observe all relevant principles in the PFMI.[99]

The **Financial Stability Board (FSB)** has prepared overarching recommendations for global stablecoin arrangements. The recommendations address the challenges that global stablecoin arrangements can present, from a regulatory perspective and also from a supervisory and oversight perspective.[100] They concern aspects such as authorities having the right tools to enable supervision and oversight, and regulation of global stablecoin arrangements. Also, FSB recommends that the authorities cooperate

[96] European Council (2021), "Digital finance package: Council reaches agreement on MiCA and DORA", press release. Published 24 November 2021. Accessed 15 March 2022. [online] Available at: Digital finance package: Council reaches agreement on MiCA and DORA – Consilium (europa.eu) and European Parliament (2022), "Cryptocurrencies in the EU: new rules to boost benefits and curb threats", press release. Published 14 March 2022. Accessed 15 March 2022. [online] Available at: Cryptocurrencies in the EU: new rules to boost benefits and curb threats | Nyheter | Europaparlamentet.

[97] CPMI-IOSCO (2021), "Application of the Principles for Financial Market Infrastructures to stablecoin arrangements", October 2021, Bank for International Settlements.

[98] PFMI are international standards for different types of financial market infrastructure. They span everything from governance and control, to various types of risk to which infrastructure firms are exposed, and how the firms should adapt their operations accordingly. The Riksbank bases its oversight of the Swedish infrastructure firms on these principles.

[99] CPMI and IOSCO's guidance for stablecoin arrangements are expected to be published in the not-too distant future.

[100] FSB (2021), "Regulation, supervision and oversight of 'global stablecoins' arrangements: Progress report on the implementation of the FSB high-level recommendations", October 2021, Financial Stability Board.

and coordinate with each other, both nationally and internationally. FSB also finds that authorities should ensure that global stablecoin arrangements have sound governance, effective risk management frameworks, appropriate recovery and resolution plans and robust data management systems.

In 2021, the **Basel Committee on Banking Supervision (BCBS)** published a consultative paper with proposals on how to manage banks' exposures to cryptoassets.[101] More specifically, BCBS proposes minimum levels for the risk-based capital requirements with which banks shall comply to manage their credit and market risks. Cryptoassets are therefore assigned different risk weights depending on their assessed risk profile. The risk weights form the basis of how much capital the banks need to hold to cover their risks. For example, cryptoassets like Bitcoin were considered to be high-risk. BCBS therefore proposed that banks should hold capital equalling at minimum their exposure to such cryptoassets.

However, the proposal was met with criticism by various industry players and BCBS therefore plans to publish a further consultative paper in mid-2022 that takes account of the criticism.[102]

The **Financial Action Task Force (FATF)** works with matters concerning money laundering and terrorist financing and has prepared standards to combat this.[103] FATF has subsequently developed guidance on how these standards should be applied to virtual assets (VAs) and virtual asset providers (VASPs).[104] In 2021 an updated version of the guidance was published.[105]

Cryptoasset-related services are covered by the Eurosystem's new oversight framework

In November 2021 a new framework was published for the oversight of digital payments, to apply in the Eurosystem and to be used by the Eurosystem central banks.[106] It is called the PISA framework – Payment Instruments, Schemes and Arrangements. The intention is that it will be used to monitor entities that enable or support the use of payment cards, credit transfers, direct debit, transfers of e-money and digital payment tokens, including electronic wallets. This also encompasses cryptoasset-related services. However, because Sweden is not in the Eurosystem, this framework does not apply in Sweden.

[101] Basel Committee on Banking Supervision (2021), "Prudential treatment of cryptoasset exposures", 10 June 2021, Bank for International Settlements.

[102] Finextra (2021), "Basel Committee to revisit cryptoasset proposals after market pushback", 9 November 2021, Finextra.

[103] FATF (2012), "International standards on combating money laundering and the financing of terrorism & proliferation: The FATF Recommendations", 16 February 2012, updated March 2022, Financial Action Task Force.

[104] FATF (2019), "Virtual Assets and virtual asset service providers", June 2019, Financial Action Task Force.

[105] FATF (2021), "Updated Guidance for a risk-based approach: Virtual Assets and virtual asset service providers", October 2021, Financial Action Task Force.

[106] ECB (2021), "Eurosystem oversight framework for electronic payment instruments, schemes and arrangements", November 2021, European Central Bank.

4 Another aspect to follow – DeFi

Decentralised finance (DeFi) involves building decentralised financial services on a blockchain. The activities found within DeFi are largely the same as those in the traditional financial system, such as lending. However, instead of regular currencies, cryptoassets are used. In DeFi , there are no financial intermediaries such as banks, and no entity overseeing the system. The DeFi market has expanded and cryptoassets worth around USD 110 billion are currently used within DeFi. The market is unregulated with low or non-existent consumer and investor protection.

4.1 Decentralised finance is expanding

DeFi operations are based on smart contracts

Decentralised finance (DeFi) aims to decentralise many of the financial activities that we typically associate with the financial system. In the traditional financial system, much of the operations are based on or intermediaries and central nodes in the form of different technical systems. For example, banks are financial intermediaries in that they accept deposits in order to then lend money to other customers.

In DeFi, the concept is rather that there should not be any intermediaries or central entities.[107] Instead, services are are provided through decentralised apps, known as dApps, which are built on top of a blockchain, primarily the Ethereum blockchain. To perform various activities on the blockchain, programmable, self-running contracts – known as smart contracts – are written to describe what will happen, for instance which transactions will be conducted, and the terms governing this process.[108] The contracts cannot be changed retroactively once they have been added to the blockchain. Stablecoins and other cryptoassets are used within DeFi to execute transactions. A common activity within DeFi is lending collateralised by different types of cryptoassets.

The DeFi market has expanded rapidly in 2021 and 2022. In total, cryptoassets worth almost USD 110 billion are used within DeFi (as of the middle of May 2022). This is, however, a decrease since the beginning of December 2021 when cryptoassets worth roughly 250 billion dollar were used within DeFi.

DeFi is currently unregulated while at the same time it is growing rapidly.[109] Because stablecoins and other cryptoassets are used within DeFi, the same risks are present in

[107] OECD (2022), "Why Decentralised Finance (DeFi) Matters and the Policy Implications", 19 January 2022, Organisations for Economic Co-operation and Development.

[108] J. Javeus (2021), "DeFi – en jättetrend fortfarande i sin linda (del 1)" *[DeFi – a megatrend still in its infancy, part 1]*, 12 November 2021, Veckans tanke, SEB Research.

[109] S. Aramonte et al. (2021), "DeFi risks and the decentralisation illusion", BIS Quarterly review, December 2021, Bank for International Settlements.

the various DeFi activities as those in cryptoassets generally. The degree of transparency is very low and consumer and investor protection is minimal. If DeFi continues to grow at the same rate, its interconnectedness with the rest of the financial system might increase, for instance through the link between stablecoins and the traditional financial system. Risks in DeFi could therefore spill over onto the latter. It is therefore relevant for authorities to follow developments in DeFi.

5 Concluding remarks

Fintech, including cryptoassets, has been associated with high growth in the past few years and today there is increased knowledge about cryptoassets in society. When new technologies are used for various financial services, the effectiveness of the financial system can improve, because development and innovation can lead to new services that are cheaper, simpler and faster to use for groups such as private individuals. At the same time, however, this presents certain challenges for authorities.

This is particularly the case for cryptoassets, which are largely unregulated in many parts of the world, while at the same time it is difficult to monitor the progression of the risks they present. This is because little data is available about them. Cryptoassets are also associated with low, or non-existent, consumer and investor protection, which makes it risky for private individuals to invest in them.

There is no exact figure on how many Swedish households are exposed to cryptoassets. From a global angle, however, exposure to cryptoassets among Swedes is likely relatively low. Swedish banks and institutional investors appear to have limited cryptoasset exposures currently. Thus far, the risk of shocks on the cryptoasset market affecting the Swedish market and traditional financial system is probably low.

A number of international bodies such as the International Monetary Fund and FSB have also expressed that cryptoassets do not pose a systemic risk currently.[110] However, they might affect financial stability further ahead if the risks associated with them are not addressed. In line with this, many central banks, authorities and international standard-setting bodies have therefore maintained focus on following the progression of the cryptoasset market and taking measures to the extent possible and necessary, for instance by issuing cryptoasset-related standards. In parallel, regulatory efforts are in progress in many jurisdictions, aimed at reducing the risks linked to cryptoassets and improving consumer and investor protection.

[110] See FSB (2022), "Assessment of Risks to Financial Stability from Crypto-Assets", February 2022, Financial Stability Board and The Crypto Ecosystem and Financial Stability Challenges. Chapter in the *Global Financial Stability Report*, October 2021, International Monetary Fund.

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