Sveriges Riksbank Economic Review

2023 no. 2

S V E R I G E S R I K S B A N K

Sveriges Riksbank Economic Review

Issued by Sveriges Riksbank

Editors: Marianne Nessén and Ulf Söderström

Advisory editorial committee: Mikael Apel, Carl Andreas Claussen, Dominika Krygier, David Kjellberg and the Communications Division
Sveriges Riksbank SE-103 37 Stockholm
Telephone +46 8 787 00 00

The Review is published on the Riksbank's website
www.riksbank.se

ISSN 2001-029X

Dear readers,

Over the past three years, the Riksbank has implemented changes in its operational framework for the implementation of monetary policy to make it simpler, more transparent and more automatic. This issue of Sveriges Riksbank Economic Review contains three articles that explain in different ways what an operational framework for monetary policy is, what tasks it is designed to carry out and what it looks like in different countries. Our hope is that the articles can provide both an introduction and a more in-depth knowledge of this area, which rarely receives as much attention as monetary policy analysis and communication. Knowledge of operational frameworks is a prerequisite for understanding how monetary policy is conducted in practice.

- **How is monetary policy implemented in practice?**

  Anders Vredin and *Per Åsberg Sommar* provide an introduction to how monetary policy is implemented in practice. This means that they explain what measures central banks take, and with whom, to ensure that decided levels of policy rates actually spread to other interest rates and the economy as a whole.

- **The Riksbank's monetary policy operational framework after the 2019-2022 reform**

  Denise Hansson and *Ingrid Wallin Johansson* provide a detailed description of the Riksbank's operational framework for monetary policy. They describe the fundamental building blocks of the operational framework, i.e. the different instruments, which collateral is accepted and the counterparties.

- **Central banks' operational frameworks – an international perspective and comparison**

  Denise Hansson and *Ingrid Wallin Johansson* describe some basic models for operational frameworks for monetary policy. They then describe in detail the operational frameworks of fourteen different central banks.

Read and enjoy!
Marianne Nessén and Ulf Söderström

Contents

How is monetary policy implemented in practice?

Anders Vredin and Per Åsberg Sommar*
Anders Vredin is Senior Advisor in the Monetary Policy Department of Sveriges Riksbank and Per Åsberg Sommar is Head of Division in the Markets Department of Sveriges Riksbank.

When central banks' decisions on what is commonly referred to as monetary policy are discussed in various contexts - for example, in the media, in academic circles or, for that matter, between individuals - the focus is often on how the "interest rate" can be expected to evolve in the future. It is also usually discussed how the interest rate can affect, and is affected by, developments in inflation and economic activity more generally. However, little attention is paid to the exact interest rate involved, how central banks implement their interest rate decisions and what the channels are between the central bank's instruments and the rest of the economy.

This article provides a broad overview of the central bank's tasks and toolkit. We also highlight many factors that central banks need to take into account when designing their systems to steer interest rates and other methods of influencing the financial system and the wider economy.

1 What are they trying to steer?

There are many similarities in the way central banks conduct monetary policy in different countries. However, the concrete design is influenced by the nature of the financial system and there are still some differences here between countries. The financial system changes over time, which also leads to different practices regarding the details of the monetary policy operational framework.[1]

In this article, we start by describing the tasks of central banks, as this obviously has implications for how they design their operational frameworks. We then turn to the methods they use to influence interest rates and the supply of liquidity and credit in

* The authors wish to thank Christoph Bertsch, Caroline Jungner and Ulf Söderström for valuable comments on earlier versions and Buster Carlsen for help with data and figures. The opinions expressed in this article are the sole responsibility of the authors and should not be interpreted as reflecting the views of Sveriges Riksbank.

[1] A systematic overview of how central banks design their monetary policy operational frameworks can be found in Borio (1997), followed by Sellin and Åsberg Sommar (2014), Bindseil (2016) and Hansson and Wallin Johansson (2023 b).

the economy. Finally, we highlight some important factors and principles they need to consider when designing their operational frameworks.

Table 1. Central bank objectives and tasks

Central bank	Objective
Norges Bank	• Maintain monetary stability and to promote the stability of the financial system and an efficient and secure payment system. • Contribute to high and stable output and employment.

Reserve Bank of New Zealand	• Economic objectives:
	  ○ Achieve and maintain stability in the general level of prices over the medium term.
	  ○ Supporting maximum sustainable employment
	• Financial stability:
	  ○ Protecting and promoting the stability of New Zealand's financial system

ECB	• Primary: Maintain price stability • Secondary: Support the general economic policies in the Union, contribute to the smooth conduct of policies pursued by the competent authorities relating to … the stability of the financial system

Bank of England	• Financial stability: Protect and enhance the stability of the financial system
	• Monetary policy:
	  ○ Maintain price stability
	  ○ Support the economic policy of His Majesty's Government, including its objectives for growth and employment

Federal Reserve	Promote effectively the goals of maximum employment, stable prices and moderate long-term interest rates
Sveriges Riksbank	• Overriding objective: maintain permanently low and stable inflation • Without neglecting the price stability objective: contribute to a balanced development of production and employment. • Without neglecting the price stability objective: contribute to the stability and efficiency of the financial system, including the ability of the public to make payments.

Source: The Bank of England Act, 1998, the Federal Reserve Act, Act relating to Norges Bank and the monetary system (Central Bank Act), Reserve Bank of New Zealand Act 2021, Sveriges Riksbank Act, The mandate of the ECB: The mandate of the ECB:.The mandate of the ECB.

While the tasks of central banks are not exactly the same in all countries, there are significant similarities in the way the objectives of their activities are formulated. Overall, it is about maintaining price stability, high employment and the stability and efficiency of the financial system. Table 1 summarises the targets for a few different central banks.

While a well-functioning financial system can be an end in itself, the financial system plays an important role in enabling the central bank to achieve its price stability and employment objectives. This is because the central bank's measures work via the financial system. To put monetary policy and financial stability decisions into practice, the central bank needs to be able to conduct financial transactions with participants in the financial system. The characteristics of the system therefore influence how the central bank needs to design its measures.

While the tools may differ slightly between central banks, they all basically work through the financial system. The financial system is said to have three main functions: facilitating payments, transforming savings into investments and facilitating risk management. These functions are used daily by individuals, households, companies and other organisations. Private banks and other so-called financial intermediaries help with this, but the financial system has proved to have some inherent instabilities that require a bank for the private banks as well - a state central bank.[2] To put it simply, the role of the central bank is to ensure that the amount of money in society, i.e. liquidity, develops so that the economy can grow at a healthy and stable rate.[3] This includes the central bank being able to coordinate liquidity support when needed, and lend money to solid but illiquid banks - acting as a lender of last resort.

For the economy to function effectively, there must be widely accepted and liquid means of payment and systems for individuals and organisations to make payments for the services and goods they want to exchange with each other. They must also be able to provide credit to each other. It is not efficient to keep all your savings in the form of cash or other assets that can be quickly converted into cash, i.e. highly liquid assets. Savings can yield higher returns if they can also be used to finance longer-term investments. Therefore, individuals often have an asset portfolio consisting of both liquid assets, such as cash or bank deposits for current expenses, and financial investments, such as bonds and shares, for longer-term savings. Added to this are real assets, such as housing.

Banks play an important role in helping households and companies to allocate part of their savings to investments that generate positive returns, while allowing them to have access to cash for payments. While state-issued banknotes and coins have historically played an important role in the payment system, various forms of private money have also always been important. The public has for a very long time been

[2] However, a central bank is not enough. Regulation of the financial system is also needed, and supervision by both the central bank and regulatory authorities. In Sweden, Finansinspektionen is responsible for the regulation and supervision of the financial system. In some countries this is the responsibility of the central bank. The focus here is on the central bank's role as the "bank of the banks".

[3] See Capie et al. (1994).

making their payments by varying either the money they hold in accounts with private banks or their debts to banks.[4] The public's bank account balances are commercial bank money. Banknotes and coins issued by central banks as well as banks' claims on the central bank are central bank money. Today, virtually all household and corporate payments are made in commercial bank money and only a very small proportion in central bank money. However, banks' transactions with each other often take place through accounts with the central bank using account-based central bank money.

Banks make transactions with each other all the time, mainly because their customers make payments to each other. Transfers between banks are made in a centralised payment system, usually provided and operated by the central bank. If a large proportion of a bank's customers suddenly want to withdraw a lot of their long-term savings, the bank may find it difficult to obtain the funds. This is because the bank has lent out these savings on a longer-term basis to generate higher returns. Banks can then borrow from each other, possibly with the central bank acting as an intermediary, where the central bank takes deposits from one bank and lends to another. Under normal circumstances, a large number of transactions take place between banks during the day, without generating significant liabilities either between banks or to the central bank overnight. But sometimes there are shocks that require the banking system to make large deposits or borrow from the central bank on a more permanent basis. The interest rates and conditions set by the central bank for such loans and deposits affect the interest rates that banks then set both on transactions among themselves and with their customers.

The need for means of payment changes over time, for example as a result of changes in economic activity. In principle, this could lead to large variations in interest rates when households and companies want to change the allocation of their savings. Having too much or too little money in the economy can also lead to an increase or decrease in the prices of goods and services, i.e. inflation or deflation. While it is natural for prices and interest rates to change, excessive fluctuations can make economic activity more volatile than desirable. The central bank, as the banks' bank, must therefore ensure that the supply of money and credit runs smoothly and promotes sound and stable economic development. This is why central banks often have objectives and tasks as in the examples in Table 1: price stability, stable and high levels of output and employment, and the stability and efficiency of the payment and financial system in general.

2 How does the central bank control interest rates and the supply of liquidity?

We can start from the Riksbank's balance sheet to describe how the Riksbank can affect interest rates in the economy and the supply of liquidity, which in turn has significance for the supply of credit, inflation and employment. You can find the balance sheet in Table 2.

[4] See, for example, Roberds and Velde (2016).

Table 2. The Riksbank's balance sheet as at 31 December 2022

SEK million

Assets		**Liabilities**	
Gold	76,488	Deposit facility	574,293
Receivables from the IMF	116,053	Debt certificates issued	583,848
Foreign currency reserves	482,336	Debt to the National Debt Office in foreign currency	76,140
Structural transactions	-	Counterpart of Special Drawing Rights	90,833
Lending facility	-	Other liabilities	11,087
Securities in SEK	823,744	Provisions	423
Other	1,340	Revaluation accounts	116,563
		Equity	62,522
		Banknotes and coins in circulation	64,956
		Reported result	-80,734
Total	1,499,961	Total	1,499,961

Note: For the financial year 2022, a loss of around SEK 80 billion was reported, which is shown in this way in the balance sheet as the decision on how to allocate it will be taken when the annual accounts for the financial year 2023 are adopted.

Source: Sveriges Riksbank (2023)

To put monetary policy decisions into practice, the central bank must be able to conduct financial transactions with participants in the financial system. Not all items on the balance sheet have a role in what is commonly referred to as monetary policy, but let's look at the most relevant items.

Central banks can use various monetary policy instruments to steer and influence interest rates in the economy. It is the central bank's monetary policy counterparties - banks - that have access to the monetary policy instruments. The monetary policy instruments are usually divided into so-called standing facilities, which can be used at the initiative of the central bank's counterparties, and so-called open market operations, which are conducted at the initiative of the central bank.

The Riksbank's deposit and lending facilities are examples of **standing facilities**. These are borrowing and lending facilities that are in principle always open, even if they are only offered to a certain group of counterparties and under certain conditions. It is therefore up to the counterparties (banks) when they want to utilise these opportunities and how much. When the Riksbank, on its own initiative, increases or decreases the amount of central bank money in the banking system by issuing

Riksbank certificates, offering deposits or loans at longer maturities or changing its holdings of securities, it is instead called **market operations**.

To begin with, we can observe that the **lending facility** was not utilised at the end of 2022, while the **deposit facility** totalled a large amount.[5] The amounts the banking system has placed at the Riksbank overnight constitute deposits, while what the banks borrow overnight constitutes lending. As noted above, a lot of money is transferred between private banks in a day. This takes place in a payment system managed by the Riksbank called RIX.[6] In 2022, the average daily turnover in RIX was SEK 553 billion, which is much more than the value of everything produced in Sweden in one day - GDP per day averaged around SEK 16 billion. This reflects, among other things, the fact that there is a lot of trade in goods and services every day, but not always new products. For example, the sale of a home involves a transfer from one bank to another. This may be reflected in RIX, but it does not imply a corresponding increase in GDP. Trade in financial instruments also gives rise to transactions between banks and via the Riksbank without giving rise to output that is reflected in GDP to the same extent.

During the day, a bank can receive payments from other banks via RIX that are larger or smaller than its payments. The Riksbank provides credit during the day when banks have deficits and accepts deposits when they have surpluses. Surpluses or deficits during the day are interest-free, but the Riksbank pays interest on the funds the banks have in their accounts overnight, called the deposit rate. If the banks instead have a debt to the Riksbank, they have to pay interest for it, the lending rate.

The fact that the volume of the deposit facility was so large while the lending facility was barely utilised in 2022 is mainly due to the Riksbank having built up a large holding of **securities in Swedish kronor**. The Riksbank has purchased government bonds, municipal bonds, mortgage bonds and corporate bonds. When the Riksbank buys these securities via monetary policy counterparties from banks, pension companies, fund managers and others, this results in payments from the Riksbank that ultimately increase the banking system's balances with the Riksbank. In some countries, there are formal requirements for banks to hold a certain proportion of their deposits from bank customers as reserves with the central bank, known as reserve requirements. But in Sweden, the Riksbank does not apply any reserve requirements, so the banking system's deposits with the Riksbank have other causes.

At the end of 2022, around half of the banking system's claims on the Riksbank consisted of **issued debt certificates**. They are Riksbank certificates in the case of Sweden and the Riksbank - other central banks have other solutions for the banks' claims on the central bank. Riksbank certificates are interest-bearing securities with a one-week maturity issued by the Riksbank. One difference between the banks' deposits in the Riksbank and the Riksbank certificates is that the certificates are

[5]Although the balance sheet states that the Riksbank's standing lending facility was not utilised at the end of the year, there are occasions when banks borrow smaller amounts from the Riksbank's standing lending facility.

[6] See the Riksbank's website for information on RIX: The RIX payment system | Sveriges Riksbank and the Riksbank's annual report for 2022, Sveriges Riksbank (2023).

securities that the banks can sell to other participants in the secondary market, while the overnight deposits are only a transaction between the Riksbank and the bank in question. The difference for a bank between having deposits at the Riksbank and having a Riksbank certificate is thus in principle the same as the difference between when a household has money in a bank account and when it has a bond or a fund unit. Riksbank certificates do not provide liquidity to the same extent as deposits, but on the other hand, they provide a slightly higher return.[7] One benefit of the fact that the certificates are transferable both between the monetary policy counterparties and to their customers is that they provide access to central bank money even for participants who are not part of the Riksbank's counterparty group. This helps to reduce the segmentation of interest-rate setting in the market, i.e. different categories of participants encounter different interest rates. The interest rate on the certificates corresponds to the Riksbank's policy rate, and is 10 basis points higher than the interest rate on overnight deposits. The interest rate on Riksbank certificates is thus in practice the interest rate that the Executive Board of the Riksbank decides on and which it considers to be compatible with the Riksbank achieving the objectives of its monetary policy. By offering Riksbank certificates and unlimited overnight lending and borrowing, the Riksbank tries to control interest rates in the economy to achieve the inflation target and keep the real economy stable.

The reason why approximately half of the banking system’s claims on the Riksbank consisted of Riksbank certificates in 2022 is that from May 2021 the Riksbank limited the possibility for the monetary policy counterparties to place at most half of their claims on the Riksbank in the form of Riksbank certificates. The counterparties had to place the remainder of their claims as overnight deposits with the Riksbank. Since February 2023, the Riksbank has ceased this restriction and instead offers its counterparties the opportunity to invest the banking system's total claims on the Riksbank in the form of Riksbank certificates, if they so wish. When the Riksbank offers an issue volume of Riksbank certificates that corresponds to the banking system’s total claims on the Riksbank, the banks’ incentive to balance liquidity among themselves at an interest rate close to the policy rate is therefore strengthened. Since February 2023, the banks have chosen to hold almost 90 per cent of their balances at the Riksbank in the form of Riksbank certificates.

3 How do the Riksbank's decisions affect market interest rates?

In the article by Hansson and Wallin-Johansson (2023a) in this special issue, you can find more details on the Riksbank's interest rates and other conditions tied to the deposit and lending facilities and the Riksbank certificates. In brief, it can be said that the Riksbank has considerable scope to influence the general level of interest rates in the financial system with the aid of the standing facilities and market operations. The interest rates on the standing facilities and Riksbank certificates affect the interest rates on short-term transactions between financial market participants, as some of

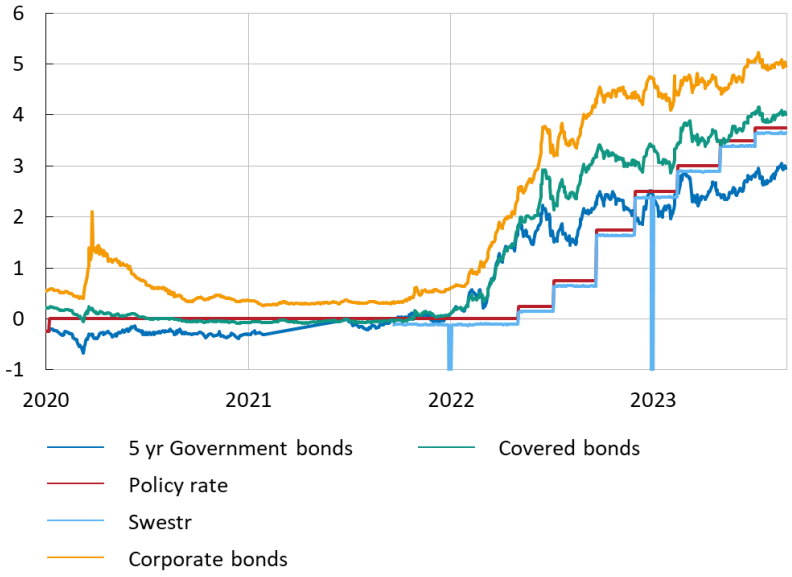
[7] The certificates can be sold back to the Riksbank in advance, but the counterparty must wait until the day after the resale to have the money available as overnight deposits at the Riksbank.

them may choose to either have claims on or borrow from the Riksbank. The Riksbank's deposit and lending rates are the rates at which the Riksbank's monetary policy counterparties can be sure that they can always place or borrow unlimited amounts against adequate collateral at the Riksbank. The Riksbank's deposit and lending rates therefore represent the opportunity cost of money when banks borrow money from each other from one day to the next in the overnight market. This gives banks with a liquidity surplus an incentive to lend money to a bank with a liquidity deficit at an interest rate that is higher than the Riksbank's deposit rate, but lower than the lending rate. This is because the bank with a liquidity deficit can otherwise always borrow from the Riksbank's standing lending facility.

Figures 1 and 2 show how a selection of market rates have developed together with the Riksbank's policy rate. The policy rate is the interest rate decided by the Executive Board of the Riksbank.

Figure 1. The Riksbank's policy rate and market rates

Per cent

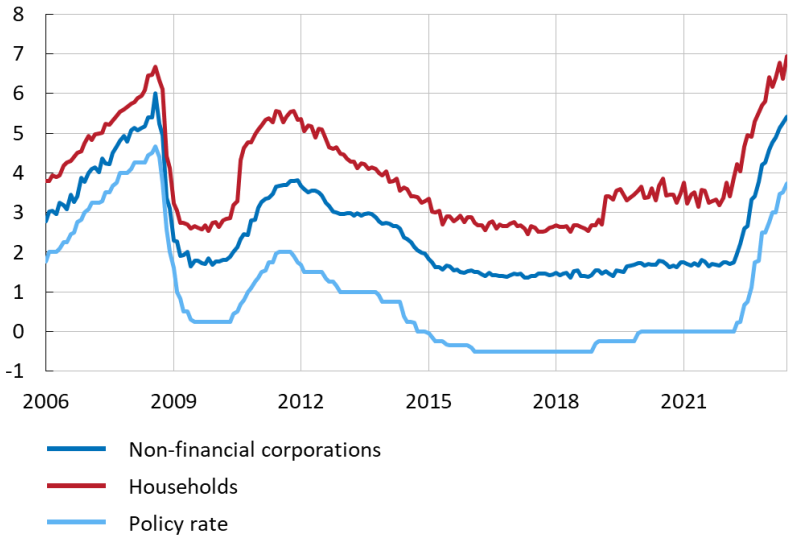


Note: Corporate and mortgage bond yields estimated with zero coupon rates using the Nelson-Siegel method.

Source: Riksbank, Bloomberg

Figure 2. The Riksbank's policy rate, the banks' lending rate to households and companies respectively

Per cent



Note: Foreign banks with branches in Sweden that are monetary policy counterparties are not included.

Source: Statistics Sweden

For various reasons, different market rates deviate from the Riksbank's policy rate. For example, yields on government securities have often been lower than the policy rate. This is due to various factors, such as government bond yields reflecting expectations of future short-term interest rates, including the policy rate. There is also an established and well-functioning liquid secondary market for government bonds. Yields on, for example, corporate bonds are higher than the interest rate on Riksbank certificates (the policy rate) because they are associated with higher risk.

However, the Riksbank's operations affect interest rates on virtually all types of securities and loans. Expectations of the Riksbank's policy rate affect both short-term and long-term interest rates. When the Riksbank conducts market operations and buys or sells bonds in the secondary markets, it also affects interest rates on securities with both short and long maturities. Short market rates in turn affect the banks' funding costs and thus short-term variable mortgage rates. Longer market rates affect, for example, the longer-term funding costs of banks and companies and the interest rates on longer-term mortgages. So the Riksbank's toolkit, as reflected in its balance sheet, has a major impact on the availability and cost of liquidity and credit in the economy, and thus on economic activity and general price developments.

However, it is not the case that the central bank's policy rate is the sole determinant of other interest rates. Depending on the market, the participants and instruments involved and the maturity of the transactions, interest rates reflect different risk premia and market conditions. Both market rates and the central bank's policy rate are also affected by developments in the economy and financial markets. For example, it is not just that longer rates reflect expectations of future policy rates and other short-term interest rates. The causal relationship can sometimes be the reverse,

for example, uncertainty about the long-term economic outlook leads to volatility in longer rates, which in turn causes volatility in the shortest rates.[8]

We see in Figure 1 that some market rates have at times been lower than the Riksbank's policy rate. When the Riksbank bought large amounts of Swedish securities, yields on government securities and mortgage bonds, for example, were pushed below the policy rate. The yields on government securities and mortgage bonds have longer maturities than the Riksbank's policy rate and when they are lower than the policy rate it partly reflects expectations of lower future policy rates. Corporate bond yields were also pushed down as a result of the Riksbank's securities purchases. This was partly an intended effect and reflects that those who sold government and housing securities to the Riksbank then needed to make other investments. However, the risk premia associated with investments in corporate bonds meant that their yields remained higher than the policy rate. The Riksbank's expanded asset purchase programme expired in December 2021, the policy rate started being raised in April 2022 and the Riksbank has been selling government bonds since April 2023. This has led to rapid upward pressure on market rates for all asset classes. The reference rate SWESTR, which stands for the Swedish krona short term rate, indicates the interest rate at which banks can borrow money in the overnight market in Swedish krona.[9] The Riksbank's deposit rate, which is 10 basis points below the policy rate, essentially sets a floor for the interest rate in the overnight market in Swedish kronor, as banks are always able to deposit money overnight with the Riksbank instead of lending to each other. SWESTR is therefore around 10 basis points below the policy rate. On the last business day of the year, however, SWESTR shows a significant year-end effect. Banks then reduce their own deposit rates to minimise the cost of the resolution fee and the bank levy based on their balance sheets on the last business day of the year. Therefore, at the turn of the year 2022/2023, banks reduced SWESTR by around 11 percentage points.

Figure 2 shows that the banks' interest rates for lending to both households and non-financial companies have followed the Riksbank's policy rate closely over time. However, the gaps between the policy rate and bank lending rates to households and non-financial companies have widened after the global financial crisis in 2008 and 2009. This is partly due to generally higher risk premia and to new rules for banks and financial markets introduced to reduce the likelihood of new crises.

4 More tools on the Riksbank's balance sheet

Let us return to the balance sheet in Table 2 and some items that normally do not have a strong link to the general level of interest rates, but may do so in certain situations. The Riksbank has a **foreign exchange reserve** that mainly consists of US and German government bonds. It fulfils several different functions. One is for the Riksbank to have rapid access to foreign currency if the private banks suddenly find it difficult to obtain the foreign currency they need, for example to repay loans in

[8] See, for example, Zagaglia (2008).

[9] Information on the SWESTR reference rate provided by the Riksbank can be found on the Riksbank's website: SWESTR | Sveriges Riksbank.

foreign currency. Another purpose of the foreign exchange reserve is that the Riksbank can influence the market price of the Swedish krona by buying and selling its foreign currency securities. For example, if the Riksbank buys US government bonds and finances this by increasing the debt of the Swedish banking system in Swedish kronor, it tends to lower the price of the krona in relation to the US dollar. However, since Sweden moved to a floating exchange rate in November 1992, the Riksbank does not have a target for the value of the krona against the dollar or other currencies, so in practice the foreign exchange reserve is no longer used for interventions to influence the krona exchange rate.[10] However, the foreign exchange reserve has been needed to provide loans to the banks in foreign currency, as the Swedish banking system and the financial markets in general have become more integrated with the rest of the world. Of course, in small, open economies, foreign exchange reserves are a more important item on the central bank's balance sheet than in the United States and the euro area, for example. This can affect both the size of the balance sheet, relative to GDP for example, and its composition, as the foreign exchange reserves have to be financed in some way - the larger the asset side, the larger the liability side has to be.

Thus, since the abandonment of the exchange rate target in November 1992, foreign exchange reserves do not normally change to affect interest rates, liquidity and credit conditions. But decisions on foreign exchange reserves may still have some such indirect effects. Part of the foreign currency reserve has previously been financed by loans in foreign currency raised by the Swedish National Debt Office, which is reflected in the item **Debt to the Debt Office in foreign currency** in Table 2. If the Riksbank changes its assets and liabilities in foreign currency by roughly the same amount, there is probably little effect on the exchange rate, the availability of liquidity or the markets for securities in Swedish kronor. However, when the Riksbank changes the allocation of domestic and foreign currency in its assets and liabilities, it can affect both market interest rates in Sweden and the exchange rate of the Swedish krona.[11]

The quantity of **banknotes and coins in circulation** does not normally have any significance for interest rates and other financial conditions in Sweden. It is essentially demand-driven as long as the Riksbank does not make any formal decisions on how many banknotes and coins should circulate in society. The Riksbank supplies the volume of banknotes and coins that households, banks and other companies demand. When the demand for banknotes and coins grows, the Riksbank distributes more banknotes and coins to the banks, which reduce their deposits with the Riksbank by a corresponding amount. As banknotes and coins do not bear interest, their demand is to some extent influenced by the general level of interest rates. If, contrary to its normal strategy, the Riksbank were to fail to match the supply of banknotes and coins to demand, this could in principle affect interest rates, as there could be an excess

[10] However, the Riksbank intervened to strengthen the krona in 2001, and from January 2016 to February 2019 it had special preparedness to intervene if the krona became too strong. See Bylund et al. (2023).

[11] Interest rates in kronor and foreign currency are also affected by expectations of exchange rate developments. If the krona is expected to depreciate against foreign currencies, investors will want to be compensated for this, putting upward pressure on domestic interest rates relative to foreign ones. This is because capital can move between countries and the relationship is usually described in terms of different variants of 'interest rate parity'.

demand or supply of liquidity that could affect prices and interest rates even for less liquid assets. There are well-known examples from history and from other countries where governments have chosen to finance their expenditure through the banknote printing presses, leading to high inflation. This is not a problem that is relevant for Sweden, but it shows that there are links between monetary policy and the quantity of banknotes and coins.

The e**quity** item in the balance sheet is determined by the profits or losses the Riksbank makes in its operations, and whether the Riksbank either pays dividends to the government budget or receives contributions from it. It is normal that the Riksbank, like other central banks, makes a profit from its operations and that a large part of it is distributed to the Treasury. The profit comes essentially from the fact that most of the Riksbank's liabilities are associated with lower interest rates than the return on assets. The liabilities may even have zero interest, such as banknotes and coins or equity, including revaluation accounts.[12] When the Riksbank distributes funds to the Treasury, equity is reduced and some other item on the balance sheet must also be affected. Depending on whether the Riksbank finances the distribution to the government budget by reducing its holdings of securities in kronor or foreign currency or by increasing deposits from the banking system, the effects on interest rates in Sweden and the exchange rate of the krona may be different. In the annual report for 2022, the Riksbank reports a loss of almost SEK 81 billion, mainly because the market value of the Riksbank's holdings of Swedish securities has decreased. This means that at the time of writing the Riksbank has negative equity of around SEK 18 billion. Under the new Sveriges Riksbank Act, which came into force in January 2023, the Riksbank must submit a request to the Riksdag for a capital injection when the Riksbank's equity falls below a base level of SEK 20 billion, adjusted for inflation.

5 What influences the design of the operational framework?

As noted at the outset, the discussion of "monetary policy" in the media and among the general public focuses on the "interest rate" set by the central bank. We have shown that there are several different interest rates that the central bank needs to decide, and that the central bank's decisions also have effects on many other interest rates, i.e. the general level of interest rates. In addition, the central bank may take decisions other than interest rate decisions, such as buying or selling domestic or foreign currency securities, which also affect financial market interest rates and thus the interest rates on loans to households and companies and the return on their savings. In this section, we will show what the central bank needs to consider when designing its operational framework. These are not considerations about the level of the policy rate or securities holdings, etc., but more detailed and technical aspects of the operational framework.

[12] The revaluation accounts reflect unrealised profits made by the Riksbank when assets and liabilities are recorded at current market value.

5.1 Some general principles for central bank operational frameworks

Central banks have different tasks and objectives, as described above, and therefore need to consider a number of different criteria when designing their systems and strategies to influence the conditions in the financial system.[13] The system needs to

- be accurate
- be easy to understand
- contribute to both efficiency and stability
- limit risks
- promote healthy competition in the financial system.

The measures included in the policy framework need to be well targeted, as different measures have different impacts on liquidity and credit conditions for households and companies. Central banks have reasons to choose methods whose impact is believed to be well understood. In practice, central banks need to formulate an operational target that they steer towards on an ongoing basis, in addition to the longer-term objectives of monetary policy such as inflation and employment. Nowadays, this is often a target for the shortest market rate. In the past, central banks have used the exchange rate or money supply as operational targets.

The methods for implementing monetary policy should also be reasonably easy to understand - robust and transparent. The nature of the financial system is changing, both in the short term and temporarily, as well as in the longer term. Therefore, the effects of a given measure will inevitably vary over time. Therefore, the operational framework itself should be as robust as possible and designed to cope with different conditions that cannot be fully anticipated today. At the same time, the framework must be understandable and predictable for households, companies and financial market participants - and not least for the central bank itself.

The framework should contribute to both the efficiency and stability of the financial system. There are obvious conflicts of interest here. For example, while the central bank may take extensive measures to stabilise financial markets, they may be less efficient if market participants expect the central bank to address all problems.

The framework should also not result in the central bank and the state taking excessive risks that should really be borne by private agents. The task of the central bank is not to generate profits for the state, although the profits should be sufficient to enable the central bank to cover its costs and in this sense be financially independent. Sometimes the central bank has to take on risks that no other participant in the financial system wants to bear, in order for the economy to develop

[13] The criteria below are inspired by Bindseil (2016). In his Figure 1 on page 196 he lists three objectives - "monetary policy", "general objectives" and "financial objectives" - which in turn have two to four sub-objectives. On page 260 he lists the objectives as "interest rate control", "incentives, preserve market netting" and "central bank protection".

favourably. But normally, the central bank should avoid taking large risks since this can lead to financial losses or to negative effects on the behaviour of private agents.[14]

Finally, the central bank must also promote healthy competition in the financial system. This is already part of the efficiency objective, but it is worth emphasising that central bank actions should ideally not distort competition in the financial system. However, competitive neutrality may conflict with other objectives - for example, treating some financial market participants more generously may result in higher accuracy, robustness and lower risk than fully market-neutral principles.

Bindseil (2016, p. 192) draws a lesson from the 2008 financial crisis: ”The design of the OF [operational framework] would ideally be supportive to the banking system’s ability to provide maturity and liquidity transformation at the service of society, while not going as far as to facilitate *excessive* leverage and moral hazard.”

5.2 Conditions for central bank lending and deposits

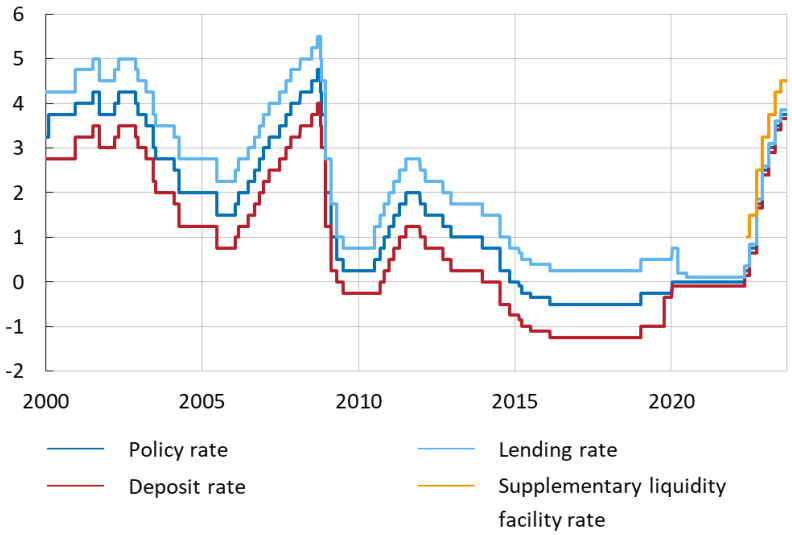
Like most modern central banks, the Riksbank has standing facilities for lending to and borrowing from the banking system overnight. The Riksbank thus needs to determine the level of interest rates in these facilities, which banks and other financial intermediaries should have access to them, and the conditions, including collateral, under which counterparties should be allowed to borrow money from the Riksbank. Monetary policy can be made more or less expansionary by changing these parameters. Thus, it is not only the level of interest rates that matters, but also which counterparties the Riksbank accepts and the conditions it imposes on them, for example in the form of collateral to limit the central bank's risk.

The central bank's deposit rate is normally lower than its lending rate. This creates an incentive for banks to primarily borrow from and to each other instead of turning to the central bank. This reflects a trade-off between accuracy and market efficiency. If the central bank was only looking to establish a certain level of market interest rates, it would choose a very narrow or even non-existent corridor between deposit and lending rates. This would bring the shortest market rates close to the level of interest rates desired by the central bank. But it would also give banks weak incentives to lend to and from each other. The central bank would therefore assume a major role as a financial intermediary, and the efficiency of the financial system might be low. On the other hand, a wide corridor between deposit and lending rates results in larger fluctuations in the shortest market rates, i.e. lower accuracy. Until October 2019, the Riksbank applied a corridor width of 150 basis points between the deposit and lending rates. As of June 2020, the Riksbank instead applies a much narrower corridor system with a symmetrical interest rate corridor of 20 basis points, see Figure 3. This means that through the standing lending facility the Riksbank offers its counterparties unlimited borrowing against primary collateral (government securities and claims on central banks) at an interest rate 10 basis points above the policy rate. If a monetary policy counterparty does not have sufficient primary collateral to cover its borrowing needs under the standing lending facility, it can borrow the excess volume under a

[14] A basic discussion of the central bank's risk-taking function, while avoiding excessive risk, is provided by Wessels and Broeders (2022).

supplementary liquidity facility. In the supplementary liquidity facility, counterparties can borrow against a wider range of collateral (the secondary collateral volume) but at a higher interest rate.[15] The liquidity facility rate corresponds to the policy rate plus 75 basis points.

Figure 3. The Riksbank's policy rate and deposit and lending rates
Per cent



Note: The supplemental liquidity facility was established on 8 June 2022.

Source: The Riksbank

Normally, the banking system borrows very little from the Riksbank. However, one of the Riksbank's tasks is to supply liquidity to the financial system as and when necessary. The Riksbank's standing lending facility, for example, is a back stop for banks, from which they know they can always borrow an unlimited amount of Swedish kronor if necessary at a predetermined interest rate and on predetermined terms, as long as they have adequate collateral. The higher the collateral requirements, the less risk for the central bank. However, high collateral requirements may also mean that less use is made of the borrowing facilities and that monetary policy becomes tighter than desirable.

There are similar balancing problems when it comes to the group of counterparties. If the Riksbank were to have generous criteria for who can have access to the facilities, this would create the conditions for good accuracy in monetary policy. On the other hand, it may lead to lower efficiency in the financial system, higher implementation and supervision costs and greater risks for the Riksbank.

From time to time, the central bank may have reasons to deviate from its normal lending or deposit conditions, or both, and take discretionary decisions to offer central bank facilities on different terms than normal. For example, the Riksbank did

[15] The secondary collateral volume consists of securities issued by intergovernmental organisations, state-guaranteed securities, covered bonds, agency securities or securities issued by non-financial companies with a sufficiently high credit rating.

this during the global financial crisis of 2008-2009. The possibility was introduced for counterparties to borrow at longer than normal maturities, not just overnight but up to one year. The group of counterparties was also widened by the Riksbank introducing the possibility for credit institutions to become "restricted monetary policy counterparties".[16] To increase counterparties' access to credit from the Riksbank, the Riksbank temporarily abolished restrictions on covered bonds as collateral for credit from the Riksbank. The limit rules that the Riksbank normally applies mean that covered bonds may comprise a maximum of half of the collateral that the counterparties provide to borrow from the Riksbank and that the counterparties may not use their own covered bonds or covered bonds issued by closely linked institutions.

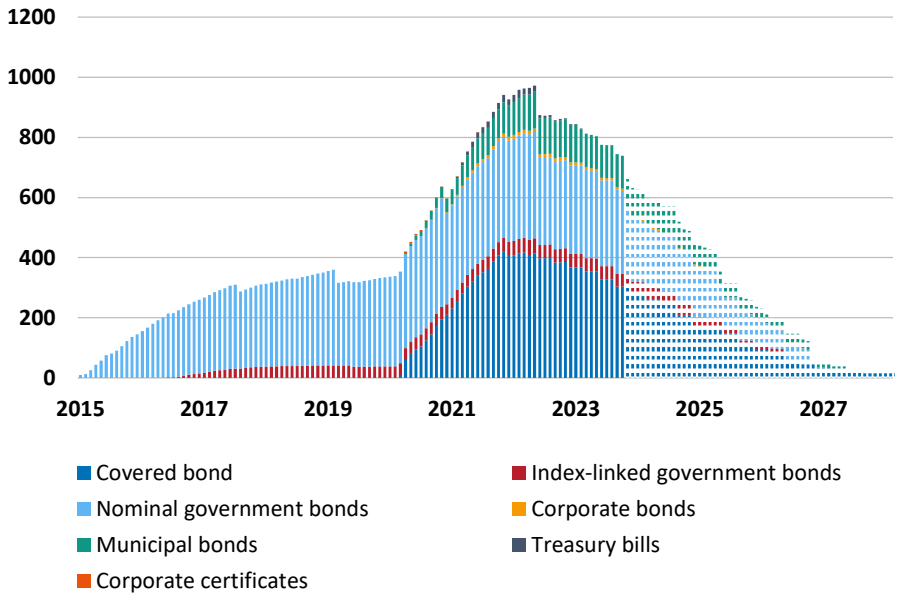
Also during the 2020-2021 pandemic, the Riksbank cancelled the limit rules for covered bonds. In addition, the Riksbank reduced the gap between the lending rate and the policy rate and offered the banks to borrow an unlimited amount of SEK against collateral with three and six months maturity at the policy rate. To stimulate bank lending to companies, the Riksbank offered banks to borrow up to SEK 500 billion against collateral, which they could then lend to non-financial companies. The group of counterparties was also expanded so that credit institutions could apply to become temporary monetary policy counterparties with access to the Riksbank's programme for lending to companies via banks.

5.3 Central bank market operations

As noted above, the Riksbank and other central banks use market operations in addition to their deposit and lending facilities to influence market rates in the financial system. Such market operations take various forms. First, the central bank can supplement the standing facilities with regular short-term market operations at the policy rate (Riksbank certificates, in the case of the Riksbank) to steer the shortest market rates sufficiently close to the policy rate. Second, central banks can vary their holdings of securities and offer lending on longer maturities to influence longer-term interest rates, credit conditions, economic activity, inflation and so on - as the Riksbank has done since 2015. Figure 4 shows how the Riksbank's holdings of different securities have developed over the years.

[16] "Restricted" meant that credit institutions that were not already counterparties or, for that matter, RIX participants were offered the opportunity to participate in certain market operations without access to standing facilities.

Figure 4. The Riksbank's holdings of Swedish securities
SEK billion



Note: The dashed bars are a forecast based on maturity and the monetary policy decision of 23 November 2023 to allow the holding of securities to decrease in line with maturity from the turn of the year 2022/2023 and the monetary policy decision of 28 June 2023 to sell government bonds at a nominal value of SEK 5 billion per month.

Source: The Riksbank.

Of course, the different operations are not conducted independently, as long-term market interest rates largely reflect market expectations of what will happen to short-term interest rates in the future. So central bank operations with short-term instruments will also affect the pricing and interest rates of long-term securities, and vice versa.

Historically and internationally, the dominant item on the central bank's asset side has normally been government bonds. In simple terms, the reason for this is that the central bank has to place its profits from issuing banknotes and coins somewhere, and the most natural option has been to lend them to the Treasury. This assumes, of course, that the central bank is owned by the state and must act in a competitively neutral manner, which it usually does.

The Riksbank had a holding of government bonds that was liquidated in 2001. The reason for this was partly that, since 1997, the Swedish National Debt Office has gradually taken over responsibility for market management of the Swedish government securities market, and partly that the Riksbank made extra transfers, SEK 40 billion, of its accumulated profits to the government budget.

During the financial crisis of 2008-2009, the Riksbank's balance sheet grew through increased lending to the banking system, both in kronor and in foreign currency. The Riksbank did not buy any securities, as other central banks did. In 2012, the Riksbank

began to build up a holding of government bonds that was initially small, with a policy portfolio of SEK 10 billion. The aim was to create operational preparedness to buy and sell government securities. From 2015, developments were also such that the Riksbank considered it justified to gradually increase its holdings of Swedish government bonds.

During the coronavirus pandemic in 2020-2021, the Riksbank continued to increase its holdings of government bonds, but also started to buy treasury bills, municipal bonds, mortgage bonds and corporate bonds. The motivation was to keep general interest rates low during the pandemic, which in turn would keep inflation and resource utilisation in the economy high, and to contribute to the smooth functioning of financial markets. At the height of uncertainty at the start of the pandemic, interest rates on securities markets rose and trading became more difficult. The Riksbank's decision to buy more types of securities than normal helped to keep interest rates down more effectively and contributed to generally calmer market conditions.

If a central bank can buy and sell securities, it needs specific rules on how it can act. These include which securities the central bank should buy, which counterparties should be used, how the transactions should be conducted and so on. Although there may be general rules in the laws governing the central bank's behaviour, the central bank itself has to set more detailed rules.

The Riksbank bought government bonds via reverse auctions in which the Riksbank's monetary policy counterparties and the Swedish National Debt Office's primary dealers had the opportunity to participate.[17] A reverse auction is a lowest-bid auction in which the bidder offering the highest interest rate receives the first allocation. After that, the bidder offering the second-highest interest rate receives allocation and so on until all the volume on offer has been allocated. This makes it clear to the market how the Riksbank prices and allocates its transactions.

To mitigate the financial consequences of the coronavirus pandemic, the Riksbank decided in spring 2020 to purchase mortgage and municipal bonds and to offer to purchase commercial paper and corporate bonds. Apart from corporate bonds, the Riksbank purchased these securities via reverse auctions in the secondary market, in which monetary policy counterparties had the opportunity to participate. The corporate bonds were also purchased on the secondary market, but through bilateral procedures.

The purchases of government, housing and municipal bonds ended in December 2022. The purchases of corporate bonds were concluded in June 2022 and purchases of commercial paper were concluded in December 2021. The Riksbank has subsequently tightened monetary policy by selling securities. In February 2023, the Riksbank decided to start selling off its government bonds as of April 2023. Together with the holdings that mature, the currently decided rate of sale of Swedish

[17] According to the ban on monetary funding in Chapter 1, Section 6 of the Sveriges Riksbank Act (SFS 2022:1568), the Riksbank may not acquire debt instruments directly from the state. Consequently, the Riksbank cannot purchase government bonds when the Swedish National Debt Office carries out issues in the primary market. The Riksbank's purchases of government bonds must be motivated by monetary policy and be made in the secondary market.

government bonds will mean that the Riksbank's holdings of Swedish securities will amount to approximately SEK 11 billion at the beginning of 2027, see Figure 4.

A question that has sometimes been the subject of intense debate among both central banks and academics is whether the central bank can best achieve its objectives by setting a policy rate that it uses to price the central bank's monetary policy instruments, standing facilities and open market operations, or a volume for some item on its balance sheet, such as securities holdings or the "monetary base", i.e. banknotes and coins plus the banks' claim on the central bank, i.e. their reserves. In some circumstances, the central bank should be able to achieve its objectives just as well by setting a price, i.e. the interest rate, as by setting a quantity for some item on the balance sheet. This would at least apply to inflation and resource utilisation targets. Of course, it is not that simple in practice. Poole (1970) published an important contribution to the literature, arguing that the central bank should endeavour to establish a certain level of interest rates if shocks in financial markets and to the demand for liquidity are common. In such cases, if the central bank tries to keep certain financial aggregates constant, it will lead to large changes in interest rates, which in turn may give rise to changes in real economic activity and inflation. If the central bank instead controls the level of interest rates and allows the volume of financial aggregates to be adjusted, the real economic effects of financial market shocks are reduced. This insight has guided the behaviour of central banks, both in normal times and during major shocks and crises. But exactly how central banks should implement their monetary policy also depends on the nature of the shocks that have occurred in financial markets. Normally, a change in a short-term interest rate by the central bank may be sufficient for the interest rate decision to affect other short-term market rates and even longer-term market rates in a reasonably predictable way. This can be said to have been an implicit assumption in Poole's analysis. But from time to time, and especially in financial crises, the transmission mechanism breaks down and the central bank needs to act directly in some specific markets or for some specific financial institutions.

Until the 2008-2009 financial crisis, there was a near consensus among central banks that they should implement their monetary policy by using corridor systems of deposit and lending rates, with or without reserve requirements, to steer the shortest market rates. Since then, many central banks have switched to floor systems where the policy rate is the deposit rate. The effective management of interest rates in a floor system requires the central bank to ensure that the banking system maintains sufficient amounts of reserves at the central bank at all times. The central bank can achieve this by providing sufficient liquidity to the banking system through lending or by buying and holding securities. This shows that monetary policy often involves trade-offs in terms of interest rates as well as the size and content of the central bank's balance sheet.[18]

[18] See Borio (2023) for a discussion of the challenges central banks face and the guiding principles they should consider in making strategic choices regarding the design of the monetary policy operational framework and the size and composition of the balance sheet.

5.4 Monetary policy codes of practice and communication

In addition to the formal rules that govern what items can be on a central bank's balance sheet and how changes to them should be implemented, the central bank needs to have a well thought-out strategy and some codes of practice for the decisions it takes to fulfil its objectives regarding inflation, employment and the stability and efficiency of the financial system.

Since the early 1990s, the dominant thinking in the central banking community has been a strategy called inflation targeting. The starting point is an explicit inflation target, which is set or jointly agreed by the central bank, government or parliament. The idea is then that the central bank will change its monetary policy instruments depending on how inflation develops in relation to that target, but with some consideration also given to developments in the real economy. The aim is for the central bank's interest rate decisions to minimise deviations of inflation from the inflation target over time, and possibly also variations in employment and resource utilisation. Such a code of practice can be described in different ways. One way is to see it as an explicit rule for how the level of the policy rate should depend on observed inflation and resource utilisation. Another is to see it as an optimisation problem in which the observed and expected development of inflation, but also, for example, resource utilisation, provides both a certain level for the policy rate right now and an expected path in the future. Of course, no central bank follows any of these rules exactly, as the reality is too complicated. Applying strict rules alone would not be effective in achieving the objectives. Nevertheless, this type of rules is often used by central banks in their internal analyses and as part of the basis for their decisions, and sometimes also as a starting point for external communication.

Central banks have generally endeavoured to communicate as clearly as possible during the period of inflation targeting. There are several reasons for this. One is that during this time central banks have gained a high degree of independence to make their own decisions. This needs to be balanced by clear information and communication from central banks so that they can be evaluated. Another reason is that expectations about future monetary policy already have effects on financial markets today. Central banks can thus influence interest rates, exchange rates and other financial market conditions through their communication. Communication has therefore become something of an instrument of central bank policy.[19]

One form of communication is that, in addition to deciding what the policy rate should be right now, the central bank also publishes information on what it expects to happen to the policy rate, inflation and resource utilisation in the future. The Reserve Bank of New Zealand was the first to publish a projected path for the policy rate in 1997, with Norges Bank and Sveriges Riksbank following suit in 2005 and 2007 respectively. Then, when many central banks found that the policy rate was close to its lower bound, they saw forward guidance as an important complement to regular

[19] For a description of the evolution of central bank independence and transparency, see Dincer and Eichengreen (2014). Holmes (2014) presents an anthropological analysis of how the way central banks describe their activities and the wider economy has influenced public perceptions.

monetary policy - as market interest rates are affected by expectations of the policy rate.

The effects of central bank purchases of securities are also sometimes interpreted in terms of "signalling". By buying or selling securities or currencies, the central bank can be seen to be signalling what it considers to be reasonable levels of interest rates and exchange rates, and hence its expectations for the policy rate. The very fact that financial market participants may interpret the central bank's actions in this way means that the central bank needs to have a strategy for its "signalling", whether or not it considers this an important channel.

Inflation targeting has generally been described as successful in various countries and evaluations. This is especially true when compared to the experience of the 1970s and 1980s, when economic development was often characterised by "stagflation" - low economic growth and high inflation.[20] But in the 2000s, new problems have emerged that were not foreseen when inflation targeting strategies were designed in the 1990s. This means that central banks have had to adapt their implementation of monetary policy to the changed circumstances. This applies to both their codes of practice and communication.

The financial crisis of 2008-2009 and its aftermath led to new forms of central bank lending, borrowing and market operations compared to what had been normal for some time. These measures have been described as "unconventional monetary policy" and have included negative policy rates, asset purchases, also known as quantitative easing (QE) and forward guidance. However, this term is misleading, as asset purchases have been a common instrument in the history of central banks. Forward guidance has also been provided in the past, not least in the form of published interest rate forecasts by some inflation-targeting central banks. However, negative policy rates are unprecedented.

The experience of the financial crisis has also led to a discussion on whether the stability of the financial system should be an additional separate objective for monetary policy, in addition to low, stable inflation and high, stable resource utilisation. The discussion has been conducted in terms of whether the central bank should "lean against the wind" and, for example, try to curb rising asset prices or excessive household debt, in addition to concern about the development of inflation or resource utilisation. A similar discussion has taken place in terms of 'lean versus clean': Should central banks limit themselves to cleaning up after a financial market failure, or should they also use monetary policy to try to prevent a failure? No one questions that central banks have a responsibility for the stability and efficiency of the financial system (see Table 1), but the question is rather whether some instruments should be linked to certain objectives and other instruments used for other objectives. As we have seen, it is difficult to draw a line on what exactly should be considered part of a monetary policy operational framework. While monetary policy has normally, at least from experience, so far been mainly concerned with setting the level of a short-term policy rate, central banks will from time to time also need to

[20] See Bylund et al. (2023).

implement their monetary policy through other types of measures, such as longer-term loans to banks or the purchase and sale of securities.

Thus, the central bank may need to adjust its balance sheet and related instruments over the business cycle to accommodate fluctuations in inflation and economic activity, and possibly also financial stability. But the balance sheet may also need more permanent changes if the financial system changes. For example, one issue discussed is that various regulations have contributed to increase the demand for safe and liquid investments. This may lead both to an increase in the demand for deposits at the central bank and to the fact that central bank purchases of securities may have different effects than before. Another question is how the growing importance of non-bank financial intermediaries (sometimes referred to as "shadow banks") should affect the way central banks formulate their monetary policy, for example with regard to counterparties and their access to standing facilities.

It has proven difficult to design rules for implementing and communicating "unconventional monetary policy" that are as simple as the rules for a central bank's interest rate decision. Negative policy rates go against the intuition of many that interest rates should be positive. Questions have been raised about whether a central bank's forward guidance in forms other than interest rate forecasts should be perceived as unconditional, i.e. a binding promise, or as conditional on economic developments. Central banks' decisions on changes in their securities holdings also have many more dimensions than decisions on one or more policy rates. Securities have many different maturities, different issuers, are associated with different risks and so on. It is therefore not as easy to present plans for securities holdings as for interest rate decisions. Moreover, the public is not obviously as interested in information on the central bank's securities transactions as it is in interest rate decisions. However, it is common for central banks to publish at least rough plans for changing their securities holdings. The Riksbank, for example, has been doing this for several years.

To summarise, monetary policy in practice is of course much more than how a central bank formulates rules for setting interest rates and other instruments at its disposal. How the central bank justifies its decisions and communicates about them can also affect the fulfilment of the objectives. It is also natural that both the design of the regulatory framework and communication change over time, given that the central bank operates in and through the ever-changing financial system.

6 Conclusion

Monetary policy is not just about setting an interest rate. In this article, we have provided a broader picture of the central bank's tasks and toolkit. For example, sometimes a central bank needs to buy or sell securities and provide loans at longer maturities and with different counterparties and conditions than normal, in order to stabilise the financial system and the wider economy. Thus, the combination and design of instruments and counterparties over time depends, inter alia, on the conditions in the financial system.

We have highlighted how central banks and especially the Riksbank implement monetary policy in practice. As the banks' bank, the central bank must ensure that the supply of money and credit to companies and households runs smoothly and promotes sound and stable economic development. Therefore, formulations of the objectives and tasks of central banks often include arguments about price stability, stable and high levels of output and employment, and the stability and efficiency of both the payment system and the financial system in general. To achieve these objectives, central banks have several tools on their balance sheets to put monetary policy and financial stability decisions into practice.

What all central banks have in common is that they need to be able to conduct various financial transactions with participants in the financial system. However, financial system conditions differ across countries, and they also change over time. This affects the tools central banks choose to use to fulfil their tasks. As the environment is constantly changing, central banks need some guiding principles when designing their frameworks and systems for implementing monetary policy. In this way, they will hopefully be able to carry out their tasks effectively even in conditions that could not be known in advance. We have reviewed a number of guiding principles and considerations that central banks need to take into account when designing their operational frameworks. Although central banks have to deal with financial systems that exhibit structural differences over time and across currency areas, all central banks normally focus on steering the shortest interest rate in the overnight market for interbank loans. More information on this is provided in the other articles in this special issue.

References

Bindseil, Ulrich (2016), “Evaluating monetary policy operational frameworks”, in *Designing Resilient Monetary Policy Frameworks*, Jackson Hole Economic Policy Symposium, Federal Reserve Bank of Kansas City, pp. 179–277.

Borio, Claudio (1997), “The implementation of monetary policy in industrial countries: a survey”, *BIS Economic Papers*, No 47, July 1997.

Borio, Claudio (2023), “Getting up from the floor”, Working Paper no. 1100, BIS.

Bylund, Emma, Jens Iversen and Anders Vredin (2023), “Monetary policy in Sweden after the end of Bretton Woods”. Paper presented at the conference on "50 years after Bretton Woods: the experience of small open economies", ETH, Zurich, 29–30 June, 2023.

Capie, Forrest, Charles Goodhart and Norbert Schnadt (1994), “The development of central banking”, in Forrest Capie, Stanley Fischer, Charles Goodhart and Norbert Schnadt (eds.), *The Future of Central Banking: The Tercentenary Symposium of the Bank of England*, Cambridge University Press, pp. 1–261.

Dincer, N. Negiz and Barry Eichengreen (2014), “Central bank transparency and independence: Updates and new measures”, *International Journal of Central Banking*, Vol. 10, no 1, March, pp. 189–253.

Hansson, Denise and Ingrid Wallin Johansson (2023a), “The Riksbank's monetary policy operational framework after the 2019-2022 reform”, *Sveriges Riksbank Economic Review*, no. 2, pp. 30-60.

Hansson, Denise and Ingrid Wallin Johansson (2023b), “Central banks' operational frameworks – an international perspective and comparison”, *Sveriges Riksbank Economic Review*, no. 2, pp. 61-108.

Holmes, Douglas R. (2014), *Economy of Words*, The University of Chicago Press.

Poole, William (1970), “Optimal choice of monetary policy instruments in a simple stochastic macro model”, *Quarterly Journal of Economics*, vol. 84, pp. 197–216.

Roberds, William and Francois R. Velde (2016), “The descent of central banks (1400 - 1815)”, in Michael Bordo, Öyvind Eitrheim, Marc Flandreau and Jan Qvigstad (eds.), *Central Banks at a Crossroads*, Cambridge University Press, pp. 18–61.

Sellin, Peter and Per Åsberg Sommar (2014), “The Riksbank’s operational framework for the implementation of monetary policy – a review”, Riksbank Studies, Sveriges Riksbank.

Sveriges Riksbank (2023), *Annual Report for Sveriges Riksbank 2022*.

Wessels, Paul and Dirk Broeders (2022), “On the capitalisation of central banks”, Occasional Studies, Volume 20-4, De Nederlandsche Bank.

Zagaglia, Paolo (2008), “Money-market segmentation in the euro area: what has changed during the turmoil?”, Working Paper no. 23, Bank of Finland.

The Riksbank's monetary policy operational framework after the 2019-2022 reform

Denise Hansson and Ingrid Wallin Johansson*
Denise Hansson is a senior economist in the Markets Department and Ingrid Wallin Johansson is a senior economist in the Monetary Policy Department.

The Riksbank uses its operational framework for monetary policy to implement the decided level of the policy rate in the market. This is done by stabilising the shortest money market rates sufficiently close to the policy rate. The interest-rate level established by the Riksbank then spreads to market rates with longer maturities, thereby also affecting the interest rates faced by households and companies. In practice, this is done by the Riksbank conducting, or offering to conduct, financial transactions with a limited group of financial agents.

In June 2022, the Riksbank finalised a reform of the operational framework for monetary policy. In this article, we describe the design of the reformed system and the considerations behind the design. In addition, we discuss the extent to which the operational framework functions as intended, and how its design relates to the operational frameworks of other central banks.

1 The monetary policy operational framework implements the decided policy rate level in the money market

The Riksbank's overriding objective for monetary policy is to maintain sustainably low and stable inflation.[1] The Riksbank's main tool for conducting monetary policy and achieving this objective is the policy rate. The monetary policy operational framework, in turn, exists to implement the decided policy rate level in the market. This means

* The authors would like to thank Heidi Elmér, Jens Iversen, Per Åsberg Sommar, Per Kvarnström, Jan Schüllerqvist, Ulf Söderström and Marianne Nessén for valuable comments on the article, and Caroline Jungner and Elizabeth Nilsson for a plain language review and English translation, respectively. The opinions expressed in this article are the sole responsibility of the author/authors and should not be interpreted as reflecting the views of Sveriges Riksbank.

[1] The Sveriges Riksbank Act (SFS 2022:1568) stipulates that monetary policy shall be aimed at achieving sustainably low and stable inflation. When the reformed operational framework gradually entered into force in 2019-2022, the previous Sveriges Riksbank Act (SFS 1988:1385) was in force. This stated that "the objective of the Riksbank's operations shall be to maintain price stability". The Riksbank interprets its task in the same way now as it did under the previous act, namely as maintaining a stable low inflation rate. It is the Executive Board of the Riksbank that decides what level the policy rate should be at to best provide sustainably low and stable inflation.

that the framework is used to conduct both expansionary and contractionary monetary policy.

Within the scope of the operational framework, the Riksbank offers a limited group of agents the opportunity to enter into financial transactions with the Riksbank. This means that these agents, known as monetary policy counterparties, are given an opportunity to invest or borrow cash via the Riksbank, and that the Riksbank can control their cost for short-term liquidity balancing.[2] In this way, the Riksbank can also influence interest-rate formation for equivalent or close substitutes for these transactions in money markets with short maturities (short-term money markets). The interest-rate level established by the Riksbank in these short-term money markets then spreads to market rates with longer maturities, thereby also affecting the interest rates faced by households and companies. In this way, the Riksbank can influence interest-rate formation, and ultimately also the real economy and inflation.

In June 2022, the Riksbank finalised a reform that had been ongoing for a number of years. The reform concerned the monetary policy operational framework.[3] The reform was implemented because there was a need to manage and improve the existing framework that had been in place since 1994. The aim was to improve the steering of interest rates, to adapt the operational framework to developments in payment and financial markets in recent decades and to better equip the operational framework for future developments in these markets.

In this article, we explain how the operational framework is designed and why it looks the way it does. We also briefly discuss the extent to which the operational framework is working as intended - whether it is achieving its objective, and how it relates to the operational frameworks of other central banks and their developments since the financial crisis.

Within the framework of the operational framework, the Riksbank can use a number of different instruments in addition to those described in this article. We focus on how the operational framework is used to implement the decided level of the policy rate. We therefore present only the instruments used to steer market interest rates at the shortest maturities and to influence the liquidity position of the banking system in the short term. Consequently, we do not discuss other instruments that the Riksbank can use, or that are used for reasons other than implementing the level of the policy rate. Thus, we do not address the Riksbank's purchases and sales of securities in the

[2] A central bank selects its set of monetary policy counterparties on the basis of those agents deemed important for monetary policy transmission. Typically, the counterparties are credit institutions, but may also include other types of financial agents (Hansson and Wallin Johansson, 2023). The Riksbank's monetary policy counterparties are credit institutions domiciled in, or with a branch in, Sweden, see Section 4.3.

[3] See the Appendix for a summary of the changes. See also the consultation The Riksbank's new operational framework for the implementation of monetary policy and the decisions on the reform on 24 September 2019 and 22 March 2022 for a more detailed description of the changes made and the reasons behind them.

secondary market, which affect longer-term market interest rates and the liquidity position in the longer term, or the Riksbank's use of FX swaps.[4]

The article starts with a section explaining the basics of how an operational framework for monetary policy functions. Section 3 then describes the most important objectives and constraints that have formed the basis for the design of the Riksbank's operational framework. In Section 4 we describe the design of the operational framework and the main motivations behind this design. The section is divided into three parts: one for each basic component of the operational framework, which are instruments, collateral and counterparties. In Section 5, we evaluate whether the operational framework functions as intended, that is, whether it succeeds in stabilising short-term market rates close to the policy rate. Section 6 sheds light on the Riksbank's operational framework in an international context and Section 7 consists of some concluding remarks.

2 Basics of how an operational framework functions

At the heart of an operational framework for monetary policy lies the central bank's ability to set the price of money, that is, to determine the interest rates at which monetary policy counterparties can borrow and deposit cash with the central bank. This allows the central bank to influence the incentives for monetary policy counterparties related to their short-term liquidity balancing and to steer the interest-rate formation at the very short end of the money market.

When a counterparty deposits money with the central bank, they are said to hold central bank reserves, i.e. they have a claim on the central bank in the domestic currency. As the central bank is the most creditworthy player in the domestic currency, such a claim is a largely risk-free investment.

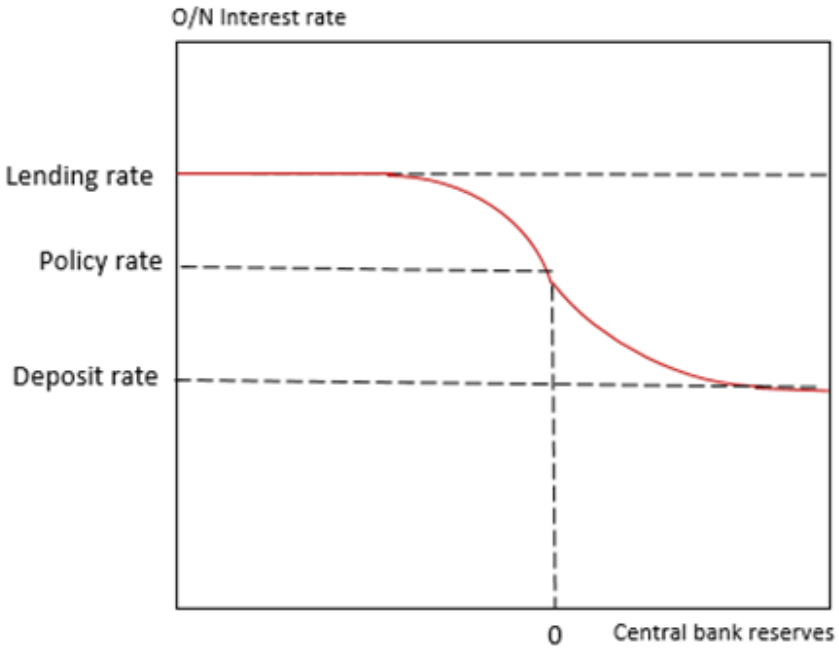
The central bank usually also lends liquidity to its monetary policy counterparties. It usually does so at a higher interest rate than it pays on central bank reserves, see Figure 1 below. The two interest rates form the interest rate corridor of the operational framework. The deposit rate, i.e. the interest rate received by monetary policy counterparties for deposits (central bank reserves), constitutes the floor of the interest rate corridor. The lending rate, that is, the interest rate they pay on loans from the central bank, is the ceiling of the corridor.

The fact that there is a difference between deposit and lending rates can create an incentive for counterparties to manage their liquidity in the market rather than with the central bank. If one monetary policy counterparty has a need to deposit while another needs to borrow, they can meet in the market and agree on an interest rate that lies between the rate they would receive and that they would pay at the central bank. This means that the interest rate corridor imposes boundaries for the interest-

[4] The Riksbank can use FX swaps within the scope of the operational framework to stabilise the overnight rate, but does that only in exceptional cases to prevent specific currency-related flows from affecting the overnight market in Swedish krona.

rate formation between monetary policy counterparties in the overnight liquidity balancing market, that is, the core of the unsecured overnight market.

Figure 1. Illustration of the demand for central bank reserves



Source: The Riksbank

A key difference between different central banks' operational frameworks relates to how the central bank's main policy rate relates to the deposit rate and the lending rate, as well as whether the central bank has a predetermined idea of how much central bank reserves the central bank's counterparties should hold, see the fact box below.

In corridor systems, the main policy rate usually represents the centre of the interest rate corridor, while in floor systems it usually corresponds to the deposit rate. In a corridor system, the central bank usually provides the amount of central bank reserves requested by the counterparties at the current interest-rate level, while a central bank with a floor system provides more central bank reserves than requested.

The relationship between the central bank's main policy rate and the deposit and lending rates is also indicative of where in the interest rate corridor the central bank wants to stabilise short-term market interest rates and what additional deposit and lending opportunities it offers, i.e. what transactions the central bank offers to carry out.

The Riksbank applies a symmetrical corridor system, which means that the distance between the deposit rate and the policy rate is the same as the distance between the

lending rate and the policy rate. It also means that the Riksbank wants to stabilise short-term market rates in the middle of the corridor.

The total amount of central bank reserves is always determined by the central bank, as only it can change the overall liquidity position of the banking system with regard to the central bank. Normally, the Riksbank provides the amount of reserves requested by the banking system at the current interest-rate level. In addition, the amount of reserves may be larger than the banking system requires as a result of, for example, supplementary monetary policy measures such as asset purchases and the Riksbank funding the FX reserve by borrowing Swedish kronor from the banking system. This creates central bank reserves, or claims on the central bank that monetary policy counterparties have no choice but to place funds in the central bank.

Fact box: Types of operational framework[5]

Corridor system
In a corridor system, the central bank steers the overnight rate between monetary policy counterparties towards the centre of the corridor, on a level with the main policy rate. The primary policy rate is usually at the same distance from the corridor floor, the deposit rate, as from the corridor ceiling, the lending rate. The central bank uses market operations to either supply or drain liquidity so that the liquidity position of the banking system with regard to the central bank on a daily basis is close to zero, i.e. the system is in balance. This steers the overnight market rate towards the centre of the interest rate corridor.

Floor system
In a floor system, the central bank steers the overnight rate between monetary policy counterparties towards the bottom of the corridor, which is comprised of the deposit rate. Typically, the deposit rate is at the same level as the main policy rate. The lending rate is the ceiling of the corridor and is higher than the deposit rate. The central bank uses market operations to ensure that the banking system has a liquidity surplus with regard to the central bank, i.e. the supply of central bank reserves exceeds the demand from the banking system at the current interest-rate level. This puts downward pressure on the overnight market rate against the deposit rate.

Quota system
In a quota system, the central bank sets a target level for demand and hence the supply of central bank reserves. The target level corresponds to the sum of the individually-set quotas of central bank reserves for each monetary policy counterparty. Counterparties can deposit funds with the central bank up to the level of their respective quotas at a relatively favourable interest rate, usually equal to the main policy rate. To ensure that demand does not exceed the target level, counterparties receive the lower deposit rate for central bank reserves in excess of their quota.

3 Objectives and restrictions for the Riksbank's operational framework

The main purpose of a monetary policy framework is to implement monetary policy by steering short-term market rates. In the case of the Riksbank, the aim is to stabilise short-term market interest rates close to the level of the key policy rate decided by the Executive Board of the Riksbank.[6] Achieving good interest-rate steering where

[5] If a central bank applies reserve requirements, counterparties are required to hold a certain, often limited, amount of reserves. However, this does not change the mechanics of how the operational frameworks function.
[6] See Policy for the Riksbank's operational framework for the implementation of monetary policy.

short-term market rates are close to the policy rate has thus been defined as the primary objective of the Riksbank's operational framework for monetary policy.

However, the primary objective is not the only objective of the operational framework. On the contrary, when a central bank designs its operational framework, it usually takes several additional aspects into account. The nature and importance of these aspects varies between central banks. In general, however, a central bank usually has three overarching aspects or objectives to address, see Bindseil (2016). The first is the monetary policy objective, that is, the effective steering of interest rates. The second is a financial objective and includes, for example, that the central bank should not expose itself to excessive risks or distort markets. The third objective can be referred to as the general objective of the operational framework and captures other relevant aspects, such as that the framework should be efficient, automatic and transparent. These have been formulated by Bindseil (2016) to evaluate operational frameworks for monetary policy and highlight that central banks should consider a number of different factors when designing an operational framework, and that these are closely interlinked. If a central bank chooses to focus only on one or a few of the criteria, it does so at the expense of the others.

Consequently, when the Riksbank reformed its operational framework, a number of aspects were taken into account in addition to the overall monetary policy objective of achieving good interest-rate steering. The most central aspects are adequately summarised by the objectives and restrictions that the Riksbank has defined for the operational framework. They define what the Riksbank wants to achieve with its operational framework and the restrictions under which the objectives are to be met. These are the criteria against which the Riksbank evaluates its operational framework and which have guided its design. The objectives and restrictions are summarised in Table 1 below and detailed in the following three sections.

Table 1. Objectives and restrictions for the Riksbank's operational framework

Classification	Definition
Primary objective	Short-term market rates should be close to the Riksbank's policy rate.
Secondary objectives	The operational framework should be simple, clear and predictable.
	Monetary policy counterparties shall be treated equally.
	The implementation of interest-rate steering should be cost-effective.
	Operational risks should be low.
	The financial risks shall be limited.
Restrictions	The banking system's liquidity position with regard to the Riksbank shall not affect t operational framework's target attainment.
	The operational framework shall not have a negative impact on payments in Swedish krona.
	The operational framework shall maintain the market's incentive to manage and price risk.

Note: The objectives and restrictions of the operational framework have been expressed in slightly different ways by the Riksbank in various documents during the reform process. The above summary is taken from the consultation *The Riksbank's new operational framework for the implementation of monetary policy* from July 2019. However, it has been slightly reformulated in relation to the consultation.

Source: The Riksbank

3.1 The primary objective is purely monetary policy

The primary objective of the Riksbank's operational framework is to stabilise short-term market rates close to the policy rate. This is because it is the short-term market rates that the Riksbank is best able to steer through the operational framework, and which form the anchor for longer-term market rates.[7] The fact that short-term rates are an anchor for longer-term rates is due to the fact that longer-term market rates are generally determined by expectations of future overnight interest rates as well as by various risk premiums, such as maturity, liquidity and credit risk premiums.[8] An operational framework that makes it easy to predict the development of short-term market rates therefore helps to stabilise interest-rate formation also at longer maturities for a variety of financial instruments and markets.

3.2 The secondary objectives refer to other objectives of the operational framework

3.2.1 The operational framework should be simple, clear and predictable.

An operational framework is implemented by, a central bank conducting, or offering to conduct, transactions with financial market participants. For these to have an interest in interacting with the central bank, the benefits of familiarising themselves

[7] The interest rate that the Riksbank is best able to control is the one for overnight liquidity balancing. Liquidity balancing in Swedish kronor is usually carried out at a maturity of up to one week. See Kronestedt Metz (2005) for an account of the market for liquidity balancing in Swedish kronor.
[8] See Fransson and Tysklind (2016) for a description of the transmission from the overnight rate to other interest rates in the economy.

with the functioning of the operational framework and then using it need to outweigh the costs. A simple, automatic and clear operational framework therefore lowers the barrier for agents to interact with the Riksbank. It also makes it easier for other relevant stakeholders to understand how the Riksbank interacts with its monetary policy counterparties, and why.

A predictable operational framework also creates transparency about how the Riksbank will act in the future. This makes it easier for businesses and individuals to anticipate and act on the monetary policy trade-offs. In this way, monetary policy becomes more effective and transparent.[9]

3.2.2 Monetary policy counterparties shall be treated equally

The Riksbank is an authority under the Riksdag and therefore applies the so-called principle of equal treatment.[10] This is a central principle in the Swedish legal system and means that the Riksbank may not discriminate against anyone without the support of the law. It means that the Riksbank should essentially treat its monetary policy counterparties equally.[11] Any departure from the principle should only be made on the basis of objective criteria and if it clearly enhances the effectiveness of the operational framework and results in better interest-rate steering.

3.2.3 The primary objective should be achieved in a cost-effective and low-risk manner

The operational framework shall not give rise to disproportionately large financial risks for the Riksbank. This is to limit potential financial losses for the Riksbank and to ensure that the Riksbank can always fulfil its tasks and commitments independently. The operational framework should also be surrounded by as few operational risks as possible to ensure that it is always implemented as intended. This creates security for both the monetary policy counterparties and the Riksbank. The operational framework must also be cost-effective to avoid wasting the Riksbank's, and ultimately society's, resources.

3.3 Restrictions on the operational framework

3.3.1 The banking system’s liquidity position shall not affect objective attainment

The liquidity position of the banking system towards the Riksbank corresponds to the banking system's total claim on, or liability to, the Riksbank.[12] If the banking system as a whole has a liquidity deficit, the banking system has a liability to the central bank, which is an asset for the Riksbank. If, on the other hand, the banking system has a

[9] See, for example, ECB (2006) for a discussion of how predictability regarding the operational framework for monetary policy and monetary policy more generally can affect its efficiency.
[10] This principle is stated in section 5, second paragraph of the Administrative Procedure Act 2017:900.
[11] However, applying equal treatment does not preclude the Riksbank from imposing differentiated requirements on monetary policy counterparties based on objective criteria, if there are good reasons for doing so. At present, this is applied, for example, in relation to the reporting requirements for money market transactions, where the more active money market participants report their transactions on a daily basis, while the less active monetary policy counterparties report annually.
[12] See Kjellberg and Vestin (2019) for an account of the various items on the Riksbank's balance sheet and the factors that affect them.

liquidity surplus, the Riksbank instead has a liability to the banking system. The size of this balance sheet item varies over time and depends on a number of factors, both endogenous and exogenous, and is influenced, among other things, by how the Riksbank manages its other balance sheet items.[13] The Riksbank's policy measures can also affect the balance sheet. One example of this is the purchase and sale of assets.[14]

Due to the fact that the liquidity position of the banking system varies over time, the Riksbank endeavours to ensure that the operational framework achieves good interest-rate steering regardless of the current liquidity position. It should work equally well when the banking system has a liquidity surplus or a liquidity deficit, and also when it is in balance. This is referred to as the universal nature of the operational framework. A universal operational framework creates flexibility for the Riksbank to be able to take appropriate measures on each occasion without jeopardising the functionality of the framework. This applies regardless of whether the Riksbank takes the policy measures for monetary policy reasons or for other reasons. This could include supporting the economy during a severe recession, switching to a self-financed gold and foreign exchange reserve, or introducing a digital central bank currency.[15]

3.3.2 The operational framework shall not adversely affect the payments market

According to the Sveriges Riksbank Act, in addition to its monetary policy mandate and objectives, the Riksbank shall contribute to an efficient and stable financial system, which includes the ability of the general public to make payments. It is therefore natural that the Riksbank's tools for achieving the monetary policy objective should not prevent the Riksbank from fulfilling its other tasks. The operational framework should therefore be designed in a way that allows it to function despite, and without impeding, the development of the payments market.

3.3.3 The operational framework shall maintain the market's incentive to price risk

It is important for the Riksbank to be able to control market interest rates to influence the economy and ultimately inflation. At the same time, it is appropriate that the Riksbank does not influence the markets more than necessary, i.e. that the Riksbank does not contribute to crowding out certain market segments or significantly

[13] Endogenous refers to influences that arise as a result of the Riksbank's decisions, while exogenous influences arise as a result of factors outside the Riksbank's control. The Riksbank can predict and influence endogenous factors to some extent. Examples of endogenous factors are how the Riksbank should finance dividends to the government and when they should be paid, or how large the gold and foreign exchange reserves should be. Exogenous factors are beyond the Riksbank's control. One example is the amount of banknotes and coins in circulation, which is determined by public demand.

[14] The Riksbank's transactions in securities for monetary policy reasons are an example of policy measures that have affected the liquidity position of the banking system towards the Riksbank. The purchases of securities were financed by an increase in monetary policy debt, which increased the liquidity surplus in the banking system. The Riksbank is currently liquidating its securities holdings through maturities and sales, which is contributing to a further reduction in the liquidity surplus.

[15] All of these measures affect the liquidity position of the banking system towards the Riksbank. The conditions for implementing these and similar measures would therefore be different if the Riksbank's operational framework did not have this restriction.

changing the dynamics of the markets. Maintaining, or at least not undermining, the incentives for financial markets to price risk is one way to ensure this.

4 The design of the Riksbank's operational framework

In this section we describe the design of the Riksbank's operational framework and the main reasons for this design. The section is divided into three parts: 4.1 describes the instruments of the operational framework, 4.2 the collateral requirements that the Riksbank applies to the operational framework and 4.3 the Riksbank's set of counterparties in the operational framework.

4.1 The instruments of the monetary policy operational framework

The instruments in the Riksbank's monetary policy operational framework consist of deposit and lending opportunities in the Riksbank. The instruments can be divided into two categories: standing facilities and open market operations. ***Standing facilities*** control the marginal cost of overnight liquidity, i.e. the cost of the last krona borrowed or invested by counterparties. They thus set the outer boundaries for the Riksbank's interest rate corridor and for the overnight rate between the monetary policy counterparties. ***Market operations*** are various forms of transactions that temporarily affect the liquidity position of the banking system towards the Riksbank. They aim to stabilise the overnight rate in the middle of the corridor, close to the policy rate. They are also an important tool for clearly signalling the level of the policy rate.

4.1.1 The design of the operational framework instruments

The Riksbank has ***standing facilities*** for both deposits and loans. What they have in common is that they have an overnight maturity and that monetary policy counterparties can always use them on their own initiative.[16] See Figure 2 below for an illustration of the standing facilities.

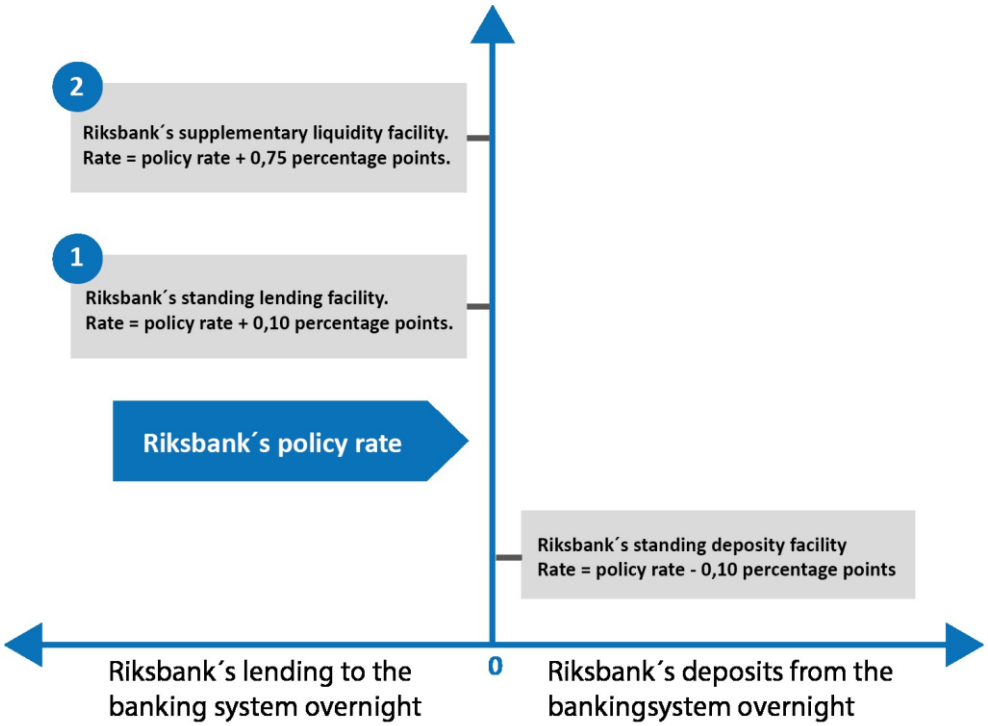
If a monetary policy counterparty has a surplus of liquidity at the end of the day, they can place it in the Riksbank's standing deposit facility overnight. There is no upper limit to the amount that counterparties may invest in the standing deposit facility and the interest rate they receive, the deposit rate, is equal to the policy rate minus 10 basis points.[17] If a counterparty instead has a deficit at the end of the day, they are primarily given the opportunity to borrow via the Riksbank's standing lending facility. Under the facility, they may borrow an unlimited volume in exchange for pledging sufficient primary collateral (see Section 4.2.1) to the Riksbank. The interest rate they pay, the lending rate, corresponds to the policy rate in force at the time, plus 10 basis

[16] In formal terms, credit and deposits under the standing facilities run from the change of value day in RIX until RIX-RTGS opens for liquidity transfers on the following value day. The time for this is normally 18.00-19.00.

[17] A basis point is one hundredth of a percentage point and is a term commonly used in financial contexts. Thus, 10 basis points are equivalent to 0.10 percentage points.

points. The interest rates on these two facilities create a corridor 20 basis points wide that sets the limits of the interest rates in the overnight market (see Section 2).

Figure 2. Standing facilities in the Riksbank's operational framework



Note: The boxes with numbers refer to the collateral pools required for use of the respective credit facilities: primary (Box 1) and secondary (Box 2) collateral pool.

Source: The Riksbank

If a monetary policy counterparty does not have sufficient primary collateral to cover its borrowing needs under the standing lending facility, it can borrow the excess volume under the supplementary liquidity facility. This is because the facility allows counterparties to borrow against a wider range of collateral (secondary collateral pool, see Section 4.2.1), but at a higher interest rate. The liquidity facility rate corresponds to the policy rate plus 75 basis points.

In contrast to standing facilities, the Riksbank offers ***market operations*** only on specific occasions determined by the Riksbank, usually once a week, and in limited volume.[18] Whether the Riksbank offers counterparties the opportunity to invest or borrow liquidity in market operations depends on whether the banking system as a whole has a surplus or deficit of liquidity towards the Riksbank.

When the banking system has a liquidity surplus, the Riksbank offers counterparties an investment opportunity, i.e. the Riksbank drains the banking system of liquidity. This is done by the Riksbank offering to issue Riksbank Certificates. Riksbank

[18] As a result of market operations being offered in a limited volume, they are offered through an auction proceedings, where counterparties bid for their desired volume. If the auctions are oversubscribed, the Riksbank applies a pro rata allocation in the auctions.

Certificates are issued at an interest rate corresponding to the current policy rate and usually have a maturity of one week. Riksbank Certificates, which are a type of security, can also be traded on the secondary market. It is also possible for counterparties to sell Riksbank Certificates back to the Riksbank before they mature.

As the Swedish banking system has had a liquidity surplus towards the Riksbank since 2008, the main market operations since then have comprised the issuance of Riksbank Certificates. If, on the other hand, the banking system had a liquidity deficit towards the Riksbank, the Riksbank would offer counterparties lending in market operations, i.e. inject liquidity into the banking system. It would then be implemented either by the Riksbank offering monetary policy repos or loans. Both would be conducted with a one-week maturity, at the current policy rate and against the primary collateral pool, see Section 4.2.

Regardless of whether the Riksbank uses market operations to inject liquidity into the banking system or drain liquidity from it, market operations are offered in a limited volume, usually corresponding to the current liquidity position of the banking system towards the Riksbank.[19] When the counterparties' total demand to invest or borrow liquidity corresponds to the volume offered by the Riksbank, the system is balanced close to zero for the duration of the market operation. This means that the overnight rate between monetary policy counterparties stabilises close to the policy rate. However, it is common that counterparties choose to hold a smaller liquidity buffer, and thus do not demand the full volume offered. They do so to be able to independently manage variations and surprises in their projected payment inflows and outflows over the life of the open market operation.

By limiting the volume offered in market operations, the Riksbank reduces the risk of the banking system's liquidity position towards the Riksbank changing sign during the term of the market operations, i.e. that the banking system as a whole goes from a surplus to a deficit or vice versa. This means that counterparties quickly move from needing to deposit money, to borrowing money, or vice versa, and it is desirable to avoid this as it risks causing unnecessary volatility in the overnight market.

The purpose and key features of the instruments are summarised in Table 2 below and the subsequent sections explain the rationale behind their design in more detail.

[19] On a number of occasions and for longer periods, the Riksbank has deviated from this principle and offered a smaller issue volume than the banking system's overall liquidity position towards the Riksbank. This is to prevent disturbances in interest-rate formation in special circumstances. See footnote 37 for more information on when and why the Riksbank last applied deviations from the principle.

Table 2. The Riksbank's instruments in the operational framework

Instrument	Purpose	Key characteristics
Standing deposit facility	Used to manage temporary liquidity surpluses at the end of the day and to provide the floor for interest-rate formation in the overnight market.	- Deposits - At the request of counterparties - Overnight maturity - The deposit rate
Standing lending facility	Used to manage temporary liquidity deficits at the end of the day and to provide a ceiling for interest-rate formation in the overnight market.	- Secured lending - At the request of counterparties - Overnight maturity - Lending rate - Primary collateral pool
Supplementary liquidity facility	Used as a backstop and to manage temporary end-of-day liquidity deficits in cases where counterparties do not have sufficient primary collateral.	- Secured lending - At the request of counterparties - Overnight maturity - Liquidity facility rate - Secondary collateral pool
Issuance of Riksbank Certificates	Used to balance the system when the banking system has a structural liquidity surplus towards the Riksbank.	- Deposits - The Riksbank controls supply - Maturity of one week - Policy rate
Monetary policy repos/ lending at longer maturities	Used to balance the system when the banking system has a structural liquidity deficit towards the Riksbank.	- Secured lending - The Riksbank controls supply - Maturity of one week - Policy rate - Primary collateral volume

Source: The Riksbank

4.1.2 Reasons for the design of the instruments

The corridor system is universal and flexible

As we wrote in Section 2, there are three dominant categories of operational framework, of which the Riksbank applies a corridor system. In the Riksbank's assessment, this category of operational framework best fulfils the objectives and restrictions that the Riksbank has defined for its framework.

A corridor system can work well regardless of the liquidity position of the banking system towards the central bank. This is in contrast to floor and quota systems that require the banking system to have excess liquidity. The corridor system is therefore universal, which has several important advantages. For example, it creates flexibility for the Riksbank to take appropriate policy measures without jeopardising the functionality of the operational framework. This is important because policy measures often affect the Riksbank's balance sheet, see Section 3.3.1. The fact that the operational framework is universal also creates the conditions for a robust operational framework that lasts over time. For example, it is an open question how digital central bank currencies and other innovations in the payment market or the financial system in general may affect the liquidity position of the banking system in relation to the Riksbank in the future.

As the corridor system does not require the Riksbank to maintain a liquidity surplus, and thus the Riksbank to have a large balance sheet, the corridor system is also associated with smaller financial risks than the other two main types of operational

framework. For example, this reduces the risk of the Riksbank incurring large financial losses due to fluctuations in the value of assets held on the balance sheet to maintain the liquidity surplus. There is also a risk that a banking system that is in a permanent liquidity surplus will demand more and more liquidity, requiring the central bank's balance sheet to continue to grow.[20] This risk is reduced for the Riksbank, which signals through the corridor system that the Riksbank does not intend to permanently maintain a situation where the banking system has a liquidity surplus.

A corridor system may also create incentives for counterparties to seek market solutions for their daily liquidity balancing in the first instance, and turn to the central bank in the second instance, see Section 2.2. This means that by applying a corridor system, the Riksbank can improve the incentives for an active money market.

A narrow corridor limits volatility in the overnight rate

The Riksbank applies a narrow symmetrical interest rate corridor of 20 basis points. The fact that the corridor is symmetric, rather than asymmetric, gives a clear signal about the policy rate. Indeed, if the overnight liquidity position of the banking system is balanced, the expected value of the overnight rate between monetary policy counterparties will be equal to the policy rate.

In a corridor system, the width of the corridor is a trade-off between, on the one hand, incentivising counterparties to seek market solutions for their liquidity management, and, on the other hand, limiting the volatility of the overnight rate.[21] With a wide corridor, counterparties will have stronger incentives to use market solutions for their liquidity management, as it will be more expensive to turn to the central bank. At the same time, it means that fluctuations in the overnight rate, which are usually restricted by the level of central bank deposit and lending rates, can be large. According to the same reasoning, the incentive to seek market solutions decreases when the corridor is narrowed. As do fluctuations in the overnight interest rate. At the same time, it should be recognised that interbank activity in Sweden, as in several other countries, has declined significantly since the global financial crisis.

The Riksbank considers that the two motives are well balanced when the corridor is 20 basis points wide. Such a corridor width should provide counterparties with an incentive for some activity in the interbank market, especially since the Riksbank offers credit in the standing lending facility only against high-quality collateral, see Section 4.2. At the same time, it should ensure that the opportunity cost of borrowing or investing with the Riksbank is not too high and that the overnight rate between monetary policy counterparties does not fluctuate by more than 20 basis points in one day. This creates good conditions for predictable interest-rate formation.

From an interest-rate steering perspective, it does not matter to the Riksbank whether the monetary policy counterparties borrow cash in the lending facility or whether they place funds in the deposit facility, see Section 2. However, for various

[20] See for example Acharya et al. (2022) for a discussion of the drivers of this phenomenon.

[21] See, for example, Bindseil and Jablecki (2011) for an empirical study on how corridor width affects volatility in overnight rates and how counterparties choose to balance their liquidity.

reasons, there is usually a stigma attached to borrowing from the central bank. A narrow corridor where the Riksbank lends against high quality collateral should be able to reduce this stigma and lessen the reluctance of monetary policy counterparties to utilise the lending facilities when necessary.

Two lending facilities enable a narrower interest rate corridor and strengthen the incentives to use high-quality collateral

As shown above, there are clear advantages to applying a narrow, symmetrical corridor. However, such a corridor assumes that the lending rate does not differ significantly from the policy rate, which is a relatively generous pricing. To justify this generous pricing, the Riksbank considers that a counterparty should pledge high-quality collateral. At the same time, it is important for the Riksbank not to reduce the counterparties' overall ability to exchange collateral for liquidity if necessary. Therefore, the Riksbank offers two lending facilities with different collateral requirements and interest rates.

The Riksbank applies a greater difference in the facilities' lending rates than the corresponding difference for borrowing in the repo market against the two different types of collateral. This is partly to strengthen the counterparties' incentives to seek market solutions for their liquidity balancing, and partly to create an incentive to primarily use government securities and central bank claims (primary collateral pool) as collateral for credit from the Riksbank, and secondarily to use somewhat riskier, but still adequate, collateral (secondary collateral pool). It also reduces the credit risk the Riksbank is exposed to. It can also be seen as the Riksbank mainly steering the interest rate on loans against the most safe assets, and the market itself setting the relative price against other assets.

4.2 The collateral in the monetary policy operational framework

The Riksbank only provides credit to monetary policy counterparties against adequate collateral. This is an obligation arising from the Sveriges Riksbank Act. Moreover, it is a way for the Riksbank to limit its credit risks, thereby protecting its capital. The collateral framework governs which securities and currencies the Riksbank accepts as collateral and how they are valued. In addition, the framework is a tool that the Riksbank can use to control counterparties' costs and incentives for borrowing from the Riksbank.

The fact that the Riksbank only provides credit against collateral means that it is not necessary to apply different interest rates for different counterparties depending on their creditworthiness. The fact that the Riksbank applies one framework for all counterparties means that the counterparties are treated equally. It also simplifies the operational framework, which contributes to clear and transparent monetary policy signalling.

4.2.1 Requirements imposed by the Riksbank regarding collateral

The Riksbank accepts collateral that is mainly comprised of various types of Swedish or foreign securities with high creditworthiness. Collateral in the form of foreign exchange is also accepted to some extent.

For a security to be accepted as collateral, it needs to fulfil a number of eligibility requirements. Among other things, it needs to have a high credit rating, a certain outstanding volume, be issued by an authorised party domiciled in a country approved by the Riksbank, be listed on a regulated market, be registered according to special rules and be issued in a currency approved by the Riksbank.[22]

The collateral pledged by the monetary policy counterparties to the Riksbank is valued daily. The current market value forms the basis for the Riksbank's valuation but, in order for the collateral to be considered adequate, haircuts are also made for the securities' liquidity, maturity and currency risk.[23] This adjusted value then forms the basis for how much a monetary policy counterparty can borrow from the Riksbank (see Section 4.1).

If the collateral pledged consists to a large degree of a single asset type, the Riksbank faces a concentration risk. To reduce it, the Riksbank also applies conditions that regulate the composition of the collateral pledged by monetary policy counterparties. These conditions mean that there are limits on the proportion of the collateral pledged that can be covered bonds and the proportion that can be issued by the same issuer or several issuers closely linked to each other.

These conditions form the basis for which collateral the Riksbank can accept for loans and how this is valued. In addition, the Riksbank divides the collateral into two collateral pools, one primary and one secondary. This is a consequence of the design of the lending facilities (see section 4.1.1). The counterparty can use the primary collateral pool for loans under the standing lending facility and the secondary collateral pool for loans under the supplementary liquidity facility. Both collateral pools are accepted for intraday credit in the Riksbank's RIX payment system.

The primary collateral pool consists of:

i. securities issued by a government
ii. securities issued by a central bank
iii. other claims on a central bank.

The secondary collateral pool is comprised of other assets accepted by the Riksbank. These are:

i. securities issued by international organisations
ii. securities guaranteed by a government

[22] See Terms and Conditions for RIX and Monetary Policy Instruments, Annex H4 Collateral Instructions, for a detailed account of the requirements for securities to be accepted as collateral. The requirement that the collateral be listed on a regulated market does not apply to Riksbank Certificates.
[23] See Terms and Conditions for RIX and Monetary Policy Instruments, Annex H4 Collateral Instructions, for a detailed account of the haircuts applied by the Riksbank.

iii. covered securities
iv. securities issued by agencies[24]
v. other securities that comply with the Riksbank's conditions.

4.2.2 Reasons for the requirements set by the Riksbank for collateral

Several types of collateral are accepted so that counterparties can always borrow when necessary

The Riksbank accepts a number of currencies, securities and claims as collateral to ensure that monetary policy counterparties can borrow from the Riksbank if they need to. In general, the Riksbank accepts debt instruments from countries that the Riksbank deems to have comparable protection for investors as Sweden.

The collateral the Riksbank accepts for lending in the operational framework for monetary policy also corresponds to the collateral the Riksbank accepts for intraday credit in the RIX payment system.[25] The Riksbank thus ensures that a situation does not arise in which the monetary policy counterparties can borrow during the day but cannot roll the credit overnight.

The basis for the haircut is the same for all types of collateral

The Riksbank applies different interest rates for lending against primary and secondary collateral volumes. This distinction is clear in that the Riksbank has two separate lending facilities, the standing lending facility and the supplementary liquidity facility. The main reason the Riksbank differentiates between the collateral pools in this way, by applying different interest rates and not by using different haircuts for the different collateral volumes, is that this does not make it more expensive for counterparties to use secondary collateral for intraday credit. It also simplifies and clarifies the framework for collateral.

See Section 4.1.2 for an explanation of why the Riksbank differentiates between lending against primary and secondary collateral volumes.

4.3 Counterparties in the monetary policy framework

The monetary policy counterparties are the only agents who have access to the Riksbank's standing facilities and market operations. This means that it is these agents that enable the Riksbank to be active in financial markets. The Sveriges Riksbank Act limits the Riksbank's possible set of counterparties to financial companies. In addition, the Riksbank has formulated a number of criteria an agent must fulfil to qualify as a counterparty to the Riksbank. These are designed in such a way that the Riksbank's

[24] Agencies refers to certain entities with federal or state guarantees, such as the US Federal Home Loan Mortgage Corporation ("Freddie Mac") and the Federal National Mortgage Association ("Fannie Mae"), the European Financial Stability Facility (EFSF) and the German Kreditanstalt für Wiederaufbau (KfW). See Appendix 2 to Annex H4 of the Terms and Conditions for RIX and Monetary Policy Instruments for the full list.
[25] Interest-free intraday credit in the RIX payment system is provided against both the primary and the secondary collateral pool.

set of counterparties primarily reflects the types of agent that are important for the transmission of monetary policy in Sweden.

The Riksbank did not review the set of monetary policy counterparties when the operational framework was reformed between 2019 and 2022. In the next section, we therefore describe how the design of the set of counterparties has been justified historically.

4.3.1 The Riksbank's set of monetary policy counterparties

The instruments in the Riksbank's operational framework are designed to facilitate short-term liquidity management in Swedish kronor and to influence its price (see Section 2). Consequently, the monetary policy counterparties need to consist of agents who need to participate in this liquidity balancing and who set the tone for interest-rate formation in the short-term money market. Counterparties also need to influence other interest-rate formation in the economy to ensure a well-functioning transmission from the operational framework to the real economy.

For the Riksbank to avoid exposing itself to unnecessarily large financial or operational risks, and for the operational framework for monetary policy to be cost-effective, it is also appropriate that the set of counterparties is not too large.

In light of this, the Riksbank has considered that the set of monetary policy counterparties should consist of participants who are credit institutions with a domicile or branch in Sweden and who are participants in the Riksbank's payment system, RIX. Agents that fulfil these criteria can apply to be a monetary policy counterparty.[26] In the following section we explain the reasons behind this design in more detail.

4.3.2 Reasons for the Riksbank's design of the set of monetary policy counterparties

Monetary policy counterparties must be domiciled or have a branch in Sweden.

The Riksbank's operational framework aims to influence interest-rate formation in Swedish kronor and ultimately affect the Swedish economy. The Riksbank therefore needs to have monetary policy counterparties that are active in Swedish financial markets.

Requiring counterparties to be domiciled or have a branch in Sweden is a way of limiting the set of counterparties to those agents that have links to the Swedish financial sector and can thus be considered relevant to the Riksbank's objectives, i.e. to conduct monetary policy in Swedish kronor.

Monetary policy counterparties shall be credit institutions

[26] In addition, monetary policy counterparties must fulfil a number of additional requirements, specified in the Terms and Conditions for RIX and Monetary Policy Instruments.

The Swedish economy, or rather its financing, is largely bank-based.[27] The larger banks in Sweden are also universal banks and have a dominant role as intermediaries in the Swedish capital markets. This means that banks are the agents that influence the financing conditions for most operators in Sweden. As payment intermediaries, the banks have also traditionally needed to manage temporary liquidity surpluses and deficits. By controlling the banks' cost of managing their liquidity, the Riksbank can thus influence interest rates for a wide range of participants.

Monetary policy counterparties shall be participants in RIX

For a monetary policy counterparty to be able to utilise standing facilities in practice, it must have access to an account in the Riksbank's central payment system, RIX. As a result, the Riksbank requires monetary policy counterparties to have their own account in RIX and not to act through a correspondent bank. The background to this requirement is that the Riksbank wishes to maintain a high degree of automation in monetary policy transactions, that should not require active input from the counterparty, and to reduce operational risks.

5 Objective attainment of the operational framework

In the previous section, we described the different elements of the operational framework, how they are organised and why. In this section, we take a step back and look at the big picture. We report on how well the operational framework achieves its primary objective of stabilising short-term market interest rates close to the policy rate. Our conclusion, which we develop in sections 5.2 and 5.3, is that target fulfilment has been good as the Riksbank has succeeded in stabilising them close to the policy rate. Section 5.1 presents the starting points for our analysis.

5.1 The starting points for the analysis

The Riksbank has the greatest opportunity to control the interest rate faced by monetary policy counterparties for liquidity balancing overnight. To evaluate the effectiveness of the operational framework in achieving the primary objective, it is therefore appropriate to first examine the level of that interest rate. As a second step, it is appropriate to examine the interest rate faced by a wider range of participants for the equivalent unsecured transactions (*unsecured overnight loans*). The interest rate that these participants encounter can be said to constitute the first step in the transmission of the Riksbank's policy rate through the operational framework to the economy.

At the same time, the primary objective is not limited to only one interest rate or one maturity. This means that we need to examine more market rates to evaluate how well the operational framework fulfils the objective. The two most obvious markets are the repo market and the FX swap market.[28] These are two markets that are

[27] Note that credit institutions include more agents than just banks, but that credit institutions and banks are used synonymously for simplicity.
[28] See Kronestedt Metz (2005) for a description of the markets and instruments used for liquidity balancing in Swedish kronor.

extremely important for short-term liquidity balancing in Swedish kronor. In relation to the unsecured overnight market, they have also grown in importance over the past decade. In the **FX swap market**, participants can obtain short-term liquidity in kronor by temporarily surrendering liquidity in foreign currency. In the **repo market**, participants exchange cash for collateral.[29]

The FX swap market is important for Swedish agents' short-term liquidity management. But it is affected by a large number of factors beyond the Riksbank's operational framework for monetary policy. For example, the pricing of FX swaps depends on current and expected interest rates in both Swedish kronor and the foreign currency in question. Because of this, and the fact that in this article we focus on how well the operational framework works for the target for interest-rate formation in Swedish kronor, we only discuss interest-rate formation on the unsecured overnight market and the repo market in the following sections.

Information on interest-rate formation is based on the data the Riksbank collects from monetary policy counterparties on their transactions in the shortest part of the Swedish money market.[30, 31] These data are regularly used by the Riksbank to evaluate the implementation of the Riksbank's monetary policy. In addition, a subset of these data is used to determine the transaction-based reference rate SWESTR.

5.2 The unsecured overnight market[32]

We define the interest rate that monetary policy counterparties face for their overnight liquidity balancing as a volume-weighted average of the interest rates on the transactions that the counterparties carry out with the Riksbank and with other monetary policy counterparties. In Figure 3 below we show how this interest rate has evolved from mid-2021 to mid-2023. As shown in the figure, the Riksbank has raised the policy rate from 0.00 per cent to 3.50 per cent over the period.[33] It can also be noted that during the same period the Riksbank went from buying debt securities on the secondary market to selling them.[34] However, the banking system has had a significant liquidity surplus towards the Riksbank throughout the observed period, around SEK 1,000 billion or more, see Figure 4.[35]

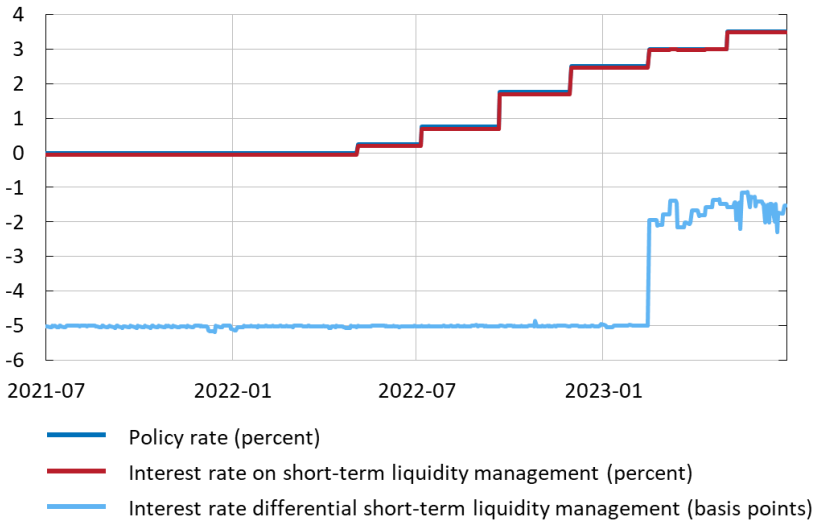
It is clear from Figure 3 that the interest rate for monetary policy counterparties' liquidity balancing has a good correlation with the Riksbank's policy rate. Over the

[29] It can be argued that the Swedish repo market is now mainly used to obtain securities that participants want to borrow for various reasons, especially in the case of repos against government bonds. However, the repo market remains a way for participants to manage their liquidity in the market by posting collateral.
[30] In accordance with the Terms and Conditions for RIX and monetary policy instruments, the Riksbank requests data on executed transactions between monetary policy counterparties and between monetary policy counterparties and a wider circle of participants. It is transactions with a maturity of up to and including ten days that must be reported to the Riksbank.
[31] In our analysis, we also use data on the use of the Riksbank's standing facilities and market operations.
[32] An overnight loan is an unsecured overnight transaction in which one party lends cash to the other.
[33] The Riksbank's decision on 28 June 2023 to raise the policy rate to 3.75% was applied from 5 July 2023.
[34] The Riksbank stopped buying securities in December 2022 and started selling securities in April 2023.
[35] The liquidity surplus is partly due to the Riksbank buying Swedish securities from 2015 onwards between 2012 and 2022 for monetary policy purposes, and partly due to the Riksbank selling Swedish kronor and buying US dollars and euros between February 2021 and December 2022 to self-finance the foreign exchange reserve.

period shown in the figure, the combined liquidity balancing rate of the monetary policy counterparties has been between 1 and 5 basis points below the policy rate.[36] Thus, the interest rate has remained stable close to the policy rate and within the interest rate corridor of the operational framework. This stable deviation from the policy rate indicates that the operational framework works well in both a low and a high interest rate environment.

Figure 3. Interest on short-term liquidity management

Per cent and basis points respectively



Note: The series Interest rate on short-term liquidity management corresponds to a volume-weighted average of the interest rates on the transactions that monetary policy counterparties make with the Riksbank and with other monetary policy counterparties (overnight maturity, unsecured).
Source: The Riksbank

The fluctuations in the interest rate can largely be explained by the fact that during the period it has varied how much of the liquidity surplus the monetary policy counterparties have chosen, and been able, to invest in Riksbank Certificates.[37] It is also a change in this volume that causes the interest rate to stabilise closer to the policy rate from mid-February 2023. From this point onwards, the Riksbank offers a larger issue volume of Riksbank Certificates.[38]

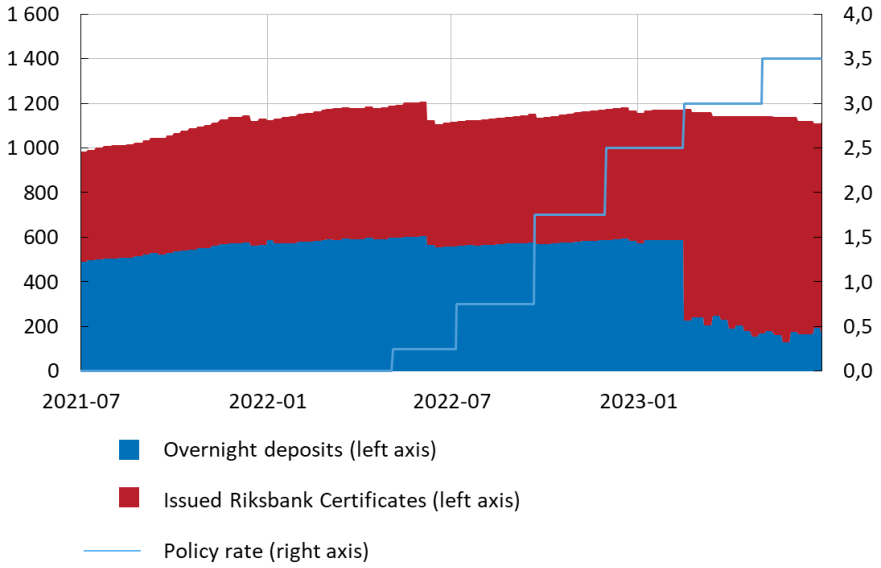
[36] The average over the period is a deviation of 4 basis points.

[37] In relation to the normally applied principle of offering an issue volume corresponding to the banking system's entire liquidity surplus, the Riksbank applied limitations on the issue volume offered between October 2019 and February 2023. The restrictions were applied to ensure that a sufficient amount of liquidity was available overnight to prevent disruptions in interest-rate formation during the reform of the operational framework and during the coronavirus pandemic. From May 2021 until February 2023, the offered issue volume was limited to half of the banking system's current liquidity surplus towards the Riksbank. The Riksbank then switched to offering an issue volume corresponding to the banking system's entire liquidity surplus towards the Riksbank. However, during a transitional period of three months (14 February to 19 May), the volume was limited by SEK 20 billion.

[38] The Riksbank increased the offered issue volume of Riksbank Certificates on 14 February 2023 (see footnote 37). As a result, counterparties have started to place a larger volume in Riksbank Certificates at the policy rate and thus a smaller volume in the standing deposit facility at an interest rate 10 basis points

When we study how well the operational framework fulfils the primary objective, the next stage of interest-rate formation is also of interest, namely the unsecured overnight rate faced by a wider range of agents. We can study this through the SWESTR reference rate. SWESTR is a volume-weighted transaction-based rate based on the actual interest rate faced by banks, financial corporations and non-financial corporations for overnight unsecured deposits with monetary policy counterparties. SWESTR is illustrated in Figure 5 below.

Figure 4. The liquidity position of the banking system and the Riksbank's policy rate
SEK billion and per cent



Source: The Riksbank

Figure 5 shows that SWESTR is stable and close to the Riksbank's policy rate. SWESTR follows changes in the policy rate and tends to be on average 11 basis points below it.[39,40] The fact that SWESTR is so responsive indicates good target fulfilment and that the monetary policy transmission works well in a first stage beyond the Riksbank's monetary policy counterparties. It is expected that the interest rate is on average just

below the policy rate. This pushes up the volume-weighted interest rate for overnight liquidity balancing by monetary policy counterparties.

[39] SWESTR started being made available for actual use as a reference rate on 1 September 2021. Before that, the historical estimates published by the Riksbank for SWESTR have been used in the calculations.

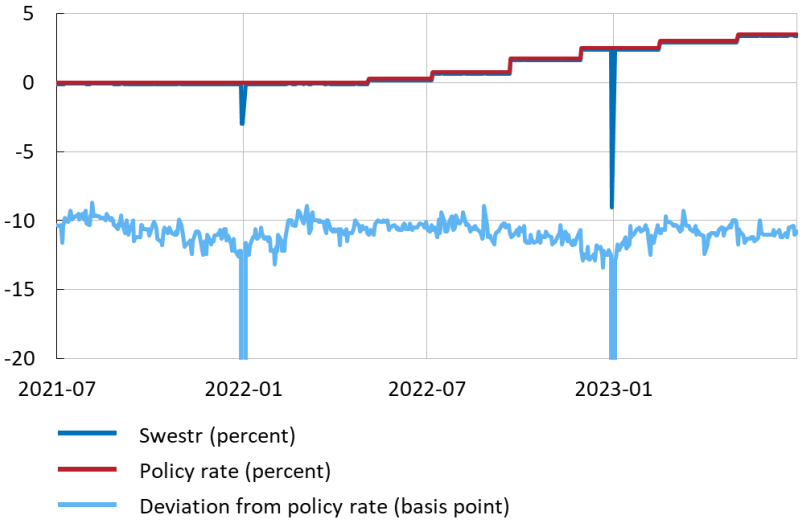
[40] This average deviation refers to the difference between SWESTR and the policy rate on all days of the year, except for the last business day of the year when SWESTR usually falls very sharply. The phenomenon of banks reducing the interest rates offered to their customers for deposits on the last banking day of the year stems from the fact that banks pay a bank tax and a resolution fee, which, expressed in a simplified way, are based on their balance sheet total at the end of the year. This implies that banks have an incentive to minimise their balance sheet total on the day in question, and that the banks therefore reduce their deposit rates to very unfavourable levels to make it unattractive for customers to deposit money with them or to compensate for the additional regulatory costs of the transactions. However, in terms of objective attainment and monetary policy implementation, the year-end effect is a negligible problem. Although the shortest money market rates deviate significantly from the policy rate on one day of the year, this is only one day per year and the deviation occurs for well-documented reasons.

below the Riksbank's deposit rate, i.e. the policy rate with a deduction of 10 basis points, as monetary policy counterparties usually price the deposits they receive on the basis of the interest rate they would receive if they invested liquidity in the Riksbank. As monetary policy counterparties can always place liquidity in the standing deposit facility, the interest rate on this provides a reference for their own pricing.

All in all, Figure 3 and Figure 5 show that the Riksbank has succeeded in stabilising overnight rates close to the policy rate for both its monetary policy counterparties and a wider range of economic agents during the period examined.

Figure 5. SWESTR

Percentage points and basis points respectively



Note: On 30 December 2021, SWESTR was -2.970 per cent. The policy rate at that time was 0.00%. On 30 December 2022, SWESTR was -9.038 per cent. The policy rate at that time was 2.50 per cent. SWESTR started being available for actual use as a reference rate on 1 September 2021. For the period before that, the historical estimates published by the Riksbank for SWESTR have been used in the calculations.

Source: The Riksbank

5.3 Repo market[41]

In the repo market, agents exchange cash for collateral. In recent years, this market has grown larger than the unsecured market in terms of liquidity balancing at slightly longer, but still short maturities, such as one week. This is true both in terms of the number of transactions carried out and the total volume of transactions, and both for transactions between monetary policy counterparties and the transactions monetary policy counterparties carry out with a wider range of participants. Against this

[41] A repo is a collateralised transaction in which one party lends cash to the other in exchange for collateral in the form of a bond.

background, it is relevant to also study interest-rate formation in the repo market in order to evaluate the operational framework.

The increased use of the repo market for short-term liquidity management is a trend that can also be observed in other economies. It has therefore also become increasingly common for central banks, in addition to targeting overnight rates, to focus on targeting and stabilising repo rates with government securities as underlying collateral, often with the help of additional instruments in the form of repo facilities.[42] The fact that the Riksbank, after the reform of the operational framework for monetary policy, differentiates between setting interest rates on credit against government securities (primary collateral volume) on the one hand, and against more risky bonds (secondary collateral volume) on the other, could also be interpreted as the Riksbank having taken a small step in this direction, i.e. towards controlling the cost of procuring liquidity against government bonds in the repo market. This is because the Riksbank now differentiates its lending in a way that mimics the segmentation of the repo market. The pricing of the Riksbank's various facilities can thus be compared more directly with the cost of borrowing against equivalent collateral on the repo market.

Based on the data that the Riksbank collects on completed repo transactions, we can make a number of observations. The most common forms of repo transaction are transactions with Swedish government bonds or covered bonds as underlying collateral. The most common maturities are one day or one week, and in both cases with one-day settlement.[43] The interest rates at which these types of operations are conducted also closely follow the policy rate. This indicates that interest-rate steering is working well.

If we study interest-rate formation in more detail, we can also see that interest rates in repo transactions with covered bonds as underlying collateral are stable and close to the policy rate. Interest rates for repo transactions with government bonds as underlying collateral are also at a stable level, but deviate relatively much from the policy rate. However, it is likely that repo transactions with government bonds as underlying collateral are also affected by the interest rate on the Swedish National Debt Office's market-supporting repo facilities, which are priced outside the interest rate corridor of the operational framework.[44]

6 The Riksbank's operational framework in an international context

The Riksbank's operational framework shares several features with those of other central banks. At the same time, it also differs in several significant ways.

[42] See, for example, Hansson and Wallin Johansson (2023) for an account of how fourteen central banks' operational frameworks are designed.
[43] That is, tomorrow-next (T/N) and tomorrow-week (T/W).
[44] See Blix Grimaldi and Hirvonen (2023) for more information on the Swedish National Debt Office's market-making repo facilities and how their utilisation has varied over time.

The vast majority of central banks apply one of the three types of operational framework described in the fact box in Section 2, i.e. corridor, floor or quota systems. These three types of operational frameworks differ at a conceptual level. This means that the Riksbank's operational framework is generally more similar to other corridor systems than the operational frameworks of central banks that apply quota or floor systems. However, the different types can be implemented in a variety of ways. There may therefore be significant differences even among central banks that apply the same type of operational framework. It is often considerations corresponding to the restrictions and secondary objectives the Riksbank has formulated for its operational framework (see Section 3) that determine the type of operational framework a central bank chooses. However, the differences in the actual implementation, i.e. the design of the policy instruments, set of counterparties and collateral requirements, depend to a large extent on differences in primary objectives, mandates and local conditions.

While the operational frameworks differ, there are also many similarities between them. For example, the vast majority of central banks have credit institutions as monetary policy counterparties, offer some type of standing deposit and lending facility with overnight maturity, and offer regular longer-term market operations to provide or drain liquidity from the banking system (Hansson and Wallin Johansson, 2023). These similarities are also a natural consequence of the fact that the overall purpose of central banks' operational frameworks is ultimately the same, i.e. to stabilise short-term market interest rates.

A further factor contributing to the significant similarities between central bank operational frameworks, and in particular similarities in how these frameworks evolve over time, is that central banks often face similar challenges and changes in their environment. These changes and challenges stem to a large extent from developments in payment and financial markets, and because they are often global phenomena, central banks face similar issues. Consequently, when central banks choose to deal with them in a similar way, as is common, it creates trends in the evolution of operational frameworks over time. To the extent that central banks handle them differently, they also illustrate important differences between central banks.

To clearly illustrate how the Riksbank's operational framework relates to other central banks' operational frameworks, and how they have developed over the past decade or so, we shed light on three such trends in the following section.

6.1 Many central banks have switched from corridor systems to floor systems

Since the global financial crisis, many central banks have moved from a corridor system to a floor system.[45] Examples include the European Central Bank, the Federal Reserve, the Bank of England, the Reserve Bank of New Zealand and the Reserve Bank of Australia. The Riksbank, on the other hand, has kept its corridor system but

[45] Some central banks have clearly communicated that they have switched from a floor system, while other central banks' operational frameworks function in practice as floor systems. See Hansson and Wallin Johansson (2023) for an account of the policy regimes of fourteen central banks.

reformed it. This makes the Riksbank stand out to some extent in an international context, although the Riksbank is not the only central bank that still applies a corridor system.

Some central banks have decided to permanently switch to a floor system, while others have been less explicit about whether and when they plan to return to a corridor system. Some central banks have also been more explicit than others about the motives behind this change. However, the trend of moving from corridor to floor systems can be seen in the context of two main changes in financial markets since the global financial crisis.

One change is that after the global financial crisis, many central banks, including the Riksbank and all of the above, have used asset purchases to make monetary policy more expansionary, thereby increasing the liquidity surplus of the banking system towards the central bank. The second change is that interbank activity in several countries has declined sharply since the global financial crisis. These are two changes in the financial markets that can be seen as compatible with a floor system. This is because a basic condition for the proper functioning of a floor system is that the banking system has a liquidity surplus towards the central bank, and that the monetary policy counterparties have strong incentives to manage their liquidity balancing with the central bank.

These two phenomena, excess liquidity and less interbank activity, have also occurred in Sweden. Nevertheless, the Riksbank has continued to apply a corridor system. The main reason for this is that the Riksbank, possibly in contrast to the other central banks, has not made the assessment that these changes limit the functioning of the corridor system. The Riksbank therefore assesses that the corridor system is still the most appropriate system for the Riksbank, based on the objectives and restrictions that the Riksbank has formulated for its operational framework.

The interest-rate formation achieved by the Riksbank in recent years can also be seen as proof that the corridor system has worked well for the Riksbank, despite the changes in the financial markets. The Riksbank has succeeded in stabilising short-term market rates at a desired level both in the period between 2012 and 2022, when the Riksbank had a large and growing liquidity surplus, and in the period from 2023 onwards, when the Riksbank's surplus has started to decline. Nor has the corridor system limited the Riksbank's ability to switch from buying to selling securities during these years.

However, such a change in monetary policy can be complicated for a central bank applying a floor system, as this type of operational framework requires the central bank to maintain a liquidity surplus. The fact that several central banks have moved from conducting expansionary monetary policy for several years to now conducting contractionary monetary policy has also highlighted this and a number of other challenges and issues arising from having a floor system. These include the need to understand the dynamics of the demand for reserves and the optimal or sufficient level of excess liquidity, as well as the extent to which the central bank can and should

control these parameters.[46] The lack of simple and unambiguous answers to these questions has also stimulated a debate on the risks of the floor system and whether there might be reasons to return to corridor systems.[47]

6.2 An increasing number of central banks are widening the set of counterparties beyond credit institutions

In recent years, it has become increasingly common for central banks to expand their set of counterparties beyond credit institutions to include additional financial firms.[48] These include central counterparties, money market funds and insurance companies.

Among the central banks that have chosen to broaden their set of counterparties are the Federal Reserve, the Bank of England, the Swiss National Bank, the Reserve Bank of Australia and the Reserve Bank of New Zealand. It is also common for central banks that have widened their set of counterparties to provide counterparties with differentiated access to the instruments in the operational framework, i.e. not all counterparties have access to all instruments under the same conditions.

The trend towards an increasing number of central banks expanding their set of counterparties can be seen in the light of the fact that there are more types of financial agents today than before, and that the financial system today is less bank-based and more market-based than before. This means that more types of agents may be important for interest-rate formation and for monetary policy transmission. Unequal access to markets and central bank policies risk segmenting interest-rate formation in short-term money markets.[49]

In Sweden, too, there has been a shift towards more market-based financing.[50] The number and types of agents that are active in financial markets have also increased. However, the Riksbank's set of counterparties is limited to credit institutions, see Section 4.3. However, the Riksbank did not analyse the set of counterparties when reviewing the operational framework in 2014, which led to the reform of the operational framework's instruments and collateral between 2019 and 2022.[51] Against this background, it seems likely that the Riksbank may review the set of counterparties in the foreseeable future, and that the Riksbank, like many other central banks, will then need to consider whether or not it should be expanded.

---

[46] See, for example, Acharya et al. (2022) for a study on the drivers of the demand for reserves and its implications for a central bank's ability to reduce the liquidity surplus of the banking system towards the central bank.

[47] See, for example, Borio (2023) for a discussion of the development of several central banks moving from a corridor system to a floor system after the global financial crisis, and why there is reason to go back.

[48] See Hansson and Wallin Johansson (2023) for a review of fourteen central banks' operational frameworks, including their respective sets of counterparties.

[49] See, for example, Eisenschmidt and Ma et al. (2022) for a study on how the balance of power between different financial agents in the euro area repo market can contribute to segmentation in interest-rate formation and affect monetary policy transmission.

[50] See Finansinspektionen (2022) for an account of the development of market-based financing in Sweden.

[51] See Sellin and Åsberg Sommar (2014) for the review of the Riksbank's operational framework and the Executive Board's decisions on changes to the operational framework: *Amendments to the Riksbank's operational framework for the implementation of monetary policy* on 24 September 2019 and *Amendments to the Riksbank's operational framework for the implementation of monetary policy - Step 2* on 22 March 2022.

6.3 An increasing number of central banks are offering instruments for financial stability purposes

Since the global financial crisis, it has become increasingly common for central banks to offer instruments within their operational frameworks that have an explicit aim of safeguarding financial stability.[52] These instruments usually consist of various forms of lending by the central bank.

These instruments can take the form of both standing facilities and recurring open market operations, and generally aim to provide liquidity in the event of market failures. These instruments are typically offered to a wider range of participants than those who have traditionally had access to the monetary policy framework, making this development consistent with that of widening the set of counterparties. The instruments offered for financial stability purposes are however also clearly linked to monetary policy. This is because they ensure that market turbulence and dysfunctional markets do not spread and thereby interfere with the interest-rate formation that the central bank wants to achieve with the operational framework. As a result, these instruments are often similar to those offered by the central bank for monetary policy purposes. It can be difficult both to make a clear distinction between them and to isolate their effects on financial markets and interest-rate formation from one another. Because of the synergies, it is also increasingly common for central banks to take a more holistic approach to the two policy areas. They more often talk about instruments for liquidity provision and interest-rate steering, rather than for either monetary policy or financial stability.

The Bank of England and the Bank of Canada are two examples of central banks that have established instruments with a clear stability purpose. There are also central banks that cite several reasons for their instruments, with the functioning of markets or stability being mentioned as one of them. Two examples of this are the Reserve Bank of New Zealand and the Federal Reserve.

These developments can be seen against the background of the growth of financial stability as a policy area since the global financial crisis, and the fact that central banks have increasingly been given the main responsibility for this area.[53] Moreover, the global financial crisis and several subsequent events, such as the US repo market turbulence in autumn 2019 and the UK liquidity crisis in autumn 2022, have highlighted that market failures and financial market turbulence are a recurring feature that central banks have to deal with. This is because there may otherwise be spill-over effects that affect both the real economy and the interest-rate formation that the central bank wants to achieve.

It can be noted that the Riksbank does not offer any standing facilities or recurring market operations for stability purposes. Instead, the Riksbank offers general liquidity support or emergency liquidity assistance where justified. At the same time, the Riksbank stands out in an international context by having a relatively limited mandate

[52] See Hansson and Wallin Johansson (2023) for a review of fourteen central banks' operational frameworks.

[53] See Calvo et al. (2018) for a discussion of how financial stability has evolved as a policy area after the global financial crisis and how responsibilities are shared between authorities in different jurisdictions.

and responsibility for financial stability, which limits its ability to act for this purpose. However, the Sveriges Riksbank Act that entered into force on 1 January 2023 has clarified the Riksbank's financial stability mandate. Given this, as well as the trend we see in how other central banks handle these two policy areas, it seems likely that we may see a debate on a more holistic approach to liquidity provision and interest-rate steering in the future.

7 Concluding remarks

The Riksbank's operational framework has become simpler, more robust, automatic and flexible following the reform between 2019 and 2022. These aspects were also some of the main intentions of reforming the operational framework for monetary policy. The reform has made the operational framework more flexible both for structural changes in the payment and financial markets, and if the Riksbank wishes to develop the operational framework further. This means that the reformed operational framework creates favourable conditions for robust interest-rate steering.

Since the final changes to the operational framework entered into force in June 2022, the general level of interest rates has changed significantly up to autumn 2023. This means that the operational framework has really been tried and tested. It is therefore particularly reassuring to see that, over this period, short-term market interest rates have shown a good degree of responsiveness to the policy rate, and that interest rates have been generally stable close to the policy rate. The reformed framework has thus largely achieved good interest-rate steering, thereby fulfilling its primary objective.

In addition, the benefits of applying a corridor system have become even more apparent during this period. The fact that the effectiveness of the operational framework does not depend on the structural liquidity position of the banking system has facilitated and ensured good interest-rate steering when the Riksbank moved from a low interest rate regime with quantitative easing to a high interest rate regime with quantitative tightening in 2022 and 2023. In the coming years - when the Riksbank, according to the current decision, will reduce the liquidity surplus through active sales and its securities holdings maturing - it will probably become even more evident that this universal aspect of the operational framework is favourable to interest-rate steering.

References

Acharya, Viral V, Rahul S Chauhan, Raghuram Rajan and Sascha Steffen (2022), "Liquidity dependence: why shrinking central bank balance sheets is an uphill task", Working Paper no. 31050, NBER.

Bindseil, Ullrich and Juliusz Jablecki (2011), "The optimal width of the central bank standing facilities corridor and banks' day-to-day liquidity management", Working Paper no. 1350, European Central Bank.

Bindseil, Ulrich (2016), "Evaluating monetary policy operational frameworks", in *Designing Resilient Monetary Policy Frameworks*, Jackson Hole Economic Policy Symposium, Federal Reserve Bank of Kansas City, pp. 179–277.

BIS, Working Group established by the Committee on the Global Financial System (CGFS) and the Markets Committee (2015), "Regulatory change and monetary policy", CGFS Papers no. 54, BIS.

Blix Grimaldi, Marianna and Johanna Hirvonen (2023), "Two decades of the Swedish National Debt Office's repo facility", *Debt Office Commentary* No. 1, Swedish National Debt Office.

Borio, Claudio (2023), "Getting up from the floor", Working Paper no. 1100, BIS.

Calvo, Daniel, Juan Carlos Crisanto, Stefan Hohl and Oscar Pascual Gutiérrez (2018), "Financial supervisory architecture: what has changed after the crisis?", FSI Insights on policy implementation, 8.

European Central Bank (2006), "The predictability of the ECB's monetary policy", *Monthly Bulletin*, vol. 1 (January), pp. 51-61, European Central Bank.

Eisenschmidt, Jens, Yiming Ma and Anthony Lee Zhaang (2022), "Monetary policy transmission in segmented markets", Working Paper no. 2706, European Central Bank.

Finansinspektionen (2022), "Mapping of market-based financing in Sweden", Report.

Fransson, Lina and Oskar Tysklind (2016), "The effect of monetary policy on interest rates", *Sveriges Riksbank Economic Review*, no. 1, pp. 36-56.

Hansson, Denise and Ingrid Wallin Johansson (2023), "Central banks' operational frameworks – an international perspective and comparison", *Sveriges Riksbank Economic Review*, no. 2, pp. 61-108.

Kjellberg, David and David Vestin (2019), "The Riksbank's balance sheet and financial independence", *Sveriges Riksbank Economic Review*, no. 2, pp. 5-41.

Kronestedt Metz, Pia (2005), "The Swedish market for balancing liquidity", *Sveriges Riksbank Economic Review* no. 4 pp. 63-87.

Sellin, Peter and Per Åsberg Sommar (2014), “The Riksbank’s operational framework for the implementation of monetary policy – a review”, Riksbank Studies.

APPENDIX

Table 3. Changes to the operational framework in the context of the reform

Date of implementation	Changes to operational framework
9 October 2019	Fine-tuning transactions cease.
9 October 2019	The interest rate on the standing deposit facility (deposit rate) is set at the policy rate -0.10 percentage points.
2 July 2020	The interest rate on the standing lending facility (lending rate) is set at the policy rate +0.10 percentage points.
8 June 2022	The supplementary liquidity facility is established in which lending is carried out against secondary collateral at an interest rate (the liquidity facility rate) equal to the policy rate +0.75 percentage points.
8 June 2022	The collateral requirements for the standing lending facility are tightened to the primary collateral pool.

Source: The Riksbank

Central banks' operational frameworks – an international perspective and comparison

Denise Hansson and Ingrid Wallin Johansson*
Denise Hansson is a senior economist in the Markets Department. Ingrid Wallin Johansson is a senior economist in the Monetary Policy Department.

Central banks use monetary policy operational frameworks to influence short-term market interest rates and thereby implement the decided level of their policy rates in the market. Although the core task of these operational frameworks is largely the same for the vast majority of central banks, they are designed and implemented in a variety of ways. Whilst there are a number of main types of operational framework with common basic features, in practice they can be quite different. In this article, we describe the operational frameworks of fourteen central banks and discuss the differences and similarities between them.

1 Introduction

It is through the monetary policy operational framework that a central bank puts its monetary policy into practice. The central bank conducts, or offers to conduct, financial transactions on a repeated basis in order to establish the level of its main policy rate in the money markets. The monetary policy operational framework is an umbrella term for these transactions and the terms and conditions associated with them.

However, the way central banks design their operational frameworks varies. These differences are largely due to the fact that central banks adapt their respective operational frameworks to local conditions, such as legislation, the structure of payment systems and financial markets, and monetary policy objectives. Differences between operational frameworks may also reflect differences in how central banks

* The authors would like to thank a number of people at the central banks discussed in this article. They have provided us with invaluable assistance by conducting factual reviews and answering questions, large and small, about their respective operational frameworks. Any remaining errors are entirely our own. Thanks to Michael Thornley (Reserve Bank of Australia), Sabrina Wu (Bank of Canada), Petr Frydrych (Česká národní banka), Kristine Rasmussen (Danmarks Nationalbank), Tom Hudepohl (European Central Bank), Csaba Csávás (Magyar Nemzeti Bank), Björgvin Sighvatsson (Seðlabanki Íslands), Mahia Pepper (Reserve Bank of New Zealand), Knut Kolvig (Norges Bank), Pawel Kowalewski (Narodowy Bank Polski), Florian Böser (Swiss National Bank), James Howat (Bank of England) and Halim Abourachid (Federal Reserve System), as well as their respective colleagues where appropriate. In addition, we would like to thank Heidi Elmér, Jens Iversen, Per Åsberg Sommar, Ulf Söderström and Marianne Nessén for valuable comments on the article, as well as Caroline Jungner and Gary Watson for clear language review and English translation respectively. The opinions expressed in the article are those of the authors and are not to be seen as the Riksbank's position.

view their impact on financial markets. These differences may relate to issues such as the perception of the central bank's role in incentivising interbank activity or in facilitating banks' compliance with their regulatory liquidity requirements.

In 2019-2022, Sveriges Riksbank reformed its operational framework.[1] Other central banks have also made significant changes in the way they implement monetary policy in recent years. This can partly be seen as a response to large liquidity surpluses in the wake of significant central bank purchases of financial assets. Most central banks also started to tighten monetary policy from 2022 onwards. It is therefore interesting to take a look at mid-year 2023 to study different central banks' operational frameworks at this point. The purpose of this article is therefore to provide an overview of a selection of central banks and their operational frameworks at this point in time, and to highlight key similarities and differences between them.[2]

Studying the operational frameworks of other central banks is valuable for a central bank, both to facilitate the evaluation of its own operational framework and to learn lessons from other central banks. It is useful for outsiders to study the design of different central banks' operational frameworks in order to understand, for example, why the central banks in question conducts or offer to conduct the transactions they do, why they sometimes act in similar ways and why they sometimes act in completely different ways.

Section 2 describes, at a conceptual level, how operational frameworks are usually designed. In Section 3, we summarise the operational frameworks of fourteen central banks. This section may prove useful as a reference work for various central banks' operational frameworks. For a more concise overview, go directly to Section 4, which summarises the differences and similarities between the operational frameworks. In Section 5, we provide some concluding remarks that look to the future.

2 Three main types of operational framework

Central banks may have different objectives for monetary policy, which is to say the most important task for their operations. Most commonly, central banks have some form of inflation target, meaning a price stability target. This means that the central bank aims to maintain a certain rate of change in the general price level. Another relatively common objective is an exchange rate target.[3] This means that the central bank aims to stabilise the value of the domestic currency against another dominant currency or basket of currencies. As a complement to these overall monetary policy objectives, it is also common for central banks to have more or less explicit real

[1] See Hansson and Wallin Johansson (2023) for a description of the Riksbank's reformed operational framework and an account of the motives and considerations behind the current design.

[2] Due to the fact that the Hungarian central bank, Magyar Nemzeti Bank, implemented a number of major reforms to its operational framework in September 2023, its operational framework is described on the basis of its status on 1 October 2023.

[3] Of the central banks studied in this article, only Danmarks Nationalbank has an exchange rate target as the overall objective of monetary policy.

economic targets and the objective of promoting an efficient payment system and financial stability.

The monetary policy operational framework is used to influence short-term market interest rates in a way that helps the central bank achieve its monetary policy objective. Regardless of the overall monetary policy objective, central banks usually decide on the level of one or more main policy rates. These signal the level of interest rates that the central bank expects to lead to the most favourable outcome based on its objectives and mandate. The operational framework is used to establish this level of interest rates in the most short-term money markets. This represents the first step in the monetary policy transmission from the policy rate to the broader economy. The money market interest rates to which the central bank attaches the greatest importance, and the level at which it intends to stabilise them, are usually specified in a so-called **operational objective** for the framework.

Central bank operational frameworks can broadly be categorised into three different types: corridor systems, floor systems and quota systems. We describe these three main types below. An important concept in this context is 'monetary policy counterparty'. This refers to the market participants with which the central bank can conduct transactions within the operational framework.

2.1 Corridor systems

A corridor system is characterised by the central bank stabilising market rates within the interest rate corridor of the operational framework. The interest rate corridor consists of the central bank's overnight deposit and lending rates. The central bank's main policy rate is usually in the centre of the corridor with the same distance to the deposit rate as to the lending rate. Central banks with corridor systems usually aim to stabilise market interest rates in the middle of the corridor, at the level of the main policy rate.

If the liquidity position of the banking system vis-à-vis the central bank is reasonably well balanced, it can be expected that some counterparties will have a liquidity surplus at the end of the day and others a liquidity deficit. This means that some counterparties have a deposit need while others have a borrowing need. A central bank usually applies different interest rates for deposits and loans. The interest rate for loans is usually higher than the interest rate for deposits. In this way, the difference between the central bank's deposit and lending rates creates an incentive for counterparties to balance liquidity with each other in the market at an interest rate that falls between the interest rate they would have paid or received if they had instead borrowed or deposited liquidity with the central bank. This causes the overnight market rate to stabilise in the middle of the corridor.

If the banking system is not in balance from the start, the central bank can temporarily balance the system by either draining or injecting liquidity through market operations. This means that the corridor system also works when the banking system has a structural liquidity surplus or deficit, in addition to when it is in balance. An operational framework with these characteristics is said to be universal, which is a

key feature of corridor systems. At the same time, it requires the central bank to have the ability to drain the right amount of liquidity from the banking system, or add the right amount to it, which presupposes that the central bank can adequately forecast the liquidity position of the banking system.

As a central bank with a corridor system does not need to maintain a liquidity surplus for the smooth functioning of the operational framework, it is also not necessary for it to have a large balance sheet. The corridor system can therefore help to make the central bank's balance sheet, and hence its equity, less sensitive to market movements. This means that the corridor system is associated with less financial risk for the central bank than other types of operational framework.[4]

A key parameter in the design of a corridor system is the corridor width, meaning the difference between the central bank's overnight deposit and lending rates. This choice can differ significantly across central banks and is mainly a trade-off between limiting volatility in the overnight market on the one hand and stimulating interbank activity on the other. A narrower corridor reduces the volatility of the overnight rate, as the central bank's deposit and lending rates limit movements in the overnight rate. At the same time, the incentives for interbank activity are reduced as the cost saving or gain to counterparties from liquidity balancing in the market rather than with the central bank, is smaller for a narrow corridor (Bindseil and Jablecki, 2011). Less interbank activity also means that the central bank is more involved in the markets. Similarly, counterparties' incentives to seek market solutions in a wide corridor are strengthened, while movements in the overnight rate risk becoming larger.

2.2 Floor systems

Floor systems are characterised by the central bank stabilising market rates at the floor of the interest rate corridor, which is the central bank's overnight deposit rate. In floor systems, the deposit rate is usually the same as the main policy rate.

Central banks with floor systems provide ample access to liquidity for their counterparties. This means that their counterparties have a need to deposit liquidity overnight. As all counterparties generally share this deposit need, most counterparties turn to the central bank rather than the market to deposit liquidity overnight. This pushes the overnight rate down to the same interest-rate level offered by the central bank for deposits.

In a well-implemented floor system, one in which the central bank ensures that there is always a significant surplus of liquidity, short-term market rates can be expected to be less volatile than in a corridor system, for example. At the same time, all liquidity

[4] This does not mean that central banks using corridor systems are automatically only exposed to insignificant financial risk, but rather that the operational framework itself does not require the central bank to have a large balance sheet that exposes the central bank to greater financial risk. See Caruana (2011) for a discussion of this, as well as four additional risks that a large balance sheet (risk of inflation, risk to financial stability, risk to market functioning and risk to government debt management) may entail. See also Borio (2023) for a similar discussion.

balancing can be expected to take place with the central bank, which means that the incentives for an active interbank market are usually weak in a floor system.

With a floor system, the central bank does not need to have a good forecasting ability for daily liquidity flows, as it may need with a corridor system. On the other hand, the central bank needs to be good at forecasting the banking system's demand for central bank reserves so that it can ensure that there is always a surplus of these reserves. The central bank can deal with this in two different ways, with a distinction being made between two different types of floor systems: demand-driven and supply-driven. A demand-driven system is characterised by the central bank providing the amount of central bank reserves the counterparties demand. A supply-driven system is characterised by the central bank instead providing the amount it deems sufficient. In both cases, counterparties can usually access central bank reserves at a low cost.

Floor systems have become more common over the last 15 years as many central banks have carried out large-scale asset purchases.[5] Indeed, floor systems can easily manage a growing liquidity surplus. At the same time, a central bank with a large balance sheet is typically exposed to greater financial risks than a central bank with a small balance sheet.[6] There is also a risk that the central bank may affect the demand for liquidity in the banking system more fundamentally by maintaining a large liquidity surplus for an extended period (Acharya et al. 2022). In turn, this means that a central bank with a floor system may find it difficult to reduce the liquidity surplus of the banking system. In addition, a floor system may also create a conflict of objectives for the central bank if it wants to pursue a contractionary monetary policy, as it requires a sufficiently large liquidity surplus in all cases.

2.3 Quota systems

Quota systems are characterised by the central bank stabilising market rates within the interest rate corridor of the operational framework and by there being two different interest rates for deposits in the central bank. Counterparties receive a favourable interest rate, usually equivalent to the central bank's main policy rate, for a certain volume that they deposit with the central bank, known as the quota. The quota is determined for each monetary policy counterparty, usually on the basis of a balance sheet measure. Deposits exceeding this quota receive a less favourable interest rate. Often the difference in interest rates is significant.

The quota rate is usually in the centre of the interest rate corridor formed by the central bank's deposit and lending rates. This means that the counterparties in a quota system have an incentive to engage in liquidity balancing transactions with each other in the market, so that all counterparties meet their quotas and can thus fully benefit from the more favourable interest rate. Quota systems can thus create incentives for financial agents to seek market solutions for their liquidity management

[5] See, for example, Borio (2023) for a discussion of the trend towards more central banks having floor systems and the consequences of this.

[6] See, for example, Caruana (2011).

and thus contribute to a more active interbank market.[7] This makes the counterparties' incentive structure similar to that of a corridor system.

Quota systems also have several similarities to floor systems. A basic condition for a quota system to work as intended is that the central bank maintains a surplus of liquidity. If the aggregate liquidity surplus exceeds the sum of the quotas, the excess volumes will receive the less favourable deposit rate. This means that the deposit rate constitutes marginal pricing for liquid assets, thereby setting the tone for interest-rate formation and the further transmission of monetary policy. This mechanism is similar to a floor system. By applying a quota system, the central bank can thus be generous with the remuneration of counterparties holding central bank reserves while maintaining good interest-rate steering. This made quota systems more common during the period of negative interest rates and large liquidity surpluses.[8,9]

There are some common differences between how central banks apply quota systems. They mainly concern the size of the quota, how its size is determined and the difference between the interest rate on quota deposits and the interest rate on other deposits. Setting quotas is usually a resource-intensive activity. Among other things, it requires the central bank to forecast counterparties' demand for liquidity and the overall liquidity surplus. There is also always an element of arbitrariness when the central bank decides on the level of quotas.

Several central banks apply reserve requirements, which sometimes resemble quota systems. Reserve requirements mean that counterparties must deposit a certain amount of liquidity with the central bank. In some cases, reserve holdings accrue interest according to the same principle as the quota in a quota system, i.e. they receive a more favourable interest rate than other deposits. There are, however, significant differences between quota systems and reserve requirements. The purpose of reserve requirements is not always monetary policy, which may mean that reserve holdings receive less interest than other deposits at the central bank or none at all. It is also not uncommon for monetary policy counterparties to be penalised if they do not comply with reserve requirements. This is not the case in a quota system, which instead is usually based on incentives. Moreover, the amount of central bank reserves that counterparties have to hold under a reserve requirement is typically smaller than those that may be held at a better rate under a quota system.

[7] See, for example, Altavilla et al. (2022).

[8] Note that several central banks referred to this as tiering rather than explicitly labelling their operational frameworks as quota systems.

[9] In many countries, this period coincided with concerns about the profitability and stability of the banking system. For interest-rate formation, it is primarily the return on the last krona, marginal pricing, that matters, while for the banks' return on deposits with the central bank, it is the average interest rate that is decisive. This means, for example, that a quota deposit with generous interest rates, such as a zero interest rate, improves the banks' profitability if the interest rate on excess deposits is negative. At the same time, it is the interest rate on the margin, which is negative that is transmitted to the short-term money market.

3 Monetary policy operational frameworks in selected jurisdictions

In Section 2, we described the basics of three main types of operational framework. In practice, however, operational frameworks can be designed in a variety of ways and it is not uncommon for operational frameworks to have elements that resemble more than one of the main types. As a result, it can be difficult to classify a central bank's operational framework according to the three main types. In order to understand how different central banks implement monetary policy in practice, it may therefore be more useful to describe and analyse the operational framework in terms of its three components. They are the **instruments** offered in the operational framework, the **counterparties** allowed to participate and the **collateral** accepted by the central bank for credit granting. In the following sections, we therefore describe the operational frameworks of fourteen central banks in terms of these three elements.

However, before examining each central bank's operational framework, it is useful to mention how we classify the different components of the operational framework.

The first component, the central bank's monetary policy **instruments**, is divided into standing facilities and market operations. **Standing facilities** are those instruments that can be used on a daily basis at the discretion of the counterparties, to an unlimited extent and under pre-specified conditions. They can be used either continuously during the day or as the money markets close. The duration of the facilities is usually only overnight. **Market operations**, on the other hand, are initiated by the central bank itself and are usually offered on a limited scale. They can have a maturity from overnight to several months, which means that market operations can be used to influence the liquidity position of the banking system vis-à-vis the central bank over a longer period of time.

The boundary between market operations and standing facilities can sometimes be somewhat blurred. For example, the name of an instrument may imply that it is a standing facility, even though its characteristics instead indicate that it is a frequently recurring market operation. In this article, we will classify the monetary policy instruments according to their characteristics, regardless of their name. Furthermore, it is worth noting that, while a large number of central banks use interest-bearing accounts as a monetary policy instrument, some central banks do not consider such accounts as a standing facility.[10] In this article, however, we will classify interest-bearing accounts at the central bank as standing facilities.

There is variation in whether central banks refer to their potential repo operations and repo facilities from the perspective of the counterparty or the central bank. For the sake of clarity, we will therefore use the term 'repo transaction' throughout, as well as the short form 'repo', and will specify whether these are used to absorb or provide liquidity to the banking system.

[10] These central banks reserve the term standing facility for their lending facilities. An example of a central bank that makes this distinction is the Swiss National Bank.

The vast majority of central banks have a wide set of instruments that they can use as part of their monetary policy operational frameworks. However, it is rare that a central bank applies all instruments simultaneously. The instruments used by the central bank usually depend on the structural liquidity position of the banking system towards it. Consequently, in order to provide a picture of the operational frameworks as they are actually applied, when describing the central banks' operational frameworks, we will only report on the instruments regularly offered by the central banks at mid-year 2023.[11] In addition, we focus on how central banks control short-term market rates – money market rates – and steer them towards their respective main policy rates. We thus do not go into detail as to whether central banks buy and sell financial assets to influence longer-term market interest rates, for example. We also do not report on the instruments offered by central banks for market-functioning or financial stability purposes, as central banks' mandates vary greatly in these areas.[12]

The second element of a operational framework is the central bank's **set of counterparties** and how it is organised. To simplify the comparison between central banks, we classify these as either narrow or wide. However, determining whether the criteria applied by the central bank to its monetary policy counterparties in the operational framework are wide or narrow is not straightforward. In this article, we define a set of counterparties as narrow if it can only consist of credit institutions. This includes institutions such as banks, savings banks and mortgage institutions. If additional agents, such as central counterparties, money market funds, investment funds and pension funds, can participate in the operational framework, we instead consider the set of counterparties to be wide.

The third element is the **collateral** that the central bank accepts to grant credit. In the same way that we classify the set of counterparties as narrow or wide, we classify the collateral pool as narrow or wide. We assess the collateral pool as narrow if one or both of the following criteria are met:

i) The central bank only accepts securities in its own currency.
ii) The central bank only accepts government bonds and equivalent debt instruments.[13]

It could be argued that this is a rough measure depending on the size and depth of local bond markets but it allows us to draw a simple boundary without subjective elements: if the accepted collateral pool is not judged to be narrow, it is automatically judged to be wide.

In this comparison, we have chosen mainly to include European central banks. In addition to the European Central Bank, we include the central banks of those EU

[11] In September 2023, Magyar Nemzeti Bank decided to implement a number of major changes to its operational framework. The vast majority of these changes were implemented between 27 September and 1 October 2023. We therefore present this operational framework as it stood on 1 October 2023.

[12] We also exclude those facilities and market operations that are directed only at foreign central banks and similar entities, such as the Foreign and International Monetary Authorities (FIMA) Repo Facility offered by the Federal Reserve.

[13] This includes subnational bonds in countries with a federal structure, as well as claims on central banks.

countries that, like Sweden, are not currently officially working towards adopting the euro as their currency.[14] In addition, the central banks of Iceland, Norway, Switzerland and the United Kingdom are also included in our sample. We also choose to study the operational frameworks in the United States and in three other non-European countries whose central banks are often compared to Sweden's, namely Australia, Canada and New Zealand. This means that we study the operational frameworks in the same countries as Sellin and Åsberg Sommar (2014) with the difference that we have added Denmark and Iceland to include all the Nordic central banks in our sample. With one exception, all of the fourteen central banks we study have an overall monetary policy objective of price stability. The exception is Denmark, which has an exchange rate target.

Our description of the central banks' operational frameworks is intended to be used as a reference work. Section 4 discusses the differences and similarities between the operational frameworks. In that section there are also summary tables of the information given in Section 3.

3.1 Australia – Reserve Bank of Australia (RBA)

The objective of the RBA's operational framework is to stabilise the interest rate on unsecured overnight interbank loans, referred to as the cash rate, close to the central bank's cash rate target.[15] The cash rate target is the RBA's main policy rate.

The RBA uses a floor system to implement its monetary policy and also characterises its operational framework as such. To ensure the smooth functioning of the payment system, the RBA also applies minimum reserve requirements.

3.1.1 Instruments

Standing facilities, available to some monetary policy counterparties

Account balances with the central bank, that is central bank reserves, earn interest at a level 10 basis points below the RBA's cash rate target. Overnight lending is offered through repo transactions against accepted collateral. There is no upper limit on lending, which takes place at an interest rate 25 basis points above the cash rate target.

Reserve holdings earn the same interest as the other central bank reserves, that is an interest 10 basis points below the cash rate target.

Unlimited and interest-free intraday credit is offered in the form of repos against approved collateral in the payment system.

Market operations, available to all monetary policy counterparties

[14] This means that the central banks of Denmark, Poland, the Czech Republic and Hungary are included in our sample, while the central banks of Bulgaria and Romania are not included, as the official policy in these countries is to endeavour to adopt the euro as their currency.

[15] In the market, this rate is known as AOINA (AUD Overnight Index Average).

In addition to the standing facilities, the RBA offers weekly market operations to provide liquidity to the banking system. Market operations are conducted in the form of repo transactions and have a maturity of 28 days. The RBA sets a lower bound for accepted bids and accepts all bids at or above this rate with full allocation. The lower bound corresponds to the interest rate for overnight index swaps (OIS) with the same maturity as the repo transaction plus a surcharge which is currently 5 basis points.

In addition, the RBA offers daily liquidity-providing repo transactions with no maturity restrictions to those counterparties subject to reserve requirements. This market operation is mainly used to facilitate the fulfilment of counterparties' reserve requirements and the interest rate corresponds to the rate earned on central bank reserves.

3.1.2 Counterparties

We classify the RBA's set of counterparties in its operational framework as wide because the central bank allows more types of agents than credit institutions as counterparties. For example, eligible companies include banks, building societies, credit unions and central counterparties. To be eligible to participate in the operational framework, counterparties must participate in the RITS central payment system and the Austraclear securities settlement system, among others. In addition, they need to be adequately supervised and able to ensure efficient and timely processing of transactions.

Counterparties that are direct or indirect members of RITS have access to the domestic market operations. Counterparties that are direct members of RITS, and thus hold accounts there, also have access to the standing facilities. On 30 June 2023, the RBA had 161 counterparties, meaning members of RITS, of which 98 were direct participants and held accounts. Of the 98 direct participants, the majority were banks, building societies and credit unions.

3.1.3 Collateral

According to our classification, the RBA accepts a narrow collateral pool for its lending. This is because it only accepts collateral in the form of securities denominated in Australian dollars and issued under Australian law. Government bonds, covered bonds, commercial paper and bonds, and other securities are accepted, as long as they fulfil requirements for credit ratings, for example. The RBA imposes the same collateral requirements for standing facilities and market operations.

3.2 Canada - Bank of Canada (BoC)

The objective of the BoC's operational framework is to stabilise overnight money market rates close to the central bank's target rate. In practice, this is assessed by looking at CORRA, the Canadian Overnight Repo Rate Average, which is a secured overnight reference rate. The target rate is the BoC's main policy rate. For its monetary policy operational framework, the BoC uses a floor system. The BoC also explicitly classifies its operational framework as a floor system.

3.2.1 Instruments

Standing facilities, available to some monetary policy counterparties

Account balances at the central bank, which is to say deposits, receive the deposit rate, which is equal to the current target rate. Unlimited overnight credit is available through the standing liquidity facility against eligible collateral at an interest rate of 25 basis points above the target rate, known as the bank rate.

Within the payment system, interest-free intraday credit is offered against all eligible collateral, without limit.

Market operations, available to some monetary policy counterparties

When it comes to market operations, the BoC offers daily overnight repos of both the liquidity-providing and liquidity-absorbing varieties.[16] The repos offered to provide liquidity are priced through an auction procedure with the target rate as the minimum interest rate. Repos offered to absorb liquidity are conducted at a fixed rate equal to the target rate.[17] In addition, the BoC offers a standing repo facility at bank rate to provide liquidity.[18]

3.2.2 Counterparties

We classify the BoC's set of counterparties as wide, as the eligibility requirements do not limit it to credit institutions. Currently, however, all monetary policy counterparties are banks or are affiliated with banks. Nevertheless, different types of participant have access to different monetary policy instruments. Some counterparties have access to standing facilities while others have access to market operations.

Direct members of the Lynx central payment system have access to interest-bearing accounts at the BoC and the standing liquidity facility. Possible members are banks with domestic banking licences, branches of some foreign banks and other financial institutions. On 12 June 2023, there were 16 direct members of Lynx.

Canadian primary dealers have access to the standing repo facility and other market operations. On 12 June 2023, there were eleven such dealers.

3.2.3 Collateral

The BoC accepts different collateral for its different monetary policy instruments. In market operations, only securities issued by the Canadian government in Canadian dollars are accepted, which is a narrow collateral pool according to our definition. The

[16] These operations are scheduled daily and executed through established programmes but, as allocation ultimately takes place at the discretion of the BoC, we classify them as market operations and not as standing facilities.

[17] Overnight liquidity-providing repos are offered in a limited volume and are allotted through a uniform-price auction procedure. Liquidity-absorbing repos are conducted on a full allotment basis and against securities issued by the Canadian government in Canadian dollars.

[18] As lending is subject to counterparty limits, we choose to classify it as a regular market operation instead of a standing facility.

standing liquidity facility accepts a number of different types of securities and loan portfolios, subject to strict currency restrictions and credit rating requirements. Although we classify the accepted collateral pool for the standing facility as wide, it should be noted that the collateral must be denominated in Canadian or US dollars. In addition, the BoC applies stricter rules for securities accepted in US dollars. Intraday credit is offered against all eligible collateral.

3.3 Czech Republic - Česká národní banka (CNB)

The CNB's main policy rate is the rate for repos with a two-week maturity, henceforth referred to as the two-week repo rate. The CNB does not specify an explicit operational objective for its operational framework. Nor does it classify its operational framework as one of the three main types discussed in Section 2. However, we consider that their operational framework has the greatest resemblance to a corridor system. The corridor is symmetrical and has a width of 200 basis points. The CNB applies reserve requirements but their purpose is not monetary policy.[19]

3.3.1 Instruments

Standing facilities, available to some monetary policy counterparties

The CNB applies reserve requirements to certain counterparties. These funds earn interest at the two-week repo rate.[20] Counterparties have the possibility to deposit central bank reserves in excess of this level in the central bank's deposit facility.[21] The interest rate on the deposit facility, the discount rate, is 100 basis points below the two-week repo rate. Overnight lending is offered against accepted collateral in the lending facility. The interest rate of the facility is called the Lombard rate and is 100 basis points above the two-week repo rate. The discount rate and the Lombard rate constitute the floor and ceiling of the interest rate corridor.

Unlimited interest-free intraday credit is offered against eligible collateral in the payment system.

Market operations, available to all monetary policy counterparties

Three times a week, the CNB offers market operations in the form of liquidity-absorbing repos with a two-week maturity. The operations are conducted as variable rate bid procedures with the two-week repo rate as the upper bound for acceptable bids. The offered volume corresponds to the forecast of the total liquidity surplus for the day.

[19] The reserve requirement is used to support the payment system. The level of the reserve requirement is set at 2 per cent of the reserve base.

[20] As of 5 October 2023, the funds used to meet the reserve requirements do not bear interest.

[21] Excess central bank reserves are not automatically remunerated at the deposit rate, but require an active decision by the counterparty. Excess central bank reserves remaining in the account are remunerated at 0 per cent.

In addition, the CNB offers weekly liquidity-providing repos with a maturity of two weeks.[22] The central bank offers these for both monetary policy and financial stability reasons. Provided that counterparties provide sufficient collateral, they can borrow an unlimited volume in these repo transactions. The interest rate is fixed but differentiated between counterparties. The interest rate is set 10 basis points above the two-week repo rate for banks and 20 basis points above the two-week repo rate for non-bank counterparties.

3.3.2 Counterparties

We classify the CNB's counterparty base as wide, although access to the different instruments of the operational framework is segmented. Counterparties subject to reserve requirements, such as banks, foreign bank branches and credit unions, have access to all instruments. Non-bank counterparties, such as insurance companies, pension funds and fund management companies, only have access to liquidity-providing market operations. On 30 June 2023, 47 counterparties were subject to reserve requirement. 33 of them had the relevant agreement for lending.

3.3.3 Collateral[23]

According to our classification, the CNB accepts a narrow collateral pool in its lending facility and market operations, as only koruna-denominated collateral is accepted. In market operations, the CNB also accepts different collateral from different types of counterparties. From banks, branches of foreign banks and credit unions the CNB accepts government bonds, treasury bills, bills issued by the CNB and mortgage bonds. From other eligible counterparties, only government bonds, treasury bills and bills issued by the CNB are accepted.

3.4 Denmark – Danmarks Nationalbank (DN)

Unlike most central banks in our sample, DN has an exchange rate target.[24] The operational objective of DN's framework is therefore to ensure that the peg of the Danish krone to the euro holds. However, in order to achieve this objective, DN aims to steer short-term market rates, which is similar to the other central banks in our sample. The target level for these money market rates is the level that maintains the peg.

DN classifies its operational framework as a corridor system but recognises that it can resemble a floor system when there is an ample amount of central bank reserves in the system. The width of the central bank's corridor is 15 basis points. Because the target level for short-term market interest rates varies over time, the interest rate that DN classifies as the main policy rate also varies over time. Depending on the amount of central bank reserves, either the deposit or lending rate is considered the

[22] The market operation is offered twice a week, but to different counterparty pools. Consequently, a single counterparty can only participate in the market operation on one occasion.

[23] Upon request, the CNB also offers what is known as a collateral upgrade swap.

[24] While DN also aims to achieve price stability, it considers that this is best achieved through a monetary policy that ensures that the value of the Danish krone stabilises against the euro.

main policy rate.[25] At the time of writing this article, i.e. in the summer of 2023, the deposit rate is judged to be the most important interest rate.

3.4.1 Instruments

Standing facilities, available to all monetary policy counterparties

Balances on so-called 'folio accounts' are remunerated at the deposit rate. The deposit rate is the floor of the interest rate corridor. There is no standing lending facility.

In the central payment system, DN offers unlimited interest-free intraday credit against collateral.

Market operations, available to all monetary policy counterparties

The ceiling of the DN interest rate corridor is not an overnight lending facility. Instead, DN offers weekly lending, normally with a one-week maturity, via market operations. Only the value of the collateral pledged by the counterparties limits the amount they can borrow. The lending rate is 15 basis points above the deposit rate. DN also offers weekly liquidity-absorbing open market operations with a one-week maturity. In these operations, counterparties are offered the possibility of placing an unlimited volume in certificates of deposit issued by DN. The interest rate is fixed and equal to the deposit rate.[26]

3.4.2 Counterparties

DN has one monetary policy counterparty group for all its operations in Danish kroner. By our definition, the counterparty group is narrow as only banks and mortgage institutions are eligible. DN had 69 monetary policy counterparties on 30 June 2023. Of these, 64 were banks and 5 housing institutions.

3.4.3 Collateral

Although DN's accepted collateral pool is classified as wide according to our criteria, as non-government bonds are accepted as well as securities not denominated in DKK, the accepted collateral pool is still relatively narrow. Apart from Danish kroner, only securities denominated in euro are accepted. The eligible collateral consists of Danish and Faroese government bonds, including government-guaranteed bonds, bonds issued by Kommunekredit and mortgage bonds, covered bonds and covered mortgage bonds issued by institutions subject to the Danish Financial Business Act.

[25] If the net position of the banking system is large, DESTR (Denmark Short-Term Rate) is likely to trade close to the floor of the corridor and the deposit rate is then considered the main policy rate.

[26] Certificates of deposit are securities that are transferable between monetary policy counterparties, but not outside this pool. The interest rate on certificates of deposit was changed to the deposit rate in 2021 and has since been utilised to a limited extent.

3.5 Euro area – European Central Bank (ECB)

The ECB has three main policy rates: the deposit facility rate, the main refinancing rate and the marginal lending facility rate. The three main policy rates are communicated as three separate decisions. The ECB has no officially stated operational objective for its monetary policy operational framework. However, based on various descriptions of the framework and speeches by members of the Governing Council, it is clear that the aim is to stabilise short-term money market rates close to the main policy rates. The liquidity surplus is currently high, and the aim is therefore to steer short-term money market rates towards the deposit rate.[27]

While the ECB does not classify its operational framework as one of the main types discussed in Section 2, our assessment is that it shares most similarities with a floor system. It is also worth noting that Isabel Schnabel, a member of the ECB's Governing Council, referred to the operational framework as a floor system in a speech on 27 March 2023.[28] The ECB applies reserve requirements to credit institutions established in the euro area, as described below.[29]

3.5.1 Instruments

Standing facilities, available to all monetary policy counterparties

The ECB offers overnight deposits through a standing deposit facility. The funds counterparties place in the facility, as well as the funds they hold to fulfil reserve requirements, earn the deposit facility rate.[30] The deposit facility rate is the lowest of the three main policy rates. In addition, the ECB offers overnight collateralised credit through its marginal lending facility, at the marginal lending facility rate. This rate is the highest of the three main policy rates and is currently 75 basis points above the deposit facility rate.

Unlimited, interest-free intraday credit is offered within the payment system against accepted collateral.

Market operations, available to all monetary policy counterparties

The ECB offers two regular market operations: the main refinancing operations and the longer-term refinancing operations. Both are liquidity-providing. The main refinancing operations are regular reverse transactions with a maturity of one week. The market operation is offered weekly and has no volume limit. Lending is collateralised and the interest rate on the operations, i.e. the main refinancing rate, is

[27] See for example Corsi and Mudde (2022).

[28] Schnabel (2023).

[29] The ECB applies an average reserve requirement. The level of the reserve requirement is 1 per cent of the reserve base i.e. certain specific liability items.

[30] The ECB requires credit institutions established in the euro area to hold a certain amount of central bank reserves on account with their respective national central banks, i.e. a reserve requirement. These central bank reserves earned interest equivalent to the deposit facility rate in the summer of 2023. However, from 20 September 2023 onwards, reserve holdings have earned 0 per cent interest.

currently 50 basis points above the deposit facility rate and 25 basis points below the marginal lending facility rate.

The longer-term refinancing operations are offered in a similar way. The main difference is that these operations have a maturity of three months and are only offered once a month. The operations are offered in full allotment and as reverse transactions at a fixed rate corresponding to the average main refinancing rate over the maturity period.

3.5.2 Counterparties

The ECB has one set of counterparties for its monetary policy instruments. Eligible counterparties are credit institutions subject to adequate supervision and subject to Eurosystem reserve requirements. This means that we characterise the ECB's set of counterparties as narrow, even though it is relatively large in terms of the number of counterparties. The ECB does not publish information on the exact number of counterparties, but according to Corsi and Mudde (2022) the ECB had 1,869 monetary policy counterparties at the end of 2021.

3.5.3 Collateral

The ECB accepts a wide collateral pool for lending in facilities and market operations. Acceptable collateral includes, for example, government bonds, covered bonds and other bank bonds, asset-backed securities and, to a limited extent, non-marketable assets and cash. The securities may be issued by agents domiciled in one out of several accepted countries and be denominated in one out of several accepted currencies.

3.6 Hungary - Magyar Nemzeti Bank (MNB)

In September 2023, the Executive Board of the MNB decided to implement several changes to its monetary policy operational framework.[31] The vast majority of changes were implemented between 27 September and 1 October 2023. Because of this, we describe the MNB's monetary policy framework as it was on 1 October 2023 instead of 30 June 2023.

The main policy rate of the MNB is the so-called base rate. The operational objective of the MNB's monetary policy operational framework is to align short-term market interest rates with the base rate and expectations of it. The MNB does not classify its operational framework as one of the main types discussed in Section 2, but our assessment is that it shares most similarities with a corridor system. On 1 October 2023, their corridor is 200 basis points wide.[32] Domestic banks are subject to reserve requirements, see below.

[31] The changes were decided on two occasions, on 12 and 26 September.

[32] The width of the corridor has been gradually reduced since May 2023. Before this, the width of the corridor was 1,250 basis points, i.e. 12.5 percentage points.

3.6.1 Instruments

Standing facilities, available to all monetary policy counterparties

A quarter of the central bank reserves held by counterparties to fulfil the reserve requirement are non-interest bearing and the remainder earn the base rate.[33] The central bank reserves held by counterparties in excess of reserve requirements are also remunerated at the base rate.

The MNB offers a standing deposit facility and a standing lending facility, both with an overnight maturity. Holdings in the deposit facility are remunerated at a rate 100 basis points below the base rate and constitute the floor of the MNB's interest rate corridor. Lending is offered against collateral without restriction at an interest rate that is currently 100 basis points above the base rate. This lending rate is the ceiling of the interest rate corridor.

Unlimited, interest-free intraday credit is offered within the payment system against accepted collateral.

Market operations, available to all monetary policy counterparties

The MNB issues discount bills to absorb liquidity. The maturity and frequency of issuance are set at the discretion of the MNB, but in general the bills are issued once a week and have a maturity of seven days. The bills are issued through an auction procedure at the central bank's base rate.

In addition, the MNB offers deposits with longer maturities and variable interest rates. The market operation is usually offered once a month in unlimited volume. The interest rate corresponds to the current base rate plus a supplement currently set at 0 basis points. The maturity can be up to six months but is usually set at one month.

On a daily basis, the MNB also offers, through tenders, overnight FX swaps (EUR/HUF) to inject euro liquidity into the banking system.[34] FX swaps are offered in limited volumes usually at variable rates where the MNB announces the maximum rate at which it will accept bids.

3.6.2 Counterparties

The MNB has one set of monetary policy counterparties for all its HUF instruments. As only credit institutions registered in Hungary, including Hungarian branches of foreign banks, are eligible to become counterparties, we classify the set of counterparties as narrow. Counterparties must be direct members of the central payment system VIBER or direct members of the clearing system for interbank transactions BKR.[35] On 30 June 2023 the MNB had approximately 30 counterparties.

[33] Counterparties that fail to fulfil their reserve requirements are subject to a penalty interest rate equal to the central bank's base rate multiplied by 2.

[34] The transactions are settled the day after the tenders. The maturity is therefore T/N.

[35] To be eligible for debt instruments, counterparties must also have a collateral account with KELER (the Central Securities Depository).

3.6.3 Collateral

The MNB accepts a wide collateral pool for its monetary policy instruments. Eligible collateral includes securities and corporate receivables in a number of currencies, as well as fixed deposits with longer maturities (and variable interest rates) with the MNB.

3.7 Iceland - Seðlabanki Íslands (SI)

SI's main policy rate is the seven-day deposit rate.[36] The objective of SI's monetary policy framework is to stabilise interbank market rates close to this rate. SI classifies its operational framework as a corridor system, but with a floor. The corridor is asymmetric around the seven-day deposit rate and has a width of 200 basis points. SI also applies fixed non-interest-bearing reserve requirements. However, the reserve requirements have no monetary policy purpose.[37]

3.7.1 Instruments

Standing facilities, available to all monetary policy counterparties

SI offers its counterparties the possibility to both invest and borrow liquidity overnight. The two standing facilities are described by their characteristics and have no explicit names. The interest rate paid by SI on central bank reserves is called the deposit rate and is 25 basis points below the seven-day deposit rate. Loans are offered against eligible collateral without any volume limit at an interest rate of 175 basis points above the seven-day deposit rate. These deposit and lending rates constitute the floor and ceiling of SI's interest rate corridor.

Interest-free intraday credit is offered within the payment system against accepted collateral up to an individual volume limit.

Market operations, available to all monetary policy counterparties

Once a week, SI offers open market operations in the form of fixed deposits with a seven-day maturity to absorb liquidity. The fixed-term deposits are offered at the main policy rate, and in limited volumes. The allocation is done through an auction procedure.

3.7.2 Counterparties

SI has one group of monetary policy counterparties for all its operations in krónur. Those eligible to become counterparties are commercial banks, savings banks and Icelandic branches of foreign financial institutions. SI's set of counterparties is

[36] The main policy rate corresponds to the rate judged to have the largest impact on short market rates. Thus, the interest rate this represents may change over time. Since 2014, the seven-day deposit rate has been considered the main policy rate.

[37] The fixed non-interest-bearing reserve requirement amounts to 2 per cent of the reserve base. The main purpose of the reserve requirement is to reduce the central bank's costs of implementing monetary policy. The aim is thus not to influence the monetary policy stance.

therefore categorised as narrow according to our definition. On 30 June 2023 the SI had 9 counterparties. Of these, 4 were commercial banks and 5 savings banks.

3.7.3 Collateral

SI accepts a narrow collateral pool for lending in its operational framework. Only securities denominated in krónur are accepted. Eligible collateral is mainly bonds and bills issued by the Icelandic government, government-guaranteed securities, covered bonds and mortgage bond portfolios.[38]

3.8 New Zealand – Reserve Bank of New Zealand (RBNZ)

The RBNZ's main policy rate is the official cash rate. The objective of the RBNZ's monetary policy framework is to stabilise short-term market interest rates close to the official cash rate. The RBNZ uses a floor system to implement monetary policy and explicitly characterises its operational framework in this way.

3.8.1 Instruments

Standing facilities, available to all monetary policy counterparties

The RBNZ pays interest at the official cash rate on overnight deposits at the central bank. In addition, the RBNZ offers a standing repo facility that allows counterparties without an account at the central bank to deposit cash at an interest rate equal to the official cash rate minus 10 basis points.[39] The RBNZ offers overnight lending through a liquidity-providing repo facility. In the facility, counterparties can borrow an unlimited volume in exchange for eligible collateral at an interest rate of 25 basis points above the official cash rate.

There is no separate facility for intraday credit in the payment system. All payments must be settled in central bank reserves.

Market operations, available to all monetary policy counterparties

Two days a week, the RBNZ issues reserve bank bills with a maturity of 7 and 28 days in limited volumes to drain the banking system of liquidity. The bills are issued through an auction procedure and are priced at a maximum of the official cash rate, or the market-implied expected level of the official cash rate at longer maturities.

In addition, the RBNZ uses FX swaps and cross currency basis swaps (NZD/USD) to influence the amount of liquidity. If the purpose is to provide liquidity, the RBNZ conducts operations at or above the market-implied level of the official cash rate. If the aim is instead to drain liquidity, the transactions are conducted at or below the market-implied level of the official cash rate. Market operations are offered as

[38] In the payment system, fixed deposits with the central bank can also be used as collateral.

[39] Unlike other liquidity-absorbing repo facilities in this review, the RBNZ's standing repo facility is limited only by the central bank's holding of collateral, i.e. there is no counterparty limit, for example. Therefore, we classify this repo facility as a standing facility. In addition, it is available close to market closure, which means that it is possible for counterparties to access it on their own initiative at the end of the day.

needed, but up to several times a day. Maturities range from one day to up to six months.

3.8.2 Counterparties

We classify the RBNZ's set of counterparties as wide because the eligibility requirements do not limit it to credit institutions. All direct participants in the Exchange Settlement Account System receive interest on their account balances at the official cash rate. These counterparties have the possibility to apply for access to the other standing facilities and market operations but do not have automatic access to them.[40] Other agents can also apply to become a counterparty. On 30 June 2023 the number of counterparties was between 20 and 30. In practice, most could access both standing facilities and all market operations.

3.8.3 Collateral

We classify the RNBZ's eligible collateral pool as narrow because only New Zealand dollar-denominated collateral is accepted for New Zealand dollar monetary policy instruments. However, both the standing lending facility and the open market operations accept a relatively wide pool of assets.

3.9 Norway - Norges Bank (NB)

The main policy rate of NB is the policy rate. The objective of NB's monetary policy framework is to stabilise short-term market interest rates close to the policy rate. NB uses a quota system with a corridor width of 200 basis points for its operational framework. NB explicitly categorises its operational framework as a quota system.

3.9.1 Instruments

Standing facilities, available to all monetary policy counterparties

NB offers a standing deposit facility and a standing lending facility. Deposits up to and including a threshold represented by the banks' individual quota are remunerated at the policy rate, while deposits above the quota are subject to the less favourable reserve rate. The quotas are determined on the basis of the overall liquidity position that NB deems appropriate.[41] The reserve rate is set 100 basis points below the policy rate and constitutes the floor of the corridor. Counterparties can borrow unlimited volumes overnight against eligible collateral in the standing facility. This facility is priced 100 basis points above the policy rate and constitutes the ceiling of the interest rate corridor.

[40] To be eligible for this, applicants must be financial institutions with a regular presence in the capital markets either as market participants or by providing infrastructure that contributes to the stability and efficiency of the New Zealand financial system. In general, institutions should have a credit rating within *investment grade,* that is, BBB- or better. To be accepted as a counterparty in FX swap transactions, counterparties must also have an ISDA agreement with the RBNZ.

[41] Banks are divided into three groups based on their total assets. All banks within each group receive the same quota. NB normally reviews the total quota volume and the distribution between banks twice a year.

Unlimited, interest-free intraday credit is offered within the payment system against accepted collateral.

Market operations, available to all monetary policy counterparties

NB conducts market operations as necessary to ensure that the volume of central bank reserves does not deviate from the targeted level. Due to fluctuations in the amount of central bank reserves, this happens relatively frequently.

When the NB drains liquidity in market operations, it issues certificates (F-deposits) and when it provides liquidity, it offers collateralised loans (F-loans). The offered volume and maturity are predetermined and set by NB. The allocation and the interest rate are set within the framework of an auction procedure.[42] In F-deposit auctions, the interest rate must be equal to, or lower than, the main policy rate. For F-loans, the interest rate must be equal to, or higher than, the main policy rate.

3.9.2 Counterparties

NB has one set of monetary policy counterparties for all its instruments in kroner. The set of counterparties is classified as narrow because only Norwegian banks, savings banks and Norwegian branches of foreign banks are eligible to become counterparties, provided that they are actively involved in payment and credit intermediation in Norway. On 30 June 2023, NB had approximately 115 counterparties.

3.9.3 Collateral

NB accepts a wide collateral pool. Provided that restrictions such as credit ratings are met, debt securities from issuers in Norway, EU/EEA countries and nine other countries are accepted. The collateral must be denominated in one of 11 recognised currencies.

The same collateral pool applies to all monetary policy lending and to intraday credit in the payment system.

3.10 Poland - Narodowy Bank Polski (NBP)

The main policy rate of the NBP is the so-called reference rate. The objective of the NBP's monetary policy operational framework is to stabilise the POLONIA rate close to the reference rate. POLONIA, or Polish Overnight Index Average, is based on unsecured overnight interbank transactions in Polish zloty. The NBP does not classify its operational framework as one of the three main types discussed in Section 2, but our judgement is that it shares most similarities with a corridor system. The corridor width is currently 100 basis points. The NBP applies reserve requirements for

[42] Allocation is made according to the multi-price method.

monetary policy counterparties with the aim of increasing the stability of short money market rates.[43]

3.10.1 Instruments

Standing facilities, available to all monetary policy counterparties

The NBP remunerates central bank reserves up to the level of the reserve requirement at the reference rate. Central bank reserves above that level can be placed in the overnight deposit facility and earn the deposit rate, which is 50 basis points below the reference rate.[44] The NBP offers overnight lending against eligible collateral in the Lombard facility. The interest rate on the facility, the Lombard rate, is 50 basis points above the reference rate. The deposit rate and the Lombard rate constitute the floor and ceiling of the interest rate corridor of the operational framework.

Unlimited interest-free intraday credit is offered against eligible collateral in the payment system.

Market operations, available to all monetary policy counterparties

The NBP's main market operation aims to drain liquidity from the banking system. They do this by issuing bills once a week. The bills have a maturity of seven days and are offered in limited volumes at a fixed interest rate corresponding to the reference rate.

The regular issuance of bills is complemented by fine-tuning operations as needed. Fine-tuning operations are typically used to absorb liquidity and are offered either in the form of liquidity-absorbing repos or through additional issues of bills. Repo operations typically have a maturity of between one and three days and are offered at an interest rate equal to the reference rate.

3.10.2 Counterparties

The NBP has one set of counterparties for all its zloty-denominated instruments. Banks are authorised to become monetary policy counterparties. Thus, we classify the NBP's set of counterparties as narrow. On 30 June 2023 the NBP had 47 counterparties.

3.10.3 Collateral

According to our classification, the NBP accepts a wide collateral pool for credit. At the same time, we note that it is relatively narrow in terms of currency. Accepted collateral includes securities issued or guaranteed by the Polish state, securities issued by the NBP, as well as municipal bonds, covered bonds and corporate bonds if they

[43] The NBP uses an average reserve requirement. The reserve requirement level is 3.5 per cent of the reserve base.

[44] Central bank reserves other than those held to fulfil reserve requirements do not earn the deposit rate automatically. Rather, this requires an active choice by the counterparty. The central bank reserves left on the account earn 0 per cent interest.

are issued in zloty and have a high credit rating. In addition, the NBP accepts euro-denominated government bonds as collateral for credit. Intraday credit in the payment system is offered against the same collateral pool.

3.11 Sweden - Sveriges Riksbank (RB)

The RB's main policy rate is called the policy rate. The objective of the RB's monetary policy framework is to stabilise short-term market rates close to the policy rate. The RB uses a symmetric corridor system to implement monetary policy and also explicitly classifies its operational framework as such. The width of the corridor is 20 basis points.

3.11.1 Instruments

Standing facilities, available to all monetary policy counterparties

The RB offers one standing deposit facility and two standing lending facilities. In the standing deposit facility, counterparties can place an unlimited amount of liquidity overnight at the deposit rate. The deposit rate corresponds to the policy rate minus 10 basis points and constitutes the floor of the policy rate corridor. Overnight lending is primarily offered through the standing lending facility. Lending in that facility is offered without restriction against high-quality collateral, referred to as the primary collateral pool, at the lending rate. The lending rate corresponds to the policy rate plus 10 basis points and constitutes the ceiling of the corridor. In cases where counterparties do not have sufficient primary collateral to cover their borrowing needs, they are given the option of borrowing the remainder from the supplementary liquidity facility. In the supplementary liquidity facility, counterparties can borrow against a wider pool of collateral, referred to as the secondary collateral pool, at the liquidity facility rate equal to the policy rate plus 75 basis points.

Unlimited interest-free intraday credit is offered against accepted collateral within the payment system.

Market operations, available to all monetary policy counterparties

The RB conducts weekly market operations to balance the liquidity position of the banking system. This means that market operations are offered as liquidity-providing when the banking system has a liquidity deficit and as liquidity-absorbing when the banking system has a liquidity surplus. For several years, the latter has been the case, meaning that the RB uses market operations to absorb liquidity. RB does this by issuing Riksbank certificates. The Riksbank certificates are negotiable securities, known as bills or discount securities, which accrue at the policy rate. The RB issues them once a week in a limited volume, usually corresponding to the liquidity position of the banking system vis-à-vis the RB. Riksbank Certificates normally have a maturity of seven days.

3.11.2 Counterparties

The RB has one set of counterparties for the monetary policy operational framework. Only entities that are credit institutions with a registered office or branch in Sweden are eligible to apply to become a counterparty. For this reason, we classify the RB's set of counterparties as narrow. In addition to being a credit institution, a monetary policy counterparty must also fulfil a number of additional requirements, such as being a participant in the central payment system RIX and having sufficient operational capacity. On 30 June 2023 the RB had 26 monetary policy counterparties.

3.11.3 Collateral

The RB differentiates the eligible collateral between its monetary policy instruments. Throughout, the RB accepts securities denominated in seven different currencies.[45]

According to our classification, the so-called primary collateral pool is narrow, while the so-called secondary collateral pool is wide. The primary collateral pool - which is required from counterparties wishing to use the standing lending facility or, if offered, liquidity-providing repos - includes government bonds and central bank receivables. The secondary collateral pool, which is accepted in the supplementary liquidity facility, includes a number of different types of securities, including agency-issued securities, covered bonds and corporate bonds.

Intraday credit is granted against both primary and secondary collateral pools.

3.12 Switzerland - Swiss National Bank / Banque Nationale Suisse / Banca Nazionale Svizzera (SNB)

The SNB's main policy rate is called just that, the SNB policy rate. The objective of the SNB's monetary policy framework is to stabilise short secured money market rates close to the SNB's policy rate.[46] In addition, the SNB has specified that it considers SARON to be the main collateralised money market rate.[47]

The SNB does not classify its monetary policy operational framework as one of the main types discussed in Section 2. In official descriptions, however, the SNB refers to its operational framework as one of reserve tiering and reserve absorption. Because of this, and based on the characteristics of the operational framework, our judgement is that it shares most similarities with a quota system. The SNB applies reserve requirements for banks, see below.

[45] Accepted currencies are Swedish krona, US dollar, British pound, Danish krone, euro, Japanese yen and Norwegian krone.

[46] The SNB's monetary policy strategy emphasises not only the level of short market rates, but also the exchange rate.

[47] SARON is the Swiss Average Rate Overnight, a secured reference rate.

3.12.1 Instruments[48]

Standing facilities, available to all monetary policy counterparties

In line with a quota system, the SNB applies a tiered remuneration of domestic banks' deposits with the central bank.[49] Deposits up to a certain threshold, corresponding to an adjusted measure of banks' reserve requirements multiplied by a factor determined by the SNB, earn interest at the SNB's policy rate.[50] Deposits above this threshold earn a lower interest rate, the SNB's policy rate with a deduction. The deduction is currently set at 50 basis points. Counterparties that are not domestic banks, but have a deposit account, receive the lower interest rate on their entire account balance.

The SNB offers overnight lending against collateral via a lending facility known as the liquidity shortage financing facility. The lending is provided via repo transactions and the collateral pledged by the counterparties must be valued to at least 110 per cent of the amount borrowed.[51] The lending rate corresponds to the SNB's policy rate plus 50 basis points. In addition, CNB offers lending without a predetermined maturity through its Covid-19 refinancing facility. Lending is collateralised and at an interest rate equal to the SNB's policy rate.[52]

Unlimited interest-free intraday credit is offered in the form of repos against accepted collateral. As with the liquidity shortage financing facility, the value of the collateral must be at least 110 per cent of the loan amount.

Market operations, available to all monetary policy counterparties

The SNB's market operations include liquidity-absorbing repo transactions and the issuance of its own securities, known as SNB bills. The purpose of the SNB bill issues is to absorb liquidity and the market operation is usually offered once a week. The bills have maturities between 28 and 336 days and are issued by auction in limited volumes. The auctions are conducted as variable rate tender procedures. The liquidity-absorbing repo transactions are offered by the SNB every business day. Generally speaking, the repos follow the standard contracts in the Swiss franc repo market. The maturity can vary from overnight to several months, but is usually one

[48] Note that the SNB categorises its instruments within the operational framework into three categories: open market operations, standing facilities and interest on deposits. However, we classify the interest on deposit accounts as a standing facility, see the introduction to Section 3.

[49] In this context, 'domestic' refers to both Switzerland and the Principality of Liechtenstein.

[50] From 1 December 2023 sight deposits up to the level of the reserve requirement minus cash holdings are not remunerated i.e. earn an interest of 0 per cent. Sight deposits above this level, but below the threshold, continue to be remunerated at the SNB policy rate.

[51] The amount a counterparty can borrow in the facility is limited by a counterparty-specific limit. The limit is normally determined for one year at a time and is set so that it is not binding except in extraordinary situations. Because of this, we classify the lending as a facility and not a market operation.

[52] The facility was set up as a temporary facility during the Covid-19 pandemic, but remains active as of summer 2023.

week. The interest rate on transactions is currently the SNB's policy rate minus five basis points.[53]

3.12.2 Counterparties

According to our definition, the SNB has a wide set of counterparties as it extends beyond credit institutions. Domestic banks have access to all monetary policy instruments and benefit from the differentiated interest rate setting on deposits. Other counterparties have access to all instruments, but do not receive the tiered remuneration. These counterparties can be, for example, insurance companies or domestic non-bank financial institutions. The SNB accepts non-bank entities as counterparties if they are deemed to have a clear monetary policy objective and are considered to contribute to the liquidity of the Swiss franc repo market. In addition, agents must also fulfil the requirements for opening a deposit account with the SNB.

The SNB does not publish any information about its counterparties. However, the SNB's annual report for 2022 indicated that 73 market participants had been granted a limit to access the liquidity shortage facility. Moreover, at the end of 2022, there were 311 payment system participants, which is a prerequisite for participation in the Swiss repo market.

3.12.3 Collateral

We classify the accepted collateral pool of the SNB's liquidity shortage facility, intraday facility and liquidity-providing repos as wide. Accepted collateral includes, in seven different currencies, for example, debt securities issued by central banks, the public sector, international and supranational institutions, multilateral development banks and private entities. Subject to certain restrictions, covered bonds and securities issued by Swiss mortgage banks and institutions are also accepted. Although the SNB accepts a wide range of claims as collateral for credit in the Covid-19 refinancing facility, we classify this collateral pool as narrow because only claims denominated in Swiss francs are accepted.

3.13 United Kingdom - Bank of England (BoE)

The BoE's main policy rate is Bank Rate. The objective of the BoE's monetary policy operational framework is to stabilise short-term wholesale interest rates close to Bank Rate. The BoE uses a floor system to implement monetary policy, and explicitly refers to its operational framework as such. In addition to this scheme, which is designed to implement monetary policy, the BoE also offers a liquidity insurance scheme to support its financial stability objectives. These facilities are not included in this description.

3.13.1 Instruments

Standing facilities, available to all monetary policy counterparties

[53] The interest rate can either be fixed for the duration of the transaction or indexed to the SNB's policy rate.

The BoE pays interest on central bank reserves held in so-called reserve accounts. Central bank reserves held in these accounts earn the Bank Rate. In addition, the BoE offers an operational standing deposit facility that is priced 25 basis points below Bank Rate. This is mainly addressed to counterparties that do not have central bank reserve accounts. The BoE offers secured overnight lending through the operational standing lending facility at an interest rate of 25 basis points above Bank Rate.

Unlimited interest-free intraday credit is offered in the payment system against collateral.

Market operations, available to some monetary policy counterparties

The BoE offers a liquidity-providing open market operation for monetary policy purposes. It is offered in the form of short-term repos. Auctions are held weekly with no limit on the volume offered. The transactions have a maturity of one week and the interest rate corresponds to Bank Rate.

3.13.2 Counterparties

We classify the BoE's set of counterparties as wide because it includes banks, building societies, broker-dealers, central counterparties and international central securities depositories. However, access to the different monetary policy and stability instruments is differentiated between different types of counterparties.

All the institutions listed above, provided they fulfil a number of requirements such as being a member of the CHAPS central payment system, are eligible to use the BoE's standing facilities within the operational framework.

Access to market operations, i.e. short-term liquidity-providing repos, is reserved for banks, building societies and broker-dealers. Thus, only these three types of counterparties are authorised to use all instruments within the monetary policy operational framework.

On 22 June 2023 the BoE had 218 counterparties with access to central bank accounts and operational standing facilities, and 115 counterparties with access to market operations.

3.13.3 Collateral

The type of collateral required to borrow from the BoE differs between instruments. For the instruments that the BoE offers for monetary policy purposes and that we have outlined in this description, the BoE accepts, according to our classification, a narrow collateral pool.[54] These securities consist of high-quality securities that trade

[54] A wider collateral pool is accepted for the lending offered for financial stability reasons.

in very deep markets and are issued by governments.[55] These are called "Level A collateral".

3.14 United States – Federal Reserve System (Fed)

The Fed's main policy rate is a target range for the federal funds rate. The federal funds rate is the interest rate on transactions in which a limited group of market participants, known as depository institutions, trade federal funds (central bank reserves) with each other overnight, unsecured. The objective of the Fed's monetary policy operational framework is to stabilise the federal funds rate within the target range, which is currently 25 basis points wide. The Fed classifies its operational framework as a floor system, but often uses the term "ample reserves regime" to describe it. The interest rates on the different instruments of the operational framework are announced as separate decisions.

3.14.1 Instruments

Standing facilities, available to some monetary policy counterparties

The Fed pays interest on account balances at the central bank at the interest on reserve balances (IORB). This rate is currently set around the centre of the target range, 10 basis points below the upper limit of the range and 15 basis points above its lower limit. The IORB represents the first floor for short-term market interest rate.

Overnight lending is offered against eligible collateral through the primary credit facility of the discount window.[56] The primary credit rate is currently set at the top of the target range for the federal funds rate and provides a theoretical ceiling for interest rates in the federal funds market.

Market operations, available to some monetary policy counterparties

Every business day, the Fed offers liquidity-absorbing market operations in the form of repo transactions in the Overnight Reverse Repurchase Facility (ON RRP). In these operations, counterparties can exchange cash for high-quality collateral overnight. Market operations are offered in limited volume, with both individual and aggregate limits.[57] The interest rate of the facility, the ON RRP rate, is the maximum interest rate at which the Fed is willing to conduct operations, while the actual interest rate for counterparties is determined through an auction procedure. The ON RRP rate is

[55] The securities concerned are denominated in pounds, euros, US and Canadian dollars and issued by governments and central banks in the United Kingdom, Canada, France, Germany, the Netherlands and the United States.

[56] Three types of credit can be offered through the discount window: primary, secondary and seasonal credit. Only primary credit is freely available on the counterparty's own initiative. In addition, there are restrictions on the use of secondary and seasonal credit that do not apply to primary credit. Primary credit can have a maturity of up to 90 days.

[57] The transactions are conducted against US government bonds. The overall limit comes from the value of US government securities in the System Open Market Account (SOMA), the Fed's holdings of government securities. In addition, there are limits at the counterparty level which restrict the use of the operations.

currently 10 basis points lower than the IORB. The ON RRP rate represents the lower, more solid floor for short-term market rates.

In addition to the ON RRP, the Fed also offers daily liquidity-providing market operations through repo transactions. These open market operations have an overnight maturity and are offered under the Standing Repo Facility (SRF). These market operations are conducted as an auction procedure and the total volume offered is limited.[58] The facility rate, the SRF rate, is the minimum rate at which the Fed is willing to conduct operations, and the actual rate is set based on the bids received in the auction. The SRF rate currently corresponds to the upper limit of the target range.

3.14.2 Counterparties[59]

We characterise the Fed's set of counterparties for its monetary policy framework as wide according to our definition. Counterparties may belong to one or more of four possible counterparty categories:

- depository institutions
- primary dealers
- ON RRP counterparties
- SRF counterparts

Depository institutions are the only counterparty category that, provided they fulfil certain requirements, can hold interest-bearing accounts in the Federal Reserve System and can access the discount window. These operators can also apply to become and be recognised as counterparties of the SRF.

Primary dealers have access to both the ON RRP and SRF.[60] On 30 June 2023, the number of dealers was 24.

In addition to dealers, other federally or state authorised banks (or federally or state licensed branches or agents of foreign banks), for example, may apply to become SRF counterparties, provided they meet certain size and repo market participation requirements. There were 18 SRF counterparties on 30 June 2023. Potential ON RRP counterparties include, in addition to dealers, other federally or state-authorised banks or savings banks, government-sponsored enterprises and certain money market funds. On 30 June 2023, the Fed had around 140 ON RRP counterparties.

[58] The market operation is conducted through a so-called multi-price auction.

[59] The Federal Reserve System generally uses the term "counterparty" to refer to counterparties in its market operations; that is, counterparties with access only to interest-bearing accounts at the central bank or lending through the discount window are not included in the term. In line with how most of the central banks in our sample refer to their counterparties, we consider all market participants that can transact with the Fed as its monetary policy counterparties.

[60] To be a primary dealer, the operator must be either a federally or state authorised bank or savings bank (or federally or state licensed branch or agent of a foreign bank), or a broker-dealer. In addition, they must fulfil a number of requirements, including that they are expected to participate consistently, and on market terms, in open market operations and that they are expected to maintain a certain level of activity in most markets.

3.14.3 Collateral

The collateral the Fed accepts when lending varies by instrument. In the discount window, the Fed accepts a wide collateral pool, such as US Treasuries, agency bonds, foreign government-guaranteed securities in ten different currencies, corporate bonds, asset-backed securities and other secured debt and loan portfolios. In the SRF, the accepted collateral pool is narrower; only US government bonds, agency debt instruments and agency mortgage bonds are accepted. All these securities must be denominated in US dollars.

4 Differences and similarities between central banks' operational frameworks

Based on the review in the previous section, we can draw a number of conclusions about the differences and similarities between the different central banks' operational frameworks. This section describes them in terms of five different parameters, the operational objectives of the framework, the classification of the framework (corridor system, floor system or quota system) and the three components of the framework – instruments, counterparties and collateral.

4.1 Operational objective of the monetary policy framework

The operational objectives of the central bank's monetary policy operational frameworks can be said to be similar in the sense that all central banks intend to steer some form of money market rates. A handful of the central banks identify a specific interest rate that they intend to control, or that they consider most important, while others express themselves more generally, with the aim of stabilising short market rates overall.[61] The main features of each central bank's operational objectives are summarised in Table 1 below.

Notably, the European Central Bank and Česká národní banka are the only ones of the 14 central banks that do not have an officially stated operational objective for their operational frameworks. However, it is clear from their behaviour that they, like other central banks, intend to steer short money market rates with their operational frameworks. All the other central banks, with the exception of Denmark, have in common that the target level of the interest rates they intend to steer is clear, and the same as the main policy rate.[62] None of the central banks communicate an acceptance range for deviations from this target.

[61] Among the central banks that designate a specific interest rate, it also varies whether this rate is secured or unsecured.

[62] Note that the Federal Reserve communicates a target range while others have a point estimate, the level of the main policy rate.

Table 1. Key elements of the operational objectives of the monetary policy framework

Central bank	Maturity	Interest rate type	Between agents
RBA	O/N	Based on unsecured transactions	Specified
BoC	O/N	Based on secured transactions	Specified
CNB		*No officially stated operational objective*	
DN	Short	Money market	Unspecified
ECB		*No officially stated operational objective*	
MNB	Short	Market rates	Unspecified
SI	Short	Market rates	Specified
RBNZ	Short	Market rates	Unspecified
NB	Short	Market rates	Unspecified
NBP	O/N	Based on unsecured transactions	Specified
RB	Short	Market rates	Unspecified
SNB	O/N	Based on secured transactions	Specified
BoE	Short	Market rates	Unspecified
Fed	O/N	Based on unsecured transactions	Specified

Note: "Between agents" means whether the central bank's operational objectives specify between which types of agents the relevant interest rate is to be evaluated.

As a central bank, being clear about which market rate or rates it considers most important to control can contribute to a clearer and more predictable monetary policy. In addition, it can create better conditions for evaluating the monetary policy conducted, both by the central bank itself and by the public. At the same time, the designation of a specific interest rate by the central bank should not be given disproportionate importance. Since short money market rates are usually co-varying, the transmission of monetary policy should not be significantly affected either.

4.2 Main categories of operational frameworks

The review of central banks' operational frameworks shows that all three main categories of operational framework discussed in Section 2 - corridor system, floor system and quota system - are represented among the central banks we have studied. At the same time, it can be noted that only about half of the central banks explicitly characterise their frameworks as one of the three main types. Table 2 below shows the type of operational framework used by the central banks in our sample. Where the central bank itself does not categorise its operational framework, the categorisation that we find most appropriate to describe the main features of each operational framework is shown.

The fact that all categories of operational framework are represented, and that it is relatively common for central banks not to officially categorise their operational framework, reinforces the view that there is no one-size-fits-all solution for designing operational frameworks. The differences between central banks, and in particular the way they have designed instruments, counterparties and collateral rules, can often be attributed to differences in objectives, mandates or other local conditions. Differences in the type of operational framework applied are also influenced by other considerations which can often be of a more ideological nature. For example, several central banks with floor systems, including the Federal Reserve and the Bank of England, state that by creating a surplus of liquidity, they also want to make it easier for banks to fulfil their regulatory liquidity requirements in order to prevent financial stability problems.[63] At the same time, several of the central banks that apply corridor or quota systems, such as Sveriges Riksbank and Norges Bank, emphasise that they want to encourage banks to seek market solutions for their liquidity management.[64]

[63] See, for example, Bank of England (2018).

[64] See, for example, Norges Bank (2014) and Sveriges Riksbank (2022)

Table 2. Categorisation of operational frameworks

Central bank	Central bank's categorisation	Authors' categorisation
RBA	Floor	
BoC	Floor	
CNB		Corridor
DN	Corridor	
ECB		Floor
MNB		Corridor
SI	Corridor	
RBNZ	Floor	
NB	Quota	
NBP		Corridor
RB	Corridor	
SNB		Quota[1]
BoE	Floor	
Fed	Floor[2]	

Note: 1: The official term used by the SNB for its operational framework is reserve tiering and reserve absorption. 2: The Fed often uses the term "ample reserves regime" to describe its floor system. However, the official term is floor system.

4.3 Instruments

All the central banks in our sample offer some form of interest-bearing standing deposit facility where either all or some of the monetary policy counterparties can place an unlimited amount of liquidity overnight.[65] In cases where not all counterparties have access to the deposit facility, the distinction is usually made on the basis of which counterparties are subject to reserve requirements or are direct participants in the payment system, see Table 5. Those subject to reserve requirements, or direct participants, are the counterparties that usually have access to the deposit facility. In practice, this is often equivalent to counterparties that are credit institutions. The Reserve Bank of New Zealand and the Bank of England stand out in that they offer two standing deposit facilities aimed at two different categories of counterparties. This means that these two central banks allow more than one category of agent to invest in the central bank without restriction, but at different interest rates.

Central banks operating under corridor or quota systems typically apply an interest rate on their deposit facility equal to the main policy rate minus between 10 and 100

[65] However, some central banks do not designate their interest-bearing accounts with the central bank as a standing facility, see the introduction to Section 3.

basis points. Instead, central banks that apply a floor system often equate the interest rate on the deposit facility with the main policy rate or apply a smaller deduction of, for example, 10 basis points.

There are some central banks that offer additional liquidity-absorbing instruments that are labelled as facilities, but which, according to our definition, are considered regular market operations rather than standing facilities. In the vast majority of cases, this is due to the fact that these instruments are subject to constraints that do not allow counterparties to place an unlimited amount of liquidity at the end of the day, nor with predetermined conditions. An example of this is the Federal Reserve's Overnight Reverse Repo Facility, which has an upper limit on the volume each counterparty can place in the instrument on a daily basis. In addition, these transactions are also not executed at the end of the day.

With one exception, all central banks also offer some form of overnight lending facility. As with deposit facilities, there are those central banks that offer the lending facility to a limited number of their counterparties. Where this occurs, it is usually based on the same differentiation principle that applies to the deposit facility. In some cases, central banks offer lending through repo transactions, but in the vast majority of cases through a collateralised credit line. Also in the case of lending, central banks may refer to instruments as facilities, but we classify them as regular market operations. This is because they are subject to significant limitations. According to our classification, only two central banks offer more than one standing lending facility, Sveriges Riksbank and the Swiss National Bank. Furthermore, Danmarks Nationalbank stands out as the only central bank that does not provide a standing lending facility. Instead, it offers a weekly liquidity-providing market operation with full allotment.

Central banks applying corridor or quota systems typically set the interest rate on their lending facilities at the main policy rate plus between 10 and 100 basis points. Central banks with a floor system typically apply a 25 basis point supplement. Seðlabanki Íslands stands out in that it maintains an interest rate setting equal to the main policy rate after a supplement of 175 basis points. Table 3 below summarises information on central banks' standing deposit and lending facilities and for relevant central banks, the interest rate applied for quotas and reserve requirements.

Table 3. Standing facilities in the monetary policy framework

Central bank	Interest on reserve requirement or quota (form of requirement)	Standing deposit facilities number / interest rate (maturity if other than O/N)	Outstanding lending facilities number / interest rate (maturity if other than O/N)
RBA	Main policy rate minus 10 basis points (reserve requirement)	**1** / Main policy rate minus 10 basis points	**1** / Main policy rate plus 25 basis points
BoC	n/a	**1** / Main policy rate	**1** / Main policy rate plus 25 basis points
CNB	Main policy rate[1] (reserve requirement)	**1** / Main policy rate minus 100 basis points	**1** / Main policy rate plus 100 basis points
DN	n/a	**1** / Main policy rate	
ECB	Deposit facility rate[2] (reserve requirement)	**1** / Deposit facility rate	**1** / Marginal lending facility rate (currently 75 basis points above the deposit facility rate).
MNB	Main policy rate (reserve requirement)	**1** / Main policy rate minus 100 basis points	**1** / Main policy rate plus 100 basis points
SI	Interest-free (reserve requirement)[3]	**1** / Main policy rate minus 25 basis points	**1** / Main policy rate plus 175 basis points
RBNZ	n/a	**2**[4] / Main policy rate / Main policy rate minus 10 basis points (O/N, T/N, T/W)	**1 /** Main policy rate plus 25 basis points
NB	Main policy rate (quota)	**1** / Main policy rate minus 100 basis points	**1 /** Main policy rate plus 100 basis points
NBP	Main policy rate (reserve requirement)	**1** / Main policy rate minus 50 basis points	**1** / Main policy rate plus 50 basis points
RB	n/a	**1** / Main policy rate minus 10 basis points	**2**[5] / Main policy rate plus 10 basis points / Main policy rate plus 75 basis points
SNB	Main policy rate (quota and reserve requirements)[6]	**1** / (currently) Main policy rate minus 50 basis points	**2**[7] / (currently) Main policy rate plus 50 basis points / Main policy rate (without maturity)
BoE	n/a	**2**[8] / Main policy rate / Main policy rate minus 25 basis points	**1** / Main policy rate plus 25 basis points
Fed	n/a	**1** / Interest rate on central bank reserves (currently 10 basis points below the ceiling and 15 basis points above the floor of the target range).	**1** / Primary credit rate (currently at the ceiling of the main target range).

Note: 1: From 5 October 2023, the interest rate on reserve holdings is 0 per cent. 2: From 20 September 2023, the interest rate on reserve holdings is 0 per cent. 3: The reserve requirements have no monetary policy purpose. 4 & 8: The deposit facilities are offered to two different categories of agent. 5 & 7: The lending facilities have different collateral requirements. 6: From 1 December 2023, the interest rate on reserve holdings is 0 per cent.

There is much more variation across the central banks in regular market operations than in standing facilities. For market operations, on the other hand, there is a clearer link between the market operations offered by the central banks and the main type of operational framework they apply.

Central banks with an ambition to either balance the liquidity position of the banking system or to limit excess liquidity, which is common in corridor and quota systems, usually offer short-term securities issues, fixed deposits or longer liquidity-absorbing repos. If the liquidity position is in reasonable structural balance, and the central bank's work is therefore more concerned with parrying temporary fluctuations in the liquidity position, central banks tend to offer both liquidity-providing and liquidity-absorbing market operations. In contrast, central banks that have large liquidity surpluses, but also apply corridor or quota systems, tend to conduct only liquidity-absorbing market operations. The greater the fluctuations in the liquidity position, the greater the need to conduct regular market operations in both directions.

Countries with floor systems or de facto floor systems typically offer liquidity-providing market operations with generous conditions to ensure that the banking system has excess liquidity.[66] Such operations usually take the form of liquidity-providing repos. Central banks that apply floor systems usually also use asset purchases to ensure ample liquidity supply. However, these market operations are not addressed in this article, in line with the delimitation set out in the introduction to Section 3. A number of central banks applying floor systems also offer a liquidity-absorbing market operation. These operations typically extend to a wider group of agents than those with access to the central bank's standing deposit facility and aim to establish a secondary floor for short market rates. This is because central banks want to avoid what is known as a "leaky floor", namely the stabilisation of money market rates for a wider group of agents below the standing deposit facility rate.

Table 4 below summarises information on the various market operations regularly used by central banks. From the summary, it can be concluded that market operations are usually offered daily or once a week. Furthermore, their maturity tends to vary between one day and one month. It is common for central banks to offer market operations at the main policy rate. In cases where the interest rate does not correspond to the policy rate, it usually constitutes the ceiling for the interest rate in liquidity-absorbing market operations and the floor for the interest rate in liquidity-providing market operations.

[66] By de facto floor systems, we mean frameworks that exhibit clear features of floor systems without the central banks themselves using the term for their respective operational frameworks, see Section 4.2.

Table 4. Frequently used market operations in the monetary policy framework

Central bank	Liquidity-absorbing Number (frequency) type of operations	(Maturity) Interest rate	Liquidity-providing Number (frequency) type of operations	(Maturity) Interest rate
RBA			**2** (weekly) repo transactions (daily) repo transactions	(28 days) The interest rate is set by auction. The lower bound corresponds to the interest rate for OISs with the same maturity plus a supplement, currently equivalent to 5 basis points. (without maturity limit) The main policy rate after a supplement of 10 basis points.
BoC	**1** (daily) repo transactions	(O/N) The interest rate corresponds to the main policy rate.	**2**[1] (daily) repo transactions	(O/N) The interest rate is set by auction. The lower bound corresponds to the main policy rate. (O/N) The interest rate corresponds to the main policy rate.
CNB	**1** (three times per week) repo transactions	(14 days) The interest rate is set by auction. The upper bound corresponds to the main policy rate	**1** (weekly) repo transactions	(14 days) For banks, the rate is equal to the main policy rate plus 10 basis points. For other counterparties, the interest rate corresponds to the policy rate plus 20 basis points.
DN	**1** (weekly) central bank bills issue	(7 days) The interest rate corresponds to the main policy rate.	**1** (weekly) fixed-rate lending	(7 days) The interest rate corresponds to the main policy rate plus 15 basis points.
ECB			**2** (weekly) repo transactions (monthly) repo transactions	(7 days) Main refinancing rate. Corresponds (currently) to a level 50 basis points above the deposit facility rate. (3 months) The interest rate corresponds to the average main refinancing rate (see above).
MNB	**3** (weekly) issuance of central bank bills (monthly) term deposits (daily) FX swaps (EUR/HUF)	(7 days) The interest rate corresponds to the main policy rate. (1 month)[2] The interest rate corresponds to the main policy rate plus a supplement of currently 0 basis points. (T/N) The MNB sets an upper bound for accepted bids.		
SI	**1** (weekly) term deposits	(7 days) The interest rate corresponds to the main policy rate.		

Note: 1: We have classified the BoC standing liquidity-providing overnight repo facility as a regular market operation instead of a standing facility because it is subject to counterparty limits. 2: The MNB reserves the right to offer term deposits with a maturity of up to 6 months. However, it is usually offered with a one-month maturity.

Central bank	**Liquidity-absorbing** Number (frequency) type of operations	(Maturity) Interest rate	**Liquidity-providing** Number (frequency) type of operations	(Maturity) Interest rate
RBNZ	**2** (twice a week)[3] issuance of central bank bills (daily/ as necessary) FX swaps	(7 and 28 days) The interest rate is determined by auction. The upper bound is given by the main policy rate, or market pricing, at longer maturities. (1 day - 6 months) The interest rate is at most equal to the main policy rate.	**1** (daily/as necessary) FX swaps	(1 day - 6 months) The interest rate is at least equal to the main policy rate.
NB	**1** (as necessary) term deposits	(1 day - not specified)[4] The interest rate is set by auction. The upper bound corresponds to the main policy rate.	**1** (as necessary) fixed-rate lending	(1 day - not specified)[5] The interest rate is set by auction. The lower bound corresponds to the level of the main policy rate.
NBP	**2** (weekly) issue of NBP bills. (as necessary) repo transactions	(7 days) Interest rate corresponds to the main policy rate (1-3 days)[6] Interest rate corresponds to the main policy rate.		
RB	**1** (weekly) issuance of central bank bills (Riksbank certificates)	(7 days) Interest rate corresponds to the main policy rate.		
SNB	**2** (weekly) issuance of central bank bills (SNB bills) (daily) repo transactions	(28-336 days) Interest rate set via auction procedure (7 days)[7] Interest rate corresponds (currently) to the main policy rate after a deduction of 5 basis points.		
BoE			**1** (weekly) repo transactions	(7 days) Interest rate corresponds to the main policy rate.
Fed	**1** (daily) repo transactions	(O/N) The interest rate is set by auction. The upper bound (ON RRP rate) corresponds (currently) to a level 20 basis points below the floor of the main target range.	**1** (daily) repo transactions	(O/N) The interest rate is set by auction. The lower bound (SRF rate) corresponds (currently) to the level of the ceiling of the main target range.

Note: 3: The RBNZ offers to issue central bank bills twice a week, on each occasion offering maturities of 7 and 28 days. 4 & 5: Norges Bank does not specify an upper bound on the maturities at which it may offer F-deposits and F-loans. 6: Repo transactions typically have a maturity of between 1 and 3 days but may have a longer maturity. 7: Under the terms and conditions, the maturity of repo transactions can vary from one day to several months. However, since September 2022, the offered maturity has always been equal to one week.

4.4 Counterparties

Just as there are significant differences between the instruments applied by central banks, there are also significant differences between central banks' counterparties. In addition, the extent to which central banks publish information on which institutions are their counterparties varies. Some central banks do not even publish information on how many counterparties they have, while other central banks make available lists of exactly which counterparties they have.

In this article, we define the set of counterparties as narrow when only credit institutions, such as banks, mortgage lenders and the like, can become counterparties. In half of the countries, such a narrow set of counterparties is applied to all instruments. In other countries, the set of counterparties extends beyond credit institutions. These additional agents include, for example, central counterparties, insurance companies and money market funds.

It can be seen that all central banks with a wide set of counterparties apply differentiated access to the instruments in their operational frameworks. Some categories of counterparties, typically non-credit institutions, may only have access to certain specific instruments, while others have access to all instruments, or some instruments are only open to certain types of counterparties. A distinction is usually made between those counterparties that are subject to reserve requirements or are direct participants in the payment system, and those that are not subject to these requirements or are direct participants. Different categories of counterparties may also have access to the instruments under different conditions, e.g. in terms of interest rates or eligible collateral.

It can also be noted that in recent years several central banks have revised their set of counterparties in a way that extends it beyond credit institutions.[67] Table 5 below summarises information on central bank counterparties in the monetary policy operational framework.

[67] An example of this is Česká národní banka, which from May 2020 extended access to certain market operations to non-credit institutions. The Federal Reserve also noticeably expanded its set of counterparties with the introduction of the ON RRP facility in 2015 after tests started in 2013.

Table 5. Set of counterparties in the monetary policy framework

Central bank	Narrow/ Wide set of counterparties	Differentiated access to instruments	
RBA	Wide	Yes	Only direct participants in the payment system (RITS) have access to standing facilities.
BoC	Wide	Yes	Only direct participants in the payment system (Lynx) have access to standing facilities. Only primary dealers have access to market operations.
CNB	Wide	Yes	Only counterparties subject to reserve requirements have access to standing facilities and liquidity-absorbing market operations. These counterparties also face more favourable conditions (interest rate and collateral pool) than other participants in liquidity-providing market operations.
DN	Narrow	No	
ECB	Narrow	No	
MNB	Narrow	No	
SI	Narrow	No	
RBNZ	Wide	Yes	Direct participants in the payment system (ESAS) face more favourable conditions (interest rate) for deposits O/N.
NB	Narrow	No	
NBP	Narrow	No	
RB	Narrow	No	
SNB	Wide	Yes	Counterparties subject to reserve requirements face more favourable conditions (interest rate) for deposits O/N.
BoE	Wide	Yes	Only banks, mortgage institutions and broker-dealers have access to market operations.
Fed	Wide	Yes	Depository institutions face more favourable conditions for deposits and lending O/N. Dealers in US government securities (unless they are also depository institutions), government-sponsored enterprises and money market funds do not have access to account deposits or discount window lending, but only to (all or some) market operations.

Note: Operators typically have to fulfil a variety of requirements to access a central bank's instruments under the operational framework. It therefore usually differs more between agents than what is specified in the fourth column of the table. The table is not intended to present these requirements in detail but to provide an overview of the main features of the design of central banks' counterparty groups.

4.5 Collateral

With regard to the third element of the operational framework, the accepted collateral, there are also significant differences, but also similarities, between the central banks we studied. All central banks require collateral from their counterparties when lending. It is also common for central banks to apply the same collateral requirements for lending in standing facilities as for lending in market operations. Where the requirements differ, the requirements for market operations are in all cases more stringent.

However, whether central banks accept a narrow or a wide collateral pool according to our definition differs. In about half of the cases, a narrow collateral pool is required. It is usually the requirement that the collateral be denominated in the domestic currency that makes us classify it as narrow. However, some central banks only provide credit against government bonds or equivalent debt instruments, which also leads us to classify the collateral pool as narrow. However, only the Bank of England and Sveriges Riksbank require the collateral to consist of government bonds, without also requiring them to be denominated in their own currency. Furthermore, Sveriges Riksbank is unique in having two facilities that require different collateral for the same set of counterparties and with the difference in interest rate being the only other difference in terms and conditions.[68] Table 6 below summarises information on the collateral required by central banks for lending in standing facilities and market operations.

[68] However, it is very common for central banks to apply different haircuts to different types of collateral. These are usually based, for example, on creditworthiness or market liquidity. The Swiss National Bank's lending facilities are distinguished by the form of lending, with lending through the liquidity shortage financing facility being provided via repos.

Table 6. Collateral requirements for lending in the monetary policy framework

Central bank	Standing facilities	Liquidity-providing open market operations
RBA	Narrow collateral pool, only own currency	Narrow collateral pool, only own currency
BoC	Wide collateral pool	Narrow collateral pool, only own currency and government bonds
CNB	Narrow collateral pool, only own currency	Narrow collateral pool, only own currency
DN	n/a	Wide collateral pool
ECB	Wide collateral pool	Wide collateral pool
MNB	Wide collateral pool	Wide collateral pool
RBNZ	Narrow collateral pool, only own currency	Narrow collateral pool, only own currency
NB	Wide collateral pool	Wide collateral pool
NBP	Wide collateral pool	Wide collateral pool
SI	Narrow cover pool, only own currency	Narrow collateral pool, only own currency
RB	Varies by facility: • Narrow collateral pool for standing lending facility, only government bonds • Wide collateral pool for supplementary liquidity facility	Narrow collateral pool, only government bonds
SNB	Varies by facility: • Wide collateral pool for liquidity shortage facility • Narrow collateral pool for Covid-19 refinancing facility, only own currency	Wide collateral pool
BoE	Narrow collateral pool, government bonds only	Narrow collateral pool, only government bonds
Fed	Wide collateral pool	Narrow collateral pool, only own currency

Note: In the above table, we have included collateral rules for liquidity-providing market operations even in cases where the central banks in question do not currently conduct such operations on a regular basis.

5 Concluding remarks

In this article, we have described the design of fourteen central banks' operational frameworks at mid-year 2023 and highlighted key similarities and differences between them. We have limited the description to those instruments that are regularly used, thus excluding the many instruments that a central bank usually reserves the right to use. In this way, we have described and contrasted the operational frameworks on the basis of how central banks choose to apply them in *practice* and not on the basis of the many *possible* ways in which they can be applied. We hope that this article will contribute to a better understanding of how different central banks implement monetary policy in practice through their respective

operational frameworks, and how central banks differ in this area. We also hope that our summary can be used as a starting point for further studies or to get a quick overview of the design of central bank operational frameworks.

At the same time, it is important to remember that operational frameworks are changeable. This article summarises the state of central bank operational frameworks as of 30 June 2023.[69] As conditions change, central banks adjust how they implement their monetary policy in order to achieve good target attainment. For example, recent years have seen significant developments in central bank operational frameworks. For example, in the wake of expansionary monetary policy measures and large liquidity surpluses, a number of central banks have switched from applying corridor systems to applying explicit or de facto floor systems.[70] At the same time, other central banks, including the Riksbank, have chosen to maintain but reform their corridor or quota systems.[71]

The coming years may be just as full of change. For example, several central banks are currently analysing what the new normal will look like in terms of their respective operational frameworks, and the European Central Bank is conducting a review of its operational framework in 2023.[72]

If the period from the 2008 financial crisis to the beginning of 2022 was characterised by a low interest rate environment and quantitative easing, 2022 and 2023 has been characterised by rising interest rates and quantitative tightening. It's a turnaround that has, among other things, highlighted the financial risks to which a central bank with a large balance sheet is exposed.[73] Several central banks have for example incurred significant financial losses in 2022 which may require them to be recapitalised.[74] The turnaround in monetary policy has also highlighted the inherent balancing act for central banks with floor systems when they want to tighten monetary policy, namely how central banks should balance the need to provide liquidity, which is necessary for the functioning of the operational framework, against the need to conduct a contractionary monetary policy. In view of the experience of financial losses in recent years, the ongoing tightening of monetary policy and the normalisation of balance sheets in many countries, it is not unreasonable to assume that the years ahead may see a renaissance of corridor and quota systems. Borio

[69] Due to the fact that the Hungarian central bank, Magyar Nemzeti Bank, implemented a number of major reforms to its operational framework in September 2023, its operational framework is described on the basis of its status on 1 October 2023.

[70] By de facto floor systems, we mean frameworks that exhibit clear features of floor systems without the central banks themselves using the term for their respective operational frameworks, see Section 4.2. The Federal Reserve, the Bank of Canada and the Bank of England have officially switched to floor systems in recent years and have declared their intention to continue doing so until further notice. In the period from autumn 2019 to autumn 2022, the European Central Bank's operational framework had clear features of a quota system, although we estimate that it mainly resembles a floor system in the summer of 2023.

[71] See Hansson and Wallin Johansson (2023).

[72] See de Guindos and Lagarde (2022).

[73] See, for example, Caruana (2011) and Borio (2023) for a discussion of the risks to which a central bank is exposed.

[74] See Bell et al (2023) for a discussion of the dynamics of why a central bank makes financial losses and the implications of this.

(2023), for example, argues that central banks should consider reintroducing such policies because of the risk of underestimating the costs of floor systems.[75]

[75] Borio (2023) uses the concept of scarce reserves systems for corridor and quota systems and abundant reserves systems for floor systems.

References

Altavilla, Carlo, Miguel Boucinha, Lorenzo Burlon, Mariassunta Giannetti and Julian Schumacher (2022), "Money markets and bank lending: Evidence from the adoption of tiering", Working Paper no. 2649, European Central Bank.

Acharya, Viral V, Rahul S Chauhan, Raghuram Rajan and Sascha Steffen (2022), "Liquidity Dependence: why shrinking central bank balance sheets is an uphill task", Working Paper no. 31050, NBER.

Bank of England (2018), "The Bank of England's future balance sheet and framework for controlling interest rates", *Discussion Paper*, 2 August 2018.

Bindseil, Ulrich and Juliusz Jablecki (2011), "The optimal width of the central bank standing facilities corridor and banks' day-to-day liquidity management", Working Paper no. 1350, European Central Bank.

Borio, Claudio (2023), "Getting up from the floor", Working Paper no. 1100, BIS.

Bell, Sarah, Michael Chui, Tamara Gomes, Paul Moser-Boehm and Albert Pierres Tejada (2023), "Why are central banks reporting losses? Does it matter?", Bank for International Settlements Bulletin, No 68.

Caruana, Jamie (2011), "Why central bank balance sheets matter", speech at the conference "Central bank balance sheets in Asia and the Pacific: the policy challenges ahead", Bank of Thailand - Bank for International Settlements, 12 December 2011.

Corsi, Marco and Yvo Mudde (2022), "The use of the Eurosystem's monetary policy instruments and its monetary policy implementation framework in 2020 and 2021", Occasional Paper no. 304, European Central Bank.

De Guindos, Luis and Christine Lagarde (2022), Press conference on monetary policy decisions, European Central Bank, 15 December.

Norges Bank (2014) "Bank's assessment of Norges Bank's liquidity management system", Working Paper no. 4, Norges Bank.

Schnabel, Isabel (2023), "Back to normal? Balance sheet size and interest rate control", speech at event, Columbia University and SGH Macro Advisors, 27 March.

Sveriges Riksbank (2022a), "Amendments to the Riksbank's operational framework for the implementation of monetary policy - Step 2", Executive Board decision 22 March 2022.

Hansson, Denise and Ingrid Wallin Johansson (2023), "The Riksbank's monetary policy framework after the 2019-2022 reform", *Sveriges Riksbank Economic Review*, no. 2, pp. 30-61.

Sellin, Peter and Per Åsberg Sommar (2014), “The Riksbank’s operational framework for the implementation of monetary policy – a review”, Riksbank Studies, Sveriges Riksbank.

Swiss National Bank (2023) 115th Annual Report: Annual Report 2022.

SVERIGES RIKSBANK
Telephone +46 8 787 00 00
registratorn@riksbank.se
www.riksbank.se

PRODUCTION SVERIGES RIKSBANK
ISSN 2001-029X