

New technology and settlement in central bank money between banks

Distributed ledger technology, DLT, is gaining traction among global financial institutions and has the potential to evolve the way financial assets are traded. Central banks are investigating the area to ensure that financial entities can continue to use central bank money as a means of settlement for DLT-based transactions. This analysis explains the importance of central bank money, the potential use of DLT in the financial system, and the work of central banks to ensure settlement in central bank money in connection with systemic financial transactions based on DLT.

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The access of financial institutions to central bank money is essential

Central bank money is the safest and most liquid asset. It helps ensure stability and confidence in money in the financial sector. Regardless of the use of new technology, it is essential that central bank money in Danish kroner remains the primary settlement asset in Denmark's interbank markets.



DLT can potentially streamline capital markets

Market entities are exploring DLT to streamline parts of the capital markets and financial sector. However, using the technology on a larger scale is associated with issues that require further work.



Future expansion of the Danish settlement infrastructure will be done in collaboration with the ECB

In spring 2025, Danmarks Nationalbank migrated its payment system, Kronos2, to the pan-European platform for payments and securities trading, TARGET Services. Danmarks Nationalbank will therefore be part of the ECB's work on and development of the financial infrastructure of the future.

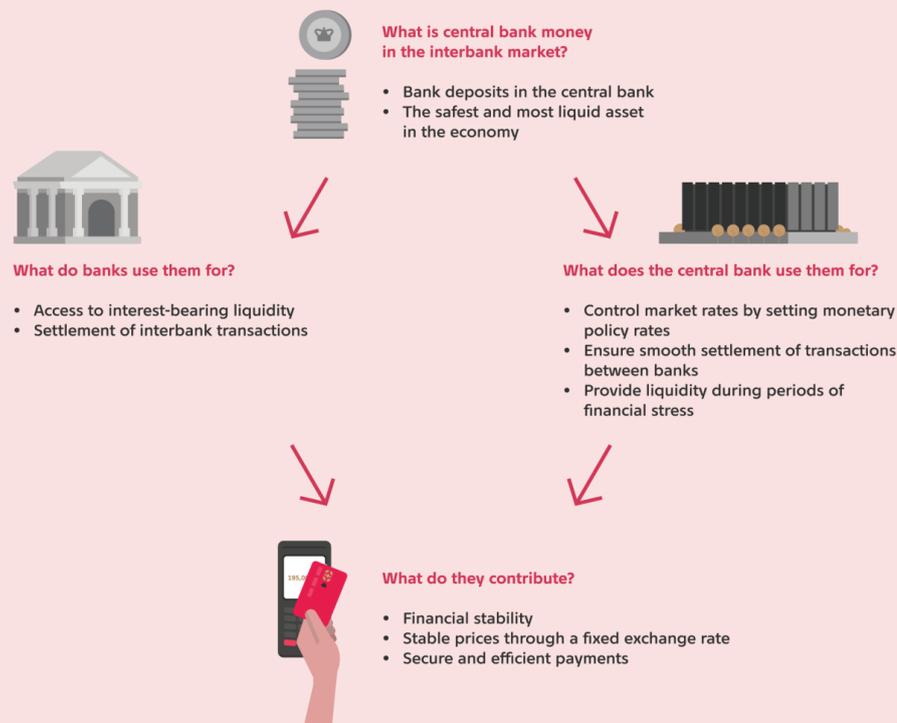
Why is it important?

One of Danmarks Nationalbank's most important tasks is to ensure the safe and efficient execution of payments so that the public, businesses and financial institutions can trade with each other. In this context, financial institutions' access to central bank money, i.e. (typically commercial banks') deposits at the central bank, is essential to ensure a stable financial sector in Denmark. Central bank money in the interbank market is the safest and most liquid asset in the economy and is used by banks and others to settle transactions. The use of central bank money creates the basis for financial stability and an effective monetary policy. It is therefore particularly relevant for Danmarks Nationalbank to consider new technological solutions to ensure that financial institutions can continue to use central bank money to settle systemic financial transactions, even when these are implemented with new technology.

Danmarks Nationalbank's approach to the Danish payments infrastructure is technology-neutral. Therefore, the bank continuously monitors digital developments to ensure that the payments infrastructure continues to benefit from the new opportunities brought about by the digitalisation of society.

Main chart

The role of central bank money in the financial system





Keywords

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01 Summary

In an economy dominated by technological development, it is crucial that central bank money, i.e. money issued by the central bank, remains a stable pillar for financial transactions between financial institutions. This applies to traditional and new digital systems that facilitate transfers and transactions of systemic importance. Such transactions are currently subject to high requirements for security, efficiency and reliability due to their importance for the financial markets and are therefore generally settled in central bank money. It is therefore essential that this access to central bank money is maintained in the future, regardless of the technology on which future payment and settlement systems between financial institutions are based.

Several private entities have developed DLT platforms in recent years. DLT is a technology that distributes a database with an overview of transactions and asset holdings to multiple participants, rather than being held by a single central entity. The technology is being promoted by several banks and financial institutions for its potential to improve parts of the capital markets and streamline processes.

One challenge in developing DLT platforms is that central bank money in its current form is generally not compatible with or available on them. And an absence of central bank money may increase the use of alternative forms of money between banks and financial institutions in the long run. The alternatives can be tokenised bank deposits, i.e. commercial bank deposits represented digitally on a DLT platform, or stablecoins, which are a cryptoasset that attempts to hold a stable value to one or more reference assets, such as a currency. The increased use of such private money at the expense of central bank money can challenge financial stability and monetary policy.

Central banks are exploring different solutions to ensure that financial institutions can settle in central bank money when conducting financial transactions on DLT platforms. In this way, central banks can also support innovation in the financial sector. Which technologies ultimately gain traction depends on the market's assessment of which technologies create the most value and efficiency.

Financial infrastructure development will be done in collaboration with the ECB

Denmark is closely linked to the euro area through its fixed exchange rate policy, payment systems and financial matters. In spring 2025, the activities on Danmarks Nationalbank's payment system, Kronos2, migrated to the pan-European payment and securities settlement platform, TARGET Services.

Danmarks Nationalbank participates in the pan-European work in TARGET Services to monitor and contribute to technological advances that can improve the efficiency and security of the financial system. Focus is also on ensuring that new solutions can be used for settlement in Danish kroner, thereby benefiting the Danish financial system from technological advances and improvements. Future expansion of the Danish settlement infrastructure, including considerations regarding DLT-based systems, will thus be done in collaboration with the ECB.

02

Central bank money is essential for financial stability and effective monetary policy

In general, money has three distinctive properties: It is widely accepted, so it can be used as a *means of payment*; it has a stable value, so it can be used as a *store of value*; and it is the *unit of measure* in which prices of goods and services are calculated.

Money is basically a claim, or receivable, against a bank, and it can be money issued by private banks or by central banks. The term 'central bank money' covers bank deposits at the central bank (also referred to as central bank reserves) and cash, but in this analysis, central bank money refers only to the former. Central bank money is unique in that it is a claim on a central bank, and when central bank money is exchanged between financial entities, the claim on the central bank is moved. Other forms of digital money represent a claim on a financial entity other than the central bank and, therefore, involve liquidity and credit risk.

Central bank money holds a value at all times that is trusted by all entities in the system. This is because the use of central bank money is not associated with credit risks, such as the risk of the counterparty going bankrupt, unlike commercial bank money, and a central bank will always be liquid and is the only entity that can provide liquidity to the financial system as a whole.

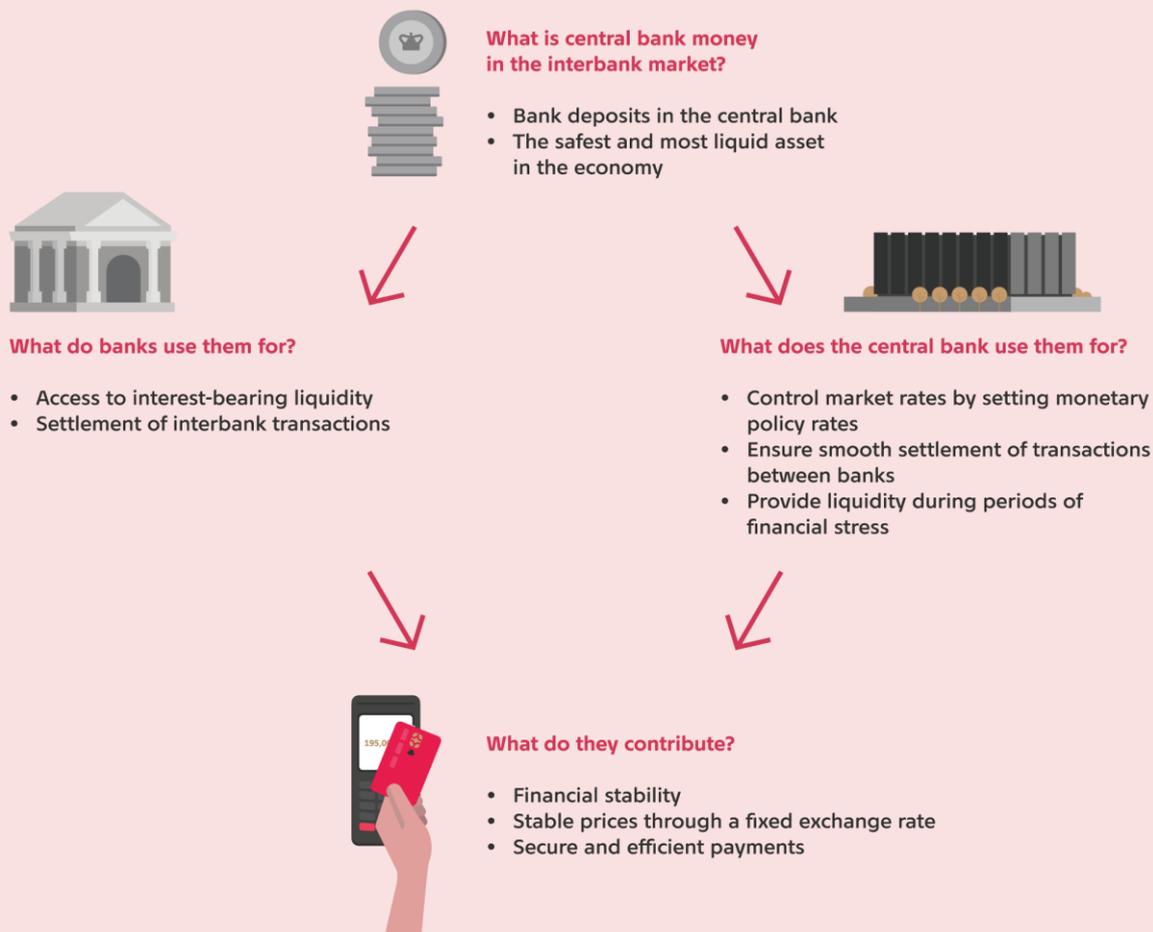
When there is an exchange of private money, such as a deposit in a bank, it requires the recipient to trust that the money received can fulfil its functions. This is the case when banks settle in central bank money and when settlement in central bank money is complemented by financial regulation such as deposit insurance. In other words, due to the unique properties of central bank money, it creates the basis for a well-functioning and stable financial system and an effective monetary policy, which ultimately leads to a currency being able to fulfil all three functions of means of payment, store of value and unit of measurement, see chart 1.

The importance of central bank money is also reflected in the fact that international standards and European legislation stipulate that securities settlement systems and systemically important payment systems should use central bank money for settlement where practical.¹

¹ See Regulation (EU) No 909/2014/EU of the European Parliament and of the Council of 23 July 2014 (CSD Regulation) ([link](#)) and Committee on Payments and Market Infrastructures (CPMI) - International Organization of Securities Commissions (IOSCO) PFMI: Principles for Financial Market Infrastructure principle 9 ([link](#)).

CHART 1

The role of central bank money in the financial system



Source: Danmarks Nationalbank

Central bank money helps make payments safe and efficient

Interbank transactions involve the exchange of money, which occurs through accounts at the central bank held by banks. When the public and businesses make payments, they typically use commercial bank money; however, the final settlement between the banks involved is usually made in central bank money, held in accounts at the central bank. There is thus a direct link between the use of central bank money and the use of central bank payment systems and facilities.

Central banks' monetary policy facilities contribute to stable prices

Central banks typically offer commercial banks facilities where they can place liquidity in the form of central bank money in deposit accounts and borrow liquidity from the central bank through lending facilities. The central bank sets the interest rates on these facilities and can thus fulfil its overall monetary policy task. In Denmark, the goal is to ensure stable price development through the fixed exchange rate policy.

At Danmarks Nationalbank, commercial banks can hold central bank money in current accounts and certificates of deposit, and take monetary policy loans from Danmarks Nationalbank.² When Danmarks Nationalbank changes the policy rate, the rate change will be transmitted to money market interest rates. During periods of pressure on the krone, this means that Danmarks Nationalbank can enforce the fixed exchange rate policy by, for example, influencing the yield spread to the euro area to maintain the krone exchange rate. The fixed exchange rate policy ensures stable price development so that the value of savings in terms of purchasing power is not eroded over time.

Central bank money helps strengthen financial stability

Commercial banks must maintain sufficient liquidity to meet potential outflows of money from their customers' accounts. Banks' liquid assets typically consist of deposits with central banks, a portfolio of liquid securities and a small cash balance. Accounts at central banks help banks to manage and obtain the necessary liquidity.

Central bank money helps ensure liquidity in unstable situations. If banks experience a liquidity shortage, the central bank can act as a lender of last resort to ensure liquidity for institutions and stabilise the situation. If a general freeze has occurred in the financial markets, the central bank can expand general borrowing options for institutions, thereby providing them with liquidity. This restores market function and normalises the flow of money between banks.

Less use of central bank money increases risks in interbank markets and can challenge the effectiveness of monetary policy

If bank-to-bank settlement increasingly takes place in assets other than central bank money, such as tokenised bank deposits or stablecoins, it could have implications for financial stability and monetary policy. Due to the central role of central bank money in the financial system, central banks work to ensure that central bank money remains the primary settlement asset in the interbank markets.

Less use of central bank money may be favoured if financial transactions take place on platforms that are not integrated with or connected to central bank systems. This can be the case, for example, if financial institutions choose to use private DLT platforms where settlement in central bank money is not possible. One possible consequence of this is that financial markets may become more fragmented, which could weaken central banks' ability to provide liquidity in unstable situations and conduct effective monetary policy, as the pass-through from monetary policy rates to market rates may weaken.

The parity of money, i.e. the equal value of money offered by different private entities in the same currency, can be challenged by increased fragmentation in financial markets. The equal value of a currency across financial markets is ensured through settlement in central bank money and trust in the central bank that issues the currency. In a highly fragmented financial system, uncertainty can arise as to whether money-like assets expressed in 'kroner' have the same value across different settlement platforms if there are differences in trust in the provider of the underlying settlement assets.³ In other words, less use of central bank money for settlement can lead to distrust in the value of money-like assets issued by private entities.

The central bank's national currency may also be challenged if private entities seek an alternative settlement asset, such as a stablecoin offered in a foreign

² See Nationalbanken.dk, Learn about monetary policy instruments, Danmarks Nationalbank, ([link](#)).

³ See Rodney Garratt og Hyun Song Shin, Stablecoins versus tokenised deposits: implications for the singleness of money, *BIS Bulletin*, nr. 73, April 2023 ([link](#)).

currency. For example, the vast majority of stablecoins are tied to the value of the US dollar.⁴ The widespread use of assets that are not linked to the national currency can affect central bank control over monetary policy and the transmission of monetary policy rates to the financial system and the real economy.

⁴ See, e.g. Christiansen, B. and R.B. Søndergaard, 2023, Crypto-assets: Risks, regulation and usage in Denmark, *Danmarks Nationalbank Analysis*, no. 16.

03 Distributed ledger technology and its potential application in the financial sector

Today, the global financial system is a complex entity. The system comprises a wide range of entities, including central banks, banks, central securities depositories, payment intermediaries, and various infrastructure providers, all of which play a role in ensuring that financial transactions are carried out correctly.

This complexity has led to ongoing research into how the financial market infrastructure can be simplified and made more efficient. To this end, several entities in the sector are exploring how technological solutions can help support these objectives. In this context, the focus is primarily on what functional possibilities the technology opens up, rather than the technology itself.

DLT has attracted increasing attention in the financial sector over the past few years.⁵ The aim has been to simplify and streamline the capital market infrastructure by consolidating multiple entities on a single platform, thereby reducing the number of intermediaries, messages, and coordination across systems. The research and development of DLT platforms as financial market infrastructure is increasingly being undertaken by traditional entities, including major banks, central securities depositories, central counterparties, CCPs, and payment intermediaries, often in collaboration with technology partners and international organisations. It is estimated that over 30 per cent of major European banks are already using or testing DLT⁶, having engaged in the ECB's exploratory work on new technology for settlement in central bank money.⁷

The new DLT platforms are generally not compatible with current central bank systems, which is why the settlement of assets and transfer of liquidity between financial entities using DLT cannot currently be carried out with central bank money. Given the technological developments of recent years, a number of central banks are focusing on ensuring that financial institutions can continue to settle in central bank money. This is achieved by either enabling new DLT platforms to communicate with existing systems or by developing new systems that support such access. This allows central banks to support safe and efficient payments and asset settlement, regardless of the underlying technology.

⁵ For a more detailed description of blockchain technology and its applications, see Seixas, Nielsen og Mogensen: New types of digital money, Danmarks Nationalbank (2022), [\(link\)](#).

⁶ See European Banking Authority (2024): Risk assessment questionnaire [\(link\)](#).

⁷ For an overview of European banks that participated in the ECB's exploratory work on new technology for settlement in central bank money, see [\(link\)](#).

Potential opportunities when using DLT

Among the opportunities to streamline the financial markets, tokenisation of financial assets, the use of smart contracts⁸ and the ability of DLT platforms to bring together multiple entities on the same infrastructure are often highlighted, e.g. in analyses from BIS⁹. DLT can potentially be used widely across financial markets and market functions. However, expectations for the technology's potential and added value differ across markets. For example, collateral trading, bond issuance and management are being explored more than other applications.¹⁰

Tokenisation of assets can lead to new applications

In practice, tokenisation of financial assets means that shares, bonds and other securities are digitally represented on a DLT platform. BIS and CPMI emphasise that by registering these assets as digital tokens, securities trades can potentially be executed more efficiently. This is partly because each transaction can be authorised and settled directly on the same platform, which can reduce the number of steps and systems a transaction has to go through for authorisation, clearing and final settlement.¹¹

Smart contracts can increase automation of processes

Smart contracts are a frequently emphasised benefit of DLT, according to BIS and others.¹² They allow the setting up of a number of customised conditions for when a given transaction should be completed. Among other things, a smart contract can ensure that both the buyer and seller only receive their respective assets (money and securities) if the conditions of the transaction are met. This interdependence and instant settlement are also referred to as 'atomic settlement'. If even one condition is not met, the smart contract ensures that the transaction is not completed. Smart contracts can thus reduce counterparty and settlement risks.¹³

Smart contracts can also be programmed to automate and customise specific processes, for example, when issuing bonds. This can relate to settlements and refunds, so that they occur automatically when the predefined conditions are met. Such applications are further described in box 1.

DLT platforms can bring multiple entities together on one platform

DLT platforms are also being investigated for their ability to bring together multiple entities on the same infrastructure and enable more direct settlement between financial institutions. According to BIS, this can, for example, have advantages for cross-border transactions involving financial assets, which often require the services of several intermediaries, such as banks, central securities depositories, and central counterparties, in different countries. These intermediaries can lead to longer transaction times and higher costs. Analyses conducted by BIS and others highlight that DLT can potentially contribute to a more efficient infrastructure by combining functions such as authorisation,

⁸ Smart contracts are computer programmes that can help to automatically execute actions, such as the exchange of values, when specific predefined conditions are met.

⁹ See BIS Blueprint for the future monetary system: improving the old, enabling the new, chapter III. improving the old, enabling the new, June 25, 2023, ([link](#)).

¹⁰ See Global Financial Markets Association, Impact of Distributed Ledger Technology in Global Capital Markets, May 13, 2023, ([link](#)).

¹¹ See Bank for International Settlements, Tokenisation in the context of money and other assets: concepts and implications for central banks, Report to the G20, Joint report by the Bank for International Settlements (BIS) and Committee on Payments and Market Infrastructures (CPMI), October 2024 ([link](#)).

¹² See Bank for International Settlements, Consultative Group on Innovation and the Digital Economy, , *Leveraging tokenisation for payments and financial transactions*, April 2025 ([link](#)).

¹³ For a more detailed discussion of DLT's potential opportunities for capital markets infrastructure, see the Danish Financial Supervisory Authority (2023): DLT skaber nye muligheder for infrastrukturen på kapitalmarkederne (DLT creates new opportunities for infrastructure in the capital markets, in Danish only) ([link](#)).

clearing and settlement on one platform with many different types of financial assets or via solutions where multiple platforms can work together.¹⁴

While T2S and similar infrastructures offer some of the same features as smart contracts, DLT and smart contracts can potentially add greater flexibility and automation, according to market entities. This is because smart contracts on a DLT platform can be programmed to fulfil very specific needs that are often too resource-intensive to develop in traditional infrastructures today.¹⁵ In traditional centralised systems, only the operator of the securities settlement system, for example, can add new features. This process can be slow and require significant coordination with participants, operators and other stakeholders.¹⁶

DLT-based platforms can empower participants to programme and implement smart contracts within predefined rules. This has the potential to drive innovation and make it economically and practically feasible to implement solutions that would otherwise be too expensive or complex in traditional infrastructures.

BOX 1

Two examples of using DLT in the financial sector

Several financial institutions have researched and developed DLT-based solutions with the aim of improving and streamlining capital markets. Some of the application areas that are often featured¹ are in improvements to bond issuance and the mobility of collateral in financial transactions.

DLT can facilitate bond issuance and management

DLT is being investigated with regard to streamlining the parts of bond issuance and handling that relate to the registration and management of bonds throughout their lifecycle. By tokenising bonds, ownership can be registered directly on a DLT platform, potentially reducing the need for registration with central securities depositories each time the security changes ownership and reducing the risk of errors.

Smart contracts can automate issuance, settlement and repayment to automate them when predefined conditions are met. The same applies to coupon payments and corporate actions, which currently can require complex processes across multiple entities.

DLT can increase transparency for current and future investors by giving them access to a real-time updated overview of issued bonds, transaction history and relevant terms directly on the platform. In addition, bond terms, such as sustainability-related conditions in green bonds, can be programmed directly into smart contracts, enabling automatic adjustment of interest payments based on carbon reduction or other ESG criteria.

DLT can improve the mobility of collateral

Collateral in the form of securities is often used by financial institutions when they take out loans or engage in financial transactions. In the European market, there are many different central securities depositories, each of which register and move securities for this purpose. The variety of entities can make collateral mobilisation complex, especially when it takes place across borders.² For example, if a bank wants to provide collateral to a counterparty using a CSD in another country, it often requires that the security is first registered in the counterparty's custody account. This process can take time, rely on multiple intermediaries and be costly. It may also mean that in some cases financial institutions hold more collateral on different platforms to ensure that they always have sufficient assets available.

Continues ...

¹⁴ See BIS (2023): Blueprint for the future monetary system: improving the old, enabling the new ([link](#)).

¹⁵ See BIS (2023): BIS Bulletin - The tokenisation continuum ([link](#)).

¹⁶ See the ECB's approach to implementing changes in T2S ([link](#)): In T2S, change requests can be submitted and the T2S Change Review Group, CRG, assesses them, makes recommendations to the T2S Steering Level for approval and prioritises the approved changes based on their business impact. The change is then coded, tested and implemented in T2S.

... continued

DLT can potentially streamline this process. This can be done by representing the ownership of securities as digital tokens. A digital token serves as proof of ownership of a given security on a DLT platform. Instead of having to re-register a security to another CSD, ownership of the security can be transferred via a token, while the underlying security remains stored in its original CSD. This can potentially make transactions faster and more flexible, as ownership can change directly between parties without the need for extensive administrative processes.

The ability to use smart contracts is often highlighted as a benefit that can help automate the collateralisation process. Smart contracts can ensure that the transfer is only completed if the agreed conditions are met, which can reduce the risk of errors and counterparty risk. If the collateral is only temporary, smart contracts can, for example, automate the return of ownership after a certain period of time. This can enable faster trading, including intraday transactions and shorter processes.

¹ See GFMA (2023): Impact of Distributed Ledger Technology in Global Capital Markets ([link](#)).

² See New Financial LLP (2021): The problem with European stock markets ([link](#)).

³ See World Bank Discussion Paper (2019): Issuing International Bonds – A Guidance Note ([link](#)).

Potential drawbacks with DLT

While DLT is seen to have the potential to streamline and improve parts of the financial market infrastructure, the realisation of these gains is associated with a number of drawbacks that require further investigation. Critical infrastructure is also associated with high demands, including governance, IT security, cyber maturity, business continuity, recovery and so on, and these aspects would also need to be addressed when using DLT.

Drawbacks arising from the use of DLT include issues such as the risk of market fragmentation, technological limitations in terms of scalability, as well as those related to governance and legal ambiguities.

Development of multiple DLT platforms poses a risk of market fragmentation

The use of DLT platforms carries the risk of increased fragmentation of the financial markets, i.e. the financial infrastructure is composed of a number of isolated platforms that are not compatible with each other. Fragmentation can occur if multiple DLT platforms are developed in parallel with traditional systems without common standards, and market entities spread their trading across different infrastructures. Fragmentation can reduce overall liquidity and lead to inefficiencies and loss of economies of scale if too many platforms are used that fulfil the same purpose.

In particular, if market participants prioritise their own commercial interests and solutions without regard to interoperability, it can lead to closed market platforms that weaken capital market integration and harmonisation.¹⁷

DLT can have limited scalability and capacity

High transaction volumes and lack of interoperability can put pressure on a DLT platform's capacity. This can result in delays or increased costs. Faster settlement may also increase the need for liquidity to settle transactions, as relevant entities need to secure sufficient funds in real time. For the same reason work is underway to develop DLT platforms with technical solutions that can address

¹⁷ See Piero Cipollone's speech (2024): Towards a digital capital markets union ([link](#)).

scalability challenges while enabling netting of transactions.¹⁸ The trade-off between faster settlement cycles and liquidity management is not unique to DLT solutions, but also applies to ongoing initiatives to shorten settlement cycles in traditional markets.¹⁹

Errors in smart contracts can pose a systemic risk

Tight integration of smart contracts can create dependencies where errors in one contract can quickly spread to others via automated processes. In systemically important infrastructures, such contagion effects can have far-reaching consequences, especially if adequate mechanisms are not in place to control the use of smart contracts.²⁰

Smart contract failures can occur not only unintentionally but also as a result of targeted attacks by malicious entities, emphasising the need for a thorough assessment of cyber risks and the potential systemic impact of technology.

Governance and legal uncertainty can be a barrier to DLT

The design of DLT platforms raises a number of legal issues that are not yet fully resolved. For example, it must be clearly defined who is responsible for operation, maintenance and decision-making authority among the participating entities. The problem is particularly pronounced with DLT as such solutions often involve more distributed control than traditional infrastructures, making it difficult to determine who has decision-making authority and liability for errors or unforeseen events.

Lack of clarification can lead to uncertainty about settlement finality and the legal status and enforcement of smart contracts.²¹

Realising the potential benefits of DLT therefore requires a thorough assessment of the technical, operational and regulatory implications of the technology.

The goal of making financial systems more efficient is nothing new

The goals of using DLT platforms are nothing new. Streamlining settlement processes and minimising counterparty risk have long been key goals in the development of financial infrastructures, regardless of the technology used. One example is the development of the European IT platform, TARGET2-Securities, T2S, which already addresses a number of these objectives through a centralised solution.²² T2S aims to integrate money and securities settlement on a single platform, reducing complexity and improving efficiency in the European securities market. The functionality of the system depends largely on the preferences of the market rather than the technology used, see box 2.

¹⁸ Layer 2 solutions are built on top of the original DLT (Layer 1) and process transactions outside the DLT (off-chain), typically by batching them and then recording the overall result on the DLT. Depending on the design, this structure can enable netting where only the net amounts are settled on Layer 1. See Basel Committee (2024): Novel risks, mitigants and uncertainties with permissionless distributed ledger technologies ([link](#)).

¹⁹ See ESMA (2024): ESMA assessment of the shortening of the settlement cycle in the European Union ([link](#)).

²⁰ See BIS (2023): The crypto ecosystem: key elements and risks ([link](#)).

²¹ At EU level, these issues are being addressed through the DLT Market Pilot Regulation (Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology, designed to identify and address any regulatory barriers.

²² See the ECB website: What is TARGET2-Securities (T2S)? ([link](#)).

BOX 2

Settlement cycles and market preferences

The European market today has a standard for settlement of securities trades that generally settles T+2, and this standard reflects market structures and liquidity needs rather than technical constraints, as the infrastructure in many cases supports faster settlement.

T2S serves as a common platform for the settlement of securities in central bank money and has shown how the integration of securities and money can reduce liquidity constraints and streamline settlement processes. One of the features of T2S that is comparable to certain features of smart contracts is T2S Linking.¹ This mechanism enables simultaneous all-or-nothing settlement of transactions and is particularly useful in situations where the simultaneity of transactions is crucial, for example, when simultaneously paying dividends to investors. T2S also supports flexible settlement cycles, including same-day settlement (T+0), provided that both securities and liquidity are available in the relevant accounts at the time of settlement. However, it should be noted that T2S Linking and short settlement cycles are primarily used in specific scenarios and are not designed for broad application across all types of transactions. Securities markets typically opt for longer settlement cycles, such as T+2, and only use shorter settlement cycles, such as T+0 and T+1, in specific cases. This is partly because longer settlement cycles give parties more time to prepare liquidity and complete necessary processes before the transaction is settled. In May 2024, North American markets transitioned to T+1, and in the EU, the transition to T+1 is expected to take place in October 2027.²

¹ See ECB (2016): Insights on T2S linking ([link](#)).

² See the Danish Financial Supervisory Authority (2024): Finansielle virksomheder skal forberede sig på en kortere periode for afvikling af værdipapirhandler (Financial organisations need to prepare for a shorter settlement period for securities trades, in Danish only) ([link](#)).

Ultimately, it's up to the market to demonstrate which technologies create the most value and efficiency. If DLT is not widely adopted, it may be due to limited utility or structural barriers, including network effects and economies of scale of existing infrastructures.

Many of DLT's applications as a financial market infrastructure are still in the experimental stage and are being tested through pilot projects and proof-of-concept programmes, which are used to demonstrate whether an idea, technology or method is technically feasible and applicable in practice.

04

Central banks are exploring different solutions

Central banks are exploring different solutions to support financial institutions' transactions on DLT platforms. The scope, complexity and time horizon of possible solutions for central banks vary considerably, and it is still uncertain which solutions best meet the needs of both private entities and central banks. So far, only a few solutions have been deployed for the settlement of real financial transactions, while more may be implemented on a larger scale in the years to come. For example, BIS estimates that up to nine solutions from central banks could be in production by 2030.²³

By engaging in studies of DLT-based solutions, central banks have the opportunity to support innovation in the sector and assess technical, operational and regulatory aspects of a potential future architecture for the financial system. For example, at the European level, central banks can help ensure that common solutions are reached, thereby harmonising capital markets, as well as setting general standards for the use of DLT in the European financial sector. It is also essential to identify and address the risks that new technology for settlement in central bank money may pose to the performance of central banks' core tasks.

Any new solution must create benefits for both the financial sector and society before it can gain traction, as existing payment and settlement systems are well-functioning and efficient.²⁴ In this context, it is essential to understand how new DLT-based payment or settlement systems can best be supported if the need for central bank money on these platforms arises, while also exploring what added value such solutions can bring compared to current solutions.

How central banks can enable settlement in central bank money

The ECB and other central banks have pointed out that conceptually there are two main approaches to solutions that can facilitate settlement in central bank money for transactions on DLT platforms, see chart 2.²⁵

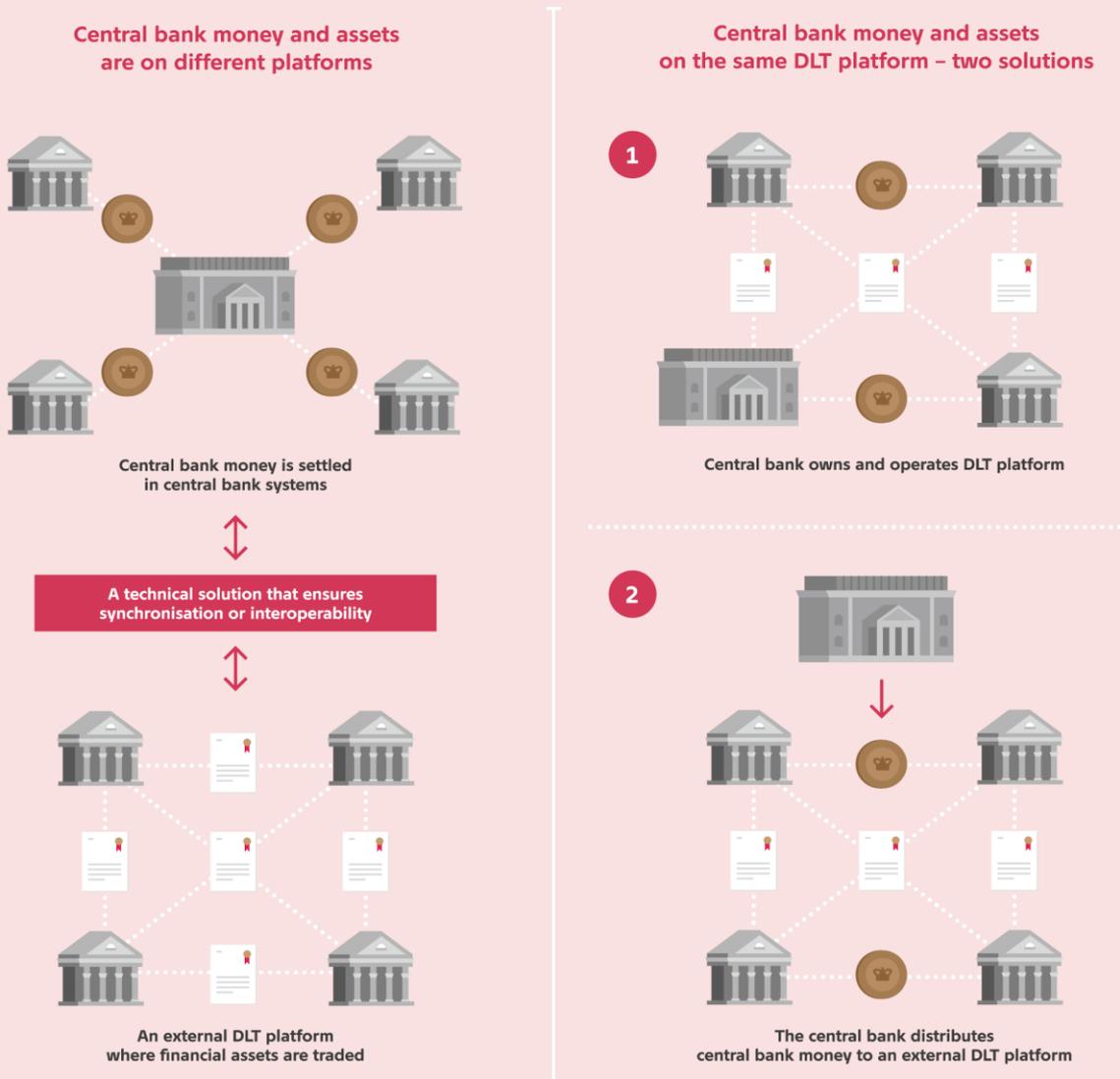
²³ See BIS (2024): Embracing diversity, advancing together - results of the 2023 BIS survey on central bank digital currencies and crypto ([link](#)).

²⁴ See Danmarks Nationalbank (2024): Oversight of the financial infrastructure 2023 ([link](#)).

²⁵ See, for example, ECB (2024): Eurosystem expands initiative to settle DLT-based transactions in central bank money ([link](#)).

CHART 2

Two main approaches to settling trades on DLT platforms in central bank money



Source: Danmarks Nationalbank

Central bank money and assets on different platforms

The first approach includes solutions in which central bank money and assets are on different platforms, and this is the approach the ECB has chosen to focus on in the first instance, see box 3.²⁶ The approach is very similar to existing systems known today. It connects central banking systems with new market platforms based on DLT. Central bank money is thus held in the central bank's own systems, separate from DLT platforms operated by private entities. The connection is established via a technical solution that ensures interoperability or synchronisation between private DLT platforms and the settlement infrastructure

²⁶ See, for example, ECB (2024): Eurosystem expands initiative to settle DLT-based transactions in central bank money ([link](#)).

at the central bank.²⁷ The solution thus enables trades and transactions, for example, with securities on DLT platforms, to be settled in central bank money at the central bank.

Examples of solutions in which central bank money and private DLT platforms are separated include the Bank of England's launch of an omnibus account and the ECB's experimental work with three interoperability solutions developed by Banque de France, Deutsche Bundesbank and Banca d'Italia, see box 3.

Central bank money and assets on the same platform

The second approach includes solutions in which central bank money and assets are on the same platform. Central bank money and other assets, such as commercial bank money and securities, are pooled on the same DLT platform where they are registered and settled. This approach is similar to the existing T2S, which also brings together securities and central bank money on the same platform, but in a centralised system.

A key consideration in this approach is whether central banks should develop, own and operate a DLT platform themselves or whether central banks should distribute central bank money on external DLT platforms operated by private entities.

Having central banks own and operate the platform ensures that they have greater control over the infrastructure and access to central bank money. One example of exploratory work that takes this approach is BIS' Project Agorá, see box 3.

If central banks distribute central bank money on private platforms, central banks have less control over the infrastructure itself. The responsibility for developing new and innovative DLT platforms is increasingly placed in the hands of private entities, with central banks participating in the platforms and controlling access to central bank money. An example of such an approach is the Swiss National Bank's, SNB, Project Helvetia, see box 3.

The approaches have different complexity and time horizons

The first approach is considered more straightforward and quicker to establish, as it does not require central banks to develop or participate in a new type of platform; instead, it involves integrating existing systems with new platforms. A potential drawback of this approach is that not all the benefits of having assets and central bank money on the same platform are realised, see section 3.

The second approach seems to represent a more long-term and technologically ambitious solution as it can better realise the potential benefits of DLT. Bringing central bank money and assets together on the same platform reduces the friction caused by different technological systems having to communicate with each other. However, the implementation of such solutions requires significant technical, legal and operational considerations, as it involves making central bank money available alongside financial assets on new infrastructure based on DLT.

²⁷ In principle, the central bank's settlement structure can also be a DLT platform. In such a case, assets and central bank money are on two different DLT platforms operated by a private provider and the central bank, respectively. The interoperability solution developed by the Banque de France involves a model where central bank money is issued on a DLT platform with an interoperability solution to an external DLT platform, see further details in Service Description of the BdF Full DLT Interoperability Solution for the Eurosystem Exploratory Work, Banque de France (2024), [\(link\)](#).

BOX 3

Selected initiatives from other central banks and BIS

Several central banks and international financial organisations are increasingly exploring new solutions for settlement in central bank money. Selected initiatives from the ECB, BoE, SNB and BIS are briefly described below.

The European Central Bank, ECB

In 2024, the ECB carried out a major exploratory work programme in collaboration with market participants, testing three interoperability solutions developed by Banca d'Italia, Banque de France and Deutsche Bundesbank, respectively. 60 market participants from nine different jurisdictions and four central banks have participated in the work and tested use cases in areas such as settlement in central bank money of digital assets issued on private DLT platforms.¹ Based on the work, the ECB has announced that it will implement an interoperability solution and look into a more integrated solution in the longer term.²

Bank of England, BoE

In 2021, the BoE made it possible to create an omnibus account, which allows multiple market participants to share an account with the BoE. In this way, market participants can link their DLT platform to the omnibus single account and thereby ensure that settlement of transactions on DLT platforms is finalised in central bank money.³

Swiss Nationalbank, SNB

SNB has been working on their *Project Helvetia* since 2020, which became a pilot project in 2024. Here, the SNB distributes central bank money in Swiss francs on a private DLT platform operated by the Swiss market infrastructure company SIX. The SNB, in collaboration with six commercial banks and SIX, settles real Swiss franc central bank money transactions between banks on a DLT platform and has issued over CHF 1 billion in central bank money on the platform.⁴

Bank for International Settlements, BIS

BIS has been working in this area for several years in collaboration with other central banks. One of BIS's most recent and major initiatives is *Project Agorá*, launched in 2024, involving five international currencies, seven central banks, the Banque de France (representing the Eurosystem), the Bank of Japan, the Bank of Korea, the Bank of Mexico, the SNB, the Federal Reserve Bank of New York (through the New York Innovation Centre) and the Bank of England. More than 25 financial institutions are also associated with the project. The project is based on a common DLT platform that combines central bank money, commercial bank money and digital assets.⁵ In addition, BIS has a long-term vision of a future financial system (referred to as *The Finternet*) consisting of multiple interconnected DLT platforms.⁶

¹ See ECB (2024): Eurosystem's exploratory work on DLT platforms progressing ([link](#)). Technical descriptions of the three solutions can be accessed via the ECB dedicated page ([link](#)).

² See ECB (2025): Eurosystem expands initiative to settle DLT-based transactions in central bank money ([link](#)).

³ See BoE (2021): Bank of England publishes policy for omnibus accounts in RTGS ([link](#)).

⁴ See BIS and SNB: Project Helvetia ([link](#)).

⁵ See BIS (2024): Project Agora ([link](#)).

⁶ See BIS (2024): The Finternet: the financial system for the future ([link](#)).

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