

# Norges Bank Papers

Central bank digital currency – final report  
for project phase 5

# Summary and conclusions from the exploration phase

## Background for the exploration

Norges Bank is assessing whether the introduction of a central bank digital currency (CBDC) is appropriate to ensure that the Norwegian krone remains an efficient, attractive and secure means of payment in the future. Drivers behind this exploration include falling cash usage, the potential of new technologies, the emergence of new money and payment systems and insights drawn from CBDC work in other central banks.

The exploration of a CBDC was included in Norges Bank's Strategy 2023–2025, which stated that we were to *"... be ready, if appropriate, to issue a central bank digital currency. A CBDC may be necessary to ensure that NOK will continue to be a safe, efficient and attractive means of payment in the future too."* (Norges Bank (2022), p.10).

The primary task of the exploration in the strategy period was to establish a basis for a decision on whether Norges Bank should issue a CBDC, and if so, in what form and with which characteristics.

## Main conclusion in the exploration so far

Norges Bank has concluded that: *"... the introduction of either a retail or wholesale CBDC is currently not warranted. However, the situation and needs could change. Norges Bank will therefore be ready to introduce a central bank digital currency if it becomes necessary to maintain an efficient and secure payment system."* The decision was published in a news item on Norges Bank's website on 10 December 2025. (Norges Bank (2025)).

The conclusion is based on the assessment that the introduction of a CBDC is probably not the most suitable measure for promoting payment system innovation, strengthening preparedness or in another way contribute to a more efficient and secure payment system at this stage.

The need for issuing a CBDC in Norway may change. Technological developments in the financial system may advance rapidly, and new services and participants are emerging. The application of blockchain technology and tokenisation in the financial sector may provide opportunities for innovation, efficiency gains and reduced settlement risk. The introduction of a CBDC may be necessary to safeguard societal considerations as these potential developments unfold. At the same time, there are other risks and aspects of tokenisation that must be clarified, and the extent of token usage in the future is uncertain.

There is currently heightened focus on whether stablecoins may become a means of settlement in, for example, tokenised securities transactions and cross-border payments. This focus could broaden, especially if the volume of transactions relating to tokenised assets becomes substantially larger than today and central banks do not facilitate settlement in central bank money for these types of payments.

Norges Bank's has carried technical and functional testing of different technologies and applications for CBDC solutions in a blockchain sandbox<sup>1</sup>. The banking sector was invited to participate in the testing. To date, one bank has taken part. The source code for the sandbox will shortly be made publicly available as open source, enabling inter alia other central banks to draw on the work undertaken in its development.

Over time, tokenisation and CBDC may enhance payment system efficiency and security. Realising the expected benefits of a CBDC will require cooperation and coordination with external stakeholders. Norges Bank has decided to continue its exploration of tokenisation and CBDCs, which will include collaboration with other payment system participants to clarify the opportunities and implications of the new technology. The possibilities for use of the Eurosystem's CBDC solutions and standards will also be explored.

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<sup>1</sup> The testing is documented in a separate report (Norges Bank, 2026b).

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# 1. Introduction

## 1.1. Background

In accordance with the strategy for the period 2023–2025, Norges Bank was to "... be ready, if appropriate, to issue a central bank digital currency. A CBDC may be necessary to ensure that NOK will continue to be a safe, efficient and attractive means of payment in the future too." (Norges Bank (2022), p.10).

The primary task of the exploration in the strategy period was to establish a basis for a decision on whether Norges Bank should issue a CBDC, and if so, in what form and with which characteristics.

Norges Bank has concluded that: "... the introduction of either a retail or wholesale CBDC is currently not warranted. However, the situation and needs could change. Norges Bank will therefore be ready to introduce a CBDC if it becomes necessary to maintain an efficient and secure payment system" (Norges Bank, 2025).

## 1.2. Norges Bank has evaluated two main forms of CBDC

**Retail CBDC** can be viewed as a digital form of cash. Such money would be a universally accessible means of payment for the public, for payments at points of sale, between individuals, for online purchases, and for payments to and from the public sector. The introduction of a retail CBDC would entail a substantial restructuring of the payment system and could, if widely adopted, challenge the business models of banks and other private actors as providers of payment services to the public.

In principle, retail CBDC can rely on traditional technologies, which is the approach of the European Central Bank (ECB) with its digital euro<sup>2</sup>. Alternatively, they can be based on **blockchain technology**, which enables the transfer of money, securities and other assets between holders without the involvement of issuers or the entities on which the assets represent a claim.

**Wholesale CBDC** is comparable to traditional central bank reserves but based on blockchain technology. A wholesale CBDC would only be available to banks and other financial sector entities with an account at the central bank, as is the case for existing central bank reserves. A wholesale CBDC would primarily serve to facilitate the settlement of transactions from tokenised platforms, such as securities trading or tokenised bank deposits<sup>3</sup>, in central bank money. An alternative to the introduction of wholesale CBDC is to adapt the central bank's existing settlement system so that it can settle transactions with tokenised assets.

Blockchain technology allows payments to be programmed, for example by making a payment contingent on the completion of another transaction or the occurrence of a specific event. At the same time, the technology raises complex issues, for example related to governance and control, which must be addressed before it can be deployed for CBDC purposes.<sup>4</sup> Several central banks in major global financial centres, together with securities market participants are already testing alternatives for the settlement of tokenised transactions in central bank money.

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<sup>2</sup> For more details on the digital euro, see ECB (2026a).

<sup>3</sup> Tokenised bank deposits are digital representations of regular bank deposits, issued on a blockchain, where customer ownership is still a claim on the bank in the same manner as a regular deposit.

<sup>4</sup> See the ECBs [FAQs on the digital euro](#), answer to question 14: "The digital euro is not based on distributed ledger technology (DLT), but it makes use of key design principles from DLT to enhance resilience and efficiency and to improve the system's overall performance and reliability.", ECB (2026a).

## 2. Would the introduction of a CBDC promote an efficient and secure payment system in Norway?

Norges Bank has placed particular emphasis on whether the introduction of a CBDC could promote innovation in payment services and whether it would be a suitable instrument to strengthen contingency arrangements in Norway's payment system. Other potential benefits of a CBDC have also been assessed, for example whether advantages could arise if a retail CBDC were defined as legal tender. Central banks in other jurisdictions have considered whether other objectives justify the issuance of a CBDC. This includes the ECB, which considers the ability to withdraw cash from bank accounts as an important foundation for public confidence in bank deposits and singleness of money (ECB, 2026). ECB further argues that retail CBDC may promote financial inclusion, and that introducing a new payment service that is independent of foreign infrastructure providers could strengthen European strategic autonomy.

This section examines how the introduction of retail and wholesale CBDC, respectively, could support Norges Bank's mission to promote an efficient and secure payment system.

### 2.1. The case for a retail CBDC

**Introducing a retail CBDC is not an appropriate measure at this stage to promote innovation that enhances effective and secure payment services.** Reports and speeches from the Bank for International Settlements (BIS), International Monetary Fund (IMF) and the World Bank, among others, express expectations that the adoption of blockchain technology in the payment system could provide a basis for new and innovative payment services.<sup>5</sup> Such expected benefits include in particular payment and settlement programmability, which could enable further automation of transaction processing. So far, blockchain technology has not been applied to any significant extent in traditional finance. However, if the expectations about this technology are fulfilled, this could unlock significant innovation potential.

Under the current division of responsibility in the payment system, banks and other private entities interface with customers directly. They develop and provide payment services to meet customer needs and are responsible for carrying out control measures to combat money laundering and financing of terrorism etc. Norges Bank's roles in the payment system are to carry out interbank settlement, to supervise interbank systems and to issue cash, but without direct contact with the public (apart from the redemption of withdrawn banknotes).

Norges Bank does not interface directly with the public in the payment system. Consequently, the new payment services, including any that may be based on blockchain technology, should be developed and offered by banks and other private providers. The means of payment in such innovative payment services need not be a CBDC. Tokenised bank deposits may serve as a better alternative. The development of such new payment services is therefore not necessarily dependent on the introduction of a retail CBDC. However, adjustments to interbank settlement may be necessary to ensure that payments made using tokenised bank deposits can be settled in central bank money in Norges Bank's Real Time Gross Settlement (RTGS) system. These issues are addressed further below in the assessment of a possible introduction of a wholesale CBDC.

**Payment solutions using retail CBDCs could enhance the payment system's contingency arrangements, but contingency considerations do not at present provide a decisive argument for the introduction of a retail CBDC.** A new payment system based on a retail CBDC would be partly independent of existing payment solutions. A new and independent payment infrastructure would

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<sup>5</sup> See eg BIS (2025a), BIS & CPMI (2024) and BIS (2023).

strengthen contingency preparedness thereby enabling CBDC payments if, for example, payment card networks were disrupted. For a retail CBDC to work well in a contingency situation, it would need to be in regular everyday use and accepted at relevant points of sale. Furthermore, establishing a new payment infrastructure as CBDCs would be complex and costly.

Introducing a retail CBDC primarily to strengthen contingency arrangements therefore appears to be a relatively costly and uncertain option compared with the cost of enhancing existing electronic contingency solutions. A working group appointed by the Ministry of Finance has highlighted opportunities to improve payment resilience by building on current contingency arrangements (see Ministry of Finance (2025)). These proposed measures are likely less costly than introducing a CBDC. Strengthening payment contingency is therefore not a decisive argument for introducing a retail CBDC in Norway now, not least given the costs, complexity and uncertainties associated with a CBDC introduction.

**CBDC as legal tender is not a decisive argument for introduction at this stage.**<sup>6</sup> According to Section 3-5 (1) of the Central Bank Act, banknotes and coins issued by Norges Bank are legal tender in Norway. There have been compelling reasons in favour of legal tender. One important reason has been the provision ensuring the possibility of discharging a payment obligation in a legally certain way if parties have not agreed on the means of payment and later disagree on the means of settlement. The provision can therefore promote efficiency by helping to prevent conflicts regarding the form of payment. This effect is reduced if the use of and access to cash weakens further. Furthermore, the provision has been eroded because, in many cases, specific rules have been established for how different types of payments must be carried out without the use of cash. According to the preparatory works to the current Central Bank Act, financial inclusion has also been one of the purposes of the legal tender provision.

The current provisions on legal tender were formulated based on the fact that banknotes and coins are used as a means of payment, but cash plays a smaller role now. If cash usage were to decline further or cease altogether, it may become necessary to reassess the need for legal tender and which means of payment should be granted such status.

Although retail CBDCs could be designed to incorporate some of the characteristics required for functioning as legal tender, other characteristics do not appear to be satisfied, for example that such a means of payment must be readily available to all. A retail CBDC would therefore likely not replicate all the characteristics that explain why cash is legal tender. It may therefore then seem natural to assume that a CBDC is not well-suited for fulfilling this purpose, at least given the current situation.

For the time being, the need for legal tender is best met by strengthening access to and the option to use cash, in the same way as legislation has also been adjusted in recent years through provisions in the Financial Contracts Act and the Financial Institutions Act.

Norges Bank has not concluded on whether a retail CBDC should become legal tender. This is an assessment that must be made by for example a dedicated legislative committee.

**Introducing a retail CBDC is not a suitable measure for financial inclusion in Norway.** The most common reasons for financial exclusion in Norway include limited digital literacy and identification problems, which make it difficult to open a bank account and therefore gain access to payment services. This is noted, for example, in the report from the Payment Commission.<sup>7</sup>

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<sup>6</sup> The need for legal tender was also analysed in the second phase of the CBDC project. See Section 2.5 in the report from this phase: Norges Bank (2019).

<sup>7</sup> [Official Norwegian Reports \(NOU 2024:21\)](#) (In Norwegian only).

Potential CBDC-based payment solutions would probably have user interfaces that are broadly similar to current digital payment services. The introduction of a retail CBDC is therefore not a particularly suitable measure for promoting financial inclusion for those that have difficulties using current payment services. This would likely be achieved more easily and at lower cost by setting design requirements for existing services.

Lack of access to banking and payment services is a relatively limited problem in Norway and is unlikely to be resolved by defining a potential CBDC as legal tender. Other instruments, including those proposed by the Payment Commission, will probably be more appropriate.

**Public confidence in bank deposits does not depend on the existence of a retail CBDC.** Some central banks argue that the ability to withdraw cash from bank deposit accounts is important for public confidence in bank deposits and support singleness of money with a one-to-one conversion rate between different types of money denominated in national currency. This would imply that an electronic alternative from the central bank should be available if cash becomes marginalised or disappears entirely. In Norges Bank's assessment, the deposit guarantee scheme, public regulation and supervision of banks, and interbank settlement in central bank money are fundamental to confidence in bank deposits and the singleness of money. Ensuring confidence in bank deposits is therefore not a compelling argument for introducing a retail CBDC.

**Introducing a retail CBDC could become relevant if necessary national control over the payment system is at risk, but this is not currently the case.** Societal considerations require that a country's payment system must be subject to sufficient national governance and control. The Eurosystem has emphasised a similar argument for the introduction of a digital euro.

If global entities achieve too dominant positions in the domestic payment system, and they are not subject to sufficient regulation by Norwegian authorities, there is a risk that societal considerations will not be safeguarded. Such entities include international card companies and big techs. *Big Techs are big companies primarily engaged* in digital services such as social media, search engines, ecommerce and IT/telecommunications equipment. Their business models centre on the collection, analysis and commercial use of user data. If these companies were to introduce new private forms of money or payment services that fail to safeguard key societal considerations, the introduction of a retail CBDC could become an appropriate corrective measure.

However, a central bank may face substantial challenges in seeking to launch a payment alternative which is more attractive than alternatives offered by large international actors with extensive experience of payments.

**The market for CBDC systems is under-developed, and introducing a CBDC now would be disproportionately costly and risky.** Were Norges Bank to introduce a CBDC solution now, it would largely have to rely on procuring an IT system developed by a commercial provider. During 2022 and 2023, another central bank conducted a comprehensive market survey of commercial suppliers of such systems. The survey found that the market was still immature, with no available system that could be deployed without comprehensive customisation. Such customisation could be costly and would normally entail undesirable risk, partly because the result could be non-standardised solutions. The market for CBDC infrastructures has still not developed substantially further.

**Collaboration with other central banks on retail CBDC infrastructure may be relevant, but so far no relevant alternatives are in operation.** No central banks in countries comparable to Norway have introduced a CBDC. Therefore, there are, as yet, no other central banks with which Norges Bank could share an operating solution. If the ECB / Eurosystem decides to introduce a digital euro that facilitates

multi-currency handling, making use of their infrastructure may be relevant for a Norwegian retail CBDC. It may also be relevant if the need for retail CBDC in Norway increases. Such collaboration would likely be dependent on Norwegian participation in T2<sup>8</sup>. Whether Norway will participate in T2 has yet to be decided.

A CBDC solution introduced in Norway now, based on, for example, external IT development, would entail high costs and would risk that the system does not satisfy relevant common standards that are introduced at a later stage. Regardless of the assessment of whether a retail CBDC should be introduced, the situation in respect of providers and standardisation suggests that it would be sensible to postpone any introduction until the market is more mature and appropriate standards are in place. If Norges Bank were to introduce a CBDC before other comparable central banks, it would entail considerable risk that the introduced system would not be compatible with what later becomes the market standard for such systems. It is better to be a fast follower than a first mover.

## **2.2. Wholesale CBDC – assessment of needs, characteristics and issues related to future development**

**Wholesale CBDC would be like traditional central bank reserves but represented on a blockchain.** Wholesale CBDC could perform the same core functions as traditional reserves, while its tokenised representation in a blockchain would enable new functionalities. The most important function of central bank reserves in the payment system is to serve as a secure means of interbank settlement in payments. If central bank reserves are represented as tokens in a blockchain, this allows for reserves or other assets (such as tokenised ownership rights to securities) to be moved between blockchains such that a transfer of ownership to money or other assets is made on the same blockchain in an integrated, instant and reciprocally dependant process called *atomic settlement*. Counterparty risk can thus be eliminated and it may be possible to reduce the number of participants involved in e.g. securities trading and settlement.

In securities settlement in Norway, settlement risk is managed at the interbank level. A reduction of settlement risk is therefore not a decisive argument for introducing a wholesale CBDC. However, tokenisation may enable the streamlining of transaction chains, allowing the number of participants and functions involved in e.g. securities trades to be organised more efficiently. Such use of blockchain technology can provide gains in the form of automation and lower costs.

**Wholesale CBDC can ensure risk-free settlement for tokenised transactions.** Without access to settlement in central bank reserves, financial infrastructures may be introduced that use e.g. stablecoins as a means of settlement. This would carry higher risk for participants and for financial stability compared with settlement in central bank money. This use of wholesale CBDC now seems like the most relevant argument for introducing a CBDC in Norway at a later date. An alternative to wholesale CBDC is to adapt the existing settlement system so that it can settle transactions from tokenised platforms. A number of central banks are currently exploring and testing such adaptations.

**In Norway, introduction of tokenisation has so far been fairly limited but could accelerate quickly once it gains momentum.** There are currently no known specific plans in Norway for the tokenisation of securities or other assets where settlement should be in central bank money. Internationally, progress has been more pronounced, particularly in financial centres such as London, Singapore, New York and Switzerland, where different forms of such tokenised solutions are being tested. However, the development of tokenisation in the Norwegian financial sector may make rapid progress once it is started. This may require that Norges Bank, at a later stage, facilitates central bank settlement of tokenised

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<sup>8</sup> T2 is the ECB/Eurosystem's settlement system for payments in euro, see ECB (2026b).

transactions at relatively short notice. Norges Bank will therefore continue efforts in this area and should be ready to introduce an appropriate form of settlement in central bank money of transactions from tokenised platforms should it later become necessary to ensure an efficient and secure payment system and financial stability.

**The advantages of tokenisation can be realised by registering multiple assets on the same blockchain, but this also entails complexity in terms of management and control.** The experimental testing that has been performed as a part of the exploration has shown that many of the benefits associated with blockchain technology can only be achieved if all assets in a settlement are registered in the same blockchain. At the same time, such a structure raises complex and unresolved issues related to responsibility, management and control. This is a topic being discussed internationally, with no viable solutions so far. Should Norges Bank conclude that a form of wholesale CBDC is needed, management and control issues must be addressed first. These issues are discussed in more detail in Section 3 with a summary from the experimental testing.

**Should wholesale CBDC be introduced in Norway, it must not undermine the possibilities for liquidity management or the conduct of monetary policy.** Banks would gain access to wholesale CBDC by converting from their holdings of traditional reserves. Should it become possible to make such conversions rapidly and efficiently in both directions, and both Norges Bank and commercial banks receive access to a comprehensive updated overview of the holdings of traditional reserves and wholesale CBDC, liquidity management could also be conducted after the introduction of tokenised reserves. There are strong arguments why banks' holdings of wholesale CBDC for settlement should be included in banks' deposit quotas and that they should bear the same interest rate as traditional reserves. This is discussed in more detail in Section 6 on the effects on liquidity management of introducing a wholesale CBDC.

Should it become relevant to introduce wholesale CBDC **or another form of settlement of tokenised transactions in central bank money** in Norway, Norges Bank should consider **collaborating on infrastructure with other central banks.** Among other things, conditions related to costs, expertise and risk indicate that such opportunities should be investigated. In that case, the use of the Eurosystem's solutions may be particularly relevant, but that likely requires an agreement between Norges Bank and the Eurosystem to use T2 as the settlement system for NOK.

## **2.3. Overall assessment of the need for a Norwegian CBDC in the near future**

**So far, there are no sufficient arguments that Norges Bank should introduce either a retail or a wholesale CBDC in the near future.** However, the use of blockchain technology may give long-term benefits in the payment and financial systems. In that case, the division of labour and responsibility in the payment system indicates that it is banks and other payment system service providers that develop and offer retail payment services based on this technology.

**The introduction of a retail CBDC may be relevant should new payment services or new types of money based on this technology be launched, such that societal needs are not met.** It may also become relevant should global operators be expected to take a dominant position in the Norwegian payment system and sufficient national governance and control of the payment system is not possible. Other instruments, such as influence through dialogue, speeches, reports and other publications, along with regulation and other measures by political authorities, may, however, be more relevant, preferably to prevent developments from moving too far in an undesirable direction.

There is currently no basis to introduce a wholesale CBDC. Tokenised central bank reserves may play a key role in securing interbank settlement of tokenised transactions. But the introduction of tokenisation in the Norwegian financial sector has not made much progress. Should tokenisation develop rapidly, it would be relevant for Norges Bank to introduce a wholesale CBDC or another form of interbank settlement in central bank money of tokenised transactions. It may be relevant to ensure that developments evolve in the desired direction and to prevent infrastructures being established where the means of settlement, is less stable money such as stablecoins. Systemically important settlement should be made with central bank money as a means of settlement. However, it is considered neither necessary nor appropriate for Norges Bank to introduce such solutions for the time being. The ECBs planned solutions in this area may be appropriate at a later date should Norges Bank enter into an agreement with the ECB to participate in T2.

**The assessment of the need to introduce a CBDC is made based on the current state of the Norwegian payment system.** If the payment system situation had warranted the introduction of a CBDC, it would have still been difficult for a relatively small central bank to be among the first to introduce a CBDC. There are good reasons why Norges Bank should rather be a fast follower should the need arise, appropriate solutions are available and standards are established.

To introduce a CBDC now would require considerable resources. At the same time, not introducing a CBDC entails a certain risk that Norway is left behind should needs rapidly change. This risk is, however, given the current situation considered to be relatively limited and does not warrant the introduction of a CBDC as a precautionary measure at this stage.

Exploration will continue into the benefits and opportunities of tokenisation and the consequences of CBDCs and other new forms of money. Collaboration with other stakeholders in the Norwegian financial sector will be important.

## 3. Summary from experimental testing<sup>9</sup>

### 3.1. General information on the test setup

The overall aim of the technical testing has been to gain insight into the characteristics of the blockchain technology relevant to the assessment of whether to introduce CBDC into the current Norwegian payment system. Specifically, this has consisted of running test cases to identify gains, issues and drawbacks of using blockchain technology in various payment system processes in which central bank money plays a role.

Tested payments and transactions are similar, but not identical to, payment transactions in the current payment system. At the same time, the testing has been of an exploratory nature and has not aimed to copy all details in existing transaction chains.

Norges Bank has also not tested how the technology's capacity to process large transaction volumes over a short period of time or how transactions in a ledger react to unforeseen or abnormal events.

Early in this exploration phase, Norges Bank entered into framework agreements with two external IT companies for the development of technology sandboxes<sup>10</sup> to house experimental testing. Both the sandbox development and necessary further development to execute the specific test cases were

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<sup>9</sup> The testing setup and findings from the testing are described in greater detail in a separate report (Norges Bank, 2026b).

<sup>10</sup> Sandbox: An isolated test environment to enable technology experiments without impacting production systems.

handled as call-offs under the framework agreements. A total of six test cases were executed during this exploration phase. One bank participated in parts of the testing.

**A test system with two sandboxes enables the testing of transaction characteristics in which both retail and wholesale CBDCs are included.** The test system consists of two sandboxes based on different blockchain or distributed ledger technologies (DLT<sup>11</sup>). CBDC transactions and holdings will be recorded on these ledgers. The establishment of the two ledgers are described under Test Case 1 and Test Case 2 below.

The aim was to use one ledger for testing retail CBDC characteristics and the other for testing wholesale CBDC characteristics. Together, the sandboxes could therefore be used to test payment transactions involving both retail and wholesale CBDCs. The two sandboxes can also be used to test financial transactions, for example securities trading with settlement in tokenised central bank reserves.

Transfer of tokens between the sandboxes was enabled by a bridge<sup>12</sup> which facilitates communication between them. The bridge can be used to transfer tokens (such as CBDC, securities or tokenised bank deposits) between the two ledgers. This is described in more detail under Test Case 3 below. This method is used to test tokenised bank deposits on both multi-ledger<sup>13</sup> and single-ledger<sup>14</sup> architecture, see description of Test Case 4.

We have also tested how CBDC can be used as a means of settlement in tokenised securities trading, and how smart contracts<sup>15</sup> and blockchain technology can automate parts of government debt management, in particular in connection with the issuance of such securities, see Test Cases 5 and 6 below.

## 3.2. The six test cases

### Test Case 1: Characteristics of the Hyperledger Besu technology in retail CBDC projects.

**Retail CBDC based on the *Hyperledger Besu* technology can provide the central bank with sufficient control over the central bank money in the ledger without gaining access to personal data.** The purpose of this test case was to explore the characteristics of retail CBDC with robust access control and governance in a two-tier distribution model, while providing the central bank with sufficient control but without access to personal data.

For a central bank that issues CBDC a decisive criterion is that no unauthorised parties can issue CBDC, which would constitute digital counterfeiting. At the same time, partly for personal data protection considerations, it may be important that the central bank cannot access data related to individual customers' payments or CBDC holdings. Should the central bank have access to such data, it could also trigger Anti-Money Laundering (AML) and Countering the Financing of Terrorism (CFT) monitoring duties.

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<sup>11</sup> Ledger/DLT: A digital ledger where all transactions are stored as a shared, verifiable log, distributed across multiple nodes, providing all authorised participants with the same up-to-date version without depending on one central authority.

<sup>12</sup> Bridge: A system for transferring messages and/or assets between two or more DLT networks. The bridge verifies an event on the source chain (for example that assets are locked) and reflects this in the target chain (for example by issuing a representation of the assets). Bridges are similar to SWIFT as a messaging layer.

<sup>13</sup> Multi-ledger system: Several individual/independent DLTs that are connected to each other. Unlike one shared ledger for everything, a multi-ledger system allocates responsibilities and states across domains (jurisdictions, currencies, market participant groups etc.).

<sup>14</sup> Single ledger-based architecture has one shared DLT.

<sup>15</sup> These are digital algorithms that link one or more conditions in order to automate transactions. Delivery versus payment (DvP) and atomicity mentioned below are examples of applications.

This would also be contrary to the principle that banks should have direct customer contact in a CBDC solution, as is the case in the current payment system.

The testing included transaction flow that is practically end-to-end ie from the establishment of a customer relationship to the execution of a payment to another retail customer. The solution was hosted on a technological platform where the roles of the central bank, banks and end-customers are handled in smart contracts. Several log-in mechanisms (including digital keys and traditional authentication) were tested.

The solution is designed so that customer information remains with banks, while the ledger only contains what was necessary to execute transfers of retail CBDC. However, personal data protection cannot be resolved by technical measures alone but must be assessed together with regulations and governance models.

In the solution, personal data are protected through pseudonymity<sup>16</sup>, whereby end-users are represented by anonymised addresses in the ledger without a direct link to their identity. This reduces personal data exposure during normal operations, but there is still a risk.

If the ledger address of an end-user can be linked to an identity – either through banks, court orders, technical leaks or data collocation – any participant with read access to the ledger would be able to view the entire transaction history related to this address. This applies to both historical and future transactions and applies regardless of whether access is through the central bank, participating banks or others with read access to the ledger. Pseudonymity alone cannot prevent full retrospective access once the identity link has been established.

## **Test Case 2: Characteristics of the Hyperledger Fabric technology in wholesale CBDC projects**

**The *Hyperledger Fabric* technology provides for both an account-based and a token-based solution for wholesale CBDC.** The purpose of this test case was to establish a technical sandbox primarily for the handling of wholesale CBDC but based on a different technology than the one in the Test Case 1 sandbox.

The test case was intended to identify characteristics when wholesale CBDC is used as a means of interbank settlement, including functions such as issuance, distribution, and redemption of wholesale CBDC, as well as various types of messages between banks in connection with interbank transactions. The test also aimed to look into whether the technology was suitable for meeting the needs for governance limits and operational traceability. The ledger was established using the Hyperledger Fabric technology, which is designed to limit access to information between participants and provides the opportunity to test account-based<sup>17</sup> and UTXO-based<sup>18</sup> wholesale CBDC.

The test also showed that this technology enables access control for both transactions and holdings, and that the central bank can have sufficient control in the ledger without breaching interbank confidentiality requirements. One important finding from the testing is that operational complexity increases with the number of participants and channels with access to the ledger.

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<sup>16</sup> Pseudonymity means that the identity is not explicitly visible in the system but can be derived if identifiers are linked to external information. Once such a link has been established, pseudonymity provides no technical access limitation.

<sup>17</sup> An account-based model is a method for recording assets on a blockchain where each address has a running balance that is updated for each transaction, similar to a bank account.

<sup>18</sup> *UTXO (Unspent Transaction Output)* is a model for representing ownership in individual blockchains, where each transaction "spends" complete former outputs and creates new ones, and where a user's balance is the sum of the UTXOs that the user can spend.

### **Test Case 3: Establishing a bridge for token transfer between two ledgers**

**If bridges are used for CBDC transfers across ledgers, some of the characteristics of blockchain technology will not be fully exploited.** The purpose of this test case was to explore whether the characteristics of a CBDC is weakened if the means of payment is transferred from the ledger controlled by the issuer to external ledgers across a bridge. This is important, partly to ensure that no-one but the central bank can issue CBDC in a scenario where tokenised asset issuers use separate ledgers. Such bridges connect different ledgers, enabling, for example, wholesale CBDC to be used for payment settlement using tokenised bank deposits on a ledger that is not under the central bank's direct control. Should CBDC be "transferred" to other ledgers using such bridges, it will be important to ensure that central bank control over the issuance and deletion of CBDC is not weakened. Furthermore, one of the objectives of the testing was to identify opportunities provided by such an arrangement for ensuring atomicity – ie payment against delivery with immediate effect.

The test showed that Delivery versus Payment (DvP)<sup>19</sup> is also possible in a bridge solution. The transfer of asset ownership (for example a security) and the payment can be linked logically but do not take place simultaneously on the two ledgers (ie not atomically). As transfers are simultaneous, this increases the risk of unforeseen events when there are errors or outages in the ledgers or in the bridges connecting them.

On the other hand, a bridge – given that security is ensured – can make CBDC available on external ledgers where other participants can use it for settlement in innovative payment services based on the new technology. The bridge structure does, however, create a larger attack surface for malicious actors and it increases security management requirements, including key management, access control and continuous monitoring.

### **Test Case 4: Characteristics of settlement of payments using tokenised bank deposits on multiple ledgers**

**Cross-ledger transactions weaken some of the key characteristics of blockchain technology** The purpose of this test case was to establish and test the characteristics of payments using tokenised bank deposits between customers with deposits in different banks and using wholesale CBDC as a means of settlement between the participating banks. The test aimed to explore advantages and disadvantages of a structure where participants operate on multiple ledgers, including how the need for governance and control over the issuance of the different assets could be safeguarded. The test supplemented the findings from Test Case 3 described above, but in this case, the means of payment was tokenised bank deposits and not retail CBDCs.

The test showed that parity (equal value) between tokenised bank deposits and CBDCs can be maintained throughout the transaction process and that real-time exchange is feasible. At the same time, the limitations of a multi-ledger architecture were clearly apparent. Smart contracts on one ledger cannot directly control operations on a different ledger, and bridges or other mechanisms can ensure asset transfer between ledgers.

The test showed that not all settlements in such multi-ledger structures take place immediately, and atomicity is therefore not achieved. This means that discrepancies can arise in the settlement process, which increases the need for standardised messaging formats, clear lines of responsibility and error-handling procedures. In such a setup, CBDC has limited added value beyond what the existing settlement

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<sup>19</sup> *Delivery versus Payment (DvP)* is a settlement principle whereby securities/assets or money change owner and the two legs of the transaction are mutually conditional ie such that counterparty risk is eliminated.

system can offer. However, such a solution could strengthen contingency preparedness by providing an alternative to the current payment infrastructure.

## **Test Case 5: Settlement of tokenised securities**

**Simultaneous transfer of ownership of multiple assets on the same ledger ensures simultaneity and reduces settlement and counterparty risk but also creates new issues.** The purpose of the test case was to simulate trading in and settlement of tokenised securities and bank deposits on one shared ledger and explore whether such an architecture provides better opportunities to realise gains that were not achieved in the multi-ledger structure tests.

In this solution, the central bank, banks, brokers, the central securities depository and the end-investor all operate on the same ledger. In this ledger, CBDC, tokenised bank deposits and securities are represented as tokens. The entire value chain, from order to settlement, is executed as one smart contract-controlled transaction. This provides atomicity, with multiple changes taking place together in one operation – in other words, either all elements of the transaction are executed or none. This also provides lower counterparty risk, real-time settlement and a high degree of traceability.

Personal data protection is ensured by the central bank having sole access to aggregated data, while detailed customer data remains protected by role-based access control. The opportunity to simulate netting effects in a gross system was demonstrated, with a potential for lower liquidity needs.

With one shared ledger, bridges or other forms of cross-ledger token transfer are not necessary (unlike in the multi-ledger structure), reducing technical and operational complexity. On the other hand, the single-ledger structure raises issues related to governance, control and responsibility. This is described in more detail in the summary below.

## **Test Case 6: Government bond issuance using blockchain technology**

**Tokenisation can make a number of functions in the life cycle of a government bond more efficient, but the inherent transparency of the technology makes it difficult to satisfy confidentiality requirements.** The purpose of this test was to determine whether the entire government bond life cycle can be tokenised and recorded on a shared ledger and be executed using smart contracts. The entire transaction chain from issuance via an auction, trading in the secondary market, coupon payments, buybacks and redemptions at maturity was handled through smart contracts. Government bonds, tokenised bank deposits and wholesale CBDC were represented as separate tokens. Settlement was to be atomic – so that either the settlement of both money and securities would be simultaneous or no asset transfers would be made. This mechanism eliminates counterparty risk and provides real-time settlement and a high degree of traceability for the issuer and market participants. Although the auction process for government bonds may deviate from the issuance of corporate bonds, the findings from the test are likely transferable to other such issuances.

The test also identified a basic conflict between the use of blockchain technology and confidentiality requirements. A blockchain is generally transparent: If a bid is made in plain language on the ledger, everyone with ledger access can see both bid prices and volumes. To conduct sealed-bid auctions, bids would have to be encrypted, and the actual opening, ranking and allotment conducted outside the ledger before the result is recorded on the ledger with signed proofs of intent. In the same manner, identification of actual bond holders in connection with, for example, coupon payments and redemptions must be performed outside the ledger, both to safeguard confidentiality and technical feasibility. Even with encryption and role-based access control, activity patterns and metadata (who participates, when, how much activity) will still be visible on the ledger.

It is again proved that a comprehensive solution requires a deliberate division of labour between processes that take place on the ledger (on-chain) and processes that take place off the ledger (off-chain). The ledger is well suited for processes requiring strong guarantees for integrity, simultaneity and accountability, such as registration of ownership, settlement (DvP) and enforcement of roles and rights. More complex, calculation-intensive or confidential processes, such as auction awards and owner identification, can be handled more practically off-chain, but with connections into the ledger.

The test showed that tokenised government bonds on a single-ledger platform provide issuers and market participants with substantial efficiency, risk reduction and transparency gains, but also revealed that the inherent transparency of blockchain technology limits which functions can be performed on-chain when there are mandatory confidentiality requirements.

### 3.3. Summary of insights from the tests

**CBDC on a single-ledger structure provides greater gains than CBDC on a multi-ledger structure but then has governance and control issues.** If a shared ledger is used for the execution and settlement of transactions, there are clear advantages compared with coordinated settlement across multiple ledgers. At the same time, there are issues related to roles and responsibilities for the shared ledger. Overall, the lesson from the tests indicates that a single ledger CBDC structure, tokenised bank deposits and tokenised securities are the best solution for realising the desired gains. These gains include simultaneous and final settlement of payments, reduced counterparty risk, fewer sources of error and easier compliance and traceability.

**Bridges between ledgers increase complexity related to governance and control, which expands the attack surface for fraud actors and others with malicious intent.** Using bridges to connect transactions across multiple ledgers in a multi-ledger structure requires mechanisms that increase technical and operational complexity and expands the attack surface and full atomicity is then not achieved.<sup>20</sup>

Using bridges raises particular governance issues for solutions requiring cross-system interaction. A bridge must be configured for privileged access to both environments and thereby concentrates risk and responsibility. This requires strict key and access management (including two-person control and separation of duties), detailed logging and real-time monitoring, effective error handling and rollback procedures and precise rules to define when final settlement is made. Standardised protocols and audit trails are necessary to reduce system and governance risk. However, even these measures will not provide settlement via a bridge with full atomicity. The use of bridges should therefore be limited to situations where interoperability and simultaneity of settlement cannot be otherwise achieved.

**A single-ledger solution entails issues related to control, governance and allocation of responsibility on the ledger.** A single ledger requires clear roles and a structure that ensures that all participants with responsibility for assets on the ledger can perform their roles and maintain sufficient control of "their assets on the ledger. For example, the central bank must be in full control of issuance and destruction of CBDCs, associated smart contracts and the main principles of secure cash settlement. In turn, banks, brokers and the central securities depository must be able to manage their own tokens and services vis-a-vis customers and the market. On the other hand, the operation of a shared ledger and basic infrastructure may be a candidate for a public-private partnership in the form of an infrastructure

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<sup>20</sup> Atomicity means that all relevant state changes in a settlement, for example transfers of money and securities, are carried out as one indivisible and simultaneous operation, typically on one ledger or within the same system. The transaction will have just one final state: completed or not completed. There are no interim states where only parts of the settlement/transfer of ownership has been completed.

company with shared change management, version control for smart contracts and clear decision-making processes.

**Blockchain technology is based on transparency, while payment system data must be subject to access limitations.** Personal data protection must be ensured by technical measures, as ledger data are generally accessible to all nodes in the system. Personal data or other sensitive information related to holdings or payments should therefore be kept off-chain or protected through appropriate encryption, at the same time as access control is governed through roles on the ledger. Such information protection increases complexity.

## 4. Relevant design features of a future Norwegian CBDC solution

The purpose of introducing such a currency influences the characteristics of a CBDC solution. As Norges Bank has concluded that introducing a CBDC is currently not warranted, there is no basis for describing the design of a possible future CBDC solution. The list of design features below must therefore be considered a rough draft that will have to be made more detailed should issuing a CBDC become relevant.

### 4.1. Relevant design features in a retail CBDC solution

**A CBDC will likely be distributed through a two-tier model.**<sup>21</sup> It is natural to assume that the allocation of responsibilities between banks and Norges Bank will remain similar to the current situation. If so, CBDC distribution to end-customers will resemble the arrangement in place for cash. A bank wishing to increase its CBDC holdings for further distribution to its customers will receive a transfer of CBDC to its wallet against a corresponding debit from the bank's central bank reserves. CBDCs are then transferred to end-customers' wallets from the bank's holdings against a corresponding debit from their bank accounts.<sup>22</sup>

**Norges Bank should not have information about individuals' CBDC holdings or payments.** Based on the current corresponding division of roles between banks and central banks, in a CBDC solution, banks will also have the direct customer contact, while Norges Bank will neither receive nor need detailed information about the public's holdings of means of payment or which payments they make. Likewise, it should not be possible for the central bank to monitor or control the CBDC holdings of individual account holders or CBDC payments.

**Know Your Customer (KYC), Countering the Financing of Terrorism (CTF) and Anti Money Laundering (AML) requirements for CBDC would be the same as for other payment services.** KYC and AML checks of CBDC users would have to be performed by banks or other market participants that offer *wallets* for CBDC storage and transactions to their customers. Bank customers would not have a customer relationship with Norges Bank, and Norges Bank would therefore not be in a position to, or have a duty to perform, customer compliance checks.

**Acquiring CBDC must be straightforward.** It must be straightforward for the public to acquire retail CBDC through online and mobile banking services and ATMs by debiting their own bank accounts.

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<sup>21</sup> See also Section 4.2 in the final report for Phase 2: Norges Bank (2019).

<sup>22</sup> CBDC holdings and transfers are different from cash holdings and cash payments, as the ledger where each individual owner's CBDCs are recorded is held by the central bank, while a wallet, in simple terms, contains a code or key that provides access to the wallet owner's CBDC holdings – unlike cash, which actually exists in a physical wallet. The two-tier model means that the central bank does not have direct customer contact, information about the identity of individual CBDC account holders or conducts CBDC transactions in the ledger.

**CBDCs will be claims on Norges Bank.**<sup>23</sup> Retail CBDC can be described as a form of digital cash and must like other central bank money be a claim on Norges Bank.

**Retail CBDC should not be interest-bearing.** In previous phases of internationally published CBDC exploration, it was argued that CBDC should be interest-bearing, and that changes in CBDC interest rates could be used to influence households' CBDC holdings.<sup>24</sup> For example, the interest rate could be reduced if the public chose to make larger-than-desired withdrawals from their bank accounts to acquire retail CBDC, which in turn could create problems for banks' funding and in extreme cases pose a threat to financial stability.

There now appears to be a relatively broad consensus in the ECB, central banks which have issued CBDC and other central banks considering whether to issue CBDC that retail CBDC should not be interest-bearing.<sup>25</sup> This is partly a result of retail CBDC being intended for transaction purposes, not investment purposes. Retail CBDC would then also be comparable to cash, which is not interest-bearing.

**The ledger for CBDC holdings and transactions should probably be based on blockchain technology.** A presumed purpose of introducing CBDC was that it would boost innovation in the use of blockchain technology. This exploration has therefore been based on the assumption that a Norwegian CBDC solution will be based on blockchain technology, which enables the use of smart contracts to automate payments. The use of this technology for CBDC solutions is, however, in an early phase, at least in traditional finance.

However, some central banks, including the ECB, have stated that it will become possible in time to use blockchain technology and smart contracts for new and efficient payment services, even if the means of payment is a CBDC that is not based on blockchain technology. This aspect will probably become clearer as the technology develops.

**CBDC should not be programmable money, and programmability, if implemented, should be at the payment service level.** It must be possible to use central bank money for payments in various settings. This is a basic principle and applies regardless of conditions relating to other events and terms. At the same time, there should not be different varieties of the same money as this could contravene the parity principle (ie a 1:1 ratio between all forms of money denominated in NOK).

One of the main purposes of programmability in a payment situation is to link the execution of a payment to other events. A common example is the link between the transfer of securities ownership and cash settlement in connection with securities trading. This is an additional argument in favour of linking smart contracts to payment services and not to the money in a CBDC solution. However, technical issues suggest that this is not straightforward to achieve in practice.

**There should probably be an upper limit on how much CBDC each individual entity can hold.**

Holding limits reduce the possibility to convert bank deposits to CBDC, which will limit the consequences of CBDC for financial stability and banks' deposit funding. The ECB has indicated that it will set a digital euro holding limit of EUR 3000 (see eg ECB (2026a)). The Bank of England has indicated a limit of GBP 10 000–20 000 (see eg Bank of England (2025) or Bank of England and HM Treasury (2023)). The introduction of retail CBDC in Norway should be followed by the introduction of a holding limit. The limit should be low enough to prevent the public from converting bank deposits to CBDC on a scale that would significantly impact financial stability and banks' deposit funding. However, the limit should not so low so

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<sup>23</sup> See also Section 3.1 in the final report for Phase 3; Norges Bank (2020).

<sup>24</sup> See eg Section 3.15 in the final report for Phase 3: *ibid*.

<sup>25</sup> Some research reports discuss whether banks' holdings of retail CBDC should bear interest. This could motivate banks to hold a certain volume of retail CBDC for further distribution to their customers.

that it prevents the use of CBDC for intended payment purposes. Some central banks have considered other measures to limit the withdrawal of bank deposits during market turbulence, eg (negative) interest on CBDC holdings.

It is too soon to conclude on where the holding limit should be set, partly because this will depend on the intended purpose of a CBDC. However, a calculation of the effect on banks' overall deposit funding if the banks should lose deposits equal to NOK 30 000<sup>26</sup> for all citizens over the age of 16 shows that the consequences could be substantial. Banks would then have to increase their central bank funding significantly, at worst by more than the liquidity they now have access to through central bank deposits and available credit facilities. In order for banks to increase their borrowing from the central bank to compensate for the loss of deposit funding, they will have to substantially increase their holdings of securities approved as collateral in Norges Bank. The impact on banks' costs and therefore lending rates is uncertain, depending partly on which securities Norges Bank would be willing to accept as collateral for the increased borrowing. The calculation has been described in more detail in Section 5.

## 4.2. Relevant design features for wholesale CBDC

The introduction of wholesale CBDC so that settlement of tokenised transactions in a secure means of settlement now seems like the most relevant argument for introducing a CBDC in Norway at a later date. Without access to settlement in central bank reserves, financial infrastructures may be introduced that use eg stablecoins as a means of settlement. This would carry higher risk for participants and for financial stability compared with settlement in central bank money. An alternative to wholesale CBDC is to adapt the existing settlement system so that it can settle transactions from tokenised platforms.

The design of a wholesale CBDC depends on the intended areas of application and the conditions that will be set for this usage. Listed below are first some potentially non-negotiable design features or characteristics of a Norwegian wholesale CBDC solution. Then follows some design features that will have to be clarified in connection with a decision on whether to introduce a wholesale CBDC.

**Reserves in the form of wholesale CBDC must bear interest at the same rate as traditional reserves.** Wholesale CBDC, like the traditional central bank deposits banks have in Norges Bank, will be a form of central bank reserves. The overnight interest rate on banks' wholesale CBDC holdings must be the same as the interest rate on traditional reserves. Diverging interest rates would disrupt liquidity management.

**Conversion between traditional reserves and wholesale CBDC must be seamless.** It must be straightforward for banks to convert traditional reserves into and out of wholesale CBDC. Likewise, both banks and Norges Bank must have a user-friendly and up-to-date overview of individual banks' wholesale CBDC holdings. In addition, Norges Bank must be able to continuously monitor the total volume of wholesale CBDCs.

**A wholesale CBDC solution will be based on blockchain technology.** Digital central bank money for interbank settlement already exists in the form of banks' reserves in Norges Bank. The introduction of a new, separate system for interbank settlement, based on reserves using technology similar to the current Norges Bank settlement system, would not result in the desired gains. This suggests that if Norges Bank introduces wholesale CBDC as a new function, the solution should be based on blockchain technology.

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<sup>26</sup> The amount of NOK 30 000 is derived from indications from the ECB to the effect that EUR 3000 may become the holding limit for digital euro. Norges Bank has not decided what the holding limit for a Norwegian retail CBDC should be. This limit should be set following further clarification of purpose and areas of application.

**A decision must be made whether to record wholesale CBDC on a public or a private ledger.** A public ledger will in principle be open to anyone who wants to connect to it through a node – which can be considered part of the ledger's network. Connecting to the ledger will provide access to the information on the ledger, including transactions and holdings, but the name or other personal data of the CBDC account holder will not be shown. The node's task in the network may differ between different ledgers. On the other hand, connecting to a node with a private ledger requires advance approval by the owner of or the organisation operating the ledger.

Should Norges Bank issue a CBDC solution on a ledger, the Bank must decide whether this ledger should be public or private. A public ledger may facilitate more innovation than a private ledger. On the other hand, a public ledger involves complex security issues that will likely entail unacceptable risk, at least until the technology has been further developed with sufficient security solutions. This suggests that the ledger for a Norwegian CBDC, at least initially, should be private and with better mechanisms so that Norges Bank can control access.

**The responsibility of the central bank will likely be limited to cash and the cash leg of settlement.** The responsibility of the central bank should be limited to the ownership and management of the CBDC token, including issuance, redemption, access control and interest rate setting. This enables banks and other payment service providers, as well as ownership registration entities (eg securities depositories, property registers etc) to develop their own tokens, smart contracts and application logic within standards and approved frameworks without changing settlement functionality.

## 5. Calculation of potential effects of a holding limit for retail CBDC

**A holding limit may be necessary to limit adverse effects on banks' deposit funding and financial stability.** A limit on CBDC holdings may be necessary to prevent CBDC withdrawals exceeding banks' ability to handle deposit withdrawals without suffering liquidity problems. Regardless of what the limit will be, Norges Bank must be able to supply the banking system with sufficient reserves to avoid liquidity problems due to the introduction of CBDC, also in times of financial turbulence. This may be ensured if Norges Bank is prepared to provide necessary F-loans to supply central bank reserves lost by the banks when customers exchange deposits for CBDCs. Banks' collateral for loans in Norges Bank must also be sufficient to take out these loans.

Norges Bank has calculated the potential effect of a holding limit of NOK 30 000 per person on both banks' funding and Norges Bank's balance sheet. This is just under the limit of EUR 3 000 per person, which the ECB has suggested as a digital euro holding limit.

**Banks may be exposed to liquidity risk even with a low holding limit.** It is uncertain how a holding limit of NOK 30 000 would affect banks' funding costs and thus lending rates. A simple calculation shows that banks' overall annual funding costs could increase by anything from NOK 1bn to NOK 4bn, assuming that all adults in Norway exchange their bank deposits for CBDCs equivalent to the holding limit, and that Norges Bank continues to provide collateralised loans. Exchange on this scale would reduce total household bank deposits by 7-8%. This could increase lending rates by an average of 2-6 basis points. In addition, it would entail a cost for the banks if they have to replace customer deposits with F-loans from the central bank (Norges Bank uses market operations, called "F-loans" and "F-deposits", to manage the quantity of reserves in the banking system)<sup>27</sup>. Should Norges Bank become willing to bear a higher risk on its balance sheet by providing reserves through the purchase of securities or by expanding the range of securities accepted as collateral, costs would likely be lower. Such measures may deviate considerably

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<sup>27</sup> For more, see [F-loans](#) and [F-deposits](#).

from the current liquidity management scheme and rules on the pledging of collateral and must be investigated in more detail if this becomes relevant.

The introduction of a CBDC could also necessitate changes to the banks' funding structure as a stable funding source is then reduced or becomes less stable. Therefore, banks may aim to increase their share of long-term wholesale funding to reduce their liquidity risk. This could significantly affect banks' funding and lending if demand is high and the funding structure is changed abruptly. Furthermore, this is the main argument given by the Bank of England for its holding limit for a digital pound.<sup>28</sup>

## 6. The introduction of wholesale CBDC and the importance for Norges Bank's liquidity management and conduct of monetary policy

**The introduction of a wholesale CBDC may affect Norges Bank's liquidity management.** Norges Bank's liquidity management is based on a quota system where central bank reserves in the banking system are managed to ensure that the shortest money market rates are kept close to the policy rate.<sup>29</sup> With the introduction of a wholesale CBDC, two types of central bank money will exist for settlement. Both are liabilities on the central bank's liability side, but with different technological characteristics. The traditional reserves are the means of settlement in the central bank's settlement systems (RTGS - Real Time Gross Settlement), while the wholesale CBDC (tokenised reserves) would be the means of settlement for tokenised payments that are registered in a blockchain-based registry.

A wholesale CBDC can assume various forms. However, there is broad consensus among central banks about some fundamental principles:

- Full interoperability/transferability between traditional central bank reserves and wholesale CBDCs without limitations or frictions when conversion takes place from one to the other.
- A wholesale CBDC and traditional central bank reserves must have identical interest terms and the same overnight rate for calculating interest.<sup>30</sup>
- Wholesale CBDC is not to be an independent instrument in the conduct of monetary policy (this partly follows from the two preceding principles).<sup>31</sup>

These principles are also the basis for some of the design features described in Section 4. Adhering to the principles supports the effective settlement of tokenised transactions in tokenised reserves (wholesale CBDC).<sup>32</sup>

### **Wholesale CBDC must be designed to not interfere with Norges Bank's ability to manage liquidity.**

If a wholesale CBDC is introduced, banks' total holdings of traditional reserves and wholesale CBDC will comprise the basis for interest calculations, the central bank's market operations and banks' need to redistribute reserves/wholesale CBDCs among themselves overnight.

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<sup>28</sup> For calculations of the possible effects on banks' funding costs, see Norges Bank (2021).

<sup>29</sup> Deposits in excess of the quota are remunerated at the reserve rate, one percentage point lower than the policy rate, while negative account balances are remunerated at the D-loan rate, one percentage point higher than the policy rate (referred to as the central bank's overnight standing facilities). Banks have an incentive to redistribute central bank reserves among themselves overnight to avoid having to use the standing facilities at unfavourable interest rates. For further discussion of the liquidity management system in Norway, see [Liquidity management](#).

<sup>30</sup> Assuming that CBDCs are to have the same interest rate terms as traditional forms of money: Like cash, retail CBDC is to be remunerated at a zero interest rate and wholesale CBDC to be the same as traditional means of settlement between banks.

<sup>31</sup> There is broad consensus among central banks that retail CBDC is also not a suitable monetary policy instrument.

<sup>32</sup> For a more in-depth discussion, see Norges Bank (2023c).

A wholesale CBDC may pose challenges to Norges Bank's liquidity management, particularly if reserves in the banking system are low. With low reserves, changes in banks' wholesale CBDC holdings immediately before end-of-day in the Real Time Gross Settlement (RTGS) systems may generate an unintended requirement for banks to redistribute reserves and CBDCs among themselves overnight. A possible solution may be to limit tokenised transactions for a short timeframe before end-of-day. If tokenised transactions are settled in traditional reserves in the RTGS system (ie a wholesale CBDC cannot be introduced), deferred settlement in the central bank may be an alternative. Both solutions have some disadvantages and will, in that case, have to be studied further. The consequences of the introduction of a wholesale CBDC for central banks' liquidity management is discussed in more detail in a separate paper.<sup>33</sup>

## **7. Legislative amendments required for the introduction of CBDCs**

If CBDCs are introduced, they will be a new means of payment that naturally enough is not yet regulated. A retail CBDC will affect several aspects of financial legislation, including the Central Bank Act, and requires relatively extensive legislative work. The need for legislative amendments in some areas has already been assessed by Norges Bank and presented in a separate paper.<sup>34</sup> The need for other legislative amendments will depend on as yet unclarified details related to a potential CBDC solution. This section first describes necessary legislative amendments for the introduction of a retail CBDC, before outlining the amendments for a wholesale CBDC.

### **7.1. Legislative amendments needed for the introduction of a retail CBDC<sup>35</sup>**

First, the introduction of a retail CBDC will require several amendments to the Central Bank Act including to Section 3-4 on issuance of banknotes and coins. This provision can also include statutory authority to regulate CBDC interest rates. If CBDCs are to be given legal tender status, this must be clarified in Section 3-5 on legal tender. Norges Bank's task to issue CBDCs should also be included in Section 1-3 on central banking activities. With respect to the need for legal tender status, this is further discussed in Section 2.1.

Second, a well-functioning solution for a retail CBDC requires clarifications in the Financial Contracts Act's provisions on means of settlement (Section 2-1) and time and place of payment (Section 2-2). The Financial Contracts Act may also specify that CBDC payments shall be deemed final and that the payments have legal protection against payers' creditors.

Third, it may be appropriate to amend Section 16-4 on the obligation of banks to receive cash and to make deposits available for their customers in the form of cash so that these provisions are also extended to comprise CBDCs.

Fourth, various provisions in the special legislation on public benefits and tax and duty claims should be adapted to CBDCs becoming a new generally accepted means of payment. If CBDCs are to be used for public receipts and payments, regulatory adjustments must be made.

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<sup>33</sup> A Norges Bank Staff Memo is published together with this Report, see Norges Bank (2026c).

<sup>34</sup> See Section 3 in Norges Bank (2023b).

<sup>35</sup> Ibid, Section 3.

Fifth, it must be clarified who is to be responsible for transaction monitoring under the Anti-Money Laundering Act with respect to CBDCs.

Sixth, if there are to be interest rates on CBDCs, this will raise some special issues that should be resolved in both the Central Bank Act and special legislation.

Seventh, the technical design of CBDCs could require distinct legislative changes. Special attention has been paid in both Norges Bank's exploration project and internationally to a solution where CBDCs are issued and distributed on blockchain-based solutions. Compared with account-based solutions, blockchain-based solutions raise several issues. For example, this applies to the legal status of CBDCs if CBDC identifiers are transferred or converted between different blockchains, including if Norges Bank is the issuer after a conversion. In simplified terms, conversion in this context means that CBDCs are moved or transferred between different blockchains by using bridges. (The technical solution for such bridges is described in Section 3 above.) It must also be determined whether end-users can hold CBDCs in their own software (often referred to as self-custody) or whether only approved custodians will be able to hold CBDCs on behalf of end-users. The legal status of CBDCs and responsibility for the entities that will verify individual payments, ie validating nodes, must also be clarified. Consideration must be given to the fact that this type of issue can be further regulated, eg by a statutory authority in the Central Bank Act or other financial regulation.

## **7.2. Legislative amendments needed for the introduction of a wholesale CBDC**

In legal terms, the introduction of a wholesale CBDC is considerably simpler than a retail CBDC. The first type of CBDC entails that some bank reserves are converted into tokens to be able to settle securities trades on a tokenised platform. Under Section 3-1, Sub-section 1 of the Central Bank Act, Norges Bank is authorised to "accept deposits from ... banks and other financial sector undertakings" (cf *litra a*), and "issue and deal in own financial instruments" (cf *litra c*). In principle, there is no doubt that Norges Bank is already authorised to issue a wholesale CBDC.

Nevertheless, there is legal uncertainty attached to how digital tokens should be characterised. As many tokens have a technical structure, the value is embedded in the token itself. It is then natural to consider a token a bearer instrument subject to property law. For example, a bearer instrument would not be subject to limitation under the Limitation Act<sup>36</sup>, and furthermore a bearer instrument could be subject to a restitution claim (vindication).<sup>37</sup>

On the other hand, a bank deposit is a simple monetary claim subject to obligation law. The value consists of a claim against the issuer and is not represented in the token. A simple monetary claim can be limited under the Limitation Act and there is no item that may be claimed for restitution.

If Norges Bank introduces a wholesale CBDC, it should be clarified in Section 3-1, Subsection 1 of the Central Bank Act that tokenised reserves are to continue to be deemed deposits and, a contrario, not as financial instruments. Alternatively, a statutory authority can be introduced whereby Norges Bank is authorised to decide the matter.

It has been stated that uncertainty as to how a digital token should be legally considered is a general problem. For example, it is unclear whether tokenised bank deposits should still be deemed to be simple

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<sup>36</sup> LOV-1979-05-18-18.

<sup>37</sup> A claim issued in the form of a bearer instrument would be subject to limitation against the issuer (cf Section 1, Subsection 1 of the Limitation Act on the Act applies to "[c]laims on money or other benefits"). But the instrument itself is deemed to be an item subject to ownership rights and is not subject to limitation. The relationship can be compared to withdrawn banknotes.

monetary claims or bearer certificates. This ambiguity means that using tokenised bank deposits as a means of payment between customers of different banks may be problematic. Resolving this uncertainty must be regarded as a matter for the legislator.

It has also been discussed whether Norges Bank instead of issuing a wholesale CBDC, should facilitate special settlement of tokenised transactions but without the tokenisation of central bank reserves themselves. Pursuant to Section 3-3, Subsection 2 of the Central Bank Act "*Norges Bank [shall] facilitate a stable and efficient system for payment, clearing and settlement between undertakings that hold accounts with the Bank*", and pursuant to Section 1-3, Subsection 3 Norges Bank shall "*facilitate the central settlement system and oversee the payment system.*" In Norges Bank's assessment, facilitating Norges Bank's settlement system (NBO) for the settlement of tokenised trades lies clearly within the central bank's current mandate, and it cannot be ruled out that such arrangements would require legislative amendments.

## **8. Can regulated stablecoins satisfy a need for a tokenised money alternative?**

Stablecoins are cryptoassets designed to maintain a stable value against a reference asset, such as national currencies. For the stablecoins issued so far, the reference asset is generally the US dollar. Market forces determine the value of stablecoins, and establishing mechanisms that maintain full value stability is challenging.

Stablecoins are bearer instruments where there is no final settlement in central bank money, neither for individual payments using stablecoins nor when stablecoins are exchanged. There is therefore no interoperability as with bank deposits, which means their values can differ. A significant increase in the scope of stablecoins undermines the principle of singleness of money.

Competition between different stablecoins does not necessarily result in the public choosing the most stable stablecoins. On the other hand, competition may be based on other characteristics, such as the possibility of return and being able to make anonymous payments. Furthermore, economies of scale may make some stablecoins dominant even though their stability characteristics are not optimal.

Stablecoins may be a source of systematic risk, partly because a loss of confidence may lead to the rapid redemption of eg the securities where the issuer has invested the reserves. A considerable reduction in the market value of these securities could then arise, which in turn can have contagion effects to the wider financial system if the volume of stablecoins becomes substantial.

Regulation may enhance stablecoin stability and reduce the risk stablecoins pose to financial stability. Such regulation consists of eg requirements for hedging, redemption and transparency, and are implemented in the EU/EEA through the Markets in Crypto-Assets Regulation (MiCAR). However, regulation can work against their intended purpose, and at worst impede the conduct of monetary policy. This may occur if the regulation enhances stablecoin safety in a way that displaces bank deposits and weakens the role of banks in the transmission mechanism of monetary policy. The amount of issued stablecoins is also less flexible / elastic than the amount of bank deposits, which can disrupt credit intermediation. Banks have the flexibility to create money by extending credit, while stablecoins must be secured before they can be issued.

Stablecoins therefore have limitations preventing them from meeting users' and society's need for money in the same way as bank deposits. Improved regulation may address some of the problems with stablecoins. At the same time, tokenised bank deposits may be a better alternative as a tokenised means

of payment than stablecoins. However, it cannot be assumed that the characteristics of tokenised bank deposits will be automatically the same as those of existing deposit money or that these deposits will out-compete stablecoins. As stablecoins are bearer instruments, they could be used by everyone with a wallet in which such money can be held, independent of the currency of the country the payer and payee are in. This feature can be very difficult to accommodate in tokenised bank deposits as the payer must have access to the relevant payment currency and the payee must have an account that is able to receive that same currency.

It is important to facilitate payment service competition, but systemically important settlements should be made in central bank money. Introducing wholesale CBDC may therefore be a suitable measure for more efficient settlement of tokenised bank deposits, while still preserving key characteristics of bank deposit payments such as interoperability.

## 9. Exploration and introduction of CBDCs in other countries

### 9.1. International CBDC exploration focus

**Many central banks are researching CBDCs, with a shift towards wholesale CBDCs.** In 2025, the BIS published a survey conducted in 2024 that showed around 91% of respondent central banks were researching CBDC in some form.<sup>38</sup> A key motivation for central banks' CBDC exploration is the need to preserve the role of central bank money while cash use is falling and prospects of tokenising traditional assets are increasing. Retail CBDC is also regarded as an instrument for financial inclusion. While earlier exploration was mostly focused on retail CBDCs, the focus has now shifted more to wholesale CBDCs, at least for central banks in advanced economies. Many central banks attribute the shift to developments in stablecoins and other cryptoassets. The survey also shows that, over the next six years, more central banks consider it likely that they will introduce a wholesale CBDC than consider it likely that they will introduce a retail CBDC.

**Few central banks have introduced a retail CBDC, and none of these are located near Norway.** So far, only central banks in the Bahamas, Jamaica and Nigeria have introduced a CBDC, all of which are **retail CBDCs**. In addition, the People's Republic of China (PRoC) has carried out a pilot project with a considerable number of registered users. However, like the other CBDC solutions, the Chinese solution is relatively little used (see Thomson (2026)).<sup>39</sup>

With the exception of the ECB / Eurosystem, many other peer jurisdictions have stated that they do not currently see a need for a retail CBDC. In that respect, Norges Bank's view on retail CBDC is in line with most other comparable central banks.

**Greater focus on wholesale CBDC.** So far, no central banks have introduced a **wholesale CBDC** as a permanent solution. However, a number of central banks are participating in testing and pilots (ie with real transactions and assets) to explore different solutions for central bank settlement of tokenised transactions. This applies particularly in regional and global financial centres, but also elsewhere. Therefore, there appears to be increased attention on the need for a wholesale CBDC to help realise the benefits of tokenised solutions, especially in securities.

An overview is provided below of the status as of March 2026 with regard to the introduction of and approach to CBDCs in selected relevant countries/currency areas.

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<sup>38</sup> BIS (2025b).

<sup>39</sup> Thomson (2026) reports in *Central Banking* that China has recently launched a new e-CNY design (e-CNY 2.0) where the e-CNY moves from the digital cash concept to digital deposit money.

## 9.2. Status in the ECB

Of the jurisdictions with which it is natural to compare Norway, the ECB is probably the central bank that has come the furthest in its exploration CBDCs.

**The ECB is working purposefully towards introducing a digital euro.**<sup>40</sup> Since 2019, the ECB/Eurosysteem has been exploring the need for a digital euro. The ECB has a somewhat different reasoning for the introduction of a digital euro compared with the reasoning underlying Norges Bank's exploration. Among the most important differences is that the ECB emphasises that access to central bank money can be considered a collective good and that a digital euro is therefore a natural extension of physical cash since cash is used less and less for payments. Furthermore, the introduction of a digital euro is justified by the argument that it would provide access to claims on the central bank/government, and that the ability to withdraw CBDC from bank accounts is important for confidence in bank deposits and for underpinning the singleness of money. Another objective of the introduction of a digital euro is that it must promote financial inclusion. The ECB further emphasises, as a strategic measure, that the introduction of a digital euro must reduce dependency on foreign payment solutions and thereby strengthen European autonomy.

The ECB is working on a rulebook that will describe terms and responsibilities among stakeholders in a digital euro infrastructure. Furthermore, the ECB/Eurosysteem has entered into contracts with private service providers for the development of five different components of digital euro infrastructure, including an offline solution that should function in emergency situations such as loss of access to the internet.

A proposal to regulate the digital euro is currently being deliberated in the EU's legislative bodies, but it is uncertain if and when these rules will be adopted by the EU. The most recent signals suggest that the Act will be adopted in 2026 H2. The ECB will decide whether to introduce a digital euro once the legislation is in place. A pilot project is in the pipeline for H2 2027, with a possible launch in 2029 (see (ECB, 2026e)).

**Central bank settlement of tokenised transactions/wholesale CBDC:** The ECB/Eurosysteem has also investigated and tested settlement solutions in central bank money for transactions and trades of tokenised assets. In this context, the ECB has published a plan<sup>41</sup> where the first stage is to adapt the ordinary RTGS system for euro (T2) to enable the settlement of tokenised asset transactions in central bank money in this system. According to the current plan, such an opportunity will only become available at the end of 2026 Q3.<sup>42</sup>

In the longer term, the ECB is investigating the benefits and challenges associated with establishing its own DLT-based platform for the settlement of tokenised transactions in central bank money. It is more uncertain if and when such a solution will be introduced. The goal of the project is not to establish a technical solution.<sup>43</sup>

Large European banks and other stakeholders in the financial sector have been involved in testing of earlier versions of these solutions.

## 9.3. Status in Sweden

Sveriges Riksbank was among the first to start testing and issuing statements on the need for an e-krona, and has recently signalled renewed focus on CBDCs.

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<sup>40</sup> See inter alia ECB (2025b), (2026a) and (2026e)

<sup>41</sup> See ECB (2025a).

<sup>42</sup> For more on the work with *Pontes*, see ECB (2026c).

<sup>43</sup> For more on the work with *Appia*, see ECB (2026d).

*“Between 2017 and 2023, the Riksbank investigated economic, legal and technical issues related to a digital version of the Swedish krona – an e-krona. In 2023, the government Payment Inquiry, which examined the role of the state in the payment market, concluded that there were not sufficient societal needs for the Riksbank to issue an e-krona. However, the report emphasised that developments are rapid and that economic, political and technological changes may require a reassessment. Since 2023, the Riksbank’s focus has therefore been on analysing and monitoring international work on central bank digital currencies – in particular the digital euro.” (Payments Report (2026), p. 25)*

In a speech at the Center for Business and Policy Studies on 4 December 2025, the Riksbank's first Deputy Governor, Aino Bunge, stated:

*“One way to view the ECB's digital euro development activities is that many countries – and many countries' central banks – are coming together to build a common system. This reduces both costs and risks for each individual country. Sweden could benefit from it in the same way as we have already done with the TARGET systems. We will therefore explore the opportunities and possible challenges of sharing the digital euro platform with a potential Swedish e-krona in the future. But developing an e-krona would take time. If and when the ECB after political approval takes the decision to develop and issue a digital euro, we as a country should know what we want and be ready to make suggestions on how to proceed. We should therefore likely already next year start discussing how to approach the issue of an e-krona if the digital euro is introduced.” (Sveriges Riksbank (2025), p.9).*

Finally, Governor Erik Thedéen of Sveriges Riksbank stated in a speech published in the Sweden Herald on 9 December 2025: *“I have not said that we should have a digital crown, but I have said that it is good to investigate and possibly have some legislative work to be prepared.”*<sup>44</sup>

## **9.4. Status in Denmark**

Danmarks Nationalbank is sceptical about whether a retail CBDC is needed but is monitoring developments in both retail and wholesale CBDC closely and participates actively in international exploration in the field.

In a speech on 19 February 2024, Central Bank Governor Signe Krogstrup of Danmarks Nationalbank stated:

*“...(I)n Denmark we currently do not see the possibilities for a CBDC to address them given the specific circumstances we have in Denmark. ...(W)ith the well-functioning digital payments infrastructure already in place in Denmark, it is not clear how a CBDC would offer added value and compete on trust and convenience, and hence be adopted in Denmark. ...(W)e follow the development closely and reassess the arguments for and against our own CBDC on an ongoing basis ”. (Danmarks Nationalbank (2024), p.9).*

In a speech on 21 January 2026, Krogstrup stated:

*“Issuing tokenised central bank money can help foster resilience. This resilience is one of the key motivations of our joint work with the ECB on developing the infrastructure for wholesale CBDC. The purpose is to ensure access to a central bank-issued or -linked settlement asset for systemically important transactions, and enable lender-of-last-resort functions in a potential*

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<sup>44</sup> Sweden Herald (2025).

*tokenised financial system. This work may also support the use of tokenised bank deposits as a complementary element in the future payments system.*

*The ECB's work on a retail CBDC, the digital euro, is also seen as important for the future ecosystem of payments and resilience. While we do not, at this point, see a need for a retail CBDC in Denmark, we follow the ECB's work closely." (Danmarks Nationalbank (2026), s.8)*

## 9.5. Status update of the three countries that have introduced a retail CBDC

**The countries that have introduced a retail CBDC have been particularly motivated by financial inclusion and reducing the costs related to the use of cash.** Central banks in Nigeria, Jamaica and the Bahamas have introduced retail CBDC as a permanent arrangement. Financial inclusion has been a key goal for each of these three countries, along with a desire to reduce the costs and risk related to cash handling and distribution.

- In 2020, **the Central Bank of Bahamas** introduced its retail CBDC solution, the Sand Dollar. The issued volume and use of the Sand Dollar remain relatively modest and mostly concentrated in the peripheral areas of the island nation. The central bank also provides substantial incentives to promote the use of Sand Dollars. Nevertheless, only a small share of transactions across the country are in Sand Dollars.<sup>45</sup>
- In 2021, **the Central Bank of Nigeria** launched the retail CBDC solution, eNaira. However, less than 1% of the population has so far adopted this CBDC. Both technical problems, poor and insufficient communication and access to other means of payment affect the extent to which the eNaira has been used.<sup>46</sup> To increase usage, work underway to allow eNaira use for public receipts and payments, and to strengthen communication to the public on the advantages of eNaira use.
- In 2022, **the Bank of Jamaica** introduced the retail CBDC solution, JAM-DEX.<sup>47</sup> The solution is based on a dynamic QR code that can be used in payment terminals. The use of JAM-DEX has been relatively limited so far, partly due to the public's preference for cash. In addition, the payment solution has had technical issues. A further challenge is that use of JAM-DEX requires merchants to install separate payment terminals.

## 10. Implications for Norway of a potential introduction of a digital euro<sup>48</sup>

**A digital euro may become popular among tourists at major tourist destinations, but usage in Norway is unlikely to notably affect the Norwegian payment system or otherwise weaken Norges Bank's ability to perform its mission.** Danmarks Nationalbank and Sveriges Riksbank published papers in 2023 and 2024, respectively<sup>49</sup> including analyses of how a digital euro would affect key conditions in the payment systems of Denmark and Sweden and their conduct of monetary policy. Denmark's Nationalbank's paper concludes that a digital euro with low holding limits would not have a significant impact on Denmark's fixed exchange rate policy and that a digital euro would only be used to a limited extent in Denmark. Similarly, the paper from Sveriges Riksbank concludes that a digital euro,

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<sup>45</sup> Central Bank of Bahamas (2025).

<sup>46</sup> Mahachi (2025).

<sup>47</sup> Bank of Jamaica (2022).

<sup>48</sup> For a more detailed assessment, see Norges Bank (2026a).

<sup>49</sup> Danmarks Nationalbank (2023) and Sveriges Riksbank (2024b).

provided that it can be used in Sweden, would have a limited impact, but that it could strengthen payment preparedness and competition.

Norges Bank has conducted an equivalent assessment for Norway, focusing on the implications for financial stability, efficiency in the payment system and the possibility to conduct liquidity management and monetary policy should the ECB decide to introduce a digital euro and should its use be permitted in Norway.

The analysis concludes that a potential digital euro in Norway would require broad assessments and adjustments but usage is unlikely to be of such an extent that it would affect Norges Bank's mission.

In accordance with the draft regulation of the digital euro, the digital euro can be used in countries outside the euro area but inside the EEA once the relevant central banks have signed an agreement with the ECB regarding such use. Assuming that some amendments are made to Norwegian law and Norges Bank signs the aforementioned agreement, the digital euro could be used in Norway under the same conditions as in the euro area.

The impact of a digital euro on the efficiency and security of the Norwegian payment system, financial stability or the conduct of liquidity management and monetary policy in Norway will depend on the extent of domestic use. Norges Bank's analyses show that there is no reason to expect that a digital euro will be used to the extent that it affects the payment system in general. The introduction of a digital euro is not likely to lead to currency substitution to an extent that threatens financial stability or affects the conduct of liquidity management or monetary policy.

However, in areas and among businesses with a considerable influx of foreign customers, it can be envisaged that a non-negligible share of future payments could be made with digital euros, for example at typical tourist destinations. In that case, it would also provide Norwegian holders of digital euros with an alternative means of payment. In isolation, this would lead to stronger competition for payment services at the relevant points of sale and strengthen preparedness at these locations. However, this would probably have a limited effect in specific areas with many tourists<sup>50</sup>, and is unlikely to have any material impact on the efficiency and security of the Norwegian payment system overall.

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<sup>50</sup> This may include places such as Flåm, Geiranger, Nordkapp, Tromsø, Bryggen in Bergen, Briksdalsbreen and the commercial area around Egertorget in Oslo.

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