



NORGES BANK

FINANCIAL INFRASTRUCTURE

2016

FINANCIAL INFRASTRUCTURE 2016



NORGES BANK

Norges Bank

Oslo 2016

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Layout: 07 Media AS
The text is set in 9 pt Azo Sans

ISSN 1894 - 8634 (online)

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EXECUTIVE BOARD'S ASSESSMENT

The *Financial Infrastructure Report* is part of Norges Bank's work to promote financial stability and an efficient payment system in Norway. Norges Bank's Executive Board discussed the *Report* at its meeting on 11 May 2016.

The Executive Board considers the financial infrastructure in Norway to be efficient. There have been few disruptions in interbank systems and in the securities settlement system. The systems comply to a large extent with international principles.

In 2015, the International Monetary Fund (IMF) concluded that Norway has a modern and stable financial infrastructure. At the same time, the IMF recommended certain measures to strengthen the infrastructure, such as improving risk management of outsourced operations of critical infrastructures. Norges Bank will ensure that the IMF recommendations are followed up.

Norges Bank has a responsibility to promote efficient payment solutions, including in the design of the settlement system and in oversight of the payment system. Norges Bank will continue to satisfy public demand for banknotes and coins and ensure that cash can function as an efficient means of payment. It is important that users can choose between different means of payment, both because they have different characteristics and because this promotes competition. Pursuant to the new Financial Institutions Act, banks are required to receive cash from and make deposits available to customers in the form of cash in accordance with customers' needs and expectations.

Banks' contingency arrangements for cash distribution may prove inadequate in a crisis situation. It has not been documented that electronic solutions can take over the role of cash in a crisis. Finanstilsynet (Financial Supervisory Authority of Norway) and Norges Bank will address the issue of contingency arrangements in the payment system.

The financial industry has developed a joint system for immediate payment. Payment system efficiency could be enhanced if banks were to utilise a single underlying solution for mobile payments. Mobile payments generally rely on international payment cards as the underlying payment solution. In the interest

of efficiency, it would be an advantage if the underlying payment solutions were less costly, and in some cases also swifter, than solutions based on the use of international payment cards. Norges Bank will consider possible adjustments to the bank settlement system that could increase payment efficiency.

A number of foreign banks that effect settlements in NOK do not participate in Norges Bank's settlement system. Another bank takes over the positions and effects the settlement on their behalf. Norges Bank will consider whether foreign banks that have considerable activity in NOK should either hold an account with Norges Bank or have several banks that can effect settlement on their behalf. This could reduce the risk associated with settlement.

The existing financial infrastructure is to a large extent built around a few centralised systems through which all transactions are processed. Internationally, market participants and the relevant public authorities are discussing whether decentralised technology, such as blockchain technology, could replace parts of the existing infrastructure. A more decentralised system involves fewer intermediaries and could result in swifter, cheaper and safer payment transactions. How secure the new technology is, and the potential consequences of putting the new technology into use, should be subject to further consideration.

Norges Bank has contact with relevant parties in its work to determine whether the use of decentralised technology can improve the efficiency of the financial infrastructure in Norway. Norges Bank will assess the safety and efficiency of new solutions in the light of international developments and the work carried out by international authorities.

Øystein Olsen
24 May 2016

NORGES BANK'S RESPONSIBILITY

Norges Bank oversees the payment system and the securities settlement system, which together constitute the financial infrastructure. The purpose of the financial infrastructure is to ensure that payments and financial instrument transactions are recorded, cleared and settled. Norges Bank supervises systems for clearing and settlement of interbank money transfers (interbank systems). Oversight and supervision is part of the Bank's work to promote financial stability.

Under Section 1 of the Norges Bank Act, Norges Bank is responsible for promoting an efficient payment system in Norway and vis-à-vis other countries. The payment system, as referred to in Section 1 of the Act, comprises any means, systems or instruments that can be used to execute or facilitate payment transactions. An efficient payment system completes payment transactions quickly, reliably and at low cost.

Norges Bank promotes an efficient payment system by:

- providing secure and efficient settlement of interbank payments in banks' accounts with Norges Bank,
- ensuring that banknotes and coins function efficiently as payment instruments, and
- overseeing important developments in the payment system and recommending changes that could improve its efficiency.

This *Report* is published as part of Norges Bank's work to promote a robust and efficient financial infrastructure. In the *Report*, Norges Bank discusses topics of current relevance and provides an account of its supervision and oversight work.

SUPERVISION

Norges Bank is responsible for supervising interbank systems pursuant to Chapter 2 of the Payment Systems Act. Norges Bank issues licences, sets requirements for interbank systems and supervises the systems to ensure that they comply with the requirements and with the Payment Systems Act. If Norges Bank identifies a violation of the Payment Systems Act or the terms of the licence, the Bank can

In the Payment Systems Act, **payment systems** are defined as interbank systems and systems for payment services. **Interbank systems** are systems for interbank money transfers, with common rules for clearing and settlement. **Systems for payment services** are systems for the transfer of funds between customer accounts in banks or other undertakings authorised to provide payment services (cf. Section 1-1 of the Payment Systems Act). Cash payment is not defined in the Payment Systems Act as a payment service.

Securities settlement systems are defined in the Payment Systems Act as systems based on common rules for the clearing, settlement or transfer of financial instruments.

Cash and deposit money are the means of payment that are primarily used for purchasing goods and services.¹ Deposit money refers to funds deposited in private banks, and payments using a card or mobile or online banking solution take place in banks' systems. The customer has a claim on the issuer of the means of payment. The central bank issues cash and the banks issue deposit money.

¹ Electronic money, or e-money, is also a means of payment. E-money payments are made using prepaid cards and e-money accounts.

instruct the interbank systems that are subject to supervision to rectify the violation.

The Operations Office of the Norwegian Interbank Clearing System (NICS) and DNB ASA (DNB) are licensed by Norges Bank to operate interbank systems. In its supervision of NICS and the DNB settlement system, Norges Bank also attaches weight to relevant international principles for financial market infrastructures. If Norges Bank considers some of these principles to be especially relevant, Norges Bank may require NICS and the DNB settlement system to comply with the standards.

Norges Bank can grant exemption from the licensing requirement for interbank systems that are consid-

TABLE 1.1 FINANCIAL MARKET INFRASTRUCTURES SUBJECT TO SUPERVISION OR OVERSIGHT

System	Instrument	Operator	Supervision/oversight	Administrative body
Norges Bank's settlement system (NBO)	Payments	Norges Bank	Oversight	Norges Bank
Norwegian Interbank Clearing System (NICS)	Payments	NICS Operations Office	Supervision and oversight	Norges Bank
DNB Bank ASA settlement system	Payments	DNB Bank ASA	Supervision and oversight	Norges Bank
SpareBank 1 SMN settlement system	Payments	SpareBank 1 SMN	Supervision	Norges Bank
Norwegian securities settlement system (VPO)	Securities	Verdipapirsentralen ASA (VPS)	Supervision and oversight	Supervision of VPS and VPO: Finanstilsynet Oversight of VPO: Norges Bank
VPS' central securities depository (CSD) function	Securities	VPS	Supervision and oversight	Supervision of CSD function: Finanstilsynet Oversight of CSD function: Norges Bank
SIX x-clear's central counterparty system	Financial instruments	SIX x-clear AG (SIX)	Supervision and oversight	Supervision of SIX: The Swiss and Norwegian financial supervisory authorities Oversight of SIX: Swiss National Bank and Norges Bank
LCH.Clearnet's central counterparty system	Financial instruments	LCH	Supervision and oversight	Supervision of LCH: Bank of England Oversight of LCH: Global College (including Norges Bank) and EMIR College
Continuous Linked Settlement (CLS)	Foreign exchange	CLS Bank	Supervision and oversight	Supervision of CLS: Federal Reserve Oversight of CLS: Central banks with currencies settled in CLS, including Norges Bank

ered too small to have an effect on financial stability. The SpareBank 1 SMN settlement system has such an exemption.

OVERSIGHT

Norges Bank's oversight responsibilities are based on Section 1 of the Norges Bank Act and international principles drawn up by the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO).

Norges Bank oversees the SpareBank 1 SMN settlement system, the central securities depository (CSD) function and the securities settlement system (VPO) of VPS (the Norwegian CSD), including the operations of the two central counterparties (CCPs) LCH.Clearnet and SIX x-clear.

Norges Bank is a member of the committee of central banks that oversees Continuous Linked Settlement (CLS) Bank, an international bank for the settlement of foreign exchange transactions. The Federal Reserve chairs the oversight committee.

Robust and efficient settlement is important for maintaining confidence that transactions in money and financial instruments will be completed in a sound manner. If Norges Bank through its oversight of the systems identifies shortcomings that could compromise security or efficiency, Norges Bank will request system owners to rectify the shortcomings. Norges Bank cannot require changes, as it can with regard to systems that are subject to supervision. Norges Bank's assessments are published in this Report.

Oversight of Norges Bank's settlement system

The provisions of Chapter 2 of the Payment Systems Act concerning interbank systems do not apply to Norges Bank's settlement system. In line with international recommendations, Norges Bank oversees

its own settlement system (NBO). According to Norges Bank's strategy, NBO shall satisfy relevant international standards and comply with requirements for critical infrastructure.¹ Thus, Norges Bank has two different roles: operator and oversight body. In order to make a clear distinction between the two different roles, two different departments at Norges Bank are responsible for operation and oversight of NBO. This form of organisation is recommended by the CPMI.²

COOPERATION WITH FINANSTILSYNET

As Finanstilsynet's and Norges Bank's supervisory and oversight responsibilities related to the financial infrastructure overlap, Norges Bank works in close collaboration with Finanstilsynet. Table 1.1 provides an overview of responsibility for supervision and oversight of the various systems in the financial infrastructure. Individual systems for retail payment services are followed up by Finanstilsynet. The collaboration between Finanstilsynet and Norges Bank is described in more detail in Norges Bank (2012).

1 See Norges Bank (2013).

2 See CPMI (2005).

1 CHALLENGES FACING NORWAY'S FINANCIAL INFRASTRUCTURE

The purpose of financial infrastructure is to ensure that payments for goods, services and financial instruments are recorded, cleared and settled. An overview of the financial market infrastructures (FMIs) supervised or overseen by Norges Bank is provided in Section 3. Some of the challenges facing Norway's financial infrastructure are discussed in this section.

1.1 THE ROLE OF CASH

There are two main means of payment in Norway: deposit money and cash. Deposit money comprises deposits in bank accounts. Payments are made in banks' systems using payment cards, mobile phones or online. Cash is issued by the central bank.

In recent decades, the value of cash in circulation has been stable around NOK 50bn a year. The share of cash in the money supply has decreased gradually as the value of bank deposits has increased. Statistics on the share of goods and services purchases that are made with cash are not available. Various methods are used to estimate this share, but the estimates vary widely.³

In Norges Bank's view, it is important to have a choice of means of payment and payment solutions, both because of their different characteristics and because this encourages competition. It gives users options and promotes efficiency.

The fees customers pay for using different options should reflect their actual cost, so that customers can take decisions based on the right information and choose the solution that serves them best on balance. At present, neither card nor cash services are priced to reflect their cost.⁴

The public can obtain cash by withdrawing deposit money. The new Financial Institutions Act requires banks to accept cash and make cash available in accordance with the needs and expectations of their customers.

Norges Bank's obligation to issue banknotes and coins means that the central bank must ensure that society has access to cash as a means of payment. Norges

Bank ensures that banks can withdraw cash from Norges Bank.

Banks' contingency arrangements for cash distribution may prove inadequate in a crisis situation. It has not been documented that electronic solutions can take over the role of cash in a crisis. Finanstilsynet (Financial Supervisory Authority of Norway) and Norges Bank will address the issue of contingency arrangements in the payment system.

Cash is also legal tender for consumer transactions, which may be important if payer and payee are unable to agree on the method of payment.

Norges Bank holds the view that cash should be readily available to the general public. The Bank has a responsibility to promote efficient payment solutions, in the design of the settlement system, for example, and in its oversight of the payment system. Norges Bank will continue to satisfy public demand for banknotes and coins and ensure that cash can function as an efficient means of payment. The development of a new banknote series will contribute to this, partly by making counterfeiting more difficult.

1.2 NEW PAYMENT SOLUTIONS

Payments using mobile phone apps are becoming more and more common. These services can be designed for various types of payment – at physical points of sale, online stores or for person-to-person transfers (see box).

The most popular use of mobile payment services to date has been for person-to-person (P2P) transfers. P2P payments have become very fast and user-friendly – the payer needs only know the payee's mobile number. In some cases, the payee receives the funds immediately; in others, it can take several days.⁵ If settlement is not immediate, the funds are placed in escrow when the payer approves the transfer.

For purchases at a point of sale, both ordinary card payments (with input of PIN or contactless) and cash payments are relatively fast and user-friendly payment

³ See Norges Bank (2014a).

⁴ See Norges Bank (2014a).

⁵ Transfers and payments to firms, associations and organisations generally take two to four days.

NEW PAYMENT SOLUTIONS – USES AND INSTRUMENTS

Users can choose between a variety of mobile payment solutions. These solutions are designed for payments using mobile phones in one or more of the following areas: physical points of sale, online shopping and person-to-person (P2P) transfers. They can also be classified according to whether payments are made through a payment card or directly from a bank

account.¹ The table shows some of the solutions available in the Norwegian payment market. Note that the table is not complete and that the market is evolving rapidly.

¹ There are also solutions for payment using e-money and solutions where payment is subsequently added to the user's mobile telephone bill.

	At point of sale	Online shopping	P2P
Card payment (debit or credit card)	MobilePay mCASH	mCASH PayPal	MobilePay Vipps mCASH PayPal ¹
Payment from bank account	mCASH	mCASH	mCASH SnapCash ²

¹ Must know payee's email address.

² Mobile banking.

methods. This has probably contributed to slower growth in mobile solutions for point-of-sale payments than for P2P payments.

With most of these mobile payment services, payment is charged to a payment card.⁶ Currently only the most common international cards can be used for this. For reasons of cost efficiency, other underlying payment solutions would have been preferable to international cards for mobile payments.

The banking sector has developed a joint solution for mobile and online payments where money is transferred immediately to the payee's account. This joint solution has a number of benefits: it is cheap and

ensures rapid payments for customers, all banks and their customers can sign up to it, and it is not dependent on a single private market participant. As yet, few banks have begun to use this solution for immediate payments. Payment system efficiency could be enhanced if more banks were to adopt a joint solution.

Norges Bank will consider possible adjustments to the bank settlement system that could lead to more cost-efficient and faster payments. In Norges Bank's view, banks and finance industry associations should work on further standardisation and joint solutions for mobile payments.

⁶ Mobile phones provide a new interface, but the payment chain is largely the same as before.

1.3 NEW RULES FOR CARD USE

Norwegians make extensive use of payment cards. A new EU regulation that also applies in Norway will reduce the fees merchants pay for these transactions. The regulation also prohibits centrally inserted automatic selection mechanisms when co-badged cards are used and could reduce cost efficiency in the Norwegian payment system.

The payment card market in Norway

The most widely used card scheme in Norway is BankAxept, a debit card system where payments are debited immediately from a bank account. Many payments are also made using international payment cards, which may be debit, charge or credit cards. BankAxept cards cannot be used for online shopping or abroad.⁷ Such transactions are becoming more and more common, however, leading to increased use of international cards (Chart 1.1). Most payment cards are co-badged, combining BankAxept and an international card, generally Visa. A centrally inserted automatic selection mechanism means that BankAxept is automatically chosen for payments with co-badged cards to Norwegian merchants unless the customer requests otherwise.

Card schemes such as BankAxept, Visa and MasterCard involve four parties besides the card company: the cardholder (payer), the merchant (payee), the card acquirer (the merchant's bank) and the card issuer (generally the payer's bank). These parties play different roles and pay each other fees (see box).

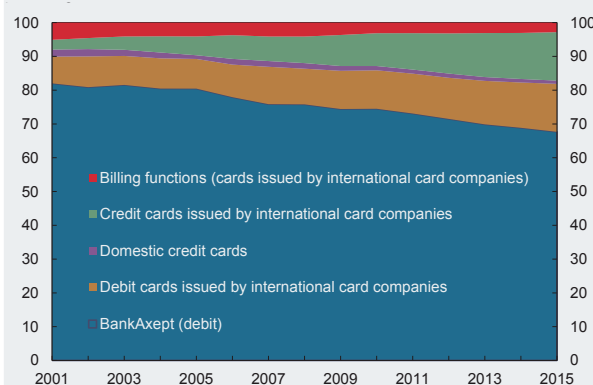
New EU regulation

A new EU regulation caps the interchange fees that the card acquirer pays the card issuer. The standard rule in the new regulation is that the interchange fee may not be more than 0.2% of the value of the transaction for payments using debit cards and 0.3% for payments using credit cards.⁸ The aim of the regulation is to encourage competition in the payment market and reduce payment costs for consumers. The regulation is due to be implemented in Norway

⁷ BankAxept plans to expand its applications.

⁸ These rules do not apply to transactions with commercial cards, card-based cash withdrawals or three-party card schemes. With three-party schemes, the issuer of the payment card and the acquirer of card transactions are one and the same. Both the cardholder and the merchant have an account with the card scheme. American Express and Diners Club are examples of three-party schemes.

CHART 1.1 Use of Norwegian payment cards by issuer and function. Value as a percentage of total value. 2001-2015



Source: Norges Bank

in stages from 1 July 2016. Proposals for its implementation in Norwegian law have been circulated for comment.

Lower interchange fees will probably mean lower merchant fees for stores, both as a result of competition between card acquirers and because the interchange fee is usually automatically included in the total merchant fee. Australia and Spain, which introduced caps on interchange fees in 2003 and 2005 respectively, found that merchants did not pass on these lower costs to consumers, while card issuers increased annual fees and transaction fees for cardholders to make up for the decrease in interchange fees. On balance, consumers ended up paying more for card payments.

It is not clear, therefore, whether the EU's intention to reduce payment costs for consumers will be realised. On the other hand, it is reasonable for consumers to cover the cost of making payments. At present, card issuers give cardholders strong financial incentives to pay with credit cards, and merchants do not pass on their payment costs to cardholders directly. This gives consumers incentives that lead to an inefficient use of resources in terms of the economy and the total costs for providing payment services are higher than necessary.

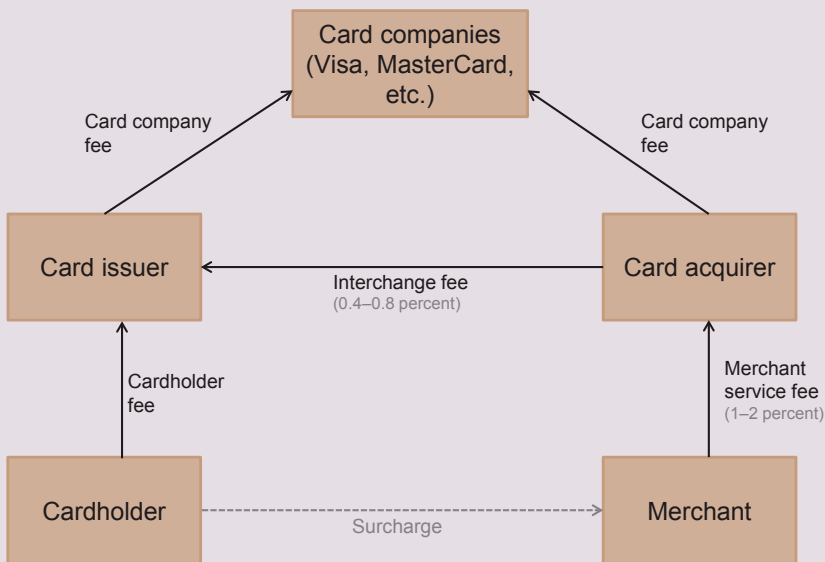
The regulation also prohibits centrally inserted automatic selection mechanisms when co-badged cards are used. The individual merchant can still install an

FEES – INTERNATIONAL PAYMENT CARDS

The card company owns the card scheme and brand. The card issuers and card acquirers are members of the card scheme and provide services to cardholders and merchants on behalf of the card company (Chart 1.2). **Card issuers** receive interchange fees from card acquirers, and annual fees from cardholders, and pay fees to the card company. **Card acquirers** ensure that merchants can accept card payments from the different card schemes and receive payments from the card issuer. **Merchants** pay a merchant fee to the card

acquirer to cover interchange fees, the fees paid by the card acquirer to the card company, and the card acquirer's costs for the merchant's payments and facilities. Merchants can pass on these fees to consumers, either directly by charging a fee for each payment, or indirectly by putting up the prices of goods and services. Estimates of some of these fees are shown in brackets and are based on Norges Bank (2014a).

CHART 1.2 Fees for using international payment cards in international four-party schemes



Source: Norges Bank

automatic selection mechanism, but the consumer must have the right to override it and decide that another part of the card is used. These co-badged cards have the brand of the international card scheme on the front and BankAxept on the back. Norges Bank's cost surveys indicate that many believe they are paying with an international card when they are actually using BankAxept.⁹ This may mean that, given a choice, many consumers will make less use of BankAxept. The economic cost of BankAxept payments is substantially lower than for payments with international cards.⁹ This aspect of the EU regulation could reduce cost efficiency in the Norwegian payment system.

In Norges Bank's view, leaving the choice of payment solution to the consumer is a sound principle. Consumers should have adequate information about their options and be presented with prices that reflect real costs. The individual merchant should consider selection mechanisms that promote efficient payment solutions while also allowing customers to make their own choices.

Will the interchange fee regulation affect the way we make payments?

Lower interchange fees will, in isolation, make card payments more attractive for merchants. The regulation will also affect the relationship between different types of card payment. Payments with international cards currently involve much higher costs for merchants than payments using BankAxept.⁹ The regulation will reduce, but not eliminate, this gap.

In the EU countries, interchange fees have been a barrier to the introduction of new card schemes. New card schemes have had to raise interchange fees substantially to attract card issuers. This affects the interchange fee and reduces merchants' interest in accepting new card schemes. In Norway, there is both a domestic debit card scheme and a number of international card schemes. This may mean that the effect on new schemes will be smaller in Norway.

The use of payment cards is very widespread for payment services using mobile phones (Section 1.2). Due to the high costs associated with international cards, some merchants have chosen not to accept mobile payments. The introduction of the interchange

fee regulation will make it relatively less costly and thus more attractive for merchants to accept mobile payments.

1.4 PAYMENT SETTLEMENT FOR FOREIGN BANKS

A number of foreign banks that effect settlements in NOK do not participate in Norges Bank's settlement system. Another bank takes over the positions and effects settlement on their behalf. Norges Bank will consider whether foreign banks that have considerable activity in NOK should either hold an account with Norges Bank or use several Norwegian banks that can effect settlement on their behalf. This could reduce settlement risk if a participant defaults.

Most banks participate in an FMI through another bank (tiered participation). A bank that participates directly in settlement takes over their payments and settles on their behalf. The balance on the indirect participant's account with the direct participant is then adjusted.

Tiered participation may save resources at the individual bank, and fewer direct participants may reduce the risk of settlement delays as a result of problems at individual banks.

Tiered participation also has its risks. If a direct participant defaults, this could mean that a large number of other banks no longer have access to the financial infrastructure. The system is more vulnerable when there are large numbers of indirect participants using the same direct participants, as is the case in Norway. The system is also more vulnerable if the indirect participant is relatively large compared with the direct participant.

International principles for FMIs attach importance to the risks associated with tiered participation arrangements.¹⁰ These principles require FMI owners to monitor indirect participants' payment activities, regularly review risks arising from tiered participation, and take mitigating action when appropriate. The principles also state that in some cases it may be appropriate for FMI owners to set an upper limit on the value of an indirect participant's payment activi-

⁹ See Norges Bank (2014a).

¹⁰ See CPMI-IOSCO (2012).

ties. For example, the Bank of England requires banks with payment activities above a set level to participate directly in central bank settlement.¹¹

Norges Bank and the Norwegian banking industry are aware of the risks associated with tiered participation. For Norwegian banks that participate indirectly in Norges Bank's settlement system, the solutions have been modified so that these banks can participate directly if the bank through which they access the FMI defaults. All Norwegian banks that participate indirectly in Norges Bank's settlement system have an account at Norges Bank that can be used if necessary. These solutions have been tested by Norges Bank and the banks.

Equivalent solutions have not been introduced for foreign banks that participate indirectly in Norges Bank's settlement system. Indirect payments from foreign banks amount to several hundred billion NOK daily and are settled by a small number of Norwegian banks. The risks can be limited in a number of ways. Norges Bank will consider whether foreign banks with considerable payment activity in NOK should either hold an account with Norges Bank¹² or have access to several Norwegian banks that can effect settlement on their behalf. Similarly, owners of other FMIs should assess the risks and possible mitigating actions to reduce vulnerabilities arising from tiered participation. A number of FMI owners have room for improvement in this respect. This is discussed further in the assessment against international principles in Section 2.

1.5 FINANCIAL INFRASTRUCTURE DECENTRALISATION

Existing financial infrastructures are to a large extent built around a few centralised systems through which all transactions are processed. Internationally, alternative new technology is now being discussed. This technology allows transactions to be performed directly between end-users to a greater extent. This section provides a brief overview of these initiatives and the international debate. The technology is still in its infancy. Both authorities and market participants

need to discuss possibilities, risks and, in time, the need for standards and regulation. Norges Bank has contact with relevant parties in its work to determine whether decentralised technology could enhance the efficiency of the financial infrastructure in Norway.

Centralised and decentralised financial infrastructure

Existing financial infrastructures are dominated by centralised solutions. Payments and other financial transactions pass through one or more intermediaries before being finally approved and settled at a central bank or central securities depository.

At the heart of a centralised payment system is the central bank's account system (Chart 1.3). Each bank has its own account, and interbank settlement takes the form of transfers between these accounts. Below the central bank level, the payment system consists of several layers of accounts. Banks that have accounts with the central bank generally also control their own account systems, with account holders such as retail and corporate customers and other banks. A payment between customers of two different banks in a centralised payment system will therefore go through numerous parties, all of which need to verify the transaction. There are similar centralised solutions for the settlement of foreign-exchange and securities transactions.

The idea that society has much to gain from replacing this existing infrastructure with decentralised solutions is gaining ground. The first time such a solution was used was with the introduction of Bitcoin in 2009. Bitcoin is both a digital currency¹³ and a decentralised payment system. Bitcoin and similar currencies have encountered a number of challenges, including large swings in value, increasing demands on IT resources, and security-related issues.

Recently, the focus of the international debate has shifted away from independent digital currencies such as Bitcoin towards other uses and the underlying technology. In fully decentralised systems, transactions take place directly between payer and payee without financial institutions as intermediaries. The infrastructure consists of a network of participants with equal status. The participants in the network

11 See Finan et al. (2013).

12 A bank must offer services from an established place of business within the EEA to have an account with Norges Bank, see Norges Bank (2009).

13 A digital currency is a currency that exists only in electronic form.

each have an identical copy of the account system, which is continuously updated.¹⁴ Encryption provides security and confidence in the system by ensuring that there is only one correct version of the account system, that transactions are not manipulated, and that funds are not used more than once. Access to the system may be open to all or restricted, for example to a group of financial institutions. The distribution of the account system/transaction ledger to everyone in the network eliminates dependence on a central operator for executing operations. This technology may result in faster and cheaper settle-

ment of transactions.¹⁵ The right-hand side of Chart 1.3 shows a diagram of a possible partly decentralised payment system where banks settle between themselves without using the central bank's settlement system.

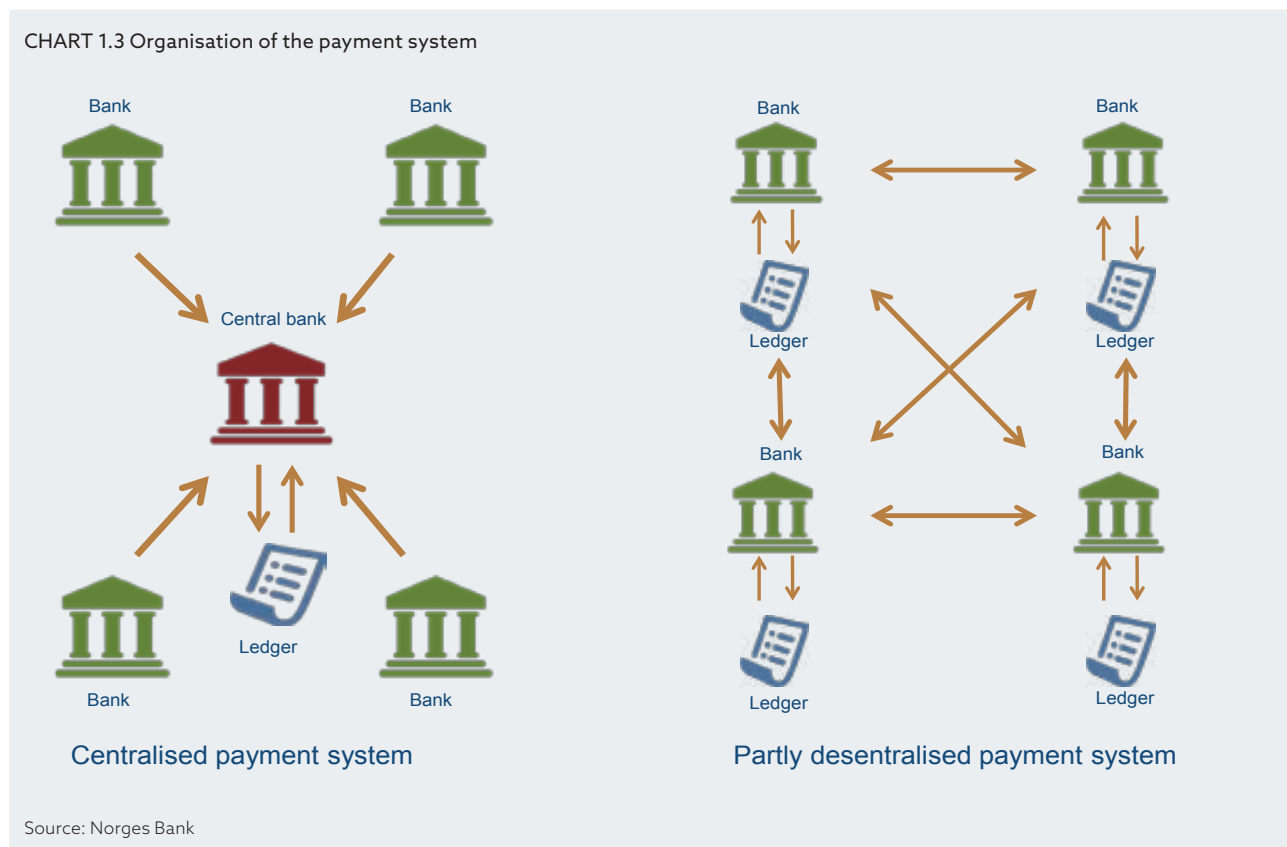
Potential applications

Decentralised technology has many potential applications both within and outside the financial sector.¹⁶ Outside the financial sector, proposals have been made to use the technology to register properties and conduct elections. Most of the proposed applications, however, relate to various types of financial transaction, accounting, auditing and so-called smart

14 "Decentralised ledger" and "blockchain" are two key concepts in the international debate. A decentralised ledger is where the transaction ledger is distributed to all participants in the network. New transactions are bundled into blocks and added to the account system when there is consensus in the network. The blocks of transactions are strung together in a chronological "blockchain".

15 See Ali et al. (2014a, 2014b) for a more detailed discussion of the potential benefits and challenges. There are also a number of private initiatives discussing the characteristics and benefits of such infrastructure systems.

16 IMF (2016), European Parliament (2016) and Evry (2015) contain overviews of the potential applications of the technology.



contracts, where delivery under the contract takes place automatically once certain values or times are reached. Some examples are presented below to provide an insight into the international debate.

Clearing and interbank settlement

When a card payment is made in a grocery store, many different operators and systems are involved before the store receives the money in its account. The cardholder's bank debits the payer's account and sends the payment for clearing and then settlement at the central bank. The money is then transferred to the store's bank, which credits the store's account. In a fully decentralised payment system, where payments go directly from buyer to seller, these "third parties" are redundant. Some have proposed variants where banks and the central bank still play a role, for example where the network consists of banks that settle payments from customers immediately using the new technology. Each individual bank obtains money for use in the network by drawing on the balance on its account with the central bank.

International payments

The system needs to accommodate currency conversion if payments between banks in different currencies are to be settled directly. Various ways of arranging this have been suggested. First, each currency could be organised in its own network, with transactions taking place across these networks. Alternatively, there could be a single network for all currencies, with currency trades carried out by a select number of network members. A third solution would be to establish a separate network currency that is fully convertible into standard currencies.

Settlement of securities trades

A securities settlement system using delivery versus payment could also use decentralised technology. The international debate has included discussion of solutions where money (or other settlement funds) and securities are stored in the network, and so-called smart contracts ensure that delivery is made versus payment. Central securities depositories and central banks manage access to the securities system and regulate access to settlement funds and securities respectively. Investment firms and banks settle transactions in the network on behalf of investors.

Norges Bank's view

Norges Bank has a duty to promote an efficient and robust financial infrastructure. The development of a decentralised financial infrastructure is in its infancy. Such an arrangement could result in reduced risk, reduced costs and faster execution. There is a need to analyse prospects, consequences and risks. Both authorities and market participants should assess the need for standardisation and regulation, but the timing of such initiatives should take account of the need for freedom of innovation in the early stages.

Norges Bank is monitoring developments and the results of work being carried out by regulatory bodies at the European and global level. It may also be necessary to view future decentralised solutions in the context of work on new payment solutions. Norges Bank will work on establishing contact and exchanging information on such systems with both banks and international regulatory bodies.

2 INTERNATIONAL RECOMMENDATIONS

In 2015, the International Monetary Fund (IMF) assessed the Norwegian financial infrastructure and how Norges Bank and other authorities conduct supervision and oversight. The main results of the IMF's assessment and the follow-up measures taken are presented in Section 2.1. In Section 2.2, Norges Bank updates its assessment of the degree to which Norwegian FMI's comply with international principles. The FMI's themselves are presented in more detail in Section 3.

2.1 IMF FSAP ASSESSMENT FOR NORWAY: FINANCIAL INFRASTRUCTURE, SUPERVISION AND OVERSIGHT

The IMF assessed the Norwegian financial system as part of its Financial Sector Assessment Program (see box).

Findings and recommendations concerning the Norwegian financial infrastructure

The IMF finds that Norway has a modern and stable financial infrastructure. It nevertheless believes that the financial infrastructure should be strengthened in a number of areas. Two key recommendations are:

- Strengthen operational risk management related to outsourcing in systemically important payment systems
- Establish clear recovery-time objectives for FMI's. It should be possible to complete settlement by the end of the day, even in the event of major operational disruptions.

The IMF's analysis and recommendations are presented in more detail in IMF (2015a, 2015b).

Findings and recommendations concerning supervision and oversight

The IMF also assessed the framework in Norway for the oversight and supervision of FMI's against the recommendations of CPMI-IOSCO (2012) on the authorities' responsibilities.

The recommendations specify what types of system the authorities are to oversee, how this oversight is to be carried out, what resources the authorities should have, and how different authorities should work together.

FINANCIAL SECTOR ASSESSMENT PROGRAM (FSAP)

The FSAP was launched by the IMF in 1999. The aim of this initiative is to strengthen international oversight of national financial systems. FSAP assessments are carried out by the IMF and cover a country's financial markets, financial institutions and financial infrastructure.

An FSAP assessment has two parts:

- 1 Analysis of the resilience of the financial system and the outlook for financial stability. This includes analyses of the system's vulnerability and exposure to risk, assessments of the authorities' efforts to ensure financial stability, and an assessment of the authorities' plans and their preparedness for financial crises.

- 2 Review of the country's compliance with standards for oversight, supervision and regulation of the financial sector. These include standards for supervisory bodies on transparency in financial matters, and how they supervise the financial sector.

Following the international financial crisis of 2008–2009, FSAP assessments were made mandatory for countries with systemically important financial sectors. These assessments are to be conducted at least every five years, and Norway was most recently assessed in 2015.

The IMF is largely positive about the supervision and oversight conducted by the Norwegian authorities.

The IMF finds that supervision and oversight have a sound legal foundation, that the bodies performing supervision and oversight have sufficient resources to carry out their work, and that there is effective collaboration between authorities both domestically and internationally. The IMF also finds that the Norwegian authorities' assessment of Norwegian FMIs is functioning as intended, with the result that FMIs are to a greater extent in compliance with international standards.

The IMF recommends improvements in some areas. The IMF believes that Norges Bank and Finanstilsynet should work more closely together on overseeing Norwegian FMIs. The IMF recommends that the oversight of foreign FMIs should be formalised to a greater extent through agreements between Norwegian and foreign authorities.

Follow-up on the IMF recommendations

Norges Bank will ensure that the IMF's recommendations are followed up on within the Bank's area of responsibility.

Some of the recommendations have already been implemented, for example a stronger risk framework for NICS. Other recommendations can be implemented relatively quickly, such as improved reporting and requiring FMIs to publicly disclose information on compliance with the principles. Some will be implemented in the slightly longer term, such as those that entail changes to agreements or technical solutions. This is in keeping with the timeframes for the IMF's recommendations.

2.2 ASSESSMENT OF NORWEGIAN FMIS AGAINST INTERNATIONAL PRINCIPLES

Norges Bank assesses FMIs against international principles drawn up by CPMI-IOSCO.¹⁷ The aim of the principles is to ensure a robust financial infrastructure that promotes financial stability. The principles provide a comprehensive standard for FMIs across borders and system types.

FMIs are assessed against the principles that are relevant to them. The degree of compliance is based on the following criteria:

- Observed: The FMI observes the principle. Any shortcomings are minor.
- Broadly observed: The FMI broadly observes the principle. The system has one or more shortcomings that give cause for concern. The FMI should follow up on these shortcomings by a specified date.
- Partly observed: The FMI partly observes the principle. The system has one or more shortcomings that could become serious if not addressed promptly. The FMI must give high priority to addressing these shortcomings.
- Not observed: The FMI does not observe the principle. The system has one or more serious shortcomings that warrant immediate action.
- Not applicable: The principle does not apply to the FMI.

The operators of Norwegian FMIs carried out a self-assessment against the principles in 2013.¹⁸ On the basis of these self-assessments and other information, Norges Bank assessed the systems in 2014 – see Norges Bank (2014b) with updates of selected principles in Norges Bank (2015a).

Norges Bank conducted a reassessment against selected principles in 2016. The results are presented in this section. No reassessment against other principles was carried out. The assessment of VPS was prepared in cooperation with Finanstilsynet.

The main conclusion of the assessments by Norges Bank and Finanstilsynet is that Norwegian FMIs largely comply with the CPMI-IOSCO principles. An overview of Norges Bank and Finanstilsynet's assessment against the individual principles is provided in Table 2.1.

The CPMI published reports on cyber security at FMIs in 2014 and 2015 (see box on page 19).

17 See CPMI-IOSCO (2012).

18 The NICS Operations Office and VPS have published their self-assessments on their websites.

TABLE 2.1. OVERVIEW OF FMIS AGAINST THE PRINCIPLES. YEAR DENOTES MOST RECENT ASSESSMENT

Principle/type of FMI	NBO	NICS	VPO	VPS' CSD function	DNB (private settlement bank)	SMN (private settlement bank)
1. Legal basis	2014	2014	2016	2014	2014	2014
2. Governance	2016	2016	2014	2014	2014	2014
3. Framework for the comprehensive management of risks	2016	2015	2016	2016	2014	2014
4. Credit risk	2014		2014		2014	2014
5. Collateral	2014					
6. Margin						
7. Liquidity risk	2014	2014	2014		2014	2014
8. Settlement finality	2014	2014	2014		2014	2014
9. Money settlements	2014	2014	2014		2014	2014
10. Physical deliveries						
11. Central securities depositories				2014		
12. Exchange-of-value settlement systems	2014		2014			
13. Participant-default rules and procedures	2014	2014	2016	2014	2014	2014
14. Segregation and portability						
15. General business risk	2014	2014	2016	2016	2014	2014
16. Custody and investment risks			2014	2014	2014	2014
17. Operational risk	2016	2016	2014	2014	2014	2014
18. Access and participation requirements	2014	2014	2014	2014	2014	2014
19. Tiered participation arrangements	2014		2016	2014		
20. FMI links			2014	2016		
21. Efficiency and effectiveness	2014	2014	2014	2014	2014	2014
22. Communication procedures and standards	2014	2014	2014	2014		
23. Disclosure of rules, key procedures and market data	2014	2014	2014	2014	2014	2014
24. Disclosure of market data by trade repositories						

Key: ■ Observed ■ Broadly observed ■ Partly observed ■ Not observed Not applicable

NORGES BANK'S SETTLEMENT SYSTEM

Norges Bank is covered by 17 of the 24 principles. Two of these principles are not considered fully observed in 2016, against one in 2015.

Principle 2 (governance) was considered observed in 2015. Norges Bank believes there is a need to review responsibilities for some tasks relating to governance and control of outsourced operations. **Norges Bank now considers Principle 2 broadly observed.**

Principle 3 (risk management framework) was considered observed in 2015. Norges Bank conducted a reassessment against this principle in 2016 **and still considers it observed.**

Principle 17 (operational risk) was considered broadly observed in 2015. An enhanced contingency solution was implemented in November 2015, resulting in greater compliance with Principle 17. Norges Bank nevertheless finds that the principle is not fully

observed. One reason is that there has not been a satisfactory risk analysis of critical service providers.

Norges Bank still considers Principle 17 broadly observed.

NORWEGIAN INTERBANK CLEARING SYSTEM

NICS is covered by 13 of the 24 principles. Norges Bank considers that two of the principles are not fully observed in 2016, the same as in 2015.

Principle 2 (governance) was considered broadly observed in 2015. This principle contains a requirement for the board of an FMI to have a sufficiently varied composition. Norges Bank finds that this requirement cannot be considered fully observed until the NICS Operations Office appoints a board member who is neither employed by, nor in some other way closely linked to, the banking sector.

Norges Bank still considers Principle 2 broadly observed. The organisation of system ownership of NICS will be revised in 2016.

CYBER SECURITY

The CPMI published a report in 2014 on cyber risks faced by FMIs and how FMIs manage these risks (CPMI, 2014). In 2015, CPMI-IOSCO published a consultation document with guidance on how FMIs should work to enhance cyber resilience (CPMI-IOSCO, 2015).

The 2015 report can be divided into two parts. The first part provides guidance on five different aspects of risk management:

- 1 Cyber governance
- 2 Identification of activities that may be vulnerable to cyber risks
- 3 Protection against cyber risks
- 4 Detection of cyber attacks
- 5 Response and recovery

The second part presents three components that are relevant to all parts of an FMI's work on cyber security:

- 1 Testing an FMI's vulnerability to cyber risks
- 2 Situational awareness
- 3 Learning and acquiring knowledge about cyber security

The guidance supplements a number of the international principles that FMIs are assessed against: Principle 2 (governance), Principle 3 (risk management framework), Principle 8 (settlement finality), Principle 17 (operational risk) and Principle 20 (FMI links). In its supervisory and oversight work, Norges Bank will monitor FMIs' work on cyber security and how they follow up on the measures recommended by CPMI-IOSCO.

Principle 17 (operational risk) was considered broadly observed in 2015. Norges Bank finds that compliance with all of the requirements of this principle has not been adequately documented for some aspects of the operating and disaster recovery solutions. Finanstilsynet and Norges Bank conducted a review of contingency solutions for domestic payments in 2015 and found that there are weaknesses in the disaster recovery solution. The NICS Operations Office will follow up on this. **Norges Bank still considers Principle 17 broadly observed.**

THE DNB AND SPAREBANK 1 SMN SETTLEMENT SYSTEMS

The DNB and SpareBank 1 SMN settlement systems were assessed against 14 of the 24 principles in 2014. Norges Bank considered all of the principles observed and has not since conducted a reassessment against these principles.

The DNB and SpareBank 1 SMN settlement systems are so-called “quasi systems”. They resemble FMIs, but manage accounts for other banks. In its assessment, Norges Bank took into account that only parts of some of the principles are applicable to such settlement systems. Norges Bank therefore emphasised that they fulfil the intentions of the principles, not that each individual key consideration must be observed.

Over the past year, DNB and SpareBank 1 SMN have assessed critical service providers in accordance with Annex F to CPMI-IOSCO (2012) (see Section 2.3).

THE SECURITIES SETTLEMENT SYSTEM

VPO is covered by 18 of the 24 principles. Five of these principles are considered not fully observed in 2016, against three in 2015.

Principle 1 (legal basis) and Principle 13 (participant default rules and procedures) were considered broadly observed in 2015. With regard to both of these principles, Norges Bank and Finanstilsynet consider that the rules followed by VPS for handling a participant bankruptcy are unclear and that VPS agreements must be read in conjunction with the agreements used by Norges Bank in order for the rules to be clear.

One source of the lack of clarity in VPS agreements is a lack of clarity in the Payment Systems Act provision relating to the handling of transactions from a participant that becomes insolvent. The Ministry of

Finance has circulated for comment a draft regulation intended to clarify the rules. The regulation has not yet been laid down. This is the reason why VPS again does not fully comply with Principles 1 and 13. **Norges Bank and Finanstilsynet still consider Principles 1 and 13 broadly observed.**

Principle 3 (framework for the comprehensive management of risks) and Principle 15 (general business risk) were considered observed in 2014. Principles 3 and 15 contain requirements for a FMI to have a recovery plan in the event of financial problems. The reason why the absence of such a plan was not noted in 2014 and 2015 is that the guidance from CPMI-IOSCO was not published until 1 October 2014. In the view of Norges Bank and Finanstilsynet, VPS should now have produced a financial recovery plan. As VPS has not completed such a plan, it does not comply with these principles. **Norges Bank and Finanstilsynet now consider Principles 3 and 15 broadly observed.**

Principle 19 (tiered participation arrangements) was considered broadly observed in 2015. Norges Bank and Finanstilsynet find that VPS has not carried out quantitative analyses of tiered participation in the system. VPS should also have a more systematic approach to risk assessment of tiered participation arrangements. VPS plans to introduce solutions that can provide better analysis of indirect participants. **Norges Bank and Finanstilsynet still consider Principle 19 broadly observed.**

VPS CENTRAL SECURITIES DEPOSITORY FUNCTION

The VPS central securities depository (CSD) function is covered by 14 of the 24 principles. Three of these principles are not considered fully observed in 2016, against one in 2015.

Principles 3 and 15 apply to both VPO and VPS. For the same reason as mentioned for VPO above, VPS does not fully comply with Principles 3 and 15. **Norges Bank and Finanstilsynet now consider Principles 3 and 15 broadly observed.**

Principle 20 (FMI links) was considered broadly observed in 2015. This is because VPS does not conduct its own assessment of links where securities issued in a foreign CSD are partly registered in VPS. According to the principle, VPS must perform its own

risk assessment and implement measures to mitigate the risk associated with establishing links.

VPS plans to rectify these shortcomings once the technical standards for the EU's Central Securities Depositories Regulation (CSDR)¹⁹ are adopted. **Norges Bank and Finanstilsynet still consider Principle 20 broadly observed.**

CONTINUOUS LINKED SETTLEMENT

Norges Bank has not conducted a separate assessment of CLS against the principles. Along with the other central banks on the oversight committee, Norges Bank commented on CLS's self-assessment prior to publication.

CENTRAL COUNTERPARTIES

Norges Bank does not conduct its own assessment of central counterparties (CCPs) that operate in Norway against the principles. The supervisory and oversight authorities in the CCPs' home countries have different practices concerning the application of the principles.

The three CCPs that operate in Norway today are subject to the requirements of the European Market Infrastructure Regulation (EMIR).²⁰ EMIR has the same aims as the CPMI-IOSCO principles. LCH.Clearnet and EuroCCP are authorised under EMIR, while SIX x-clear is recognised under EMIR.²¹ Non-EU CCPs (SIX x-clear) are recognised by the European Securities and Markets Authority (ESMA), while EU CCPs (LCH.Clearnet and EuroCCP) are authorised by a group that oversees and supervises CCPs.

2.3 EXPECTATIONS APPLICABLE TO CRITICAL SERVICE PROVIDERS

FMI's are dependent on external service providers. The risk associated with this dependence on others is not adequately covered by the 24 CPMI-IOSCO principles. CPMI-IOSCO (2012, 2014) has therefore

drawn up five expectations applicable to critical service providers (see box on page 22). These expectations cover areas such as risk identification and management, information security and technology planning. The aim of the expectations is to ensure that services are held to at least the same standards as if they were provided by the FMI's themselves.

In 2015, Norges Bank asked FMI's to identify their critical service providers and assess them against the CPMI-IOSCO expectations. The FMI's reported that they had the following critical service providers:

- NBO: EVRY, SIA/Perago, Vermeg
- DNB: EVRY, Tata Consultancy Services, HCL Technologies
- SpareBank 1 SMN: EVRY
- VPS: None
- NICS Operations Office: Nets Norge Infrastruktur (NNI)

Norges Bank approved the list of critical service providers before the FMI's began their assessments. NNI is a critical service provider for the NICS Operations Office, but was extensively included and discussed in the NICS Operations Office's self-assessment against the CPMI-IOSCO principles in 2013. An assessment against the oversight expectations for critical service providers was therefore considered unnecessary. Norges Bank will review the assessments from DNB and SpareBank 1 SMN in cooperation with Finanstilsynet.

¹⁹ Regulation (EU) No. 909/2014 on improving securities settlement in the European Union and on central securities depositories.

²⁰ Regulation (EU) No. 648/2012 on OTC derivatives, central counterparties and trade repositories.

²¹ On 15 April 2016, the Government presented proposals that include the implementation of EMIR in Norway. See Norwegian Government (2016) and Norwegian Ministry of Foreign Affairs (2016a, 2016b).

EXPECTATIONS APPLICABLE TO CRITICAL SERVICE PROVIDERS

CPMI-IOSCO has issued five expectations applicable to service providers critical to an FMI's operations, see Annex F to CPMI-IOSCO (2012) and the assessment methodology in CPMI-IOSCO (2014):

Expectation 1: Risk identification and management

A critical service provider is expected to identify and manage operational and financial risks to its critical services and ensure that its risk-management processes are effective.

Expectation 2: Information security

A critical service provider is expected to implement and maintain appropriate policies and procedures, and devote sufficient resources to ensure the confidentiality and integrity of information and the availability of its critical services.

Expectation 3: Reliability and resilience

A critical service provider is expected to implement appropriate policies and procedures and devote suffi-

cient resources to ensure that its critical services are available, reliable and resilient. Its business continuity management and disaster recovery plans should therefore support the timely resumption of its critical services in the event of an outage so that the service provided fulfils the terms of its agreement with an FMI.

Expectation 4: Technology planning

A critical service provider is expected to have in place robust methods to plan for the entire lifecycle of the use of technologies and the selection of technological standards.

Expectation 5: Communication with users

A critical service provider is expected to be transparent to its users and provide them sufficient information to enable users to understand clearly their roles and responsibilities in managing risks related to their use of the critical service provider.

3 DEVELOPMENTS IN SUPERVISION AND OVERSIGHT OF FMIS

In its oversight and supervision work over the past year, Norges Bank has attached importance to FMI owners' risk analyses, control of outsourced operations and contingency arrangements, as signalled in last year's report. Although improvements have been made in some areas, Norges Bank believes that there is still a need for action in a number of areas (for more details, see Section 2.2).

In the coming year, Norges Bank will follow up:

- the IMF's recommendations, including that FMI owners improve the control of outsourced operations
- measures taken by FMI owners to address the principles that Norges Bank does not consider fully observed, including whether
 - contingency solutions are satisfactory
 - satisfactory analyses of tiered participation arrangements are conducted and the necessary measures implemented to reduce risks.

The Bank will follow the national and international debate on how decentralised technology might affect the financial infrastructure.

The following subsections discuss developments in the various FMIs and the supervision and oversight conducted by Norges Bank.

3.1 INTERBANK SYSTEMS

Interbank systems are systems for interbank payment transfers, with common rules for clearing and settlement.

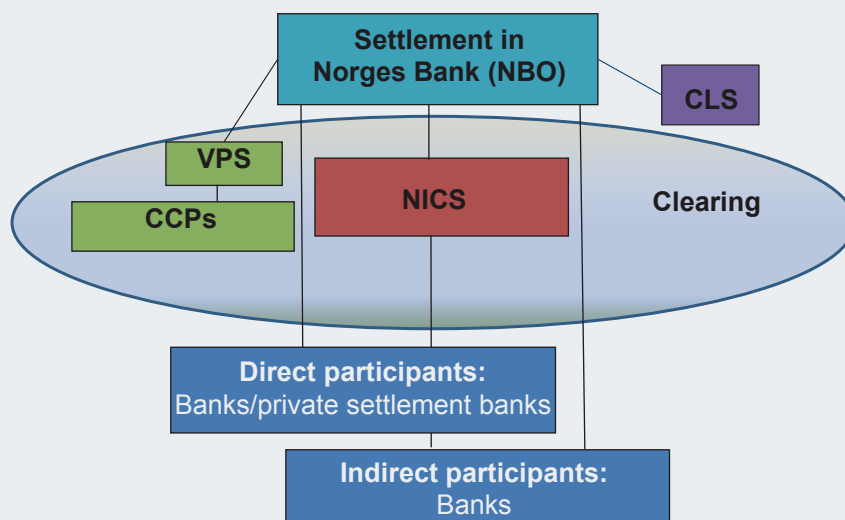
3.1.1 NORGES BANK'S SETTLEMENT SYSTEM

The system in brief

Norges Bank is the ultimate settlement bank in the Norwegian payment system. All payments made in NOK are ultimately settled between the banks in Norges Bank's settlement system (NBO) (Chart 3.1), including payments by households and firms, payments in securities and foreign exchange markets, and payments involving the public sector.

Transactions settled in NBO can be divided into two categories: gross settlement and net settlement. Gross settlement is the settlement of individual payments. These payments can be submitted through-

CHART 3.1 Interbank and securities settlement systems in Norway¹



¹ The chart has been simplified for reasons of clarity.
Source: Norges Bank

out NBO's opening hours and are settled immediately. Net settlement is the settlement of positions cleared by NICS, VPS and SIX x-clear. In these clearings, large numbers of transactions are accumulated and the net amount each individual bank owes to, or is owed by, other banks is calculated. Net settlements take place at set times during the day.

The value of transactions sent for clearing is much higher than the value of cleared transactions settled in NBO. Payments that do not go through clearing (gross settlements) account for the bulk of settlement volumes in NBO. Payments resulting from trading in foreign exchange and the banks' distribution of deposits in the central bank (overnight loans) account for the bulk of settlement volumes in NBO.

Around 130 banks have an account with Norges Bank, including all Norwegian banks. Just over 20 of these banks participate in net settlements at Norges Bank, while the remaining banks' positions are settled through one of these banks.

Oversight

Two oversight meetings about NBO are held each year, as well as additional meetings on specific topics. In its oversight in 2015, Norges Bank focused on control of outsourced operations, internal organisation and division of responsibilities, and operational risk management. NBO's compliance with a number of international principles was reassessed (see Section 2.2 for more details).

Operations

Daily turnover in NBO averaged NOK 219bn in 2015, up around 11% on 2014.

NBO's operations were stable in 2015, and system availability during NBO's opening hours was close to 100%.

Changes to the system

Norges Bank worked on two major changes to the NBO system in 2015:

- The backup solution Market Infrastructure Resiliency Service (MIRS) was implemented. This solution is to ensure that settlements can still be performed in the event of problems with the main operating systems (see discussion below).

- A new system for managing securities pledged by banks as collateral for loans from Norges Bank was put into operation. The new system automates a number of previously manual procedures.

Outsourcing

Norges Bank has purchased software for NBO from the Italian company SIA. The software was developed by the South African company Perago, a wholly-owned subsidiary of SIA. IT operations for the settlement system have been outsourced to EVRY since 2009. Norges Bank now has plans to put IT operations for NBO out to competitive tender.

The international principles for FMIs require outsourced services to meet the same standards as if they were provided by the FMI itself. This will make considerable demands on FMIs in terms of follow-up and risk analysis of the services provided.

Contingency arrangements

The operating solution for NBO is designed in such a way that software and hardware are duplicated. Duplication provides protection against faults in physical components. Serious software and data errors can nevertheless lead to disruptions in operations.

Norges Bank has now implemented an additional line of defence in the form of the Market Infrastructure Resiliency Service (MIRS). This enhanced contingency solution will be used if there are simultaneous problems at NBO's primary and secondary operating sites. MIRS is based on SWIFT's infrastructure. It uses a software package that differs from that used at the Bank's two main operating sites. The solution can therefore be used if there is a problem with software or data at the primary and secondary operating sites.

3.1.2 NORWEGIAN INTERBANK CLEARING SYSTEM

The system in brief

The Norwegian Interbank Clearing System (NICS) is the banks' joint system for clearing payment transactions. Nearly all payment transactions in Norway are sent to NICS. Most of the transactions received by NICS are included in a multilateral clearing in which each bank's position against other banks is calculated. The clearing result is sent to Norges Bank's settlement system (NBO). Banks also send transactions via NICS that are not included in a multilateral clearing.

These transactions are settled one by one, i.e. gross transactions, and are typically payments of more than NOK 25m. These transactions are settled as they are received by Norges Bank's settlement system.

Settlements at Norges Bank that are based on the multilateral NICS clearings take place at about 5.30 a.m., 11 a.m., 1.30 p.m. and 3.30 p.m. After settlement, the transactions (so-called accounting data) are returned to the banks via NICS to be entered as credits or debits in bank customer accounts.

Supervision

The Payment Systems Act states that an interbank system may not be established or operated without a licence from Norges Bank. The NICS Operations Office was established by Finance Norway and holds a licence from Norges Bank to serve as operator of NICS. The Bank conducts semi-annual supervisory meetings with the NICS Operations Office. Additional meetings on specific issues are conducted as necessary.

In its supervision over the past year, Norges Bank has focused on how the NICS Operations Office is organised and how it handles outsourcing and contingency arrangements.

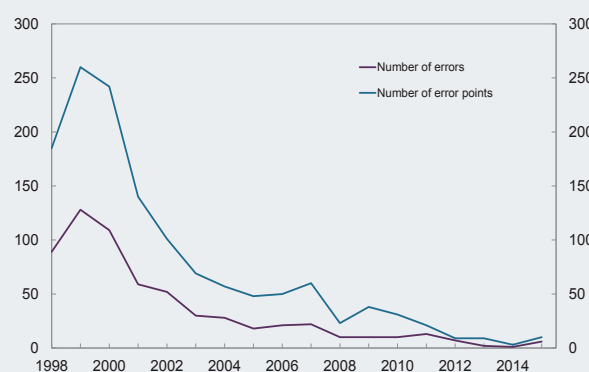
As required by its licence, the NICS Operations Office produces an annual report on the clearing system.²² The report presents the operating situation, changes to the system, tests of operating and disaster recovery solutions, and risk analyses performed.²³

Operations

In 2015, an average of NOK 127bn was sent for clearing in NICS each day. After clearing, the total value of the banks' positions averaged NOK 12bn daily.

Operational stability is measured by recording all disruptions and assigning error points according to the level of severity. The number of disruptions and error points increased slightly in 2015 but is still at a low level (Chart 3.2).

CHART 3.2 Disruptions in NICS operations. Number of errors and error points. 1998–2015



1 Error points indicate error severity level.

Source: NICS Operations Office

Changes to the system

The NICS Operations Office has strengthened its work on risk management in recent years. A new risk management framework was introduced in spring 2015. In autumn 2015, the NICS Operations Office issued a mandate for a risk committee for NICS to perform independent assessments of the work and assessments performed by staff as regards risk management. The committee will report to the NICS Operations Office board.

Outsourcing

The NICS Operations Office has outsourced the technical operation of NICS to Nets Norge Infrastruktur AS (NNI). NNI is owned by the Danish company Nets A/S, which is owned in turn by the Danish holding company Nets Holding A/S. The Nets group made a number of changes to its organisation structure in 2015, but NNI is still a Norwegian-registered company.

The management team of the NICS Operations Office are employed by Finance Norway, and the NICS Operations Office does not formally have any staff. The management team works mainly on general governance, regulatory compliance and management of non-conformities of financial origin. Norges Bank is keen for the NICS Operations Office also to have sufficient capacity and expertise to manage and control IT services provided by companies in the Nets group. In October 2015, the Bank therefore asked the NICS Operations Office to assess how this aspect of its

22 See Norges Bank (2015b).

23 A short Norwegian version of the report is available on Finance Norway's website, see NICS Operations Office (2016).

system ownership responsibilities is being addressed and whether there is reason to make changes to the current organisation and staffing arrangements.

Finance Norway reported back to Norges Bank in February 2016 that a new strategy had been adopted for the payments area. This strategy assigns increased resources to manage system ownership responsibilities for NICS. A dedicated infrastructure company wholly owned by Finance Norway has been set up and will apply to Norges Bank to be the licensee for NICS. The company will also take on other duties relating to the banks' shared payment services infrastructure. Finance Norway has stated that the new company will focus in particular on risk management and the control of outsourced IT operations.

Contingency arrangements

Nets A/S, in consultation with the NICS Operations Office, is to maintain a contingency plan for use in the event of financial problems at Nets. This plan contains a number of different instruments that Nets is to deploy to prevent financial problems from affecting NICS operations.

NICS operates from two different sites. Software and databases are "mirrored" so that, in practice, the two operating sites are identical. Both operating sites are used in day-to-day operations, but if one develops problems as a result of faults in physical components, all operations are transferred to the other. The NICS Operations Office conducts an annual test to confirm that one operating site can take over all operations if the other site fails. Another type of event that could pose a challenge is errors in software and databases that could lead to disruptions at both operating sites simultaneously.

Finanstilsynet and Norges Bank carried out joint supervision of the NICS Operations Office and selected other participants in Norway's payment infrastructure during the period 2013–2015. This supervision formed part of the work to document the contingency solutions for domestic payments. Finanstilsynet and Norges Bank found that the NICS Operations Office does not have a satisfactory disaster recovery solution for its technical operations. This conclusion must be seen in the light of how important NICS is for financial stability.

At the same time as the aforementioned supervision was being conducted, the banking sector under the auspices of Finance Norway worked on a possible solution for clearing that could be used if both of the two existing operating sites were to become unavailable. Further assessment of a possible third operating site has been delayed because Nets has begun work on a new data centre strategy that may also strengthen the recovery solution for NICS. Finance Norway therefore wants to await the results of this strategy process before deciding on any further action on the NICS disaster recovery solution.

3.1.3 PRIVATE SETTLEMENT BANK SYSTEMS

The systems in brief

There are three private settlement banks in Norway. DNB is the settlement bank for 94 banks, SpareBank 1 SMN for 11 banks and Danske Bank for one bank.

The role of a settlement bank is to take over the positions participant banks have in the NICS clearing. Once the NICS clearing has been settled at Norges Bank, participant banks' settlement accounts are credited or debited at the settlement bank. Direct participants in Norges Bank's settlement system, NBO, are called first-tier banks, while banks participating through private settlement banks are called second-tier banks.

Private settlement bank systems are not separate technical systems, but are based on settlement banks' systems and procedures for exchanging other transactions.

Supervision and oversight

The Payment Systems Act states that an interbank system may not be established or operated without a licence from Norges Bank. Norges Bank may make exceptions from this requirement for systems that are regarded as too small to have any effect on financial stability.

DNB is licensed by Norges Bank to operate a settlement system as a private settlement bank. Norges Bank holds regular semi-annual supervisory meetings with DNB concerning its settlement system. Additional meetings on specific issues are conducted as necessary. Topics at supervisory meetings during the year included contingency solutions and DNB's work on introducing new operating solutions. A meeting

was also held on DNB's assessment of critical service providers against international principles.

As required by its licence, DNB prepares an annual report on its settlement bank system. This report covers the operating situation, changes to the system, testing of operating and disaster recovery solutions, and risk analyses performed.²⁴

SpareBank 1 SMN does not require a licence, and this bank's settlement system is therefore not subject to supervision by Norges Bank. Norges Bank nevertheless oversees its operation and holds an annual meeting with SpareBank 1 SMN to review the operating situation, exercises carried out and any system changes. SpareBank 1 SMN also prepares an annual report on the system.

Danske Bank's settlement system is too small to require oversight by Norges Bank.

Operations

Operation of the DNB and SpareBank 1 SMN settlement bank systems has been stable over the past year, and there were no disruptions affecting the systems.

Changes to the systems

DNB opened a new operating site for a number of its data systems in autumn 2015 and has strengthened its disaster recovery solutions in 2016. This work has proceeded according to plan and has not had any negative effects on the operation of the settlement bank system.

No material changes have been made to the SpareBank 1 SMN settlement bank system in the past year.

Outsourcing

DNB uses three different IT service providers: EVRY and the Indian companies HCL Technologies and Tata Consultancy Services. DNB's settlement bank system is dependent on reliable services from all three providers.

SpareBank 1 SMN uses EVRY as its main IT service provider.

Contingency arrangements

Like other banks, DNB and SpareBank 1 SMN are exposed to risks in many areas. A failure to control risks could affect their ability to serve as settlement banks. Like other banks, DNB and SpareBank 1 SMN are subject to capital requirements and operating rules intended to reduce the general risk associated with banking operations.

DNB and SpareBank 1 SMN's operating solutions are designed in such a way that their software and hardware are largely duplicated. This makes the systems more robust in the event of, for example, a fault in a physical component.

Provision has been made for second-tier banks to participate directly in NBO net settlement (as first-tier banks) if a private settlement bank is no longer able to continue this activity.

Norges Bank introduced a new disaster recovery solution for NBO in 2016. Should the primary operating site for NBO be out of action, DNB, SpareBank 1 SMN and the other first-tier banks will be able to connect to the recovery solution.

3.1.4 CONTINUOUS LINKED SETTLEMENT

CLS Bank operates the world's largest multicurrency cash settlement system, settling payment instructions related to foreign exchange (FX) transactions in 18 currencies, including the Norwegian krone (NOK).²⁵ Payment instructions are settled on a gross basis across settlement members' accounts on the books of CLS. CLS calculates funding as a net position for each settlement member in each currency. Ingoing and outgoing currency payments are transacted through CLS and members' accounts with the various central banks.²⁶ A settlement member may use another bank (a nostro agent) to make and receive CLS-related payments.

Oversight of CLS

CLS is subject to both supervision and oversight. CLS is supervised and overseen by the Federal Reserve,

24 See Norges Bank (2015b).

25 The other currencies are the US dollar, euro, pound sterling, Canadian dollar, Swiss franc, Hong Kong dollar, Australian dollar, New Zealand dollar, Mexican peso, Israeli shekel, South Korean won, Singapore dollar, Japanese yen, South African rand, Hungarian forint, Danish krone and Swedish krona.

26 See Norges Bank (2015a) for more details.

while 23 central banks, including Norges Bank, cooperate on oversight of CLS via the CLS Oversight Committee (OC). The Federal Reserve chairs the OC. An oversight protocol consented to by the participating central banks describes how the OC is organised, what information CLS should give the OC with regard to changes in the settlement system, and how the OC is to assess proposed changes.²⁷ The OC performs periodic assessments of CLS against the Principles for Financial Market Infrastructures, CPMI-IOSCO (2012), but no grades are published on observance of the principles.

Operations

Settlement of NOK in CLS averaged NOK 425bn per day, a 20% increase over 2014.

There were no incidents that affected settlement of NOK in CLS in 2015.

Changes to the system

In October 2015, CLS began a collaboration with Tri-Optima on delivery of a foreign exchange forward compression service. The new service will enable participants to reduce the number and notional value of trades, substantially reducing gross exposures.

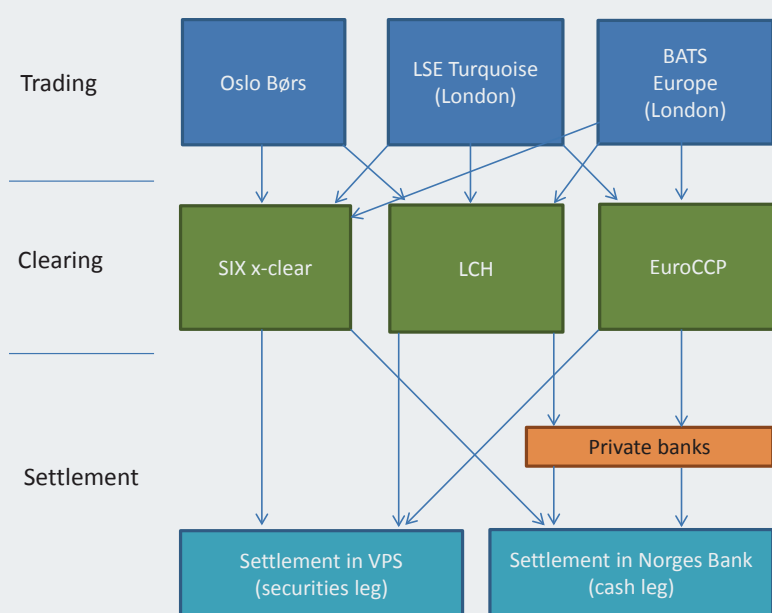
CLS started settling payment instructions in Hungarian forint (HUF) in November 2015. This is the first time since 2008 that CLS has added a new currency. During the same month, CLS began a collaboration with MarkitWire to settle cross-currency basis swaps (CCS). Participating members book trades using MarkitWire, and MarkitWire transmits CCS-related payment instructions to CLS, which settles the trade.

Outsourcing

IBM provides operational services for the CLS system, as well as service management and support functions.

27 See Federal Reserve (2015).

CHART 3.3 Trading, clearing and settlement of equities in NOK



Source: Norges Bank

Contingency arrangements

CLS operates two geographically separate data centres. The software and databases are duplicated. If one site becomes unavailable, all operations are transferred to the alternative site.²⁸

3.2 SECURITIES SETTLEMENT

Verdipapirsentralen (VPS) is both the Norwegian Central Securities Depository (CSD) and operator of the securities settlement system (VPO). In VPO, rights to securities are transferred to VPS accounts, while the cash leg takes place at Norges Bank.

Equity transactions sent to VPO for settlement come from a number of trading venues and pass through several CCPs and banks (Chart 3.3). CCPs participate in VPO because they enter into equity trades on regulated trading venues, becoming the counterparty to both the buyer and the seller of the equities.

3.2.1 VPS SETTLEMENT SYSTEM

The system in brief

VPO performs settlement of equities, equity certificates and fixed-income securities denominated in NOK. A total of 38 players (investment firms, banks and CCPs) participate directly in securities settlement in VPS. Of these, 21 also participate directly in the cash leg of settlement at Norges Bank (20 banks and one CCP). There are also a number of indirect participants.

The CCPs calculate a net equity position and a net cash position for each of the participants and send these positions to VPS. As a result of this netting, fewer transactions are sent for settlement. Trades in NOK bonds are not settled via CCPs but sent directly to VPS by investment firms.

VPO settlement takes place twice a day, at around 6 a.m. and 12 noon. In 2015, 74% of the total volume of transactions was settled in the early morning settlement. VPO is based on multilateral net settlement. For each of the two settlements, VPS calculates a cash position for each of the 21 participants in the cash leg. These cash positions are settled through the participants' VPO settlement accounts at Norges

Bank. Since there are two settlements daily, a maximum of 42 cash transactions take place each day. Once the cash leg is complete, the rights to the securities are registered to VPS accounts. There are 1.3 million VPS accounts, and these settlement transactions are settled individually (gross). In 2015, such transactions in VPS averaged 48 000 per day.

Oversight

VPS and VPO are supervised by Finanstilsynet and are subject to oversight by Norges Bank. Norges Bank holds semi-annual oversight meetings with VPS, with Finanstilsynet invited as observer. Additional meetings on specific issues are conducted as necessary. Over the past year, Norges Bank's oversight activities have focused on VPS's preparations for adjustment to the new EU securities settlement regulation (CSDR) and compliance with the international principles from CPMI-IOSCO (see Section 2.2).

Operations

The net settlement value of securities at Norges Bank averaged NOK 3.8bn per day in 2015. The gross value was considerably higher. According to VPS, the total value of settlements averaged NOK 58.8bn per day in 2015.

System availability for VPS was 99.8% in 2015. Three VPO settlements were not completed on time during the year.

The standard procedure for securities trades is settlement after two days. Some trades are not settled on the agreed date, generally because one party has insufficient funds. In 2015, approximately 4% of transactions and 10% of the value of settlements in VPO were not settled on the agreed date. The settlement ratio has been falling since January 2013. VPS offers participants a number of services that can improve this ratio, and considered in 2015 whether some of these services should be made compulsory for the participants. VPS decided to defer the decision and instead encourage greater voluntary use of these services.

Changes to the system

In 2014, VPS entered into an agreement with an external provider on modernising the core system for CSD services and settlement. The new system was to comply with new EU rules (CSDR) and participation in TARGET2-Securities (T2S) (see box on page 30).

28 See CLS (2014).

NEW EU REGULATION ON SECURITIES SETTLEMENT AND TARGET2-SECURITIES

New EU regulation on securities settlement

Central securities depositories (CSDs) provide services related to the registration of financial instruments in electronic form and the settlement and safekeeping of such instruments. In 2014, the EU introduced a regulation on securities settlement and central securities depositories (CSDR).¹ The aim is to promote safe, efficient and well-functioning securities settlement throughout the EU.

The regulation is designed to promote competition among CSDs in the same way as CCPs and banks compete today. EU authorities are responsible for ensuring that the CSDR is consistent with CPMI-IOSCO (2012).

The CSDR has not yet been incorporated into the EEA Agreement. This is because the regulation gives the EU's supervisory body ESMA powers that contravene the Norwegian Constitution. This problem can be resolved if the Storting adopts the Government's proposals of 15 April 2016 on EEA harmonisation with the EU financial supervisory system. The proposals entail authorising EFTA's oversight body ESA to take decisions that have a direct effect in Norway.² If the proposals are adopted, the CSDR and other EU regulations concerning EU supervisory bodies can be enacted in Norwegian law without contravening the Constitution.

The Ministry of Finance has appointed a task force led by Finanstilsynet to prepare for the introduction of the CSDR. Norges Bank is part of the group along with representatives of market participants.

Under the CSDR, European CSDs currently licensed to offer services in their home country must apply to the authorities in their home country for a licence that

entitles them to offer services throughout the EU. These services must be offered in such a way that investors and issuers can comply with national legislative requirements in the areas of company law, tax law and investor accounts. CSDs from third countries (countries outside the EU/EEA) must be recognised by ESMA before they can offer services in the EU/EEA.

The CSDR contains a number of conditions that CSDs must meet in order to be granted a licence. These cover organisation, rules of procedure, design of services (which may include related banking services), responsible operation and rules for resolution.

The CSDR includes rules to promote settlement on the agreed settlement date. The rules on settlement discipline cover trading venues, CCPs, investment firms and banks. If settlement does not take place on the agreed date, day penalties will apply from the following day unless the party in default is a central counterparty or insolvent. If settlement is significantly delayed because the seller of a security defaults, a compulsory purchase (known as a buy-in) must take place. CSDs and trading venues must ensure that they introduce rules for this.

The CSDR also contains rules for institutions that perform settlement of securities transactions outside the CSDs' settlement systems (settlement internalisers). These institutions must regularly report aggregated information on these transactions to the authorities.

Licence applications are to be sent from the CSD to the competent authority in the home country, which is Finanstilsynet in Norway's case. The CSDR requires Finanstilsynet to consult with any other "relevant authority", which is Norges Bank in Norway's case. The CSDR does not affect central banks' responsibility to conduct oversight to ensure efficient and secure payment systems.

1 The associated technical standards will be introduced in the EU in 2016–2018.

2 See Norwegian Government (2016) and Norwegian Ministry of Foreign Affairs (2016a, 2016b).

TARGET2-Securities

In parallel with the development of the CSDR, central banks in the euro area, led by the European Central Bank (ECB), have developed a technical platform for securities settlement called Target2-Securities (T2S). T2S is a joint IT platform that CSDs and central banks can use for settling securities trades in EUR and other European currencies. The CSDR permits CSDs to outsource their technical operation to T2S. Together, T2S and the CSDR are intended to promote a single securities market in Europe and boost competition among CSDs.

T2S started operations in June 2015 with four small CSDs. Seven CSDs are now connected, and a further 16 will join in waves. The start date for many CSDs has been delayed, and the final wave is now due to migrate to the T2S platform in September 2017. These waves apply only to EUR. DKK will be included in the fourth quarter of 2018 as the first non-EUR currency.

VPS and market participants established a forum in autumn 2015 for renewed discussions on whether VPS's securities settlement in NOK should join T2S. Norges Bank handles the cash leg of securities settlement in NOK and will consider participation in T2S if requested by VPS or other market participants.

The agreement was terminated by VPS on 15 April 2016.²⁹ The technical standards to be implemented pursuant to the CSDR will now be developed within the existing core system.

Outsourcing

VPS has not outsourced its system operations.

Contingency arrangements

In its oversight, Norges Bank has a particular focus on contingency arrangements for both operating and financial problems.

VPS and Norges Bank collaborate on contingency arrangements in the event of operating problems in VPO and hold regular contingency exercises. Norges Bank and VPS tested disruption management procedures for VPO three times in 2015.

VPS operates VPO from two different sites. Software and databases at the two sites are “mirrored” so that, in practice, the two operating sites are identical. If one encounters problems due to faults in physical components, all operations are transferred to the other. Serious errors in software or databases could, however, lead to simultaneous disruptions at both sites. VPS implemented a solution in spring 2016 where backups of software and data are stored outside the two operating sites.

3.2.2 CENTRAL COUNTERPARTIES

The systems in brief

Central counterparties (CCPs) enter into transactions between buyers and sellers of financial instruments and guarantee that the contracts are fulfilled (clearing). The original parties to the trade are then no longer exposed to counterparty risk. CCPs can make an important contribution to financial stability, especially in periods of market turmoil.

Norwegian market participants’ trades in financial instruments are settled through several CCPs. The most important are SIX x-clear, LCH.Clearnet (LCH) and EuroCCP. The use of CCPs has increased greatly in the years since the financial crisis for trades on both regulated and unregulated trading venues. A number of regulated trading venues have made the use of

CCPs mandatory. On Oslo Børs, mandatory CCP clearing of equity trades was introduced in 2010.

The EMIR regulation introduces the obligation to centrally clear certain classes of interest rate derivative contracts traded outside regulated trading venues. In terms of outstanding volume, interest rate derivative contracts account for more than 80% of all derivative contracts.³⁰ In Norway, mandatory CCP clearing for OTC derivatives has not yet been introduced (see box on page 33).

Norges Bank participates in the oversight of CCPs that can be expected to affect financial stability in Norway.

Supervision and oversight

Because CCPs provide cross-border services, they can be important for financial stability in more than one country. Both EMIR and CPMI-IOSCO recommendations therefore require collaboration on oversight and supervision between the authorities in the countries where the CCP offers services. Norges Bank and Finanstilsynet participate respectively in the oversight and supervision of CCPs considered most important for financial stability in Norway.

SIX x-clear is a Swiss CCP that provides clearing for trades in equities on Oslo Børs. Norges Bank and Finanstilsynet have signed a collaboration agreement with the Swiss authorities on the oversight and supervision of SIX x-clear. Norges Bank holds biannual oversight meetings with SIX x-clear, as well as meetings with the Swiss authorities.

In March 2016, SIX x-clear was recognised by ESMA as a CCP authorised to offer services in the EU under EMIR.

EuroCCP is a Dutch CCP that provides clearing of trades in Norwegian equities on a number of trading venues other than Oslo Børs. Norges Bank and Finanstilsynet both participate as observers in the EMIR college for EuroCCP. Observer status gives full access to information but not voting rights.

LCH is a UK CCP that provides clearing of equity trades on Oslo Børs. Its domestic supervisory authority, the Bank of England, has set up a college for the

²⁹ See VPS (2016).

³⁰ See BIS (2015).

CLEARING OBLIGATION FOR NORWEGIAN INTEREST RATE DERIVATIVES

The financial crisis of 2008–2009 revealed that trades in OTC¹ derivatives were not supported by sufficient margin.² In addition, the authorities had limited possibilities of maintaining an overview of exposures in the market. As a result, the leaders of the G20 countries agreed to strengthen the regulation of the derivatives markets. One important change is that OTC derivatives are to be cleared to a greater extent through CCPs. This was followed up in the US by the Dodd-Frank Act and in Europe by EMIR.

The European Securities and Markets Authority (ESMA) published proposals on 10 November 2015 to introduce mandatory clearing of interest rate derivatives denominated in NOK.³ The proposals have been sent to the European Commission for consideration. If the Commission adopts the proposals, more detailed rules on the clearing obligation will be published in the EU's Official Journal. The clearing obligation will not apply until at least six months after the rules are published.

Initial implications for Norwegian market participants

A clearing obligation for interest rate derivatives denominated in NOK will initially affect only a few Norwegian market participants. As EMIR has not been implemented in Norwegian law,⁴ the clearing obligation will not apply to Norwegian companies. However, a number of large Norwegian companies trade with counterparties in the EU that are subject to the clearing obligation. Because market participants in the EU are

subject to the clearing obligation, their Norwegian counterparties must use clearing in order to trade with them.

Possible implications for Norwegian market participants in the longer term

If EMIR is implemented in Norwegian law, the clearing obligation will also apply to other Norwegian companies that trade in interest rate derivatives. A number of Norwegian market participants would then have to amend their solutions for the settlement of interest rate derivatives. The clearing obligation would apply initially to the largest and most professional participants, while smaller participants would have more time to adapt to the new requirements.

Implications for financial stability

The clearing obligation for interest rate derivatives will reduce counterparty risk between market participants. At the same time, the clearing obligation will increase the concentration of risk at CCPs. The work being carried out by the authorities and market participants to limit concentration risk is discussed in Norges Bank (2015a).

1 Over the counter (OTC) trades are trades that take place outside regulated trading venues.

2 Funds that a CCP demands from members as collateral.

3 The proposals cover fixed-to-float interest rate swaps (IRSs) and forward rate agreements (FRAs), see ESMA (2015).

4 See footnote 21 on page 21.

supervision and oversight of LCH under EMIR.³¹ Finanstilsynet participates in this college.

LCH is also the most important CCP globally for clearing OTC interest rate derivatives. The Bank of England has therefore set up a global college with a broader composition than required by EMIR. Norges Bank participates in this college.

Changes to the systems

LCH began to offer clearing services on Nasdaq Nordic in November 2015, and SIX x-clear began to offer services on Nasdaq Nordic in March 2016. Nasdaq Nordic consists of the trading venues Nasdaq Copenhagen, Nasdaq Helsinki, Nasdaq Stockholm and First North Sweden.

Contingency arrangements

To ensure that CCPs can handle a severe crisis, EMIR requires them to have contingency plans for how they will obtain extra liquidity in a financial crisis. The competent authority in the CCP's home country has the main responsibility for ensuring that these requirements are met, but under EMIR this is to take place in collaboration with foreign authorities participating in oversight of the CCP. LCH³² and EuroCCP have drawn up contingency plans for financial problems, and SIX x-clear is in the process of doing so.

31 See Bank of England (2015).

32 See Bank of England (2015).

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DEFINITIONS AND ABBREVIATIONS

Only definitions and abbreviations that are specific to the Norwegian system are included. The international reader will find definitions of general concepts in material released by the BIS, EU, etc.

AvtaleGiro: A form of direct debit whereby funds to cover recurring payments are automatically drawn from the payer's bank account on the due date.

BankAxept card: Debit card issued by Norwegian banks and linked to the customer's bank account for use in Norway. It is the dominant card system for transactions in Norway.

BankID: A PKI-based (public key infrastructure) form of electronic identification which can be used for online payments or payments via a mobile device.

Finance Norway: The industry organisation for the financial industry in Norway.

NBO: Norges Bank's settlement system in which banks can settle claims and liabilities with other banks through their accounts in Norges Bank. NBO comprises both gross and net settlement facilities.

NICS: The Norwegian Interbank Clearing System, which is the banks' joint clearing system for transactions denominated in NOK. It is used by all banks that are part of the industry's common payment services infrastructure. Cleared positions in NICS are settled in NBO.

VPO: The Norwegian securities settlement system.

VPS: The Norwegian central securities depository.

TABLE 1: AVERAGE DAILY TURNOVER IN CLEARING AND SETTLEMENT SYSTEMS (TRANSACTIONS)

	2001	2002	2003	2004	2005	2006	2007	2008	2009 ³	2010	2011	2012	2013	2014	2015
NICS															
NICS Gross	303	300	596	611	532	547	593	605	524	568	548	594	659	624	772
NICS SWIFT Net ¹	4 719	4 925	5 155	4 480	4 744	5 301	5 908	6 390	6 269	-	-	-	-	-	-
NICS Net (million) ²	3.4	3.7	4.0	4.3	4.7	5.1	5.5	5.9	6.5	6.8	7.2	7.8	8.2	8.7	9.1
NBO															
Total number of transactions									1 165	1 146	1 138	1 274	1 406	1 367	1 565
RTGS Gross transactions excl. NICS									463	477	479	549	595	592	658

1 Phased out in June 2010.

2 Previous NICS Retail and NICS SWIFT Net payments below NOK 25m are included as from June 2010 in NICS Net.

3 For NBO, the figures for 2009 are calculated for the period 17 April to 31 December. There is a break in the series this year.

Sources: The figures under NICS are from the NICS Operations Office. The figures under NBO are from Norges Bank.

¹ For tables showing developments in retail payment services, see *Norges Bank Papers* 1/2016.

TABLE 2: AVERAGE DAILY TURNOVER IN CLEARING AND SETTLEMENT SYSTEMS (IN BILLIONS OF NOK)

	2001	2002	2003	2004	2005	2006	2007	2008	2009 ³	2010	2011	2012	2013	2014	2015
NICS	211.4	212.5	248.7	195.7	200.8	224.8	254.5	246.6	213.1	196.5	221.4	247.8	253.5	262.8	285.9
NICS Gross	151.2	149.5	187.8	129.4	135.5	155.3	176.8	165.9	124.1	107.2	119.1	138.6	136.0	140.9	160.1
NICS SWIFT Net ¹	16.1	16.2	12.6	5.2	5.7	6.7	7.6	7.3	6.1	-	-	-	-	-	-
NICS Net (million) ²	44.1	46.8	48.3	61.1	59.6	62.8	70.1	73.4	82.9	89.3	102.3	109.2	117.5	121.9	125.8
NBO	172.1	169.2	206.8	152.3	160.8	185.2	226.1	224.9	168.4	162.2	172.1	201.9	188.3	198.0	219.3
NICS Gross	150.7	149.5	187.7	128.9	135.5	155.3	180.2	163.9	113.2	106.3	119.0	137.7	135.2	140.8	157.5
RTGS Gross transactions excl. NICS	6.9	4.8	7.2	11.1	12.1	16.1	31.1	45.6	40.2	42.5	42.4	51.1	38.5	42.5	46.0
NICS SWIFT Net ¹	5.3	5.5	2.1	1.0	0.9	1.0	1.2	1.1	0.9	1.1	-	-	-	-	-
NICS Net ²	6.8	6.9	6.7	7.6	8.5	8.1	8.1	9.2	9.6	7.1	6.3	8.7	10.3	10.8	11.9
VPO and Oslo Clearing ⁴	2.3	2.5	3.1	3.7	3.8	4.7	5.5	5.1	4.5	5.3	4.5	4.4	4.2	3.9	3.8
VPO						4.4	5.1	4.9	4.4	5.2	4.5	4.4	4.2	3.9	3.8
Oslo Clearing ⁵						0.3	0.4	0.3	0.1	0.1	0.1	0.0	0.0	0.1	-

1 Phased out in June 2010.

2 Previous NICS Retail and NICS SWIFT Net payments below NOK 25m are included as from June 2010 in NICS Net.

3 For NBO, the figures for 2009 are calculated for the period 17 April to 31 December. There is a break in the series this year.

4 From May 2015, legally integrated with SIX x-clear.

5 See note 4.

Sources: The figures under NICS are from the NICS Operations Office. The figures under NBO are from Norges Bank.

TABLE 3: NUMBER OF PARTICIPANTS IN CLEARING AND SETTLEMENT SYSTEMS (AT YEAR-END)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Norges Bank's settlement system (NBO): Banks with account at Norges Bank	145	142	143	140	134	129	130	128	131	129
Norges Bank's settlement system (NBO): Banks with retail net settlement at Norges Bank	23	23	22	21	21	21	22	22	21	22
DNB	104	103	103	106	105	103	98	98	97	94
SpareBank 1 SMN	17	18	16	16	13	12	11	11	11	11
Norwegian Interbank Clearing System (NICS)	146	146	143	145	142	138	132	131	130	128

Source: Norges Bank

