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Central bank digital currency

Federal Council report in response to the Postulate 18.3159, Wermuth, of 14.06.2018

Table of contents

Summary

The Wermuth postulate (18.3159) requested the Federal Council to examine the opportunities and risks of introducing a cryptofranc (e-franc). This report is the Federal Council's response to the postulate. It looks at the key questions in the area of central bank digital currency (CBDC). However, it does not examine private cryptocurrencies (e.g. bitcoin), which include so-called stablecoins (e.g. Libra) and are fundamentally different to CBDC. They are not legal tender, perform only some of the functions of money, and are organised and controlled by the private sector.

The term CBDC denotes money that a central bank could create in digital form and make available to the general public. It would be complementary to existing types of central bank money, i.e. banknotes in circulation and sight deposits held by commercial banks at the central bank. The banks' sight deposits at the central bank already represent a kind of CBDC; however, rather than being accessible to everyone this money is only available to a restricted group comprising commercial banks and other selected financial market participants. Households and companies, by contrast, are mainly able to use digital currency in the form of customer deposits at commercial banks – so-called "book money".

As regards the design of CBDC, a distinction can be made between account-based and valuebased models. In the account-based model, it would be possible for the general public to open accounts at the Swiss National Bank (National Bank, or SNB) or digital central bank accounts at commercial banks. In the valuebased model, the CBDC would be stored in a kind of e-wallet. The exact design of the CBDC would depend on the intended use.

Various different reasons for and expectations about the introduction of CBDC have been voiced by both the public and specialists. Essentially, these mainly concern improved financial inclusion (access for the general public to payment and financial services), the need for digital money that is free of default risk, and an increase in payment efficiency, monetary policy effectiveness and financial stability. Some economists also expect that CBDC could reduce tax evasion and money laundering. However, the analysis conducted for this report shows that CBDC for the general public meets these expectations only partly or not at all, that the repercussions can be far-reaching depending on the design, and that there are better solutions for most of the areas considered.

From a legal perspective, the introduction of CBDC would require adjustments to various provisions of both public law and civil law. The specific legal adjustments needed will differ considerably depending on the design of the CBDC. Under certain circumstances, changes at ordinance level might also be necessary.

The Federal Council takes the view that universally accessible CBDC would not bring any additional benefits on the whole for Switzerland at the moment. The SNB shares this assessment and sees the newly arising risks to monetary policy and financial stability, in particular, as a major challenge. Other countries are also discussing CBDC. Most central banks are examining the topic and the possible repercussions. To date, however, only a few of them are planning to issue digital currencies in the short or medium term.

The Federal Council and the SNB are actively monitoring the related international approaches and innovations, the technological developments and the payment needs of companies and households. They are also collaborating closely with other authorities and international bodies. This could give rise to a reassessment of the opportunities and risks of universally accessible CBDC in the future.

1 Background

The postulate requests the Federal Council to examine the possibilities, opportunities and risks of introducing and issuing a crypto-Swiss franc, or e-franc. In addition to regulatory questions, the study should also consider social and ecological sustainability aspects, the high degree of uncertainty and volatility on the markets, the future of the payment transactions infrastructure and the locational opportunities. Moreover, all currently foreseeable technological options should be taken into account.

The Federal Council has recommended that the postulate be adopted, as it has observed the growing interest in cryptocurrencies, digital payment systems and central bank digital currency. The procedural request can be found in the appendix.

In the public debate, private cryptocurrencies (e.g. bitcoin) and central bank digital currency (e.g. e-franc, cryptofranc) are often conflated. There are, however, fundamental differences between private cryptocurrencies and central bank digital currency. In December 2018, the Federal Council published the report "Legal basis for distributed ledger technology and blockchain in Switzerland", which, among other things, examines questions surrounding private cryptocurrencies.[1]

Subject of the report: central bank digital currency

This report looks at the key questions in the area of central bank digital currency, or CBDC. The term as used in the report denotes money that a central bank could create in digital form and make available to the general public.[2] It would be a supplement to existing types of central bank money (in Switzerland, these are banknotes in circulation and sight deposits of commercial banks held at the central bank). The banks' sight deposits at the central bank already represent a kind of CBDC; however, rather than being accessible to everyone, this money is only available to a restricted group of commercial banks and other selected financial market participants.[3] CBDC for the general public would be legal tender just like banknotes, the coins issued by the Confederation and the sight deposits held at the SNB, but unlike cryptocurrencies (e.g. bitcoin, Ether).

Today, households and companies are able to use digital currency above all in the form of customer deposits at commercial banks – so-called "book money".[4] Book money is denominated in Swiss francs but is neither central bank money nor legal tender. Book money represents a payment commitment on the part of the bank, and is a contractual obligation to pay out the balance on a customer's account in francs (banknotes and coins) at the request of the customer. Book money is subject to default risk: a commercial bank can get into financial difficulty and, in extreme cases, can even become insolvent.

The introduction of CBDC would mean a change to the existing monetary system and would raise economic, monetary policy and legal questions. The possible benefits and drawbacks of CBDC are the subject of much, and occasionally heated, debate in both central banking and academic circles. This report undertakes a critical analysis of the arguments for and against introducing CBDC, and presents various possible design options. As a basic premise, the report assumes a situation in which CBDC and established types of money coexist.

In addition to Switzerland, many other countries are discussing CBDC. For example, Sweden's Riksbank, the Bank of England, Norges Bank and the Bank for International Settlements (BIS) have

[1] Federal Council report of 14 December 2018 on the "Legal basis for distributed ledger technology and blockchain in Switzerland" (Federal Council report 2019)
[2] Definition according to SNB glossary entry for "CBDC": https://www.snb.ch/en/srv/id/glossary#C
[3] See "Instruction sheet on admission to the SIC system and sight deposit accounts", https://snb.ch/en/mmr/reference/sicgiro_access/source/sicgiro_access.en.pdf
[4] Households and companies can also use private cryptocurrencies for payment purposes. However, their use is not very widespread at present (see section "Definition of private cryptocurrencies").

conducted analyses and studies on the subject. To date, no country has introduced CBDC for the general public.

Definition of private cryptocurrencies

Private cryptocurrencies are the digital representation of a value ("digital token") and can be traded via technical infrastructures such as the internet. They can take on certain functions of money but, just like other privately issued currencies, are not legal tender.[5] Such currencies are issued by private organisations (e.g. XCHF from Swiss Crypto Tokens), or organised and controlled by participants in a computer network (e.g. bitcoin, Ether). Private cryptocurrencies often define their own units of account.

Digital tokens

A digital token is the digital representation of an underlying value, much as a banknote is the physical representation of a value. In technical terms, digital tokens are data, such as that stored in a distributed ledger, which can be accessed with a private digital key that is randomly generated from a very large number of possible combinations. A cryptographic algorithm (e.g. an elliptic curve digital signature algorithm, or ECDSA) is then used to generate a public key from the private key. This public key is stored in a main ledger that is managed either centrally by a service provider, or decentrally on a large number of computers in a distributed ledger. If the token holder spends their token in a transaction, the token in the main ledger is assigned a new public key, whose associated private key belongs to the payment recipient, i.e. the new token holder. In turn, the new holder can only pass on the value using their own private key. If the private key is lost, the token can no longer be used. Thus, in principle, tokens carry a risk of loss just like cash.

The Swiss Financial Market Supervisory Authority (FINMA) categorises most private cryptocurrencies as "payment tokens", as they are designed to be a means of payment.[6] They are intended to enable users to acquire goods or services in a given system and thus embody a value recognised within that system. Existing private cryptocurrencies can also be used to acquire analogue goods and services, and achieve a specific market value through being traded on specialist exchanges.[7] So far, the vast majority of existing private cryptocurrencies embody none, or only a few, of the functions of money (see section 3.1), as their value fluctuates too widely. The hallmarks of a successful currency are above all value retention and broad acceptance. Fluctuating value, a lack of acceptance and their inefficiency as a means of payment have significantly hampered the building of trust in private cryptocurrencies.

To alleviate the value fluctuation problem, private cryptocurrencies have been created that aim to keep price volatility to a minimum through their design as "stablecoins", i.e. "coins" that retain their value. Stablecoins represent a specific amount of a "stable" asset. Often, they are backed with an official currency, and use the same unit of account.

[5] Definition according to SNB glossary entry for "cryptocurrency": https://snb.ch/en/srv/id/glossary#C
[6] See also Swiss Financial Market Supervisory Authority (2018)
[7] Federal Council report (2018), pp. 49 et seq.

Stablecoins

Owing to the wide fluctuation in the value of private cryptocurrencies (such as bitcoin or Ether), a number of so-called "stablecoins" have been launched or proposed recently. Stablecoins are designed with the potential to take on the characteristics of value-retaining money. They can achieve this by being pegged to stable, official currencies, for example. A number of stablecoins now exist; they can be categorised according to three relevant features, namely pegging, backing and access. Depending on the design, the economic, legal and regulatory implications can vary widely. Some stablecoins already exist (Tether, XCHF), while others are still at the project stage (USC, Libra, SDX CHF token).

Pegging[8]: In the simplest case, a stablecoin is pegged to a single currency. The issuer of a stablecoin in Swiss francs would typically commit to its token having the same value as cash in Swiss francs. But a stablecoin can also be pegged against a basket of official currencies.

Backing: A stablecoin can be backed with commercial bank money, with other highly liquid assets such as government bonds, with cash or with sight deposits at the central bank. The key to value retention is the credibility of the commitment to the underlying asset: In the case of a stablecoin, the greater the backing of the issued token with Swiss franc assets, and the more liquid and reliably valuable the assets, the greater the credibility. Indeed, some stablecoin issuers try to lend their commitment as much credibility as possible by fully backing their tokens with bank deposits or banknotes in the anchor currency.

Access: In principle, a stablecoin can be accessible to the general public. Well-known examples here are Tether and Libra. Having said that, some projects such as USC and SDX CHF token restrict access to a relatively small group of financial market participants. The aim in this case is primarily to settle the cash leg of transactions with security tokens.

Dimension	**Features and examples**
Pegging	Currency (e.g. XCHF[9], USC[10], SDX CHF token[11]), currency basket (e.g. Libra[12])
Backing	Commercial bank money (e.g. Tether[13]), securities such as government bonds (e.g. Libra), cash (e.g. XCHF), sight deposits at the central bank (e.g. USC, SDX CHF token)
Access	Broad access (e.g. Tether, Libra), access only for financial market participants (e.g. USC, SDX CHF token)

Definition of blockchain / distributed ledger technology

Technologically, private cryptocurrencies are largely based on cryptography and computer networks. The technology is often referred to by the generic term "distributed ledger technology", or DLT. The most well known DLT is blockchain, on which bitcoin is based.

[8] Stablecoins can also be pegged to other underlying values, such as gold or diamonds
[9] https://www.swisscryptotokens.ch/buy-sell-xchf/
[10] https://www.fnality.org/what-we-do
[11] https://www.sixdx.com/en/home/sdx/business-model.html
[12] https://libra.org/de-DE/?noredirect=de-DE
[13] https://tether.to/

Distributed ledger technology
Distributed ledgers are decentralised databases that grant shared Write and Read access to the participants in a network. In contrast to a centrally administered database, in this network there is no central authority entering new data into the database. New data can be added by the participants themselves at any time. A subsequent update process ensures that all participants always have access to an up-to-date and standardised data set. One particular design of DLT is blockchain.

In principle, CBDC could also be implemented using DLT, but there are other technical options available. In contrast to private cryptocurrencies, in the case of CBDC there is a trusted central authority: the central bank. Consequently, technologies could be used that are based on trusted partners. However, technology for CBDC must meet certain criteria. It must be protected against cyberattacks, must be able to process high transaction volumes quickly and enable exchanges with existing payment systems in real time, and must ensure the confidentiality of payments.[14]

Definition of wholesale token

Wholesale tokens are a form of CBDC which – unlike the universally accessible CBDC that is the focus of this report – is only accessible to a restricted group of users: financial market participants. Such tokens would be used in payment transactions between financial market participants, similar to sight deposits at the central bank today, and could help increase the efficiency of securities trading, settlement and management. Thus, security tokens could, so it is hoped, be transferred from one party to another more or less instantly, and could bring efficiency gains in securities management. With wholesale tokens for financial market participants, it would then be possible for security tokens to be exchanged for token money on a delivery-versus-payment (DVP) basis.

The possible advantages and drawbacks of a wholesale token were examined by the SNB and the Bank for International Settlements (BIS) in a joint project. In June 2019, the BIS launched an Innovation Hub aimed at facilitating central bank efforts in the area of innovative financial technologies. The SNB has announced that it will play an active role in the BIS Innovation Hub right from the start.[15] For example, a feasibility study will look at whether CBDC for financial market participants can be integrated into a DLT infrastructure. This new form of CBDC should enable the settlement of tokenised assets between financial market participants.[16]

[14] See Perret (2019), p. 34 et seq.
[15] SNB press release of 30 June 2019, https://www.snb.ch/en/mmr/reference/pre_20190630/source/pre_20190630.en.pdf
[16] SNB press release of 8 October 2019, https://www.snb.ch/en/mmr/reference/pre_20191008/source/pre_20191008.en.pdf

Structure of the report

This report is divided into seven chapters. In chapter 2, we explain what CBDC is and what expectations are attached to it. The chapter closes with an overview of international developments. As CBDC would be confronted by an existing, functional monetary system, chapter 3 is devoted to an examination of the current monetary system and the role of the state in the supply of money. Chapter 4 then looks at the place of CBDC alongside existing types of money. In addition, it discusses various possible designs for CBDC. These vary depending on the expectations or the intended use. In chapter 5, we ask whether the expectations placed on CBDC can be met and what the risks might be. Here, questions relating to financial inclusion, the need for secure money, the efficiency of payment systems, monetary policy, financial stability and financial crime are discussed, together with the advantages and disadvantages. Chapter 6 examines the legal aspects of CBDC, with a particular focus on the role of the SNB as a central bank in today's monetary and currency system. The chapter looks at the possible impact of the introduction of CBDC on the SNB's statutory mandate, and what adjustments would be necessary at constitutional, federal law and ordinance level. Chapter 7 presents conclusions for Switzerland.

2 Why central bank digital currency?

2.1 CBDC – what is that?

Regulating the monetary system and providing the economy with an adequate supply of legal tender[17] are statutory requirements. In most countries, monetary policy tasks are conferred on a central bank which is independent from the government and the state.[18] This is the case in Switzerland (Art. 99 para. 2 of the Federal Constitution of 18 April 1999, SR 101), where the SNB issues banknotes (Art. 99 para. 1 of the Cst., Art. 4 of the National Bank Act of 3 October 2003, SR 951.11 (NBA); Arts. 7 et seq. of the Federal Act on Currency and Payment Instruments, SR 941.10 (CPIA)). Coins are issued by the Confederation (Swissmint) itself (Arts. 4 et seq. of the CPIA). Banknotes and coins are legal tender (Art. 2 lit. a and b of the CPIA) and are universally available. Likewise, the Swiss franc-denominated sight deposits at the SNB are also legal tender in Switzerland (Art. 2 lit. c of the CPIA); this arrangement differs to those in other countries' monetary systems. These sight deposits are available to a restricted group of users (banks and selected financial market participants). Together, banknotes in circulation and banks' sight deposits at the SNB make up the monetary base, or "central bank money". Banknotes are physical central bank money, which is universally accessible. The sight deposits at the SNB are digital central bank money (CBDC), but are only available to a restricted group of users – financial market participants.

A distinction should be made between central bank money and book money (customer deposits at commercial banks); rather than being legal tender, the latter represents a Swiss franc-denominated claim against the relevant commercial bank. Unlike central bank money, book money is subject to default risk. Book money plays an important role above all in retail payments, which are performed using a variety of technologies (online banking, debit card, credit card, payment app, etc.).

Thus, the discussion of CBDC focuses primarily on whether the general public should have access to CBDC, or whether it should be restricted to a limited group of financial market participants. The exact design of CBDC for the general public would depend on the reasons for introducing CBDC, among other things. Essentially, there are two models (see chapter 4). First, account-based models, in which it would be possible for the general public to open accounts at the SNB – although the task of administering digital central bank accounts for the general public might conceivably be transferred to the commercial banks or other financial market participants. Direct and universal access to CBDC would thus be created. The second option would be a model that is closer to cash and is often described as "valuebased" or "tokenbased".[19] In the valuebased model, CBDC is stored in a kind of "e-wallet". When a payment takes place, a digital token changes hands without an account entry being made in the conventional sense.

2.2 Expectations surrounding CBDC

The doubts about financial stability raised by the 2008 financial crisis, the advent of private cryptocurrencies, the development of new digital payment methods, the arrival of new large companies (so-called big techs, i.e. tech firms such as Google, Amazon, Facebook, Apple, Alipay, Wechat) offering payment services, and the debate surrounding the future of cash are posing new challenges to authorities and central banks worldwide. Central banks, in particular, are faced with the question of what role they should be playing in an increasingly digitalised world. BIS General Manager Agustín Carstens describes the situation thus: "While we have seen bursts of innovation to the

[17] "Legal tender" refers to all means of payment with which a monetary debt can be effectively settled
[18] Rieben (1997), p. 68 et seq.
[19] For more information on these arrangements, see Bank for International Settlements (2019a), p. 2

monetary system before, this time feels different. Innovation is rampant and entrepreneurs are trying to improve not only the way we pay but also money itself."[20] Cecilia Skingsley, Deputy Governor of Sveriges Riksbank, says: "We need a broad discussion of what it means when central government's presence on the payment market's supply side risks disappearing along with cash."[21] Some see the issuance of CBDC as an opportunity to ensure the supply of money to the population by the central banks.

The debate over CBDC has become more intense, both in public and in academic circles, in recent years. Some people are demanding that CBDC be introduced quickly, while others reject this idea outright, citing the many questions still to be answered and the potential negative effects. Various reasons for introducing CBDC for the general public are put forward in the public debate. The main ones are as follows.

Financial inclusion: Some countries have witnessed a decline in the use and acceptance of cash, making it more difficult for people without a bank account – and therefore without a digital means of payment (debit card, payment app, etc.) – to pay for things. This is compounded by the huge growth in areas such as online shopping, where digital payment is practically the only method available. CBDC could ensure that households and companies retain access to central bank money, even without cash, and that people without bank accounts are able to carry out digital payments. In this way, CBDC could contribute to financial inclusion, i.e. to the accessibility of payment and financial services for the general public.

Need for digital money without default risk: In today's monetary system, central bank money is accessible for the general public only in the form of cash (banknotes). Only banks and other selected financial market participants have access to central bank money in the form of sight deposits at the SNB. For their payments, households and companies mainly use digital money provided by the banks in the form of book money. Transfers can be effected using various technologies (debit cards, credit cards, payment apps, etc.). Book money represents a contractual obligation by the account-holding commercial bank to pay out the credit balance on a customer's account in francs (banknotes and coins) at the request of the customer. There is thus the possibility that the obligor, i.e. the commercial bank, will get into difficulty, and even become insolvent. Book money is therefore subject to default risk. The need for "safe" money that is free from default risk has increased in many countries since the 2008 financial crisis, as evidenced by the growing demand for cash, for example. CBDC would allow the general public to benefit from the practical advantages of digital money, without having to forgo the need for default risk-free legal tender.

Increased efficiency of payments: Further arguments for introducing CBDC are the expected cost savings and efficiency gains compared not just to cash, but also to other digital payment and settlement methods. For instance, CBDC should enable faster, more secure and cheaper payments, across borders and irrespective of time and place, than under the existing system.

Increased monetary policy effectiveness: Some academics think that CBDC could reinforce interest rate targeting as a tool of monetary policy. This would be predicated on the central bank's ability to set positive and negative interest rates for CBDC. Some economists regard CBDC, combined with the abolition (or at least restricted use) of cash, as an opportunity to cut interest rates well below zero.[22] In periods of very low interest rates like those witnessed over the past decade, this could provide the central banks with more room for manoeuvre.

Greater financial stability: In the wake of the 2008 financial crisis, the debate centred increasingly around financial stability. It was argued in many quarters that CBDC can increase the stability of the

[20] Bank for International Settlements, Agustín Carstens (2019c)
[21] Sveriges Riksbank, Cecilia Skingsley (2018b), p. 1 et seq.
[22] Bordo and Levin (2017); Rogoff (2016)

financial system because it carries no default risk and is attractive for bank customers in a crisis. The underlying rationale is that banks, faced with the competition posed by such a risk-free asset, would be more mindful of their own creditworthiness and avoid excessively risky transactions, thereby making the entire financial system, and indirectly also bank deposits, more secure.

Reduction of tax offences and money laundering: CBDC can be designed in a number of different ways, ranging from relatively anonymous to completely traceable. As an argument in favour of traceable CBDC, some economists[23] claim that it could replace anonymous cash, which is suspected of being used excessively in tax offences and money laundering.

In chapter 5, we discuss whether CBDC can live up to these expectations, and the drawbacks and risks of its introduction. We also examine whether there are alternatives that might be better suited to providing the expected advantages of CBDC.

2.3 Overview of international developments

In 2018, the BIS surveyed 63 central banks about their work on CBDC.[24] The majority of the central banks surveyed reported that they were looking at the possible repercussions of CBDC. However, the central banks appeared to be proceeding with caution, and only a few were planning to issue CBDC in the short (one to three years) or medium term (one to six years).

As regards the reasons for their looking into CBDC, the banks named security and efficiency of payments, the decreasing use of cash, financial stability, financial inclusion and monetary policy considerations. If central banks' motives for looking into universally accessible CBDC are broken down according to the country's state of development, we can see that the predominant motivations for emerging economies are payment efficiency and financial inclusion. Advanced economies, by contrast, cite security of payments and financial stability as the primary motivating factors. For some advanced economies (such as Sweden), it is the decreasing use of cash.

The BIS survey concludes that most central bank that have examined the challenges relating to CBDC are not convinced that the benefits currently outweigh the drawbacks. The respondents that did see clear advantages were mainly from developing countries and emerging economies. BIS General Manager Agustín Carstens regards the central banks' caution over the full consequences of CBDC for the monetary and payment system as appropriate.[25]

[23] See Rogoff (2016)
[24] Bank for International Settlements (2019a), p. 1
[25] Bank for International Settlements, Agustín Carstens (2019b)

Examples of international CBDC projects

In 2017, ***Sveriges Riksbank*** launched the e-Krona project, prompted by the ongoing decline in the use and acceptance of cash in Sweden. This development was driven, firstly, by the digital affinity of both companies and the general population, and Sweden's resulting frontrunner status in the area of cashless payment solutions.[26] Secondly, it was the Riksbank itself which, as part of a deregulation strategy adopted in 2005, decided that banks would bear the cost of the supply and distribution of cash. Consequently, access to cash – for example at bank branches and ATMs – was increasingly restricted.[27] The decline in the use of cash also reduced the role of the state on the money supply side. Together with the simultaneous decrease in cash acceptance in shops, restaurants, etc. and the increasing digitalisation of commerce and services, this has made it more difficult for individual sections of the population to make purchases.

To date, the project group has published two reports (Sveriges Riksbank 2017, 2018a). The e-Krona is intended as a supplement to cash and should, if possible, have the same features. In the view of the Riksbank's Deputy Governor, Cecilia Skingsley (2018b), the results show that it would be possible, within the statutory mandate of the Riksbank and using the available technology, to issue an e-Krona. According to her, studies have also shown that it would be possible to design an e-Krona so that it did not have an excessively negative impact on monetary policy and financial stability. However, this is contradicted by a report in the Riksbank's Economic Review (Sveriges Riksbank, Armelius et al., 2018c), which see less scope for monetary policy easing in a crisis, and predicts lower growth and higher exchange rate volatility. The Riksbank is planning a pilot with a valuebased e-Krona and has submitted a request to the Swedish parliament for the requisite legal amendments that would also allow account-based CBDC (Sveriges Riksbank, 2018b).

As far back as January 2016, the ***People's Bank of China*** (PBoC) announced that it was planning to issue CBDC in the future. As the motivating factor, it cited the gains in efficiency and availability of the payment and settlement system that CBDC could bring (Yanagawa and Yamaoka, 2019). Moreover, CBDC would make it possible to prevent tax offences. In 2017, the PBoC set up a "digital currency research lab", and in July 2019 the Chinese State Council granted official permission for the central bank to pursue the CBDC project. Details of the project, or a timeline for its realisation, have not yet been made public by the PBoC. In August 2019, the Deputy Director of the PBoC's Payment System Department was quoted in agency reports as having said that its digital currency was "almost ready" (FAZ 2019).

The ***Central Bank of Uruguay*** ran a pilot project on an e-peso from October 2017 to April 2018, in which it issued CBDC in the amount of UYU 20 million (equivalent to around CHF 600,000) to 10,000 people. The users were given access to e-pesos via an app on their smartphone and could use it at up to 80 companies participating in the project. According to the central bank, this was motivated by the waning importance of cash. The project is aimed at establishing an infrastructure for digital payments and providing universal access to digital services. Owing to the experience gained and the lack of technical problems, the project was judged to be a success. In addition, it is planned to look more closely into possible designs (anonymous, interest-bearing, etc.) and the associated impact (Bank for International Settlements, 2019a).

[26] In this regard, see Sveriges Riksbank (2018c)
[27] See Sveriges Riksbank (2011)

3 The current monetary system and the role of the state in the money supply

3.1 Functions and development of the Swiss franc and the role of the Swiss National Bank

In an economy based on the division of labour, money is indispensable, and performs three main functions: as a unit of account, as a means of exchange and as a store of value.[28] Over the centuries, money has transformed from pure commodity money to today's various forms. The current monetary system is based on a state monopoly to issue legal tender. The state sets the unit of account and provides the general public with money in the form of banknotes and coins. Private types of money also exist on this basis, such as the book money deposited at banks by households and companies.

In Switzerland, the state was endowed with the coin-producing monopoly when the Confederation was founded in 1848. The Swiss franc was introduced in 1850 with the Federal Act on Coinage. Its value was initially defined in terms of silver, and then also gold following the Coinage Act of 1860.[29] The Swiss National Bank was established in 1907, and was given the note-issuing privilege. Yet, up until the outbreak of the First World War, gold and silver coins were the only legal tender. Banknotes were first declared to be legal tender during World War I, but only until 1931, when Switzerland returned to gold. In 1936, during the Great Depression, the Swiss franc was devalued and banknotes once again became legal tender. Following the Second World War, the franc had a fixed exchange rate peg to the US dollar, whose value was, in turn, defined against gold.

Since the end of the Bretton Woods System in 1973, the franc, like other major currencies, has been a fiat money, i.e. a currency without an intrinsic value. Because the production of fiat money is virtually cost-free and the state holds the monopoly, there is an inherent risk that it will put too much money into circulation in order to finance its spending. This, and the resulting inflation, were an international problem in the late 1970s and the 1980s, and led to a clear separation of fiscal and monetary policy. Monetary policy tasks were conferred on independent central banks, which were given an explicit mandate to ensure price stability.

Article 99 paragraph 2 of the Federal Constitution, together with Article 5 paragraph 1 of the NBA, entrusts the SNB with the task of ensuring price stability while taking account of economic developments. In addition, as part of its core monetary policy mandate[30], the SNB is responsible for ensuring the supply and distribution of cash in Switzerland, facilitating and ensuring the smooth functioning of cashless payment systems and contributing to the stability of the financial system. In fulfilling its monetary policy mandate, the SNB is independent (Art. 6 of the NBA). The counterpart to this independence is the duty of accountability (Art. 7 of the NBA).[31] The value of the Swiss franc is largely based on public confidence in the SNB's ability to ensure price stability. A comprehensive discussion of the SNB's mandate can be found in the monetary policy report approved by the Federal Council on 21 December 2016[32].

[28] See also Interdepartmental coordinating group on combating money laundering and the financing of terrorism, CGMF (2018b)
[29] Gold strikes in California had brought the price of gold down; as a result, the more valuable silver coins disappeared from circulation and it became necessary to use gold coins for payments
[30] See Federal Council report of 21 December 2016 on monetary policy (Federal Council report 2016), pp. 10 et seq.
[31] See Federal Council report (2016), p. 6
[32] Federal Council report (2016)

3.2 Existing types of money: central bank money and book money

Central bank money. The term "central bank money" covers the banknotes issued by the SNB and Swiss franc-denominated sight deposits at the SNB. The banks and a restricted group of other financial market participants have access to sight deposits at the SNB.[33] There is a high degree of substitutability between the two types of central bank money (banknotes and sight deposits). Banknote issuance, and hence the division of central bank money between notes in circulation and sight deposits, is dictated by payment needs (Art. 7 para. 1 of the CPIA), i.e. it is driven by the general public's demand for banknotes.

Book money: This term describes households' and companies' customer deposits at commercial banks. Book money is also denominated in Swiss francs. Unlike central bank money, book money is not legal tender. However, it does represent a claim on legal tender, because a bank's customers can exchange their deposits at the bank for banknotes, i.e. central bank money.

Central bank money and book money differ in terms of their risk for the owner. Owners of central bank money are exposed only to the risk of an inflation-driven decrease in purchasing power. In Switzerland, this risk is very low: average inflation since the end of the Bretton Woods system has been around 2.0%; since the introduction of the SNB's new monetary policy strategy in 2000, it has been at 0.5%, with only slight fluctuations. The SNB equates price stability with an inflation rate of 0–2%. Owners of book money are also exposed to the risk of default by the account-holding bank in addition to the inflation risk.[34] If a commercial bank becomes insolvent, its customers can exercise their claim to banknotes only up to the maximum amount set by the deposit insurer. Rumours about the possible illiquidity of a bank can lead to a bank run, in which a large number of customers withdraw their deposits simultaneously from that bank, and attempt to either transfer them to other banks or exchange them for banknotes. Through deposit insurance and banking regulation, the legislator has reduced the risk of bank runs.

Global financial crisis and tightening of banking regulations

The global financial crisis that erupted in 2008 revealed weaknesses in the financial system. The crisis started in the US as a result of excessive mortgage lending. The mortgages were securitised, i.e. turned into securities, and were then sold on by the lending bank to other banks. Through resecuritisation and division into higher or lower-rated tranches, the impression arose that these instruments were secure. The easy access to credit led to a real estate price bubble, which burst when borrowers defaulted on the underlying mortgages. Banks lost confidence in each other, the interbank money market dried up, and the financial crisis began. To stabilise the financial system, the central banks initially implemented emergency measures, such as increasing the supply of liquidity, providing liquidity as lender of last resort, and cutting interest rates to put the real economy back on an even keel. There were also a number of bank bailouts by the state. In Switzerland, the Confederation and the SNB put together a rescue package for UBS in October 2008.

To increase the resilience of the financial system, various measures were implemented at international and national level in the wake of the crisis. The international standards, known as Basel III, increased the capital and liquidity requirements. As part of these regulatory efforts, Swiss legislators introduced a number of amendments to existing laws and ordinances. In addition, the

[33] SNB instruction sheet, https://www.snb.ch/en/mmr/reference/sicgiro_access/source/sicgiro_access.en.pdf
[34] See Federal Council dispatch of 26 May 1999 on the Federal Act on Currency and Payment Instruments (CPIA), BBl **1999** 7258, 7271 (dispatch 1999)

Federal Council addressed the "too big to fail" issue by, inter alia, further increasing the capital requirements for systemically important banks.[35] In this respect, Switzerland has gone beyond the international standards. Moreover, depositor protection for bank deposits has been considerably strengthened in Switzerland.[36]

3.3 Two-tier monetary system and cashless payments

Today's monetary system is a two-tier arrangement: both the public sector, through the independent central bank, and the private sector, in the form of the commercial banks, play a role in the supply of money. The same applies for the payment system. This is a tried and tested division of responsibilities, in which the state provides the financial market participants with the basis for private sector business activities and innovation.

Two-tier monetary system. Today, all advanced economies have a two-tier monetary system, in which the central bank ensures the supply and/or creation of money together with the private sector banks.[37] The central bank issues central bank money and acts as banker to the banks, while the commercial banks act as the interface to the end customers and create book money.

In the **first tier**, the central bank issues central bank money, for example by providing a bank with liquidity against collateral and crediting the corresponding amount to its sight deposit account.[38] A bank's request for liquidity depends on the conditions at which the central bank is offering it, and on the bank's need for sight deposits at the central bank. This, in turn, depends on the expected cash withdrawals and payments by the bank's customers. If a bank wants to transfer funds to another bank for one of its customers, it will need to have sufficient liquidity in the form of sight deposits at the central bank.[39]

In the **second tier**, the commercial banks create book money by lending to their customers. When the bank grants a loan, it credits this amount to the borrower's account. The borrower can instruct the bank to make payments from this credit amount; for this, the bank needs sight deposits at the central bank.

The possibility for commercial banks to create book money is dictated by the central bank's willingness to increase or reduce banks' sight deposits as part of its monetary policy, among other things. So money creation by the commercial banks is carried out on the basis of central bank money. Accordingly, central bank money is often referred to as the "monetary base".

Two-tier monetary system: solution between two extremes

Today, money is created in a two-tier system, in which the central bank buys securities or foreign exchange from the commercial banks and credits the countervalue to the banks' sight deposit accounts. On this basis, the banks can create money for their customers through lending. This book money represents a claim to central bank money. In principle, however, money could also be created exclusively by the private sector (an idea that was propounded by F.A. von Hayek in

[35] Amendments to the Federal Act on Banks and Savings Banks (Banking Act, BankA) of 30 September 2011 (strengthening financial sector stability; too big to fail), AS **2012** 811
[36] Federal Council report of 3 July 2019 on systemically important banks, BBl **2019** 1860 (Federal Council report 2019)
[37] On the subject of money creation, see Swiss National Bank, Thomas Jordan (2018a)
[38] For this purpose, the SNB uses repurchase agreements, or repos. As an alternative, the SNB can buy foreign exchange from the bank and credit the countervalue in Swiss francs to its sight deposit account.
[39] Banks hold sight deposits at the central bank not just for payment purposes, but also in order to meet regulatory requirements (e.g. minimum reserve requirements)

1976)[40] or only by the state (which was the aim of the sovereign money initiative, for example). Currently, no advanced economy follows either of these two extreme approaches.

In the past, there have been single-tier systems in which money creation was carried out exclusively by the private sector. However, they proved to be unstable in a crisis, because no commercial bank acted as lender of last resort. A two-tier system, with a central bank that provides liquidity under certain conditions during a crisis, addresses this problem.[41]

A single-tier system in which money creation was performed exclusively by the central bank would not be advisable, owing to information inefficiencies; commercial banks are best able to assess which of their customers are creditworthy, i.e. for which parties they should create new money.[42] Moreover, competition between the different banks leads to efficiency gains and innovation.

Two-tier payment system. According to Article 5 of the NBA, the SNB's tasks include ensuring the supply of money and facilitating and ensuring the smooth functioning of cashless payment systems. The general public almost exclusively use banknotes, coins and book money as payment instruments.[43] Other types of money, such as private cryptocurrencies, have played virtually no role to date. Just as with the supply of money, the public sector – through the central bank – provides the basis for the second, private sector tier in the cashless payment system too.

In the **first tier**, payments between commercial banks are settled through the Swiss Interbank Clearing (SIC) system, which is run on behalf of and overseen by the SNB, using the sight deposits of the banks concerned. The use of sight deposits at the SNB eliminates default risk between the commercial banks involved in the transaction.

In the **second tier**, or "retail" payments sector, bank customers' payments are settled electronically, for example through a card payment at a supermarket. Here, financial service providers (banks, card issuers, etc.) compete to provide services to customers. Recent years have seen considerable technological innovation in this area, and additional functionalities (e.g. contactless payments) have been created for customers. This second tier uses the private customer's deposits at the bank, i.e. book money, as the means of payment.[44]

[40] Friedrich August von Hayek (1976)
[41] See Charles Goodhart (1988)
[42] Agustín Carstens (Bank for International Settlements, 2019c) notes that socialist countries have opted for the extreme solution of a single-tier system involving just the central bank
[43] Swiss National Bank (2018b)
[44] An increasing proportion of retail payment transactions are now being settled through the SIC system using commercial bank sight deposits

4 Digital central bank currency – possible designs

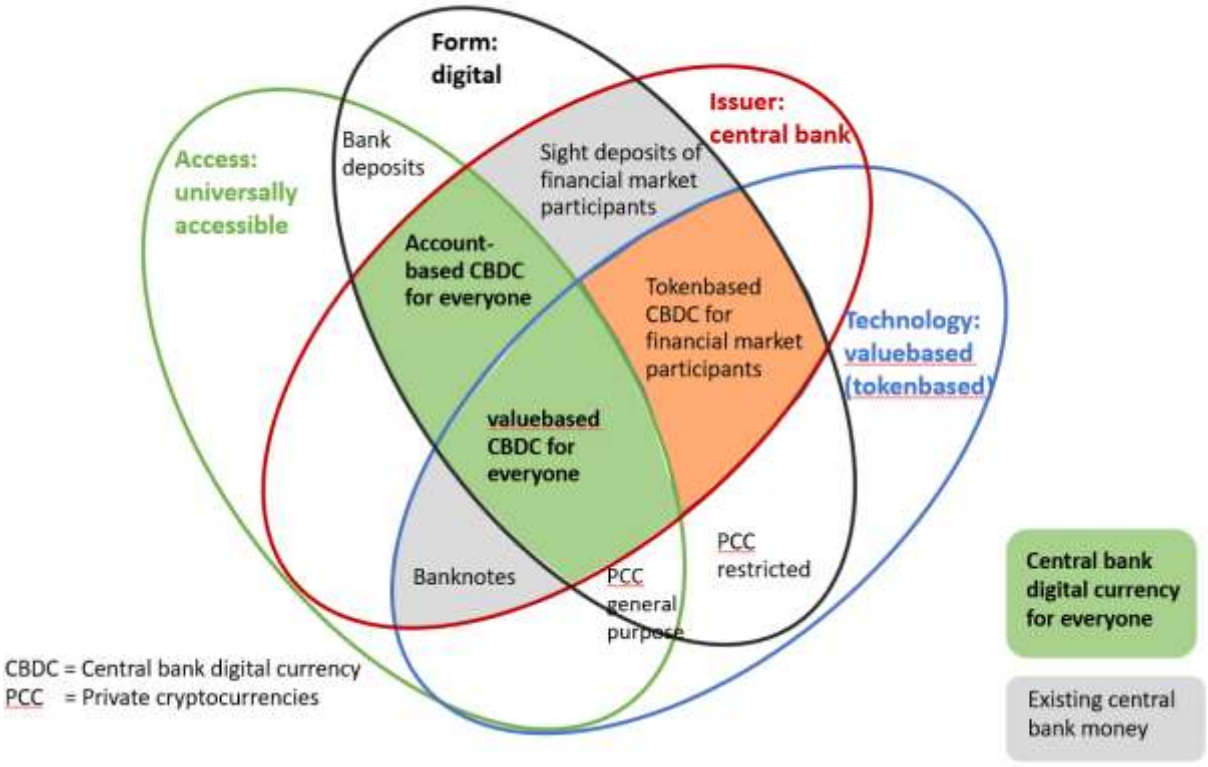
The BIS has classified various types of money, and these are briefly described below (section 4.1). This chapter focuses on the types of central bank money that would be universally accessible: cash and CBDC. We discuss how these types of money are created (section 4.2) and how transactions involving them might be carried out (section 4.3). The design of a CBDC will depend on its intended purpose, or the rationale behind its introduction. In section 4.4, we therefore discuss the core design features of CBDC.

4.1 The money flower: types of money

The BIS categorises money according to its four features (see Figure 1):

(1) issuer: *central bank* or *private sector*
(2) access: *universal* or *restricted (financial market participants)*
(3) form: *digital* or *physical*
(4) technology: *accountbased* or *valuebased* (tokenbased)

Figure 1: The money flower



Source: Own depiction based on Bank for International Settlements (2018), p. 5.

Issuer: Today, central bank money is issued in physical form as banknotes and in digital form as commercial bank sight deposits (grey-shaded areas). The money flower contains three other types of money which could be issued by the central bank: universally accessible CBDC (account-based or valuebased; green-shaded areas) and tokenbased CBDC for a restricted group of users, the financial market participants (orange-shaded area). In addition to money issued by the central bank, there are also private types of money. In this context, digital forms include book money (accountbased) and cryptocurrencies (tokenbased), which are either universally accessible (bitcoin, Ether, Libra, etc.) or for

a restricted user group (e.g. SIX Digital Exchange stablecoin (SDX CHF token), Utility Settlement Coin (USC); see the box on stablecoins in chapter 1).

Access: A further feature when considering the type of money. Currently, central bank money is universally accessible only in its physical form as banknotes. Book money, while also universally accessible, is not issued by the central bank. The accountbased or valuebased CBDC (green-shaded areas) discussed in this report would be universally accessible central bank money. By contrast, access to existing CBDC – accountbased sight deposits – is restricted. It is only available to commercial banks and certain financial market participants. A valuebased CBDC for a restricted user group, also known as a "wholesale token", would likewise only be accessible to financial market participants (orange-shaded area; see the section on wholesale tokens in chapter 1).

Form: Money can be issued in either physical or digital form. The only form of physical central bank money in Switzerland is banknotes.

Technology: The distribution of money can be either account-based or valuebased. Account-based types of money are credit balances at the account-holding bank. If accountholders pay with their money, the balance on their account decreases. Bank deposits and commercial bank sight deposits at the central bank are account-based. Account-based CBDC would also come into this category. With valuebased money, a token is exchanged between two parties. A token represents a certain value, for example one Swiss franc. The term "token" is mainly used to describe a digital manifestation of value (see the box on tokens in chapter 1). Cash is a physical manifestation and thus also a token in the broadest sense. A token is also the manifestation of a value (just like cash) so, unlike with an account-based transfer, there is no need to check the holder's identity. It is enough to check the validity of the token. Digital tokens can be transferred via e-wallets on technical devices (e.g. smartphone, computer, tablet) or via prepaid cards.

The rest of this report focuses on the green-shaded areas, i.e. the types of money that could be issued by the central bank and would be universally accessible: account-based and valuebased CBDC.

4.2 Issuance of CBDC

Cash is issued in exchange for commercial bank sight deposits at the central bank. The issuance of CBDC for the general public could take place in the same way, i.e. either in exchange for commercial bank sight deposits at the central bank, or against cash.

Cash: Today, users generally withdraw cash from ATMs or over the counter at a bank. This reduces the credit balance on their bank accounts. If commercial banks want to increase their cash holdings in order to refill their ATMs, they can do so by exchanging their sight deposits at the central bank for cash. Thus, the central bank issues cash via the commercial banks in exchange for the sight deposits they hold with it.

Account-based CBDC: If customers had an account at the central bank, they could top it up by making a cash deposit at the central bank or transferring book money from their account at a commercial bank.[45] As a result of this transfer, the relevant commercial bank's liabilities vis-à-vis the customer would fall, and its sight deposits at the central bank would decrease by the same amount. Account-based central bank money would thus be created through the exchange against cash or commercial bank sight deposits.

Valuebased CBDC: Tokens can also be obtained in exchange for cash or book money, and thus indirectly via commercial bank sight deposits at the central bank. The exchange against book money

[45] In principle, it would also be conceivable for private commercial banks to offer "central bank accounts" for private customers on behalf of the SNB.

would not be anonymous. By contrast, the exchange against cash could in principle be done anonymously for small amounts. For larger amounts, the customer or beneficial owner would need to be identified or designated, due to the requirements of the Anti-Money Laundering Act (AMLA) of 10 October 1997 (SR 955.0) – as is already the case with cash.

4.3 Transferring CBDC

Transactions with cash, account-based CBDC and valuebased CBDC differ in terms of transfer type, validation and anonymity.

With **cash**, the transfer is physical. The authentication ("validation") of coins and banknotes can be performed by the recipients themselves. No third party is involved in the transaction, and there is no exchange of data between the participants, so in this sense the transaction is anonymous for transfers up to a certain amount (AMLA requirements).

With **account-based CBDC**, the transfer is digital and takes place via the central bank accounts of the participants or between a central bank account and a commercial bank account. The central bank validates the transaction insofar as only those central bank balances that are available can be used for the transaction. The accounts, and hence the counterparties, are not anonymous.

With **valuebased CBDC**, the transfer is not effected via the participants' accounts at the central bank, but through the handover of a token. This transfer takes place directly between the participants. To prevent the same token from being spent twice by one party, regular validation in the main ledger at the central bank is necessary. In principle, the exchange can take place anonymously, as only the digital tokens are exchanged, and not necessarily any information on the participants. However, in order to comply with AMLA requirements, the valuebased CBDC would have to be designed such that it would be possible to identify the participants at least for larger amounts – as is the case with cash.

4.4 Design features of CBDC

The features of CBDC depend on their intended use. The table below provides an overview of design features compared to existing central bank money.

Table: Main design features of central bank money

	Existing central bank money		Universally accessible central bank digital currency	
	Banknotes	**Sight deposits at central bank**	**Account-based**	**Valuebased (tokenbased)**
Access	Universal	Banks and other selected financial market participants	Universal	Universal
Anonymity	Anonymous once issued	Not anonymous	Not anonymous	Can be largely anonymous once issued
Transfer	Decentralised once issued	Centralised, on SNB balance sheet	Centralised, on SNB balance sheet	Decentralised with periodic centralised validation
Interest	Not possible	Possible	Possible	Possible but unlikely
Ceiling	Amounts limited by the "demand for payment purposes"; no ceiling for ownership, only for payments	Possible in principle	Possible in principle	Like banknotes, possible in principle to limit amounts
Operating hours	24/7	Currently, SIC operating hours, 24/7 possible	24/7 possible	24/7 possible
Inflation risk	Yes	Yes, if interest lower than inflation	Yes, if interest lower than inflation	Yes
Risk of loss	Yes	No	No	Yes

Questions surrounding anonymity and transfer have already been discussed in sections 4.2 and 4.3 above. As regards the function and ramifications of CBDC, access, ceilings and interest are decisive factors.

Access: In principle, everyone has access to cash. Theoretically, access to CBDC could be restricted to certain groups. An accountholder's identity is known, and in the case of CBDC, the identity of the customer is usually known at the time of issue too. However, limiting access to, say, domestic users would lead people to circumvent the rules, which would need to be combatted with checks. It would not be possible to enforce these checks across the board, and they would bring costs and might potentially be damaging to the Swiss financial centre. Access to CBDC would thus not be exclusive, i.e. anyone could use it. Nevertheless, access would require appropriate technology. The CBDC would be either in an account or in an e-wallet, which would be accessed via technical systems such as mobile phones, tablets, computers, prepaid cards, etc.

Ceilings: Cash issuance is essentially dictated by the demand for payment purposes and is partly limited by the cost of holding cash. With valuebased CBDC, it would likewise be possible to tailor the available amount to the demand for payment purposes and to limit it accordingly. If CBDC is held in the form of tokens, costs are incurred in the same way as for cash (risk of loss, hedging, etc.).[46] With account-based CBDC, by contrast, the costs are practically zero. This could lead to very high demand. For this reason, ceilings are sometimes proposed for the issuance of account-based CBDC. While it would be difficult and costly to enforce a ceiling per person for CBDC, an absolute ceiling on the total amount would be easy to arrange in principle. However, the close substitutability with other types of central bank money (cash and financial market participants' sight deposits) would no longer be guaranteed. For if the demand for CBDC were to increase when the absolute ceiling had already been reached, this would result in a digital Swiss franc being worth more than a cash franc or a franc in a sight deposit at the central bank. If the various types of legal tender were no longer exchangeable one for one, this would lead to inefficiencies and legal uncertainty.

[46] Norges Bank (2018), p. 25, on the subject of tokenbased CBDC: "If an electronic unit is lost, the money held in the unit will also be lost, just as in the case of cash. Individuals are therefore likely to limit the volume of money they store in such units."

Interest: Today, the general public holds book money because of its usefulness in payment transactions and as a store of value, on the one hand, and because of its interest-bearing properties, on the other. If designed according to the account-based model, CBDC could in principle be interest-bearing. Interest-bearing CBDC would approximate to book money. The interest rate would significantly impact the attractiveness of CBDC. The higher the interest rate, the greater the competition posed by CBDC to book money. In an extreme scenario, this could call the two-tier monetary system into question. To avoid undesirable competition with book money, the central bank would have to set the interest rate on account-based CBDC substantially lower than that on book money (see section 5.4). Interest on valuebased CBDC, by contrast, appears less realistic.

It can thus be concluded that valuebased CBDC could be designed to resemble today's cash fairly closely. For this to be the case, it would have to be universally accessible, have no ceiling on issuance and bear no interest. Like cash, valuebased CBDC would be less suited to the storage of large amounts or to making large payments, owing to the risk of loss.[47]

In terms of function and usage, account-based CBDC is more comparable to existing book money, but with the key difference that there is no risk of default. Depending on the exact design (with or without interest, level of the interest rate), account-based CBDC could be an attractive investment and an alternative to bank deposits.

[47] Nonetheless, because of its physical nature, cash has features that distinguish it from CBDC, e.g. as regards anonymity or reliance on a digital infrastructure. So it is not possible to exactly replicate cash with CBDC.

5 Arguments for and against CBDC

This chapter describes the possible effects of CBDC for the general public in Switzerland. The potential consequences, as well as the advantages and disadvantages, are presented and assessed for the key CBDC expectations that were mentioned briefly in section 2.2. The specific design options set out in chapter 4 are included in the analysis where necessary.

5.1 Financial inclusion

Universal access to CBDC is often demanded with the argument that cash could increasingly be replaced as legal tender for various reasons. For example, growing volumes of payment transactions are becoming cashless (e.g. via credit and debit cards, payment apps, etc.) as a result of new technologies and changing preferences. Moreover, there are political efforts in various countries to restrict the use of cash in order to combat money laundering and tax offences.[48] With the diminishing use and/or acceptance of cash, population groups that are unable or unwilling to open a bank account could thus find themselves unable to make payments or receive money. Furthermore, economic activity is increasingly moving online, where practically all payments have to be made digitally.

CBDC could ensure continued access to legal tender for households and companies even without cash. Financial inclusion would be guaranteed, as people without an account with a commercial bank would also be able to make digital payments. CBDC would meet the general public's need for digital forms of payment that are inexpensive, efficient and stable.

If CBDC were introduced primarily with the aim of counteracting the undesirable impact of the growing displacement of cash, it would have to be designed in a very similar way to cash. Consequently, it would have to be valuebased, non-interest-bearing and universally accessible.

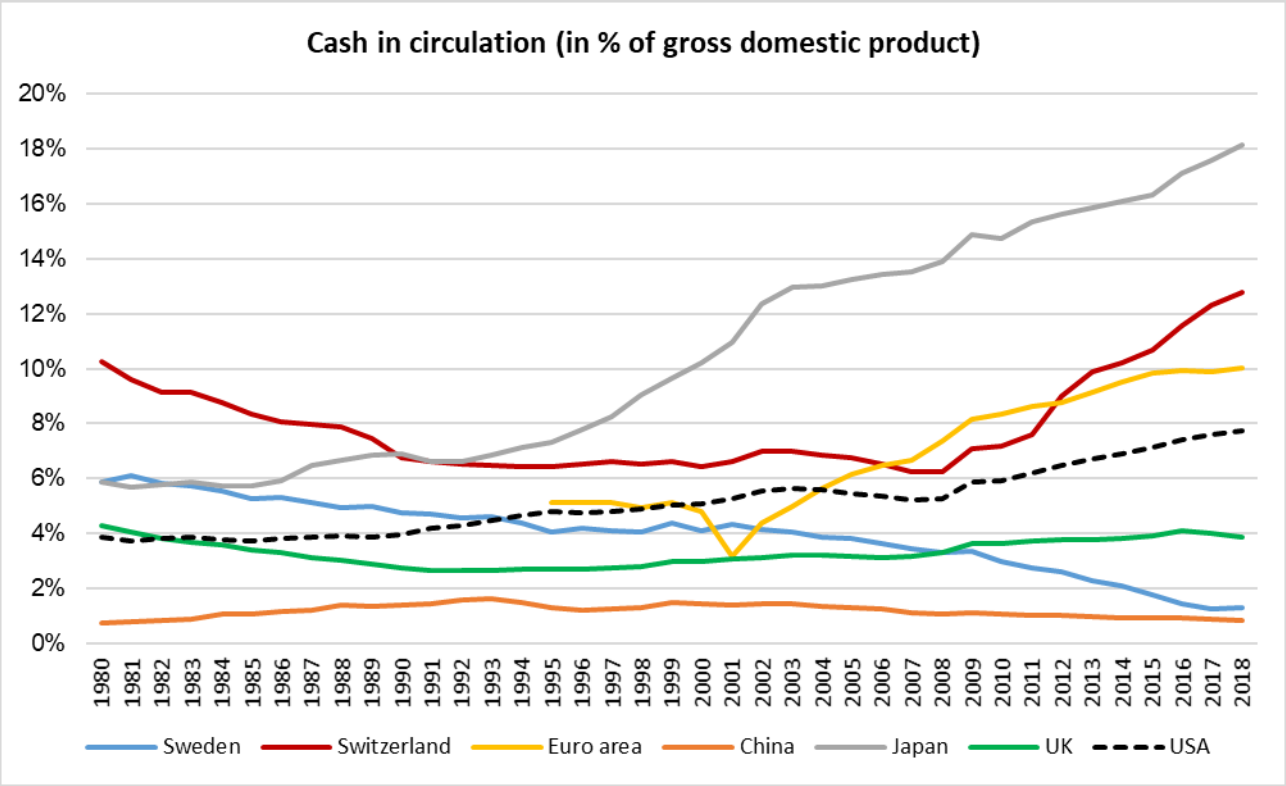
Uninterrupted cash use and acceptance in Switzerland

In mature economies such as Switzerland, the question of whether CBDC is needed from a financial inclusion viewpoint depends predominantly on the extent to which cash use and acceptance are decreasing and access to book money by certain segments of the population is restricted.[49] The trend of cash in circulation in various countries relative to their economic output (Figure 2) shows that Sweden in particular stands out for its declining use of cash, as already mentioned in chapter 2.

There are no signs of a reduction in cash acceptance in Switzerland yet – except for a few isolated cases. Cash use is still high. From the early 1990s until the 2008 financial crisis, cash in circulation relative to nominal GDP was largely stable, meaning that the demand for cash increased in line with nominal economic growth. Cash in circulation relative to GDP has even grown much faster since the financial crisis. It is most likely that the further increase seen in cash in circulation over the past decade, which can also be observed in many other countries, e.g. Germany, is due to the fact that the importance of cash as a store of value has risen against the backdrop of the financial crisis and the low interest rate environment.[50] But even without this effect, which should correct itself when the economic situation and interest rate environment return to normal, there is no evidence of cash being displaced as a payment method in Switzerland.

[48] For example, the European Central Bank stopped issuing 500-euro banknotes at the end of 2018, and France has had a ceiling of EUR 1,000 for cash payments since September 2016.
[49] In emerging economies and developing countries, another aspect is often important, i.e. if many people do not have access to financial services due to poverty or underdeveloped or unreliable banking systems. CBDC can then give the population the possibility of using financial services even without a banking system that works.
[50] Interdepartmental coordinating group on combating money laundering and the financing of terrorism, CGMF (2018b)

Figure 2: Cash in circulation



Source: Thomson Reuters, own presentation

This finding is also supported by the SNB's 2017 survey on payment methods, which found that cash is the most frequently used payment instrument for non-recurring payments by households in Switzerland. Of the payments recorded, 70% were processed with cash, but when measured in terms of value, cash accounted for only 45% of the recorded expenditure. However, the differences in payment behaviour that have been observed in other countries between groups with different socio-demographic characteristics are also evident in Switzerland. In particular, the aspects of age and household income are significant. People over the age of 55 and respondents from low-income households show above-average attachment to cash. By contrast, people aged 15 to 34 or from high-income households have a preference for card payments.[51] Since these people will probably not be highly attached to cash even as they get older, the use of cash for payment purposes could decrease in Switzerland too in the future. Moreover, there is robust growth in e-commerce and the associated digital payments in Switzerland.[52]

In short

In view of the still high level of cash use and acceptance, CBDC is currently not needed in Switzerland to ensure financial inclusion. It is nonetheless necessary to continually evaluate cash use and acceptance, as digital financial services are constantly evolving and the population's payment habits are also changing.

Approaches to ensure financial inclusion in the future without CBDC also exist. If cash use or acceptance declines in the future, other regulatory measures, for instance, could guarantee financial

[51] See Swiss National Bank (2018b) and interdepartmental coordinating group on combating money laundering and the financing of terrorism, CGMF (2018b)
[52] See also section 5.3. on payment transactions

inclusion. In Denmark, for example, commercial banks are obliged to offer each consumer a payment account.[53] Sweden has been discussing increased protection for the use of cash for quite some time, with the legislator guaranteeing access to cash by law.

5.2 Money without default risk needed

One of money's core functions is as a store of value. The 2008 financial crisis showed that some banks had taken on high risks, including in Switzerland. The public became aware that banks can become insolvent and that deposits with banks are thus subject to default or insolvency risk. Concerns about the stability of banks prompted the public to "turn increasingly to cash as a way of storing some of their savings outside the banking system",[54] which was also reflected in the jump in the use of cash in Switzerland and other countries, as already explained in section 5.1 and Figure 2. This public need for secure money and investments without default risk was apparent also in other phases of heightened uncertainty, such as during the euro area debt crisis from the end of 2011 to mid-2012. The function of cash as a store of value is estimated in a recent study,[55] according to which 60% of all banknotes in circulation are held for savings. This corresponds to a value of CHF 45 billion.

The fact that customer deposits at the supposedly "safest" banks in Switzerland increased disproportionately after the financial crisis provides further evidence of the greater need for secure investments. Customer deposits at the cantonal banks, most of which have a state guarantee (with the exception of Bern, Geneva and Vaud), climbed by 15.5% in the 2008 crisis year alone and continued to rise sharply in the subsequent four years (cumulative increase of 27.2% between 2009 and 2012).[56] The growth rates have returned to normal since 2013, bringing them closer to those of other banks. Customer deposits at PostFinance, which had a state guarantee until October 2017, likewise surged during the financial crisis, going from CHF 51 billion before the financial crisis to CHF 110 billion in 2012.

The issue of financial system stability and investment security has also been a major political debate topic in recent years. In that respect, the sovereign money popular initiative that was launched in Switzerland in the wake of the financial crisis is particularly noteworthy. This initiative called for an SNB monopoly on creating money, meaning that commercial banks could no longer do so. It was clearly rejected by the people and the cantons in June 2018.

In today's monetary system, "secure money", i.e. central bank money, is accessible to the general public only in the form of physical cash. In digital terms, households and businesses can only save book money or use it for payments. Some economists[57] believe that it would be beneficial to introduce CBDC given the practical advantages of digital currency and the growing use of digital transactions.

Need for secure money currently met by cash

The SNB has a legal mandate to ensure the supply and distribution of cash in line with the demand for payment transactions and thus the needs of households and businesses. As mentioned above, the population's behaviour does not suggest that cash will become meaningless in the near future. The demand for cash is robust, also in terms of its function as a store of value.

In short

Like all types of money, cash is used not just for payments, but also as a store of value, especially in

[53] Danmarks Nationalbank (2017)
[54] Swiss National Bank (2017), speech by Fritz Zurbrügg at the World Banknote Summit, p. 2ff.
[55] Assenmacher, Katrin et al. (2019)
[56] SNB banking statistics
[57] E.g. Niepelt, Dirk (2018)

times of uncertainty. There are no moves to abolish cash in Switzerland. Against this backdrop, CBDC is thus unnecessary at present. If the situation were to change and cash use and acceptance were to plunge, alternative access to central bank money for households and businesses would have to be examined.

Moreover, substantial measures were taken in the wake of the 2008 financial crisis to increase confidence in commercial banks. The Federal Council has increased the resilience of systemically important banks with the too-big-to-fail provisions, for example. With the new provisions introduced in 2016, Switzerland's capital requirements for global systemically important banks are among the highest in the world. Furthermore, the protection of customer deposits at commercial banks has been boosted by various legislative amendments.

5.3 Payment transactions

One possible argument for introducing CBDC would be to improve the security and efficiency of payment transactions. This argument touches on the SNB's task of facilitating and securing the operation of cashless payment systems. Efficiency gains are mentioned relative not only to cash, but also to other existing payment methods. Some have called for CBDC to be introduced given the growing demand for payment services that are available instantly and at all times from any location. Cross-border payments are often discussed too in this context.

CBDC is additionally discussed as a means of safeguarding the role of the central bank in cashless payment transactions. In particular, the presence of large technology companies in this area (so-called "big techs" such as Facebook, Alipay and WeChat) has the potential to influence the role of central banks in payment transactions.

Relevance for Switzerland

The SNB's survey on payment methods indicated that the coexistence of cash and cashless payment methods functions well and that households are satisfied with the existing payment possibilities.[58]

Nevertheless, the payment transaction landscape is changing in Switzerland too. For example, there has been a structural shift in economic activity, from physical shops to online shopping (e-commerce), in recent years.[59] As a result, the proportion of cashless payments can be expected to increase at the expense of cash payments in the future. This development is accompanied by the need to process cashless payments instantly and at all times via a secure and efficient infrastructure.

Alternatives

The demand for a technically secure and efficient payment method can be met even without CBDC for the general public. The focus here is on instant payments, which enable almost immediate payment processing with the existing payment system. Instant payments have the added advantage of reducing the period of exposure to default risk for payers and payees that results from the number of parties involved in the payment (commercial banks, financial market infrastructures and other financial intermediaries).

In cross-border retail payments, where processing is still slow, costly and lacking in transparency, introducing an individual CBDC without also coordinating with other central banks would offer virtually no advantages. To increase the efficiency of existing systems, it is necessary to improve

[58] See Swiss National Bank (2018b)
[59] E-commerce has grown by 53% since 2012 and accounted for 9.6% of Swiss retail trade in 2017 (Wölfle, Ralf and Leimstoll, Uwe (2018))

interoperability between the systems and coordination among the parties involved. That does not require any CBDC.

In short

In the area of cashless retail payments, efficiency can be increased and security ensured by further developing the existing infrastructure, without there being any need to introduce CBDC for the general public. The private sector can develop new technologies and products based on the infrastructure provided by the SNB and within the regulatory guidelines. That is why the SNB is striving to refine the existing SIC payment system to accommodate established and new financial service providers' future requirements (e.g. round-the-clock operation). Furthermore, the SNB, together with the BIS, is also researching the possible advantages and risks of integrating CBDC for financial market participants into a distributed ledger technology infrastructure (token-based CBDC for financial market participants, so-called "wholesale tokens", see also chapter 1).

5.4 Monetary policy

A key question concerns the implications CBDC would have for the SNB's monetary policy. Regarding the possible effects, a distinction has to be made between a "normal" monetary policy environment, phases with higher Swiss franc demand when the franc serves as a safe haven, and a low interest rate environment.

“Normal" environment

The credit channel plays an important role in the monetary policy transmission mechanism. By targeting short-term money market interest rates, the central bank indirectly influences long-term capital market interest rates and commercial banks' interest rate conditions for commercial loans and mortgages. If the central bank raises or lowers its interest rates, banks' lending conditions become more expensive or cheaper for their customers, thereby applying the brakes to the economy or stimulating it through monetary policy.

The central bank could possibly influence banks' lending and deposit rates even more directly than at present with CBDC. This would require CBDC to bear interest. The interest on universally accessible CBDC would form a lower limit for the interest on customer deposits with banks (because otherwise there would be major shifts to CBDC), which could boost the central bank's influence on bank interest rates. However, the BIS believes that it is questionable whether this would be of great practical significance, as most central banks can already influence bank interest rates sufficiently with their existing instruments.[60]

By contrast, CBDC could have an undesirable adverse impact on the credit channel in the event of a large-scale shift from book money to CBDC. For example, it would cause banks to lose liquidity and stable sources of refinancing. They would pass on higher refinancing costs to their credit customers, which could ultimately curb economic growth without that being the intention of monetary policy. The extent to which customer deposits at banks would be shifted into CBDC would depend largely on the relative appeal of CBDC, especially its interest rate. Provided that CBDC does not have a particularly attractive interest rate, i.e. its interest is significantly lower than that of bank deposits, the negative impact on lending conditions is likely to be limited.[61]

[60] Bank for International Settlements (2018a)
[61] Shifts could become much more pronounced in phases of heightened uncertainty and financial market turbulence. However, this would then mainly pose a risk to financial stability and is thus addressed in section 5.5.

Phases with higher Swiss franc demand

During times of crisis, domestic and foreign investors see the Swiss franc as a safe haven: demand for francs rises and the currency appreciates. Switzerland's political, institutional, social and fiscal policy stability are cited as reasons why the franc is perceived as a safe haven.

Safe haven-related appreciation is often sudden and sharp. For Switzerland, as a small economy that is highly interconnected internationally, such appreciation leads to a deterioration in competitiveness, especially if it is long lasting. Exchange rate movements are of major significance for the SNB, as they have a direct impact on both inflation and the economy, and thus on the fulfilment of its mandate.

It can be assumed that there would be demand for SNB CBDC not only from Swiss residents, but also from foreigners.[62] Particularly in the case of CBDC without an upper limit, foreign demand could rise especially if Switzerland were to act alone internationally in launching CBDC. Even if CBDC were to be designed without a positive interest rate, its liquidity and lack of default risk would make it an attractive investment compared with the alternatives in which Swiss francs are usually held at present (book money, equities, bonds, money market investments). In times of crisis, this could exacerbate the upward pressure on the franc even further. In order to prevent the associated repercussions for the Swiss economy and inflation, the SNB would have to counteract an appreciation with its monetary policy instruments, as it has done in recent years by cutting interest rates, intervening in the foreign exchange market and temporarily setting a minimum exchange rate.

Low interest rate environment

In Switzerland and many other countries, monetary policy rates are very low or even negative. Against this backdrop, various economists see CBDC with negative interest rates as a means of pushing interest rates much further into negative territory than previously and thus stimulating the economy.[63]

However, CBDC alone would not be sufficient to expand the leeway for negative interest rates as long as cash remains an alternative. In the case of a negative interest rate that exceeds the cost of holding cash (physical storage, risk of loss), we could expect to see greater shifts to cash to circumvent the negative interest. In order to prevent a switch to cash, it would be necessary to abolish cash altogether or, as a less radical option, to make it less attractive to hold cash, e.g. by applying a discount on the face value or abolishing high denomination notes. As none of these ideas is up for discussion in Switzerland, CBDC, even with negative interest rates, would not increase the current monetary policy scope for negative interest rates.

If it does not bear interest, it is likely that CBDC would even reduce the scope for negative interest rates because, like with physical cash holdings, there is no default risk, but lower costs would be incurred than with holding cash. This applies especially to account- based models, whereas – depending on the design – costs could still be incurred for holding valuebased CBDC, like with cash (risk loss, security costs). In the case of account-based, non-interest-bearing CBDC, the effective interest rate floor would be zero. This would have prevented short and long-term interest rates from descending into negative territory, as witnessed in several countries in recent years, and thereby restricting the scope for monetary policy to an undesirable extent.[64]

[62] The central banks of Denmark and Sweden are also addressing this issue (Danmarks Nationalbank, 2017, and Riksbank, 2018a), although their currencies are less in demand as safe havens than the Swiss franc
[63] For example, Rogoff, Kenneth S. (2016), as well as Bordo, Michael and Levin, Andrew (2017)
[64] See the Riksbank's assessment (2018a)

Aside: helicopter money

It is sometimes mentioned that CBDC would facilitate the distribution of helicopter money.[65] While in today's system the central bank puts newly created money into circulation through commercial banks, account-based CBDC would allow helicopter money to be paid directly to the population via their central bank account. It should be borne in mind that helicopter money would be a gift of money and ultimately a fiscal policy measure. No central bank has used helicopter money to date.

The issue of the SNB distributing money directly and debt-free to government units and households was discussed in Switzerland as part of the sovereign money initiative rejected by the people and the cantons in 2018. Like the SNB, the Federal Council rejected such a direct distribution of money, as it would complicate monetary policy and put it under increased political pressure, which could jeopardise price stability in the long term.[66]

In short

The assessment of the impact of CBDC on monetary policy is negative. In normal times, CBDC would have no discernible advantages for the effectiveness of monetary policy, but it could curb lending and economic growth, and restrict banks' business models. If safe havens are sought, it would facilitate the flight into the Swiss franc and increase the upward pressure on it. The scope for lower negative interest rates would be expanded only if access to cash were severely restricted or if cash were completely abolished, which is not up for discussion.

5.5 Financial stability

CBDC would result in the creation of another investment instrument without default risk in addition to cash. This additional option would facilitate the shift from book money (with default risk) to central bank money, which could have an impact particularly during periods of heightened uncertainty. Although it is already possible for customers to switch to central bank money by having their bank deposits paid out in cash, this is counteracted by the fact that holding large amounts of cash involves costs and practical obstacles (storage and insurance are expensive, transport is likewise expensive and time-consuming, physical availability is limited in the short to medium term). This could change with CBDC, as it would be available at a lower cost and very quickly. The flight to CBDC would be easiest with an account-based design, as customers could convert all their bank deposits into central bank money more or less "at the push of a button" and virtually free of charge. This would not be quite as smooth with valuebased CBDC, because holding large amounts of money entails costs (e.g. risk of loss), as is the case with cash.

It is not *a priori* clear how the easier option for fleeing to central bank money associated with CBDC would affect the financial stability to which the SNB is obliged to contribute, as both destabilising and stabilising effects could potentially occur. Moreover, it is worth mentioning that bank customers already have the possibility of satisfying a heightened need for "secure" investments by switching from financial institutions without a state guarantee to those with a state guarantee.

[65] Perret, Virgile (2019), Hanl, Andreas and Michaelis, Jochen (2019)
[66] Dispatch of 9 November 2016 on the popular initiative "For crisis-resistant money: end fractional-reserve banking (sovereign money initiative)", BBl **2016** 8475

Destabilising effect on financial stability

The facilitated flight to central bank money could encourage and accentuate financial crises.[67] Even minor uncertainties could trigger a bank run more quickly than in the current monetary system. Problems at a single institution could also infect other institutions more quickly, which could cause the crisis to spread more rapidly and thus endanger the stability of the entire financial system. Consequently, CBDC would significantly increase the financial stability risks in the existing monetary system. That would have to be countered with more stringent regulation (e.g. higher liquidity coverage ratio, LCR) or higher deposit protection.[68]

CBDC could weaken rather than strengthen financial stability not only in the event of crises, but also in calm times, as it would tend to complicate the refinancing of banks. In the event of customer deposits shifting massively to CBDC, banks would either have to shrink their balance sheets and adapt their business models or increasingly resort to other sources of funding (e.g. interbank market, bonds). Since these sources of funding have volatile costs and dry up quickly in times of crisis, banks' refinancing would tend to be more expensive, riskier and less stable.[69] The use of more volatile sources of funding would force banks to hold more high-quality investments through the LCR, and acquiring them would entail additional costs for banks.

The extent to which there would be a permanent shift from bank deposits to CBDC would in turn depend largely on the relative appeal of CBDC and thus its actual form. In this context, the more the design is geared towards an account form with possibly attractive interest rates, the stronger the shifts are likely to be. These would probably tend to be smallest in the case of a non-interest-bearing valuebased form that carries a risk of loss. Interest is likely to be secondary in times of crisis, however, with the result that a shift to CBDC is likely even if its design is unattractive.

Stabilising effect on financial stability

Yet the risk of a flight to CBDC could also have a disciplining effect on banks. Commercial banks would have a major interest in making their business models more secure in order to prevent the outflow of customer deposits. Banks might take fewer risks in competing for customers, making the financial system more stable overall.

In short

CBDC would be an alternative, safe and liquid investment option for bank customers. The financial stability impact is rather negative on the whole. At best, the ease with which funds could be shifted would encourage banks to take fewer risks and thus contribute to financial stability. Bank runs can occur even now, but CBDC carries the risk of a "bank run at the touch of a button", and it could also make refinancing more expensive and less stable for banks. The greater the appeal of CBDC is in relation to book money (and cash), the higher the financial stability risks are. The existing regulations would probably have to be made stricter. Against the background of risks that are difficult to estimate but potentially considerable, most central banks, the BIS and the International Monetary Fund are sceptical about CBDC from a financial stability perspective.

Furthermore, economic policy measures that are more suitable for ensuring financial stability exist and are less uncertain and risky than creating CBDC for the general public. The tightening of banking regulations in Switzerland and many other countries during the financial crisis has already significantly reduced the incentives for banks to take excessive risks. Banking regulations could be tightened

[67] See in particular the Bank for International Settlements (2018a)
[68] International Monetary Fund (2018)
[69] International Monetary Fund (2018)

further if financial stability so requires. In its third evaluation report of 3 July 2019[70] on systemically important banks, the Federal Council concluded that the Swiss regulatory approach to mitigate the risks to financial stability posed by systemically important banks – which combines various measures and has been refined over the years – is positive and appropriate by international standards. A fundamental reorientation is thus unnecessary.

5.6 Financial crime

CBDC could improve states' options for combating financial crime such as tax offences, money laundering and terrorist financing, as it would enable criminal transactions to be tracked and identified easily. Several economists[71] believe that CBDC would be particularly effective in curbing financial crime if it were to largely replace today's cash, which is seen as conducive to criminal financial transactions because of its anonymity. This is why various proposals have been made to combine CBDC with the abolition of cash or restrictions on its use, e.g. the abolition of large banknotes.

In order to achieve the goal of stemming financial crime, CBDC should be as "traceable" as possible. This would best be achieved with an account-based design that guarantees the traceability of account movements and transactions. A valuebased variant could theoretically be designed in a way that could enable considerable anonymity (regarding the parties to transactions). However, the actual design would probably be such that identification and tracking would be mandatory above certain amounts or with certain transaction types, for example.[72]

Unclear connection between different forms of money and financial crime

The argument that CBDC would curb financial crime is contentious among specialists, in particular as regards the crime risks associated with cash relative to digital payment methods. Although cash facilitates criminal transactions such as tax offences, money laundering and terrorist financing because of its anonymity, many international studies indicate that there is already a growing use of cashless channels for money laundering and terrorist financing.[73] Therefore, replacing cash with suitable digital payment methods would not guarantee less financial crime. Last but not least, private cryptocurrencies pose considerable risks in the areas of money laundering and terrorist financing, including for Switzerland.[74]

The financial crime risks associated with private cryptocurrencies could also affect CBDC under certain circumstances. The BIS sees substantial risks in this regard, especially in the case of a relatively "liberal" design (quite high level of anonymity, no access restrictions, no restrictions for cross-border payments). Moreover, cyber-risks could rise for the SNB, as CBDC would be a lucrative target and would create appropriate incentives. Attacks on CBDC could undermine confidence in the currency.

In order to reduce such risks of crime, CBDC would probably have to be both designed restrictively and regulated closely for traceability purposes. For example, CBDC transactions would also have to comply with the current anti-money laundering provisions. This could lead to payment ceilings, access restrictions and stricter monitoring of cross-border payments, for instance. However, such restrictions could very well impair the efficiency of CBDC as a payment method. In addition, the objective of crime prevention has to be weighed against the protection of privacy.[75]

[70] Federal Council report (2019)
[71] See Rogoff, Kenneth S. (2016), as well as Bordo, Michael and Levin, Andrew (2017)
[72] International Monetary Fund (2018)
[73] Interdepartmental coordinating group on combating money laundering and the financing of terrorism, CGMF (2018a) and the literature cited therein
[74] Interdepartmental coordinating group on combating money laundering and the financing of terrorism, CGMF (2018b)
[75] International Monetary Fund (2018)

In short

There is currently uncertainty as to whether criminal transactions such as tax offences, money laundering and terrorist financing, etc. can be curbed with CBDC. More appropriate and more targeted measures exist for effectively combating financial crime than launching CBDC, e.g. within the framework of the current measures to combat money laundering and terrorist financing. For Switzerland, the following in particular are worth mentioning:

- In order to counteract the misuse of cash, Switzerland – like many other countries – has taken numerous legislative measures.[76] Crucial elements include the due diligence duties of financial intermediaries[77], money transmitters and casinos when receiving and paying out cash. An amendment to the Anti-Money Laundering Act also proposes lowering the cash payment threshold from CHF 100,000 to CHF 15,000 for the application of due diligence duties by precious metal and precious stone traders.[78] Similarly, with the entry into force on 1 January 2020 of the Ordinance of the Swiss Financial Market Supervisory Authority of 3 June 2015 on the Prevention of Money Laundering and the Financing of Terrorism (FINMA Anti-Money Laundering Ordinance, SR 955.033.0, AMLO-FINMA), the Agreement of 13 June 2018 on the Swiss Banks' Code of Conduct with regard to the Exercise of Due Diligence (CDB 20) and the self-regulatory organisations' regulations, the threshold for cash transactions involving financial intermediaries will be lowered to CHF 15,000.[79]
- With regard to the risks of misuse in the area of private cryptocurrencies, Switzerland has a comprehensive regulatory system in place to combat the threat[80], even if it does not yet eliminate all vulnerabilities. International solutions are essential to significantly reduce the risk of crime further.[81]

[76] Interdepartmental coordinating group on combating money laundering and the financing of terrorism, CGMF (2018a)
[77] Article 3 et seq. of the AMLA
[78] Dispatch of 26 June 2019 on amending the Anti-Money Laundering Act (AMLA), BBl **2019** 5451
[79] https://www.finma.ch/de/~/media/finma/dokumente/dokumentencenter/anhoerungen/laufende-anhoerungen/rs-gwv/20180718-as-gwv-finma.pdf?la=de; https://www.swissbanking.org/de/themen/regulierung/geldwaeschereibekaempfung
[80] The dispatch of 27 November 2019 on the Federal Act on the Adaptation of Federal Law to Technical Developments in Distributed Ledger Technology (dispatch 2019) also provides for an amendment of the AMLA
[81] Interdepartmental coordinating group on combating money laundering and the financing of terrorism, CGMF (2018b)

6 Legal aspects

The following explanations refer to CBDC that would be accessible to the general public. This section is by no means exhaustive, and only the most important legal aspects are highlighted. The need for legal adjustments differs considerably depending on how CBDC is designed, i.e. account-based or valuebased, etc. Consequently, it is impossible at this stage to give a conclusive description of all the legal implications, as this would go beyond the scope of this report.

6.1 Consequences for the existing monetary and economic system

Article 99 paragraph 1 of the Federal Constitution states that the Confederation is responsible for money and currency, and that "the Confederation has the exclusive right to issue coins and banknotes", i.e. cash. The Confederation's monopoly on money and currency covers in particular the right to determine the currency unit and to designate the legal tender.[82] These powers are fleshed out in the CPIA.

The banknote-issuing privilege has been transferred by the Confederation to the SNB since it started business in 1907 (Art. 4 of the NBA).[83] This right to issue banknotes was initially linked directly to the National Bank's conduct of monetary policy. It enabled the National Bank to influence the money supply and the external value of the currency.[84] In today's environment, however, steering the money supply by issuing banknotes plays virtually no role. Instead, the SNB implements its monetary policy operationally by influencing the level of interest rates on the Swiss franc money market.[85] In this way, it influences the level of sight deposits held by commercial banks with the National Bank and thus the banks' ability to create money (see section 3.3). The legislator has designated sight deposits as legal tender and stipulated that they must be accepted in payment without restriction by any person holding a sight deposit account with the SNB (Art. 3 para. 3 of the CPIA).

For money to fulfil its function as a payment method, store of value and unit of account, its value has to be stable. The constitutional and legislative authorities have used their comprehensive legislative powers in the area of money and currency (Art. 99 para. 1 of the Cst.) and delegated responsibility for the intrinsic value of money (monetary stability) and the external value of money (exchange rate) to the SNB. As a result, in accordance with Article 99 paragraph 2 of the Federal Constitution, "the Swiss National Bank, as an independent central bank, pursues a monetary policy that serves the overall interests of the country". This constitutional mandate is further clarified at the statutory level by Article 5 paragraph 1 of the NBA, which states that the National Bank shall ensure price stability while taking due account of economic developments. In this context, it decides autonomously on the use of the entire range of monetary policy instruments available. The National Bank has a clear legal mandate which at the same time defines the scope of its activities.[86] Aside from ensuring the supply and distribution of cash in Switzerland, its core tasks also include providing the Swiss franc money market with liquidity, facilitating and securing the operation of cashless payment systems, managing the currency reserves and contributing to the stability of the financial system (Art. 5 para. 2 of the NBA). Before introducing CBDC, it would thus be necessary to examine how this would affect the

[82] Schar-Schuppisser, Markus (2010) 49 f. in Nobel, Finanzmarktrecht, § 6 N 7
[83] SR 951.11. The National Bank's banknote-issuing privilege was originally limited in time and had to be renewed every 20 years by the Federal Assembly. With the entry into force of the totally revised NBA on 1 May 2004, the note-issuing privilege was permanently transferred to the National Bank (dispatch of 26 June 2002 on the revision of the National Bank Act (NBA) BBl **2002**, 6178 f (dispatch 2002)).
[84] Dispatch of 27 May 1998 on a new article on money and currency in the Federal Constitution 1998, BBl **1998** 4017, 4018 f.(dispatch 1998); dispatch **2002**, 6178 f
[85] Nowadays, primarily certain open market operations (repo transactions, foreign exchange market interventions, foreign exchange swaps and securities transactions), as well as standing facilities (liquidity-shortage financing facility, intraday facility) are of practical relevance for the SNB.
[86] Federal Council report (2016), p. 6

fulfilment of the SNB's mandate and how it could be brought into line with its constitutional and statutory mandate.

As explained in chapter 5, the introduction of universally accessible CBDC could lead to customers increasingly shifting their bank deposits to CBDC. General public access to CBDC could therefore impact the distribution of roles between the state and the private sector, as the SNB would have to take on new tasks that were previously not part of its mandate or core tasks. If the SNB were to perform tasks similar to those performed by commercial banks in the current two-tier monetary system, it would compete with the private sector. Any changes regarding the distribution of roles and the new competitive situations between the state and the private sector would have to be examined for compatibility with the principle of economic freedom and the inherent principle of freedom from state intervention (Art. 27 and Art. 94 of the Cst.).[87] In the process, it should also be borne in mind that less drastic alternatives may exist to satisfy the public's demand for a secure and efficient cashless payment method (see section 5.3).

6.2 Public law aspects

The Confederation has comprehensive legislative powers in the area of money and currency (Art. 99 para. 1 of the Cst.). The basic features of CBDC for the general public (account- or valuebased design, access, convertibility, etc.) would have to be regulated in legislation. It would be necessary to examine whether and to what extent the power to regulate (technical) details could be delegated to the SNB.

Under Article 2 of the CPIA, coins, banknotes and Swiss franc sight deposits at the Swiss National Bank are considered to be legal tender. The following are not legal tender: other "physical" payment methods such as Reka, WIR, prepaid cards, cheques, etc., as well as all electronic payment methods that are not sight deposits held at the SNB (collectively: "other types of money"). Unlike in the case of legal tender, there is no legal obligation to accept these other types of money (Art. 3 of the CPIA). This means that they can be used for payments only if the recipient agrees contractually to accept this form of payment.[88] In contrast, everyone must accept Swiss banknotes in payment without restriction, and sight deposits at the SNB must be accepted in payment without restriction by anyone holding an account there. In the case of coins, the acceptance obligation is limited to 100 regular issue coins. If CBDC were introduced as legal tender, at least Articles 2 and 3 of the CPIA would have to be adapted accordingly and – depending on the design of the CBDC – further aspects would have to be regulated in the CPIA and, if applicable, in the NBA and in the implementing provisions.

Another key aspect to be regulated concerns the technical infrastructure required. The SNB could conceivably provide and operate the necessary infrastructure itself or commission a third party to do so (as is currently the case with the SIC payment system, for example, which is operated by a private company on behalf of, and subject to oversight by, the SNB). If the operation of the technical infrastructure is outsourced, there will have to be supervision of the operator and possibly monitoring of the infrastructure. Depending on the CBDC design, the Financial Market Infrastructure Act and the corresponding ordinances may need to be adapted.

[87] The distribution of roles between the state and the private sector was addressed as part of the work on the revision of the article on money and currency in the Federal Constitution (Art. 39a of the Cst.). With regard to the Confederation's monopoly on money, it was stated that "the constitutional authority [...] shall leave to the market the development and offering of further payment instruments that can fulfil functions similar to cash in the cashless society"; see dispatch (1998) 4007, 4032.

[88] Mirroring the public law acceptance obligation set out in Article 3 of the CPIA, Article 84 paragraph 1 of the Swiss Code of Obligations stipulates at private law level that pecuniary debts must be discharged in legal tender of the currency in which the debt was incurred. Accordingly, the debtor generally has to pay pecuniary debts in cash and the creditor is generally obliged to accept cash payments, unless the parties have contractually agreed otherwise. If CBDC were recognised as legal tender, creditors and debtors would, in principle, have the option of settling the transaction in cash or CBDC, without there being a need to adapt Article 84 paragraph 1 of the Swiss Code of Obligations.

The role of financial intermediaries (banks, service providers such as wallet providers, payment system operators, trading platforms, etc.) would then have to be clarified. Likewise, it would be necessary to examine the question of having CBDC issued directly by the SNB or put into circulation indirectly via commercial banks and other financial intermediaries. The conditions under which financial intermediaries provide services in connection with CBDC would have to be regulated accordingly. This would affect primarily the Federal Act of 15 June 2018 on Financial Services (SR 950.1, Financial Services Act, FinSA) and the Federal Act of 15 June 2018 on Financial Institutions (SR 954.1, Financial Institutions Act, FinIA), the Federal Act of 8 November 1934 on Banks and Savings Banks (SR 952.0, Banking Act, BankA) and the Federal Act of 23 June 2006 on Collective Capital Investment Schemes (SR 951.31, Collective Investment Schemes Act, CISA), as well as the corresponding ordinances.

In the area of combating money laundering and terrorist financing, it would be necessary to determine who is responsible for ensuring compliance with the relevant statutory provisions and who carries out the necessary checks and controls (money laundering, terrorist financing) on CBDC users. The AMLA and/or the Anti-Money Laundering Ordinances[89] would have to be adapted accordingly.

The same applies to the obligations of financial intermediaries with regard to compliance with national and international tax legislation (e.g. in connection with the automatic exchange of information) and generally to the tax treatment of CBDC. Here, too, adjustments to national law and international agreements may well be necessary.

Finally, consideration should be given to how the legal position of CBDC could be verified and what degree of anonymity should be granted technically and protected legally. In this context, technical and legal clarification would be needed regarding how data protection could be ensured and the privacy of CBDC users sufficiently protected. Responsibilities in this area would have to be regulated. In this respect, the Federal Act of 19 June 1992 on Data Protection (SR 235.1, FADP) and its implementing provisions should be thoroughly reviewed.

6.3 Civil aspects

From the perspective of civil law, it is necessary to distinguish between account-based and valuebased CBDC. The legal consequences vary depending on whether CBDC is designed like book money (i.e. account-based) or like cash (i.e. valuebased). This concerns in particular the legal nature of CBDC for the general public and thus the legal assessment of certain processes (issuance of central bank money, transfer and finality, assignment, loss, pledging, bankruptcy treatment, etc.). Depending on the CBDC design, it would be possible – although only in part – to draw on the existing legal framework of the Swiss Code of Obligations or the new legal framework on DLT uncertificated securities[90]. Overall, because of the similarity to book money, account-based CBDC is likely to require fewer legal adjustments than a valuebased form of CBDC.

The question of liability would thus be closely linked to the operation of the technical infrastructure (see section 6.2 above). Liability claims may arise in connection with the technical operation (e.g. interruption or failure of the systems) or due to cyber-risks, but also in the event of incorrect transmission, theft, fraud and the breach of data protection or privacy. Here, the legal framework is likely to depend very much on whether the SNB operates the necessary technical infrastructure itself or has it operated by a third party. Aside from substantive issues (finality, multiple use, etc.), it is also necessary to consider the questions of the incidents for which the operator is liable and those for which the operator can pass on liability to third parties (e.g. software companies), the applicable

[89] SR 951.1
[90] See dispatch (2019)

liability regime (private law or public liability law), and the proceedings (civil proceedings or administrative proceedings) in which any claims would have to be asserted.

Finally, the treatment of CBDC in cross-border situations would have to be clarified. In addition to the issue of the place of jurisdiction, the question of applicable law would also have to be addressed.

6.4 In short

The specific need for legal adjustments varies considerably depending on how CBDC for the general public is designed. As things currently stand, various adjustments would be necessary at the statutory level in terms of public law, and individual adjustments might also be necessary in the area of civil law.

7 Conclusions

CBDC for the general public has increasingly been the topic of national and international discussions for several years in the context of the changes in the financial system (nascent private cryptocurrencies and the associated products and services, new digital payment options, the arrival of new large providers in payment markets and discussions about the future of cash). CBDC is seen, among other things, as an instrument for ensuring the central banks' ability to act in a changed financial environment.

CBDC can be designed in various ways (e.g. account or valuebased, interest-bearing or not, anonymous or traceable, etc.). Depending on its design, it may have functional similarities to cash or a bank deposit. The precise design of CBDC depends largely on its intended purposes. Analysis shows that it is impossible to achieve all objectives at once, as some of them would require contradictory arrangements.

The launch of CBDC for the general public would have an impact in various areas. This report looked at the possible effects on financial inclusion, the need for secure money, payment transactions, monetary policy, financial stability and financial crime, and came to the following conclusions.

- CBDC would be a way to ensure financial inclusion, i.e. general public access to payment and financial services in an increasingly cashless world. From this point of view, however, there is currently no need for CBDC in Switzerland, given the population's almost complete coverage with bank accounts and the uninterrupted use and acceptance of cash. The situation needs to be reviewed on an ongoing basis, as payment habits and financial services are constantly evolving.
- At present, the public need for secure money, i.e. money without default risk, is covered in particular by the availability of cash, as well as by deposit protection and the possibility of placing money with financial institutions that have a state guarantee. As became apparent in the course of the 2008 financial crisis, banknotes are increasingly used as a store of value in times of crisis. People in Switzerland have guaranteed access to central bank money, and cash continues to be widely accepted and in demand. At the same time, the resilience of commercial banks and the protection of customer deposits have been boosted by various legislative amendments. Should the situation change in the future, CBDC would be a way of satisfying the population's need for secure money.
- With regard to increasing the efficiency and security of cashless payment transactions, CBDC conveys no advantages in Switzerland. The existing system is efficient and secure, and is also being refined continuously. There is room for improvement in the area of cross-border payments. However, the introduction of CBDC would not solve this problem. It would be preferable to improve interoperability between the existing systems and coordination between the parties involved.
- In terms of the SNB's monetary policy, the verdict on universal accessibility to CBDC would have to be negative, as it would bring new risks rather than discernible benefits. CBDC would not increase the leeway in terms of monetary policy. On the contrary, it would carry the considerable risk that – depending on the design – greater foreign demand for Swiss CBDC could put the Swiss franc under heightened upward pressure, especially in times of crisis.
- With regard to financial stability, the overall impact is rather negative. Relative to today, CBDC would be likely to increase the risk of bank runs, even though it could have a disciplinary effect on the banking sector as an alternative investment.
- It is unclear whether CBDC would be suitable for combating financial crime (tax offences, money laundering, terrorist financing). The existing statutory instruments are more effective at combating

financial crime both in Switzerland and internationally. Moreover, CBDC could be a lucrative target for cybercriminals.

To sum up, the Federal Council has concluded that universally accessible CBDC would not bring any additional benefits on the whole for Switzerland at the moment. The SNB is also against CBDC for the general public at the present time, basing its opinion on the considerable risks, e.g. for financial stability (Swiss National Bank 2018c, 2019).

As things currently stand, further progress on CBDC that is restricted to financial market players would appear more promising than "CBDC for everyone". This would not have the same far-reaching, fundamental implications as CBDC for the general public. These so-called "wholesale tokens" could possibly help to enhance efficiency in the trading, settlement and management of securities. In this respect, experiments and clarifications will have to show whether the technology is already sufficiently advanced and whether the expected efficiency gains can be achieved. The BIS Innovation Hub project mentioned earlier will make an important contribution in this regard.

Rapid technological developments, changing payment behaviour and needs, and the experience of other countries may lead to a reassessment of the opportunities and risks of CBDC for the general public in the future. For this reason, the Federal Council and the SNB will continue to monitor developments closely.

8 Text of the postulate

18.3159 Postulate

Report on the opportunities and risks of introducing a crypto franc

The Federal Council is requested to submit a report examining the possibilities, opportunities and risks of creating and issuing a crypto franc (e-franc).

Reason

According to media reports, various states and national banks are currently examining the possibility of creating electronic currencies. Sweden's Riksbank even published the first report on its e-krona project back in September 2017. This project was inspired by the strong momentum seen in the development of electronic forms of payment and cryptocurrencies, among other things. These raise a number of regulatory questions. Furthermore, there are issues regarding the digital divide – for many citizens who are less tech-savvy, the technological obstacles separating them from private cryptocurrencies are still insurmountable at present – social and environmental sustainability, the great uncertainty and volatility in these markets, the future of the money transaction infrastructure and location opportunities. The situation in Switzerland is not entirely the same as that in Sweden, which is the world leader in electronic payment transactions. Nevertheless, the same questions will arise sooner or later in Switzerland. The report called for here should examine the opportunities and risks of creating an e-franc. In the process, the Federal Council should include all of the technological possibilities that are currently foreseeable.

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